AMETEK®
PROGRAMMABLE POWER

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Sorensen

Mi-BEAM Series

Operation Manual

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AMETEK Programmable Power, Inc., a unit of AMETEK Electronic Instruments Group (a division of AMETEK, Inc.), is a global leader in the design and manufacture of precision, programmable power supplies for R&D, test and measurement, process control, power bus simulation and power conditioning applications across diverse industrial segments. Offering bench-top supplies to rack-mounted industrial power subsystems, AMETEK Programmable Power is the proud manufacturer of Elgar, Sorensen, California Instruments, and Amrel brand power supplies and electronic loads.

AMETEK, Inc. is a leading global manufacturer of electronic instruments and electromechanical devices with annualized sales of $6.9 billion. The company has over 21,000 colleagues working at more than 150 manufacturing facilities and nearly 150 sales and service centers in the United States and 30 other countries around the world.

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Product Family: Mi-BEAM Series Power Supply
Warranty Period: 5 Years

Warranty Terms

AMETEK provides the following warranty for the product listed above ("Product"): If a defect in materials or workmanship is discovered and reported in writing within the applicable warranty period, AMETEK, at its discretion, will:

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2. Issue a credit note for the defective Product, or
3. Provide replacement parts for the defective Product.

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4. The Product is damaged due to misuse, accident, negligence, or failure to maintain it as required by AMETEK's specifications.
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8. The Product is used with items, articles, or materials not authorized by AMETEK.

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- Request a Return Material Authorization (RMA) number from the repair facility (**must originate in the country in which it where it was purchased**):
- **In the USA**, contact the AMETEK Customer Service Department prior to the return of the product to AMETEK for repair:
- Telephone: 800-733-5427, ext. 2295 or ext. 2463 (toll free North America) 858-450-0085, ext. 2295 or ext. 2463 (direct).
- **Outside the United States**, contact the nearest Authorized Service Center (ASC). A full listing can be found either through your local distributor, or on our website, www.programmablepower.com, by tapping the Support button or going to the Service Centers tab.
- When requesting an RMA, have the following information ready:
  Model number
  Serial number
  Description of the problem

NOTE: Unauthorized returns will not be accepted and will be returned at the shipper's expense.

NOTE: A returned product found upon inspection by AMETEK to be in the specification is subject to an evaluation fee and applicable freight charges.

IMPORTANT SAFETY INSTRUCTIONS

Before applying power to the system, verify that your product is configured properly for your application.

WARNING!



Hazardous voltages might be present when covers are removed. Qualified personnel must use extreme caution when servicing this equipment. Circuitry, test points, and output voltages might be floating with respect to chassis ground. Do not touch electrical circuits and use appropriately rated test equipment. A safety ground wire must be connected from the chassis to the Alternating current (AC) mains input when servicing this equipment.

CAUTION!



This equipment contains Electrostatic discharge (ESD) sensitive input or output connection ports. When installing equipment, follow ESD safety procedures. ESD might cause damage to the equipment.

Only qualified personnel, who deal with attendant hazards in power supplies, are allowed to perform installation and servicing.

Ensure that the AC input power line ground is connected properly to the unit safety ground chassis. Similarly, other AC power ground lines, including those for application and maintenance equipment, must be grounded properly for both personnel safety and equipment protection.

Always ensure that facility AC input power is de-energized prior to connecting or disconnecting any cable.

In normal operation, the operator does not have access to hazardous voltages within the chassis. However, depending on the user's application configuration, HIGH VOLTAGES HAZARDOUS TO HUMAN SAFETY may be normally generated on the output terminals. The customer/user must ensure that the output power lines are labeled properly as to the safety hazards and that any inadvertent contact with hazardous voltages is prevented.

Guard against risks of electrical shock during open cover checks by not touching any portion of the electrical circuits. Even when power is off, capacitors may retain an electrical charge. Use safety glasses and protective clothing during open cover checks to avoid personal injury by any sudden component failure.

AMETEK Programmable Power Inc., San Diego, California, USA, or any of the subsidiary sales organizations, cannot accept any responsibility for personnel, material or inconsequential injury, loss or damage that results from improper use of the equipment and accessories.

SAFETY SYMBOLS



WARNING: Electrical Shock Hazard.



HAZARD: Strong oxidizer



CAUTION: Read the accompanying message for specific information.



BURN HAZARD: Hot Surface Warning. Allow to cool before servicing.



DO NOT TOUCH: Touching some parts of the instrument without protection or proper tools could result in damage to the part(s) and/or the instrument.



TECHNICIAN SYMBOL: All operations marked with this symbol are to be performed by qualified maintenance personnel only.



ELECTRICAL GROUND: This symbol in the instrument marks the central safety grounding point for the instrument.



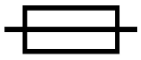
STANDBY (SUPPLY): Equipment is in standby mode and still has an active power supply. Disconnect before servicing.



OFF (SUPPLY): Power supply is OFF.



ON (SUPPLY): Power supply is ON.



FUSE: Risk of electrical shock or hazard. Disconnect power and use only the specified fuse type and rating.



ALTERNATING CURRENT (AC): AC is present. Avoid contact with live parts to prevent electric shock. Disconnect power before servicing.



DIRECT CURRENT (DC): DC is present. Avoid contact with live parts to prevent electric shock. Disconnect power before servicing.

FCC NOTICE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the Federal Communications Commission (FCC) Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

ABOUT THIS MANUAL AND REGULATORY COMPLIANCE

This manual has been written for the Modular Intelligent-Bidirectional Energy Amplified (Mi-BEAM) Series of power supplies, which have been designed and certified to meet the Low Voltage Directive, Electromagnetic Compatibility, and Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directives per the requirements of the European Community.

These models have been designed and tested to meet the Electromagnetic Compatibility Directive 2014/30/EU, and the Low Voltage Directive 2014/35/EU. In addition, these models have been found to be compliant with FCC 47 CFR Part 15, Subpart B, 107(b) Class A, 109(g) Class A.

Since the Low Voltage Directive is to ensure the safety of the equipment operator, universal graphic symbols have been used both on the unit itself and in this manual to warn the operator of potentially hazardous situations. Refer to the Important Safety Instructions.

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1 INTRODUCTION

This operational manual describes the installation, operation, calibration, and service of the Mi-BEAM Series power supply models with true extended autoranging output. Representing the latest generation, these models deliver precise output with high accuracy, low disturbance, and fast transient response. With extensive programmability and a user-friendly interface, the power supply offers a rich feature set and functionality, including source and sink capabilities allowing bidirectional power transfer, a simplified color touch screen, remote operation through virtual panels, the fastest and cleanest power available, and built-in islanding detection.



Figure 1-1. Mi-BEAM Series

1.1 GENERAL DESCRIPTION

The Mi-BEAM Series power supply is a one-step solution for testing and validation of various green energy applications such as batteries, battery chargers, motor drives, electric vehicle drives, and solar photovoltaic inverters. These power supplies provide both source and sink characteristics, allowing bidirectional power transfer.

The Mi-BEAM Series power supply is a high-density supply of 37.5 kilowatts (kW) in a 4U full-rack size. There are three power variants available, 12.5 kW, 25 kW, and 37.5 kW. These products are offered with an extended wide range of voltage and current models. The extended wide range channels provide an expanded current and voltage range at the full output power level, enabling the ability to satisfy a wider range of test needs without requiring the purchase of additional models.

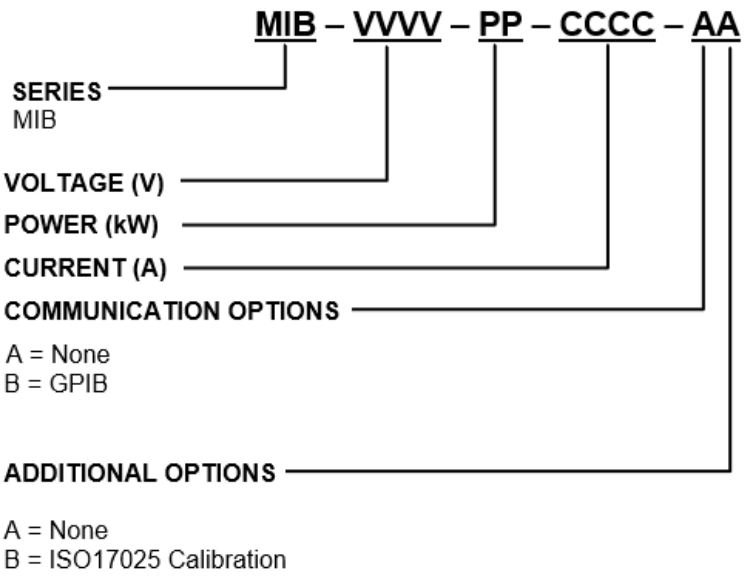
The Mi-BEAM Series is Digital Signal Processor (DSP) controlled and can be operated from the user-friendly front panel touchscreen or through Ethernet LAN Extensions for Instrumentation (LXI), Universal Serial Bus (USB), RS-232, CAN standard control interfaces, as well as through the optional General-Purpose Interface Bus (GPIB) control interfaces.

The Mi-BEAM Series power supply can be operated using a computer application called ‘Virtual Panels’. Virtual Panels allows the user to remotely control the Mi-BEAM Series, log data, and monitor the instrument. User can perform all operations using Virtual Panels control just as they would directly with the unit’s front panel.

This source comes with Isolated Analog Programming Inputs and Monitor Outputs for output voltage and current. Output is provided with external user I/O for Remote Inhibit, Remote ON/OFF, Status, and Trigger functions.

Additionally, the instrument provides control interface for both parallel and series operation. This feature enables the user to connect and control up to a maximum of 32 power supply units, achieving power levels up to 1200 kW in parallel operation, and connect and control up to maximum of 2 power supply units, achieving voltage levels up to 4000V in series operation. Refer to Figure 1-2 for decoding of the Mi-Beam Series model number.

Voltage	Power	Current
400V	12kW	80A
400V	25kW	160A
400V	37kW	240A
600V	12kW	50A
600V	25kW	100A
600V	37kW	150A
800V	12kW	40A
800V	25kW	80A
800V	37kW	120A
1200V	25kW	80A
1200V	37kW	80A
1500V	25kW	50A
1500V	37kW	50A
2000V	25kW	50A
2000V	37kW	50A



Model Number Example:

MIB-2000-37-0050-AA = Mi-BEAM, 2000V output, 37.5kW, 50A Output, No Options
MIB-0600-12-0050-AA = Mi-BEAM, 600V output, 12.5kW, 50A Output, No Options
MIB-0600-25-0100-AA = Mi-BEAM, 600V output, 25kW, 100A Output, No Options

Figure 1-2. Model Number Decoding

1.2 KEY BENEFITS

1.2.1 SIMPLE OPERATION

The Mi-Beam Series can be operated entirely from its menu-driven front panel touchscreen. The full-color touch display shows menus, setup data, control and monitor the Output Programming Parameters, Supervisory and Set Point limits, Measurements, and System Settings. Additionally, a variety of standard communication interfaces are available including; LAN, USB, RS-232C, CAN and Optional GPIB IEEE-488 interface. This allows the instrument to be easily integrated into an automated test system, providing the fastest and cleanest power up to 2000V, with bidirectional output current capabilities ranging from ±4,800 A to 1.2 MW in a parallel system, and voltage levels up to 4000V with series system.

1.2.2 CONFIGURATIONS

The Mi-Beam Series offers the output voltage models of 400V, 600V, 800V, 1200V, 1500V, and 2000VDC, all within a 4U rack height chassis. The system features full DC source and sink capabilities with power levels ranging from 12.5 kW to 37.5 kW. The Mi-Beam Series is fully scalable up to 1.2 MW with parallel systems, and it achieves a regenerative efficiency of 95%

and voltage levels up to 4000V with series system. This capability expands the user's test coverage and makes it more versatile power supply.

1.2.3 REMOTE CONTROL

Standard RS-232C, USB, LAN and CAN along with optional IEEE-488 remote control interfaces, allow programming of all instrument functions from an external computer. The popular Standard Commands for Programmable Instruments (SCPI) command protocol is used for programming.

1.3 TESTING APPLICATIONS

1.3.1 BATTERY SIMULATION

In an era where energy storage technologies are rapidly advancing, the Mi-Beam series offers a robust battery simulation solution that replicates the electrical characteristics of various batteries. This flexibility allows engineers to dynamically adjust the battery parameters, streamlining the development and testing of Battery Management Systems (BMS) for Electric Vehicles (EVs) and renewable energy applications.

1.3.2 BATTERY TESTING

To ensure the reliability and longevity of energy storage systems, battery testing is essential. The Mi-Beam series excels in simulating charge and discharge cycles, delivering detailed insights into battery performance and efficiency. With its programmable features, users can perform wide variety of charging and discharging profiles, enabling comprehensive evaluations of battery health and lifecycle across diverse operating conditions.

1.3.3 SOLAR INVERTER TESTING

With the increasing focus on renewable energy, thorough testing of solar inverters is essential for maximizing system performance. The Mi-BEAM series is designed to emulate different PV panel and array characteristics. This PV array simulator replicates MPPT and various real-world PV array conditions, including EN50530 and Sandia SAS models, to ensure comprehensive inverter testing.

2 SPECIFICATIONS

This chapter provides the electrical, environmental, and physical specifications for the Mi-BEAM Series power supplies.

Unless otherwise noted, the specifications are valid under the following conditions:

a) Ambient temperature of 25 ± 5°C; after a 30-minute warm-up; fixed AC input line and load.

b) DC output into a resistive load.

c) Specifications values are valid from 10% of the full-scale value.

d) Stability is over an 8-hour period after a 30-minute warm up.

e) If remote sense is used, then the output voltage accuracy, regulation and stability specifications are valid at the point where the remote sense leads are connected.

2.1 OPERATING MODES

The Mi-BEAM Series power supply supports the following modes of operations. Refer to the Chapter 5 for further details regarding the operational modes.

a) Bidirectional Mode:

The Mi-BEAM Series power supply supports two quadrant operation i.e. the power supply can act as source or sink. The current from the Mi-BEAM power supply to the Unit under test (UUT) is considered as positive and the current from UUT to the Mi-BEAM power supply is considered as negative.

Bi-directional (bi-DIR) mode supports voltage and current programming types, and they are described below,

• **Voltage:** In this programming type Mi-BEAM power supply regulates voltage. Various regulation settings are available in the voltage programming type (CV/CC, CV- Ser. Res, CV/CP and CV), and foldback operation will be performed based on the selected regulation settings. Refer to Section 8.1.

• **Current:** In this programming type Mi-BEAM power supply regulates current. Various regulation settings are available in the current programming type (CC/CV, CC/CP, CP/CC and CC), and foldback operation will be performed based on the selected regulation settings. Refer to Section 8.1.

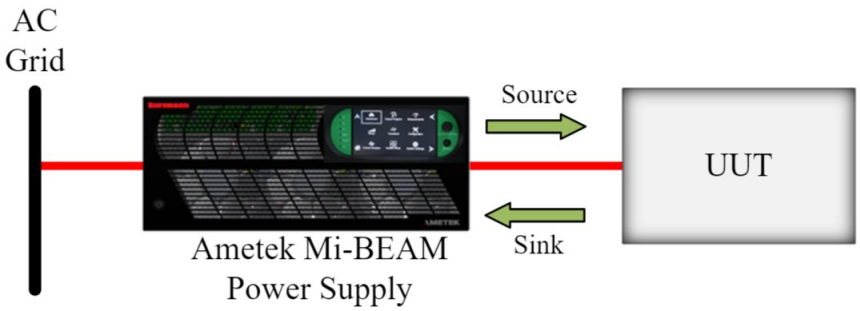


Figure 2-1. Bi-directional mode of operation

b) Source mode:

This mode provides single quadrant operation, i.e. the power is supplied to the UUT from Mi-Beam Power supply. The direction of the current is always positive (only positive limits for current and power will be applicable) and power transfer is always from the Mi-BEAM Series power supply to the UUT.

Source mode supports voltage and current programming types, and they are described below,

- **Voltage:** In this programming type Mi-BEAM power supply regulates voltage. Various regulation settings are available in the voltage programming type (CV/CC, CV/CP, CP/CV, CV-Ser. Res and CV), and foldback operation will be performed based on the selected regulation settings. Refer to Section 8.2.

- **Current:** In this programming type Mi-BEAM power supply regulates. Various regulation settings are available in the current programming type (CC/CV, CC/CP, CP/CC and CC), and foldback operation will be performed based on the selected regulation settings. Refer to Section 8.2.

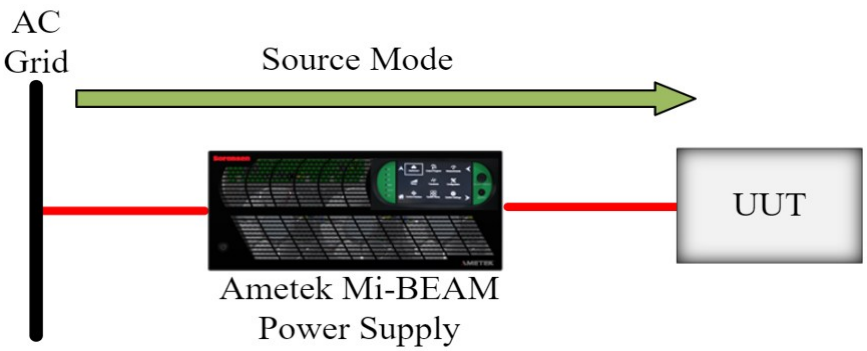


Figure 2-2. Power supply mode of operation

c) eLoad Mode:

This mode provides negative quadrant operation, i.e., power is drawn from the UUT to the AC grid through the Mi-BEAM power supply. The direction of current is always negative (only negative limits for current and power will be applicable) and power transfer is always from UUT to Mi-BEAM power supply.

Electronic Load (eLoad) supports voltage and current programming types, and they are described below,

- **Voltage:** In this programming type Mi-BEAM power supply regulates voltage. Various regulation settings are available in the voltage programming type (CV/CC, CV/CP, CR/CV, CP/CV and CV), and foldback operation will be performed based on the selected regulation settings.

- **Current:** In this programming type Mi-BEAM power supply regulates current. Various regulation settings are available in the current programming type (CC/CV, CC/CP, CR/CC, CP/CC and CC), and foldback operation will be performed based on the selected regulation settings.

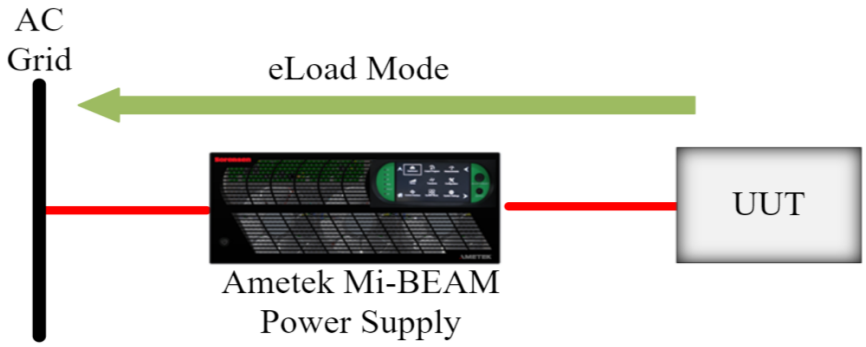


Figure 2-3. eLoad mode of operation

d) Battery Simulation Mode:

The Mi-BEAM power supply series supports simulating battery characteristics in both charge and discharge conditions. Seamless dynamic transitions from charge to discharge and vice versa are possible. The unit has a feature to enter various parameters to simulate real-world battery characteristics.

In Battery simulation (BATSIM) mode, various programming types are supported, and they are described below,

- **Battery Simulation-Charge Mode:** In this mode Mi-BEAM power supply regulates the voltage to simulate battery charge characteristics and direction of the current is negative. Depending upon the current injected by the battery charger (UUT) the instantaneous SoC is calculated, and the output voltage is varied as per the battery characteristics defined by the user.

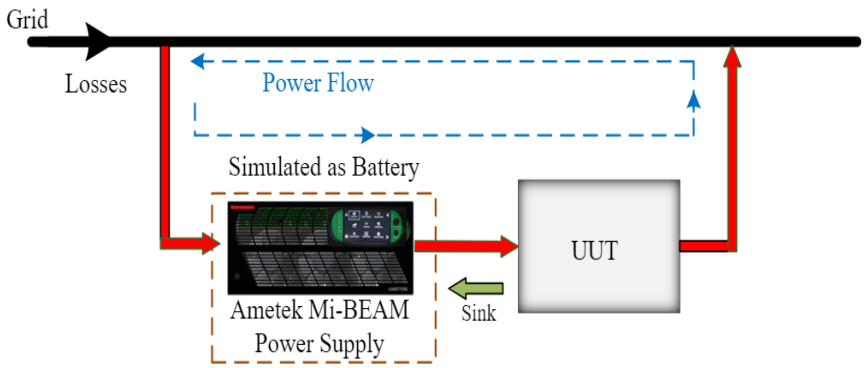


Figure 2-4. Battery simulation-charge mode

- **Battery Simulation-Discharge Mode:** The Mi-BEAM Series power supply regulates the voltage to simulate battery discharge characteristics and direction of the current is positive. Depending upon the current drawn by the UUT, the instantaneous SoC is calculated, and the output voltage is varied as per the battery characteristics defined by the user.

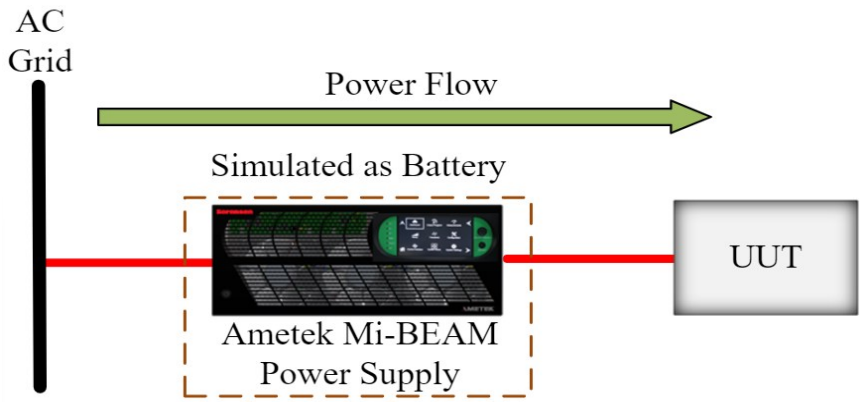


Figure 2-5. Battery simulation-discharge mode

e) Battery Test Mode:

The battery to be tested is the UUT wherein the Mi-BEAM Series power supply is made to operate as per the charge or discharge characteristics defined by the user to test the battery. The Battery Testing (BATTEST) mode supports seamless dynamic transition from charge to discharge and vice versa. Users can create multiple charging and discharging profiles which can be sequenced to achieve the required battery test conditions.

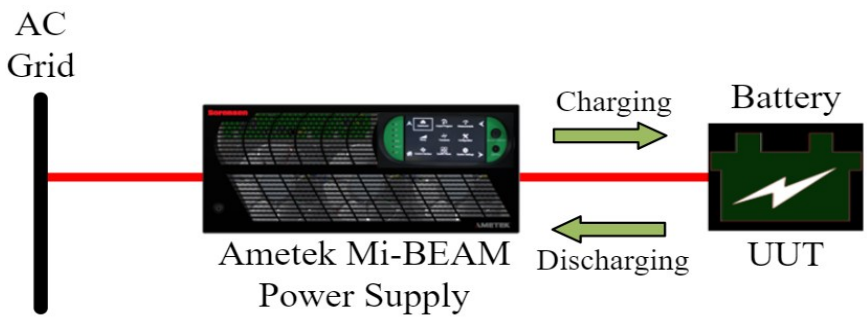


Figure 2-6. Battery simulation-charge mode

f) Solar Photovoltaic (PV) Simulator:

The Mi-BEAM Series power supply operates in a 'current programming type with Constant Current/Constant Voltage (CC/CV) regulation setting,' following the Photovoltaic (PV) array I/V characteristics set by the user. The PV array simulator (PVSIM) simulates Maximum Power Point Tracking (MPPT) and various real-world PV array scenarios for testing PV inverters.

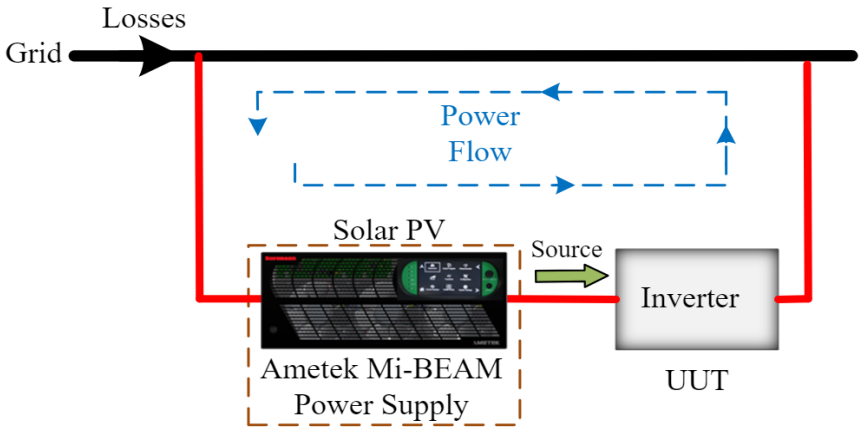


Figure 2-7. Solar Array Simulation

2.2 VIRTUAL PANELS FOR REMOTE CONTROL

The Virtual Panel is a Windows-based Graphical User Interface (GUI) application designed for the remote control of power supply. It allows for the programming and monitoring of Mi-BEAM power supplies remotely. Virtual Panels can be connected to a standalone unit or to the Leader unit of a paralleled chassis through USB, LAN, RS232, CAN or GPIB.

Virtual Panels also allows communication with multiple power supplies through a LAN interface, connected from a PC through an Ethernet switch. This functionality allows for the programming and operation of multiple power supplies through a single GUI interface. Up to 32 chassis can be operated simultaneously with one GUI. Refer to Figure 2-8 for the setup of connecting multiple power supplies through virtual panels.

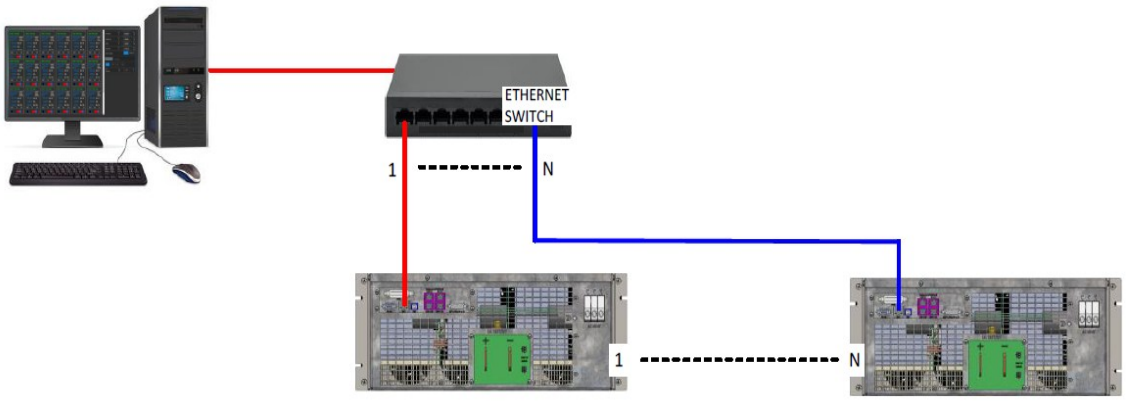


Figure 2-8. Setup for connecting multiple power supplies through Virtual Panels

2.3 OUTPUT POWER

The Mi-Beam Series power supply offers different output power configurations to meet user needs. The available output power configurations of the Mi-Beam Series are as follows:

MODEL	POWER (FOR AC INPUT HIGH LINE) (1)	POWER (FOR AC INPUT LOW LINE) (2)
Mi-BEAM Series	12.5 kW, 25 kW, 37.5 kW	6 kW, 12 kW, 18 kW
(1) ***AC Input High Line:*** *Nominal High Line Input range is 380 to 480 Volts Alternating Current (VAC).* (2) ***AC Input Low Line:*** *Nominal Line input range is 200 to 240 VAC.*		

Table 2-1. AC High Line and Low Line Power Configuration

2.4 OUTPUT VOLTAGE AND CURRENT RATINGS

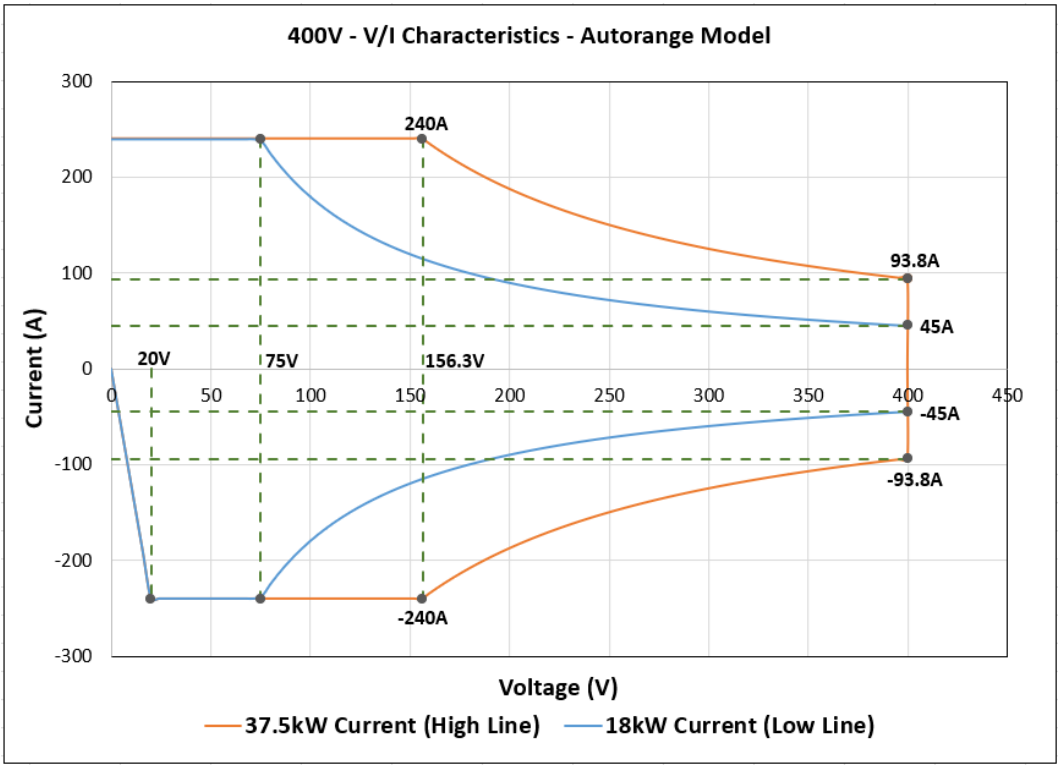
Output voltage and current ratings are offered with Auto Ranging characteristics. The Auto Ranging feature provides an expanded current range at the full output power level, enabling the ability to satisfy a wider range of testing needs without requiring the purchase of additional models.

POWER	HIGH LINE	12.5 kW	25 kW	37.5 kW
	LOW LINE	6 kW	12 kW	18 kW
Voltage (V)		Rated Current (A)		
400		80	160	240
600		50	100	150
800		40	80	120
1200		--	80	80
1500		--	50	50
2000		--	50	50

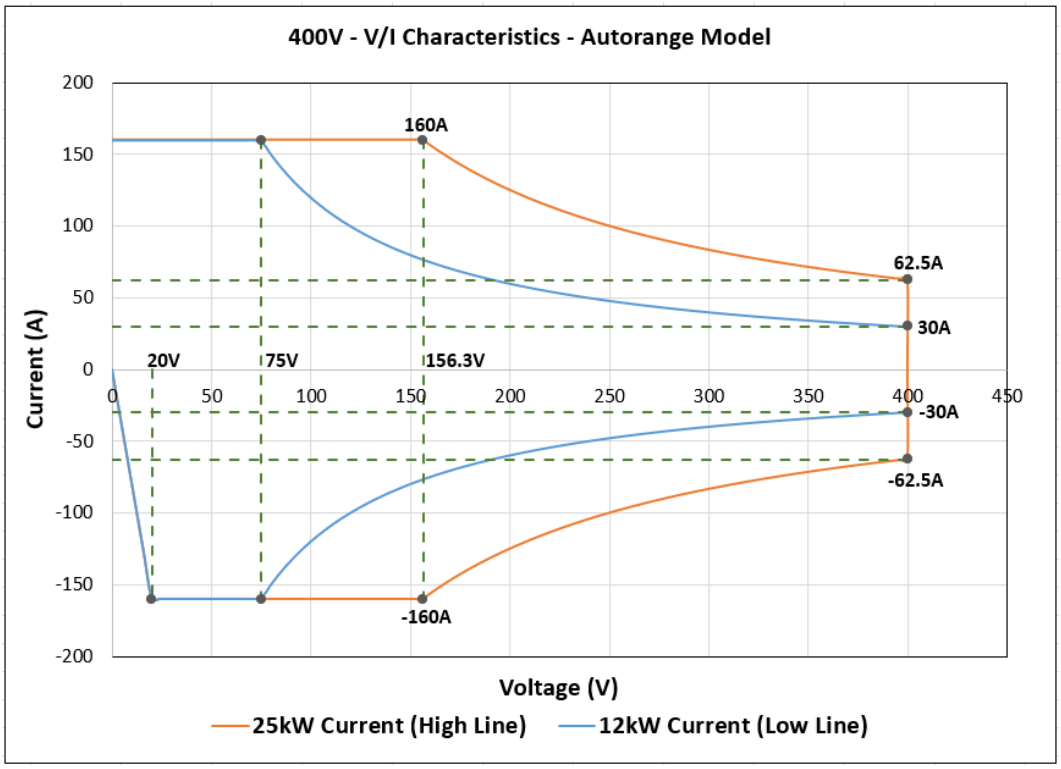
Table 2-2. Output Voltage and Current Ratings

2.5 AUTO RANGING OUTPUT VOLTAGE AND CURRENT V/I CHARACTERISTICS

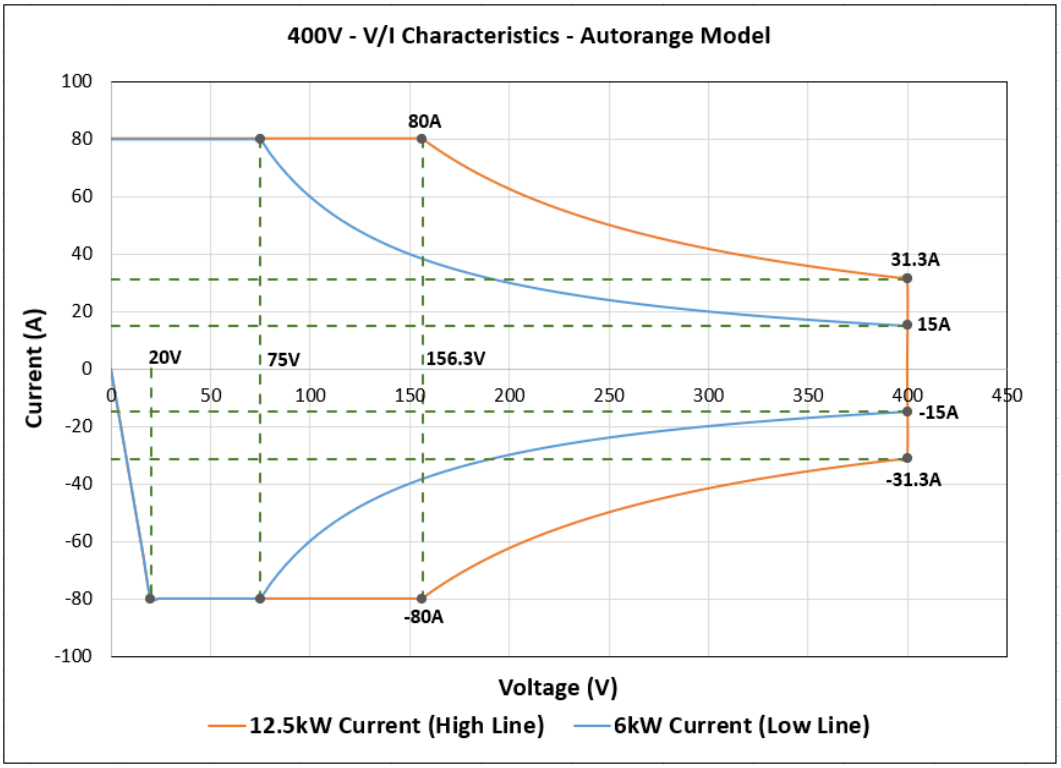
For rated power ratings, the auto-ranging models offer an expanded current range, enabling them to meet a broader spectrum of testing requirements. Refer to Figure 2-9 for the different V/I characteristics of the auto-ranging models.



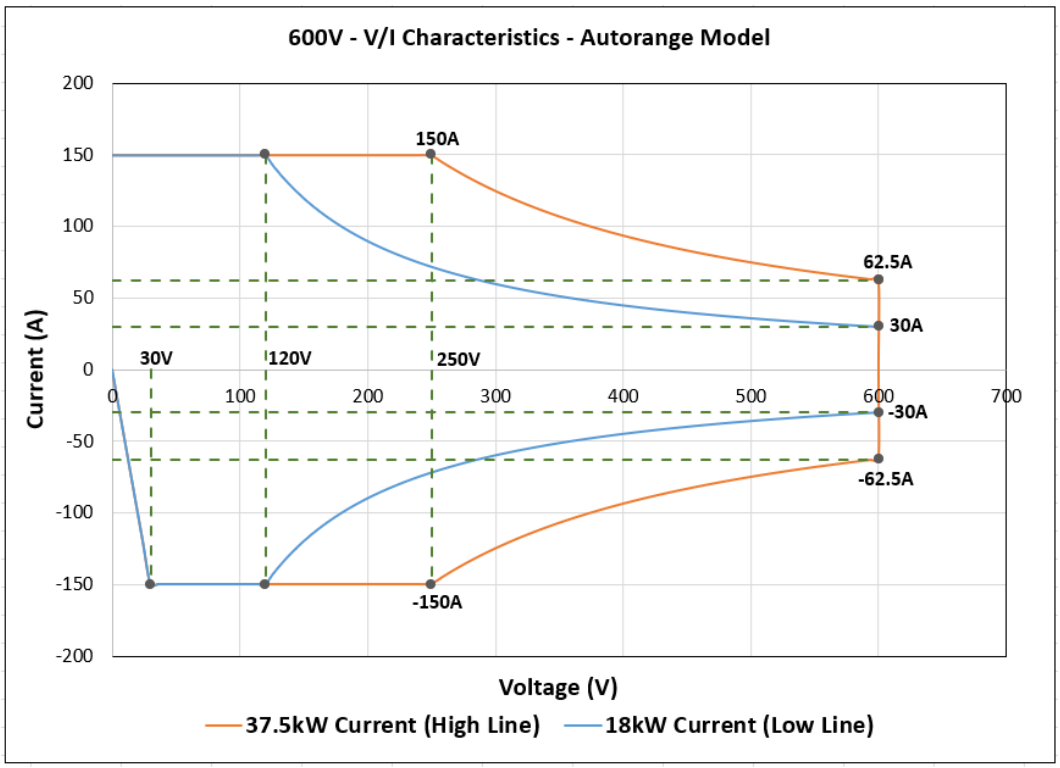
400V 37.5kW 240A Model



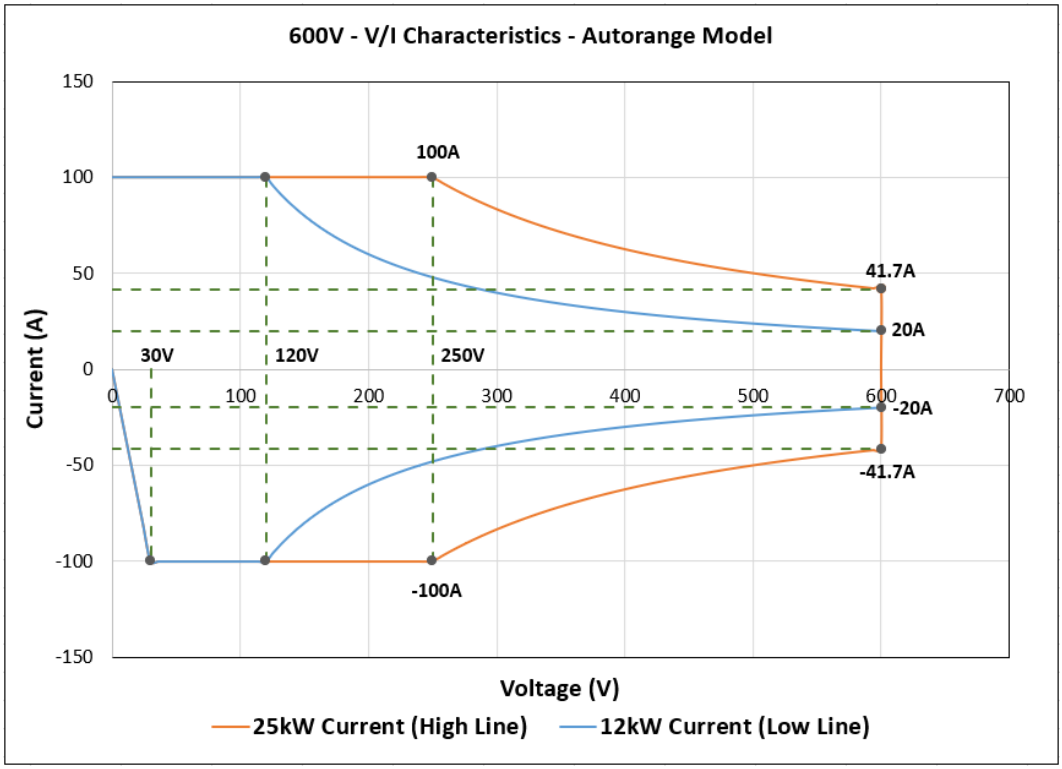
400V 25kW 160A Model



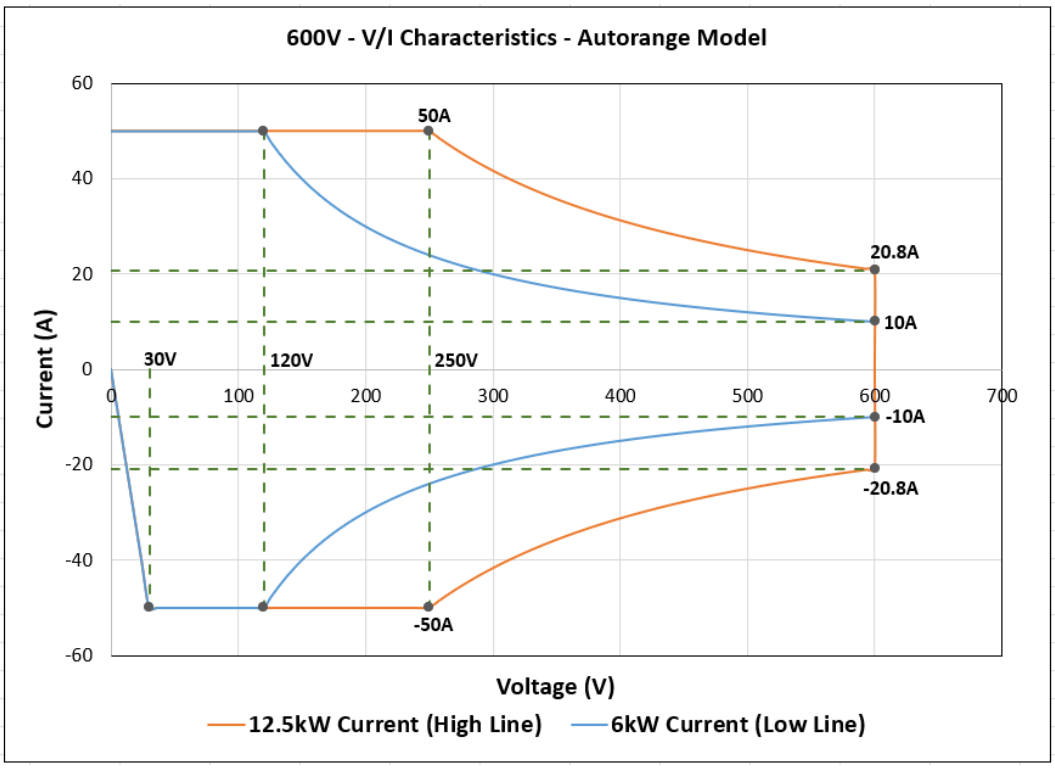
400V 12.5kW 80A Model



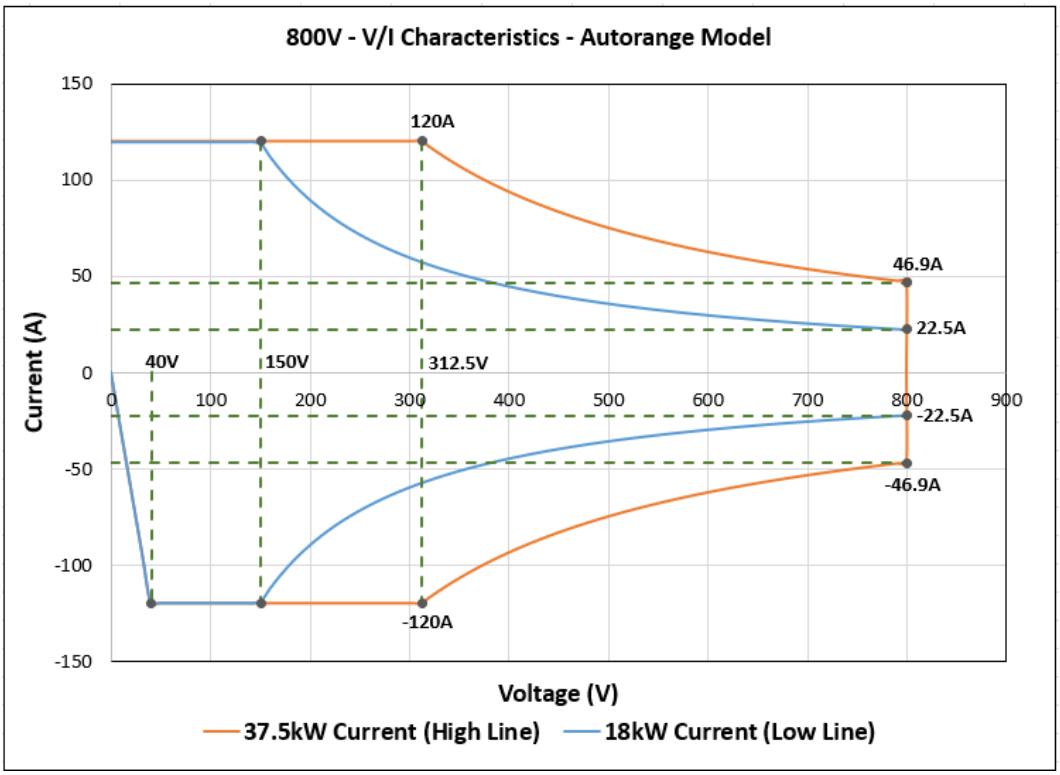
600V 37.5kW 150A Model



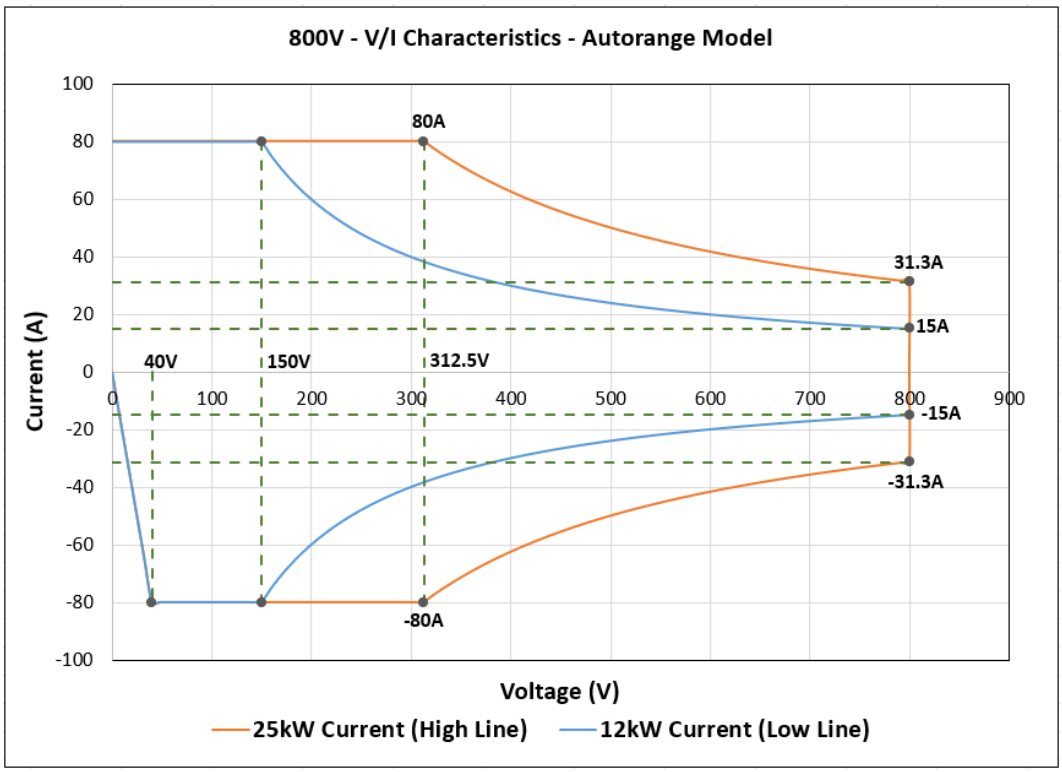
600V 25kW 100A Model



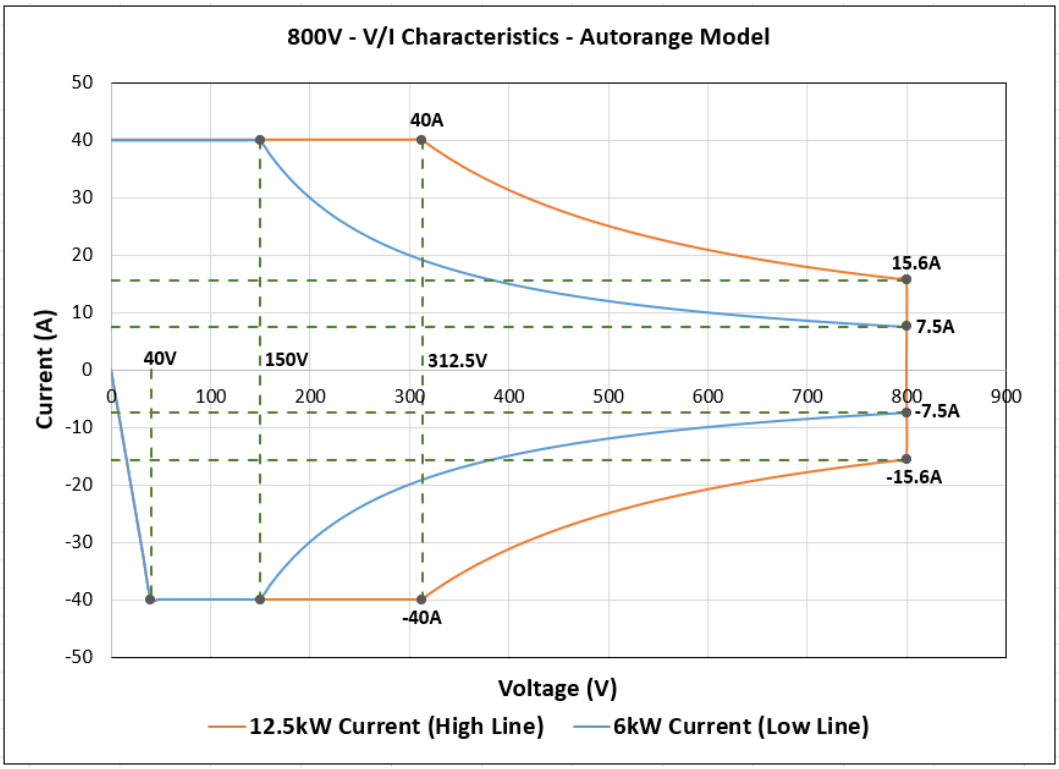
600V 12.5kW 50A Model



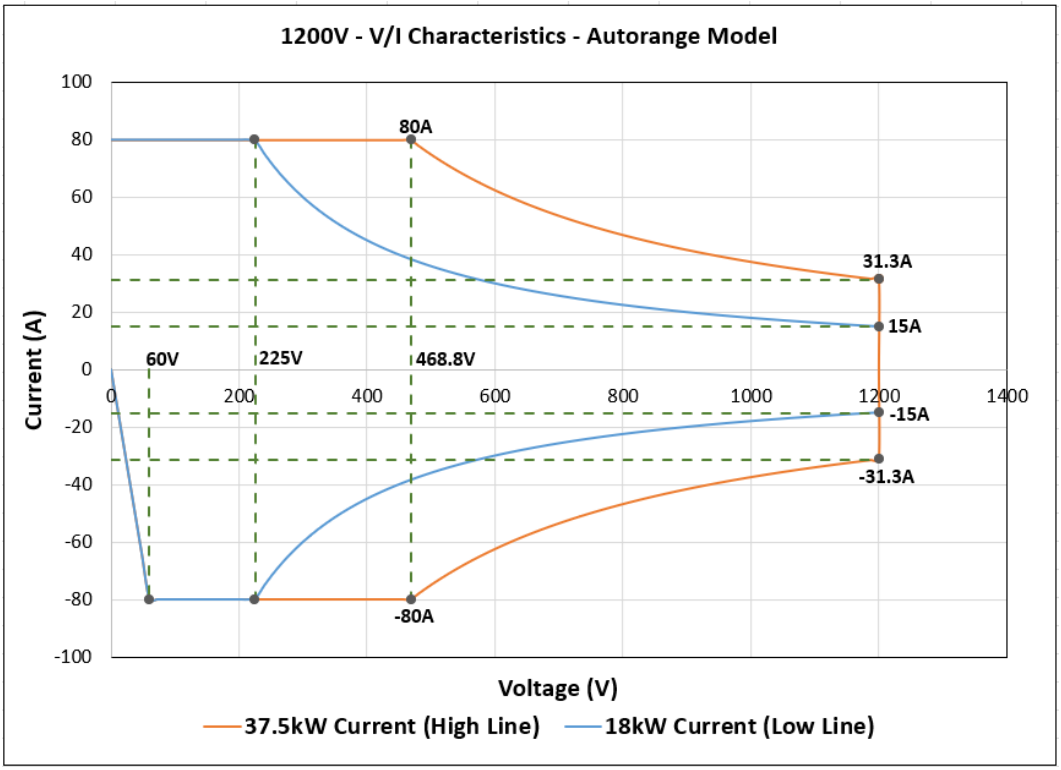
800V 37.5kW 120A Model



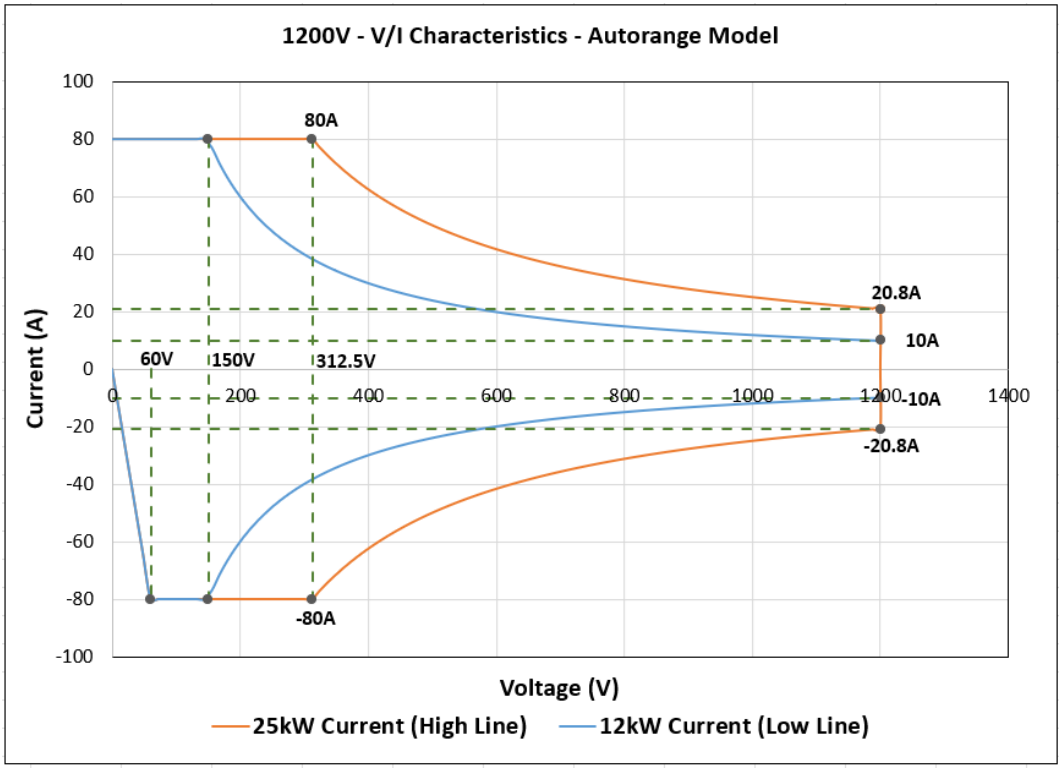
800V 25kW 80A Model



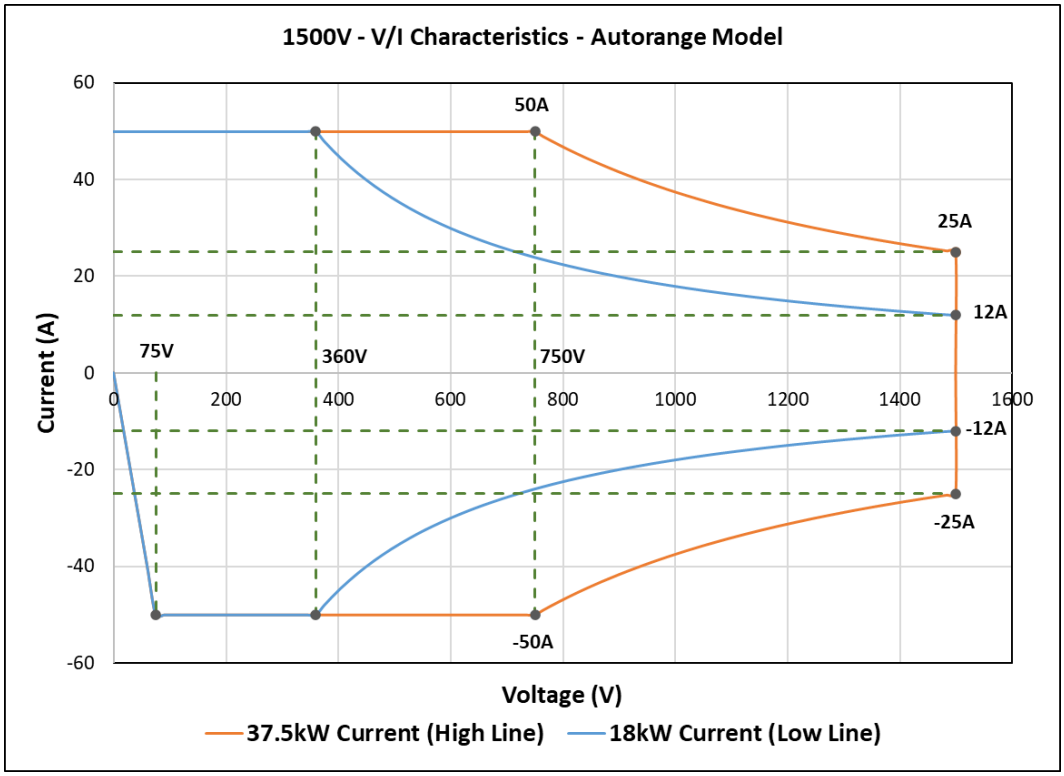
800V 12.5kW 40A Model



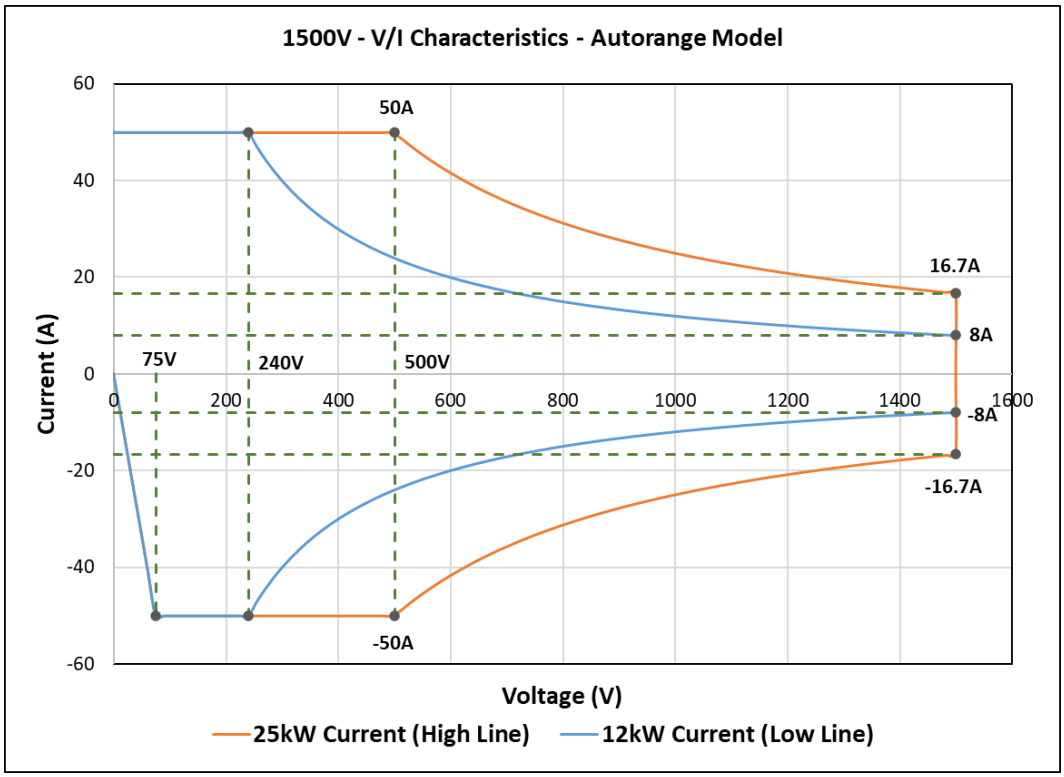
1200V 37.5kW 80A Model



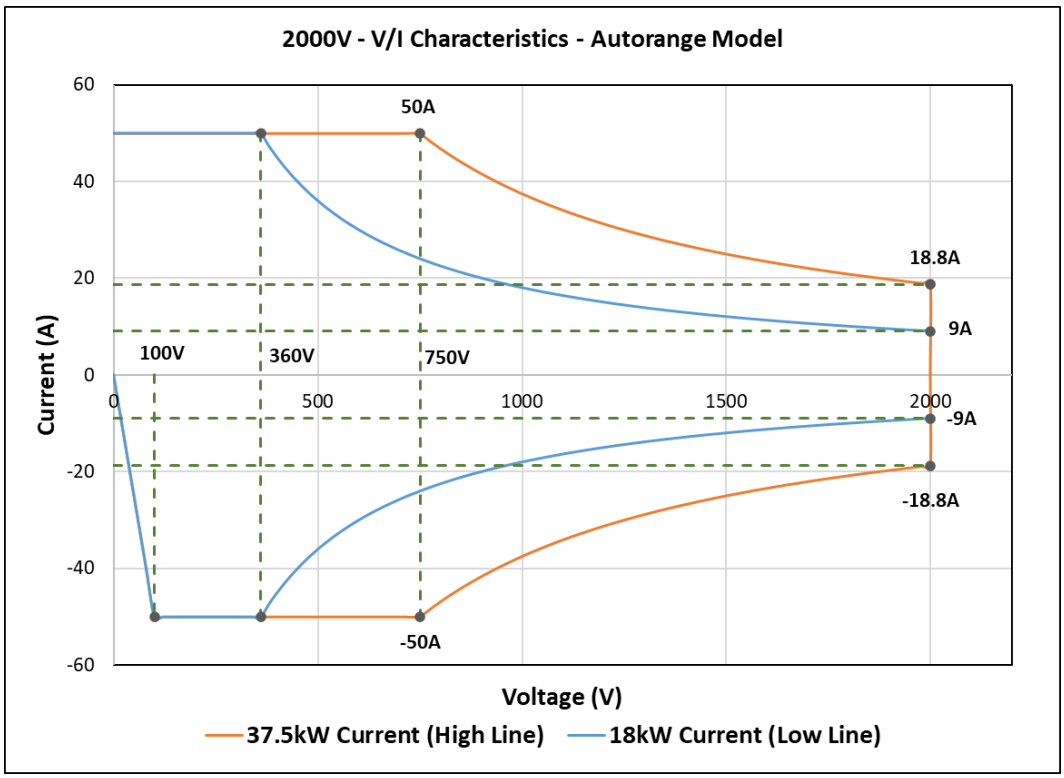
1200V 25kW 80A Model



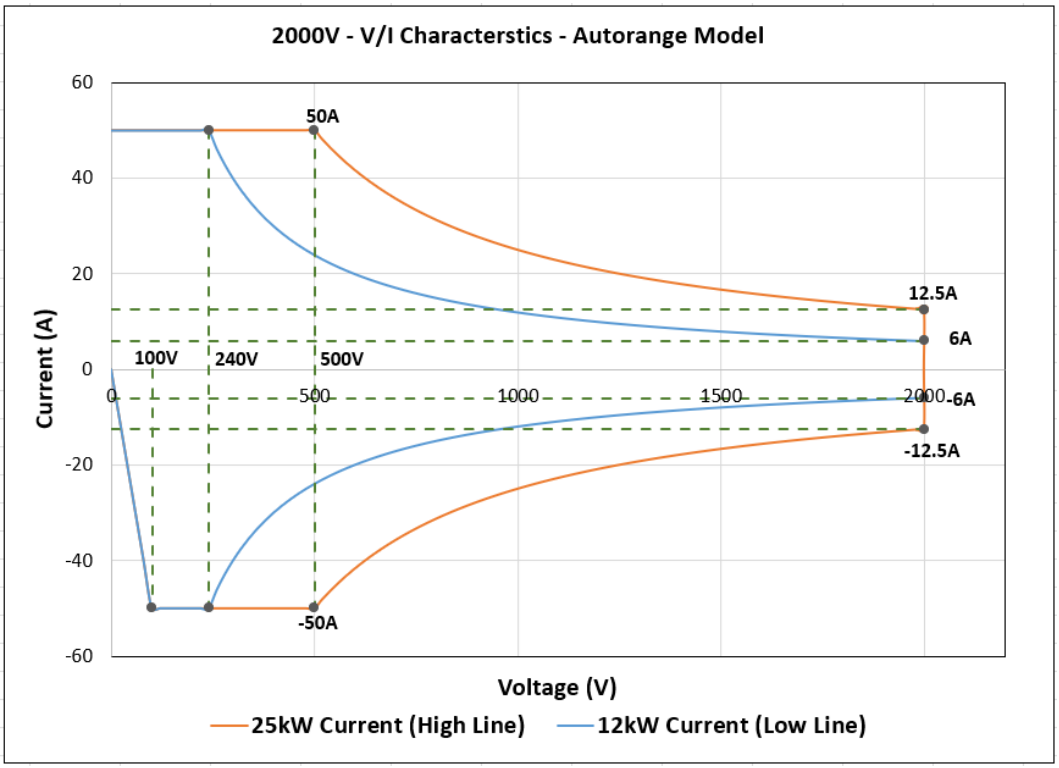
1500V 37.5kW 50A Model



1500V 25kW 50A Model



2000V 37.5kW 50A Model



2000V 25kW 50A Model

Figure 2-9. V/I Characteristics of Auto-ranging models

2.6 RESOLUTION SPECIFICATIONS

The Mi-Beam device features outstanding resolution capabilities for both programming and readback functions. These resolution values demonstrate its ability to precisely measure and control output parameters with high accuracy, as detailed below;

RESOLUTION	REMOTE DIGITAL INTERFACE	FRONT PANEL
Voltage output programming set resolution	0.002% of full scale	5 Digits
Current output programming set resolution	0.002% of full scale	5 Digits
Power output programming set resolution	0.01% of full scale	5 Digits
Overvoltage programming set resolution	0.1% of full scale	5 Digits
Voltage output readback set resolution	0.002% of full scale	5 Digits
Current output readback set resolution	0.002% of full scale	5 Digits
Power output readback set resolution	0.01% of full scale	5 Digits

Table 2-3. Front Panel Resolution Specifications

2.7 DC OUTPUT PROGRAMMING, READBACK AND REGULATION SPECIFICATIONS(1)(2)

This section provides an overview of the parameters and specifications for programming and readback accuracy through the front panel or remote digital interface, along with the DC regulation characteristics in both constant voltage and constant current modes, ensuring optimal performance and reliability.

PROGRAMMING AND READBACK ACCURACY THROUGH FRONT PANEL OR REMOTE DIGITAL INTERFACE	
PARAMETERS	**ACCURACY AND RESPONSE TIME SPECIFICATIONS**
Voltage output programming accuracy	± 0.1% of rated output voltage
Current output programming accuracy	± 0.4% of rated output current
Power output programming accuracy	± 0.75% of rated output power
Overvoltage programming accuracy	± 1%, maximum, of rated output voltage
Voltage output readback accuracy	± 0.1% of rated output voltage
Current output readback accuracy	± 0.4% of rated output current
Power output readback accuracy	± 0.75% of rated output power
Overvoltage response time	20 milliseconds (ms)
DC Regulation Characteristics- Constant Voltage Mode	
Maximum line regulation	± 0.01% of rated voltage
Maximum load regulation	± 0.02% of rated voltage (3)
Temperature Drift	± 0.02% of rated voltage/degree Celsius
Stability	± 0.05% of rated voltage
DC Regulation Characteristics- Constant Current Mode	
Maximum line regulation	± 0.05% of rated current
Maximum load regulation	± 0.08% of rated current
Temperature Drift	± 0.03% of rated current/degree Celsius

Stability	± 0.05% of rated current

(1) *Output voltage accuracy, regulation and stability specifications are valid at the point where the remote sense leads are connected. In the unit remote sense mode to be selected using front panel or the digital interface.*

(2) *Regulation is measured with the rated power.*

(3) *For 1500 V and 2000 V models, the load regulation specification is considered with respect to 2000 V rated voltage.*

Table 2-4. DC Output Programming, Readback and Regulation Specifications

2.8 eLOAD RESISTANCE PROGRAMMING RANGE

An electronic load maintains a constant resistive load by setting a specific resistance value. This enables precise testing of power supplies, batteries, and other devices under various load conditions to ensure reliable performance. At a specified operating voltage, the minimum and maximum resistance can be calculated as follows:

a) Minimum Resistance: Minimum resistance is determined by dividing the operating voltage of the UUT by the maximum current at that voltage.

$$Minimum\ resistance = \frac{Operating\ UUT\ Voltage}{Maximum\ current\ at\ the\ operating\ voltage}$$

b) Maximum Resistance: Maximum resistance is determined by dividing the operating voltage of the UUT by 1.6% of the rated current.

$$Maximum\ resistance = \frac{Operating\ UUT\ Voltage}{0.016\ \times Rated\ Current}$$

POWER	HIGH LINE	12.5 KW		25 KW		37.5 KW	
	LOW LINE	6 KW		12 KW		18 KW	
Voltage (V)	Minimum Operating Voltage for Maximum Current (V)	Minimum Resistance (1) (Ω)	Maximum Resistance (2) (Ω)	Minimum Resistance (1) (Ω)	Maximum Resistance (2) (Ω)	Minimum Resistance (1) (Ω)	Maximum Resistance (2) (Ω)
400	20	0.25	312	0.125	155	0.085	104
600	30	0.6	750	0.3	375	0.2	250
800	40	1	1250	0.5	625	0.333	416.67
1200	60	--	--	1.2	1500	0.75	937
1500	75	--	--	1.5	1875	1.5	1875
2000	100	--	--	2	2500	2	2500

(1) *Minimum resistance value in this table is calculated at minimum operating voltage. The minimum resistance value changes for each of the operating voltage and is calculated using the formula mentioned above.*

(2) *Maximum resistance value in this table is calculated at maximum operating voltage. The maximum resistance value changes for each of the operating voltage and is calculated using the formula mentioned above.*

Table 2-5. eLoad Maximum and Minimum Resistance Programming Range

2.9 REMOTE SENSE

The remote sense feature is designed to enhance the accuracy of voltage regulation by compensating for voltage drops in the load leads. This is particularly important in high-power applications, where even small voltage drops can significantly affect performance. Remote sense terminals are installed at the output to monitor the voltage directly at the load point. The remote sense compensation is as follows:

PARAMETER	DESCRIPTION
Allowed Line drop Voltage	2% of the rated output voltage.
Connection	Voltage accuracy specifications apply at the point where the remote sense leads are connected.
Line Drop Effect on Output	There would be increased voltage equivalent to the line drop voltage at the terminals of the Power Supply.

Table 2-6. Remote Sense Voltage Adjustment Parameters

2.10 USER-DEFINED SLEW RATE CONTROL CHARACTERISTICS

The maximum rate at which the Mi-BEAM Series can respond to a change in set value is determined based on the user-defined voltage. The slew rate during voltage and current regulation operations are recorded as follows:

SLEW RATE CONTROL CHARACTERISTICS						
MODELS (V)	VOLTAGE REGULATION OPERATION (V/ms) [1][2]			CURRENT REGULATION OPERATION (A/ms) [3][4][5][6]		
	12.5 kW	25 kW	37.5 kW	12.5 kW	25 kW	37.5 kW
400	40	40	40	160	320	480
600	60	60	60	100	200	300
800	80	80	80	80	160	240
1200	-	120	120	-	160	160
1500	-	150	150	-	100	100
2000	-	200	200	-	100	100

[1] *Maximum rate of output voltage change is at constant output current.*
[2] *In voltage regulation mode the maximum slew rate of load current should not exceed specified maximum current slew rate.*
[3] *Maximum rate of output current change is at constant output voltage.*
[4] *In current regulation mode the maximum slew rate of load voltage should not exceed specified maximum voltage slew rate.*
[5] *In a parallel connected system, the current slew will be multiplied by number units in parallel.*
[6] *Rate of change of output power must not exceed 'rated power of the unit' per 0.5 ms.*

Table 2-7. Slew Rate Control Characteristics

2.11 TRANSIENT SPECIFICATIONS – VOLTAGE REGULATION OPERATION

The transient specification of a system is a critical performance characteristic, as it determines the speed and accuracy with which the system responds to changing parameters. The specified transient characteristics assume that the load changes in such a way that the output voltage does not exceed the maximum slew rate defined in the Section 2.10. Based on the models, the transient specification in voltage regulation is recorded as follows:

TRANSIENT SPECIFICATIONS – VOLTAGE REGULATION OPERATION				
MODEL (V)	**VOLTAGE RISE TIME (ms), FULL LOAD (1)(3)(7)(8)**	**VOLTAGE FALL TIME (ms), FULL LOAD (2)(3)(7)(8)**	**VOLTAGE FALL TIME (ms), NO LOAD (4)**	**TRANSIENT RESPONSE (ms) (5)(6)**
400	10	10	10	1
600	10	10	10	1
800	10	10	10	1
1200	10	10	10	1
1500	10	10	10	1
2000	10	10	10	1

(1) *Measured from 10%-90% of the output voltage change at rated resistive load - typical.*

(2) *Measured from 90%-10% of the output voltage change at rated resistive load - typical.*

(3) *In voltage regulation mode the maximum slew rate of load current should not exceed specified maximum current slew rate.*

(4) *Measured from 90%-10% of output rated voltage at No load – typical.*

(5) *Typical time to recover within 0.75% of rated output voltage for load change of 50-100% of rated output current. Refer to maximum allowed slew rate given in Section 2.10.*

(6) *Typical overshoot and undershoot during the 50% load change would be within 10% of the rated voltage.*

(7) *Unit must be configured to 'Slew mode – Fast' to achieve the mentioned rise or fall time in the table. If the configured rise or fall time is < 1.5 times the rise or fall time mentioned in the table, output power of the unit must be limited to 75% of the rated. If the configured rise or fall time is between 1.5 to 2 times the rise or fall time mentioned in the table, output power of the unit must be limited to 90% of the rated.*

(8) *If unit is configured to 'Slew mode – Normal', the minimum rise or fall time of the unit will be limited to thrice the transient response time mentioned.*

Table 2-8. Voltage Regulation Operation

2.12 TRANSIENT SPECIFICATIONS – CURRENT REGULATION OPERATION

The transient specification of a system is a critical performance characteristic, as it determines the speed and accuracy with which the system responds to changing parameters. The specified transient characteristics assume that the load changes in such a way that the output current does not exceed the maximum slew rate defined in the Section 2.10. Based on the models, the transient specification in current regulation is recorded as follows:

TRANSIENT SPECIFICATIONS – CURRENT REGULATION OPERATION			
MODEL (V)	**CURRENT RISE TIME (ms), FULL LOAD** (1)(3)(6)(7)(8)	**CURRENT FALL TIME (ms), FULL LOAD** (2)(3)(6)(7)(8)	**TRANSIENT RESPONSE (ms)** (4)(5)
400	0.5	0.5	0.5
600	0.5	0.5	0.5
800	0.5	0.5	0.5
1200	0.5	0.5	0.5
1500	0.5	0.5	0.5
2000	0.5	0.5	0.5

(1) *Measured from 10%-90% of the output current change at constant rated voltage regulated by UUT - typical.*

(2) *Measured from 90%-10% of the output current change at constant rated voltage regulated by UUT - typical.*

(3) *In current regulation mode the maximum slew rate of load voltage should not exceed specified maximum voltage slew rate.*

(4) *Typical time to recover within 0.75% of rated average output current for load change of 50-100% of rated output voltage.*

(5) *Typical overshoot and undershoot during the 50% output voltage change would be within 15% of the rated current.*

(6) *Unit must be configured to 'Slew mode – Fast' to achieve the mentioned rise or fall time in the table, in this slew mode output power of the unit must be limited to 85% of the rated.*

(7) *If unit is configured to 'Slew mode – Normal', the minimum rise or fall time of the unit will be limited to twice the rise or fall time mentioned in the table.*

(8) *In paralleled system, the minimum rise or fall time remains same.*

Table 2-9. Current Regulation Operation

2.13 OUTPUT VOLTAGE RIPPLE AND NOISE - VOLTAGE REGULATION OPERATION

The output voltage ripple and noise refer to the variations and disturbances in the output voltage of a power supply. Based on the voltage regulation operation, the ripple and noise root mean square (RMS) and peak-to-peak (Pk-Pk) values are recorded as follows:

RATED OUTPUT VOLTAGE (V)	VOLTAGE RIPPLE AND NOISE RMS, mV (1)	VOLTAGE RIPPLE AND NOISE PK-PK, mV (2)
400	120	500
600	120	500
800	360	1500
1200	360	1500
1500	360	1500
2000	360	1500

(1) RMS ripple or noise, over 20 Hertz (Hz) to 300 kilohertz (kHz) bandwidth, is measured directly across the output terminals with the supply operating into 90% of rated resistive load and nominal AC input line voltage.

- *RMS ripple is calculated using the below formula,*
- *Vrms1 = RMS ripple measured when output is OFF*
- *Vrms2 = RMS ripple measured with full load*
- *Effective RMS = $\sqrt{((Vrms2)^2 – (Vrms1)^2)}$*

(2) PK-PK ripple or noise, over 20 Hz to 20-megahertz (MHz) bandwidth with the supply operating into 90% of rated resistive load and nominal AC input line voltage.

- *PK-PK ripple is calculated using the below formula,*
- *Vpk-pk1 = PK-PK ripple measured when output is OFF*
- *Vpk-pk2 = PK-PK ripple measured with full load*
- *Effective PK-PK = Vpk-pk2 – Vpk-pk1*

Table 2-10. Output Voltage Ripple and Noise for Voltage Regulation Operation

2.14 AC INPUT SPECIFICATIONS

The AC input specifications for the Mi-Beam series ensure optimal performance and compatibility with standard power supply, enabling reliable operation. The specifications are provided below:

PARAMETER	DESCRIPTION	
Input Voltage Nominal range	AC Input Low Line: 3 phase, 3 wire + Ground (Gnd).	AC Input High Line: 3 phase, 3 wire + Gnd.
	Low Line Nominal rating range: 200 to 240 VAC, 3 Phase, Line-Line (1)	High Line Nominal rating: 380 to 480 VAC, 3 Phase, Line-Line
Input Voltage, Operating range	AC Input Low Line: 3 phase, 3 wire + Gnd.	AC Input High Line: 3 phase, 3 wire + Gnd.
	Low Line Operating rating range: 180 to 264 VAC, 3 Phase, Line-Line (1)	High Line Operating rating: 342 to 528 VAC, 3 Phase, Line-Line
Input Current, Maximum RMS	AC Input Current Low Line: 3 phase, 3 wire + Gnd.	AC Input Current High Line: 3 phase, 3 wire + Gnd.
	72 A at 180 VAC Line-Line	72 A at 342 VAC Line-Line
Efficiency	AC Input Low Line: 3 phase, 3 wire + Gnd.	AC Input High Line: 3 phase, 3 wire + Gnd.
	93-95% (2)	93-95% (3)
Inrush Current, typical (4)	AC Input Low Line: 3 phase, 3 wire + Gnd.	AC Input High Line: 3 phase, 3 wire + Gnd.
	100 A at 180 VAC Line-Line	110 A at 342 VAC Line-Line
Input Frequency, Nominal Rating	50 Hz, 60 Hz	
Input Frequency Range	47 Hz to 53 Hz, 57 Hz to 63 Hz	

PARAMETER	DESCRIPTION
Power Factor [5], typical	3-Phase: 0.99; active Power factor-controlled input rectifier
Isolation Test Voltage[6]	2100 VDC Input to Ground

[1] For Low Line AC input voltage output power is derated to 50%.
[2] Typical value at full load 18 kW output and nominal AC input voltage of 208 VAC L-L at 50/60 Hz input frequency.
[3] Typical value at full load 37.5 kW output and nominal AC input voltage of 480 VAC L-L at 50/60 Hz input frequency.
[4] Not including EMI filter inrush less than 200 us.
[5] Measured at full load at rated three phase nominal AC input voltage of:

- *380 VAC, 400 VAC, 480 VAC L-L for input High Line*
- *208 VAC L-L for input Low Line.*

[6] Isolation test conducted only in factory.

Table 2-11. AC Input Specifications

2.15 OPERATIONAL CHARACTERISTICS

The specific features and performance parameters that define how a product functions under various conditions. These characteristics provide detailed information about the capabilities and limitations of the device, ensuring it meets the required performance standards. The operational characteristics for the Mi-Beam series are listed below. Refer to the Chapter 5 for more details.

PARAMETER	CHARACTERISTICS
Bidirectional Mode	The power can flow from power supply to UUT and vice versa (2 quadrant operation). This mode has 'Voltage' and 'Current' programming types, and supported regulation settings are: **a) Voltage (programming type) –** CV, CV/CC, CV/CP, CV-SER-RES **b) Current (programming type) –** CC, CC/CV, CC/CP, CP/CC.
Source Mode	The power can flow only from the power supply to UUT. This mode has 'Voltage' and 'Current' programming types and supported regulation settings: **a) Voltage (programming type) –** CV, CV/CC, CV/CP, CP/CV, CV-SER-RES **b) Current (programming type) –** CC, CC/CV, CC/CP, CP/CC.
eLoad Mode	The power flow is from output of the power supply to the Input AC-Grid. This mode has 'Voltage' and 'Current' programming types and supported regulation settings: **a) Voltage (programming type) –** CV, CV/CC, CR/CV, CP/CV, CV/CP **b) Current (programming type) –** CC, CC/CV, CR/CC, CP/CC, CC/CP.
Battery Simulation Mode	This is an optional module; different battery characteristics can be simulated. The user can choose either from built in battery models of commonly used battery types or customized battery models. The required characteristics of charge and discharge operation can be fine-tuned using various battery parameters including the ability to import Voltage vs SOC data. Allows seamless dynamic transition from charge to discharge and vice versa.

PARAMETER	CHARACTERISTICS
Battery Testing Mode	This is an optional module; the required charge or discharge characteristics is applied to the UUT by the power supply. Users can create multiple charging and discharging profiles which can be sequenced to achieve the required battery test conditions. Allows seamless dynamic transition from charge to discharge and vice versa.
Solar PV Array Simulator Mode	This is an optional module; the PV curve of a solar array is applied by the power supply by operating in source-current (CC/CV) mode to the UUT such as an inverter. PV array simulator simulates MPPT and various real-world PV array scenarios for testing the inverter. Includes EN50530 and Sandia SAS models.
Automotive Standard Testing	Pre-defined test sequences for partial compliance in accordance with LV 123 and LV 148 within the slew rate limitations specified for the supply. Tests such as injecting high frequency voltage ripple would require additional equipment.
Drive Train Testing	Drive trains can be tested by operating the power supply in bi-DIR mode. The power supply is used to analyze the characteristics of the drive with the ability to regenerate power back to AC Grid during braking of the drive train. Includes V-I characteristics programming to support standardized drive cycle tests.
Front Panel Controls	Enhance front panel touch display for the unit enables control and programming of output. Organized menus to support Output Programming, Measurements, Power ON Settings, Communication Controls and System Settings, External Analog interface, Voltage and Current ramp functions.
Voltage Ramp	Voltage Ramp could be generated with a programmable Dwell, Start and End Voltage set points. Dwell time could be set to 1 ms minimum and 9999s maximum. Maximum slew to be limited as per the slew rate specifications of the output model.
Current Ramp	Current Ramp could be generated with a programmable Dwell, Start and End Current set points. Dwell time could be set to 1 ms minimum and 9999s maximum. Maximum slew to be limited as per the slew rate specifications of the output model.
List/ Waveform generation Function	List function allows the user to set up the supply to automatically run a series of voltage and current mode operations. This is especially useful for setting up the supply to test compliance standards or unburdening the test computer in automated testing applications. Through RS-232, IEEE-488 or Ethernet, an external computer can trigger the list. Up to 50 lists may be stored, with each list containing up to 50 individual steps. With an extensive list of step functions such as ramping and looping, the user can define a variety of test sequences.
Fault Identification	On-board diagnostics identify when the power supply has experienced a fault.
Programming Command Set	SCPI compliant command set and same could be used with all the communication interfaces (USB, RS232, Ethernet, CAN, IEEE-488).
Graphical User Interface (Virtual Panel)	Virtual panels allow programming and monitoring of Mi-BEAM power supply remotely. GUI supports all the operational modes such as bi-Directional, Source, eLoad, Battery Simulation, Battery Test and Solar Array Simulation. GUI also supports Output Programming, Measurements, Power ON Settings, Communication Controls and System Settings, External Analog interface, Voltage and Current ramp functions, List/Waveform generation function, Data Logging function.
Software Drivers	IVI-C and IVI-COM, LabVIEW drivers provided for user programming.

PARAMETER	CHARACTERISTICS
GPIB interface, Option	Parallel interface complies with IEEE-488.1, IEEE-488.2, and the SCPI command specification.
Parallel Operation	Units with identical voltage ratings must be connected in parallel. Units with different model numbers can still be paralleled if their voltage ratings are the same. Outputs to be hardwired to the load from the relevant paralleled output terminals. Up to 32 units can be paralleled (maximum of 7 units per rack, with multiple racks are interconnected), enabling power levels up to 1200 kW.
Series Operation	Units with identical model numbers can be connected in series, i.e. the voltage, current and power ratings of the units must be same. Outputs to be hardwired to the load from the relevant series output terminals. Only 2 units with same model number can be connected in series. Series split phase operation allows user to connect to a load with a common terminal.
Analog Programming	Provides Isolated Analog interface to program output.
Calibration	Calibration interval is 1 year; calibration is firmware-based through the SCPI commands using communication interface or Virtual Panels.

Table 2-12. Operational Characteristics

2.16 FRONT PANEL CONTROLS OR INDICATORS

The front panel controls and indicators are designed for clear and intuitive operation. This series includes three distinct unit types, each tailored to meet specific operational needs. The controls and indicators are strategically placed to ensure ease of use and efficient monitoring, enhancing overall functionality and user experience. The unit types and their corresponding controls and indicators are listed below. For further clarification, refer to Figure 2-10.

UNIT TYPE	CONTROLS OR INDICATORS
Standalone Unit with Enhanced Touchscreen Display	Touch-Panel, Thin Film Transistor (TFT) color Liquid-crystal display (LCD) display with menu-based control. Display size: 4U models, 5 in. (127 mm) diagonal Rotary encoder for menu navigation and parameter adjustment and entry, with integrated selection switch. **a) POWER Switch:** Turns unit ON or OFF. **b) OUTPUT Switch:** Turns output ON or OFF. **c) OUTPUT LED:** Integrated into the OUTPUT switch; indicates that the output of the unit has been turned on. **d) CV LED:** Indicates that the unit is in constant-voltage mode and the output voltage is being regulated. **e) CC LED:** Indicates that the unit is in constant-current mode and the output current is being regulated. **f) CP LED:** Indicates that the unit is in constant-power mode and the output power is being regulated. **g) REM LED:** Indicates that the unit is under control of the remote digital interface.

UNIT TYPE	CONTROLS OR INDICATORS
	h) FAULT LED: Indicates that an internal fault has been detected, and the output has been shut down. **i) LXI LED:** LXI status annunciation.
Standalone Unit with ATE Front Panel	**a) POWER Switch:** Turns unit ON or OFF. **b) POWER LED:** Integrated into the POWER switch; indicates that the AC input power is turned on to the unit. **c) OUTPUT LED:** Integrated into the OUTPUT switch; indicates that the output of the unit has been turned on. **d) CV LED:** Indicates that the unit is in constant-voltage mode and the output voltage is being regulated. **e) CC LED:** Indicates that the unit is in constant-current mode and the output current is being regulated. **f) CP LED:** Indicates that the unit is in constant-power mode and the output power is being regulated. **g) FAULT LED:** Indicates that an internal fault has been detected, and the output has been shut down. **h) LXI LED:** LXI status annunciation.
FOLLOWER Units	**a) POWER switch:** Turns unit ON or OFF. **b) POWER LED:** integrated into the POWER switch; indicates that the AC input power is turned on to the unit. **c) OUTPUT LED:** integrated into the OUTPUT switch; indicates that the output of the unit has been turned on. **d) FAULT LED:** indicates that an internal fault has been detected, and the output has been shut down.

Table 2-13. Front Panel Controls or Indicators

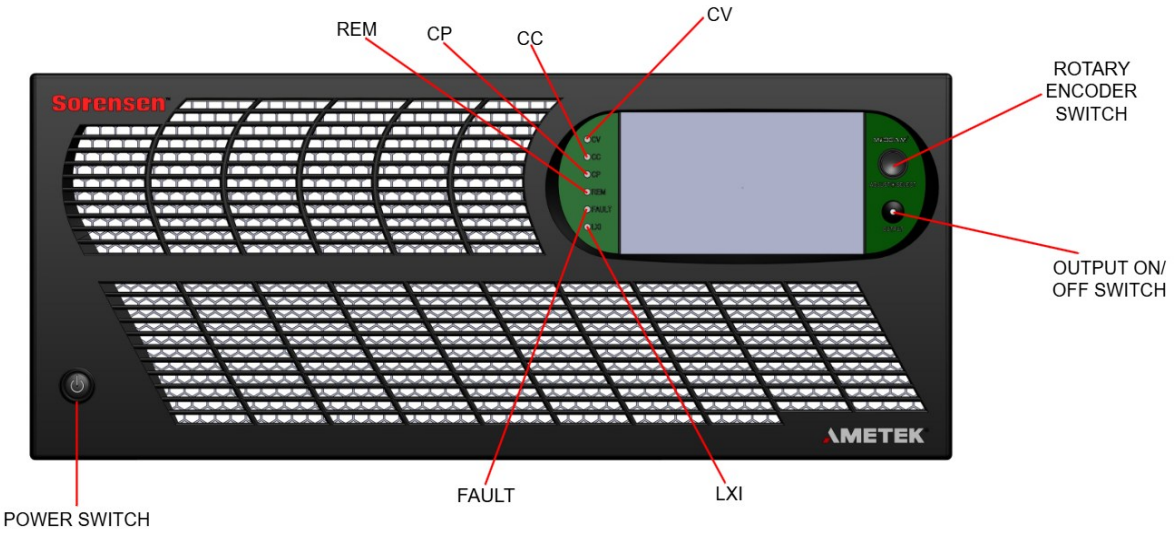


Figure 2-10. Front panel

2.17 REMOTE ISOLATED EXTERNAL USER CONTROL I/O SIGNAL INTERFACE AND ISOLATED ANALOG INTERFACE CHARACTERISTICS

The Remote Isolated External User Control I/O Signal Interface allows for remote control using various digital signals and can interface with a wide range of external control systems, offering flexibility and supporting multiple communication protocols for versatile integration. It provides electrical isolation for control signals, preventing interference and enhancing safety. Similarly, the Isolated Analog Interface ensures high accuracy in analog signal processing with minimal noise and distortion. It electrically isolates analog signals to prevent interference, supports analog inputs and outputs corresponding to output voltage and current, and is designed to withstand harsh industrial environments, ensuring reliable performance. The functions and characteristics of the Remote Isolated External User Control I/O Signal Interface and the Isolated Analog Interface for the Mi-Beam series are listed below.

NOTE: Mi-BEAM power supply provides 26-Pin Digital I/O interface connector for Trigger, Status output, Remote ON/OFF and Inhibit. All the signals in this interface are isolated from the output negative.

REMOTE ISOLATED EXTERNAL USER CONTROL I/O SIGNAL INTERFACE	
FUNCTION	**CHARACTERISTICS**
Remote Inhibit Input – Contact Closure - Open	Opening the Switch or Relay contact between this terminal and signal return will turn OFF the output. Switch or Relay closure or direct short from this terminal to signal return would turn-on the output. Remote inhibit can be configured in three modes; **a) Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output. **b) Live:** after reclosing the contact, user can turn ON the output. **c) OFF:** inhibit function would be disabled. Remote circuit must sink up to 10 milliampere (mA) from 5 volts direct current (VDC) to enable.
Remote Inhibit Input – Contact Closure - Close	Closing the Switch or Relay contact between this terminal and signal return will turn OFF the output. Switch or Relay opening would turn ON the output. Remote inhibit can be configured in three modes; **a) Latch:** after reclosing the contact, user can clear the fault and turn ON the output. **b) Live:** after reclosing the contact, user needs to turn ON the output. **c) OFF:** inhibit function would be disabled. Remote circuit must sink up to 10 mA from 5 VDC to enable.

REMOTE ISOLATED EXTERNAL USER CONTROL I/O SIGNAL INTERFACE	
FUNCTION	**CHARACTERISTICS**
Remote Inhibit Input – Active Source – High	An active voltage source high signal from this terminal to signal return will Turn OFF the output of power supply. Remote inhibit can be configured in three modes; **a) Latch:** after removing the active voltage source, user can clear the fault and turn ON the output. **b) Live:** after removing the active voltage source, user can turn ON the output. **c) OFF:** inhibit function would be disabled. Remote circuit must sink up to 10 mA from 5 VDC to enable.
Remote Inhibit Input – Active Source – Low	An active voltage source low signal from this terminal to signal return will Turn OFF the output of power supply. Remote inhibit can be configured in three modes; **a) Latch:** after removing the active voltage source low signal, user needs to clear the fault and turn ON the output. **b) Live:** after removing the active voltage source, user can turn ON the output. **c) OFF:** inhibit function would be disabled. Remote circuit must sink up to 10 mA from 5 VDC to enable.
Trigger In(1)	TTL compatible Input signal, active-high pulse of 100 μs; detects external hardware trigger at falling edge of the pulse for voltage, current ramp and Transient List functions. Signal connects to Open-anode of opto-isolator diode with internal 1 kΩ series resistor internal to power supply. Voltage Rating: Maximum 24 V, Minimum -5 V Low state: 0.3 V max, High State 2.7 V min
Trigger Out(1)	Output signal, active-high; synchronization pulse of 100 μs. Open collector transistor output, Collector is connected to the 26-pin connector. The emitter point of transistor is connected to common return pin of the interface connector. Voltage Rating: Maximum 30 V, Minimum 3 V for Active High, Current Sink Current: 50 mA
CC/CV status Output	Output signal, High state indicates Constant Current mode operation, and Low state indicates Constant Voltage mode operation. Open collector transistor output, Collector is connected to the 26-pin connector. The emitter point of transistor is connected to common return pin of the interface connector. Voltage Rating: Maximum 30 V, Minimum 3 V for Active High, Current Sink Current: 50 mA
Output ON/OFF Status	Output signal, High state indicates Output is ON and Low state indicates Output is OFF.

REMOTE ISOLATED EXTERNAL USER CONTROL I/O SIGNAL INTERFACE	
FUNCTION	**CHARACTERISTICS**
	Open collector transistor output, Collector is connected to the 26-pin connector. The emitter point of transistor is connected to the common return pin of the interface connector. Voltage Rating: Maximum 30 V, Minimum 3 V for Active High, Sink Current: 50 mA
FAULT Status	Output Signal, High state indicates fault state of the power supply. Open collector transistor output, Collector is connected to the 26-pin connector. The emitter point of transistor is connected to the common return pin of the interface connector. Voltage Rating: Maximum 30 V, Minimum 3 V for Active High, Current Sink Current: 50 mA
ISOLATED ANALOG PROGRAMMING FEATURES	
Remote Analog Programming of Output Voltage [(2)(3)]	Independent Signal inputs for output voltage programming using External Analog Reference. Analog reference source is user selectable and can be a voltage or resistance. User can select the reference source and range as given below; **a)** Voltage as Reference Source**:** 0 V to user selectable maximum range (5 V to 10 V) for 0 to full scale rated Output. **b)** Resistance as Reference Source**:** 0 Ω to user selectable maximum range (5 kΩ to 10 kΩ) for 0 to full scale rated Output. Programming accuracy and linearity: ±1% of rated output
Remote Analog Programming of Output Current [(2)(3)]	Independent Signal inputs for output current programming using External Analog Reference. Analog reference source is user selectable and can be a voltage or resistance. User can select the reference source and range as given below; **a)** Voltage as Reference Source**:** User selectable range of (-5 V to +5 V) or (-10 V to +10 V) for 0 to full scale rated Output. **b)** Resistance as Reference Source**:** 0 Ω to user selectable maximum range (5 kΩ to 10 kΩ) for 0 to full scale rated Output. This is applicable only in source mode. Programming accuracy and linearity: ±1% of rated output
Monitor Signals for the Output Voltage and Output Current	Monitor Signals for the Output Voltage and Current. Full Scale range: 0 V to 10 V corresponds to 0-100% full-scale output. Minimum recommended Load: 100 kΩ, typical Maximum Load: 20 kΩ Monitor accuracy and linearity: ±1% of full-scale output
Remote Analog Programming of Overvoltage [(2)(3)]	Signal input for setting Overvoltage using External Analog Reference Voltage. Range: 0.25 V to user selectable maximum range (5 V to 10 V) for 5% to 110% of the full-scale Output Voltage.

REMOTE ISOLATED EXTERNAL USER CONTROL I/O SIGNAL INTERFACE	
FUNCTION	**CHARACTERISTICS**
	Programming accuracy and linearity: ±1% of full-scale output.

(1) Trigger IN and Trigger OUT signals can be used during Ramp and Transient List functionality only.
(2) Unit can only be operated in remote analog programming in Bi-directional, Source and Eload modes.
(3) Analog Programming is not supported in Series operation.

PIN	REFERENCE	TYPE	RANGE	FUNCTIONAL DESCRIPTION
1	VPRG_VOLT	Input	0 to 10V	Independent Signal inputs for output voltage programming using External Analog Reference. In this, the reference is a voltage source: 0 V to user selectable maximum range (5 V to 10 V) for 0 to full scale rated output voltage.
2	VPRG_CURR	Input	0 to 10 kΩ	Independent Signal inputs for output voltage programming using External Analog Reference. In this, the reference is resistance source: 0 Ohm to user selectable maximum range (5 kΩ to 10 kΩ) for 0 to full scale rated output voltage.
3	IPRG_VOLT	Input	-10 to +10 V	Independent Signal inputs for output current programming using External Analog Reference. In this, the reference is a voltage source: -10 V to +10 V for 0 to full scale rated output current.
4	IPRG_CURR	Input	0 to 10 kΩ	Independent Signal inputs for output current programming using External Analog Reference. In this, the reference is resistance source: 0 Ohm to user selectable maximum range (5 kΩ to 10 kΩ) for 0 to full scale rated output current (available only in Source mode).
5	OVPRG_VOLT	Input	0 to 10V	Remote Analog Programming of Overvoltage. Signal input for setting Overvoltage using External Analog Reference Voltage. 0.25 V to user selectable maximum range (2 V to 10 V) for 5% to 110% of the full-scale Output Voltage.
6	GND_ISOSELV	Return	NA	Ground for programming Signals
7	VMON	Output	0 to 10V	Monitor Signals for the Output Voltage
8	IMON	Output	-10 to +10V	Monitor Signals for the Output Current
9	GND_ISOSELV	Return	NA	Ground for Monitor Signals
10	DIO_OUT1	Output	0 to 30 V	Open collector transistor output for user programming
11	DIO_OUT2	Output	0 to 30 V	Open collector transistor output for user programming
12	SOUR/SINK_OUT	Output	0 to 30 V	Open collector transistor output. Collector is connected to the 26-pin connector. Status

PIN	REFERENCE	TYPE	RANGE	FUNCTIONAL DESCRIPTION
				signal to communicate the direction of current flow. **a)** Low – indicates power transfer is from power supply to UUT. **b)** High – indicates power transfer is from UUT to Power supply.
13	TRIG_OUT	Output	0 to 30 V	Active-high; synchronization pulse of 100 μs. Open collector transistor output. Collector is connected to the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector.
14	DIO_ON/OFF_STAT	Output	0 to 30 V	High state indicates Output is ON and Low state indicates Output is OFF. ON/OFF-Open collector transistor output, Collector is connected to the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector.
15	DIO_CC/CV_OUT	Output	0 to 30 V	CC/CV status- open collector configuration. Collector is connected to the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. High state indicates Constant Current mode operation, and Low state indicates Constant Voltage mode operation.
16	DIO_FAULT_OUT	Output	0 to 30 V	Fault status- open collector configuration. Collector is connected to the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. Open collector configuration. Collector is connected to the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. High state indicates fault state of the power supply.
17	RTN	Return	NA	Return for digital signals
18	RTN	Return	NA	Return for digital signals
19	TRIG_IN	Input	0 to 24 V	TTL compatible Input signal, active-high pulse of 100 μs; detects external hardware trigger at falling edge of the pulse for voltage, current ramp, and Transient List functions. Signal connects to Open-anode of opto-isolator diode with internal 1kΩ series resistor internal to power supply.
20	DIO_OUTPUT_ON/OFF	Input	0 to 24 V	Remote-control input for output on/off with a logic signal: a logic-high, 2.7-24 VDC TTL/CMOS signals will enable (turn-on) the

PIN	REFERENCE	TYPE	RANGE	FUNCTIONAL DESCRIPTION
				output of the supply, and a logic-low signal disables (turns off) the output.
21	Digital_IN-1	Input	-5 to 24 V	Remote-control input with a logic signal.
22	Digital_IN-2	Input	-5 to 24 V	Remote-control input with a logic signal.
23	Digital_IN-3	Input	-5 to 24 V	Remote-control input with a logic signal.
24	Remote_Inhibit_Active_Voltage	Input	-5 to 24 V	Remote-control input for output on/off with a logic signal. User can select the signal condition (LOW/HIGH) to turn OFF output.
25	Remote_Inhibit_Contact_Closure	Input	-5 to 24 V	Switch or Relay contact is used to turn OFF the output. User can select the switch or relay position (Open/Close) to turn OFF the output.
26	RTN	Return	NA	Ground return
NOTE: All the signals are safety isolation SELV-rated, referenced to chassis.				

Table 2-14. Remote Isolated User Control and Analog Interface

2.18 EXTERNAL RELAY CONTROL SIGNAL CONNECTOR

Mi-BEAM Series power supply has an 8-Pin interface connector to provide output isolation and negative voltage polarity detection, when interfaced with the Mi-BEAM Output isolation chassis.

Mi-BEAM output isolation chassis (5580714-01R - Rated Voltage and Current: 2000V, 1000A) must be purchased separately. Refer to the block diagram for interfacing the UUT with Mi-BEAM series power supply along with Mi-BEAM isolation chassis.

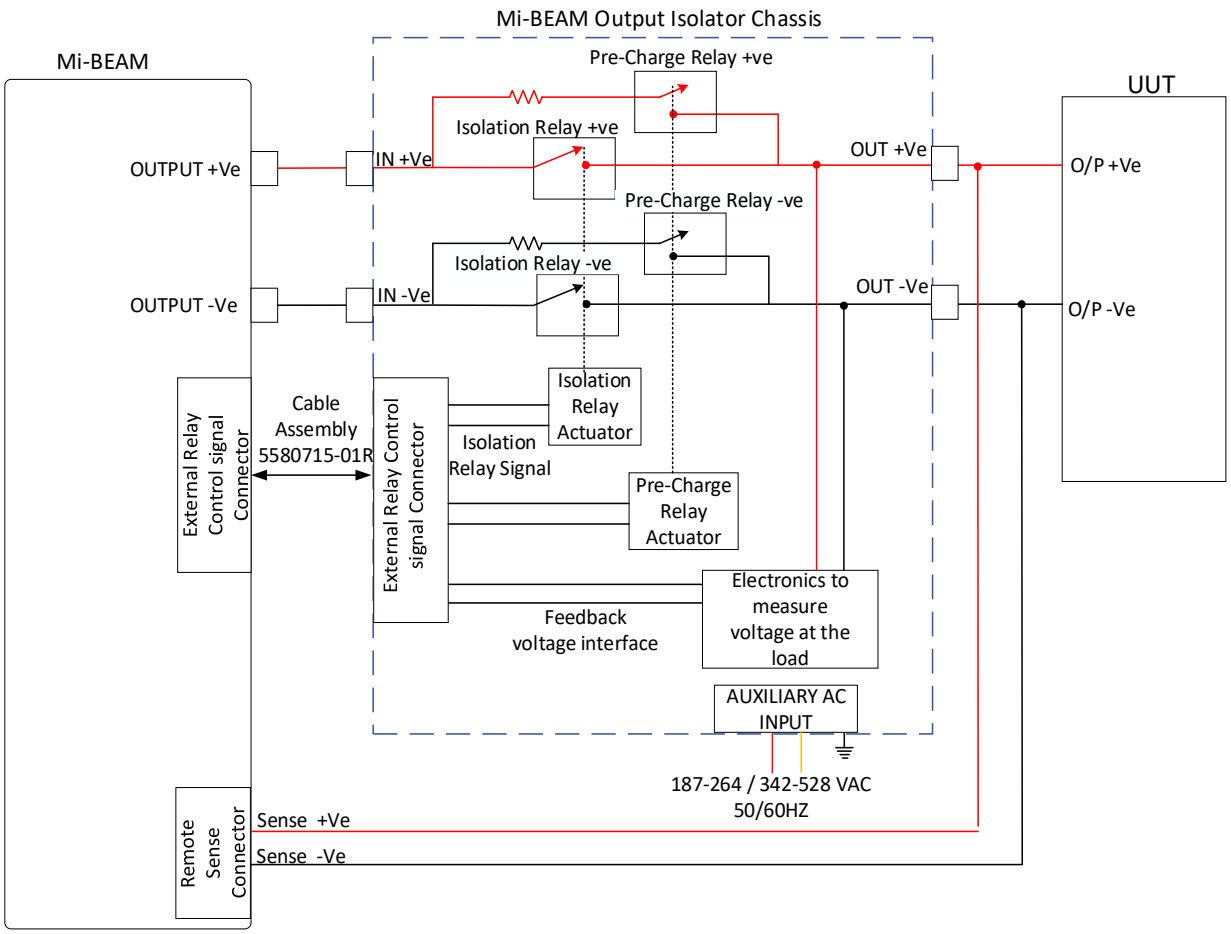


Figure 2-11. Mi-BEAM Isolation Chassis block diagram

2.19 REMOTE CONTROL DIGITAL INTERFACE CHARACTERISTICS

The features and capabilities of the digital interfaces used for remote control of a device. These interfaces allow for communication and control between the device and external systems or controllers. The remote-control digital interface characteristics in the Mi-BEAM are listed below.

INTERFACE	CHARACTERISTIC
LAN	Ethernet LXI Complaint 10BASE-T and 100BASE-T over twisted-pair cables compliant with IEEE 802.3; **Connector:** 8P8C modular jack.
USB	Serial interface compliant to USB 2.0; **Connector:** Type-B receptacle.
RS-232C	Serial interface compliant to RS-232C;

INTERFACE	CHARACTERISTIC
	Protocol: data bits, 7 with parity and 8 without parity; stop bits, 2; baud rate, 9600 to 115200; handshake, CTS and RTS; **Connector:** Subminiature-D, 9-contact receptacle.
CAN	**Protocols:** CAN2.0B and CANopen; **Baud Rates:** 20kbps to 1mbps (20k, 40k, 50k, 80k, 100k, 125k, 150k, 200k, 250k, 400k, 500k, 1000 kbps) ; **Node Id:** 1 to 127; **Termination:** 120 Ω recommended (termination needs to be done by the user), safety isolation SELV-rated, referenced to chassis. **Unit side connector:** compression terminals, Phoenix P/N 1995499 **Mating Connector**: Phoenix P/N 1840366 **CAN 2.0B:** Frame types supported: Extended frame (29-bit ID) and Data frames (DLC up to 8 bytes); **Supported services:** Raw CAN messages (without protocol encapsulation); **Communication type:** Signal Mapping via DBC; **CAN database file:** .dbc file support. **CANOpen:** Frame types supported: NMT, SDO, PDO, and Heartbeat; **Supported services:** Object Dictionary Access; **Communication type:** Structured Communication via Object Dictionary and Signal Mapping via DBC; **CAN database file:** .dbc file support.
IEEE-488 (Optional)	Parallel interface complies with IEEE-488.1, IEEE-488.2, and the SCPI command specification; **Command execution response time:** 10 ms, typical; **Connector:** IEEE-488.1 compliant.
Firmware Upgrade	Firmware could be upgraded through the LAN interface using Firmware Update Tool.

Table 2-15. Remote Control Digital Interface

2.20 PROTECTION FUNCTION CHARACTERISTICS

The features and capabilities of a system designed to safeguard equipment and ensure safe operation under various conditions. The protection functions in the Mi-BEAM are listed below.

FUNCTION	CHARACTERISTICS
Output Overvoltage Protection (OVP)	Programmable to 110% of full-scale output voltage; exceeding OVP threshold results in shutdown of output.
Output Positive Overcurrent Protection (+ve OCP) (1)	Programmable to 120% of full-scale output Positive current; exceeding Positive OCP threshold results in shutdown of output.
Output Negative Overcurrent Protection (-ve OCP) (2)	Programmable to 120% of full-scale output Negative current; exceeding Negative OCP threshold results in shutdown of output.
Output Current Limit Protection	User-selectable regulation settings, **a) Bi-DIR Mode:** • Voltage (programming type) – CV, CV/CC, CV-SER-RES, CV/CP • Current (programming type) – CC, CC/CV, CC/CP, CP/CC. **b) Source Mode:** • Voltage (programming type) – CV, CV/CC, CV/CP, CP/CV, CV-SER-RES • Current (programming type) – CC, CC/CV, CC/CP, CP/CC. **c) eLoad Mode:** • Voltage (programming type) – CV, CV/CC, CR/CV, CP/CV, CV/CP • Current (programming type) – CC, CC/CV, CR/CC, CP/CC, CC/CP. o In **CV/CC** mode, regulates voltage, on reaching the current limit power supply regulates the limit reached, on reaching the power limit results in shutdown of output. o In **CV/CP** mode, regulates voltage, on reaching the power limit power supply regulates the limit reached, on reaching the current limit results in shutdown of output. o In **CC/CV** mode, regulates current, on reaching the voltage limit power supply regulates the limit reached, on reaching the power limit results in shutdown of output. o In **CC/CP** mode, regulates current, on reaching the power limit power supply regulates the limit reached, on reaching the voltage limit results in shutdown of output. o In **CP/CC** mode, regulates power, on reaching the current limit power supply regulates the limit reached, on reaching the voltage limit results in shutdown of output.

FUNCTION	CHARACTERISTICS
	○ In **CP/CV** mode, regulates power, on reaching the voltage limit power supply regulates the limit reached, on reaching the current limit results in shutdown of output. ○ In **CR/CC** mode, regulates resistance, on reaching the current limit power supply regulates the limit reached, on reaching the voltage and power limit results in shutdown of output. ○ In **CR/CV** mode, regulates resistance, on reaching the voltage limit power supply regulates the limit reached, on reaching the current and power limit results in shutdown of output. ○ In **CV** mode, regulates voltage, on reaching current or power limits results in shutdown of output. ○ In **CC** mode, regulates voltage, on reaching voltage or power limits results in shutdown of output. ○ In **CV-SER-RES** mode, regulates voltage, on reaching voltage or current or power limits results in shutdown of output. In all the regulation settings, shutdown delay on reaching the limit is programmable from 100 ms to 5 s.
AC Input Overcurrent Protection	Internal fuses in each phase for fault isolation; not user replaceable.
AC Input Undervoltage Protection	Automatic shutdown for insufficient AC input voltage.
Islanding Detection	In sink mode, the loss of input AC grid is detected by built-in islanding detection feature. Thus, accidental islanding formation with the regenerative load is avoided.
AC Input Transient Protection	Protection to withstand EN61326-1, Surge testing to industrial test levels.
Overtemperature Protection (OTP)	Internal temperature monitors cause shutdown of output if temperature thresholds are exceeded.
(1) This is applicable only in Bi-Directional, Source, PV Simulator, Battery Simulator and Battery Test operating modes. *(2) This is applicable only in Bi-Directional, eload, Battery Simulator and Battery Test operating modes.*	

Table 2-16. Protection Function Characteristics

2.21 OUTPUT ISOLATION

The Table 2-17 outlines the output isolation details for the Mi-Beam series, covering both the unit's rated output voltage and various other rated output voltage conditions. The specific isolation details are provided below;

UNIT RATED OUTPUT VOLTAGE	RATED OUTPUT VOLTAGE ≤ 400 V	400 V < RATED OUTPUT VOLTAGE ≤ 2000 V
Output terminal Chassis Earth (1)	714 V_{RMS} / ±1000 V_{peak}	1428 V_{RMS} / ±2000 V_{peak}
Output terminal Positive to (+Ve) to Negative (-Ve)	V_{peak} = 110% of output rated voltage	
Isolated Analog interface Signals and External User Control I/O interface to Output Negative terminal(2)	±1000 V_{peak}, maximum	±2000 V_{peak}, maximum
Input AC to Output DC, working voltage (3)	730 V_{RMS} / ±1022 V_{peak}	1460 V_{RMS} / ±2045 V_{peak}

(1) *The output terminal positive to chassis earth voltage is the sum of the output terminal negative to chassis earth voltage and operating output voltage. At any operating condition, the output terminals to chassis earth voltage should not exceed the given limit.*

(2) *The Isolated Analog programming and external user interface signals are galvanically isolated from negative output terminal; operation of Isolated Analog Interface signals should be at SELV safety voltage conditions to chassis ground.*

(3) *Input AC and Output DC are galvanically isolated.*

Table 2-17. Output Isolation

2.22 ENVIRONMENTAL SPECIFICATIONS

The environmental conditions and requirements that a product, system, or process must meet ensure that the product or system can operate effectively within its intended environment and comply with relevant environmental regulations. The environmental characteristics are listed below;

PARAMETER	SPECIFICATION
Operating Temperature	0°C (32°F) to 40°C (104°F)
Storage Temperature	-25°C (-13°F) to 65°C (149°F)
Altitude	2000 m (6,600 ft)
Operating Humidity	20-80 %, non-condensing
Relative Humidity	10-95 %, non-condensing
Vibration	MIL-PRF-28800F, Class 3; 5-500 Hz per Paragraph 4.5.5.3.1. MIL-PRF-28800F, Class 3; 5-55 Hz per Paragraph 4.5.5.3.2.
Shock	MIL-PRF-28800F, Class 3; 20G half-sine with 11 ms duration per Paragraph 4.5.5.4.1.
Transportation Integrity	ISTA Test Procedure 1B

Table 2-18. Environmental Specifications

2.23 MECHANICAL SPECIFICATIONS

The mechanical specification provides the information about the product, system, or component must meet to perform reliably and safely conditions. The mechanical specifications are listed below.

PARAMETER	SPECIFICATION
Dimensions	**a)** H, 6.97 in (177 mm); W (front panel), 18.9 in (480 mm); D, 27.56 in (700 mm-enclosure only); **b)** H, 6.97 in (177 mm); W (Chassis), 16.9 in (429 mm); D, 27.56 in (700 mm-enclosure only).
Unit Weight	**a)** For 37.5kW 400V, 600V, 800V, 1200V, 1500V, 2000V models and 25kW for 1200, 1500V, 2000V – 62kgs **b)** For 25kW 400V, 600V, 800V model – 50kgs. **c)** For 12.5kW 400V, 600V, 800V model – 38kgs.
Shipping Weight	**a)** For 37.5kW 400V, 600V, 800V, 1200V, 1500V, 2000V models and 25kW for 1200, 1500V, 2000V – 90kgs. **b)** For 25kW 400V, 600V, 800V models – 78kgs. **c)** For 12.5kW 400V, 600V, 800V models – 66kgs.
Chassis Material	Steel with plastic front panel
Chassis Finish	Steel electroplated
Installation	Protective covers are provided for AC input and DC output. Rackmount: per ANSI-EIA-310-D, with front panel mounting flanges and chassis provisions for mounting rack slides; slides option available.
Cooling	Force-air cooling; linear, variable fan speed control; air intake at front/sides and exhaust at rear.
Acoustic Noise	**a)** 56 A-weighted decibels (dBA), at idle fan speed; measured at 1.5 m (4.92 ft) with A-weighting. **b)** 78 dBA, at maximum fan speed; measured at 1.5 m (4.92 ft) with A-weighting.

Table 2-19. Mechanical Specifications

2.24 OUTPUT ISOLATION CHASSIS (5580714-01R) MECHANICAL SPECIFICATIONS

The output isolation chassis (5580714-01R) mechanical specification provides the information about the product, system, or component must meet to perform reliably and safely conditions. The output isolation chassis mechanical specifications are listed below.

PARAMETER	SPECIFICATION
Dimensions	**a)** H, 6.97” (177 mm); W (front panel), 18.9” (480 mm); D, 27.56” (700 mm-enclosure only);

PARAMETER	SPECIFICATION
	b) H, 6.97” (177 mm); W (Chassis), 16.9” (429 mm); D, 27.56” (700 mm-enclosure only);
Unit Weight	30Kgs
Shipping Weight	50Kgs
Chassis Material	Steel with plastic front panel
Chassis Finish	Steel electroplated
Installation	Rackmount: per ANSI-EIA-310-D, with front panel mounting flanges and chassis provisions for mounting rack slides; slides option available.
Cooling	Force-air cooling; linear, variable fan speed control; air intake at front/sides and exhaust at rear.

Table 2-20. Output Isolation Chassis Mechanical specifications

2.25 REGULATORY AGENCY COMPLIANCE

The following Table 2-21 provides the regulatory agency compliance details for the various parameters and their specifications for the Mi-Beam series.

PARAMETER	SPECIFICATION
EMC	CE marked for EMC Directive 2014/30/EU per EN61326-1:2021, Class-A for emissions and immunity as required.
Safety	NRTL marked for US and Canada to CAN/CSA-C22.2 No. 61010-1-12, UL 61010-1 Third Edition. CE marked for LVD compliance 2014/35/EU to EN 61010-1 Third Edition as required for the EU CE mark.
CE Mark LVD Categories	Installation Overvoltage Category: II; Pollution Degree: 2, IP20 Indoor uses only.
RoHS	CE marked for compliance with RoHS3 EU Directive 2015/863/EU for Restriction of Hazardous Substances in Electrical and Electronic Equipment.

Table 2-21. Regulatory Agency Compliance

2.26 REAR PANEL CONNECTORS

The various ports and interfaces located on the back of the device allows it to interface with other systems and peripherals. The rear panel connectors of the Mi-BEAM are listed in the table below;

CONNECTOR	DESCRIPTION
AC Input	3-Phase AC input: connector terminals; **a) Unit side connector:** compression terminals, Phoenix P/N 3073571, Mating Connector, Cable Lug
Safety-Ground	M6 chassis stud
DC Output (+Ve and -Ve) (For 400-2000V Models)	DC Output terminal; **a) Unit side connector:** Copper bus bar - 35mm height and 5mm thickness, with an M6 threaded hole using Clinch nuts- 1 Number each for Positive and Negative terminal.
Remote Sense (S+) and (S-)	**a) Unit side connector:** compression terminals, Phoenix P/N 1995499, x2 numbers (for S+ and S-) **b) Mating Connector:** Phoenix P/N 1840366, x2 numbers (for S+ and S-)
Isolated External User Control I/O interface	User control signal interface connector; safety isolation SELV-rated, referenced to chassis; **a) Unit side connector:** high-density, 26-contact, female D-Type, Norcomp P/N 181-026-213R531 **b) Mating connector:** Norcomp P/N 180-026-103L001
Parallel Interface	One number of 15P – 2PORT DB15 male and female connectors; safety isolation SELV-rated, referenced to chassis. This interface is used for the leader-follower parallel or series operation of the Mi-BEAM Series power supply.
External Relay Control Signal Connector	User control external relay signal interface connector; safety isolation SELV-rated, referenced to chassis; **a) Unit side connector:** Molex 430200800 **b) Mating connector:** Molex 430250800
LAN Interface	Ethernet 10 BASE-T and 100 BASE-T; safety isolation SELV-rated, referenced to chassis; **a) Connector:** 8P8C modular jack.
USB Interface	Serial interface to USB 2.0; safety isolation SELV-rated, referenced to chassis; **a) Connector**: Type-B.
RS-232 Interface	Serial interface to RS-232C; safety isolation SELV-rated, referenced to chassis; **a) Connector:** Subminiature-D, 9-contact receptacle.
CAN Interface	CAN interface compliant to CAN2.0B and CANopen is provided; safety isolation SELV-rated, referenced to chassis. **a) Unit side connector:** compression terminals, Phoenix P/N 1995499 **b) Mating Connector:** Phoenix P/N 1840366
IEEE-488 Interface (Optional)	Parallel interface to IEEE-488.1, IEEE-488.2, and SCPI; safety isolation SELV-rated, referenced to chassis; connector: IEEE-488.1 compliant.

CONNECTOR	DESCRIPTION
Parallel Interface	One number of 15P – 2PORT DB15 male and female connectors; safety isolation SELV-rated, referenced to chassis. This interface is used for the leader-follower parallel or series operation of the Mi-BEAM Series power supply. **a)** **1 Feet** (0.304 m) Cable - **890-015-01** (CABLE,15P, D-SUB, M/F, SHLD,1FT (0.304 m)). – To connect between units within a rack. **b)** **2.5 Feet** (0.762 m) Cable - **890-015-04** (CABLE,15P, D-SUB, M/F, SHLD,2.5FT (0.762 m)). – To connect between units within a rack. **c)** **5 Feet** (1.52 m) Cable - **890-015-02** (CABLE,15P, D-SUB, M/F, SHLD,5FT (1.52 m)) – Only to be used for Rack-to-Rack connection.

Table 2-22. Rear Panel Connectors

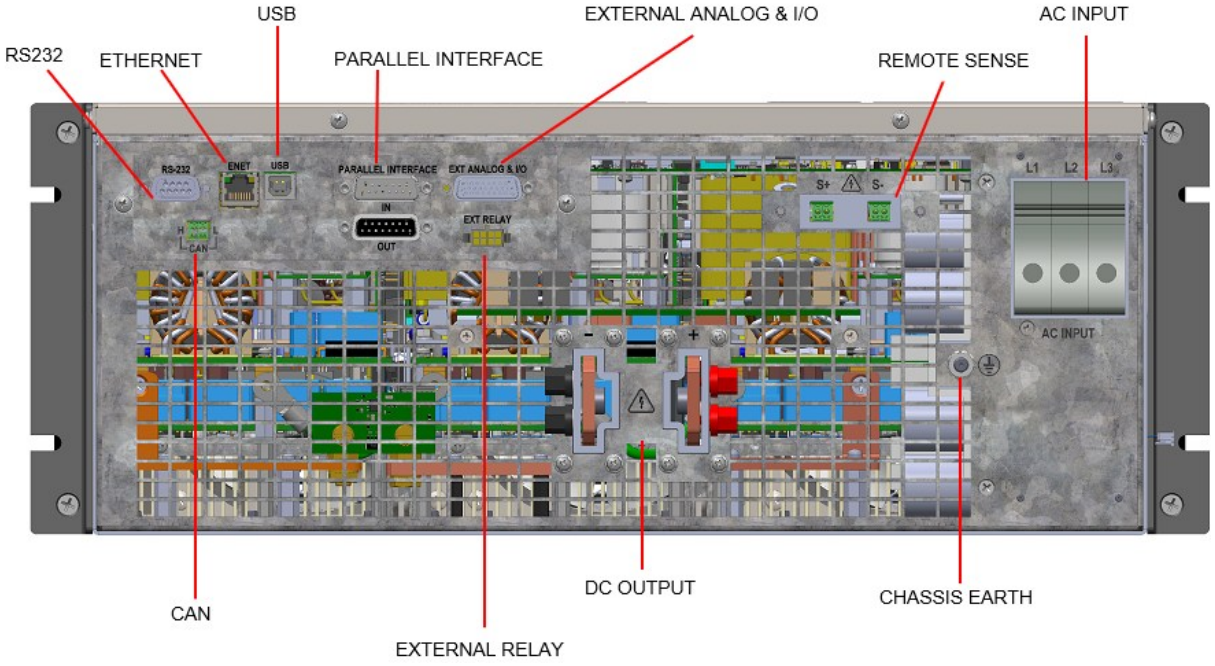


Figure 2-12. Rear Panel Connectors

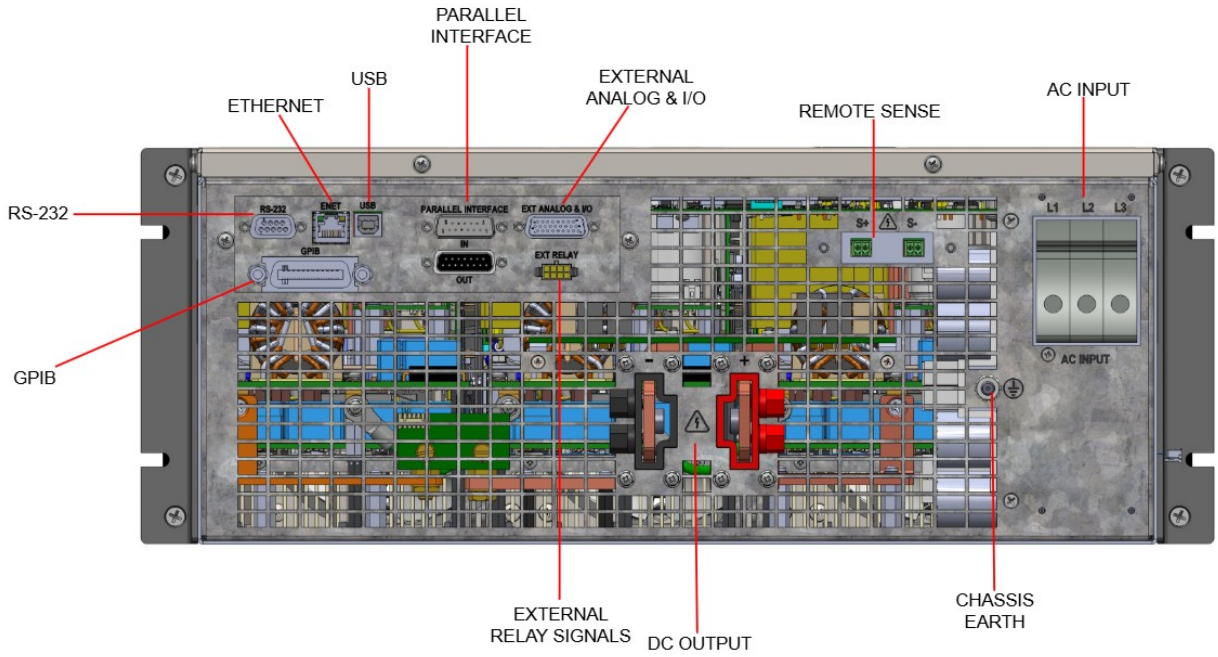


Figure 2-13. Rear Panel Connectors with GPIB – optional

2.27 OUTPUT ISOLATION CHASSIS (5580714-01R) REAR PANEL CONNECTORS

The various ports and interfaces located on the back of the device allows it to interface with other systems and peripherals. The rear panel connectors of the Mi-BEAM Output Isolation Chassis are listed in the table below;

CONNECTOR	DESCRIPTION
AC Input	**a) AC input Low Line:** L1 + L2 + Gnd 187 – 264 VAC, Line-Line, 50/60 Hz **b) AC input High Line:** L1 + L2 + Gnd 342 – 528 VAC, Line-Line, 50/60 Hz **c) Maximum Power :** 240W **d) Unit side Connector:** Compression terminals, Phoenix P/N 3073571 **e) Mating Connector:** Cable Lug
DC Output	**a) Voltage:** 2000V maximum **b) Current:** 1000A
Safety-Ground	M4 chassis stud
DC Positive Output and DC Negative Output (For 400-2000V Models)	DC Output terminal;

CONNECTOR	DESCRIPTION
	a) Unit side connector: Copper bus bar - 75mm height and 6mm thickness, with an M8 threaded hole using Clinch nuts- 4 Numbers each for Positive and Negative terminal.
DC Positive Input and DC Negative Input (For 400-2000V Models)	DC Input terminal; **a) Unit side connector:** Copper bus bar - 75mm height and 6mm thickness, with an M8 threaded hole using Clinch nuts- 4 Numbers each for Positive and Negative terminal.
External Relay Control Signal Connector	User control external relay signal interface connector; safety isolation SELV-rated, referenced to chassis; **a) Unit side connector:** Molex 43020-0800 **b) Mating connector:** Molex 43025-0800

Table 2-23. Output Isolation Chassis Rear Panel Connectors

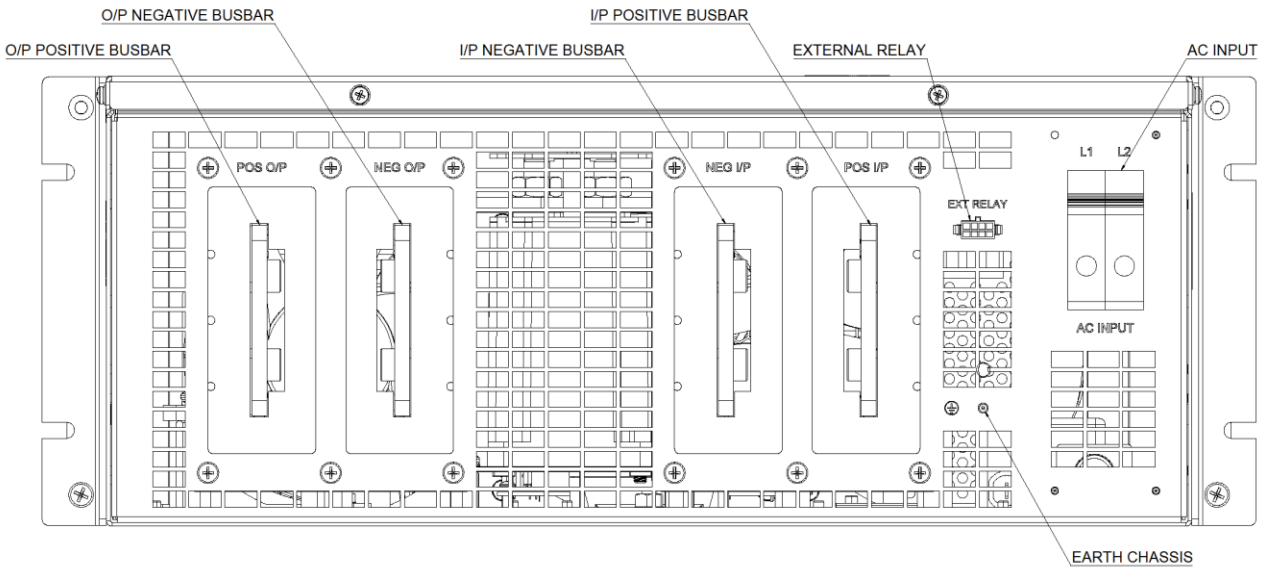


Figure 2-14. Output Isolation Chassis - Rear Panel

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3 INSTALLATION

This chapter provides detailed instructions for the safe and proper installation of the Mi-BEAM Series power supply models. It covers the necessary steps to ensure optimal performance and longevity of the equipment. The following information will help prevent damage to the unit and ensure compliance with safety standards.

3.1 UNPACKING AND INSPECTION

Inspect the shipping carton for possible damage before unpacking the unit. Carefully unpack the equipment. Save all packing materials until the inspection is complete. Ensure that all items listed on the packing slips have been received. Visually inspect all exterior surfaces for broken knobs, connectors, or displays. Inspect for dented or damaged exterior surfaces. External damage may be an indication of internal damage.

If any damage is evident, immediately contact the carrier that delivered the unit and submit a damage report. Failure to do so could invalidate future claims. Direct repair issues to Customer Service at 858-458-0223 (local) or 1-800-733-5427 (toll-free in North America).



CAUTION!

A minimum of two people are required to carry the unit from the package using the attached lifting straps, as it weighs up to 137 lbs. (62 kg).

Make sure the location (floor) in which the Mi-BEAM Series unit(s) will be installed can support the weight of the unit(s).

3.1.1 CONTENTS OF SHIPMENT

Depending on the model, configuration, and options available for the user's Mi-BEAM Series power supply, the ship kit may include additional parts and accessories.

Minimum items included in the ship kit:

1. Remote Sense Mating Connector, Refer to Item 1 in Table 3-1.
2. Protective cover and grommet for DC output and remote sense, Refer to Item 2 in Table 3-1.
3. Protective cover for AC input, Refer to Item 3 in Table 3-1.
4. KEPS Steel Nut and Screw and washers for installing AC Input, DC output and Remote sense protective covers, Refer to Item 4 in Table 3-1.
5. Analog programming Mating connector, Refer to Item 5 in Table 3-1.
6. Certificate of Conformance, Refer to Item 6 in Table 3-1.

7. EMI ferrite cores for AC input and DC output connection cables Refer to Item 7 in Table 3-1

8. Stylus pen for the front panel operation Refer to Item 8 in Table 3-1

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY	MFG	MFG P/N
1	893-160-28	TERM BLK 2P,8A,160V, PCB MNT	3	Phoenix Contact	1840366
2	9580380-01R	COVER, SAFETY, SENSE O/P,4U-DC RGN	1	AMETEK	9580380-01R
	9580289-01R	COVER,SAFETY,DC O/P,NEG,4U-DC RGN	1	AMETEK	9580289-01R
	9580289-02R	COVER,SAFETY,DC O/P,POS,4U-DC RGN	1	AMETEK	9580289-02R
	109-505-10	GROMMET,5ID,10OD,TPE	2	JACOB GmbH	G505-1016-00
3	9580336-01R	COVER, SAFETY, AC INPUT,4U-DC RGN	1	AMETEK	9580336-01R
4	9580614-01R	SCREW, M4X8MM, INSUL, POS,4U-Mi BEAM	2	AMETEK	9580614-01R
	76011	WASHER,M6,FLAT,12MM OD,SS	4	Any	NA
	76012	WASHER,M6,SPLIT LOCK,11.8MM OD,SS	4	Any	NA
	9580614-02R	SCREW, M4X8MM, INSUL, NEG,4U-Mi BEAM	2	AMETEK	9580614-02R
	082000B	LOCKNUT, M3 x 0.5 MM (0.019 IN.) THD, STL, ZINC, W/T WASHER	6	Any	NA
	75162	SCREW,M6 X 16MM,PAN HD,ZN	2	Any	NA
	110-901-28	SCREW,M6 X 16MM,SKT HD,ZN	2	Any	NA
5	856-103-26	CONN,26P, D-SUB HD PLUG, PNL MNT	1	Norcomp	180-026-103L001
6	152546	CERTIFICATE OF CONFORMANCE	1	NA	NA
7	995-336-43	CORE,FERRITE,CBL,43R,2ODX1.5H	2	FAIR-RITE PRODUCTS CORP	2643626202
8	881-800-00	STYLUS PEN,RESISTIVE TOUCH,VM800	1	FTDI/ BRIDGETEK	VA-FC-STYLUS1

Table 3-1. Contents of Shipment

NOTE: If any parts are missing, reach out to AMETEK Customer Service at 858-458-0223 (local) or 1-800-733-5427 (toll-free).

Optional accessories:

a) K580351-01R: Rackmount slide kit; includes two slides with rack adapter brackets and mounting hardware.

3.2 MECHANICAL INSTALLATION



WARNING!

This unit is intended for installation in a protected environment. Exposure to conductive contaminants, corrosive compounds or gases that could be ingested into the chassis could result in internal damage. To reduce the risk of fire or electrical shock, install the Mi-BEAM Series unit in a temperature and humidity controlled indoor area.



CAUTION!

The power supply should be provided with proper ventilation. The front and rear of the unit must be free of obstructions. To ensure proper airflow, a minimum 2 in. (50.8 mm) clearance from the rear air outlet is required.



CAUTION!

No user serviceable parts are inside; service is only to be performed by qualified personnel.

The Mi-BEAM Series power supply is designed for rackmount applications, there is an option for a rack mounted slide. The unit is forced air cooled with internal fans drawing air in from the front and sides and exhausting at the rear. The front and rear of the unit must be kept clear of obstruction, and clearance must be maintained to allow unimpeded airflow. The same consideration given to the side grilles will minimize internal temperature rise. Special consideration must be made to overall air flow characteristics, and the resultant internal heat rise, when a source is installed inside enclosed cabinets to avoid excessive heating and over-temperature problems. The temperature of the ambient air at the air intake should not exceed 40°C (104°F).

3.2.1 RACK MOUNTING

The Mi-BEAM Series power supply is designed for mounting in a standard 19 in. (482.6 mm) equipment rack that is compliant to ANSI/EIA-310-D. If other instrumentation is mounted in the rack adjacent to the unit, there is no need for additional clearance above or below the source. It should be supported in the rack using appropriate L-brackets or rackmount slides. Refer to Figure 3-1 for typical rackmount installation. The rack mounting slide kit, part number K580351-01R consists of the following items:

PART NUMBER	DESCRIPTION	MFG	ITEM	QTY
105-140-22	RACK SLIDES,140LBS,22 IN,SS	JONATHAN 370QD-22	1	2
9580805-01R	BRKT,RACK SLIDE,4U-Mi-BEAM	AMETEK	2	4
110-800-06	SCREW,8-32 X .375, PFH100, LK, SS	ANY	4	15

PART NUMBER	DESCRIPTION	MFG	ITEM	QTY
112EN04-01	NUT,8-32, W/CONE WASHER, KEP, CS	ANY	5	8
110GS04-08	SCREW,10-32, X .500, SEMS, PPH, CS	ANY	6	12
112GI04-01	NUT, 10-32, ZINC PL	ANY	7	12

Table 3-2 . Rack Mounting Slide Kit

NOTE: Remove the lifting straps from the unit before assembling the rack slides.

NOTE: Item (1) consists of three parts (item (1A), item (1B) and item (1C)) as shown in Figure 3-1.

Recommended rackmount kit installation instruction is as follows:

a) Install the slide sections item (1) (supplied as part of item (1)) on both sides of the power supply chassis with screws, item (4) (three on one side and four on the other).

b) Install the brackets, item (2), to the cabinet sections of the slides, item (1C) (supplied as part of item (1)), with screws, item (4), and nuts, item (5) (four on each side).

c) Adjust the location of the mounting brackets as required for the rack cabinet vertical rails utilized.

d) Mount the cabinet sections of the slides, item (1C), (with brackets already installed) into the cabinet using appropriate hardware (e.g., the screws and nuts supplied, item (6) and item (7), or user-supplied bar-nuts, cage-nuts, clip-nuts), while ensuring that they are level, front to back and left to right, on the cabinet rails.

e) Insert adjustable side sections, item (1B) (supplied as part of item (1)), into cabinet slide sections, item (1C). Insert power supply chassis with installed slide sections, item (1A), into the adjustable slide sections, item (1B).

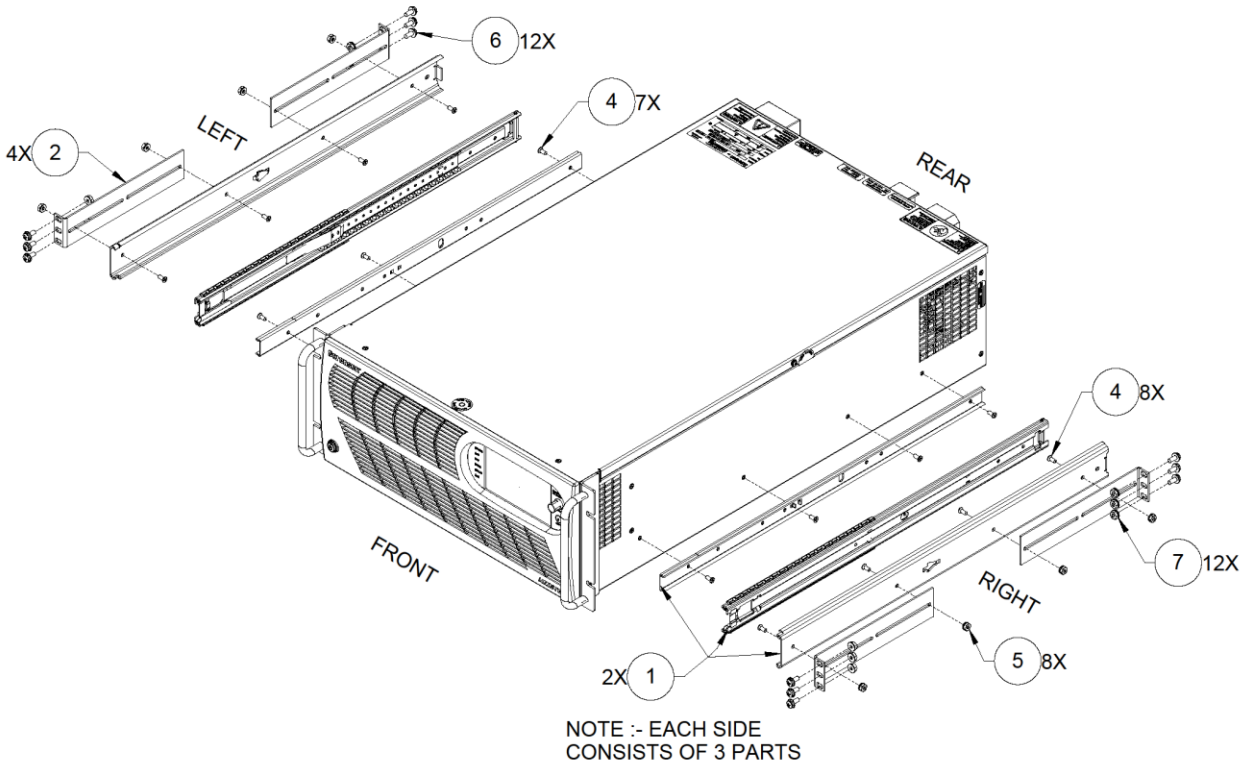


Figure 3-1. Rack mounting

3.3 CHASSIS REMOVAL FROM RACK

The slides have a front disconnect feature and lock at full extension. To disconnect and remove the chassis from the rack, depress the flat steel spring (located on the slides) inward, and pull the chassis forward. To return the chassis back into the rack from full extension, depress the flat steel spring (located on the slides) inward, and push the chassis back.

When the chassis is at full extension, the flat springs are located behind the front rack rails. Retract the springs with a flat blade screwdriver or similar device to release from lock-out or to remove the chassis from the rack.

3.4 OUTLINE DRAWINGS

Figure 3-2 shows the outlines and overall dimensions for installation of the Mi-BEAM Series power supply without relay option.

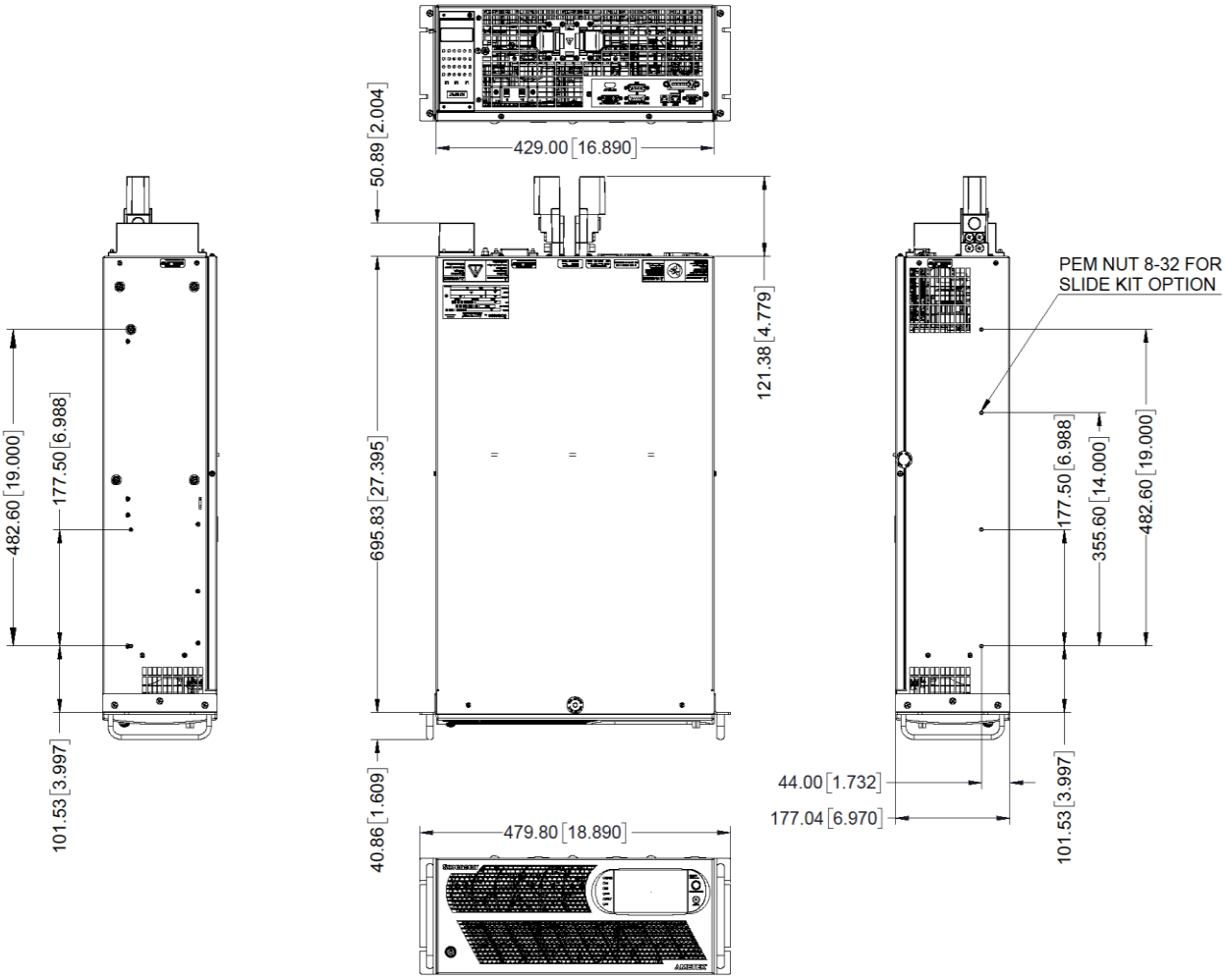


Figure 3-2: Outline Drawing

Figure 3-3 and Figure 3-4 shows the installation of the rear panel protective covers for the AC input and DC Output terminations. The components comprising these covers are supplied in the ship kit. Figure 3-6 shows the rear panel view of the power supply and the location of the connectors.

3.5 REAR PANEL PROTECTIVE COVERS

3.5.1 INPUT PROTECTIVE COVERS

Protective covers are provided for the rear panel AC input connector. They are installed to studs on the rear panel, as shown in Figure 3-3, using M3 X 0.5 KEPS-nuts with a maximum tightening torque of 0.8 Nm (7 lb-in). The components comprising the covers are supplied in the ship kit.

CAUTION!
Do not exceed a tightening torque of 0.8 Nm (7 lb-in.) when installing M3 0.5 KEPS nuts.

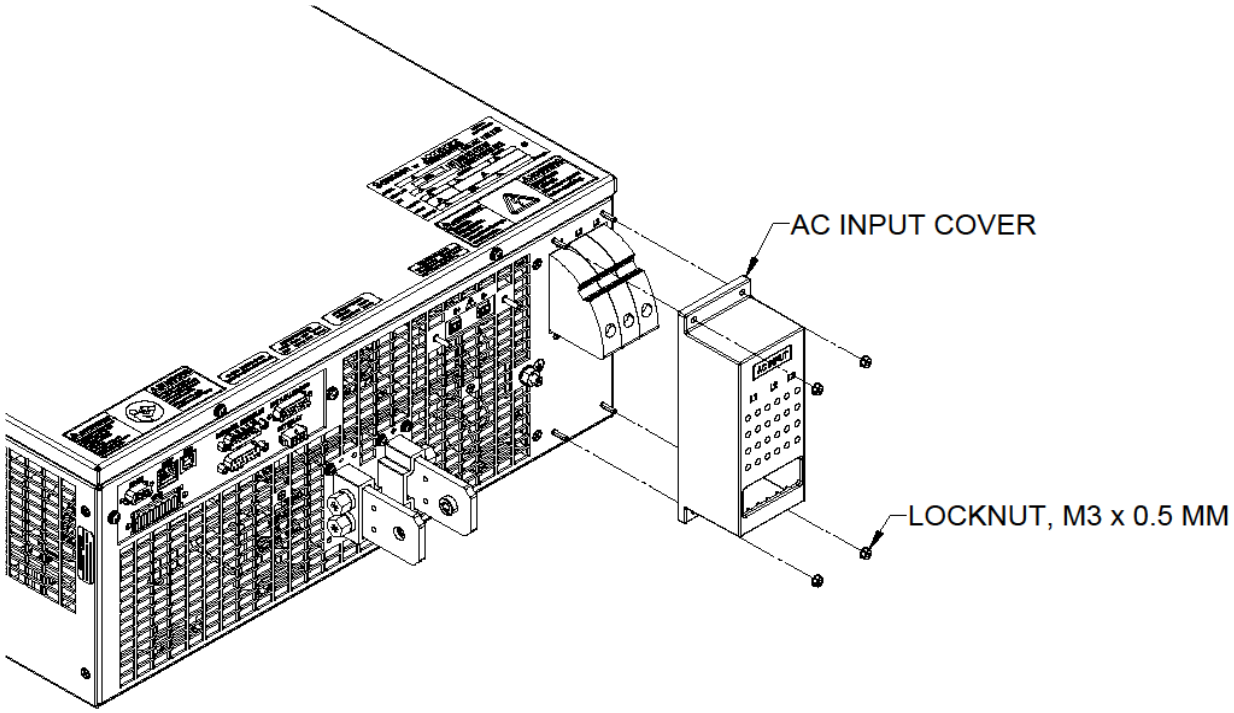


Figure 3-3. AC Input Protective Cover

3.5.2 OUTPUT PROTECTIVE COVERS

Protective covers are provided for the rear panel DC output connector. Install safety cover P/N: 9580289-01R on the positive bus bar and P/N: 9580289-02R on the negative bus bar, securing each with an M4 × 8 mm screw, refer to Figure 3-4. The components comprising the covers are supplied in the ship kit.

NOTE: Use red color M4 × 8 mm screw for positive bus bar protective cover installation and black color M4 × 8 mm screw for negative bus bar protective cover installation.

CAUTION!
Do not exceed a tightening torque of 0.8 Nm (7 lb-in.) when installing M4 × 8 mm screws.

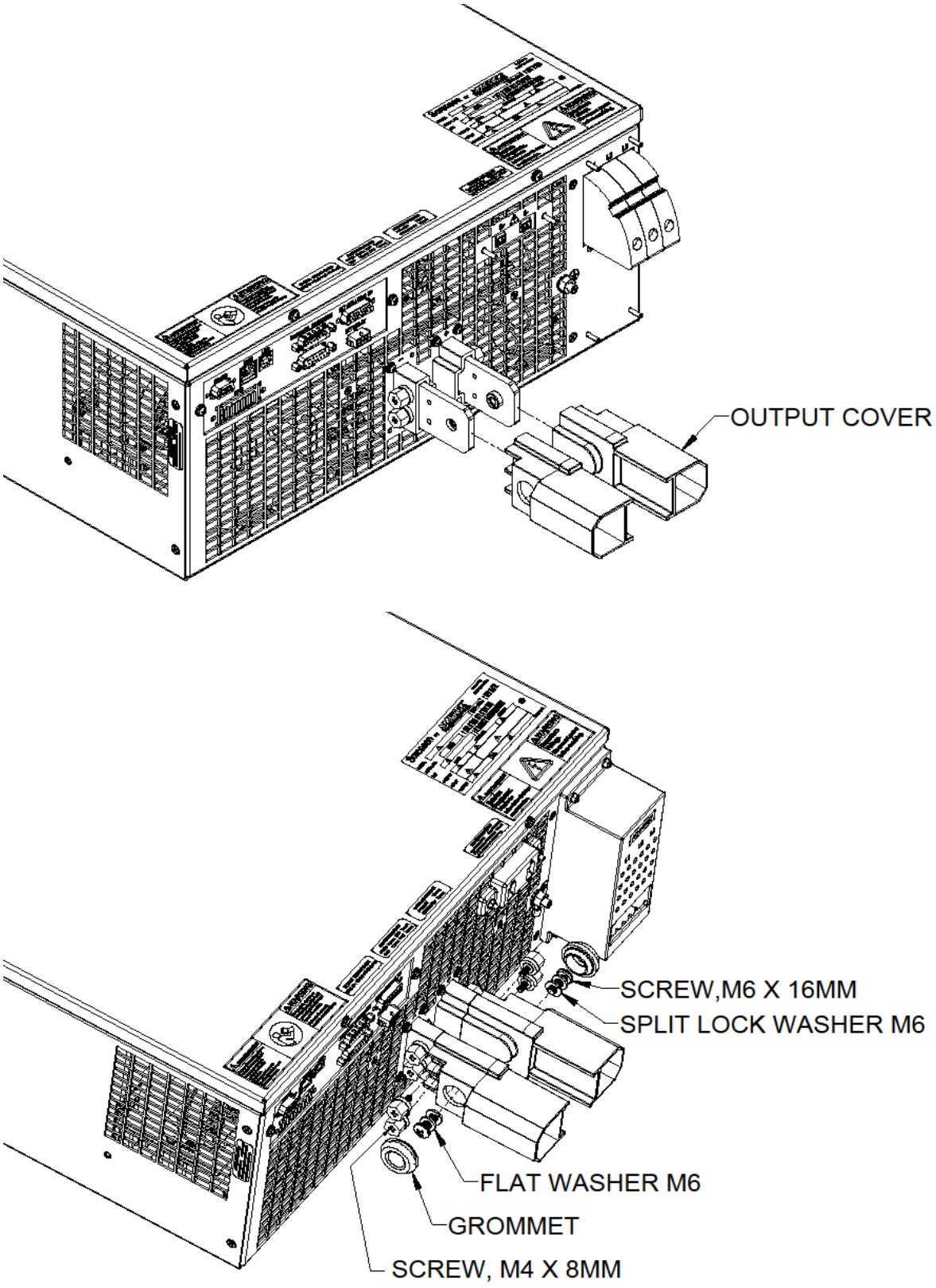


Figure 3-4. Rear Panel DC Protective covers

3.5.3 REMOTE SENSE COVER

Protective cover (P/N: 9580380-01R) are provided for the rear panel remote sense connections. They are installed to studs on the rear panel, as shown in Figure 3-5, using M3 X 0.5 KEPS-nuts with a maximum tightening torque of 0.8 Nm (7 lb-in). The components comprising the covers are supplied in the ship kit.

CAUTION!

Do not exceed a tightening torque of 0.8 Nm (7 lb-in.) when installing M4 × 8 mm screws.

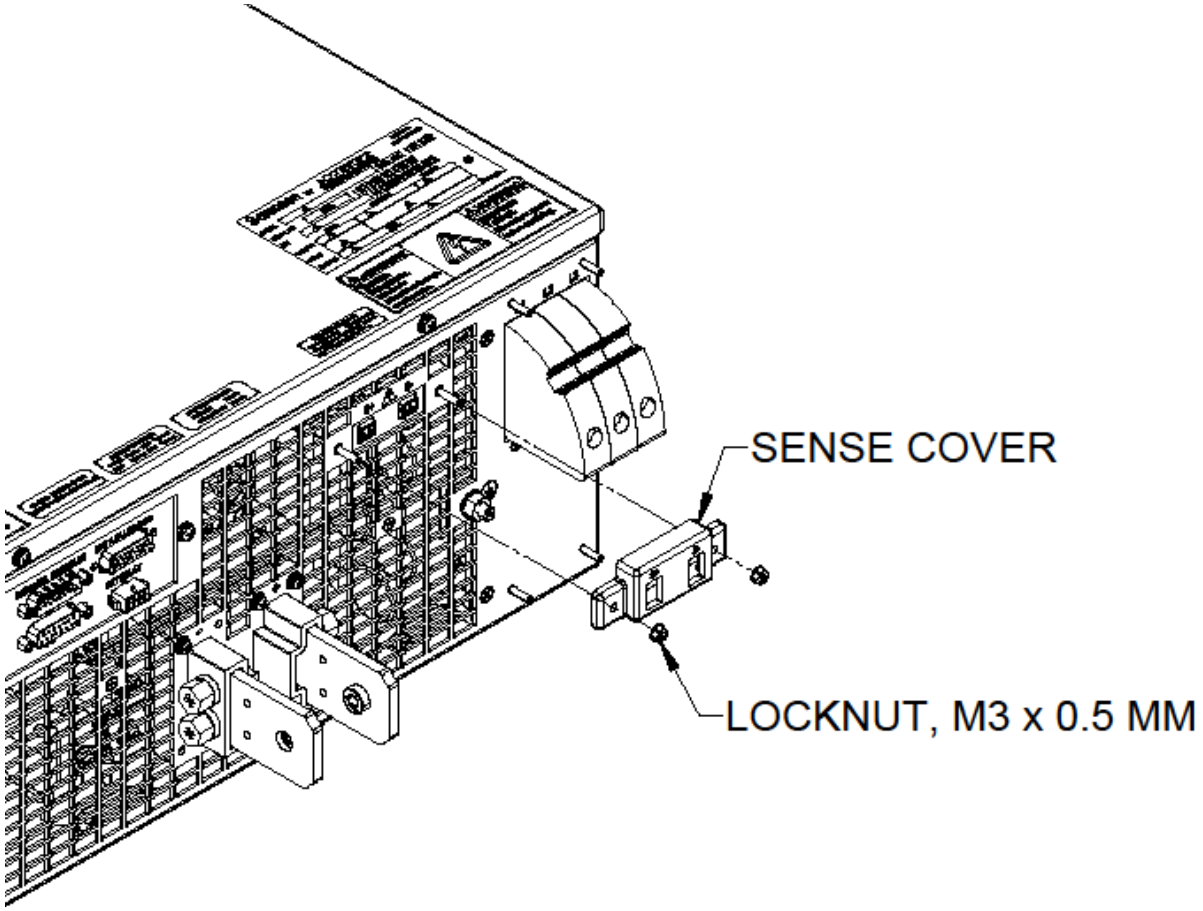


Figure 3-5. Remote sense cover

3.6 REAR PANEL INPUT/OUTPUT CONNECTIONS



WARNING!

High voltage present at rear panel poses risk of electrical shock. The input and output covers maintain protection against hazardous voltages. Do not remove protective covers on AC input or DC output. Refer installation and servicing to qualified personnel.



WARNING!

The input and output voltages at the rear panel of the unit might be HAZARDOUS LIVE. When rack-mounting or panel-mounting the unit, suitable safeguards must be taken by the installer to ensure that HAZARDOUS LIVE voltages are not OPERATOR accessible. OPERATOR access should only be to the front panel of the unit.



WARNING!

A safety disconnect device for the AC mains input must be installed so that it is readily accessible to the user.



WARNING!

A properly sized input overcurrent protection device must be installed at the AC mains input, either a circuit breaker or fuse having a rating of 25% over the maximum AC input line currents listed in Table 2-2.



WARNING!

To prevent an electrical shock hazard, a safety ground wire must be connected from the safety ground stud on the rear panel to the AC mains ground.



CAUTION!

Under no condition should the negative output terminal exceed 2000V to earth ground. Floating the negative output terminal subjects the internal control circuitry of the power supply to the same potential as present at the negative output terminal. The signals of analog programming and external user interface connector are isolated from the output terminals of the power supply.

Figure 3-6 shows the rear panel view of the power supply and locations of the rear panel connector. Table 3-3 provides details of the connectors located in the rear panel of the power supply.

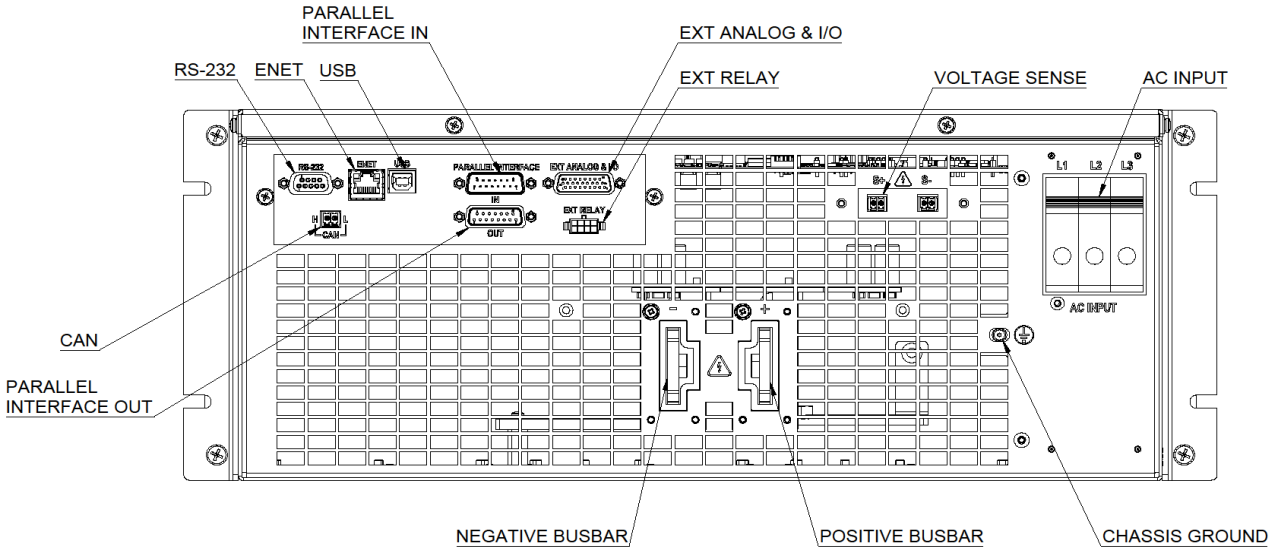


Figure 3-6: Rear Panel View

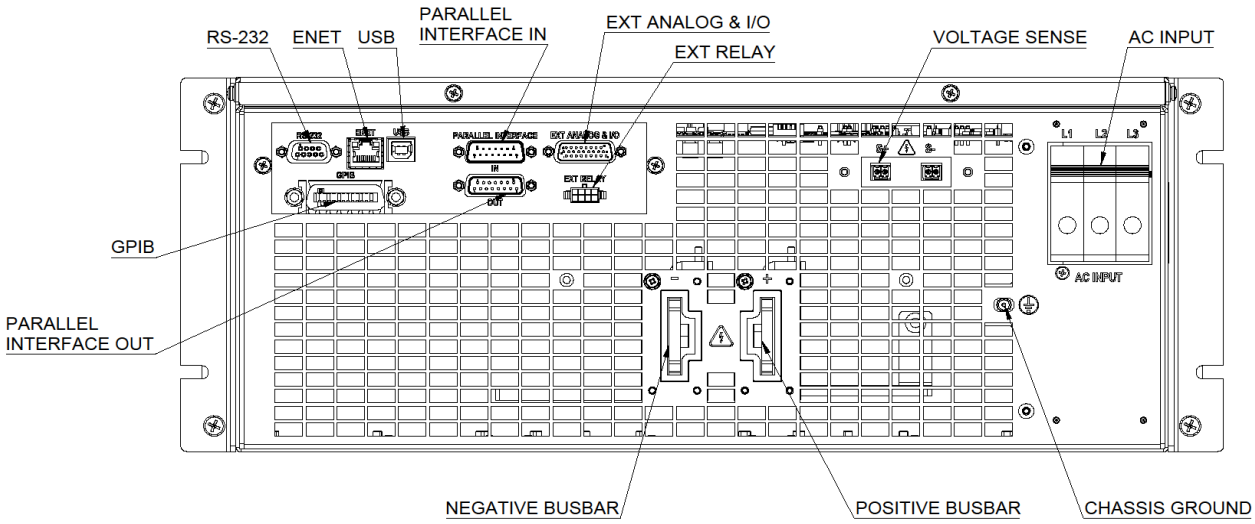


Figure 3-7: Rear Panel with GPIB - Optional

CONNECTOR	FUNCTION	CONNECTION
L1 – AC, L2 – AC, L3 – AC, Chassis - GND	AC input power; see Section 3.7.	AC mains 3-phase input
DC Output and Remote Sense Connector	DC output power and Remote voltage sensing; see Section 3.9.	Output load
RS-232C connector	RS-232C connector for remote digital control; see Section 3.12.5.	External digital interface

CONNECTOR	FUNCTION	CONNECTION
USB Connector	USB type B connector for remote digital control; see Section 3.12.6.	External digital interface
Ethernet connector	Ethernet connector for remote digital control; see Section 3.12.7.	External digital interface
CAN Connector	CAN connector for remote digital control; see Section 3.12.8.	External digital interface
External Analog and I/O	Remote isolated external user control I/O signal interface and isolated analog interface; see Section 3.12.1.	External user controller and I/O
Ext Relay	External relay control signal connector; see Section 3.12.4.	External Relay connector
Parallel In and Out	Series or Paralleling the Mi-BEAM power supply; see Section 3.11	External digital interface

Table 3-3: Rear Panel Connectors

3.7 AC INPUT POWER CONNECTION

The Mi-BEAM Series power supply is designed to operate from 3-phase input power, having 3-wire, with nominal AC input voltage and 50/60 Hz input frequency. Refer to Table 2-11.

The factory default AC input Line is configured to High Line. In order to operate the unit with low line input, turn ON the unit with low line input and configure the AC input Line to Low line, refer to Section 10.2.5.7. On the next power cycle unit can be operated in Low Line.

The unit operates with high power factor, minimizing the required input apparent power and current harmonic distortion. Refer to the specifications of Section 2 for AC input current requirements, and derating of output power as a function of AC input voltage.

3.7.1 AC INPUT OVERCURRENT PROTECTION

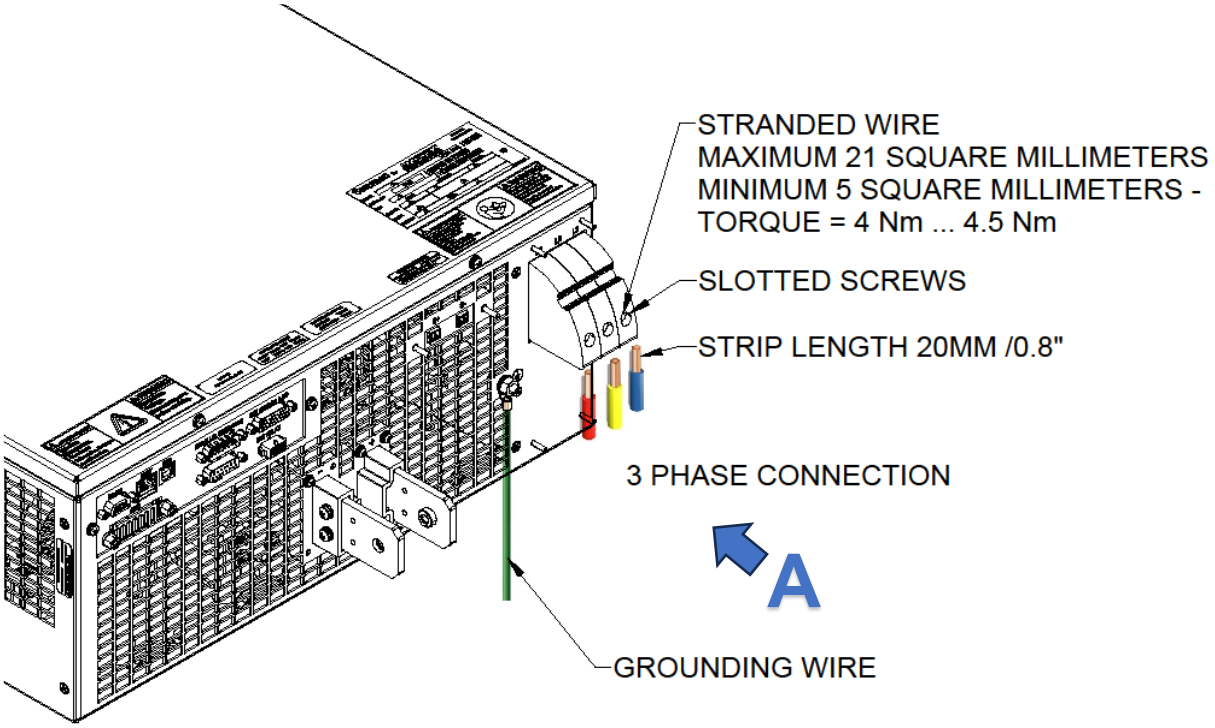
The Mi-BEAM Series power supply has fuses at the AC input for fault protection. These fuses are internal to the chassis and are not user accessible. They provide fault isolation in case a failure occurs with internal components or wiring. A suitable overcurrent protection device must be provided externally, within the system installation, to protect the external wiring and interconnects.

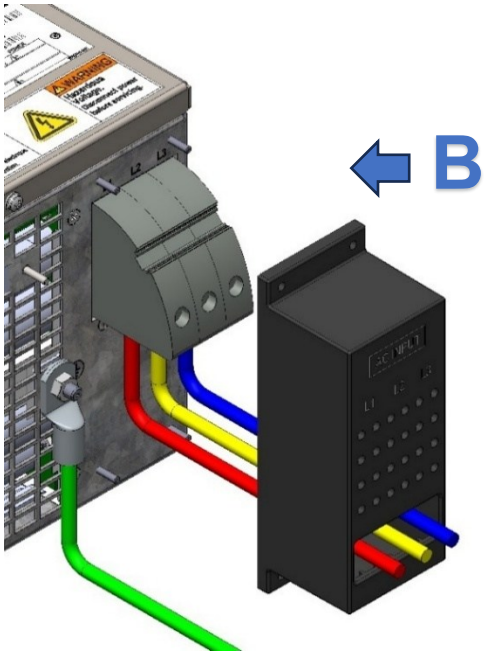
3.7.2 AC INPUT SAFETY DISCONNECT DEVICE

The Mi-BEAM Series power supply's 'Power' switch available in the front panel does not disconnect the AC input line from the unit. Ensure that an appropriately rated safety disconnect device is incorporated in the installation that will provide isolation from the AC input when the device is opened. The device could be a circuit breaker, and must be located close to the unit, within reach of the operator, and clearly labeled as the disconnection device.

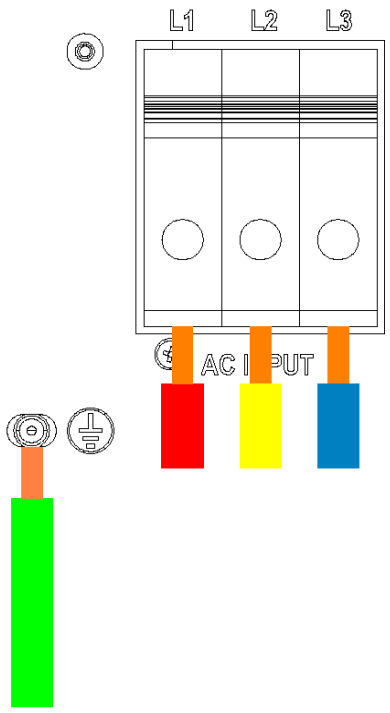
3.7.3 AC INPUT CONNECTOR

The AC input is located on the rear panel, along with the chassis ground stud. Refer to the Figure 3-8. Table 3-4 details the functions and connector pinout, and Table 3-5 lists the connector type.





AC Input Connector – View A



AC Input Connector – View B

Figure 3-8. AC Input Connector

A 3-Phase input is connected to L1/L2/L3 (a connection to neutral is not utilized with 3-Phase input). The connector has compression terminals with female contacts. A ground connection must always be made to the utility earth protection ground using rear panel Chassis ground stud. Figure 3-8 shows the AC input connector wiring.

NAME	TYPE	FUNCTION
L1	AC Input	Line-1 input from utility AC mains;
L2	AC Input	Line-2 input from utility AC mains;
L3	AC Input	Line-3 input from utility AC mains;
CHASSIS GROUND	Safety Ground	Safety-Ground connection from utility earth protection-ground.

Table 3-4: AC Input Connector Pinout and Safety-Ground

CONNECTOR	TYPE
AC Input	**a) Chassis connector header:** Phoenix P/N 3073571; 3-position, compression terminals; **b) Wire striping length:** 20 mm (0.8 in.). **c) Tightening torque**: 4 Nm (35 lb-in) min to 4.5 Nm (39 lb-in) max. **d) Wire cross section:** 4 mm^2 (12 AWG) min to 25 mm^2 (4 AWG) max. Refer to Phoenix P/N 3073571 manufacturer datasheet for the complete specifications of the connector.
Chassis Ground	Stud provided in the rear panel for Safety-Ground Connection. For using the rear panel M6 stud, nut tightening torque is 4.2Nm (3 lb-in) max.

Table 3-5: AC Input Connector Type

CAUTION!

To prevent damage to the AC input mating connector, follow torque specifications, and, if a wire ferrule is used, ensure that it is properly sized and that it has been crimped with the appropriate ferrule crimping tool.

3.7.4 CONNECTING AC INPUT HIGH LINE (380V – 480 V)

CAUTION!

Do not connect an AC input voltage that is greater than 528 VAC line-to-line. Exceeding the maximum AC input voltage could result in damage to the unit.

CAUTION!

A ground wire must be connected from the rear panel safety-ground terminal or the rear panel safety ground stud to the utility power distribution earth protection-ground.

CAUTION!

For High Line AC input ensure the AC input voltage is between 342 to 528 VAC throughout the operation.

Connecting AC input - High Line is as follows:

NOTE: The factory default AC input Line is configured to High Line, Refer to Section 10.2.5.7.4 for PONS AC Input Line Configuration.

a) Confirm that the line-to-line voltage from the AC source is within the range of 342 to 528 VAC.

b) Ensure the circuit rating of the operating model. Refer to Table 3-6.

MODEL POWER (kW)	OUTPUT POWER (kW)	INPUT VOLTAGE/INPUT POWER (kVA)	CIRCUIT BREAKER(1) (V)
12.5	12.5	3PH 380-480 VAC L-L/16	32A-380
25	25	3PH 380-480 VAC L-L/29	56A-380
37.5	37.5	3PH 380-480 VAC L-L/41	84A-380
(1) If the circuit breaker can detect earth fault, ensure the earth fault leakage RMS current must be settable greater than or equal to 50mA.			

Table 3-6. Circuit Breaker – High Line

c) Use wires rated for current equal to or greater than the values specified in Table 3-10.

d) Route the AC source wires through the ferrite core (P/N: 995-336-43), and then through the safety cover (P/N: 9580336-01R). Refer to Figure 3-9.

e) Connect the utility AC source wires to the rear panel AC input connector terminals L1, L2, L3. Refer to Figure 3-9.

f) After completing the connections, install the safety cover (P/N: 9580336-01R) onto the unit using M3 × 0.5 mm locknuts to ensure proper protection and compliance with safety standards. Refer to Figure 3-3.

g) Connect a ground wire from the rear panel chassis ground stud to the utility power distribution earth protection ground. Refer to Figure 3-9.

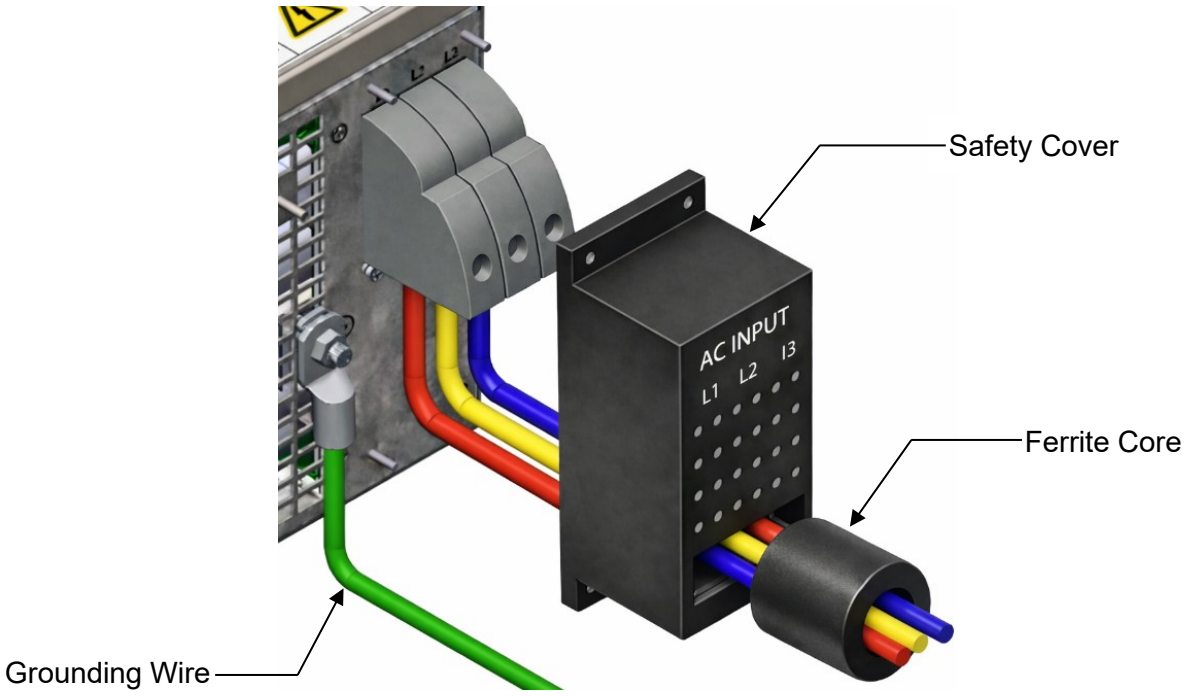


Figure 3-9. AC Input Connection

3.7.5 CONNECTING AC INPUT LOW LINE (200V – 240 V)

CAUTION!
Do not connect an AC input voltage that is greater than 528 VAC line-to-line. Exceeding the maximum AC input voltage could result in damage to the unit.

CAUTION!
A ground wire must be connected from the rear panel safety-ground terminal or the rear panel safety ground stud to the utility power distribution earth protection-ground.

CAUTION!
For Low Line AC input ensure the AC input voltage is between 180 to 264VAC throughout the operation.

Connecting AC input - Low Line is as follows:

NOTE: In Low Line operation, the unit supports only 50% derated power. Refer to Section 2.3.

NOTE: The factory default AC input Line is configured to High Line. In order to operate the unit with low line input, turn ON the unit with low line input and configure the AC input Line to Low line, refer to Section 10.2.5.7 . On the next power cycle unit can be operated in Low Line.

a) Confirm that the line-to-line voltage from the AC source is within the range of 180 to 264 VAC.

b) Ensure the circuit rating of the operating model. Refer to Table 3-7.

MODEL POWER (kW)	OUTPUT POWER (kW)	INPUT VOLTAGE/INPUT POWER (kVA)	CIRCUIT BREAKER[1] (V)
12.5	12.5	3PH 200-240 VAC L-L/8	30A-200
25	25	3PH 200-240 VAC L-L/15	53A-200
37.5	37.5	3PH 200-240 VAC L-L/21	80A-200
[1] If the circuit breaker can detect earth fault, ensure the earth fault leakage RMS current must be settable greater than or equal to 50mA.			

Table 3-7. Circuit Breaker – Low Line

c) Use wires rated for current equal to or greater than the values specified in Table 3-10.

d) Route the AC source wires through the ferrite core (P/N: 995-336-43), and then through the safety cover (P/N: 9580336-01R). Refer to Figure 3-9.

e) Connect the utility AC source wires to the rear panel AC input connector terminals L1, L2, L3. Refer to Figure 3-9.

f) After completing the connections, install the safety cover onto the unit using M3 × 0.5 mm locknuts to ensure proper protection and compliance with safety standards. Refer to Figure 3-3.

g) Connect a ground wire from the rear panel chassis ground stud to the utility power distribution earth protection ground. Refer to Figure 3-9.

3.8 DC OUTPUT CONNECTION

Output Power of the Mi-BEAM Series power supply is through positive and negative bus bars.

CONNECTOR	DESCRIPTION
DC Output (+Ve and -Ve)	DC Output terminal; **Unit side connector:** Copper bus bar - 35mm height and 5mm thickness with an M6 threaded hole using Clinch nuts - 1 Numbers each for Positive and Negative terminal.

Table 3-8. DC output Connector

WARNING!
Before handling the DC output connector, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live DC output can result in fatal electric shock and may cause death.

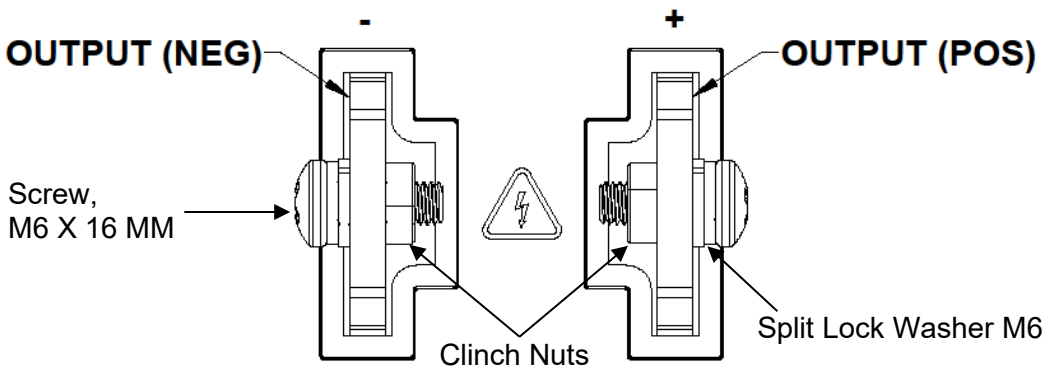


Figure 3-10. DC Output Bus Bar

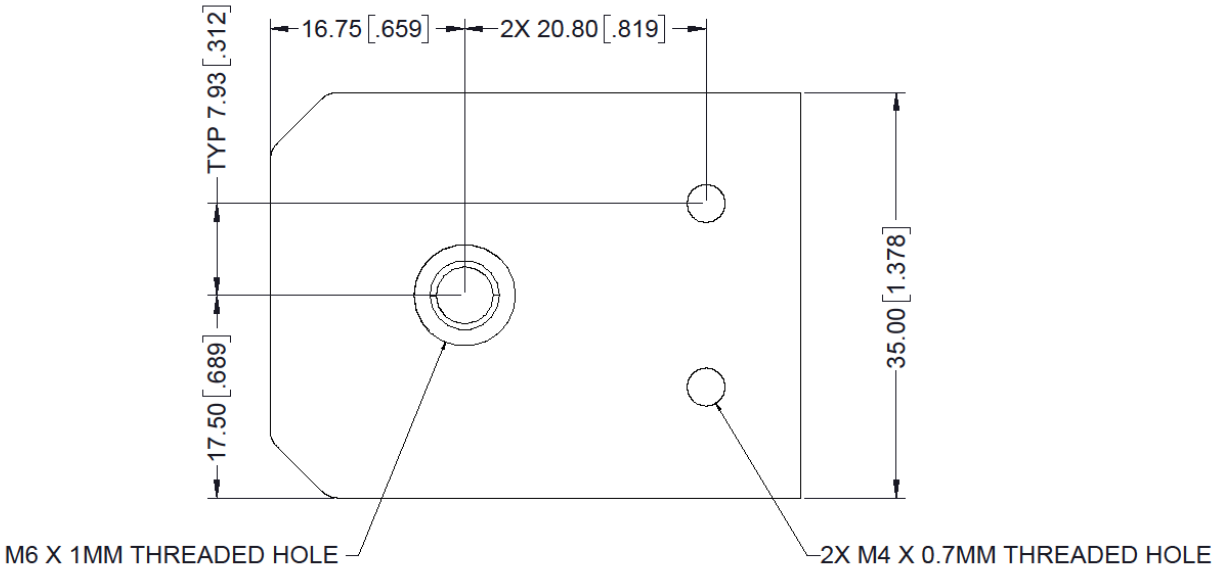


Figure 3-11. Bus Bar Dimension

3.8.1 CONNECTING DC OUTPUT

WARNING!

Before handling the DC output connector, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live DC output can result in fatal electric shock and may cause death.

CAUTION!

Do not exceed a tightening torque of 12 Nm (106.2 lb-in) when installing M6 screws.

Connecting DC Output is as follows:

a) Connect the safety cover (P/N: 9580380-01R) securely over the remote sense terminals using M3 × 0.5 mm locknuts. Refer to Figure 3-5.

b) Verify and ensure that both the positive and negative DC output bus bars are fully de-energized for safe handling.

c) Install the safety cover (P/N: 9580289-01R) on the positive bus bar and the safety cover (P/N: 9580289-02R) on the negative bus bar, securing each with an M4 × 8 mm screw. Refer to Figure 3-12.

d) After installing the safety covers, route the DC output wires through the ferrite core (P/N: 995-336-43), then connect the positive and negative wires to their respective bus bar terminals using M6 × 16 mm screws. Refer to Figure 3-12 and Figure 3-13.

e) Install grommets (P/N: 109-505-10) on both the positive and negative sides for safety. Refer to Figure 3-12 and Figure 3-13.

NOTE: Use red color M4 × 8 mm screw for positive protective cover installation and black color M4 × 8 mm screw for negative protective cover installation.

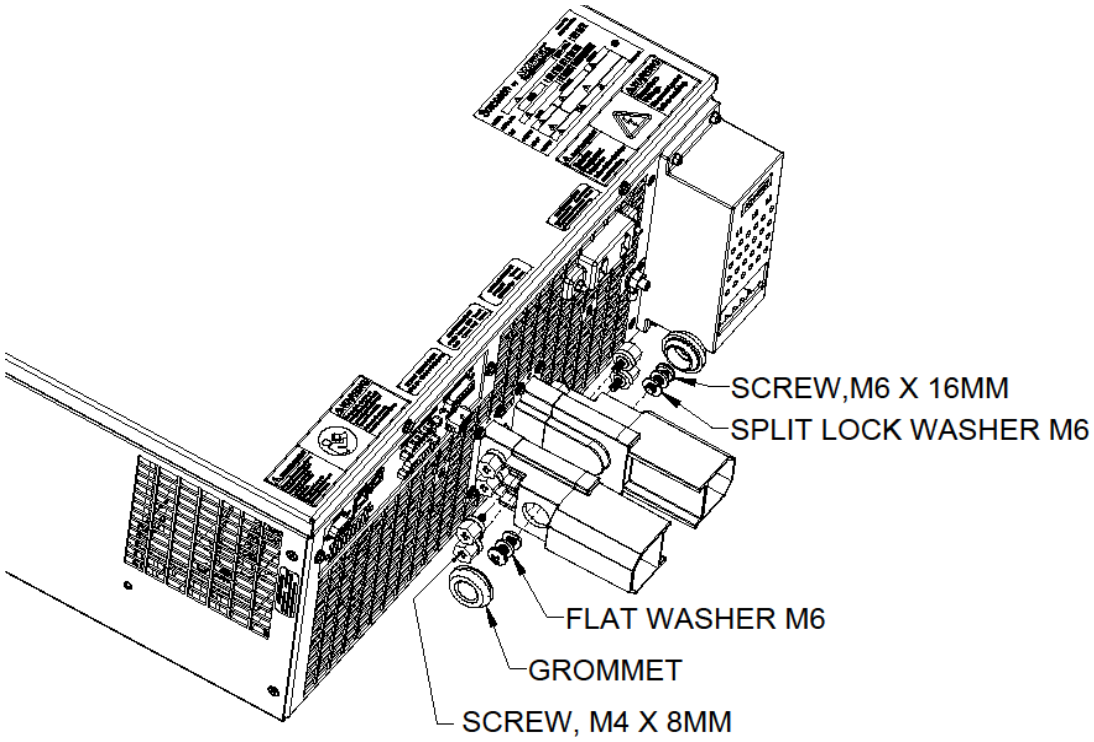


Figure 3-12. DC output Connection

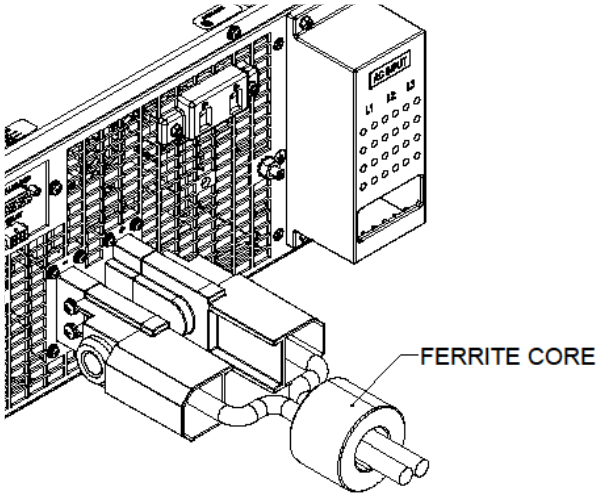


Figure 3-13. DC Output Connection – Ferrite Core

3.9 REMOTE SENSE CONNECTION

WARNING!
Before handling the remote sense connector, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live remote sense connector can result in fatal electric shock and may cause death.

The remote sense connector is located on the rear panel. Figure 3-14 shows the rear panel view of the connector and Table 3-9 lists the connector type.

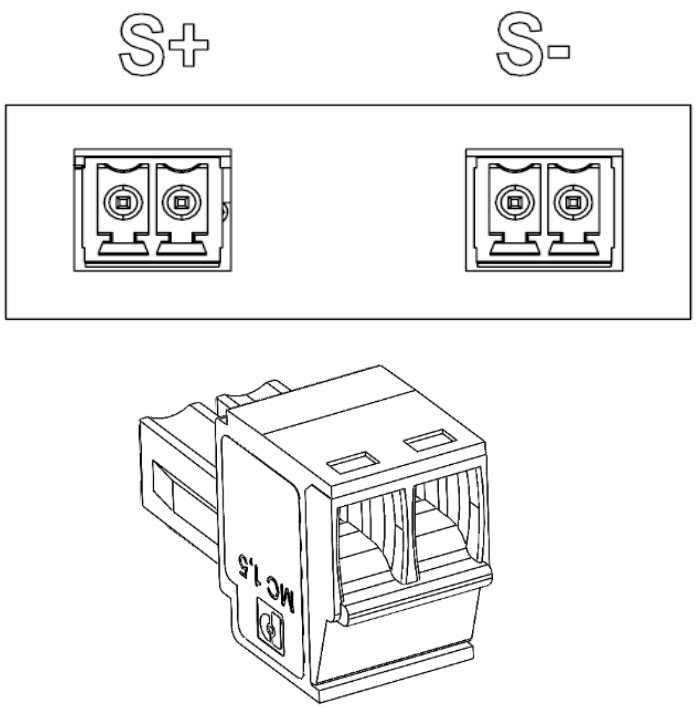


Figure 3-14. Remote Sense connector

CONNECTOR	TYPE
Remote Sense	a) **Unit side connector:** compression terminals, Phoenix P/N 1731471, x2 numbers (for S+ and S-). b) **Mating Connector:** Phoenix P/N 1840366, x2 numbers (for S+ and S-).

Table 3-9. Remote Sense Connector Type

3.9.1 NOISE AND IMPEDANCE EFFECTS



WARNING!
Before handling the remote sense connector, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live remote sense connector can result in fatal electric shock and may cause death.

To minimize noise pickup or radiation from load circuits, remote sense wires should be twisted pair and have minimum lead length. Shielding of the sense leads may be necessary in high noise environments. Even if noise is not a concern, the load and remote sense wires should be twisted pairs to reduce coupling between them, which could impact the stability of the output amplifier. Twisting the load wires provides an additional benefit in reducing the parasitic inductance of the cable. This improves the dynamic response characteristics at the load by maintaining low source impedance at high frequencies. If connectors are utilized for the power and sense leads, consideration of routing is necessary to minimize coupling between the leads. Ensure that the connector terminals for the sense leads are in adjacent contact locations and minimize the physical loop area of the untwisted portions.

3.9.2 REMOTE SENSE



WARNING!
Before handling the remote sense connector, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live remote sense connector can result in fatal electric shock and may cause death.

Output voltage sensing is user-selectable to be either local sense or remote sense. Sensing provides the signal for measurement of the output voltage and determines the physical point where the output voltage is precisely regulated. Local sense is at the rear panel output connector, while remote sense is at the load, through a cable connection from the rear panel remote sense connector. Based on the user selection (local or remote) the corresponding sense signal is used by the controller as the voltage feedback for output regulation. Figure 3-14, show the remote sense Connector.

Remote sensing is used to compensate for the voltage drop that occurs across the wires connecting the load to the output of the power supply. A separate pair of wires is routed to measure the voltage at the terminals of the load where precise regulation of the output voltage is desired. The remote sense leads are connected at the remote sense connector on the rear panel; refer to Figure 3-15.

Example:

Connect the terminal Sense Positive (+), to the point at the load that is connected to the Output Positive terminal, and the terminal Sense Negative (-), to the point at the load that is connected to Output Negative terminal.

On selecting the remote sense, if the difference between the remote sense and the local sense exceeds more than 2% of the rated output voltage, then the unit would go to fault state. The fault can arise due to any of the following conditions.

a) The remote sense is selected, and the remote sense wiring is not connected to the power supply.
b) The remote sense is connected in reverse polarity.
c) The load cable drop exceeds 2% of the rated output voltage.

NOTE: Under remote sense fault condition, the output voltage will be programmed to zero.

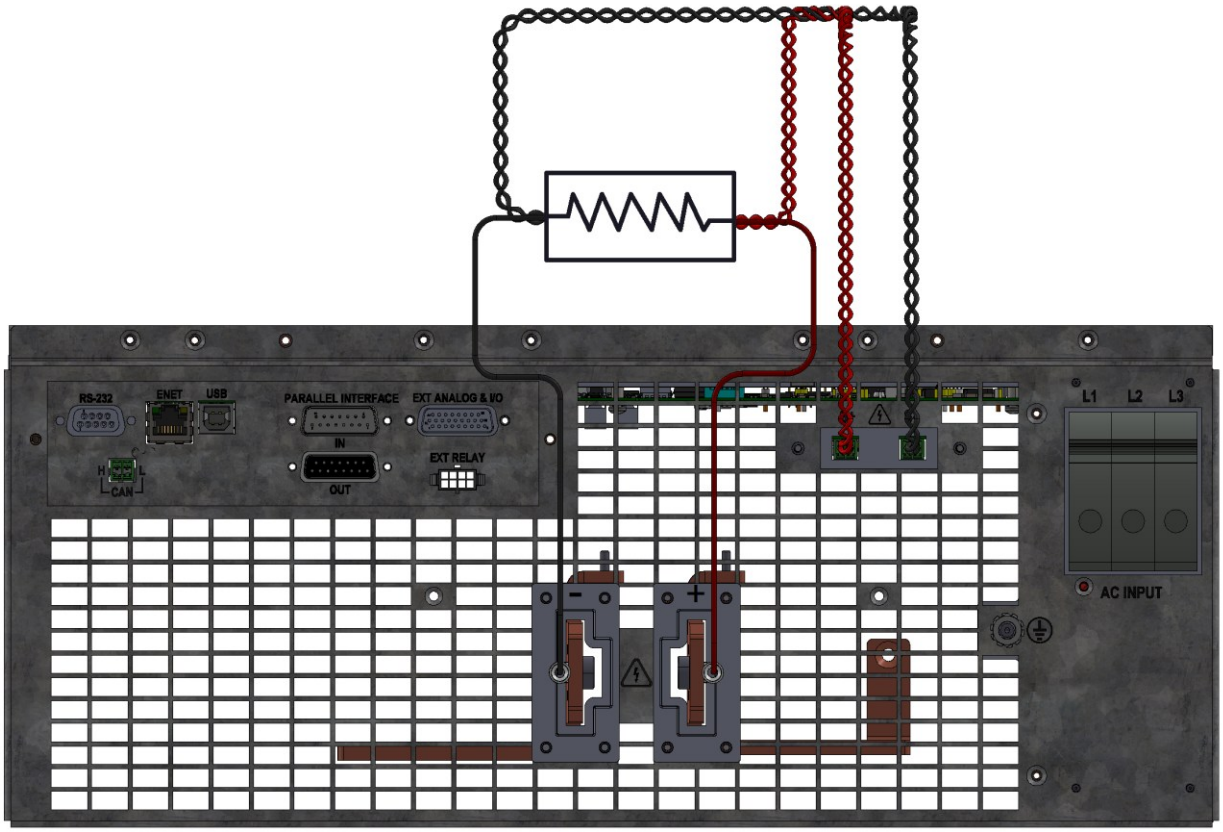


Figure 3-15: Remote Sense Connection

3.10 WIRE GAUGE SELECTION

This section provides guidance on selecting the appropriate wire size. Care must be taken to properly size all conductors for the input and output of the power supply.

CAUTION!
Cables with Class B or C stranding should be used. Fine-stranded (flexible) cables should not be used unless crimp-on lugs or ferrules are used that are approved for fine-stranded cables.

3.10.1 WIRE SIZE

The tables below will assist in determining the appropriate wire size for both the input and output connections. Table 3-10 gives minimum recommended wire size; these recommendations are for 30°C (86° F) ambient, and for copper wire only. This table is derived from the National Electrical Code and is for reference only. Local laws and conditions may have different requirements. For higher ratings, wires can be parallel or series; refer to the National Electrical Code for guidelines.

SIZE	TEMPERATURE RATING OF COPPER CONDUCTOR		
AWG	60°C (140°F)	75°C (158°F)	90°C (176°F)
	TYPES : TW, UF	TYPES: RHW, THHW, THW, THWN, XHHW, USE, ZW	TYPES : TBS, SA, SIS, FEP, FEPB, MI, RHH, THHN, THHW, XHH, XHHW
	CURRENT RATING, A(RMS)		
18	NA	NA	14
16	NA	NA	18
14	15	20	25
12	20	25	30
10	30	35	40
8	40	50	55
6	55	65	75
4	70	85	95
3	85	100	115
2	95	115	130
1	110	130	145
0	125	150	170
00	145	175	195
000	165	200	225
0000	195	230	260

Table 3-10. Minimum Wire Size

When determining the optimum cable specification for the user's power applications, the same engineering rules apply whether at the input or output of an electrical device. Thus, this guide applies equally to the AC input cable and DC output cable for this power supply and application loads.

Power cables must be able to safely carry maximum load current without overheating or causing insulation degradation. It is important to power supply performance to minimize IR (voltage drop) loss within the cable. These losses have a direct effect on the quality of power delivered to and from instruments and corresponding loads.

When specifying wire gauge, consider derating due to operating temperature at the wire location. Wire gauge current capability and insulation performance drops with the increased temperature

developed within a cable bundle and with increased environmental temperature. Thus, short cables with generously derated gauge and insulation properties are recommended for power supply applications.

Be careful when using published commercial utility wiring codes. These codes are designed for the internal wiring of homes and buildings and accommodate the safety factors of wiring loss, heat, breakdown insulation, aging, etc. However, these codes consider that up to 5% voltage drop is acceptable. Such a loss directly detracts from the quality performance specifications of this Mi- Beam power supply. Also, consider how the wiring codes apply to bundles of wire within a cable arrangement.

In high performance applications requiring high inrush or transient currents, additional consideration is required. The cable wire gauge must accommodate peak currents developed at peak voltages, which might be up to ten times the average current values. An underrated wire gauge adds losses, which alter the inrush characteristics of the application and thus the expected performance. Table 3-10 details the resistance of wires and the voltage drop in cables when operating at their maximum rated current, with the wire temperature set at 20°C (68° F). For copper wire, the temperature coefficient of resistance is alpha (α) = 0.00393 Omega (Ω)/°Celsius (C) at 20°C (68° F) (t1). As the temperature rises to a new value (t2), the resistance of the wire increases. This change in resistance can be calculated using the following formula:

$$R2 = R1\ (1 + \alpha\ (t2\ -\ t1))$$

Where R1 is the resistance at the reference temperature t1.

NOTE: If the temperature value is in Fahrenheit, convert the omega value from Celsius to Fahrenheit by dividing by the conversion factor of 1.8.

The output power cables must be large enough to prevent the line voltage drop (total of both output wires) between the power supply and the load from exceeding the remote sense capability as presented in the specification section. Calculate the voltage drop using the following formula:

$$Voltage\ Drop = 2\ \times Distance\ in\ feet\ \times Cable\ resistance\ per\ foot\ \times Current$$

SIZE, AWG	A(RMS), (90°C WIRE)	OHMS/100 FT (30.4 M), (ONE WAY)	VOLTAGE DROP/100 FT (30.4 M), (COLUMN 2 X COLUMN 3)
18	14	0.639	8.95
16	18	0.402	7.24
14	25	0.253	6.33
12	30	0.159	4.77
10	40	0.100	4.00
8	55	0.063	3.47
6	75	0.040	3.00
4	95	0.025	2.38
3	115	0.020	2.30
2	130	0.016	2.08
1	145	0.012	1.74
0	170	0.0098	1.67
00	195	0.0078	1.52
000	225	0.0062	1.40
0000	260	0.0049	1.27

Table 3-11. Wire Resistance and Voltage Drop, 20°C

3.11 PARALLEL INTERFACE IN AND OUT

In parallel operation, the Parallel IN and OUT ports allow up to 32 Mi-Beam power supply units with identical voltage ratings can be connected in parallel (maximum of 7 units per rack, with multiple racks are interconnected). Units with different model numbers can still be paralleled as long as their voltage ratings are the same.

In series operation, the Parallel IN and OUT ports allow up to 2 Mi-Beam power supply units with identical model numbers can be connected in series; i.e. the voltage, current and power ratings of the units must be same. Use only the following shielded 15-pin D-sub-M/F cables:

a) 1 Feet (0.304 m) Cable - **890-015-01** (CABLE,15P, D-SUB, M/F, SHLD,1FT (0.304 m))

b) 5 Feet (1.52 m) Cable - **890-015-02** (CABLE,15P, D-SUB, M/F, SHLD,5FT (1.52 m))

Remote analog control is not supported in series operation. Refer to Chapter 5 and Chapter 6.

3.12 REAR PANEL USER INTERFACE CONNECTORS

The rear panel contains the connectors for the remote analog and discrete-digital control interfaces, the digital communications interfaces (LAN, USB, RS-232C, CAN and optional GPIB IEEE-488), and the external interface.

3.12.1 REMOTE EXTERNAL USER CONTROL INTERFACE

The Remote External user control interface is located on the rear panel. Figure 3-16 shows the rear panel view of the connector, and Table 3-12 lists the connector type. Table 3-13 shows the functions and Table 3-14 shows the connector pinout.

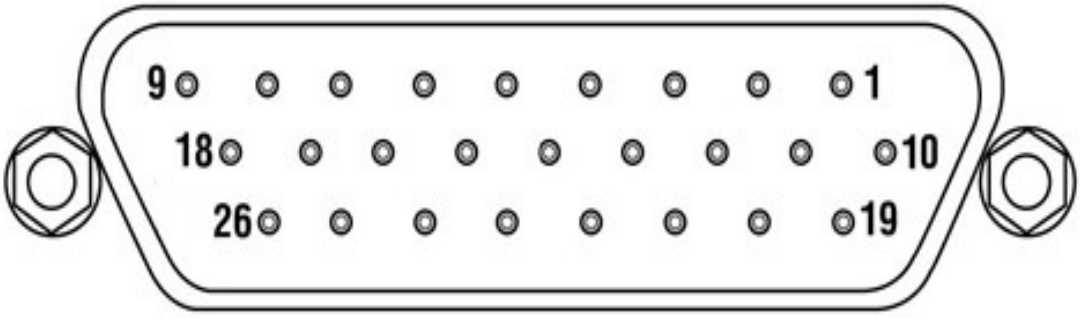


Figure 3-16. External User Control Interface connector

CONNECTOR	TYPE
Remote External User Control Interface	High-density, 26-contact, female D-Type, Norcomp P/N 181-026-213R531 Mating connector: Norcomp P/N 180-026-103L001

Table 3-12: External User Control Interface connector Type

REMOTE ISOLATED EXTERNAL USER CONTROL I/O SIGNAL INTERFACE	
FUNCTION	**CHARACTERISTICS**
Remote Inhibit Input – Contact Closure - Open	Opening the Switch or Relay contact between this terminal and signal return will turn OFF the output. Switch or Relay closure or direct short from this terminal to signal return would turn-on the output. Remote inhibit can be configured in three modes; **a) Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output. **b) Live:** after reclosing the contact, user can turn ON the output. **c) OFF:** inhibit function would be disabled. Remote circuit must sink up to 10 milliampere (mA) from 5 volts direct current (VDC) to enable.
Remote Inhibit Input – Contact Closure - Close	Closing the Switch or Relay contact between this terminal and signal return will turn OFF the output. Switch or Relay opening would turn ON the output. Remote inhibit can be configured in three modes; **a) Latch:** after reclosing the contact, user can clear the fault and turn ON the output. **b) Live:** after reclosing the contact, user needs to turn ON the output.

REMOTE ISOLATED EXTERNAL USER CONTROL I/O SIGNAL INTERFACE	
FUNCTION	**CHARACTERISTICS**
	c) OFF: inhibit function would be disabled. Remote circuit must sink up to 10 mA from 5 VDC to enable.
Remote Inhibit Input – Active Source – High	An active voltage source high signal from this terminal to signal return will Turn OFF the output of power supply. Remote inhibit can be configured in three modes; **a) Latch:** after removing the active voltage source, user can clear the fault and turn ON the output. **b) Live:** after removing the active voltage source, user can turn ON the output. **c) OFF:** inhibit function would be disabled. Remote circuit must sink up to 10 mA from 5 VDC to enable.
Remote Inhibit Input – Active Source – Low	An active voltage source low signal from this terminal to signal return will Turn OFF the output of power supply. Remote inhibit can be configured in three modes; **a) Latch:** after removing the active voltage source low signal, user needs to clear the fault and turn ON the output. **b) Live:** after removing the active voltage source, user can turn ON the output. **c) OFF:** inhibit function would be disabled. Remote circuit must sink up to 10 mA from 5 VDC to enable.
Trigger In(1)	TTL compatible Input signal, active-high pulse of 100 μs; detects external hardware trigger at falling edge of the pulse for voltage, current ramp and Transient List functions. Signal connects to Open-anode of opto-isolator diode with internal 1 kΩ series resistor internal to power supply. Voltage Rating: Maximum 24 V, Minimum -5 V Low state: 0.3 V max, High State 2.7 V min
Trigger Out(1)	Output signal, active-high; synchronization pulse of 100 μs. Open collector transistor output, Collector is connected to the 26-pin connector. The emitter point of transistor is connected to common return pin of the interface connector. Voltage Rating: Maximum 30 V, Minimum 3 V for Active High, Current Sink Current: 50 mA
CC/CV status Output	Output signal, High state indicates Constant Current mode operation, and Low state indicates Constant Voltage mode operation. Open collector transistor output, Collector is connected to the 26-pin connector. The emitter point of transistor is connected to common return pin of the interface connector. **a) Voltage Rating:** Maximum 30 V, Minimum 3 V for Active High,

REMOTE ISOLATED EXTERNAL USER CONTROL I/O SIGNAL INTERFACE	
FUNCTION	**CHARACTERISTICS**
	b) Current Sink Current: 50 mA
Output ON/OFF Status	Output signal, High state indicates Output is ON and Low state indicates Output is OFF. Open collector transistor output, Collector is connected to the 26-pin connector. The emitter point of transistor is connected to the common return pin of the interface connector. **a) Voltage Rating:** Maximum 30 V and Minimum 3 V for Active High, **b) Sink Current:** 50 mA
FAULT Status	Output Signal, High state indicates fault state of the power supply. Open collector transistor output, Collector is connected to the 26-pin connector. The emitter point of transistor is connected to the common return pin of the interface connector. **a) Voltage Rating:** Maximum 30 V, Minimum 3 V for Active High, **b) Sink Current:** 50 mA
ISOLATED ANALOG PROGRAMMING FEATURES	
Remote Analog Programming of Output Voltage [(2)(3)]	Independent Signal inputs for output voltage programming using External Analog Reference. Analog reference source is user selectable and can be a voltage or resistance. User can select the reference source and range as given below; **a) Voltage as Reference Source:** 0 V to user selectable maximum range (5 V to 10 V) for 0 to full scale rated Output. **b) Resistance as Reference Source:** 0 Ω to user selectable maximum range (5 kΩ to 10 kΩ) for 0 to full scale rated Output. Programming accuracy and linearity: ±1% of rated output
Remote Analog Programming of Output Current [(2)(3)]	Independent Signal inputs for output current programming using External Analog Reference. Analog reference source is user selectable and can be a voltage or resistance. User can select the reference source and range as given below; **a) Voltage as Reference Source:** User selectable range of (-5 V to +5 V) or (-10 V to +10 V) for 0 to full scale rated Output. **b) Resistance as Reference Source:** 0 Ω to user selectable maximum range (5 kΩ to 10 kΩ) for 0 to full scale rated Output. This is applicable only in source mode. Programming accuracy and linearity: ±1% of rated output
Monitor Signals for the Output Voltage and Output Current	Monitor Signals for the Output Voltage and Current. **a) Full Scale range:** 0 V to 10 V corresponds to 0-100% full-scale output. **b) Minimum recommended Load:** 100 kΩ, typical **c) Maximum Load:** 20 kΩ **d) Monitor accuracy and linearity:** ±1% of full-scale output

REMOTE ISOLATED EXTERNAL USER CONTROL I/O SIGNAL INTERFACE	
FUNCTION	**CHARACTERISTICS**
Remote Analog Programming of Overvoltage [2][3]	Signal input for setting Overvoltage using External Analog Reference Voltage. **a) Range:** 0.25 V to user selectable maximum range (5 V to 10 V) for 5% to 110% of the full-scale Output Voltage. **b) Programming accuracy and linearity:** ±1% of full-scale output.
[1] Trigger IN and Trigger OUT signals can be used during Ramp and Transient List functionality only. *[2] Unit can be operated in remote analog programming in Bi-directional, Source and Eload modes only.* *[3] Analog Programming is not supported in series operation.*	

Table 3-13: External User Control Interface Characteristics

PIN	REFERENCE	TYPE	RANGE	FUNCTIONAL DESCRIPTION
1	VPRG_VOLT	Input	0 to 10V	Independent Signal inputs for output voltage programming using External Analog Reference. In this, the reference is a voltage source: 0 V to user selectable maximum range (5 V to 10 V) for 0 to full scale rated output voltage.
2	VPRG_CURR	Input	0 to 10 kOhm	Independent Signal inputs for output voltage programming using External Analog Reference. In this, the reference is resistance source: 0 Ohm to user selectable maximum range (5 kOhm to 10 kOhm) for 0 to full scale rated output voltage.
3	IPRG_VOLT	Input	-10 to +10V	Independent Signal inputs for output current programming using External Analog Reference. In this, the reference is a voltage source: -10 V to +10 V for 0 to full scale rated output current.
4	IPRG_CURR	Input	0 to 10 kOhm	Independent Signal inputs for output current programming using External Analog Reference. In this, the reference is resistance source: 0 Ohm to user selectable maximum range (5 kOhm to 10 kOhm) for 0 to full scale rated output current (available only in Source mode).

PIN	REFERENCE	TYPE	RANGE	FUNCTIONAL DESCRIPTION
5	OVPRG_VOLT	Input	0 to10V	Remote Analog Programming of Overvoltage. Signal input for setting Overvoltage using External Analog Reference Voltage. 0.25 V to user selectable maximum range (2 V to 10 V) for 5% to 110% of the full-scale Output Voltage.
6	GND_ISOSELV	Return	NA	Ground for programming Signals
7	VMON	Output	0 to10V	Monitor Signals for the Output Voltage
8	IMON	Output	-10 to +10V	Monitor Signals for the Output Current.
9	GND_ISOSELV	Return	NA	Ground for Monitor Signals
10	DIO_OUT1	Output	0 to 30 V	Open collector transistor output for user programming
11	DIO_OUT2	Output	0 to 30 V	Open collector transistor output for user programming
12	SOUR/SINK_OUT	Output	0 to 30 V	Open collector transistor output. Collector is connected to the 26-pin connector. Status signal to communicate the direction of current flow. Low – indicates power transfer is from power supply to UUT. High – indicates power transfer is from UUT to Power supply.
13	TRIG_OUT	Output	0 to 30 V	Open collector transistor output. Collector is connected to the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. Active-high; synchronization pulse of 100 µs.
14	DIO_ON/OFF_STAT	Output	0 to 30 V	ON/OFF-Open collector transistor output, Collector is connected to the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. High state indicates

PIN	REFERENCE	TYPE	RANGE	FUNCTIONAL DESCRIPTION
				Output is ON and Low state indicates Output is OFF
15	DIO_CC/CV_OUT	Output	0 to 30 V	CC/CV status- open collector configuration. Collector is connected to the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. High state indicates Constant Current mode operation, and Low state indicates Constant Voltage mode operation.
16	DIO_FAULT_OUT	Output	0 to 30 V	Fault status- open collector configuration. Collector is connected to the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. High state indicates fault state of the power supply
17	RTN	Return	NA	Return for digital signals
18	RTN	Return	NA	Return for digital signals
19	TRIG_IN	Input	0 to 24 V	TTL compatible Input signal, active-high pulse of 100 µs; detects external hardware trigger at falling edge of the pulse for voltage, current ramp, and Transient List functions. Signal connects to Open-anode of opto-isolator diode with internal 1kΩ series resistor internal to power supply.
20	DIO_OUTPUT_ON/OFF	Input	0 to 24 V	Remote-control input for output on/off with a logic signal: a logic-high, 2.7-24 VDC TTL/CMOS signals will enable (turn-on) the output of the supply, and a logic-low signal disables (turns off) the output
21	Digital_IN-1	Input	-5 to 24 V	Remote-control input with a logic signal
22	Digital_IN-2	Input	-5 to 24 V	Remote-control input with a logic signal

PIN	REFERENCE	TYPE	RANGE	FUNCTIONAL DESCRIPTION
23	Digital_IN-3	Input	-5 to 24 V	Remote-control input with a logic signal
24	Remote_Inhibit_Active_Voltage	Input	-5 to 24 V	Remote-control input for output on/off with a logic signal
25	Remote_Inhibit_Contact_Closure	Input	-5 to 24 V	Switch/Relay contact closure or direct short from this terminal to signal return is required to Turn ON/OFF the power supply. Opening the contact would shut down the output.
26	RTN	Return	NA	Ground return
NOTE: All the signals are safety isolation SELV-rated, referenced to chassis.				

Table 3-14: External User Control Interface Pin Out details



CAUTION!
All the three channels signal returns (Pin 17, 18 and 26) are shorted internally. Applying a voltage potential between them would damage the power supply.



CAUTION!
External User Control interface signals are isolated from negative output terminal; Isolation voltage is rated for ±2000 VRMS, maximum; operation of Isolated Analog Interface signals should be at SELV safety voltage conditions to chassis ground.

3.12.2 REMOTE INHIBIT SIGNAL

The Remote Inhibit signal, Pin-24 for Remote inhibit Active Voltage and Pin-25 for Remote inhibit Contact Closure, can be used to enable or disable the output of the power supply.

The following types can be selected:

a) Contact Closure: The remote inhibit type can be set to ‘Contact Closure’ using SCPI command;

```
OUTP: REM: INHIBIT: TYPE 0
```

Contact closure has two remote inhibit states, it can be either ‘OPEN’ or ‘CLOSE’

- **OPEN:** When the inhibit state is selected to ‘OPEN’, open path from this signal to the return signal shuts down the power supply output. The remote inhibit state can be set to ‘Open’ using SCPI command;

```
OUTP: REM: INHIBIT: STATE 0
```

- **CLOSE:** When the inhibit state is selected to ‘CLOSE’ a switch/relay contact closure or a direct short from this terminal to signal return shuts down the power supply output. The remote inhibit state can be set to ‘Close’ using SCPI command;

```
OUTP: REM: INHIBIT: STATE 1
```

b) Active Source: The remote inhibit type can be set to ‘Active Source’ using SCPI command;

```
OUTP: REM: INHIBIT: TYPE 1
```

Active source has two remote inhibit states, it can be either ‘LOW’ or ‘HIGH’.

- **LOW:** When the inhibit state is selected to ‘LOW’ an active voltage source low from this terminal to signal return shuts down the power supply output. The remote inhibit state can be set to ‘LOW’ using SCPI command;

```
OUTP: REM: INHIBIT: STATE 0
```

- **HIGH:** When the inhibit state is selected to ‘HIGH’, an active voltage source high from this terminal to signal return shuts down the power supply output. The remote inhibit state can be set to ‘HIGH’ using SCPI command;

```
OUTP: REM: INHIBIT: STATE 1
```

The remote inhibit mode can be changed using SCPI command;

```
OUTP: REM: INHIBIT: MODE <mode>.
```

The default mode for Remote Inhibit is OFF.

a) LATCH: The Remote Inhibit input latches the output in the protection shutdown state. This state can only be cleared by the remote digital interface SCPI command, `*CLS`.
The remote inhibit mode can be set to ‘Latching’ using SCPI command;

```
OUTP: REM: INHIBIT: MODE LATCHING.
```

b) LIVE: The output state follows the state of the Remote Inhibit input. The remote inhibit mode can be set to ‘live’ using SCPI command;

```
OUTP: REM: INHIBIT: MODE LIVE
```

c) OFF: The power supply ignores the Remote Inhibit input. The remote inhibit mode can be set to ‘OFF’ using SCPI command;

```
OUTP: REM: INHIBIT: MODE OFF
```

For additional information on programming the Remote Inhibit function, refer to the Mi-Beam Programming Manual. To download the latest version, visit the AMETEK Programmable Power website at www.programmablepower.com.

3.12.3 REMOTE ANALOG PROGRAMMING

The remote analog programming is located on the rear panel. Figure 3-16 shows the rear panel view of the connector, and Table 3-12 lists the connector type. Table 3-13 shows the functions and Table 3-14 shows the connector pinout.

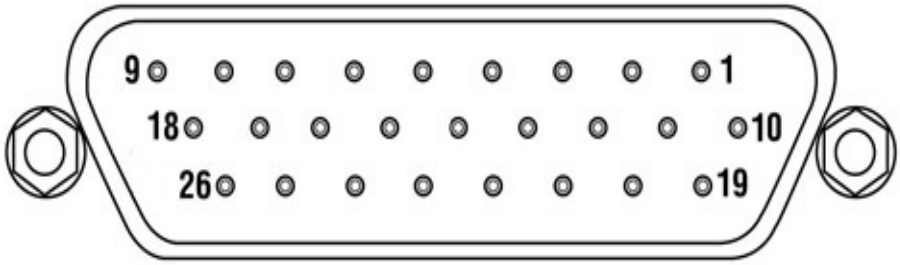


Figure 3-17. Analog Control connector

3.12.3.1 REMOTE VOLTAGE PROGRAMMING

Remote voltage programming configuration is used for applications that require the output voltage be programmed (controlled) from a remote instrument. An external resistance or external voltage source can be used as a programming device. When using remote voltage programming, a shielded, twisted-pair cable is recommended to prevent noise interference to programming signals.

a) Remote Voltage Programming by Voltage Source

Programs the output voltage of the supply by external voltage reference source. Refer to Control Interface chapter to configure the power supply to program output voltage by external reference source using front panel screen or refer to the programming manual P/N: M587352-01.

- **Power supply configuration to program output voltage by voltage source:**

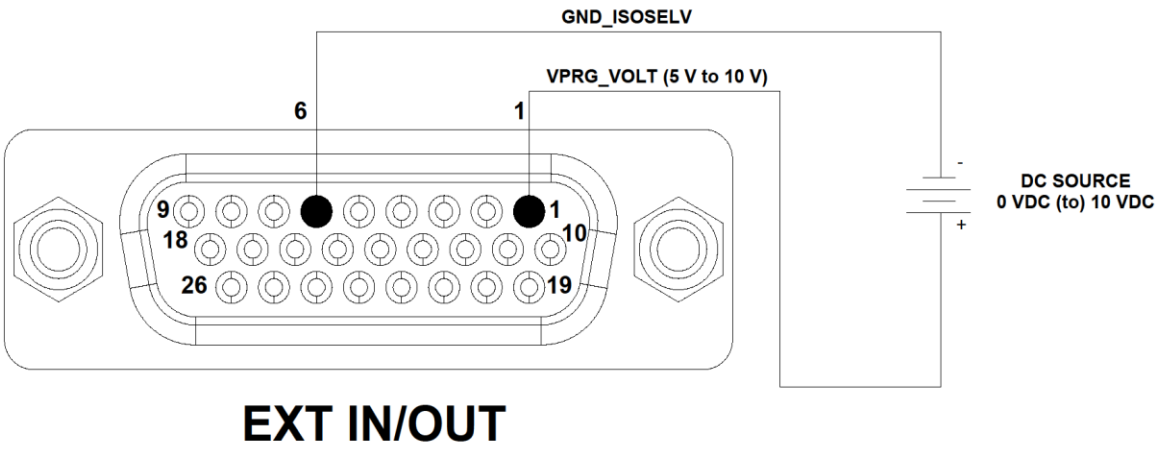


Figure 3-18. Remote Voltage Programming by Voltage source

The DC voltage source is connected between Pin 1 (VPRG_VOLT), ground Pin 6 (GND_ISOSELV) and the 'Analog Reference source' is selected as 'Voltage' from the front Panel. Refer to Figure 3-18.

The Full-Scale voltage value can be modified to any voltage between 5V to 10V from front panel screen or by the digital interface SCPI Command. Default FSC voltage value is 10V, where 10V corresponds to 100% output voltage. The corresponding voltage-programming coefficients for output voltage are 100% rated output voltage / FSC VDC. The equation for output voltage set from analog programming is as follows:

$$\text{Vout} = Vdc \times (100\% \text{ rated output voltage} / \text{ FSC VDC}), \text{with Vdc in volts.}$$

b) Remote Over Voltage Programming by Voltage Source

Programs the output over voltage protection limit of the supply by external voltage reference source. Refer to Control Interface chapter to configure the power supply to program output overvoltage by external reference source using front panel screen or refer to the programming manual P/N: M587352-01.

- **Power supply configuration to program output overvoltage by voltage source:**

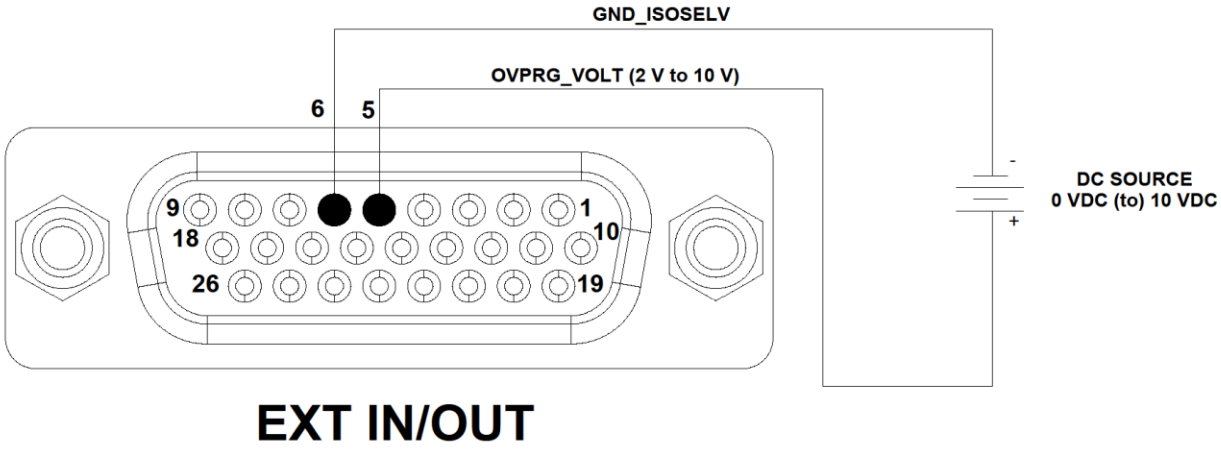


Figure 3-19. Remote Over Voltage Programming by Voltage source

The DC voltage source is connected between Pin 5 (OVPRG_VOLT), ground Pin 6 (GND_ISOSELV) and the 'Analog Reference source' is selected as 'Over Voltage' from the front Panel. Refer to Figure 3-19.

The Full-Scale voltage value for overvoltage programming can be modified to any voltage between 5 V to 10 V from the front panel screen or by using the digital interface SCPI Command. The default FSC voltage value is 10 V, where 10 V corresponds to 110% of the rated output voltage. The equation for overvoltage set from analog programming is as follows:

$$\text{OVP} = Vdc \times (110\% \text{ rated output voltage} / \text{ FSC VDC}), \text{with Vdc in volts}$$

c) Remote Voltage Programming by Current Source

Programs the output voltage of the supply by current reference source. Refer to Control Interface chapter to configure the power supply to program output voltage by external reference source using front panel screen or refer to the programming manual P/N: M587352-01.

- **Power supply configurations to program output voltage by current source:**

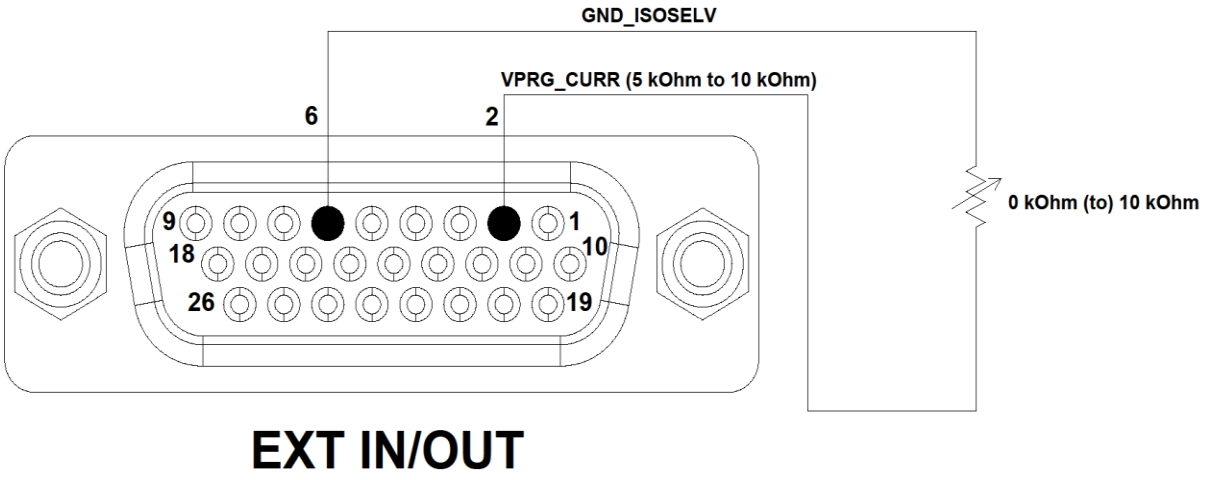


Figure 3-20. Remote Voltage Programming by Current Source

The programmable resistor is connected between Pin 2 (VPRG_CURR), ground Pin 6 (GND_ISOSELV) and the 'Analog Reference source' is selected as 'Current' from the front Panel. Refer to Figure 3-19.

The Full-Scale value for voltage programming can be modified to any value between 5 kΩ to 10 kΩ from the front panel screen or by using the digital interface SCPI Command. The default FSCR value is 10 kΩ, where 10 kΩ corresponds to 100% of the rated output voltage. The equation for voltage set from analog programming current source is as follows:

$$\text{Vout} = R \times (100\% \text{ rated output voltage} / \text{FSC k}\Omega), \text{with R in kilo ohms.}$$

3.12.3.2 REMOTE CURRENT PROGRAMMING

Remote current programming is used for applications that require the output current be programmed (controlled) from a remote instrument. An external resistance or external voltage source can be used as a programming device. When using remote current programming, a shielded, twisted-pair cable is recommended to prevent noise interference to programming signals.

a) Remote Current Programming by Voltage Source

Programs the output current of the supply by external voltage reference source. Refer to Control Interface chapter to configure the power supply to program output current by external reference source using front panel screen or refer to the programming manual P/N: M587352-01.

- **Power supply configurations to program output current by voltage source:**

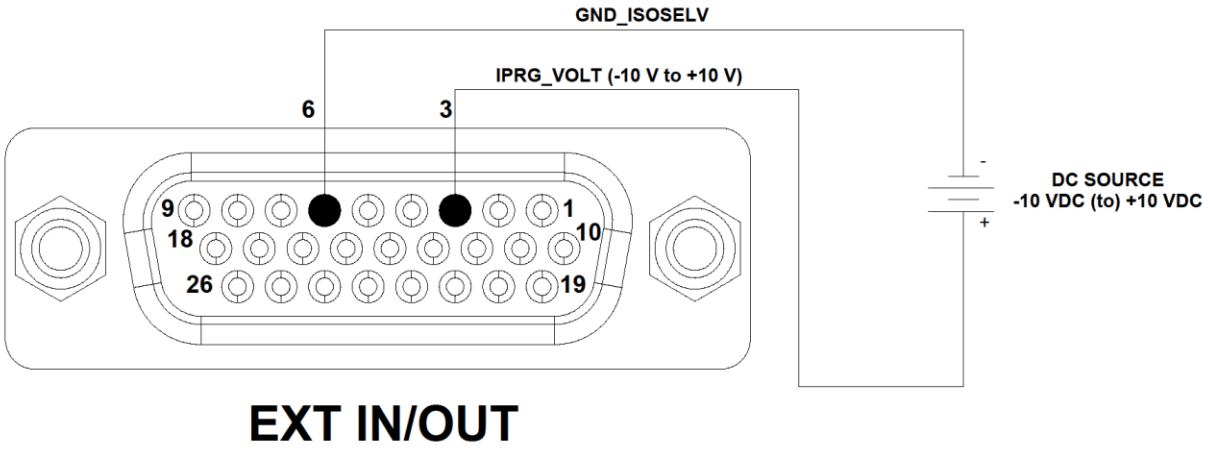


Figure 3-21. Remote Current Programming by Voltage Source

The DC voltage source is connected between Pin 3 (IPRG_VOLT), ground Pin 6 (GND_ISOSELV) and the 'Analog Reference source' is selected as 'Resistive' from the front Panel. Refer to Figure 3-21.

The Full-Scale voltage value can be modified to any voltage between 5V to 10V from front panel screen or by the digital interface SCPI Command. Default FSC voltage value is 10V, where 10V corresponds to 100% output current and -10V corresponds to -100% output current. The corresponding voltage-programming coefficients for output current are 100% rated output current / FSC VDC. This produces transfer functions for output current, as follows:

$$\text{Iout} = Vdc \times (100\% \text{ rated output current/FSC VDC}), \text{with Vdc in volts.}$$

b) Remote Current Programming by Current Source

Programs the output current of the supply by external current reference source. Refer to Control Interface chapter to configure the power supply to program output current by external reference source using front panel screen or refer to the programming manual P/N: M587352-01.

- **Power supply configurations to program output current by current source:**

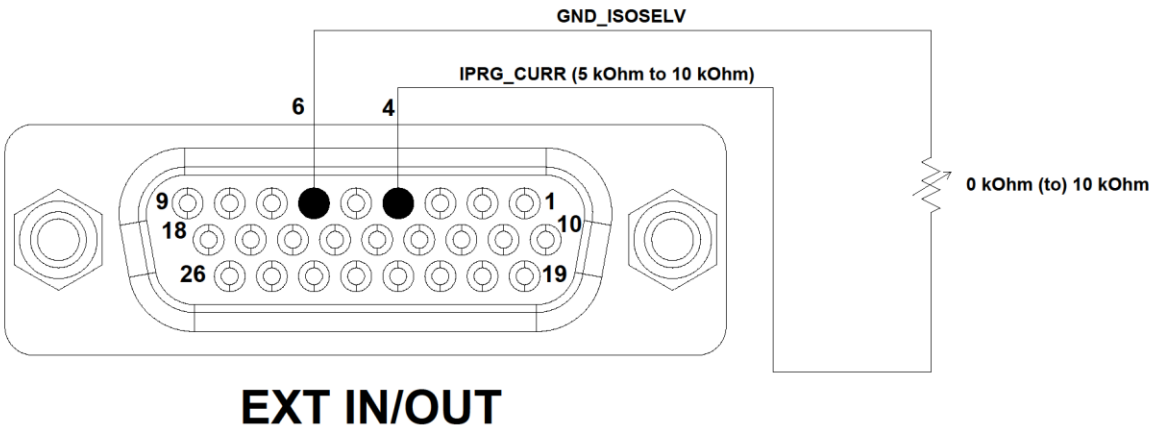


Figure 3-22. Remote Current Programming by Current Source

The programmable resistor is connected between Pin 4 (IPRG_CURR), ground Pin 6 (GND_ISOSELV) and the 'Analog Reference source' is selected as 'Current' from the front Panel. Refer to Figure 3-22.

The Full-Scale value for current programming can be modified to any value between 5 kΩ to 10 kΩ from the front panel screen or by using the digital interface SCPI Command. The default FSCR value is 10 kΩ, where 10 kΩ corresponds to 100% of the rated output current. The equation for current set from analog programming current source is as follows

$$\text{Iout} = R \times (100\%\ \text{rated output current}/\ \text{FSC k}\Omega), \text{with R in kilo ohms.}$$

NOTE: Remote current programming by current source is applicable only when operating source mode.

3.12.3.3 VOLTAGE MONITOR (VMON)

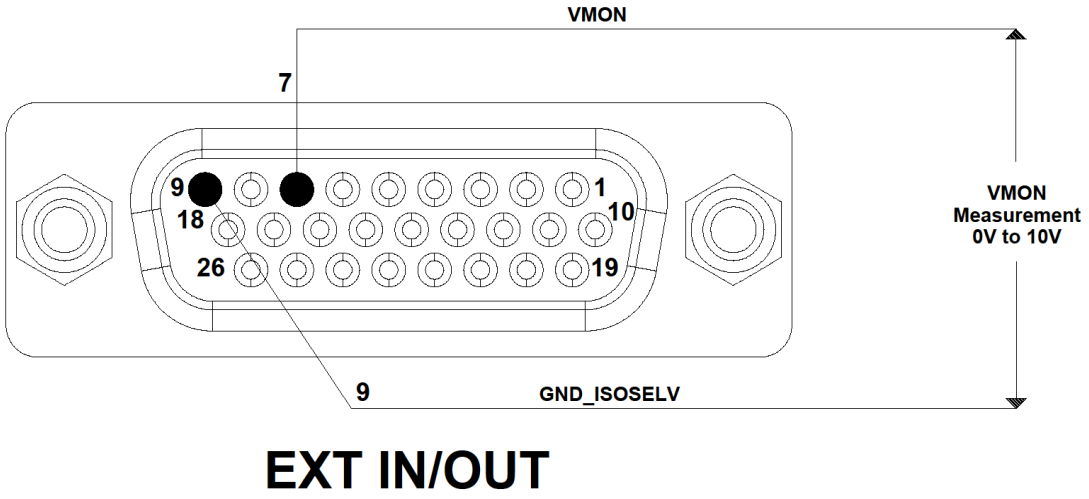


Figure 3-23. Voltage Monitor

Voltage Monitor provides functionality to monitor the scaled down output voltage of the power supply. Scaled down Output voltage could be monitored at VMON terminal of analog programming connector. Measurement of output voltage from 0 to 100% of full-scale rated output corresponds to 0 to 10V.

3.12.3.4 CURRENT MONITOR (IMON)

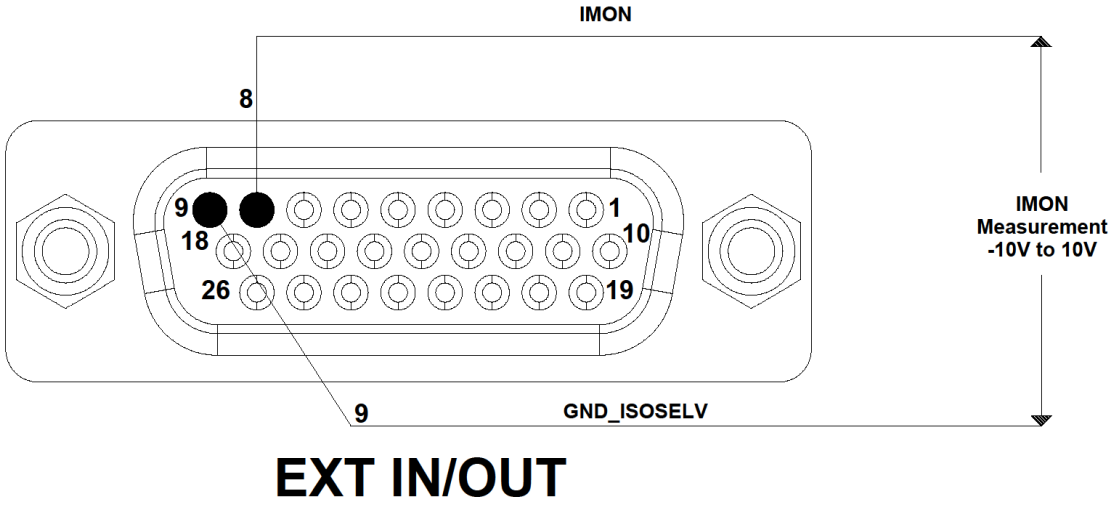


Figure 3-24. Current Monitor

Current Monitor provides functionality to monitor the scaled down output current of the power supply. Scaled down Output current could be monitored at IMON terminal of analog programming connector. Measurement of output current -100% to 100% of full-scale rated output corresponds to -10V to 10V.

3.12.3.5 DIO OUTPUT 1

Open collector transistor output for user programming.

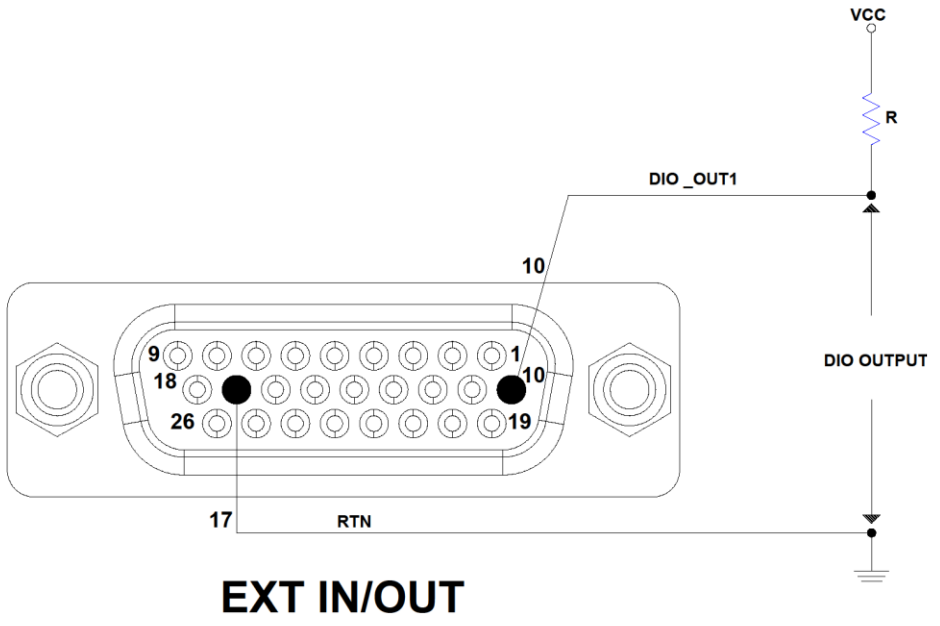


Figure 3-25. Dio Output 1

3.12.3.6 DIO OUTPUT 2

Open collector transistor output for user programming

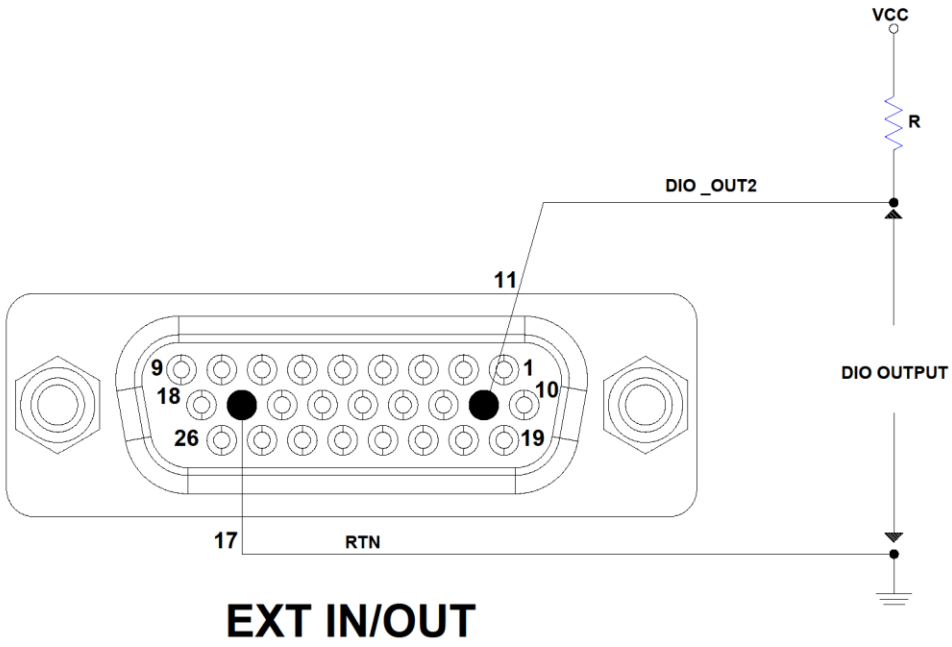


Figure 3-26. Dio Output 2

3.12.3.7 SOUR/SINK OUTPUT

The open collector transistor output has its collector connected to the 26-pin connector, while the pin-12 (SOUR/SINK_OUT) is connected to the common return pin-17 (RTN) of the interface connector. Status signal to communicate the direction of current flow.

a) Low – indicates power transfer is from power supply to UUT.

b) High – indicates power transfer is from UUT to Power supply.

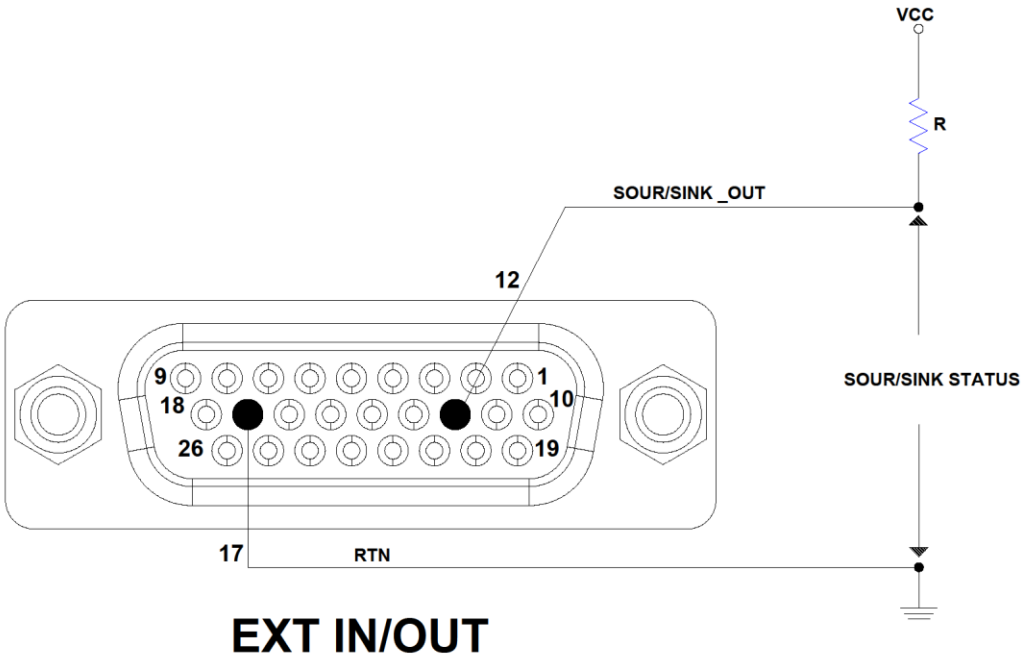


Figure 3-27. SOURCE/SINK Output

3.12.3.8 TRIGGER OUT FUNCTION (TRIG_OUT)

The open collector transistor output has its collector connected to the 26-pin connector, while the emitter pin-13 (TRIG_OUT) and pin-17 (RTN) is common return of the interface connector. It provides an active-high synchronization pulse of 100 µs.

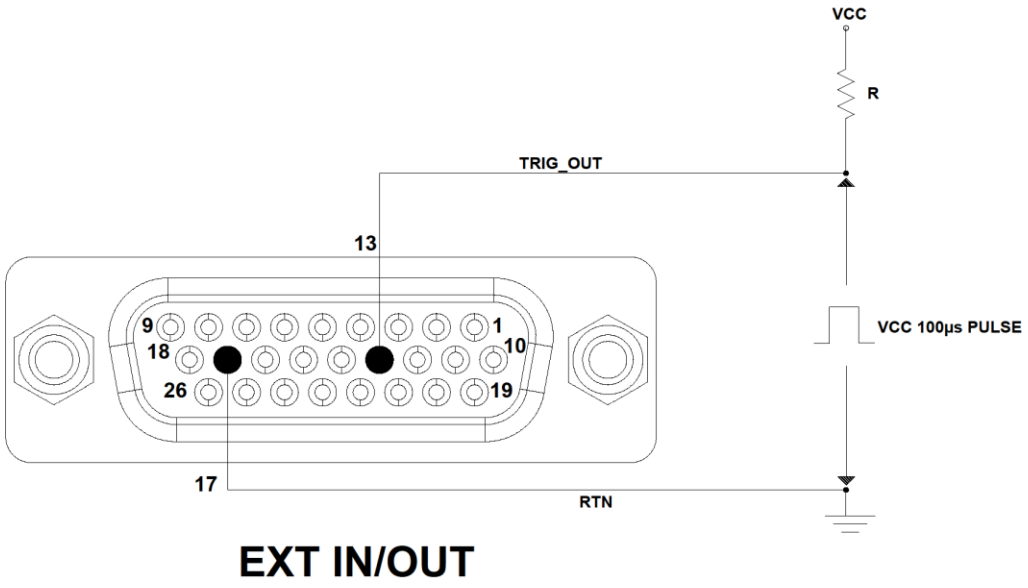


Figure 3-28. TRIG_OUT

3.12.3.9 DIO ON/OFF STATUS (DIO_ON/OFF_STAT)

The open collector transistor output has its collector connected to the 26-pin connector, while the emitter Pin-14 (DIO_ON/OFF_STAT) and Pin-17 (RTN) is common return

of the interface connector. When the output is in a high state, it indicates that the output is ON, and when the output is in a low state, it indicates that the output is OFF.

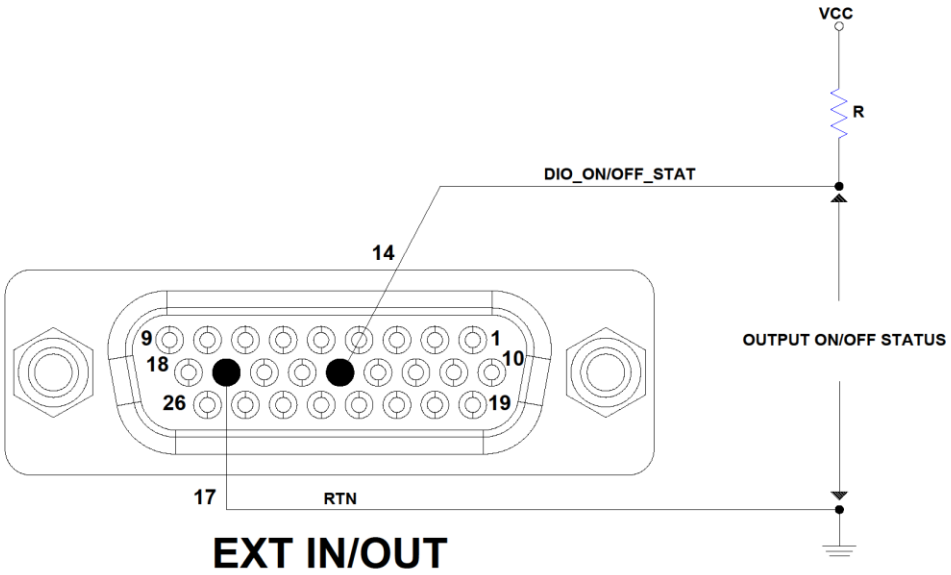


Figure 3-29. DIO_ON/OFF_STAT

3.12.3.10 DIO CC/CV OUTPUT (DIO_CC/CV_OUT)

The open collector configuration has its collector connected to the 26-pin connector, while the emitter Pin-15 (DIO_CC/CV_OUT) of the transistor is connected to the common return Pin-17 (RTN) of the interface connector. A high state indicates Constant Current mode operation, and a low state indicates Constant Voltage mode operation.

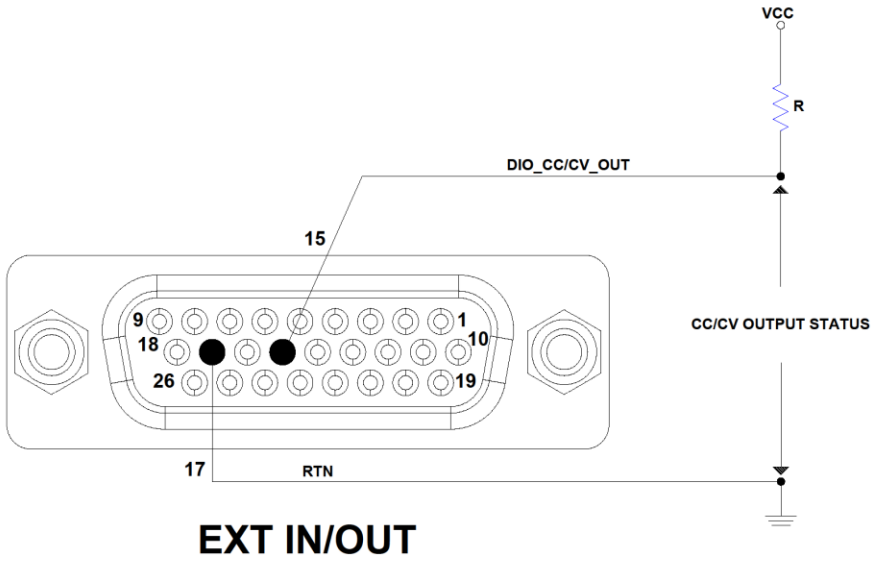


Figure 3-30. DIO_CC/CV_OUT

3.12.3.11 DIO FAULT OUTPUT (DIO_FAULT_OUT)

The open collector configuration has its collector connected to the 26-pin connector, while the emitter Pin-16 (DIO_FAULT_OUT) of the transistor is connected to the common return Pin-17 (RTN) of the interface connector. A high state indicates a fault state of the power supply.

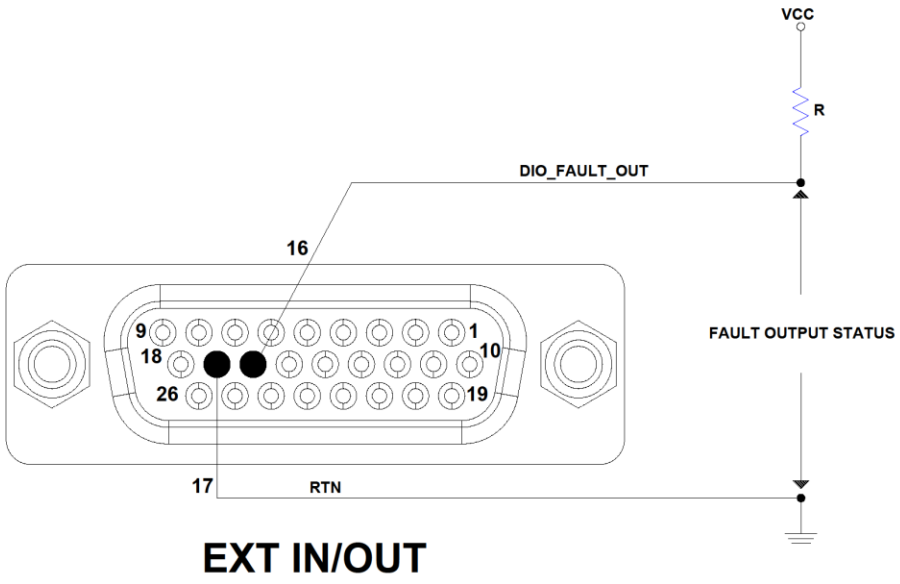


Figure 3-31. DIO_FAULT_OUT

3.12.3.12 TRIGGER IN FUNCTION (TRIG_IN)

The TTL-compatible input signal is an active-high pulse of 100 µs. This signal detects an external hardware trigger to Pin-19 (TRIG IN) and Pin-17 (RTN) at the falling edge of the active-high pulse for voltage, current ramp, and transient list functions. The signal connects to the open anode of the opto-isolator diode, which has an internal 1 kΩ series resistor within the power supply.

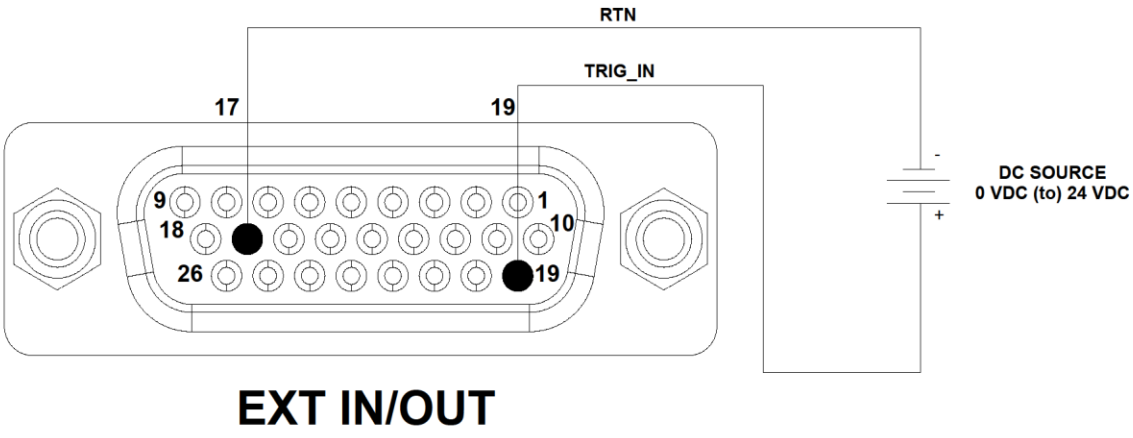


Figure 3-32. TRIG_IN

3.12.3.13 DIO OUTPUT ON/OFF (DIO_OUTPUT_ON/OFF)

The remote-control input for output ON/OFF operates with a logic signal. A logic-high signal, 2.7-24 VDC TTL/CMOS, connected to Pin-20 (DIO_OUTPUT_ON/OFF) and Pin-17 (RTN), will enable the output of the supply, while a logic-low signal will disable the output.

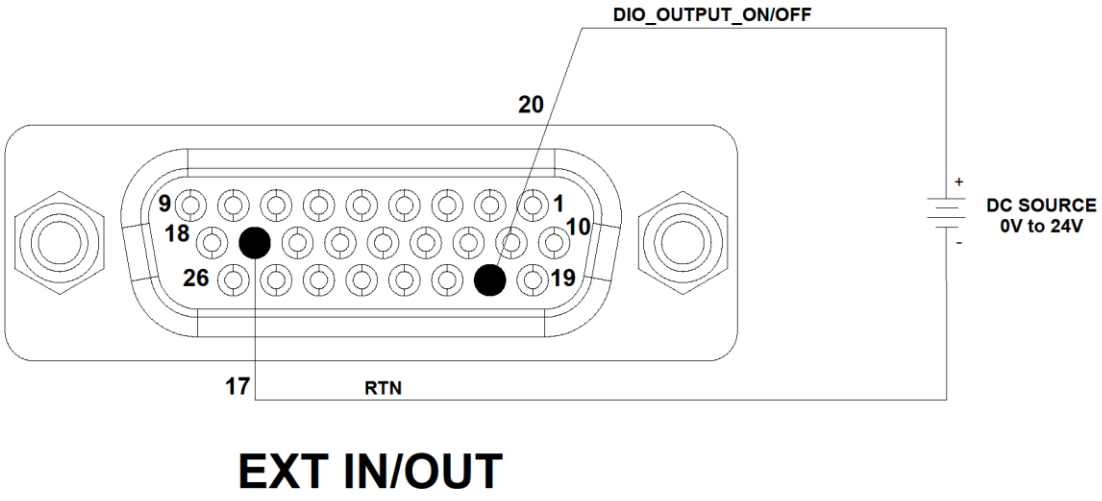


Figure 3-33. DIO_OUTPUT_ON/OFF

3.12.3.14 DIGITAL IN 1

Remote-control input with a logic signal.

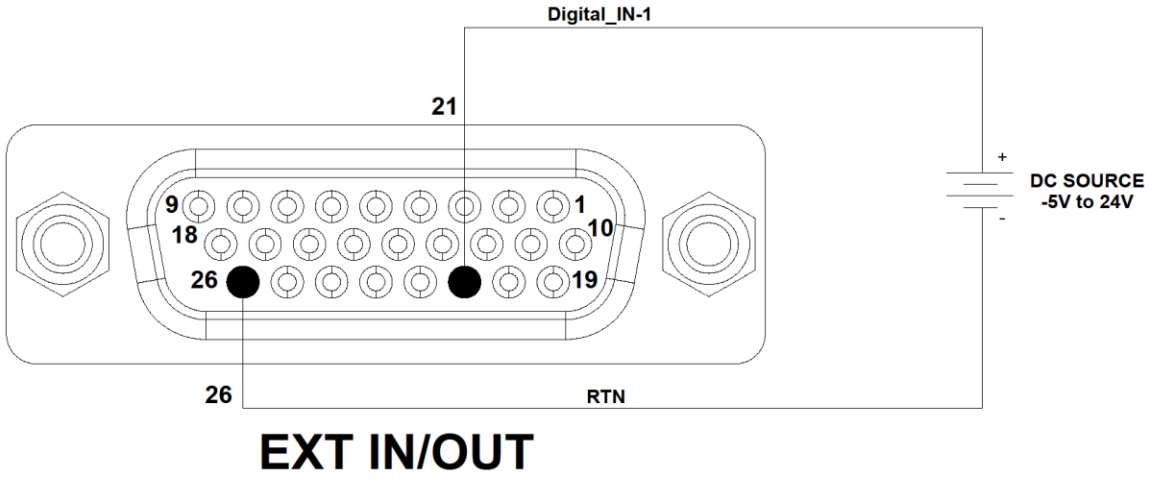


Figure 3-34. Digital IN 1

3.12.3.15 DIGITAL IN 2

Remote-control input with a logic signal.

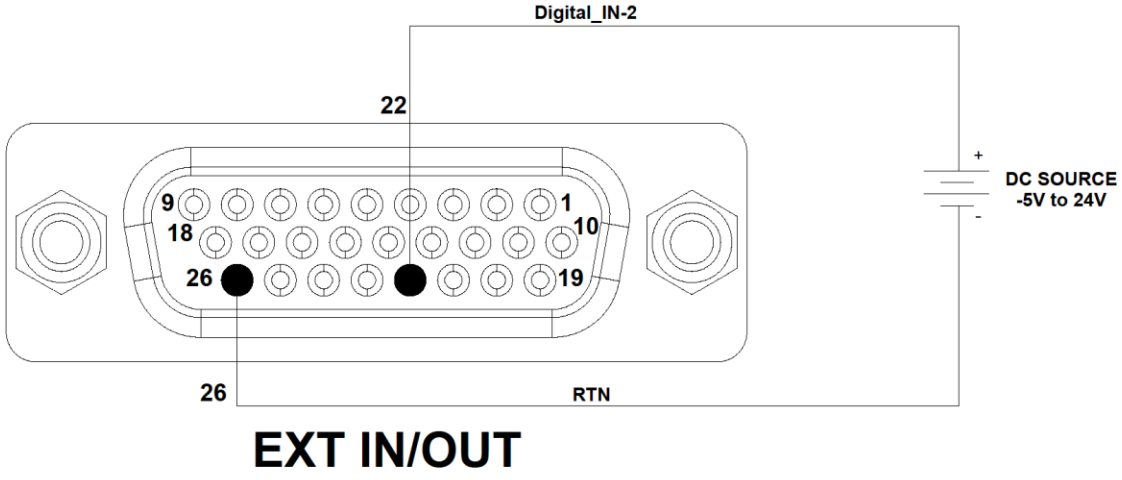


Figure 3-35. Digital IN 2

3.12.3.16 DIGITAL IN 3

Remote-control input with a logic signal.

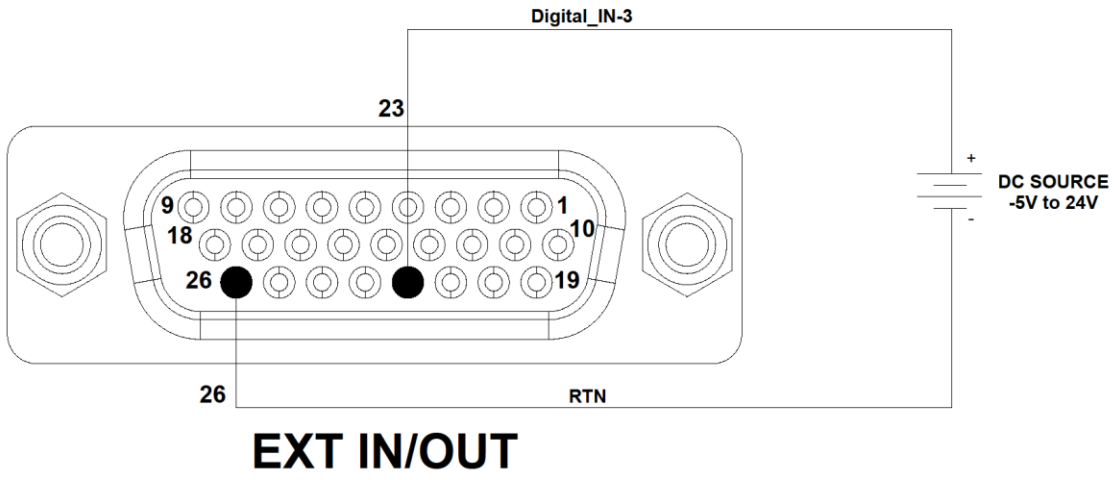


Figure 3-36. Digital IN 3

3.12.3.17 REMOTE INHIBIT ACTIVE VOLTAGE

For details related to the Remote Inhibit active voltage, refer to Section 3.12.2.

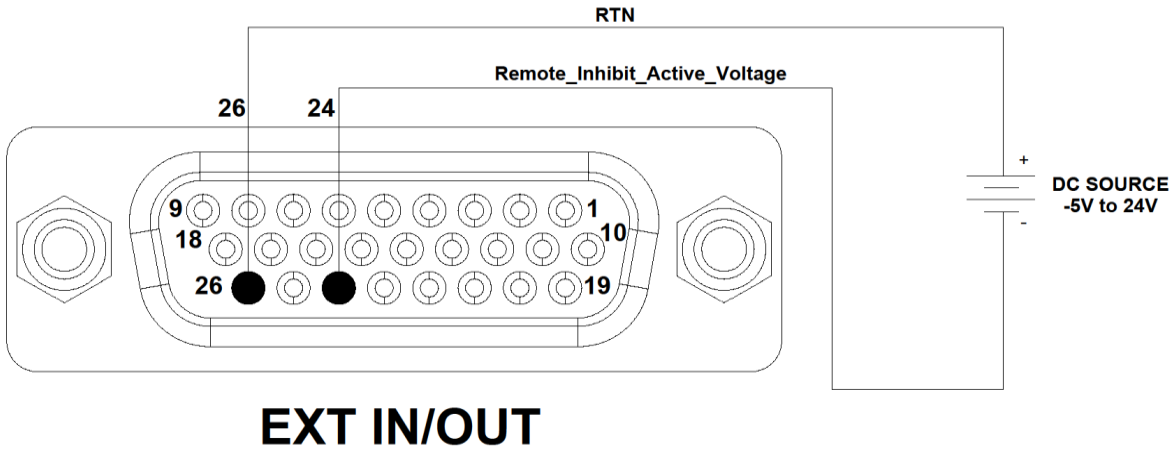


Figure 3-37. Remote Inhibit Active Voltage

3.12.3.18 REMOTE INHIBIT CONTACT CLOSURE

For details related to the Remote Inhibit contact closure, refer to Section 3.12.2.

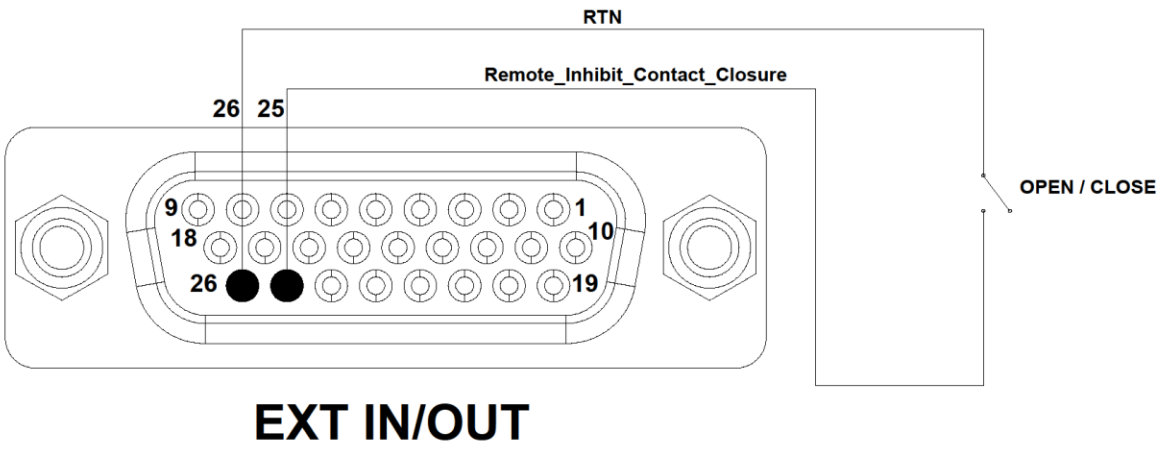


Figure 3-38. Remote Inhibit Contact Closure

3.12.4 EXTERNAL RELAY CONTROL SIGNAL CONNECTOR

Mi-BEAM Series power supply provides 8-Pin interface connector for relay operation. An 8-pin Molex connector (430200800) located at the rear panel provides external auxiliary control signals to increase the user's operating control of the supply. The mating receptacle is Molex 430250800 with 8 terminals. Refer to Section 2.18.

3.12.5 RS-232C SERIAL INTERFACE

RS-232C Figure 3-39, Table 3-15 for connector type and Table 3-16 for pin descriptions. The power supply functions as Data Circuit-terminating Equipment (DCE). The cable connecting to the Data Terminal Equipment (DTE) should be straight-through (one-to-one contact connections). For EMC considerations a ferrite core can be added to the cable AMETEK P/N: 991-642-28, Manufacturer P/N: CS28B0642.

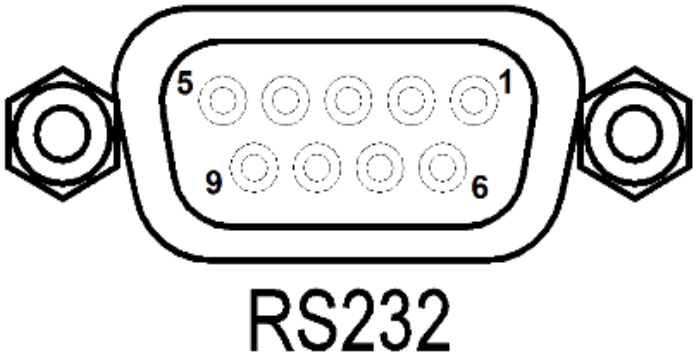


Figure 3-39. RS-232C Interface Connector

CONNECTOR	TYPE
RS-232C Interface	9-contact receptacle (female) Subminiature-D.

Table 3-15. RS-232C Interface Connector Type

PIN #	NAME	DCE SIGNAL	DIRECTION
1	N/C	N/A	N/A
2	TxD	Transmit Data	Output
3	RxD	Receive Data	Input
4	N/C	N/A	N/A
5	Common	N/A	N/A
6	N/C	N/A	N/A
7	RTS	Request to Send	Input
8	CTS	Clear to Send	Output
9	N/C	N/A	N/A

Table 3-16. RS-232C Interface Connector Pinout

3.12.6 USB INTERFACE

USB remote control interface is made through a Series-B device connector located on the rear panel; refer to Figure 3-40 for view of connector, Table 3-17 for the connector type and Table 3-18 for pin descriptions. Use a standard USB cable to connect the Mi-BEAM Series power supply to a computer.

For EMC considerations a ferrite core can be added to the cable AMETEK P/N: 991-642-28, Manufacturer P/N: CS28B0642.

CAUTION!
Connecting the power supply to the computer controller through a USB hub is not recommended. The USB connection should be direct between the two devices.

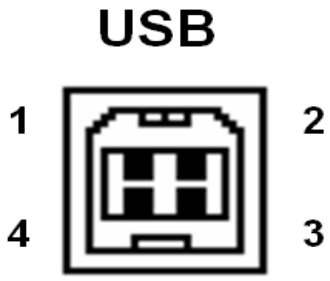


Figure 3-40. USB Interface Connector

CONNECTOR	TYPE
USB Interface	USB series-B type Connector

Table 3-17. USB Interface Connector Type

PIN #	NAME	DESCRIPTION
1	N/C	No Connection
2	D-	Data -
3	D+	Data +
4	GND	Ground

Table 3-18. USB Interface Connector Pinout

3.12.7 LAN INTERFACE

A LAN connector (Ethernet 10BaseT/100BaseT) is located on the rear panel for remote control; refer to Figure 3-41 for view of connector, Table 3-19 for connector type and Table 3-20 for pin descriptions. A standard modular cable with an 8P8C modular plug should be used between the power supply and a network hub. For a direct connection to a computer LAN card, a crossover cable with an 8P8C modular plug is required. The MAC Address (Media Access Control) of the Ethernet port is printed on a label on the chassis of the power supply. For information on how to set up a network connection or a direct computer connection using the LAN interface.

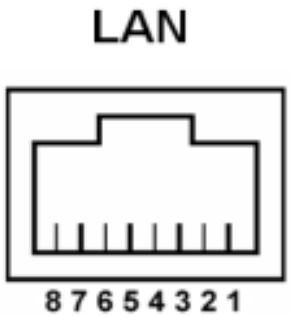


Figure 3-41. LAN Interface 8P8C Modular Connector

CONNECTOR	TYPE
LAN Interface	Standard RJ45 connector

Table 3-19: LAN Interface Connector Type

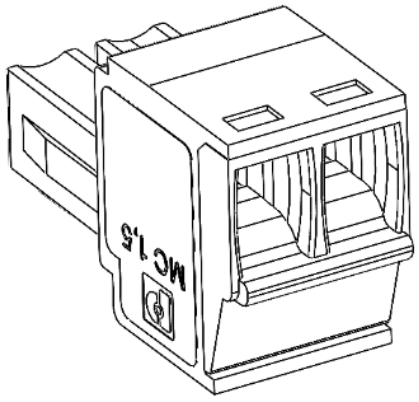
PIN #	ETHERNET SIGNAL	EIA/TIA 568A	EIA/TIA 568B CROSSOVER
1	Transmit/Receive Data 0 +	White with green stripe	White with orange stripe
2	Transmit/Receive Data 0 -	Green with white stripe or solid green	Orange with white stripe or solid orange
3	Transmit/Receive Data 1 +	White with orange stripe	White with green stripe
4	Transmit/Receive Data 2 +	Blue with white stripe or solid blue	Blue with white stripe or solid blue
5	Transmit/Receive Data 2 -	White with blue stripe	White with blue stripe
6	Transmit/Receive Data 1 -	Orange with white stripe or solid orange	Green with white stripe or solid green
7	Transmit/Receive Data 3 +	White with brown stripe or solid brown	White with brown stripe or solid brown
8	Transmit/Receive Data 3 -	Brown with white stripe or solid brown	Brown with white stripe or solid brown

Table 3-20. LAN Interface 8P8C Modular Connector Pinout

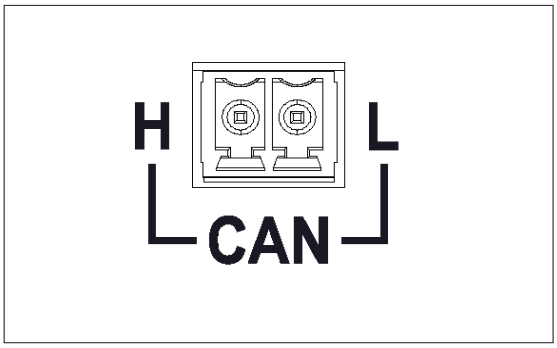
3.12.8 CAN INTERFACE

The CAN connector is located on the rear panel for remote control; refer to Figure 3-41, Table 3-9 for connector type and for Table 3-22 pin descriptions. To minimize noise pickup from load circuits, CAN wires should be in twisted pairs and have a minimum lead length.

NOTE: CAN bus uses differential signaling, and twisting the pair minimizes electromagnetic interference and ensures signal integrity.



CAN Interface connector – Side View



CAN Interface connector – Front View

Figure 3-42. CAN Interface connector

CONNECTOR	TYPE
CAN	Unit side connector: compression terminals, Phoenix P/N 1995499 Mating Connector: Phoenix P/N 1840366

Table 3-21. CAN Connector

PIN	DESCRIPTION
H (High)	Transmits the higher voltage line of the CAN differential signal (dominant state).
L (Low)	Transmits the lower voltage line of the CAN differential signal (recessive state).

Table 3-22. CAN Connector Pinout

3.12.9 GPIB INTERFACE (Optional)

A GPIB connector is located on the rear panel for remote control; refer to Figure 3-42 for rear view of connector, Table 3-23 for connector type and Table 3-24 for pin descriptions.

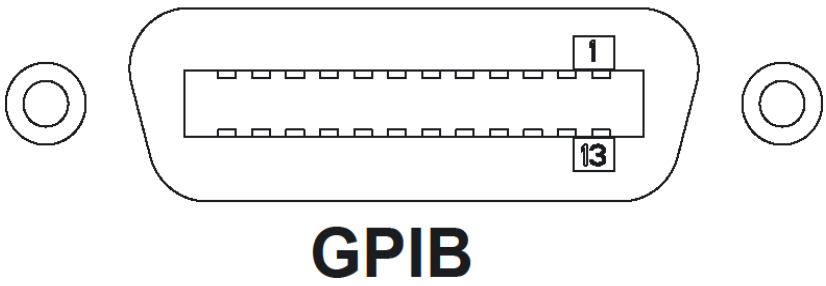


Figure 3-43. GPIB interface Connector

CONNECTOR	TYPE
GPIB Interface	PCB D-Sub Connectors, Receptacle, Cable-to-Board, 24 Position TE Connectivity P/N: 5554923-1

Table 3-23. GPIB Interface Connector Type

PIN #	GPIB SIGNAL	DESCRIPTION
1	DIO1	Data Input/ Output bit
2	DIO2	Data Input/ Output bit
3	DIO3	Data Input/ Output bit
4	DIO4	Data Input/ Output bit
5	EOI	End- Or- Identity
6	DAV	Data Valid
7	NRFD	Not Ready for Data
8	NDAC	Not Data Accepted
9	IFC	Interface Clear
10	SRQ	Service Request
11	ATN	Attention
12	SHIELD	Tied to Digital Ground
13	DIO5	Data Input/ Output bit
14	DIO6	Data Input/ Output bit
15	DIO7	Data Input/ Output bit
16	DIO8	Data Input/ Output bit
17	REN	Remote Enable
18	GND	Digital Ground
19	GND	Digital Ground
20	GND	Digital Ground
21	GND	Digital Ground
22	GND	Digital Ground
23	GND	Digital Ground
24	GND	Digital Ground

Table 3-24. GPIB Interface Connector Pinout

4 INTERFACING Mi-BEAM POWER SUPPLY WITH ACTIVE SOURCE OR LOAD

4.1 INSTRUCTIONS FOR SAFE OPERATION BEFORE LOAD INTERFACING

The safety instructions must be strictly followed to ensure safe and reliable operation of the Mi-BEAM power supply before interfacing with load.



WARNING!

Before handling the DC output connector of the Mi-BEAM power supply, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live DC output can result in fatal electric shock and may cause death.



CAUTION!

Failure to follow the instructions mentioned in this chapter may result in serious equipment damage or personal injury.

a) Make sure the following voltages are zero before making any connections or touching the terminals of the Mi-BEAM power supply:

- Positive (+ve) terminal to Negative (-ve) terminal
- Positive (+ve) terminal to Chassis
- Negative (-ve) terminal to Chassis.

NOTE: It is possible for the positive (+ve) or negative (-ve) terminal to have high voltage with respect to chassis ground even when the Mi-BEAM power supply display shows 0 V.

b) Make sure that the Mi-BEAM power supply is grounded, this can be done by connecting the utility earth protection ground to rear panel Chassis ground.



WARNING!

Operating the unit without a proper protective earth (PE) connection can result in a serious electric shock hazard, including risk of fatal injury and may cause death.

c) Make sure that the positive (+ve) terminal of the Mi-BEAM power supply is connecting to the positive (+ve) terminal of the UUT, and the negative (-ve) terminal to the negative (-ve) terminal of the UUT.

NOTE: Interchanging the terminal connection and operating may damage the Mi-BEAM internal power circuits.



CAUTION!

Reversing the polarity and operating the unit will result in severe internal damage to the Mi-BEAM power supply.

d) Make sure that all protection and regulation limits are properly configured before initiating an operation:

- Overvoltage Protection (OVP)
- Overcurrent Protection (OCP)
- Regulation limits
    - **Example**: In case of CV regulation setting, ensure that the current and power limits are set correctly.

4.2 INTERFACING Mi-BEAM TO AN ACTIVE SOURCE OR LOAD

4.2.1 INTERFACING Mi-BEAM USING USER ISOLATION BOX

It is always better to discharge the output voltage of both Mi-BEAM power supply and UUT before circuit closure between the two for operation. In most cases, it is required to perform circuit closure when either Mi-BEAM or UUT or both units are having terminal voltage.

Example – Interfacing Mi-BEAM to a Battery;

When a battery is used as a load, a terminal voltage is always present. Therefore, the circuit must be closed in a charged condition. In such cases, an additional isolation box is required between the Mi-BEAM power supply and the UUT to ensure smooth interfacing.

The isolation box contains a pre-charge contactor with a series resistance and an isolation contactor. The pre-charge contactor ensures the smooth charging of output-side capacitors, preventing a high dV/dt across them, which would otherwise result in a large inrush current.

Refer to Figure 4-1 for the connection diagram used to interface Mi-BEAM power supply to an active source or load.

The control signals for the pre-charge contactors on both the positive and negative sides can be the same, and likewise, the control signals for the isolation contactors on both sides can also be common.

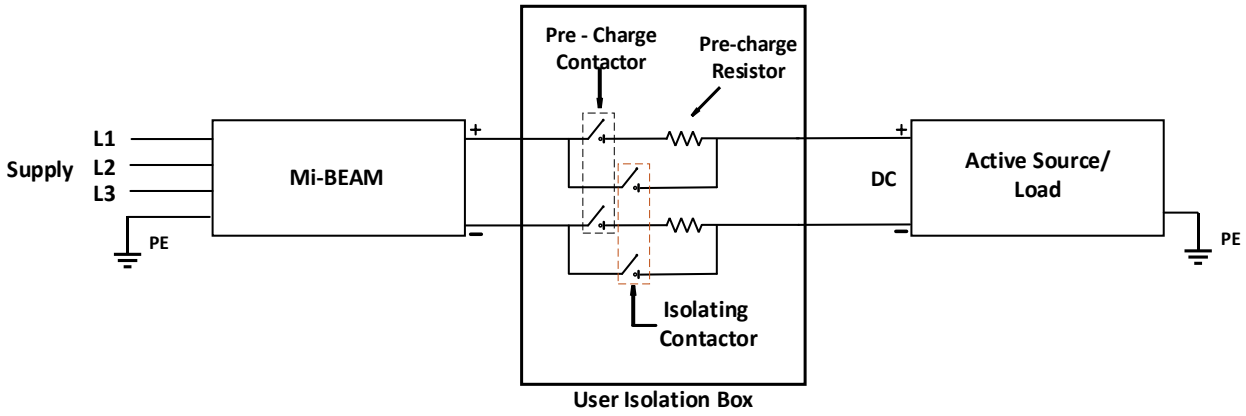


Figure 4-1. Mi-BEAM connected to an active source or load though an isolation box

Pre-charge resistance calculation:

- $Pre-charge\ Resistance\ (\Omega)\ on\ the\ positive\ terminal$

$$= \frac{Rated\ Voltage\ of\ Mi-BEAM\ Power\ Supply\ (V)}{RatedCurrentofMi-BEAMPowerSupply(A)\times 2}$$

- $Pre-charge\ Resistance\ (\Omega)\ on\ the\ negative\ terminal$

$$= \frac{Rated\ Voltage\ of\ Mi-BEAM\ Power\ Supply\ (V)}{RatedCurrentofMi-BEAMPowerSupply(A)\times 2}$$

Example:

For the Mi-BEAM power supply model **MIB-2000-0037-0050-AA**:

- **Rated Voltage** = 2000 V
- **Rated Current** = 50 A

$$Pre-charge\ Resistance\ on\ the\ positive\ terminal = \frac{2000\ (V)}{50\ (A)\times 2} = 20\ (\Omega)$$

$$Pre-charge\ Resistance\ on\ the\ negative\ terminal = \frac{2000\ (V)}{50\ (A)\times 2} = 20\ (\Omega)$$

Typical Pre-charge resistor wattage can be around 150 to 200 Watts, this can be divided across the positive and negative terminal.

- Pre-charge resistor wattage on the positive terminal can be around 75 to 100 Watts.
- Pre-charge resistor wattage on the negative terminal can be around 75 to100 Watts.

NOTE: Always verify the rated voltage and current before the calculation.

Pre-charge time calculation:

Typical pre-charge time will be around 4 to 5 times of 'RC' time constant, where 'R' is pre-charge resistance and 'C' is the output capacitance of the Mi-BEAM power supply. Refer to Table 4-1 for Mi-BEAM power supply output capacitance.

OUTPUT CAPACITANCE (µF) (± 10 %)			
Output Voltage (V)	Output Power		
	12.5 kW	25 kW	37.5 kW
400	360 uF	360 uF	360 uF
600	360 µF	360 µF	360 µF
800	186 uF	186 uF	186 uF
1200	-	65 uF	65 uF
1500	-	40 µF	40 µF
2000	-	40 µF	40 µF

Table 4-1. Power Supply Output Capacitance

4.2.1.1 CONNECTING THE UUT TO MI-BEAM

a) Close the pre-charge contactors of the isolation box simultaneously (using either the same or separate control inputs). This will initiate voltage equalization between the Mi-BEAM power supply and the UUT.

b) Once the pre-charging process is complete, the terminal voltages of both the Mi-BEAM and the UUT will be equalized.

c) Close both the isolation contactors simultaneously (using either the same or separate control inputs) to establish a direct connection between the Mi-BEAM power supply and the UUT.

d) Open the pre-charge contactors simultaneously (using either the same or separate control inputs)

e) The units can then be turned ON sequentially, and regular operation can be started.

4.2.1.2 LOAD DISCONNECTION

a) Turn OFF the output of both the Mi-BEAM and the UUT and ensure that the load current is zero.

b) Open both isolation contactors to disconnect the Mi-BEAM from the UUT. The operation of isolation box is shown with a timing diagram, refer to Figure 4-2.

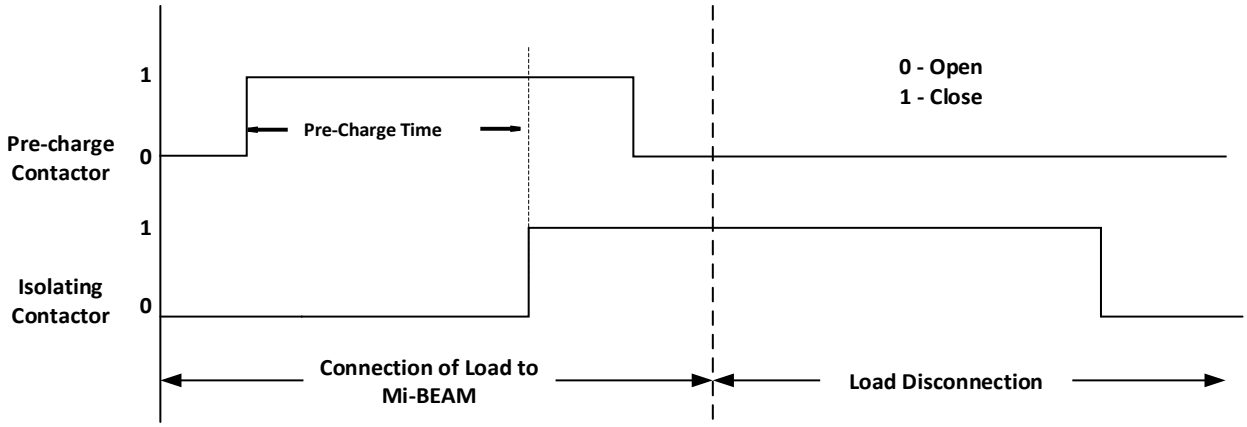


Figure 4-2. Timing diagram showing operation of pre-charge and isolating contactor of Mi-BEAM

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5 PARALLEL OPERATION

Parallel mode of operation is used for applications that require more current or power than a single power supply can provide. To meet these higher output requirements, power supplies can be connected in parallel, effectively combining their capacities to achieve the desired performance.

NOTE: Only units with identical voltage ratings must be connected in parallel. Units with different model numbers can still be paralleled as long as their voltage ratings are the same.

NOTE: If Isolation chassis is connected to the Mi-BEAM paralleled system, ensure the maximum current of the system must not exceed the current rating of the output isolation chassis (5580714-01R - Rated Voltage and Current: 2000V, 1000A).

In ‘Parallel Operation Mode’, the system is needs to be configured to either ‘Max Power’ or ‘Max Current’. This selection is significant when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel. Refer to Section 5.2.

5.1 SETTING UP PARALLEL OPERATION



CAUTION!

Contact the factory for parallel operation with more than seven power supplies.

Each power supply has two separate 15-pin connectors on the upper left rear panel, labeled ‘PARALLEL INTERFACE IN’ and ‘PARALLEL INTERFACE OUT’. To connect power supplies in parallel, use a ‘Leader’ or ‘Follower’ daisy-chain wiring configuration, refer to Figure 5-1. For parallel cable information refer to Section 2.26.

a) Using an interface cable (P/N 890-015-01), connect the 'PARALLEL INTERFACE OUT' port of the Leader power supply to the 'PARALLEL INTERFACE IN' port of the second power supply (Follower 1).

NOTE: In parallel operation, the Leader unit manages all programming, readback, and control functions. Remote analog control is not supported in this mode.

NOTE: Units with the same voltage rating, with either identical or different power ratings, are allowed to be connected in parallel.

b) On the second power supply (Follower 1), connect another interface cable from its 'PARALLEL INTERFACE OUT' port to the 'PARALLEL INTERFACE IN' port of the third power supply (Follower 2). Continue this daisy-chain connection for up to a maximum of seven power supplies (one Leader unit and six follower units).

c) In the Leader unit, navigate to ‘PONS Multi Chassis Operation’ and select ‘Parallel’. Refer to Figure 10-165.



WARNING!

Before handling the DC output connector, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live DC output can result in fatal electric shock and may cause death.



CAUTION!

Under no condition the voltage between negative or positive output terminal of the paralleled system to chassis earth must not exceed 2000V.



CAUTION!

Use only the wires specified in Section 3.10 to connect the positive (-) and negative (+) terminals.

d) Connect the positive (+) output terminals of all power supplies together, along with the positive (+) terminal of the load.

e) Connect the negative (-) output terminals of all power supplies together, along with the negative (-) terminal of the load.

f) Ensure that there are no shorts between the Positive (+) and Negative (-) output terminals.

g) Ensure all cables are kept as short as possible and connect twisted-pair sense cables as follows;

- For remote sensing at the load, only the Leader unit should have a twisted-pair cable running from its sense terminals to the load terminals.

h) After all the successful connection, power ON the leader and all follower units.

NOTE: If an output isolation chassis (refer to Chapter 7) is connected to the parallel configuration of Mi-Beam power supply, turn ON the output isolation chassis first, then the leader unit. After the leader is powered on, turn on the follower units.

i) Ensure that the 'PONS Multi Chassis Operation' in the Leader unit is set to 'Parallel'. Refer to Figure 10-165.

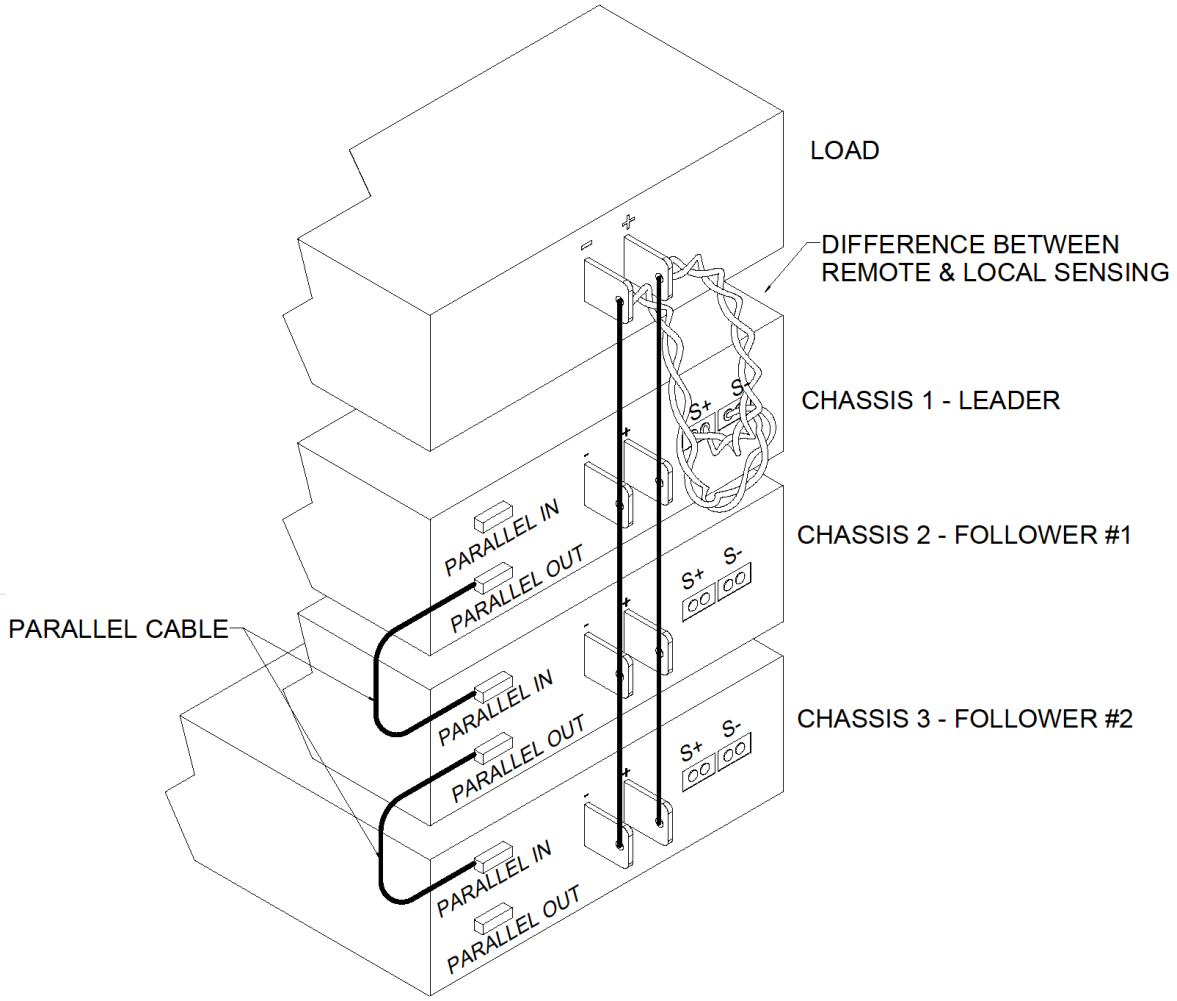
j) Navigate to 'Configuration' Screen and select 'Parallel Operation Mode'.

k) Select 'Max Power' or 'Max Current' based on the user requirement. Refer to Section 5.2 for operational details and Figure 10-166 for front panel operation.

l) The leader unit displays the total power and current of the parallel connected system.

m) The follower unit displays its own current and power measurements. Refer to Figure 9-25.

NOTE: For the first-time parallel operation, reset the system by selecting 'Factory Default' in the 'System Settings' screen and then reboot it. This ensures the paralleled system is initialized with default PONS values. After rebooting, the system automatically adjusts and sets the limit values to their maximum based on the number of units connected in parallel.



PARALLEL WITH REMOTE SENSING

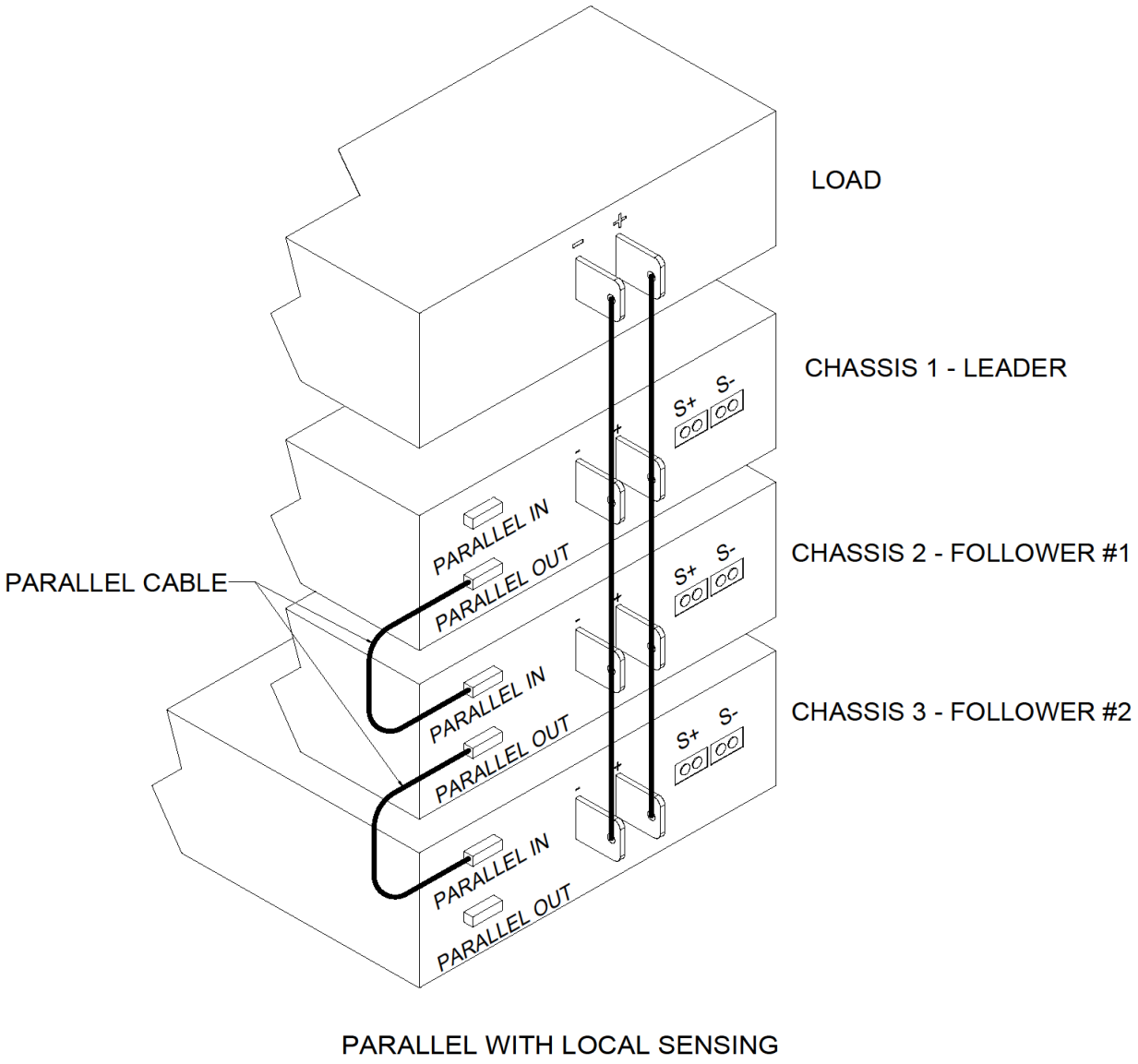


Figure 5-1. Parallel Connection

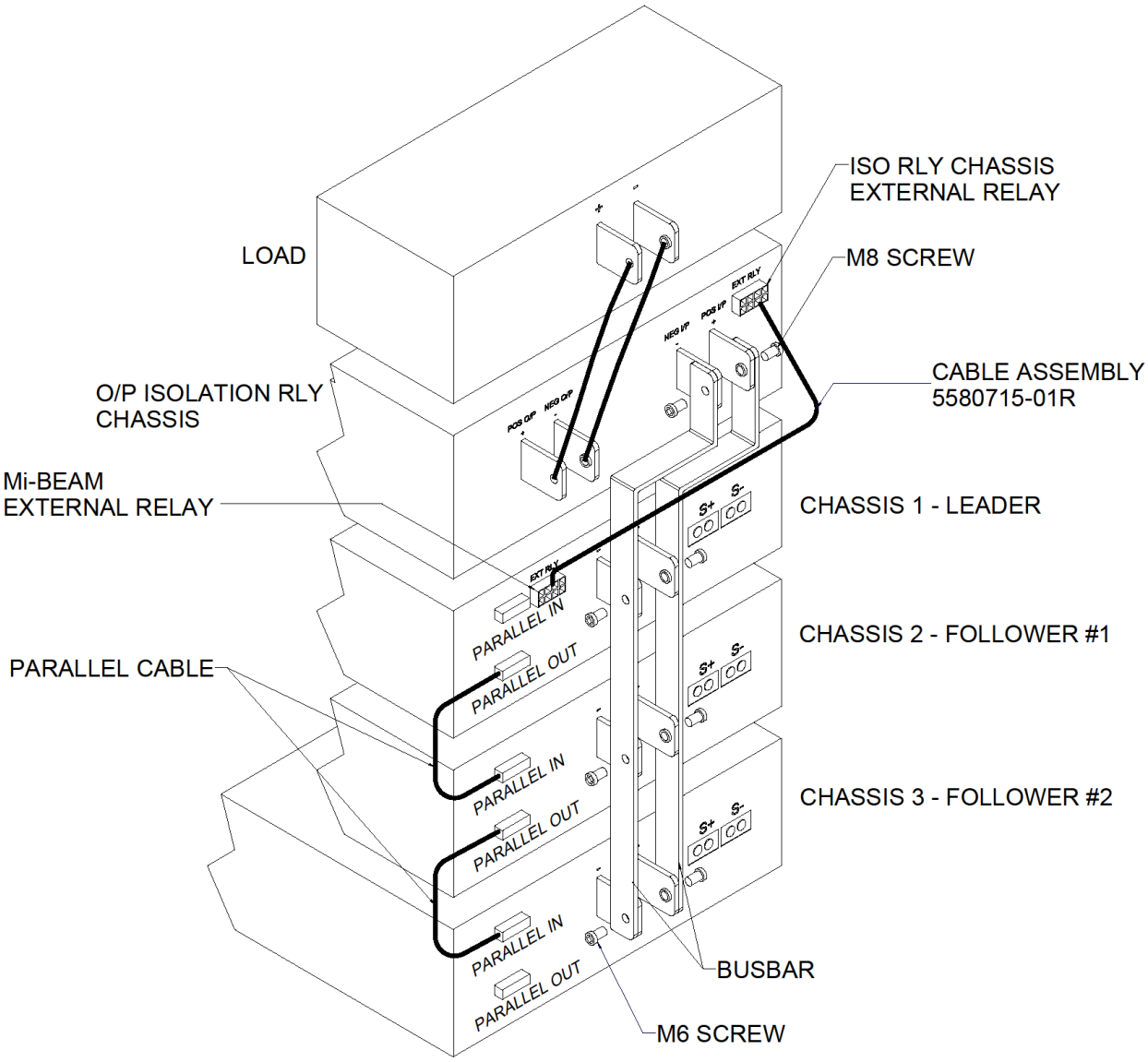


Figure 5-2. Parallel Connection with Output Isolation chassis

5.2 PARALLEL OPERATION MODE SETTINGS

When units with different power ratings are connected in parallel (applicable only for 1200 V, 1500 V and 2000 V voltage rated models), the system can deliver either maximum power or maximum current, based on the selected configuration.

a) If configuration is ‘Max Power’, the system delivers maximum power by limiting the overall current.

b) If configuration is ‘Max Current’, the system delivers maximum current by limiting the overall power.

NOTE: When units with identical model numbers are connected in parallel, the configuration becomes insignificant. Regardless, selecting either 'Max Power' or 'Max Current' enables the system to deliver maximum power and current in both configurations.

NOTE: When 400V, 600V and 800V voltage rated units are connected in parallel (irrespective of identical or non-identical model numbers), the configuration becomes insignificant. Regardless, selecting either 'Max Power' or 'Max Current' enables the system to deliver maximum power and current in both configurations.

Example:

a) Consider two 2000V voltage rated power supplies with different model numbers that are connected in parallel;

- MIB-2000-37-0050-AA
- MIB-2000-25-0050-AA

b) The paralleled system model number will be MIB-2000-62-0100-AA.

c) On selecting 'Max Power', unit's maximum power will be 62.5kW and unit's maximum current will be 83.33A. Calculation is mentioned below,

- $Maximum\ system's\ power\ delivery\ =\ Unit\ 1\ rated\ Power +\ Unit\ 2\ rated\ Power$
  - $62.5kW\ =\ 37.5kW\ +\ 25kW$
- $Maximum\ system's\ current\ delivery =\ Unit\ 1\ rated\ Current\ \times\ (Unit\ 1\ rated\ power/\ rated\ power\ of\ the\ unit\ with\ maximum\ power\ rating) +\ Unit\ 2\ rated\ Current\ \times\ (Unit\ 2\ rated\ power/rated\ power\ of\ the\ unit\ with\ maximum\ rated\ power)$
  - $83.33A = \big((50A \times 37.5kW)/37.5kW\big) + \big((50A \times 25kW)/37.5kW\big)$

d) On selecting 'Max Current' unit's maximum power will be 50kW and unit's maximum current will be 100A. Calculation is mentioned below,

- $Maximum\ system's\ power\ delivery\ = Number\ of\ units\ in\ parallel\ \times\ power\ of\ the\ unit\ with\ minimum\ power$
  - $50kW\ =\ 2\ \times\ 25kW$
- $Paralleled\ system's\ current\ delivery\ =\ Unit 1\ rated\ current +\ Unit\ 2\ rated\ current$
  - $100A\ =\ 50A +\ 50A.$

6
SERIES OPERATION

Series mode of operation is used for applications that require more voltage or power than a single power supply can provide. To meet these higher output requirements, power supplies can be connected in series, effectively combining their output voltages while maintaining the same output current capability.

NOTE: Only 2 power supplies can be connected in series, and the connected units must have the same model number, i.e. the voltage, current and power ratings of both the units must be same.

Based on the connection to the load's common terminal, series operation is divided into two:

a) Series: Mi-BEAM series system output is connected to the two output terminals of the load, positive (+) and negative (-). Refer to Figure 6-1.

- Series connected Mi-BEAM positive (+) output terminal is connected to the positive (+) terminal of the load.
- Series connected Mi-BEAM negative (-) output terminal is connected to the negative (-) terminal of the load.
- Based on the connection of the series system center to the earth from the leader or follower, the series connection is divided into two types:
  - Series – Grounded
  - Series – Non-Grounded

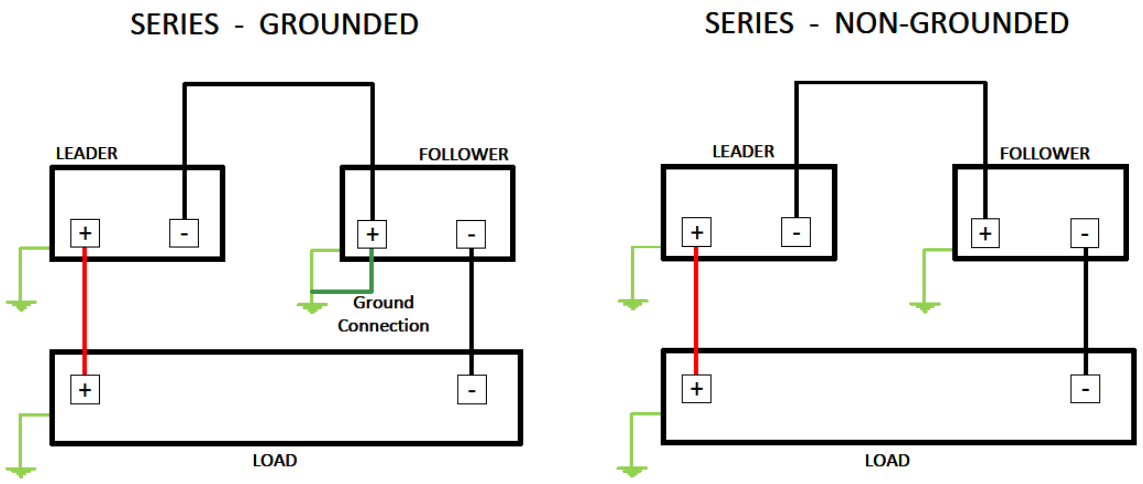


Figure 6-1. Series Connection – Grounded and Non-Grounded

b) Series Split Phase: Mi-BEAM series system output is connected to the three terminals of the load, positive (+) and negative (-) and common terminal. Refer to Figure 6-2.

- Series connected Mi-BEAM positive (+) output terminal is connected to the positive (+) terminal of the load.
- Series connected Mi-BEAM negative (-) output terminal is connected to the negative (-) terminal of the load.
- Series connected Mi-BEAM either the Leader's negative (-) terminal or the Follower's positive (+) terminal is connected to the common terminal of the load.
- Based on the connection of the series split phase system center to the earth from the leader or follower, the series split phase connection is divided into two types:
  - Series split phase – Grounded
  - Series split phase – Non-Grounded.

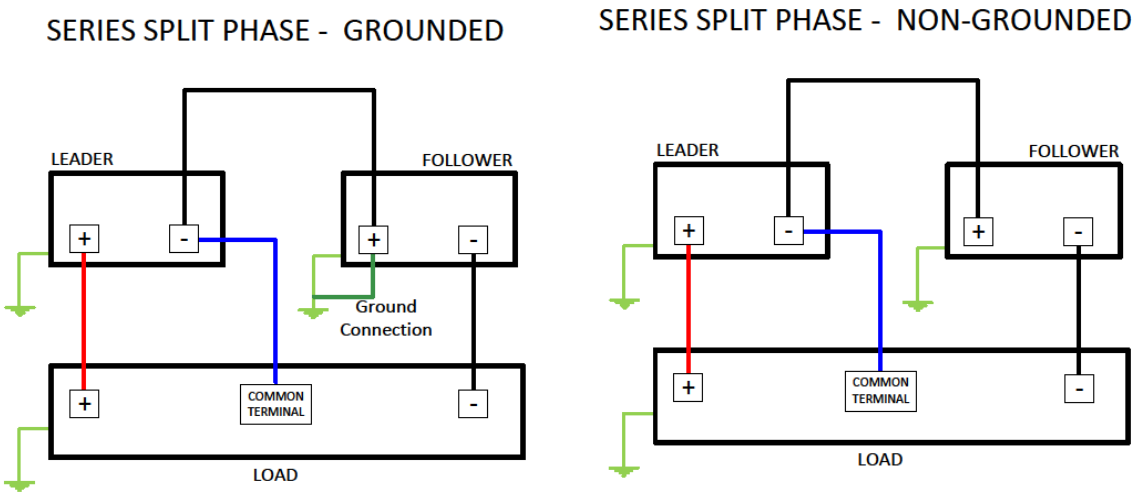


Figure 6-2. Series Split Phase Connection – Grounded and Non-Grounded

NOTE: Series operation supports only Bi-Directional, Source and e-Load operating modes. The supported programming type and regulation settings is 'Voltage - CV'.

NOTE: If 'PONS Multi-Chassis Operation' is set to 'Series' and any 'PONS Operating Mode', 'Programming Type', or 'Regulation setting' is configured to a value that is not supported for Series operation, the system automatically resets the 'PONS Operating Mode', 'Programming Type', and 'Regulation settings' to their default values.

6.1 SETTING UP SERIES OPERATION

6.1.1 SERIES – NON-GROUNDED



CAUTION!

No more than two power supplies should be used in series operation. Using more than two units may result in damage or operational errors in the power supplies.



CAUTION!

For series non-grounded operation, the load voltage connected to the series system output terminals must not exceed 2000V. Exceeding this limit may result in damage to the equipment.

Each power supply has two separate 15-pin connectors on the upper left rear panel, labeled ‘PARALLEL INTERFACE IN’ and ‘PARALLEL INTERFACE OUT’. For connecting the parallel cable refer to Figure 6-3 and for parallel cable information refer to Section 2.26.

a) Using an interface cable (P/N 890-015-01), connect the 'PARALLEL INTERFACE OUT' port of the Leader power supply to the 'PARALLEL INTERFACE IN' port of the Follower power supply.

NOTE: The Leader unit manages all programming, readback, and control functions. Remote analog control is not supported in this mode.

NOTE: Only 2 power supplies can be connected in series, and the connected units must have the same model number, i.e. the voltage, current and power ratings of both the units must be same.

b) In the Leader unit, navigate to ‘PONS Multi Chassis Operation’ and select ‘Series’. Refer to Figure 10-165.

c) Select ‘Non-Grounded’, listed under ‘Series Common Terminal’. Refer to Figure 10-165.

d) After configuring the settings, power OFF the leader and the follower units.



WARNING!

Before handling the DC output terminals, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live DC output can result in fatal electric shock and may cause death.



CAUTION!

Under no condition the voltage between negative or positive output terminal of the series system to chassis earth must not exceed 2000V.



CAUTION!

Use only the wires specified in Section 3.10 to connect the positive (+) and negative (-) terminals.

e) Connect the positive (+) output terminal of the Leader power supply to the positive (+) terminal of the load.

f) Connect the negative (-) output terminal of the Leader power supply to the positive (+) output terminal of the Follower power supply.

g) Connect the negative (-) output terminal of the Follower power supply to the negative (-) terminal of the load.

h) Ensure that there are no shorts between the positive (+) and negative (-) terminals within the units.

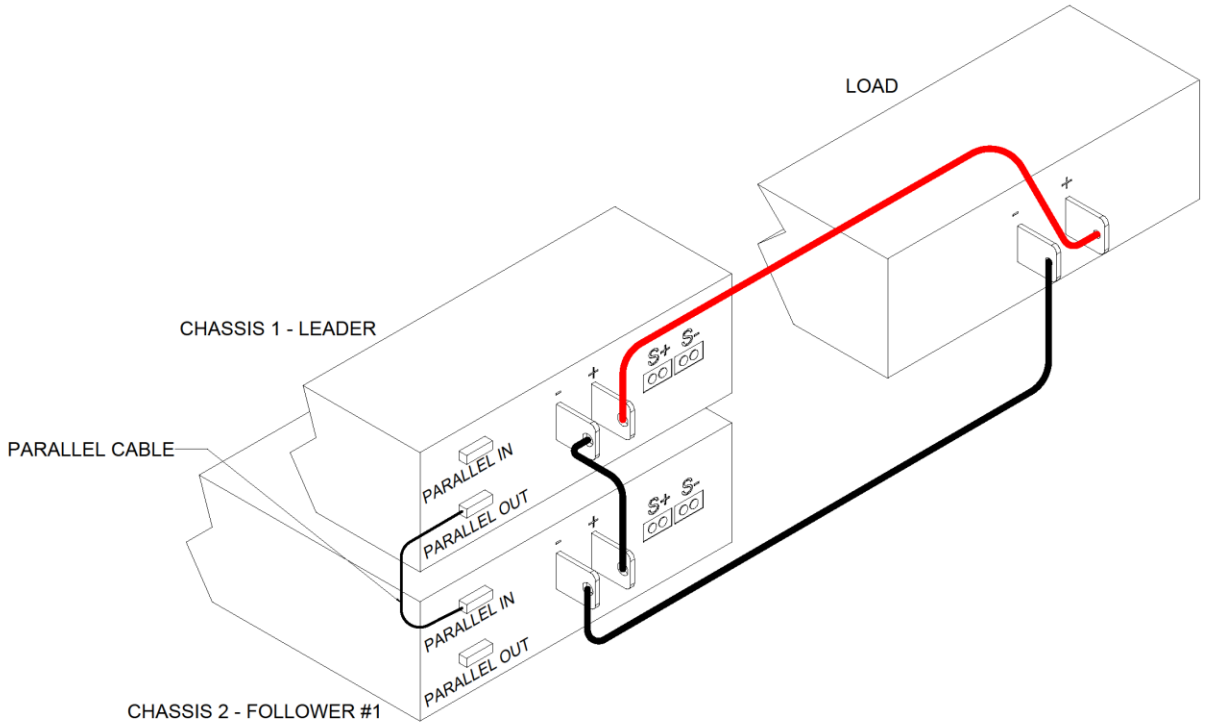
i) After the successful connections, power ON the leader and follower units.

j) Ensure that the 'Series' in the Leader unit is set to 'Non-Grounded'. Refer to Figure 10-165.

k) The leader unit displays the terminal voltage, total power of the series connected system and its own current measurements.

l) The follower unit displays its own voltage, current and power measurements. Refer to Figure 9-26.

NOTE: For the first-time series operation, reset the system by selecting 'Factory Default' in the 'System Settings' screen and then reboot it. This ensures the series system is initialized with default PONS values. After rebooting, the system automatically adjusts and sets the limit values to their maximum.



SERIES - NON-GROUNDED

NOTE:

RED CABLE - LEADER POSITIVE TERMINAL TO LOAD POSITIVE TERMINAL

BLACK CABLE - FOLLOWER NEGATIVE TERMINAL TO LOAD NEGATIVE TERMINAL AND LEADER NEGATIVE TERMINAL TO FOLLOWER POSITIVE TERMINAL

Figure 6-3. Series Connection – Non-Grounded

The maximum achievable output voltage depends on the Mi-BEAM power supply models. In non-grounded series operation, the maximum output voltage can reach up to 400 V, 600 V, 800 V, 1200 V, 1500 V, and 2000 V for the Mi-BEAM power supply models 400, 600, 800, 1200, 1500, and 2000, respectively. Refer to Table 6-1.

MODEL	MAXIMUM VOLTAGE PER UNIT (LEADER/FOLLOWER)	MAXIMUM OUTPUT VOLTAGE FOR THE SERIES (NON-GROUNDED)
400	200	400
600	300	600
800	400	800
1200	600	1200
1500	750	1500
2000	1000	2000

Table 6-1. Voltage Limits per Model

For example, If 2000 V models are connected in series non-grounded operation, the maximum achievable terminal output voltage is limited to 2000V.

6.1.2 SERIES – GROUNDED



CAUTION!
No more than two power supplies should be used in series operation. Using more than two units may result in damage or operational errors in the power supplies.



CAUTION!
For series grounded operation, the load voltage connected to the series system output terminals must not exceed 4000V. Exceeding this limit may result in damage to the equipment.

Each power supply has two separate 15-pin connectors on the upper left rear panel, labeled 'PARALLEL INTERFACE IN' and 'PARALLEL INTERFACE OUT'. For connecting the parallel cable refer to Figure 6-4 and for parallel cable information refer to Section 2.26.

a) Using an interface cable (P/N 890-015-01), connect the 'PARALLEL INTERFACE OUT' port of the Leader power supply to the 'PARALLEL INTERFACE IN' port of the Follower power supply.

NOTE: The Leader unit manages all programming, readback, and control functions. Remote analog control is not supported in this mode.

NOTE: Only 2 power supplies can be connected in series, and the connected units must have the same model number, i.e. the voltage, current and power ratings of both the units must be same.

b) In the Leader unit, navigate to 'PONS Multi Chassis Operation' and select 'Series'. Refer to Figure 10-165.

c) Select 'Grounded', listed under 'Series Common Terminal'. Refer to Figure 10-165.

d) After configuring the settings, power OFF the leader and the follower units.



WARNING!
Before handling the DC output terminals, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live DC output can result in fatal electric shock and may cause death.



CAUTION!
Under no condition the voltage between negative or positive output terminal of the series system to chassis earth must not exceed 2000V.



CAUTION!

Use only the wires specified in Section 3.10 to connect the positive (+), negative (-) and chassis earth terminals.

e) Connect the positive (+) output terminal of the Leader power supply to the positive (+) terminal of the load.

f) Connect the negative (-) output terminal of the Leader power supply to the positive (+) output terminal of the Follower power supply.

g) Connect either positive (+) output terminal of the Leader power supply or negative (-) output terminal of the Follower power supply to Chassis earth.

h) Connect the negative (-) output terminal of the Follower power supply to the negative (-) terminal of the load.

m) Ensure that there are no shorts between the positive (+) and negative (-) terminals within the units.

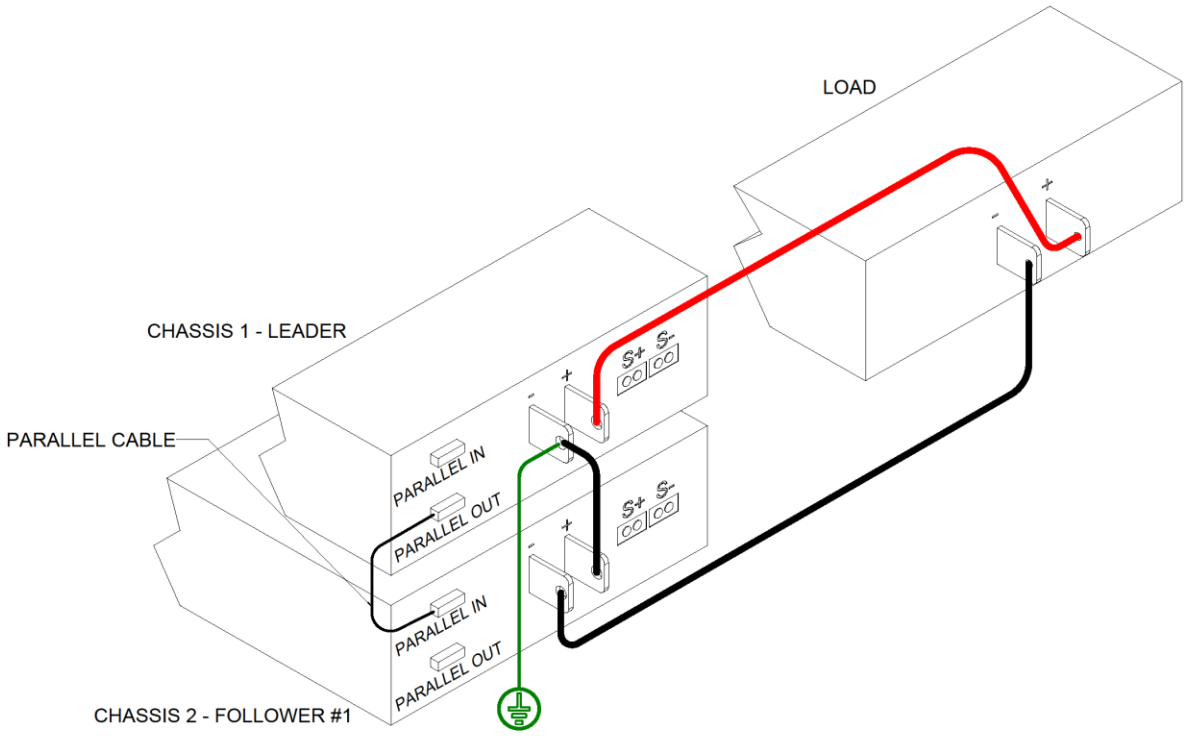
n) After the successful connections, power ON the leader and follower units.

o) Ensure that the 'Series' in the Leader unit is set to 'Grounded'. Refer to Figure 10-165.

p) The leader unit displays the terminal voltage, total power of the series connected system and its own current measurements.

q) The follower unit displays its own voltage, current and power measurements. Refer to Figure 9-26.

NOTE: For the first-time series operation, reset the system by selecting 'Factory Default' in the 'System Settings' screen and then reboot it. This ensures the series system is initialized with default PONS values. After rebooting, the system automatically adjusts and sets the limit values to their maximum.



SERIES - GROUNDED

NOTE:

RED CABLE - LEADER POSITIVE TERMINAL TO LOAD POSITIVE TERMINAL

BLACK CABLE - FOLLOWER NEGATIVE TERMINAL TO LOAD NEGATIVE TERMINAL AND LEADER NEGATIVE TERMINAL TO FOLLOWER POSITIVE TERMINAL

GREEN CABLE - LEADER NEGATIVE TERMINAL TO CHASSIS EARTH

Figure 6-4. Series Connection – Grounded

The maximum achievable output voltage depends on the Mi-BEAM power supply models. In grounded series operation, the maximum output voltage can reach up to 800 V, 1200 V, 1600 V, 2400 V, 3000 V, and 4000 V for the Mi-BEAM power supply models 400, 600, 800, 1200, 1500, and 2000, respectively. Refer to Table 6-2.

MODEL	MAXIMUM VOLTAGE PER UNIT (LEADER/FOLLOWER)	MAXIMUM OUTPUT VOLTAGE (V)
400	400	800
600	600	1200
800	800	1600
1200	1200	2400
1500	1500	3000
2000	2000	4000

Table 6-2. Voltage Limits per Model

For example, If 2000 V models are connected in split phase series non-grounded operation, the maximum achievable terminal output voltage is 4000V.

6.2 SETTING UP SERIES SPLITPHASE OPERATION

6.2.1 SPLITPHASE SERIES – NON-GROUNDED



CAUTION!
No more than two power supplies should be used in series operation. Using more than two units may result in damage or operational errors in the power supplies.



CAUTION!
For split phase series non-grounded operation, the load voltage connected to the series system output terminals must not exceed 2000V. Exceeding this limit may result in damage to the equipment.

Each power supply has two separate 15-pin connectors on the upper left rear panel, labeled ‘PARALLEL INTERFACE IN’ and ‘PARALLEL INTERFACE OUT’. For connecting the parallel cable refer to Figure 6-5 and for parallel cable information refer to Section 2.26.

a) Using an interface cable (P/N 890-015-01), connect the 'PARALLEL INTERFACE OUT' port of the Leader power supply to the 'PARALLEL INTERFACE IN' port of the Follower power supply.

NOTE: The Leader unit manages all programming, readback, and control functions. Remote analog control is not supported in this mode.

NOTE: Only 2 power supplies can be connected in series, and the connected units must have the same model number, i.e. the voltage, current and power ratings of both the units must be same.

b) In the Leader unit, navigate to ‘PONS Multi Chassis Operation’ and select ‘Series Split Phase’. Refer to Figure 10-165.

c) Select ‘Non-Grounded’, listed under ‘Series Common Terminal’. Refer to Figure 10-165.

d) After configuring the settings, power OFF the leader and the follower units.



WARNING!
Before handling the DC output terminals, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live DC output can result in fatal electric shock and may cause death.



CAUTION!
Under no condition the voltage between negative or positive output terminal of the series system to chassis earth must not exceed 2000V.



CAUTION!

Difference of current between leader and follower will flow through the wire connected to common terminal, ensure appropriately rated wire is used. Use only the wires specified in Section 3.10 to connect the positive (+), negative (-), common terminals.

e) Connect the positive (+) output terminal of the Leader power supply to the positive (+) terminal of the load.

f) Connect the negative (-) output terminal of the Leader power supply to the positive (+) output terminal of the Follower power supply.

g) Connect either the positive (+) output terminal of the Leader power supply or the negative (-) output terminal of the Follower power supply to the common terminal point of the load.

h) Connect the negative (-) output terminal of the Follower power supply to the negative (-) terminal of the load.

i) Ensure that there are no shorts between the positive (+) and negative (-) terminals within the units.

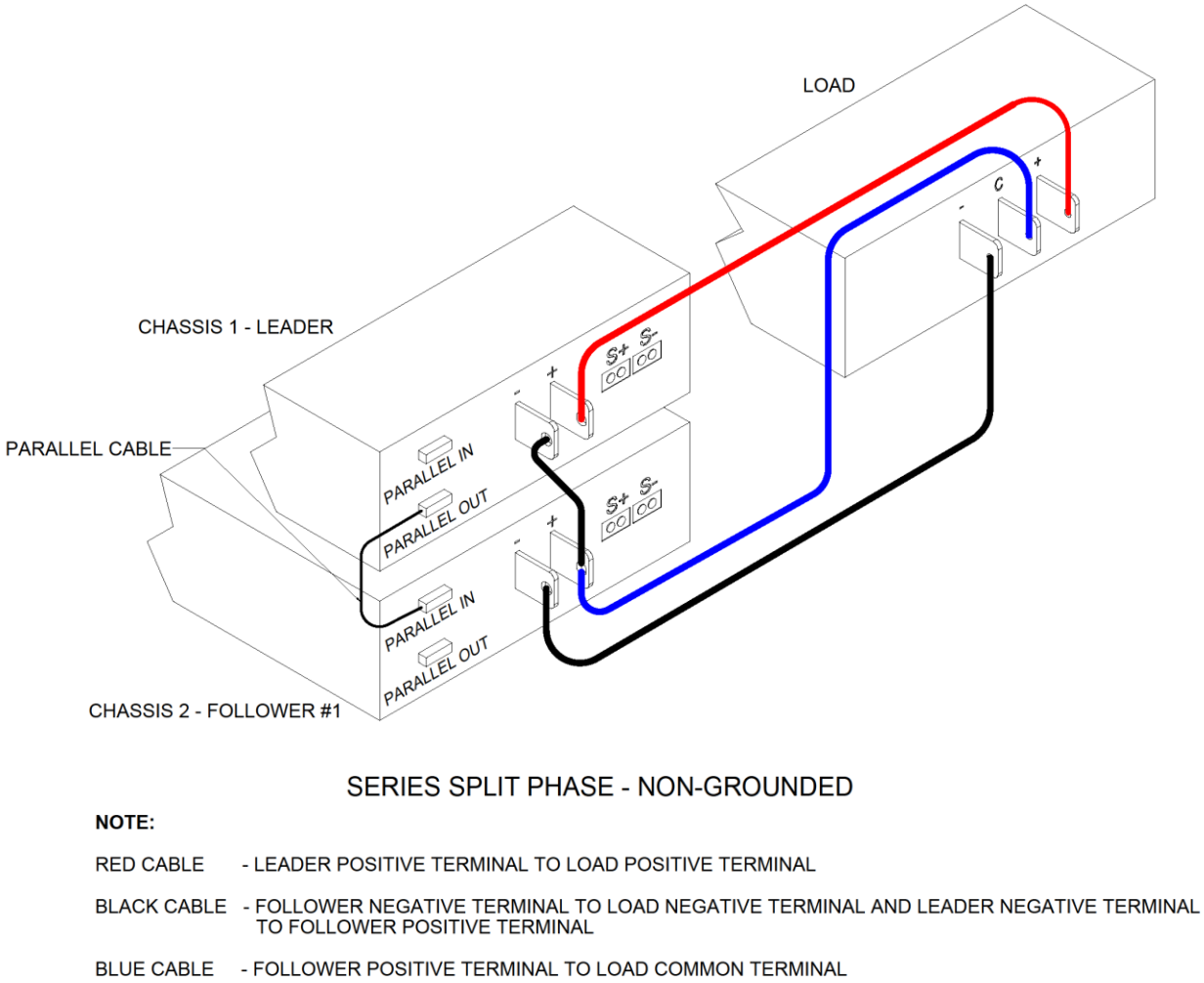
j) After the successful connections, power ON the leader and follower units.

k) Ensure that the 'Series Split Phase' in the Leader unit is set to 'Non-Grounded'. Refer to Figure 10-165.

l) The leader unit displays the terminal voltage, total power of the series connected system and its own current measurements.

r) The follower unit displays its own voltage, current and power measurements. Refer to Figure 9-26.

NOTE: For the first-time series operation, reset the system by selecting 'Factory Default' in the 'System Settings' screen and then reboot it. This ensures the series system is initialized with default PONS values. After rebooting, the system automatically adjusts and sets the limit values to their maximum.



SERIES SPLIT PHASE - NON-GROUNDED

NOTE:

RED CABLE - LEADER POSITIVE TERMINAL TO LOAD POSITIVE TERMINAL

BLACK CABLE - FOLLOWER NEGATIVE TERMINAL TO LOAD NEGATIVE TERMINAL AND LEADER NEGATIVE TERMINAL TO FOLLOWER POSITIVE TERMINAL

BLUE CABLE - FOLLOWER POSITIVE TERMINAL TO LOAD COMMON TERMINAL

Figure 6-5. Splitphase Series Connection – Non-Grounded

The maximum achievable output voltage depends on the Mi-BEAM power supply models. In Split phase non-grounded series operation, the maximum output voltage can reach up to 400 V, 600 V, 800 V, 1200 V, 1500 V, and 2000 V for the Mi-BEAM power supply models 400, 600, 800, 1200, 1500, and 2000, respectively. Refer to Table 6-3.

MODEL	MAXIMUM VOLTAGE PER UNIT (LEADER)	MAXIMUM VOLTAGE PER UNIT (FOLLOWER)	MAXIMUM OUTPUT VOLTAGE (V)
400	200	200	400
600	300	300	600
800	400	400	800
1200	600	600	1200
1500	750	750	1500
2000	1000	1000	2000

Table 6-3. Voltage Limits per Model

For example, If 2000 V models are connected in series non-grounded operation, the maximum achievable terminal output voltage is limited to 2000V.

6.2.2 SPLITPHASE SERIES – GROUNDED



CAUTION!

No more than two power supplies should be used in series operation. Using more than two units may result in damage or operational errors in the power supplies.



CAUTION!

For split phase series grounded operation, the load voltage connected to the series system output terminals must not exceed 4000V. Exceeding this limit may result in damage to the equipment.

Each power supply has two separate 15-pin connectors on the upper left rear panel, labeled 'PARALLEL INTERFACE IN' and 'PARALLEL INTERFACE OUT'. For connecting the parallel cable refer to Figure 6-6 and for parallel cable information refer to Section 2.26.

a) Using an interface cable (P/N 890-015-01), connect the 'PARALLEL INTERFACE OUT' port of the Leader power supply to the 'PARALLEL INTERFACE IN' port of the Follower power supply.

NOTE: The Leader unit manages all programming, readback, and control functions. Remote analog control is not supported in this mode.

NOTE: Only 2 power supplies can be connected in series, and the connected units must have the same model number, i.e. the voltage, current and power ratings of both the units must be same.

b) In the Leader unit, navigate to 'PONS Multi Chassis Operation' and select 'Series Split Phase'. Refer to Figure 10-165.

c) Select 'Grounded', listed under 'Series Common Terminal'. Refer to Figure 10-165.

d) After configuring the settings, power OFF the leader and the follower units.



WARNING!

Before handling the DC output terminals, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live DC output can result in fatal electric shock and may cause death.



CAUTION!

Under no condition the voltage between negative or positive output terminal of the series system to chassis earth must not exceed 2000V.

CAUTION!

Difference of current between leader and follower will flow through the wire connected to common terminal, ensure appropriately rated wire is used. Use only the wires specified in Section 3.10 to connect the positive (+), negative (-), common terminals.

e) Connect the positive (+) output terminal of the Leader power supply to the positive (+) terminal of the load.

f) Connect the negative (-) output terminal of the Leader power supply to the positive (+) output terminal of the Follower power supply.

g) Connect either positive (+) output terminal of the Leader power supply or negative (-) output terminal of the Follower power supply to Chassis earth.

m) Connect either the positive (+) output terminal of the Leader power supply or the negative (-) output terminal of the Follower power supply to the common terminal point of the load.

h) Ensure that there are no shorts between the positive (+) and negative (-) terminals within the units.

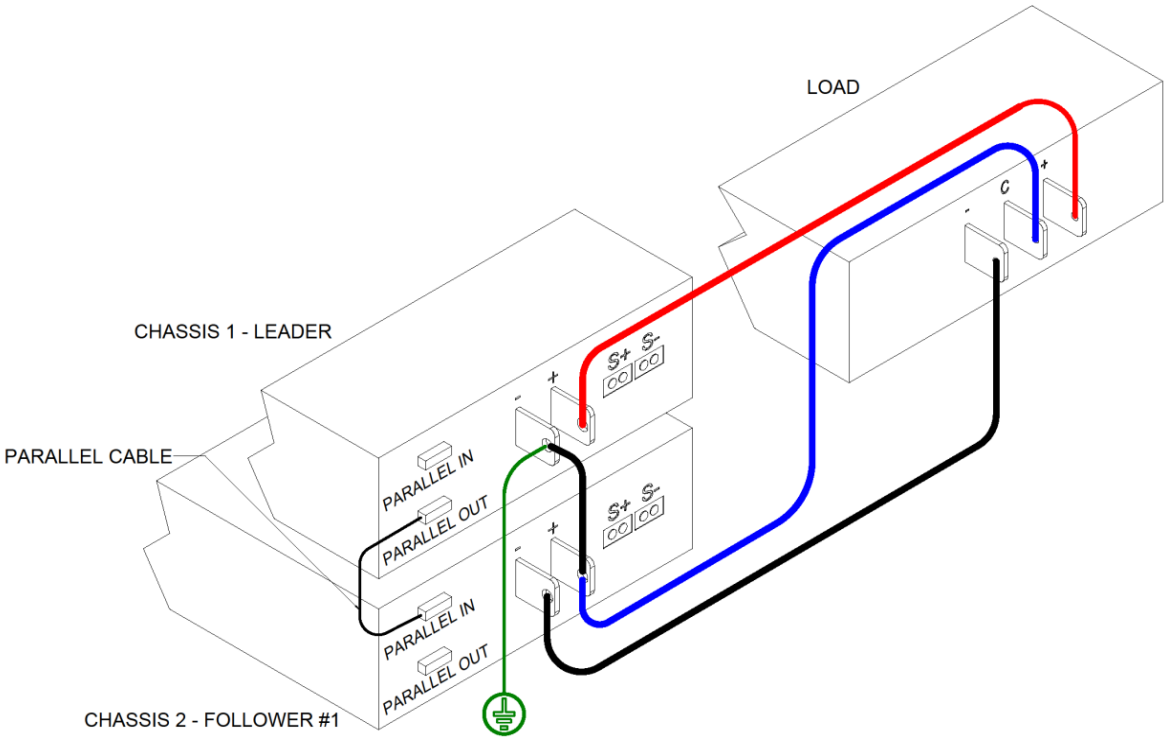
i) After the successful connections, power ON the leader and follower units.

j) Ensure that the ‘Series Split Phase’ in the Leader unit is set to ‘Grounded’. Refer to Figure 10-165.

n) The leader unit displays the terminal voltage, total power of the series connected system and its own current measurements.

s) The follower unit displays its own voltage, current and power measurements. Refer to Figure 9-26.

NOTE: For the first-time series operation, reset the system by selecting ‘Factory Default’ in the ‘System Settings’ screen and then reboot it. This ensures the series system is initialized with default PONS values. After rebooting, the system automatically adjusts and sets the limit values to their maximum.



SERIES SPLIT PHASE GROUNDED

NOTE:

RED CABLE	- LEADER POSITIVE TERMINAL TO LOAD POSITIVE TERMINAL
BLACK CABLE	- FOLLOWER NEGATIVE TERMINAL TO LOAD NEGATIVE TERMINAL AND LEADER NEGATIVE TERMINAL TO FOLLOWER POSITIVE TERMINAL
BLUE CABLE	- FOLLOWER POSITIVE TERMINAL TO LOAD COMMON TERMINAL
GREEN CABLE	- LEADER NEGATIVE TERMINAL TO CHASSIS EARTH

Figure 6-6. Splitphase Series Connection – Grounded

The maximum achievable output voltage depends on the Mi-BEAM power supply models. In split phase grounded series operation, the maximum output voltage can reach up to 800 V, 1200 V, 1600 V, 2400 V, 3000 V, and 4000 V for the Mi-BEAM power supply models 400, 600, 800, 1200, 1500, and 2000, respectively. Refer to Table 6-2.

MODEL	MAXIMUM VOLTAGE PER UNIT (LEADER)	MAXIMUM VOLTAGE PER UNIT (FOLLOWER)	MAXIMUM OUTPUT VOLTAGE (V)
400	400	400	800
600	600	600	1200
800	800	800	1600
1200	1200	1200	2400
1500	1500	1500	3000
2000	2000	2000	4000

Table 6-4. Voltage Limits per Model

For example, If 2000 V models are connected in split phase series non-grounded operation, the maximum achievable terminal output voltage is 4000V.

7
OUTPUT ISOLATION CHASSIS

It is recommended to use the Mi-BEAM Output Isolation Chassis in conjunction with the Mi-BEAM Power Supply when interfacing with an active source or load. This configuration ensures output isolation and facilitates detection of negative voltage polarity. Proper implementation of this setup enhances system safety.

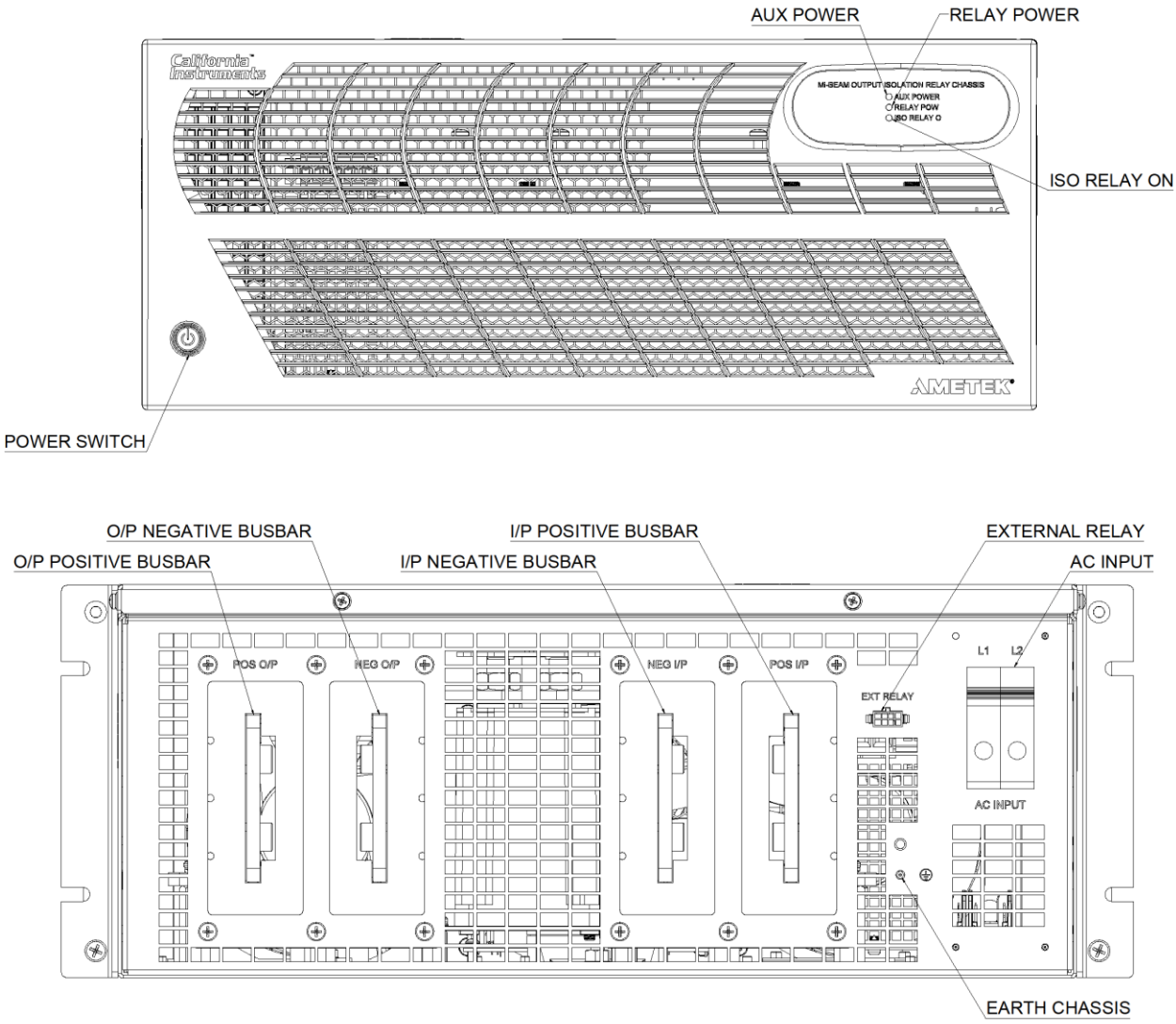


Figure 7-1. Output Isolation chassis

The Mi-BEAM Output Isolation Chassis (5580714-01R - Rated Voltage and Current: 2000V, 1000A) must be purchased separately, refer to the Figure 7-1. Figure 7-2 block diagram, for interfacing of the Output Isolation Chassis with Mi-BEAM series power supply along with the UTT.

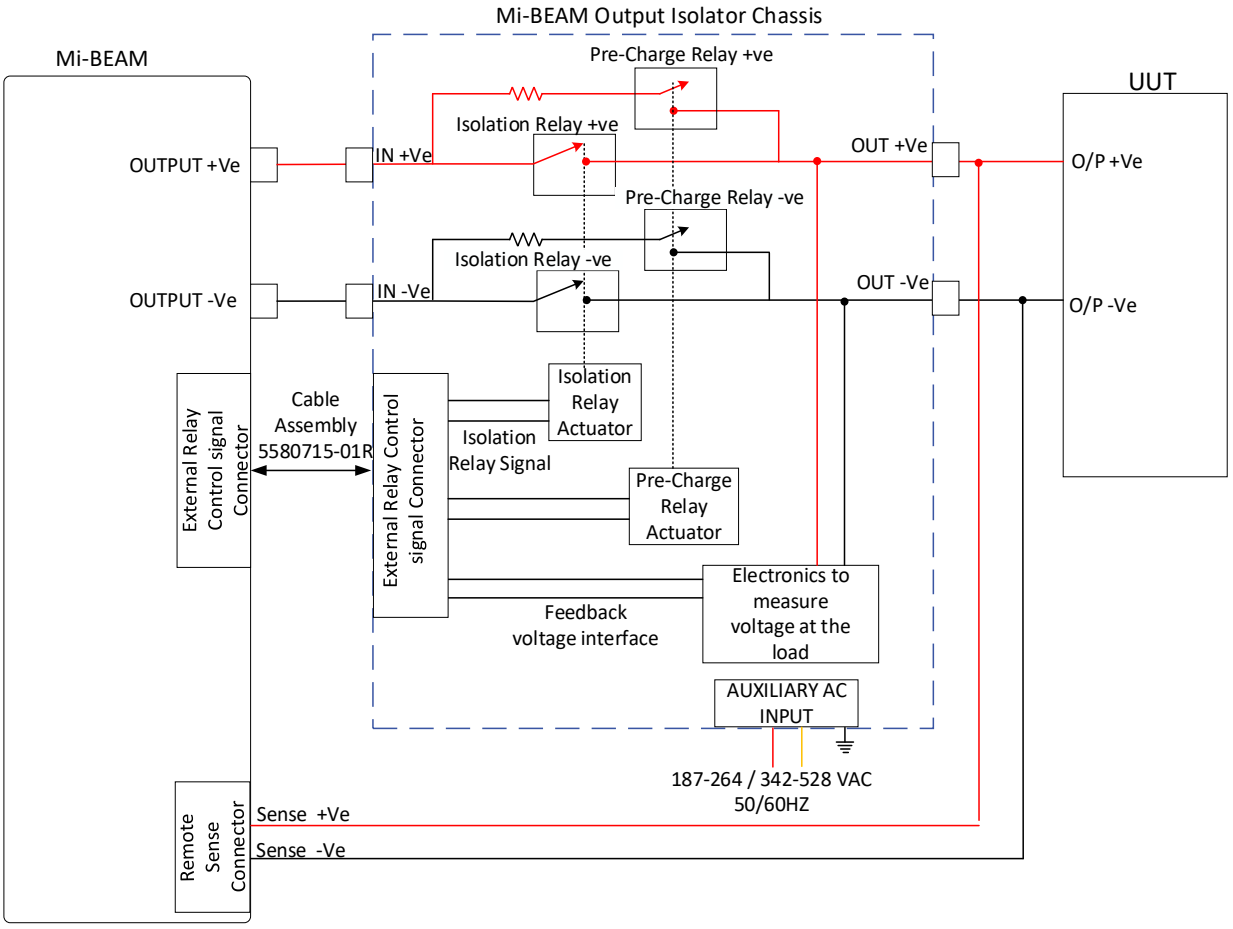


Figure 7-2. Interfacing Mi-BEAM with UUT and Mi-BEAM Output Isolation chassis

The maximum voltage or current of the paralleled Mi-BEAM system must not exceed the voltage or current rating of the output isolation chassis (5580714-01R - Rated Voltage and Current: 2000V, 1000A). Refer to Table 7-1 for the Mi-BEAM power supply models connected in parallel with the output isolation chassis.

MODEL VOLTAGE	POWER	UNIT CURRENT	MAXIMUM UNITS CONNECTED	TOTAL POWER	TOTAL CURRENT
400 V	37.5 kW	240 A	4	225 kW	960 A
600 V	37.5 kW	150 A	6	225 kW	900 A
800 V	37.5 kW	120 A	6	225 kW	720 A
1200 V	37.5 kW	80 A	6	150 kW	480 A

MODEL VOLTAGE	POWER	UNIT CURRENT	MAXIMUM UNITS CONNECTED	TOTAL POWER	TOTAL CURRENT
1500 V	37.5 kW	50 A	6	75 kW	300 A
2000 V	37.5 kW	50 A	6	225 kW	300 A

Table 7-1. Parallel configuration of identical Mi-BEAM models with the Output Isolation Chassis

NOTE: Connecting more than four Mi-BEAM models 400 V, 37.5 kW, 240 A in parallel will exceed the rated current of the Output Isolation Chassis.

Rack-mounting for the Output Isolation Chassis follows the same as the Mi-BEAM unit. For detailed instructions, including step-by-step procedures and the required parts list, refer to Section 3.2.1.

7.1 UNPACKING AND INSPECTION

Inspect the shipping carton for possible damage before unpacking the Output Isolation Chassis. Carefully unpack the equipment. Save all packing materials until the inspection is complete. Ensure that all items listed on the packing slips have been received. Visually inspect all exterior surfaces for broken knobs, connectors, or displays. Inspect for dented or damaged exterior surfaces. External damage may be an indication of internal damage.

If any damage is evident, immediately contact the carrier that delivered the unit and submit a damage report. Failure to do so could invalidate future claims. Direct repair issues to Customer Service at 858-458-0223 (local) or 1-800-733-5427 (toll-free in North America).



CAUTION!

A minimum of two people are required to carry the unit from the package using the attached lifting straps, as it weighs up to 66 lbs. (30 kg).

Make sure the location (floor) in which the Output Isolation Chassis unit will be installed can support the weight of the unit(s).

7.1.1 CONTENTS OF SHIPMENT

Minimum items included in the ship kit:

1. Cable Assembly for external relay connector, refer to Item 1 in Table 7-2.
2. KEPS nut for assembling auxiliary AC input cover, refer to Item 2 in Table 7-2.
3. Protective cover for Auxiliary AC input, refer to Item 3 in Table 7-2.

4. M4 nut for installing grounding wire and AC Input protective cover, refer to Item 4 in Table 7-2.

5. Certificate of Conformance, refer to Item 5 in Table 7-2.

ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY	MFG	MFG P/N
1	5580715-01R	CBL ASSY,EXT SEN,ISO RELAY,4U-MI-BEAM	1	AMETEK	5580715-01R
2	082000B	LOCKNUT, M3 x 0.5 MM (0.019 IN.) THD, STL, ZINC, W/T WASHER	4	ANY	NA
3	9580336-02R	COVER, SAFETY, AC INPUT,4U-DC RGN	1	AMETEK	9580336-02R
4	MN-M04K-07	NUT,M4X0.7,KEPS,STEEL,ZINC PLATE	1	ANY	NA
5	152546	CERTIFICATE OF CONFORMANCE	1	NA	NA

Table 7-2. Contents of Shipment

NOTE: If any parts are missing, reach out to AMETEK Customer Service at 858-458-0223 (local) or 1-800-733-5427 (toll-free).

7.2 OUTLINE DRAWINGS

Figure 7-3 shows the outlines and overall dimensions for installation of the Mi-BEAM Output Isolation Chassis.

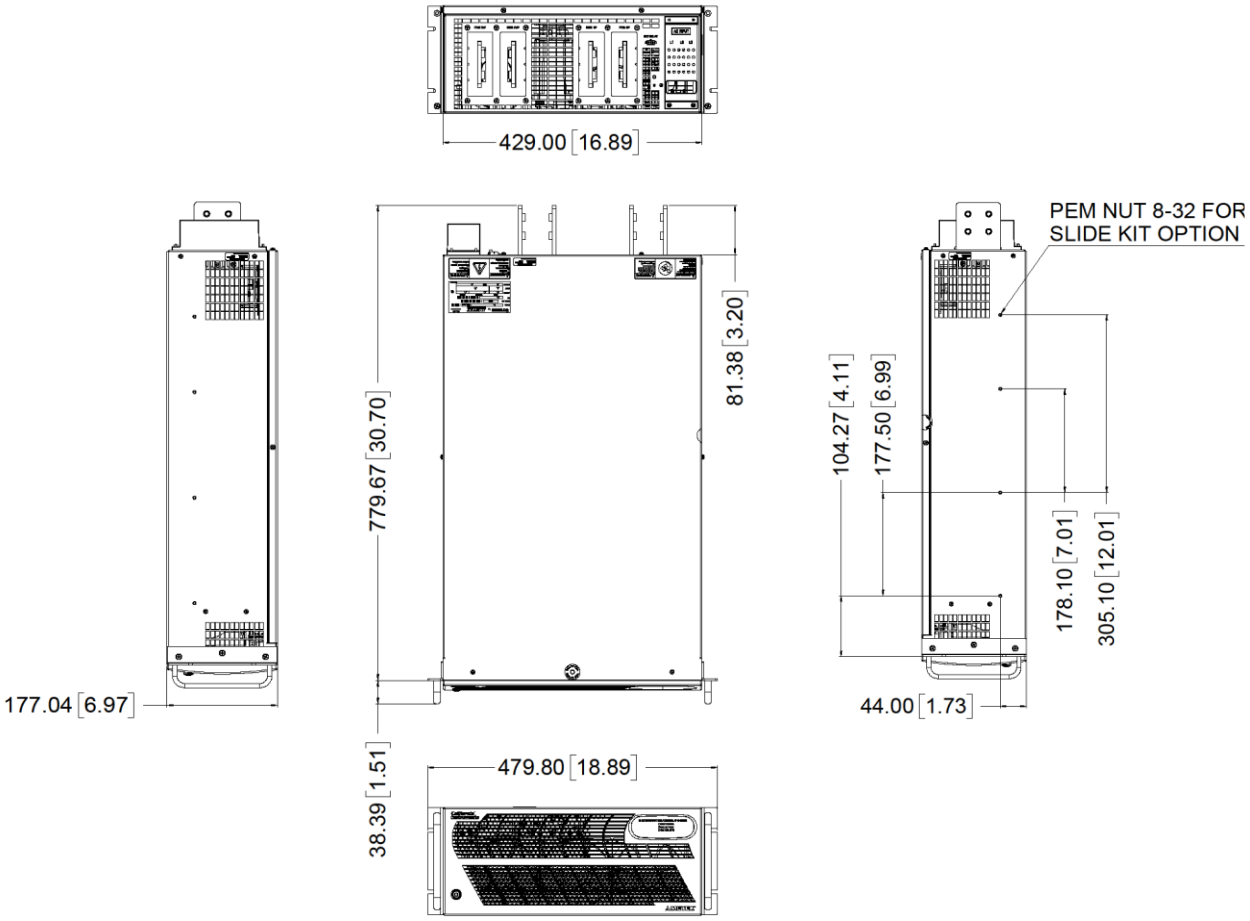
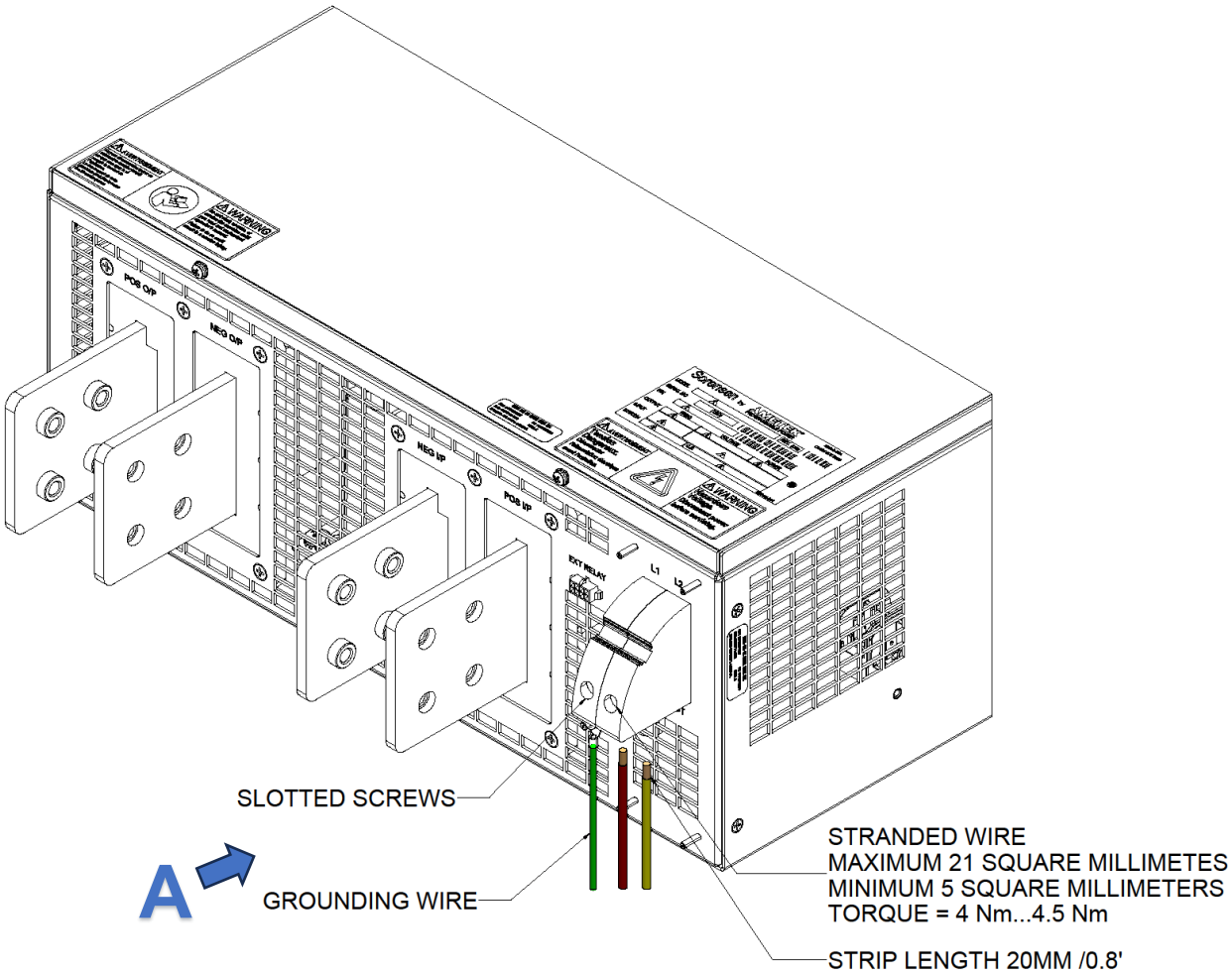
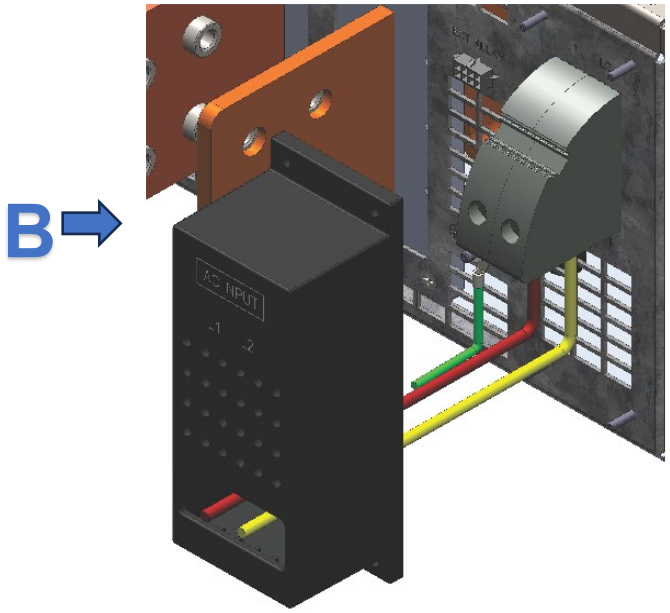


Figure 7-3: Output Isolation Outline Drawing

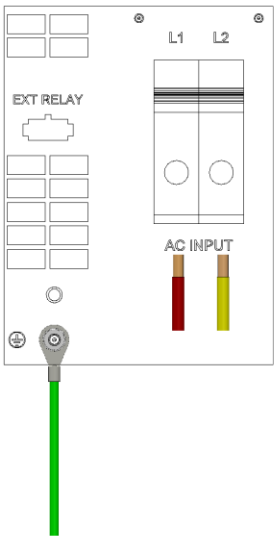
7.3 AUXILIARY AC INPUT POWER CONNECTOR

The Mi-BEAM Output Isolation Chassis is designed to operate from a 2-wire (L1 and L2) line -to-line input power source with an input voltage of 187 to 264 or 342 to 528 VAC and 50/60 Hz input frequency. Refer to Table 2-23. The Auxiliary AC input is located on the rear panel, along with the chassis ground stud, refer to the Figure 7-4. Table 7-3 details the functions and connector pinout, and Table 7-4 lists the connector type.





AC Input Connector - View A



AC Input Connector - View B

Figure 7-4. AC Input Connector

A 2-wire (L1 and L2) line-to-line input is only allowed to connect to the Auxiliary AC input of the output isolation chassis. The connector uses compression terminals, and a protective cover is provided to safeguard the entire Auxiliary AC input. A ground connection must always be made to the utility earth protection ground using the rear panel chassis ground stud. Refer to Figure 7-4.

NAME	TYPE	FUNCTION
L1	AC Input	Input from utility AC mains.
L2	AC Input	Input from utility AC mains.
CHASSIS GROUND	Safety Ground	Safety-Ground connection from utility earth protection-ground.

Table 7-3: AC Input Connector Pinout and Safety-Ground

CONNECTOR	TYPE
AC Input	**a) Chassis connector header:** Phoenix P/N 3073571; 2-position, compression terminals; **b) Wire striping length:** 20 mm (0.8 in.). **c) Tightening torque:** 4 Nm (35 lb-in) min to 4.5 Nm (39 lb-in) max. **d) Wire cross section:** 4 mm^2 (12 AWG) min to 25 mm^2 (4 AWG) max. Refer to Phoenix P/N 3073571 manufacturer datasheet for the complete specifications of the connector.
Chassis Ground	Stud provided in the rear panel for Safety-Ground Connection. For using the rear panel M4 stud, nut tightening torque is 1.8 Nm (15.93 lb-in) max.

Table 7-4: AC Input Connector Type

CAUTION!

To prevent damage to the AC input mating connector, follow torque specifications and, if a wire ferrule is used, ensure that it is properly sized and that it has been crimped with the appropriate ferrule crimping tool.

7.3.1 AUXILIARY AC INPUT OVERCURRENT PROTECTION

The output Isolation chassis has fuses at the Auxiliary AC input for fault protection. These fuses are internal to the chassis and are not user accessible. They provide fault isolation in case a failure occurs with internal components or wiring. A suitable overcurrent protection device must be provided externally, within the system installation, to protect the external wiring and interconnects.

7.3.2 AUXILIARY AC INPUT SAFETY DISCONNECT DEVICE

The 'Power' switch available in the front of the output isolation chassis does not disconnect the Auxiliary AC input line from the unit. Ensure that an appropriately rated safety disconnect device is incorporated in the installation that will provide isolation from the AC input. The device could be a circuit breaker, and must be located close to the unit, within reach of the operator, and clearly labeled as the disconnection device.

7.4 DC INPUT CONNECTOR

The input from the Mi-BEAM is delivered to Output Isolation Chassis through positive and negative input bus bars.

CONNECTOR	DESCRIPTION
DC Negative (-) Input and DC Positive (+)Input	DC Input terminal; **a) Unit side connector:** Copper bus bar - 75mm height and 6mm thickness, with an M8 threaded hole using Clinch nuts - 4 Numbers each for Positive and Negative terminal.

Table 7-5. DC Input Connector

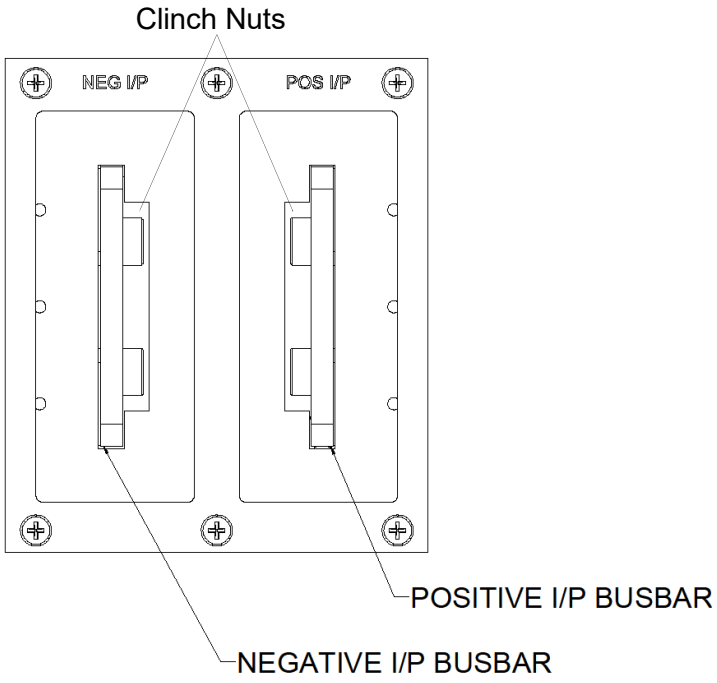


Figure 7-5. DC Input Bus Bar – Output Isolation Chassis

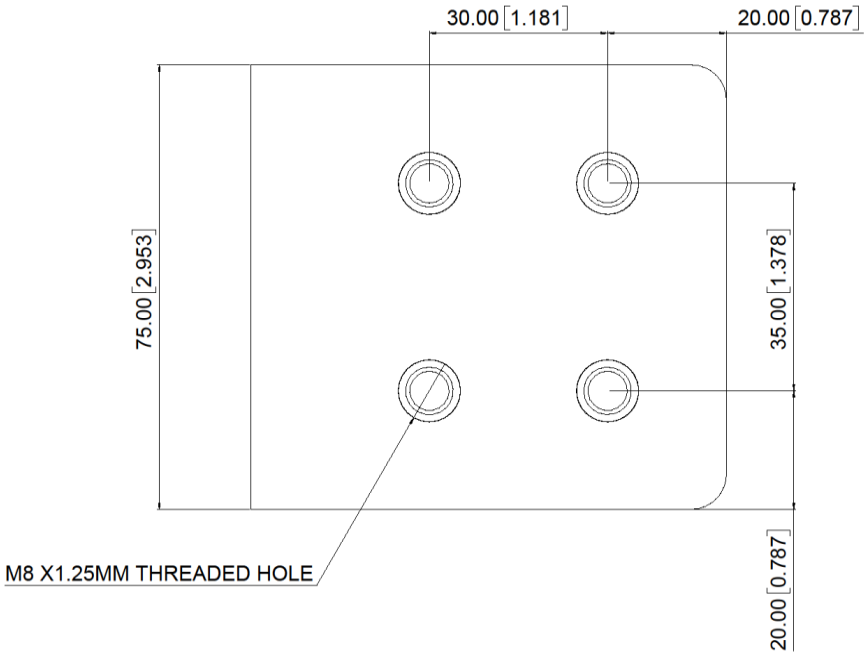


Figure 7-6. Bus Bar Dimension –– Output Isolation Chassis

7.5 DC OUTPUT CONNECTOR

The output power from the Output Isolation Chassis is delivered to the UUT through positive and negative output bus bars.

CONNECTOR	DESCRIPTION
DC Negative (-) Output and DC Positive (+) Output	DC Output terminal; **a) Unit side connector:** Copper bus bar - 75mm height and 6mm thickness, with an M8 threaded hole using Clinch nuts - 4 Numbers each for Positive and Negative terminal.

Table 7-6. DC output Connector

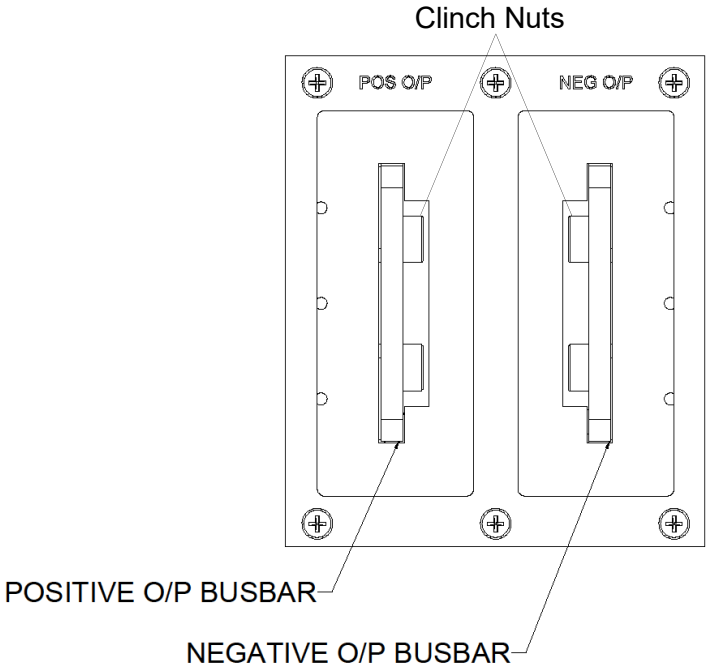


Figure 7-7. DC Output Bus Bar – Output Isolation Chassis

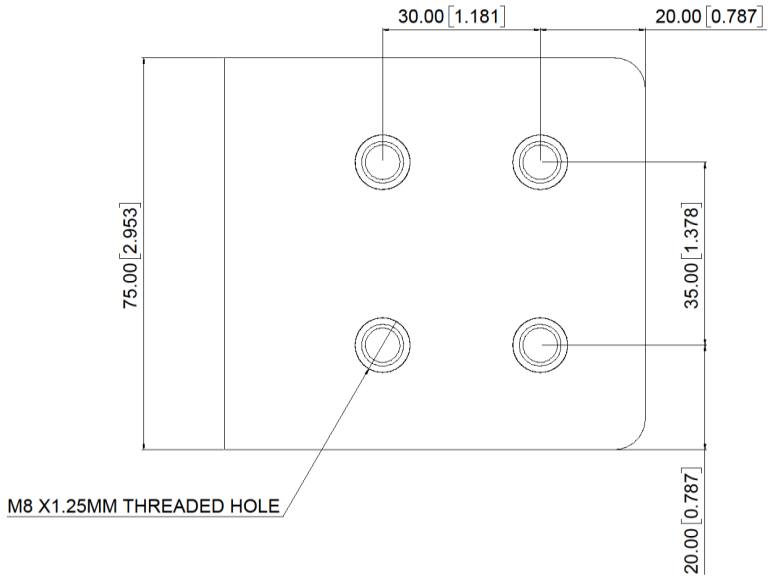


Figure 7-8. Bus Bar Dimension – Output Isolation Chassis

7.6 EXTERNAL RELAY CONNECTOR FOR OUTPUT ISOLATION CHASSIS CONNECTION

The Mi-BEAM Output Isolation Chassis includes an 8-pin Molex connector (Part No. 430200800) positioned on the rear panel. This must be connected to the Mi-BEAM unit by cable assembly (P/N: 5580715-01R).

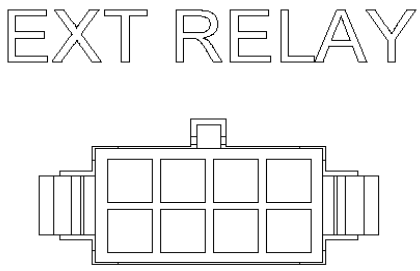


Figure 7-9. External Relay - Output Isolation Chassis

7.7 INSTRUCTIONS FOR SAFE OPERATION BEFORE INTERFACING WITH Mi-BEAM

The safety instructions must be strictly followed to ensure the safe and reliable operation of the Mi-BEAM power supply and Output Isolation Chassis before interfacing.



WARNING!

Before handling the DC input or output connectors of the Mi-BEAM power supply and Output Isolation Chassis, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live DC can result in fatal electric shock and may cause death.



CAUTION!

Failure to follow the instructions mentioned in this chapter may result in serious equipment damage or personal injury.

a) Make sure the following voltages are zero before making any connections or touching the terminals of the Mi-BEAM power supply and Output Isolation Chassis:

- Positive (+ve) terminal to Negative (-ve) terminal
- Positive (+ve) terminal to Chassis
- Negative (-ve) terminal to Chassis.

NOTE: It is possible for the positive (+ve) or negative (-ve) terminal to have high voltage with respect to chassis ground even when the Mi-BEAM power supply or Output Isolation Chassis display shows 0 V.

b) Make sure that the Mi-BEAM power supply and Output Isolation Chassis is grounded, this can be done by connecting the utility earth protection ground to rear panel Chassis ground.



WARNING!

Operating the unit without a proper protective earth (PE) connection can result in a serious electric shock hazard, including risk of fatal injury and may cause death.

c) Make sure that the positive (+ve) output terminal of the Mi-BEAM power supply is connecting to the positive (+ve) input terminal of the output isolation chassis, and the negative (-ve) output terminal to the negative (-ve) input terminal of the output isolation chassis.

NOTE: Interchanging the terminal connection and operating may damage the internal power circuits of the units.



CAUTION!

Reversing the polarity and operating the unit will result in severe internal damage to the Mi-BEAM power supply and the Output Isolation Chassis.

7.8 CONNECTING OUTPUT ISOLATION CHASSIS TO Mi-BEAM AND UUT

a) Connecting Auxiliary AC Input

- Confirm that the line-to-line voltage from the AC source is within the range of 187 to 264 (50/60 Hz) or 342 to 528 VAC (50/60 Hz).
- Use wires rated for current equal to or greater than the values specified in Table 3-10.
- Insert the AC source connection wires through the safety cover (P/N: 9580336-02R). Refer to Figure 7-4.
- Connect the utility AC source wires to the rear panel AC input connector terminal L1 and L2 and tighten the slotted screws. Refer to Figure 7-4.
- After completing the connections, install the safety cover (P/N: 9580336-02R) onto the unit using M3 × 0.5 mm locknuts to ensure proper protection and compliance with safety standards.
- Connect a ground wire from the rear panel chassis ground stud to the utility power distribution earth protection ground. Refer to Figure 7-4.

NOTE: Ensure that the connectors are properly aligned before turning ON the device to avoid damage and for the safe operation.

b) Connecting Output Isolation Chassis to Mi-BEAM



WARNING!

Before handling the DC Positive and Negative Input or Output bus bars of the Mi-BEAM power supply and Output Isolation Chassis, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live DC can result in fatal electric shock and may cause death.



CAUTION!

Do not exceed a tightening torque of 12 Nm (106.2 lb-in) when installing M6 screws.



CAUTION!

Do not exceed a tightening torque of 24 Nm (212.4 lb-in) when installing M8 screws.

- Ensure the Mi-BEAM Output bus bar and Output Isolation Chassis input bus bar are de-energized using a multimeter and confirm zero voltage.
- Connect the positive (+) output bus bar of the Mi-Beam to the positive (+) input bus bar of the Output isolation Chassis.
- Connect the negative (-) output bus bar of the Mi-Beam to the negative (-) input bus bar of the Output isolation Chassis.
- After ensuring the proper alignment of the bus bars, secure the Mi-BEAM bus bar using M6 screws and the output isolation chassis using M8 screws to ensure proper protection and compliance with safety standards.

NOTE: Based on the current rating, the attaching bus bar (Mi-Beam output to Output isolation chassis input) dimensions will vary. Always maintain a clearance of 25 mm (0.98 in) between (+) positive and (-) negative bus bars or contact the factory for the exact bus bar dimensions.

c) Connecting DC output to UUT



WARNING!

Before handling the DC Positive and Negative Output bus bars, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live DC output can result in fatal electric shock and may cause death.



CAUTION!
Do not exceed a tightening torque of 24 Nm (212.4 lb-in) when installing M8 screws.

- Ensure the output bus bars of the Output Isolation Chassis and input bus bar of the UUT are de-energized using a multimeter and confirm zero voltage.
- Connect the positive (+) output bus bar of the Output Isolation Chassis to the positive (+) input bus bar of the UUT using appropriately rated wires or bus bars.
- Connect the negative (-) output bus bar of the Output Isolation Chassis to the negative (-) input bus bar of the UUT using appropriately rated wires or bus bars.
- After positioning the wires on bus bars, secure them using M8 screws to ensure proper protection and compliance with safety standards.

d) Connecting External Relay Cable Assembly

- Connect the External Relay cable assembly (P/N: 5580715-01R) to the Mi-Beam and Output Isolation Chassis external relay connectors.
- The units then can be turned ON sequentially, and regular operation can be started.

NOTE: When Mi-BEAMs are connected in parallel, turn on the Output Isolation Chassis first, then the Leader unit. After the leader is powered on, turn on the Follower units.

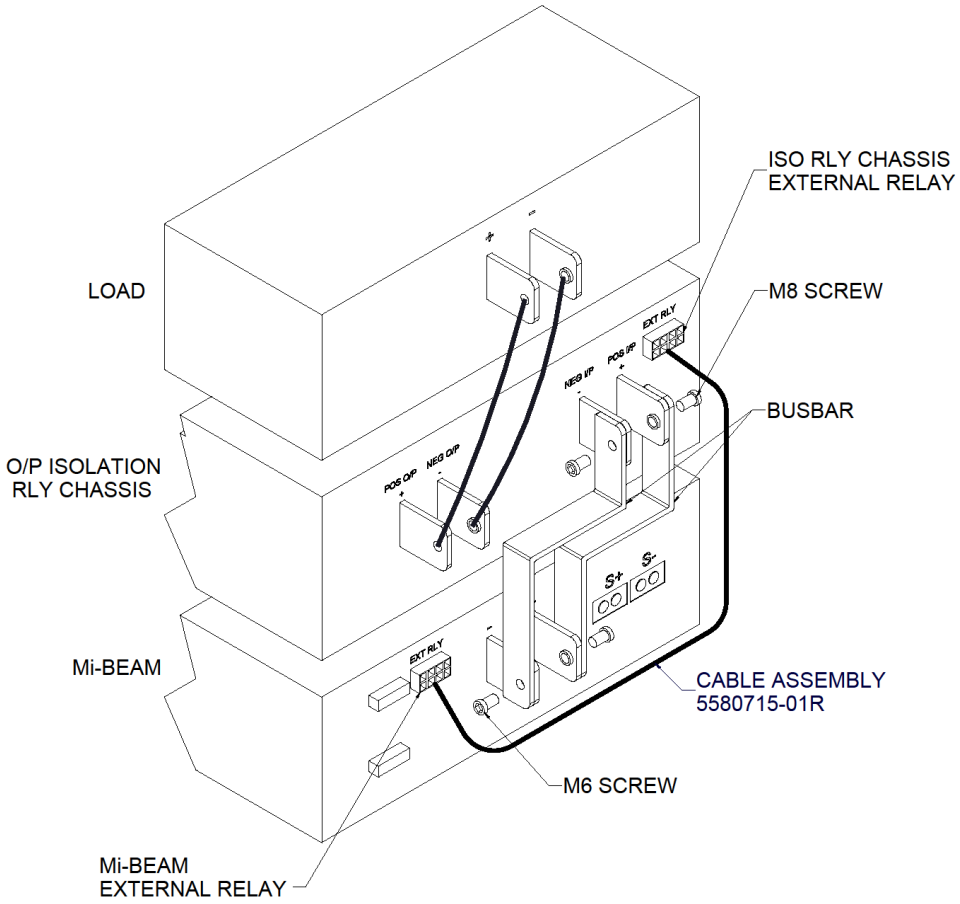


Figure 7-10. Mi-BEAM Connection with Output Isolation Chassis and UUT

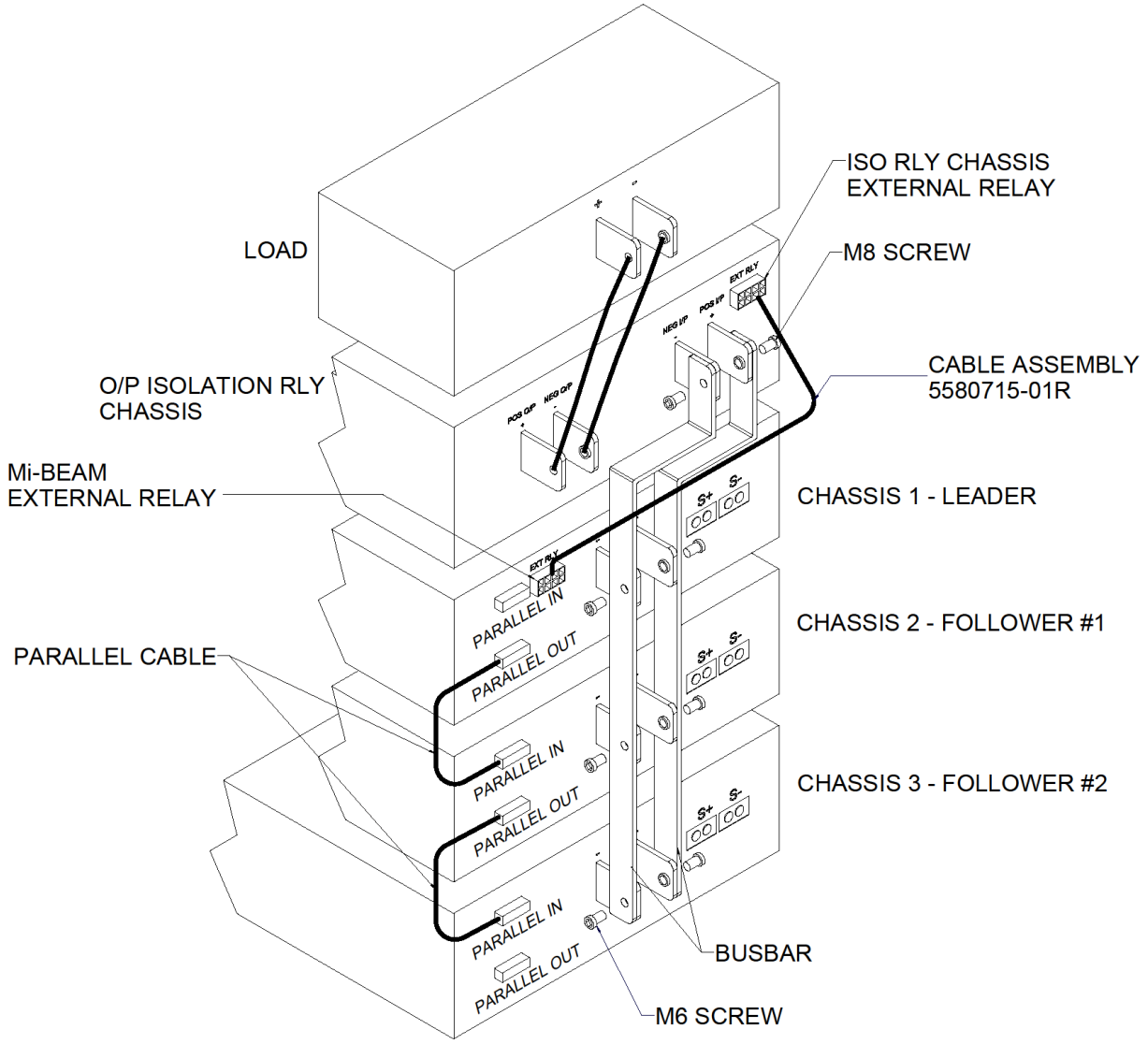


Figure 7-11. Parallel Connection with Output Isolation chassis

NOTE: The maximum current of the paralleled Mi-BEAM system must be within the current rating of output isolation chassis (5580714-01R - Rated Voltage and Current - 2000V, 1000A).

8 OPERATING MODES

This chapter provides detailed instructions on the various operating modes supported by the Mi-BEAM Series power supply. Designed for versatile and reliable performance across a wide range of applications, the Mi-BEAM Series ensures precise and efficient power delivery through its advanced control features. The Mi-BEAM Series supports the following modes of operations.

8.1 BIDIRECTIONAL MODE

The Mi-BEAM Series power supply supports two-quadrant operation as shown in Figure 8-1. In this, the convention is that current flowing from the Mi-BEAM power supply to the UUT is designated as positive, while current flowing from the UUT to the Mi-BEAM power supply is designated as negative.

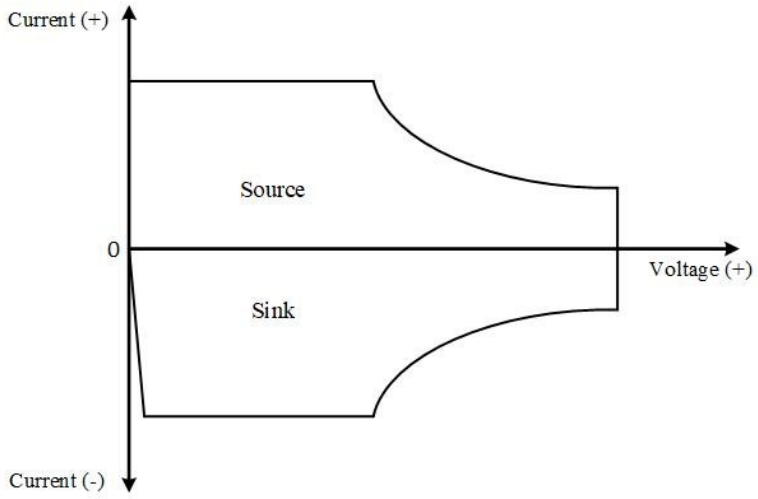


Figure 8-1. Two-quadrant (Bi-directional) operation

In this mode, the Mi-BEAM Series power supply can either function as source or sink power, as shown in Figure 8-2.

Bi-directional mode supports various programming types as described below:

a) Voltage: In this programming type Mi-BEAM power supply regulates voltage. Foldback operation will be performed based on the regulation setting selected. Various regulation settings in voltage programming type are described below,

- **Constant Voltage/Constant Current (CV/CC):** In this regulation setting, output voltage is regulated to the user set value. On reaching the current limit (positive or negative), output would be regulated to the set current limit value. On reaching the power limit (positive or negative), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Voltage Series Resistance (CV – Ser Res):** In this setting, user can set the voltage and series resistance. Depending on the current output, the terminal voltage would be varied based on the voltage drop across the series resistance. In the event of reaching the programmed current limit (positive or negative) or power limit (positive or negative) or voltage limit (high or low), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Voltage/Constant Power (CV/CP):** In this regulation setting, output voltage is regulated to the user set value. On reaching the power limit (positive or negative), output would be regulated to the set power limit value. On reaching the current limit (positive or negative), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Voltage (CV):** In this regulation setting, output voltage is regulated to the user set value. On reaching the set current limit (positive or negative) or power limit (positive or negative), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

b) Current: In this programming type Mi-BEAM power supply regulates current. Depending on the chosen regulation setting, a fold-back operation will be executed. Various regulation settings in current programming type are described below,

- **Constant Current/Constant Voltage (CC/CV):** In this regulation setting, output current is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the set voltage limit value. On reaching the power limit (positive or negative), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Current/Constant Power (CC/CP):** In this regulation setting, output current is regulated to the user set value. On reaching the power limit (positive or negative), output would be regulated to the set power limit value. On reaching the voltage limit (high or low), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Power/Constant Current (CP/CC):** In this regulation setting, output power is regulated to the user set value. On reaching the current limit (positive or negative), output would be regulated to the set current limit value. On reaching the voltage limit (high or low), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Current (CC):** In this regulation setting, output current is regulated to the user set value. On reaching the set voltage limit (high or low) or power limit (positive or negative), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

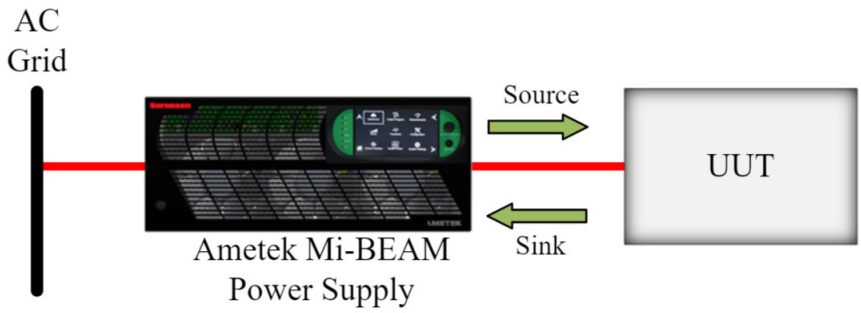


Figure 8-2. Bi-directional mode of operation

8.2 SOURCE MODE

In source mode operation, power supply supports single quadrant operation as shown in Figure 8-3. In this specification, the direction of current is always positive (positive limits for current and power will be applicable) and power transfer is always from the Mi-BEAM Series power supply to the UUT.

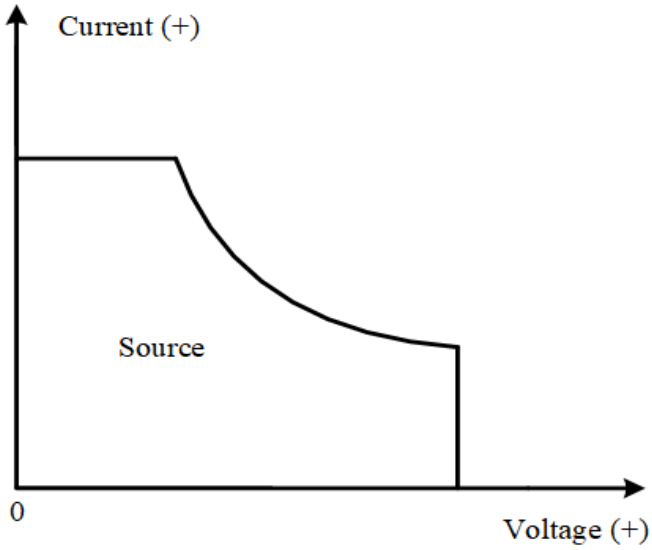


Figure 8-3. Single quadrant (Source) operation

In this mode, the Mi-BEAM Series power supply can function as a source, as shown in Figure 8-4.

Source mode supports various programming types as described below:

a) Voltage: In this programming type Mi-BEAM power supply regulates voltage. Foldback operation will be performed based on the regulation setting selected. Various regulation settings in voltage programming type are described below,

- **Constant Voltage/Constant Current (CV/CC):** In this regulation setting, output voltage is regulated to the user set value. On reaching the current limit (positive), output would be

regulated to the set current limit value. On reaching the power limit (positive), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Voltage/Constant Power (CV/CP):** In this regulation setting, output voltage is regulated to the user set value. On reaching the power limit (positive), output would be regulated to the set power limit value. On reaching the current limit (positive), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Power/Constant Voltage (CP/CV):** In this regulation setting, output power is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the set voltage limit value. On reaching the current limit (positive), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Voltage Series Resistance (CV – Ser Res):** In this setting, user can set the voltage and series resistance. Depending on the current output, the terminal voltage would be varied based on the voltage drop across the series resistance. In the event of reaching the programmed current limit (positive) or power limit (positive) or voltage limit (low), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Voltage (CV):** In this regulation setting, output voltage is regulated to the user set value. On reaching the set current limit (positive) or power limit (positive), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

b) Current: In this programming type Mi-BEAM power supply regulates current. Depending on the chosen regulation setting, a fold-back operation will be executed. Various regulation settings in current programming type are described below,

- **Constant Current/Constant Voltage (CC/CV):** In this regulation setting, output current is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the set voltage limit value. On reaching the power limit (positive), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Current/Constant Power (CC/CP):** In this regulation setting, output current is regulated to the user set value. On reaching the power limit (positive), output would be regulated to the set power limit value. On reaching the voltage limit (high or low), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Power/Constant Current (CP/CC):** In this regulation setting, output power is regulated to the user set value. On reaching the current limit (positive), output would be regulated to the set current limit value. On reaching the voltage limit (high or low), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Current (CC):** In this regulation setting, output current is regulated to the user set value. On reaching the set voltage limit (high or low) or power limit (positive), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

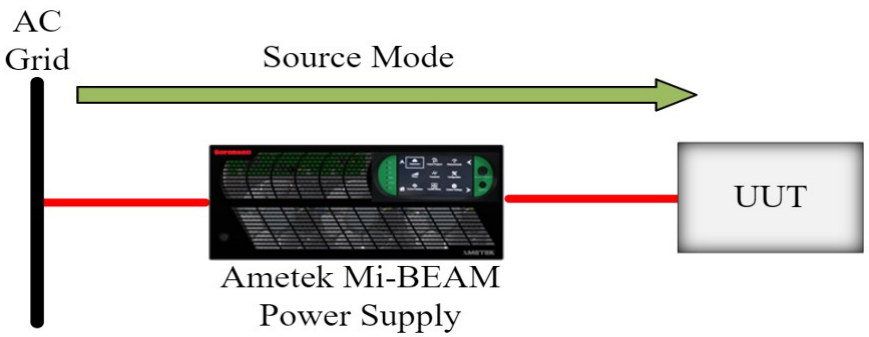


Figure 8-4. Power supply mode of operation

8.3 eLOAD MODE

In eLoad mode operation, power supply supports single quadrant operation as shown in Figure 8-5. In this specification, the direction of current is always negative (negative limits for current and power will be applicable) and power transfer is always from UUT to Mi-BEAM power supply.

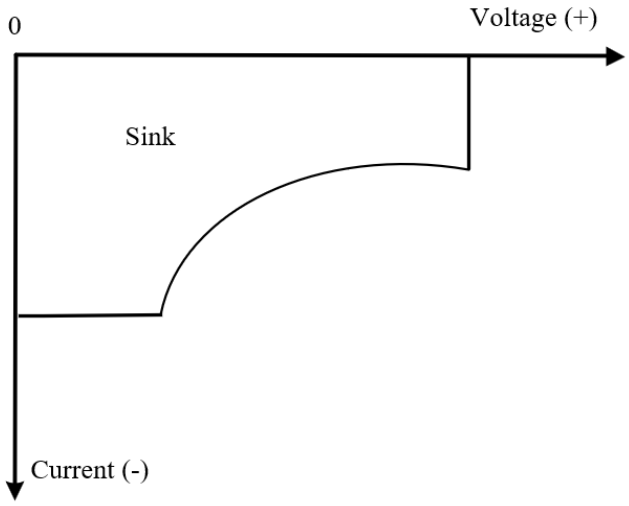


Figure 8-5. Single quadrant (eLoad) operation

In this mode, the Mi-BEAM Series power supply can function as a sink, as shown in Figure 8-6. eLoad mode supports various programming types as described below:

a) Voltage: In this programming type Mi-BEAM power supply regulates voltage. Foldback operation will be performed based on the regulation setting selected. Various regulation settings in voltage programming type are described below,

- **Constant Voltage/Constant Current (CV/CC):** In this regulation setting, output voltage is regulated to the user set value. On reaching the current limit (negative), output would be regulated to the set current limit value. On reaching the power limit (negative), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Voltage/Constant Current (CV/CP):** In this regulation setting, output voltage is regulated to the user set value. On reaching the power limit (negative), output would be regulated to the set power limit value. On reaching the current limit (negative), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Resistance/Constant Voltage (CR/CV):** In this regulation setting, output resistance is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the set voltage limit value. On reaching the current limit (negative) or power limit (negative), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Power/Constant Voltage (CP/CV):** In this regulation setting, output power is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the set voltage limit value. On reaching the current limit (negative), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Voltage (CV):** In this regulation setting, output voltage is regulated to the user set value. On reaching the set current limit (negative) or power limit (negative), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

b) Current: In this programming type Mi-BEAM power supply regulates current. Depending on the chosen regulation setting, a fold-back operation will be executed. Various regulation settings in current programming type are described below,

- **Constant Current/Constant Voltage (CC/CV):** In this regulation setting, output current is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the set voltage limit value. On reaching the power limit (negative), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Current/Constant Voltage (CC/CP):** In this regulation setting, output current is regulated to the user set value. On reaching the power limit (negative), output would be regulated to the set power limit value. On reaching the voltage limit (high or low), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Resistance/Constant Current (CR/CC):** In this regulation setting, output resistance is regulated to the user set value. On reaching the current limit (negative), output would be regulated to the set current limit value. On reaching the voltage limit (high or low) or power limit (negative), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Power/Constant Current (CP/CC):** In this regulation setting, output power is regulated to the user set value. On reaching the current limit (negative), output would be regulated to the set current limit value. On reaching the voltage limit (high or low), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

- **Constant Current (CC):** In this regulation setting, output current is regulated to the user set value. On reaching the set voltage limit (high or low) or power limit (negative), Mi-BEAM will detect it as a foldback fault and output will be turned OFF.

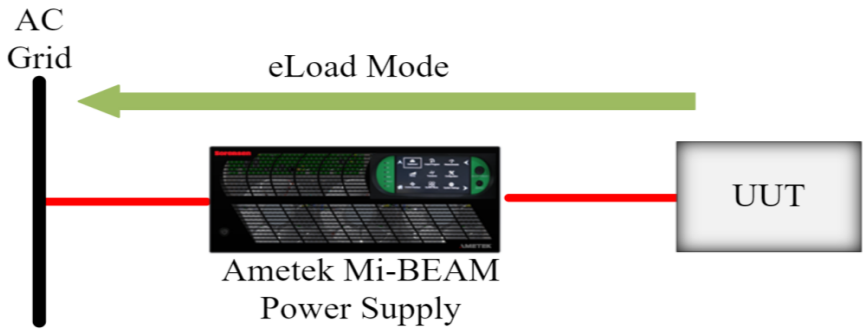


Figure 8-6. eLoad mode of operation

8.4 BATTERY SIMULATION MODE

The Mi-BEAM Series power supply is equipped to simulate battery characteristics under both charging and discharging conditions. It supports seamless dynamic transitions between these states, ensuring accurate replication of real-world battery behavior. Users can input various parameters to customize the simulation to specific needs.

Battery simulation during charge and discharge conditions is described below,

a) Battery Simulation-Charge Mode: The Mi-BEAM Series power supply regulates voltage to simulate battery charge characteristics, with the current direction being negative. Based on the current injected by the UUT (battery charger), the instantaneous SoC is calculated. The output voltage is varied as per the battery characteristics defined by the user. The Mi-BEAM Series power supply functioning in battery simulation charge mode is shown in Figure 8-7.

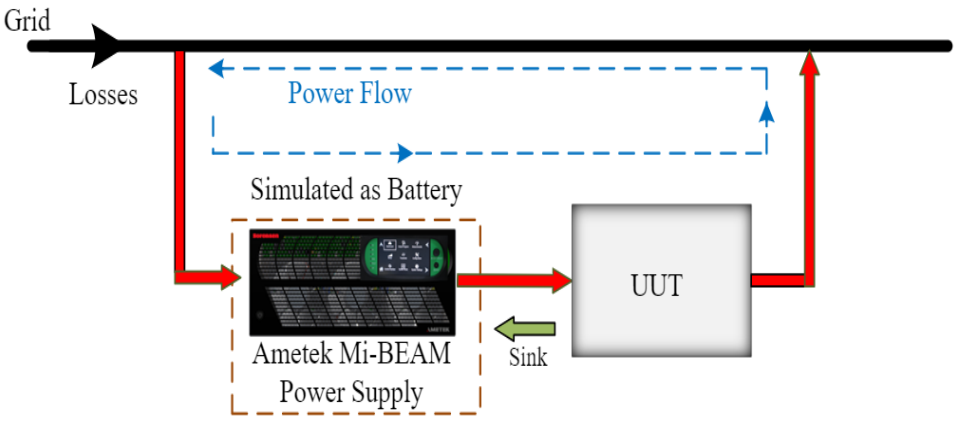


Figure 8-7. Battery simulation-charge mode

b) Battery Simulation-Discharge Mode: The Mi-BEAM Series power supply regulates voltage to simulate battery charge characteristics, with the current direction being positive. Based on the current drawn by the UUT, the instantaneous SoC is calculated. The output voltage is varied as per the battery characteristics defined by the user. The Mi-BEAM Series power supply functioning in battery simulation discharge mode is shown in Figure 8-8.

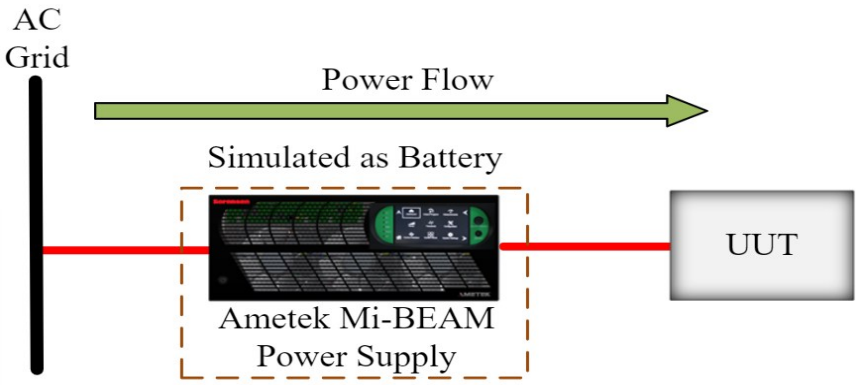


Figure 8-8. Battery simulation-discharge mode

8.5 BATTERY TEST MODE

The Mi-BEAM Series power supply is equipped to test battery characteristics under both charging and discharging conditions. The battery needs to be tested is considered here as the UUT. The power supply operates according to user-defined charge and discharge characteristics to test the battery. This mode supports seamless transitions between the two states. Users can create multiple charging and discharging profiles, which can be sequenced to achieve the required battery test conditions. The Mi-BEAM Series power supply functioning in battery test mode is shown in Figure 8-9.

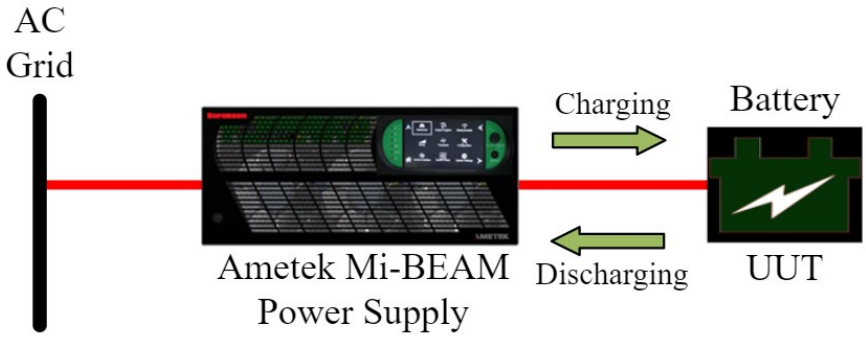


Figure 8-9. Battery test mode

8.6 PHOTOVOLTAIC SIMULATOR

The Mi-BEAM Series power supply is designed to test various aspects of photovoltaic systems under controlled conditions, operating in a 'current programming type CC/CV regulation setting' that follows the PV array I/V characteristics set by the user. In this mode, the PV curve of a solar

array is applied by the power supply by operating in source-current mode to the UUT such as an inverter. The PV array simulator simulates MPPT and various real-world PV array scenarios for testing the inverter, including compliance with EN50530 and Sandia SAS models. The Mi-BEAM Series power supply functioning in solar array simulator mode is shown in Figure 8-10.

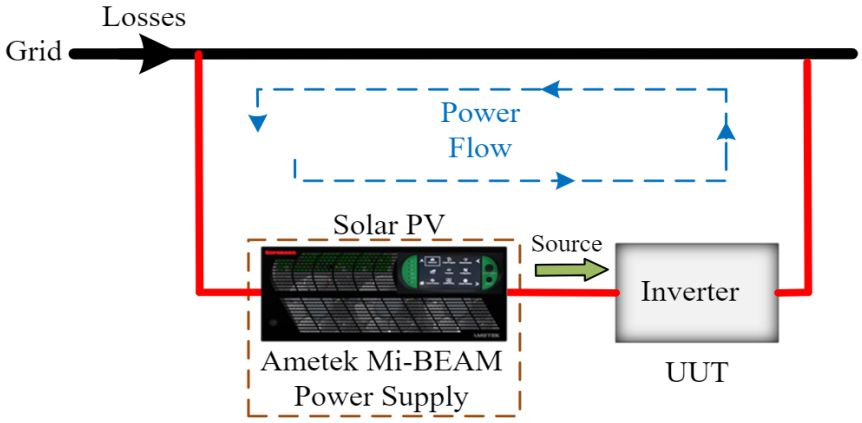


Figure 8-10. Solar Array Simulation

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9 FRONT PANEL

This chapter offers basic instructions on the front panel operations of the Mi-BEAM Series power supply. Engineered for user-friendly interaction and precise control, the Mi-BEAM Series front panel allows for seamless navigation and adjustment of settings. The intuitive design ensures efficient and accurate management of power delivery, catering to a wide array of application needs. The following section provides information of the controls, indicators, and the front panel menu functionalities for the operation of the power supply.

9.1 FRONT PANEL CONTROLS AND INDICATORS

Figure 9-1 shows a view of the front panel and Table 9-1 below shows the reference switches, indicators, and functional descriptions of the Enhanced front panel.

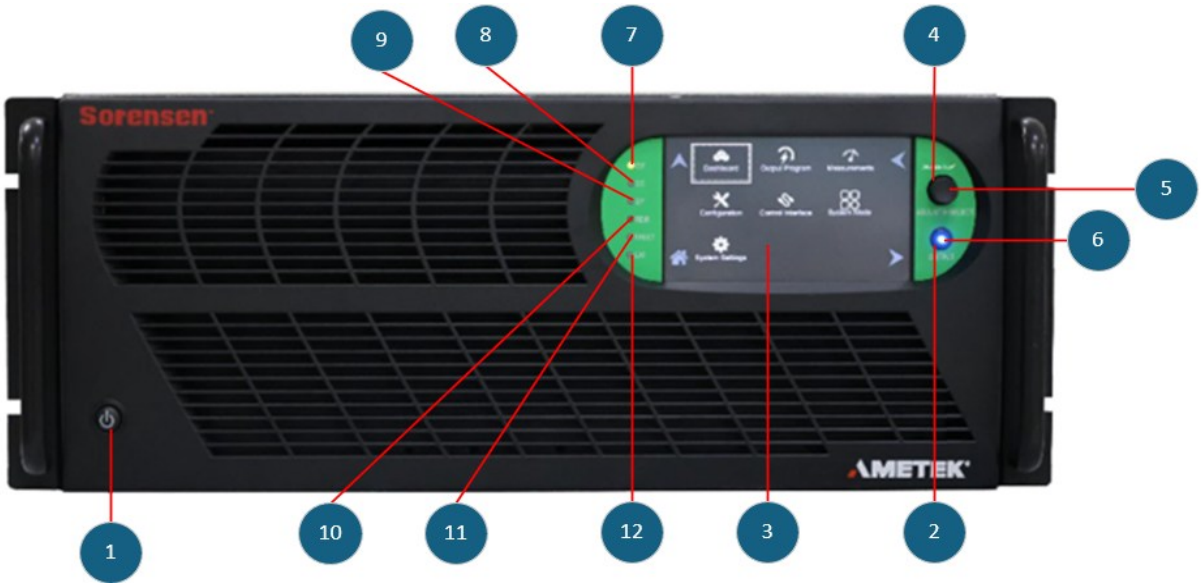

Figure 9-1. Front Panel

WARNING!
The power-up factory default state is output enabled, where the output will be energized at the settings of voltage and current.

ITEM	REFERENCE	FUNCTIONAL DESCRIPTION
CONTROLS: TO NAVIGATE THROUGH DIFFERENT MODES AND SETTINGS		
1	ON/OFF Switch	Two–position pushbutton switch turns the source on and off. **WARNING!** The OFF position does not remove AC input from internal circuits. Disconnect all external AC input before servicing the unit.
2	OUTPUT Switch	Momentary switch that toggles the output power ON/OFF and closes/opens the output isolation relay.
3	Display	TFT color graphics display with backlight and pressure-actuated touchscreen; menu-driven settings and functions.
4	Rotary Encoder	Navigates between and within screens; scrolls through functions and selects numerical values; adjusts output parameters in real-time.
5	Rotary Encoder Switch	Momentary-action switch that selects functions and enters numerical values.
LED MODE INDICATORS: TO INDICATES THE ACTIVE MODE		
6	Output	Output is turned on; the indicator is integral to the OUTPUT switch.
7	CV	All output phases of the power supply are presently in Constant-Voltage mode, and the output voltage is regulated.
8	CC	At least one of the output phases of the power supply is presently in Constant-Current mode, and the output current of that output is regulated.
9	CP	At least one of the output phases of the power supply is presently in Constant-Power mode, and the output current of that output is regulated.
10	REM	The source is presently controlled by the remote digital interface. If the RS-232C, USB, or LAN interface is used, the REM state can be enabled by the external controller using the SCPI command, `SYST: REM`. If the optional IEEE-488 (GPIB) interface is used, this indicator will be illuminated whenever the REM line (REM ENABLE) line is asserted by the IEEE-488 controller. Any time the REM LED is lit, the front panel control of the unit is disabled. To regain control through the front panel, the external controller must send the SCPI command, `SYST: LOC`.
11	Fault	A fault condition has occurred; the output is shut down, the isolation relay is open, and the output voltage is programmed to zero.
12	LXI	LXI status annunciation, LED will illuminate red when network connection is not present/Lost. Same LED blinks green when identifying the device through web page. On successful connection LED would be OFF.

Table 9-1. Front Panel Controls and Indicators

9.2 FRONT PANEL DISPLAY NAVIGATION

The selection of the output characteristics and adjusting the output parameters through the front panel display could be accomplished using the DASHBOARD screen, refer to Figure 9-3 or the OUTPUT PROGRAM screen, refer to Figure 10-16. The selection and adjustment of items could be done using either the touchscreen or rotary encoder:

a) Using the touchscreen or rotary encoder, navigate to the HOME Screen and select the OUTPUT PROGRAM screen, refer to Section 9.3.2 and Section 9.3.3. Within the OUTPUT PROGAM screen, select the parameter, and adjust its value.

b) The DASHBOARD screen provides an alternate means of adjusting the primary parameters, voltage, current, and power, in the same menu. It is also located on HOME Screen. It has the additional functionality of real-time adjustment of the parameters as the encoder is rotated. Refer to Section 9.3.3.

9.3 BASIC FRONT PANEL OPERATION

The Mi-Beam power supply provides extensive functionality and programmability, which could be exercised through the front panel, and the remote analog or digital control interface. This section provides basic details such as Navigation, Menu selection, Rotary encoder and Soft numeric keyboard which are common to all screens.

The Mi-Beam Series power supply is shipped from the factory configured for front panel (local) voltage/current/OVP control, and with the remote sense not connected (default to internal local voltage sensing at chassis output terminals). The remote sense leads must be connected externally by the user to achieve performance specifications. The Analog Control connector is supplied with a mating connector which has the remote output ON/OFF control signals jumpered to allow the output to be enabled.



WARNING!

When the power supply is initially powered on, it defaults to an output-enabled state. A warning screen will display a 10-second countdown timer before the output is energized. During this countdown, the output voltage and current are set to zero, the OVP is set to maximum, and the Output State is OFF. After the 10-second timer elapses, the Output State will switch to ON.

9.3.1 FRONT PANEL TOUCH-SCREEN DISPLAY

The front panel display of the Mi-Beam Series power supply allows the user to select various menus required to configure and operate the unit. Navigation through the various menus can be done using the touchscreen display or the rotary encoder. Tapping the display screen or clicking with the encoder on any menu or function will enter that menu or execute that function.

The touchscreen utilizes resistive, pressure-actuated technology, which depends on pressure being applied to the top surface of the screen to detect the position of input. A fingertip, fingernail, or stylus pen can be used. Refer to Figure 9-2.

NOTE: Do not use a hard or sharp tip, such as a ball-point pen or mechanical pencil.



Figure 9-2. Stylus Pen

CAUTION!
Damage or scratching of the touchscreen could occur if excessive pressure is applied to the surface or if objects with hard or sharp tips are used.

The present cursor position is always shown with a selection-box that has a highlighted border around a field. Some screens have multiple pages, as indicated by the highlighted Arrow icons located on the right side of the screen. Tapping an Arrow or selecting it with the rotary encoder and clicking the switch, scrolls the screen to the next page. Tapping on the HOME icon which is in the left side of the screen will exit that screen and return to the HOME screen. Refer to Figure 9-3 respectively.

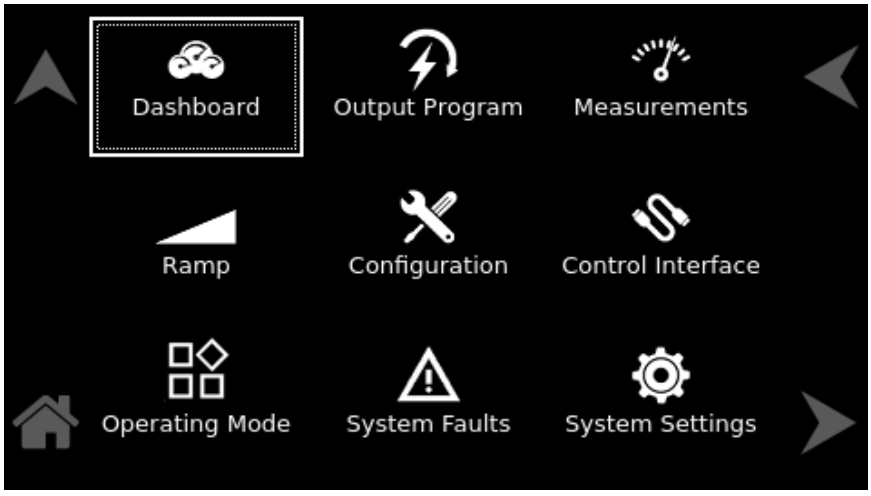

Figure 9-3. HOME Screen with Dashboard Highlighted

Parameters that are adjustable have selection-fields where values can be entered. The active parameter selection field is highlighted with a border; refer to Figure 9-4, which shows the Dashboard Menu with the voltage selection field active. Tapping the selection field box selects that parameter for adjustment, and the screen changes to a numeric keypad that allows value entry, refer to Figure 9-5.



Figure 9-4. DASHBOARD Screen Menu with Voltage Selection-Field Active

9.3.2 TOUCH-SCREEN NUMERIC KEYPAD

The touchscreen has a keypad that allows numeric value entry; refer to Figure 9-5. After scrolling through menus until a parameter selection field box is highlighted, tap the selection field to select it. Afterwards, the keypad screen will be displayed. Tap numerical value keys, the decimal point key, or the polarity key to select them, while the back-arrow key erases the last entry. To enter a negative value, first enter the number, then the minus sign. The selected values appear in the upper-left parameter window, and the cursor moves to the next available position. Tap the OK key after entering the value to take effect.

NOTE: Functions that accept a numeric value require the value to be within the allowed range. Otherwise, an error will be generated, and the value will not be accepted.

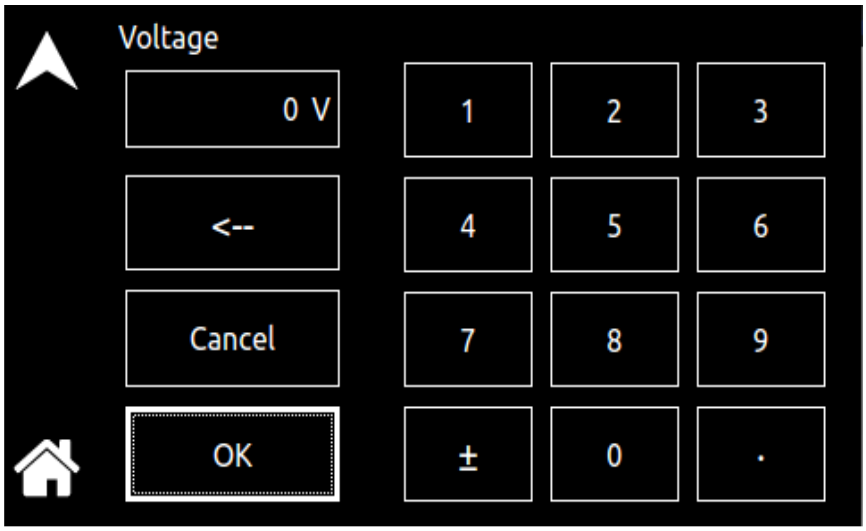

Figure 9-5. Touch-Screen Numeric Keypad

9.3.3 ROTARY ENCODERS

The rotary encoder provides an alternative method for navigating the display. It is used to select functions, change parameter values, and perform setup. Additionally, it allows movement between menu screens and between editable items within an individual menu screen.

The rotary encoder is located on the front panel and provides continuous adjustment in both clockwise and counterclockwise directions; refer to Figure 9-6. Turning the encoder knob allows sequential scrolling through each menu or function on the screen; the item that is active has its selection field-box highlighted. To select a choice, depress the encoder knob to engage the encoder momentary switch. The rotary encoder can operate in one of two distinct modes;

MODE	DESCRIPTION
NAVIGATE	The rotary encoder can be used to scroll through menu screen functions and settings. The selected (active) item will be outlined in a highlighted selection-field box. As the encoder is rotated, the highlighted box will be scrolled through all items on a screen that could be selected, refer Figure 9-3.
ADJUST/SELECT	After scrolling to a function, depress the rotary encoder knob to select it. Clicking on a selection button will change its state (ON or OFF), and clicking on a function or menu will select it and navigate to a screen that allows further value entry. Parameter values, such as voltage and current, are adjusted by selecting the parameter (clicking on it) to enable the selection field (refer to Figure 9-4). If a parameter has been selected whose value can be adjusted, and the encoder switch is depressed, a screen will be displayed with a parameter selection field highlighted that has a value entry window. The rotary encoder can then be used to continuously adjust the parameter value up and down as the encoder is

MODE	DESCRIPTION
	rotated. Click the encoder a second time to enter the value. If the OUTPUT switch is ON, the output parameter will change when the encoder is clicked. The DASHBOARD screen menu allows for real-time adjustment of output parameters. The values of these parameters change immediately as the rotary encoder is turned. If the OUTPUT switch is on, the output parameter will change as the encoder is rotated. Refer to Section 9 of the DASHBOARD screen menu for a description of the parameters that can be adjusted in real-time. The rotary encoder can also be used with the numeric keypad to enter values. After selecting a parameter using the touchscreen, the numeric keypad will be displayed; refer to Figure 9-6. The rotary encoder can be used to select any of the items on the numeric keypad by scrolling through them and clicking on them with the encoder switch to select them. The active value is identified on the screen with a highlighted field-box, and the entered decimal places are shown in the upper-left window. The cursor moves to the next available position as values are entered. After the desired decimal places are entered sequentially, the OK key is clicked to execute the final value and to take effect.  ***Figure 9-6. Rotary Encoder***

Table 9-2. Modes of Rotary Encoder

9.4 FRONT PANEL DISPLAY MENU AND FUNCTIONALITY

9.4.1 POWER-UP SCREENS

When the system is powered on, the display initially shows the Mi-BEAM Splash screen, refer to Figure 9-7. This is displayed after a series of verification screens that check the system chassis, firmware integrity, and module presence, refer Figure 9-8 to Figure 9-10. If the system is configured for parallel operation, additional checks are performed to validate parallel chassis communication, follower chassis communication, compatibility with the parallel chassis, and overall system integrity, refer to Figure 9-11 to Figure 9-14. Any fail in verification shows an error

screen, refer to Figure 9-15 and Figure 9-16. Upon successful verification, the system proceeds to the initializing screen and displays the Start-Up screen, which includes details such as the manufacturer name, model number, serial number, firmware revisions, and last calibration date, refer to Figure 9-17. Finally, the Dashboard screen is displayed, providing access to system, refer to Figure 9-18 and Figure 9-19.



Figure 9-7. Splash Screen



Figure 9-8. Chassis addressing



Figure 9-9. Checking firmware integrity

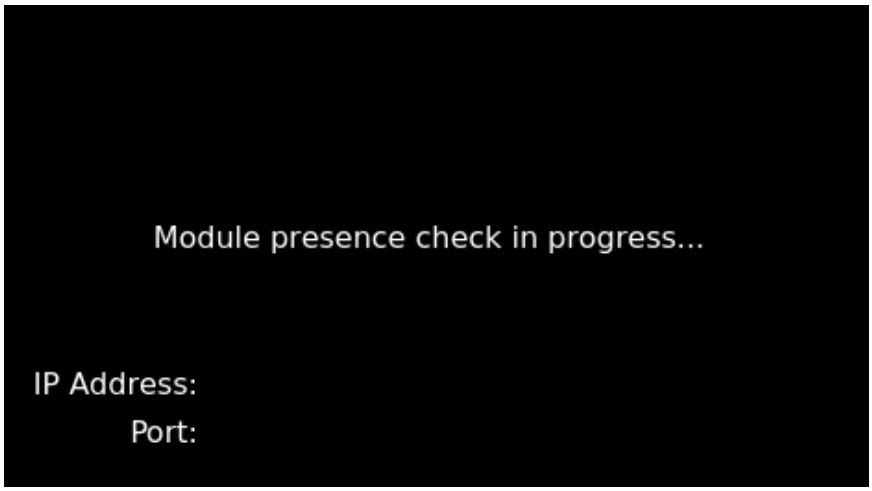

Figure 9-10. Module presence check in progress

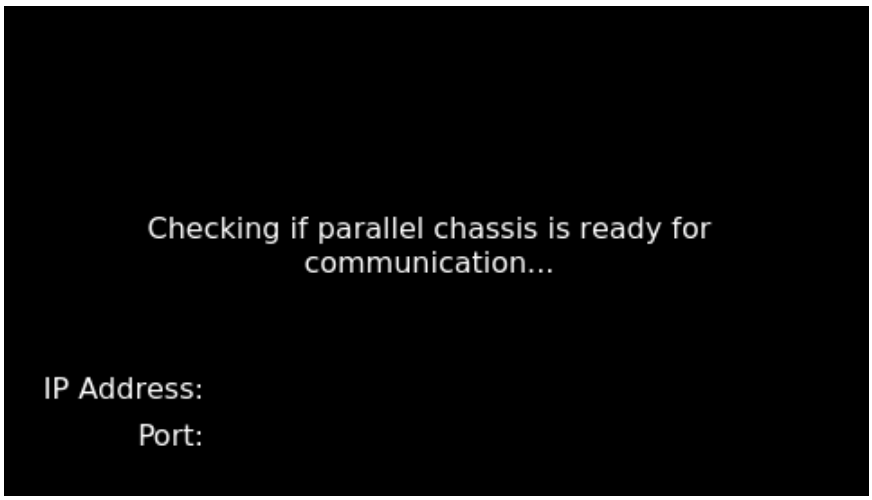

Figure 9-11. Checking parallel chassis – communication

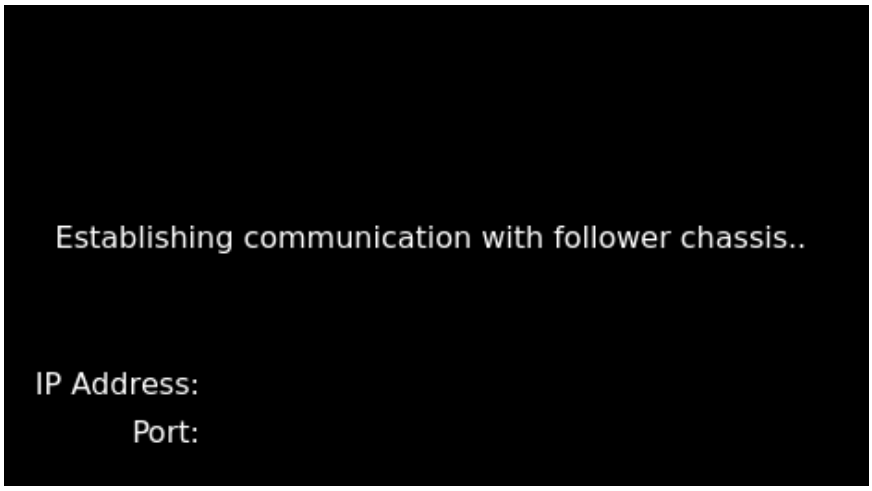

Figure 9-12. Estabilishing Communication – Follower Chassis

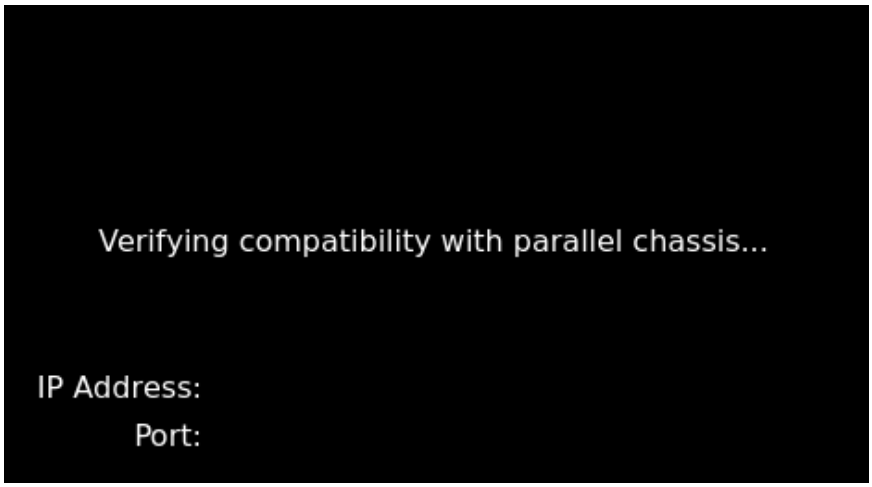

Figure 9-13. Verifying compatibility with parallel chassis

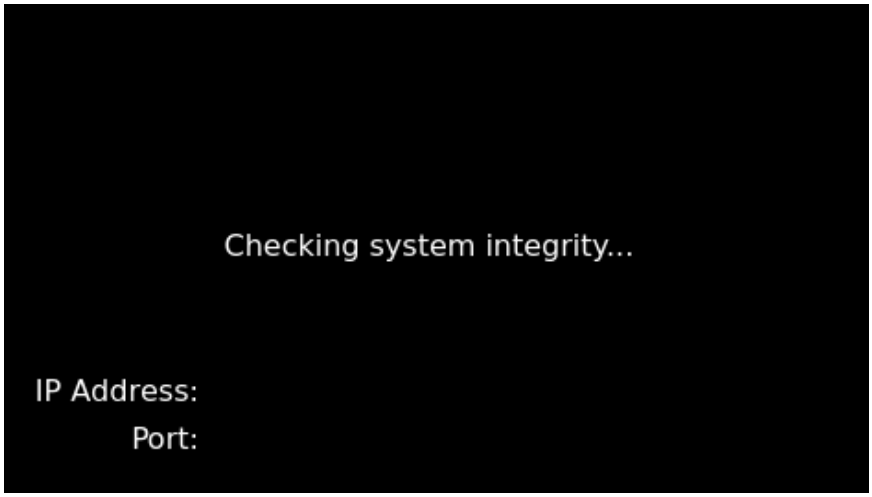

Figure 9-14. Checking system integrity

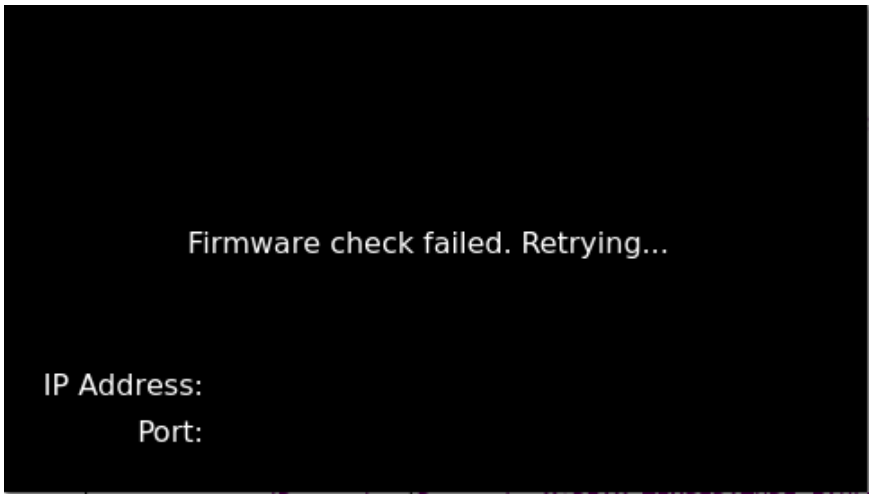

Figure 9-15. Firmware check failed. Retrying

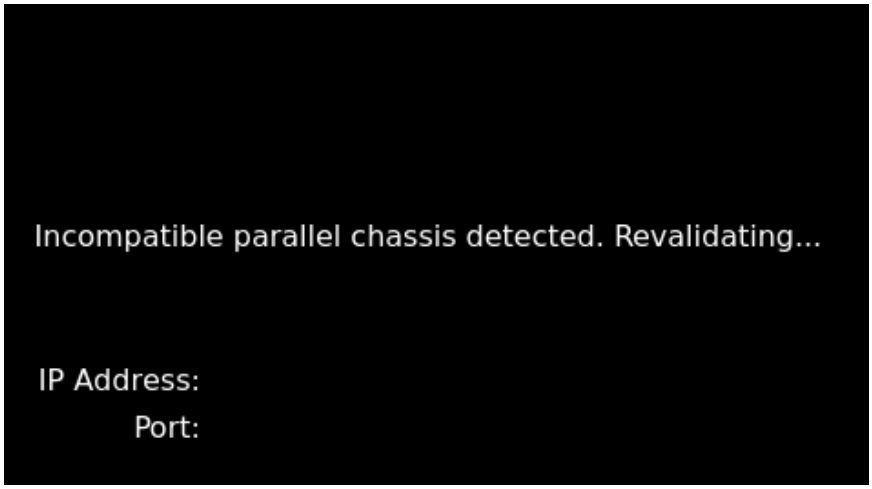

Figure 9-16. Incompatible parallel chassis detected. Revalidating

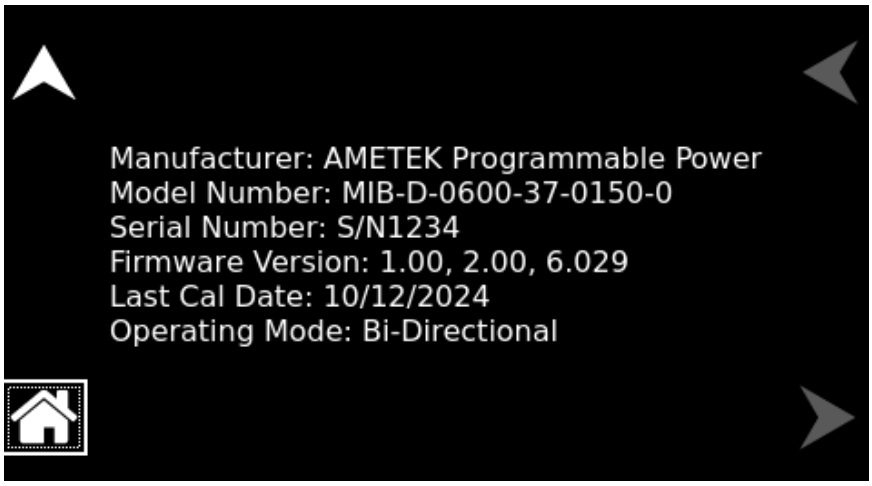

Figure 9-17. Power-On Screen Displaying Model and Version

9.4.2 HOME SCREEN TOP-LEVEL MENU

Selecting the Home icon or Up Arrow will open the HOME screen of the menu structure. It is made up of menus, as follows: Dashboard, Output Program, Measurements, Ramp, Configuration, Control Interface, Operating Mode, System Faults and System Settings.

NOTE: The top-level menu on the home screen will change based on the selected mode of operation.

Each menu of a screen could be selected by tapping its associated selection-field box through the touchscreen, or by selecting it with the rotary encoder and depressing the rotary encoder SELECT switch. Refer Figure 9-18 and Figure 9-19.

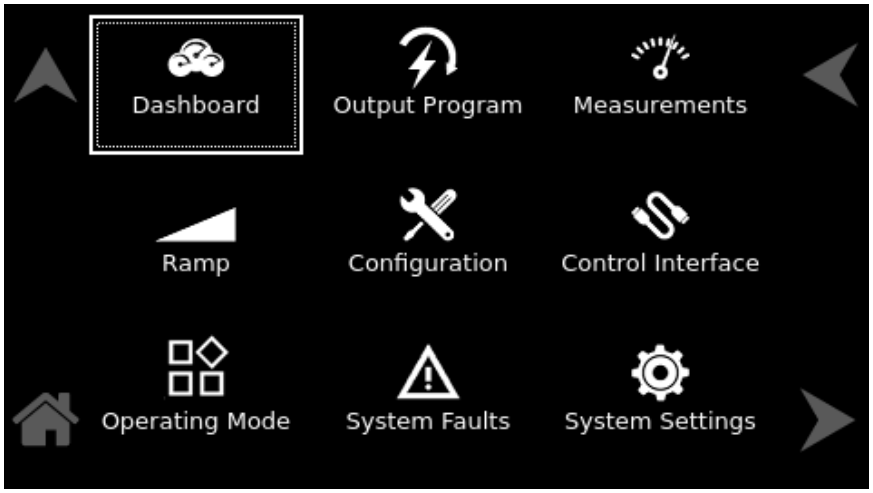

Figure 9-18. Home Screen for Bidirectional Mode, Source Mode and eLoad Mode

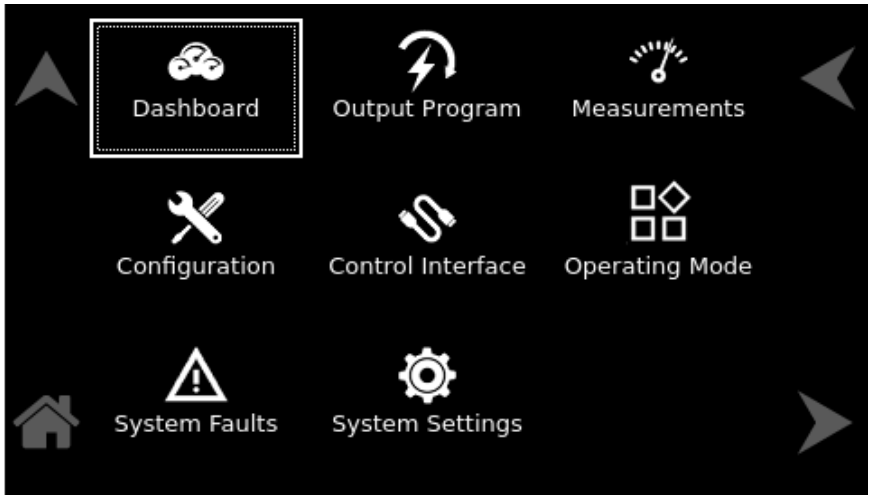

Figure 9-19. Home Screen for PVSIM, BATSIM and BATTEST Mode

There are four virtual buttons visible on a screen: UP, LEFT, and RIGHT arrows, and HOME icon. Those buttons that are highlighted are active for the screen being displayed. The arrow buttons will scroll to the next page of the menu structure in the direction indicated. The HOME

button will return to the previous home screen that has the top-level menu from which a sub-menu was entered. The HOME button is no longer functional once a home screen is entered.

The following top-level menu choices can be accessed through the touchscreen:

TOP-LEVEL SCREEN MENU	MENU DESCRIPTION
Dashboard	Provides Regulation settings and measurement of output parameters: Voltage, Current, Power, Series resistance, Over Current Protection (OVP) and Over Voltage Protection (OVP).
Output program	Provides setting of Voltage, Current, Power, Output state and Series resistance.
Measurements	Provides measurement of output parameters: Voltage, Current and Power.
Ramp	Provides menu for Voltage and Current ramp.
Configuration	Provides setup of Profiles, Regulation Settings, Slew Rate, Protection, User Limits, Output Sense, External Relay, PONS, Measurement Average Samples, Connections, Battery Mode and Battery Stop Conditions.
Control Interface	Provides setup of remote digital interfaces: RS232, GPIB, LAN, Analog and USB.
Operating Mode	Provides guidance on the operating modes of the power supply: Bi-DIR, SOUR, ELOAD, PVSIM, BATSIM, and BATTEST.
System Settings	Provides display of firmware versions, selection of language, hardware parameter limits, brightness of the display, and default screen timeout.
System Faults	Provides the descriptions of faults that have occurred in a power module.

Table 9-3. Home Screen Menu Content

9.4.2.1 DEFAULT SCREENS

The default screen provides measurements of the DC output 'Voltage', 'Current', and 'Power', and based on the selected modes ‘MPPT’, ‘SOC’, and calculated 'Capacity' will also be shown. When the Dashboard screen is idle for a set time delay, the display will automatically switch to the Default screen. Tap anywhere on the screen to return to the Dashboard screen. Based on the conditions 'Output state', 'Fault', and 'Power direction', the color of the Default screen will differ. Refer to Table 9-4 and Figure 9-20 to Figure 9-23.

OUTPUT STATE	FAULT	POWER DIRECTION	DISPLAY COLOR
OFF	NO	NA	Grey
OFF	YES	NA	Red
ON	NO	Negative	Green
ON	NO	Positive	Blue

Table 9-4. Default Screen – Conditions and Color

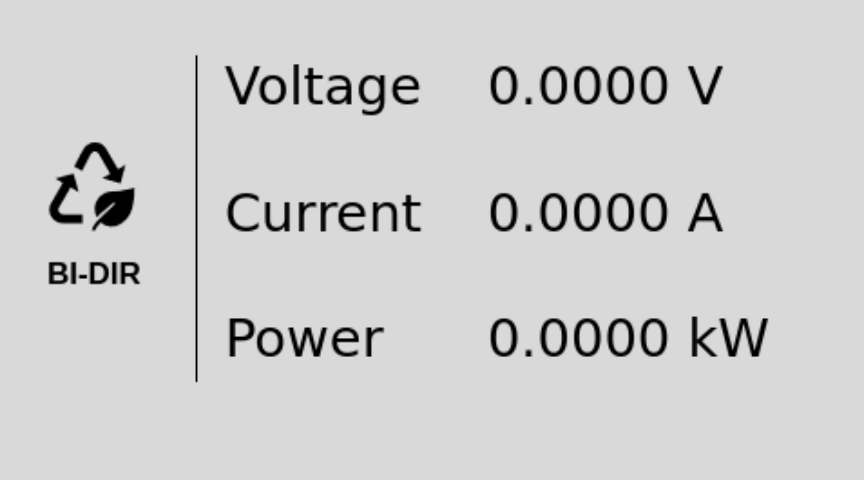

Figure 9-20. Dashboard Screen (Output State – OFF, Fault – NO and Power Direction – NA)

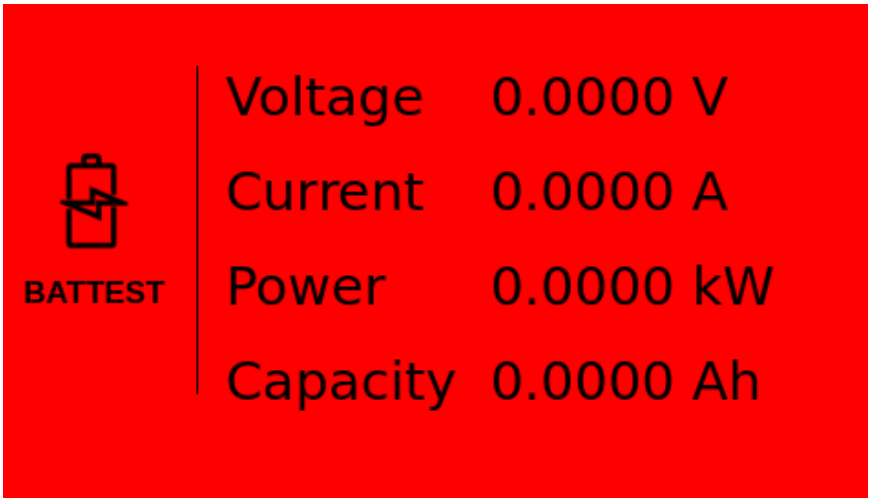

Figure 9-21. Dashboard Screen (Output State – OFF, Fault – YES and Power Direction – NA)

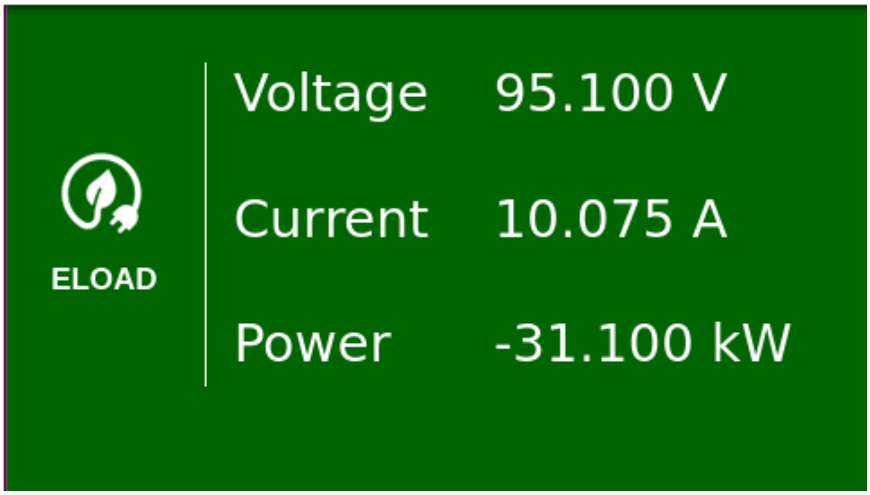

Figure 9-22. Dashboard Screen (Output State – ON, Fault – NO and Power Direction – NEGATIVE)

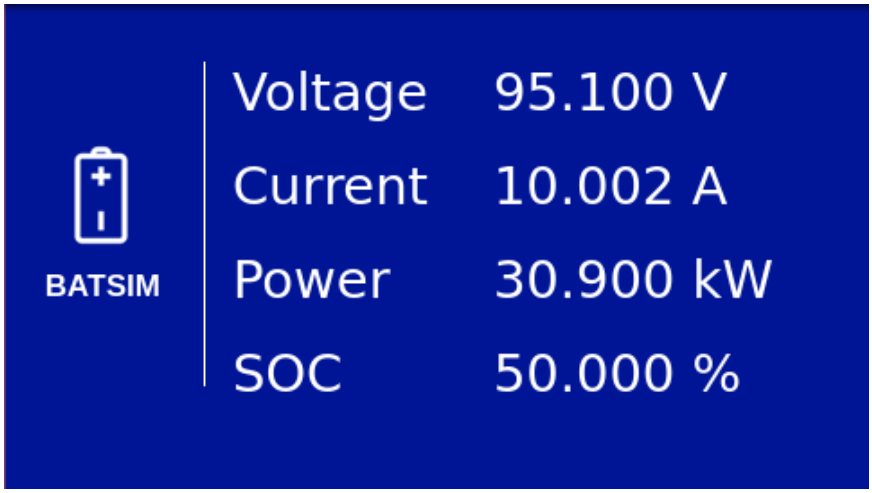

Figure 9-23. Dashboard Screen (Output State – ON, Fault – NO and Power Direction – POSITIVE)

9.4.2.2 NAVIGATING BETWEEN HOME SCREEN MENUS

Each menu in the Home Screen can be reached in two ways:

a) Tapping selected menu on HOME SCREEN of the front panel touchscreen.
b) Scrolling to menu with the encoder and depressing the encoder switch.

Tapping the UP-ARROW button will return the user to the previously selected screen menu, and tapping the HOME button will return the user to the Home Screen.

9.5 FOLLOWER FRONT PANEL DISPLAY

9.5.1 FOLLOWER POWER-UP SCREENS

When the system is powered On, the display initially shows the Mi-BEAM splash screen, as shown in Figure 9-24. This screen appears after a series of verification screens, similar to the Leader power supply, refer to Section 9.4.1.



Figure 9-24. Splash Screen - Follower

9.5.2 FOLLOWER HOME SCREEN

The Follower HOME screen is designed for real-time monitoring of operational parameters, such as current, voltage, and power; the settings are neither accessible nor modifiable from this interface. The follower unit displays only its own measurements, not the combined values of the entire parallel or series operation.

By default, the follower displays the ‘Parallel Operation’ screen. The follower screens vary depending on the operating mode selected in ‘PONS Multi-Chassis Operation Settings’ in the Leader unit. Refer to Section 10.2.5.7.4.

9.5.2.1 PARALLEL OPERATION - FOLLOWER

The default screen on the follower unit is ‘Parallel Operation’ screen. When ‘Parallel’ is selected on the leader unit, both the leader and follower units must be restarted for the configuration to take effect.

On the follower screen, real-time current and power values are displayed. These values represent only the individual measurements of each follower unit. Refer to Figure 9-25.

NOTE: The combined values are displayed only on the leader unit.

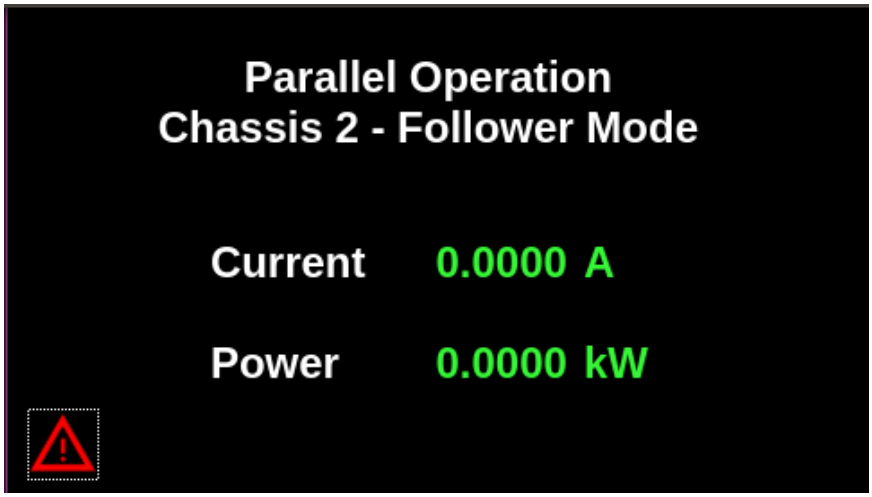

Figure 9-25. Parallel Operation – Follower Screen

9.5.2.2 SERIES OPERATION - FOLLOWER

When ‘Series’ or ‘Series Split Phase’ is selected on the leader unit, both the leader and follower units must be restarted for the configuration to take effect.

On the follower screen, real-time voltage, current and power values are displayed. These values represent only the individual measurements of each follower unit. Refer to Figure 9-26.

NOTE: The combined values are displayed only on the leader unit.

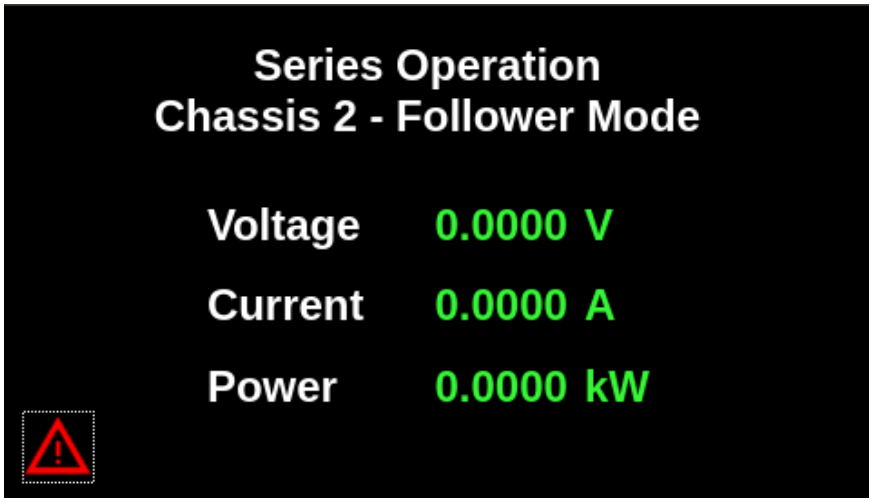

Figure 9-26. Series Operation – Follower Screen

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10 BI-DIRECTIONAL MODE OPERATION

10.1 Mi-BEAM CONNECTION TO UUT AND CONFIGURATION

10.1.1 IDENTIFY THE UUT PORT TYPE

Determine if the UUT port is a current type (e.g. DC-Charger output) or a voltage type (e.g. battery or any voltage source).

a) Current type – UUT regulates the current
b) Voltage type – UUT regulates the voltage

10.1.2 CONFIGURING MI-BEAM FOR CURRENT TYPE UUT

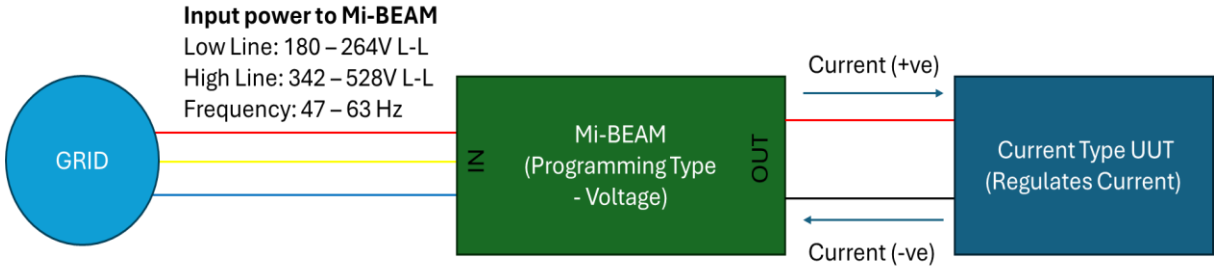


Figure 10-1. Current Type UUT

To configure the Current Type UUT, set the programming type (Prog. type) to 'Voltage' and select the appropriate regulation setting (CV/CC, CV/CP, CV Series Res and CV) in the dashboard. Refer to Section 10.2.1 for detailed instructions.

10.1.2.1 CONSTANT VOLTAGE/ CONSTANT CURRENT (CV/CC)

The power supply regulates the output voltage to the user-set value. On reaching the current limit (positive or negative), the output is regulated to the current limit. On reaching the power limit (positive or negative), the output voltage is programmed to zero, and the output is turned OFF. Refer to Section 10.2.1.2.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 10-92.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 10-92.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 10-92.

- **Voltage User Limit:** This setting limits the maximum voltage value that can be set in Mi-BEAM. Refer to Figure 10-95.

b) Setting Limits: The current and power limits can be set from the 'Output program' screen. In this regulation setting, Negative current limit, Positive Current limit will be used to perform foldback operation and Negative Power limit, Positive Power limit will be used to trip Mi-BEAM. Refer to Section 10.2.2.1.

All applicable options based on the programming type 'Voltage' and regulation setting 'CV/CC' are shown in Table 10-1.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
VOLT	CV/CC	YES	NA	NA	NA	NA	YES	YES	YES	YES

Table 10-1. Applicable Options – CV/CC

- **Negative Current limit:** On measured current reaching this value, Mi-BEAM will regulate the current at the set negative current limit. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 10-19.

- **Positive Current limit:** On measured current reaching this value, Mi-BEAM will regulate the current at the set positive current limit. This value must be set higher than current that can flow from Mi-BEAM to UUT. Refer to Figure 10-18.

- **Negative Power limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the power flown from UUT to Mi-BEAM. Refer to Figure 10-21.

- **Positive power limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 10-20.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Negative Current Limit, Positive Current Limit, Negative Power Limit and Positive Power Limit) for the delay time configured. Refer to Figure 10-86.

c) Setting Voltage value: Enter the voltage value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OVP. Refer to Figure 10-17.

d) **Connect the UUT to the Mi-BEAM:** Ensure all connections are secure and correctly aligned with the UUT port type.

e) **Output State:** Once all the parameters are configured as mentioned above, output can be turned ON. Refer to Figure 10-22.

f) **Start the Test:** Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) **Monitoring and Adjustments:** Monitor the output and make any necessary adjustments to the settings. Use the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 10.2.3.

h) **End the Test:** Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

10.1.2.2 CONSTANT VOLTAGE/ CONSTANT POWER (CV/CP)

The power supply regulates the output voltage to the user-set value. On reaching the power limit (positive or negative), the output is regulated to the power limit. On reaching the current limit (positive or negative) is reached, the output voltage is programmed to zero and the output is turned OFF. Refer to Section 10.2.1.3.

a) **Configuration:** Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 10-92.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 10-92.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 10-92.

- **Voltage User Limit:** This setting limits the maximum voltage value that can be set in Mi-BEAM. Refer to Figure 10-95.

b) **Setting Limits:** The current and power limits can be set from the ‘Output program’ screen. In this regulation setting, Negative Power limit, Positive Power limit will be used to perform foldback operation and Negative current limit, Positive Current limit will be used to trip Mi-BEAM. Refer to Section 10.2.2.1.

   All applicable options based on the programming type 'Voltage' and regulation setting 'CV/CP' are shown in Table 10-2.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
VOLT	CV/CP	YES	NA	NA	NA	NA	YES	YES	YES	YES

Table 10-2. Applicable Options – CV/CP

- **Negative Current limit:** On measured current reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the current flown from Mi-BEAM to UUT Refer to Figure 10-19.

- **Positive Current limit:** On measured current reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the current that can flow from Mi-BEAM to UUT. Refer to Figure 10-18.

- **Negative Power limit:** On measured power reaching this value, Mi-BEAM will regulate the power to set negative power limit. This value must be set lower than the power flown from UUT to Mi-BEAM. Refer to Figure 10-21.

- **Positive power limit:** On measured power reaching this value, Mi-BEAM will regulate the power to set positive power limit. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 10-20.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Negative Current Limit, Positive Current Limit, Negative Power Limit and Positive Power Limit) after the delay time configured. Refer to Figure 10-86.

c) Setting Voltage value: Enter the voltage value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OVP. Refer to Figure 10-17.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 10-22.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings. Use the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 10.2.3.

h) End the Test: Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

10.1.2.3 CONSTANT VOLTAGE SERIES RESISTANCE (CV – SER RES)

The user can set the voltage and series resistance. The terminal voltage varies based on the voltage drop across the series resistance. On reaching the current limit (positive or negative),

power limit (positive or negative), or voltage limit (high or low), the output voltage is programmed to zero and the output is turned OFF. Refer to Section 10.2.1.5.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 10-92.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 10-92.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 10-92.

- **Voltage User Limit:** This setting limits the maximum voltage value that can be set in Mi-BEAM. Refer to Figure 10-95.

b) Setting Limits: The current and power limits can be set from the 'Output program' screen. In this regulation setting, Voltage High Limit, Voltage Low Limit, Negative current limit, Positive Current, Negative Power limit and Positive Power limit will be used to trip Mi-BEAM. Refer to Section 10.2.2.2.

All applicable options based on the programming type 'Voltage' and regulation setting 'CV - Ser. Res' are shown in Table 10-10.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM	SERIES RES
VOLT	CV-SER. RES	YES	NA	NA	YES	YES	YES	YES	YES	YES	YES

Table 10-3. Applicable Options – CV- Ser. Res

- **Voltage High Limit**: On measured voltage reaching this value output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from UUT to Mi-BEAM. Refer to Figure 10-26.

- **Voltage Low Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the voltage flown from UUT to Mi-BEAM. Refer to Figure 10-27.

- **Negative Power limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 10-31.

- **Positive power limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 10-30.

- **Negative Current limit:** On measured current reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 10-29.

- **Positive Current limit:** On measured current reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the current flown from Mi-BEAM to UUT. Refer to Figure 10-28.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage Low Limit, Voltage High Limit, Negative Current Limit, Positive Current Limit, Negative Power Limit and Positive Power Limit) after the delay time configured. Refer to Figure 10-86.

c) **Setting Voltage value:** Enter the voltage value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OVP. Refer to Figure 10-24.

d) **Series Resistance:** Enter the series resistance value to control the voltage drop. Refer to Figure 10-25.

e) **Connect the UUT to the Mi-BEAM:** Ensure all connections are secure and correctly aligned with the UUT port type.

f) **Output State:** Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 10-32.

g) **Start the Test:** Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

h) **Monitoring and Adjustments:** Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 10.2.3.

i) **End the Test:** Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

10.1.2.4 CONSTANT VOLTAGE (CV)

The power supply regulates the output voltage to the user-set value. On reaching the current limit (positive or negative) or power limit (positive or negative), the output voltage is programmed to zero and the output is turned OFF. Refer to Section 10.2.1.2.

a) **Configuration:** Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 10-92.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 10-92.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 10-92.

- **Voltage User Limit:** This setting limits the maximum voltage value that can be set in Mi-BEAM. Refer to Figure 10-95.

b) Setting Limits: The current and power limits can be set from the 'Output program' screen. In this regulation setting, Negative current Limit, Positive Current Limit, Negative Power Limit, and Positive Power Limit will be used to trip Mi-BEAM. Refer to Section 10.2.2.1.

All applicable options based on the programming type 'Voltage' and regulation setting 'CV' are shown in Table 10-4.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
VOLT	CV	YES	NA	NA	NA	NA	YES	YES	YES	YES

Table 10-4. Applicable Options – CV

- **Negative Current limit:** On measured current reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 10-19.

- **Positive Current limit:** On measured current reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the current flown from Mi-BEAM to UUT. Refer to Figure 10-18.

- **Negative Power limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the power flown from UUT to Mi-BEAM. Refer to Figure 10-21.

- **Positive Power limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 10-20.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Negative Current Limit, Positive Current Limit, Negative Power Limit and Positive Power Limit) after the delay time configured. Refer to Figure 10-86.

c) Setting Voltage value: Enter the voltage value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OVP. Refer to Figure 10-17.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 10-22.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 10.2.3.

h) End the Test: Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

10.1.3 EXAMPLE: TESTING OF DC CHARGER USING CV/CC (DEFAULT) REGULATION SETTING

Test Criteria: Test the DC charger charging at maximum current at various voltage levels.

a) Determine if the UUT port is a current type

- **Current type** – UUT regulates the current

b) Conditions of **DC Charger** (UUT):

- Output Voltage Range: 200V to 1000V
- Maximum Output Current: 30A
- Maximum Output Power: 30kW

c) Assign the protection parameters in Mi-BEAM:
- Set Positive Overcurrent Protection (Pos. OCP) to 60A
- Set Negative Overcurrent Protection (Neg. OCP) to -60A
- Set Overvoltage Protection (OVP) to 1200V
- Set Voltage User Limit to 1000V

d) Assign the Set limits in Mi-Beam:

- Set Positive Current Limit to 5A
- Set Negative Current Limit to -35A
- Set Positive Power Limit to 10kW
- Set Negative Power Limit to 35kW
- Set Delay to 0.100 Sec

e) Set the voltage value of 800V

f) Ensure all configuration parameters are set

g) Turn ON the output of the Mi-BEAM

h) Mi-BEAM will regulate the set voltage of 800V

i) Configure Current from DC Charger:

j) Set the current from the DC charger to a value between 0 to 30A

k) Mi-BEAM will sink the configured current from the DC charger

l) Monitor the output and make necessary adjustments to ensure the UUT operates within the desired parameters

m) Once the test is complete, safely disconnect the UUT from the Mi-BEAM

n) Power down the Mi-BEAM.

10.1.4 CONFIGURING MI-BEAM FOR VOLTAGE TYPE UUT

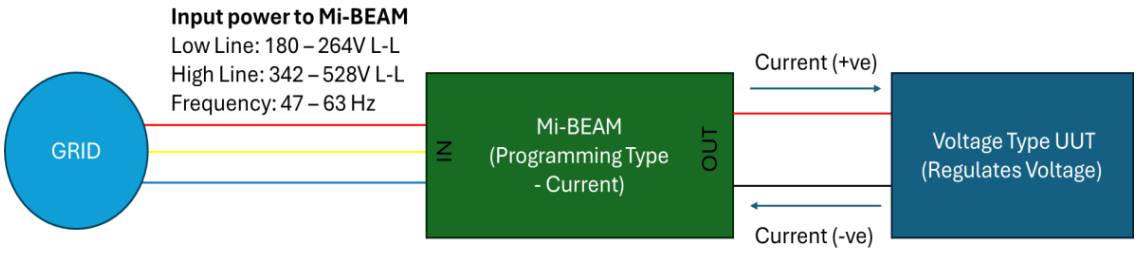


Figure 10-2. Voltage Type UUT

To configure the Voltage Type UUT, set the programming type (Prog. type) to 'Current' and select the appropriate regulation setting (CC/CV, CC/CP, CP/CC and CC) in the dashboard. Refer to Section 10.2.1 for detailed instructions.

10.1.4.1 CONSTANT CURRENT/CONSTANT VOLTAGE (CC/CV)

The power supply regulates the output current to the user-set value. On reaching the voltage limit (high or low), the output is regulated to the voltage limit. On reaching the power limit (positive or negative), the output current is programmed to zero, and the output is turned OFF. Refer to Section 10.2.1.5.

a) **Configuration:** Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must

be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 10-92.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 10-92.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 10-92.

- **Current User Limit:** This setting limits the maximum and minimum current value that can be set in Mi-BEAM. Refer to Figure 10-96.

b) Setting Limits: The voltage and power limits can be set from the 'Output program' screen. In this regulation setting, Voltage high Limit, Voltage low limit will be used to perform foldback operation and Negative Power limit, Positive Power limit will be used to trip Mi-BEAM. Refer to Section 10.2.1.5.

All applicable options based on the programming type 'Current' and regulation setting 'CC/CV' are shown in Table 10-5.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
CURR	CC/CV	NA	YES	NA	YES	YES	NA	NA	YES	YES

Table 10-5. Applicable Options – CC/CV

- **Voltage High Limit**: On measured voltage reaching this value, Mi-BEAM will regulate the voltage at set voltage high limit. This value must be set higher than the voltage flown from Mi-BEAM to UUT Refer to Figure 10-35.

- **Voltage Low Limit**: On measured voltage reaching this value, Mi-BEAM will regulate the voltage at set voltage low limit. This value must be set lower than the voltage flown from Mi-BEAM to UUT Refer to Figure 10-36.

- **Positive Power limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 10-37.

- **Negative Power Limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 10-38.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage high Limit, Voltage Low Limit, Negative Power Limit and Positive Power Limit) after the delay time configured. Refer to Figure 10-88.

c) **Setting Current value:** Enter the current value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OCP. Refer to Figure 10-34.

d) **Connect the UUT to the Mi-BEAM:** Ensure all connections are secure and correctly aligned with the UUT port type.

e) **Output State:** Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 10-39.

f) **Start the Test:** Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) **Monitoring and Adjustments:** Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 10.2.3.

h) **End the Test:** Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM

10.1.4.2 CONSTANT CURRENT/CONSTANT POWER (CC/CP)

The power supply regulates the output current to the user-set value. On reaching the power limit (positive or negative), the output is regulated to the voltage limit. On reaching the voltage limit (high or low), the output current is programmed to zero, and the output is turned OFF. Refer to Section 10.2.1.7.

a) **Configuration:** Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 10-92.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 10-92.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 10-92.

- **Current User Limit:** This setting limits the maximum and minimum current value that can be set in Mi-BEAM. Refer to Figure 10-96.

b) **Setting Limits**: The voltage and power limits can be set from the ‘Output program’ screen. In this regulation setting, Voltage High Limit, Voltage Low limit will be used to perform foldback operation and Negative Power limit, Positive Power limit will be used to trip Mi-BEAM. Refer to Section 10.2.2.3.

All applicable options based on the programming type 'Current' and regulation setting 'CC/CP' are shown in Table 10-6.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
CURR	CC/CP	NA	YES	NA	YES	YES	NA	NA	YES	YES

Table 10-6. Applicable Options – CC/CP

- **Voltage High Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from Mi-BEAM to UUT Refer to Figure 10-35.

- **Voltage Low Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the voltage flown from Mi-BEAM to UUT Refer to Figure 10-36.

- **Positive Power limit:** On measured power reaching this value, Mi-BEAM will regulate the power at set positive power limit. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 10-37.

- **Negative Power Limit:** On measured power reaching this value, Mi-BEAM will regulate the power at set negative power limit. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 10-38.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage high Limit, Voltage Low Limit, Negative Power Limit and Positive Power Limit) after the delay time configured. Refer to Figure 10-88.

c) Setting Current value: Enter the current value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OCP. Refer to Figure 10-34.

d) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 10-39.

e) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 10.2.3.

h) End the Test: Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM

10.1.4.3 CONSTANT POWER/CONSTANT CURRENT (CP/CC)

The power supply regulates the output power to the user-set value. If the current limit (positive or negative) is reached, the output is regulated to the current limit. If the voltage limit (high or

low) is reached, the output power is programmed to zero, and the output is turned OFF. Refer to Section 10.2.1.6.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 10-92.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 10-92.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 10-92.

- **Power User Limit:** This setting limits the maximum and minimum power value that can be set in Mi-BEAM. Refer to Figure 10-97.

a) Setting Limits: The voltage and power limits can be set from the 'Output program' screen. In this regulation setting, Positive Current limit, Negative Current Limit will be used to perform foldback operation and Voltage High Limit, Voltage Low Limit will be used to trip Mi-BEAM. Refer to Section 10.2.2.4.

All applicable options based on the programming type 'Current' and regulation setting 'CP/CC' are shown in Table 10-7.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
CURR	CP/CC	NA	NA	YES	YES	YES	YES	YES	NA	NA

Table 10-7. Applicable Options – CP/CC

- **Voltage High Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 10-42.

- **Voltage Low Limit**: On measured current reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 10-43.

- **Positive Current Limit:** On measured current reaching this value, Mi-BEAM will regulate the current at set Positive Current Limit. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 10-44.

- **Negative Current Limit:** On measured current reaching this value, Mi-BEAM will regulate the current at set Negative Current Limit. This value must be set lower than the power flown from Mi-BEAM to UUT. Refer to Figure 10-45.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage High Limit, Voltage Low Limit, Negative Power Limit and Positive Power Limit) after the delay time configured. Refer to Figure 10-88.

b) Setting Power value: Enter the power value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured protection value. Refer to Figure 10-41.

c) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 10-46.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

f) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 10.2.3.

g) End the Test: Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

10.1.4.4 CONSTANT CURRENT (CC)

The power supply regulates the output current to the user-set value. On reaching the voltage limit (high or low) or power limit (positive or negative), the output current is programmed to zero, and the output is turned OFF. Refer to Section 10.2.1.2.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 10-92.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 10-92.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 10-92.

- **Current User Limit:** This setting limits the maximum and minimum current value that can be set in Mi-BEAM. Refer to Figure 10-96.

b) Setting Limits: The voltage and power limits can be set from the 'Output program' screen. In this regulation setting, Voltage High Limit, Voltage Low Limit, Negative Power Limit, Positive Power Limit will be used to trip Mi-BEAM. Refer to Section 10.2.2.3.

All applicable options based on the programming type 'Current' and regulation setting 'CC' are shown in Table 10-8.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
CURR	CC	NA	YES	NA	YES	YES	NA	NA	YES	YES

Table 10-8. Applicable Options – CC

- **Voltage High Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 10-35.

- **Voltage Low Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the voltage flown from Mi-BEAM to UUT. Refer to Figure 10-36.

- **Positive Power limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 10-37.

- **Negative Power Limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 10-38.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Volt high, Volt Low, Negative Power Limit and Positive Power Limit) after the delay time configured. Refer to Figure 10-88.

c) Setting Current value: Enter the current value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OCP. Refer to Figure 10-34.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 10-39.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 10.2.3.

h) End the Test: Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

10.1.5 EXAMPLE: TESTING OF BATTERY PACK USING CC/CV (DEFAULT) REGULATION SETTING

Test Criteria: Test the battery pack's health by performing charge and discharge cycles.

a) Determine if the UUT port is a voltage type (e.g. battery or any voltage source).

- **Voltage type** – UUT regulates the voltage

b) Conditions of **Battery pack** (UUT):

- Output Circuit Voltage (OCV):
  - At 0% SoC: 350V
  - At 100% SoC: 600V
- Maximum Charge Current: 30A
- Maximum Discharge Current: -30A

c) Ensure that the programming type is set to current, and the regulation setting is in CC/CV (Default)

d) Assign the protection parameters in Mi-BEAM:

- Set Positive Overcurrent Protection (Pos. OCP) to 35A
- Set Negative Overcurrent Protection (Neg. OCP) to -35A
- Set Overvoltage Protection (OVP) to 650V
- Set Current High (User Soft Limit) Limit to 30A
- Set Current Low (User Soft Limit) Limit to -30A

e) Assign the Set limits in Mi-Beam:

- Set Volt High Limit to 600V
- Set Volt Low Limit to 350V
- Set Positive Power Limit to 37kW
- Set Negative Power Limit to -37kW
- Set Delay to 0.100 Sec

f) Set a current value (positive value for charging and negative value for discharging the battery pack).

g) Ensure all configuration parameters are set

h) Turn ON the output of the Mi-BEAM

i) Mi-BEAM will charge or discharge the battery based on the current set (Positive current for charging and Negative current for discharging)

j) Monitor the output and make necessary adjustments to ensure the UUT operates within the desired parameters

k) Once the test is complete, safely disconnect the UUT from the Mi-BEAM

l) Power down the Mi-BEAM.

10.2 FRONT PANEL OPERATION

This section provides detailed information on the front panel operation in Bi-directional mode. Each menu of a screen could be selected by tapping its associated selection-field box through the touchscreen, or by selecting it with the rotary encoder. Refer to Figure 10-3.

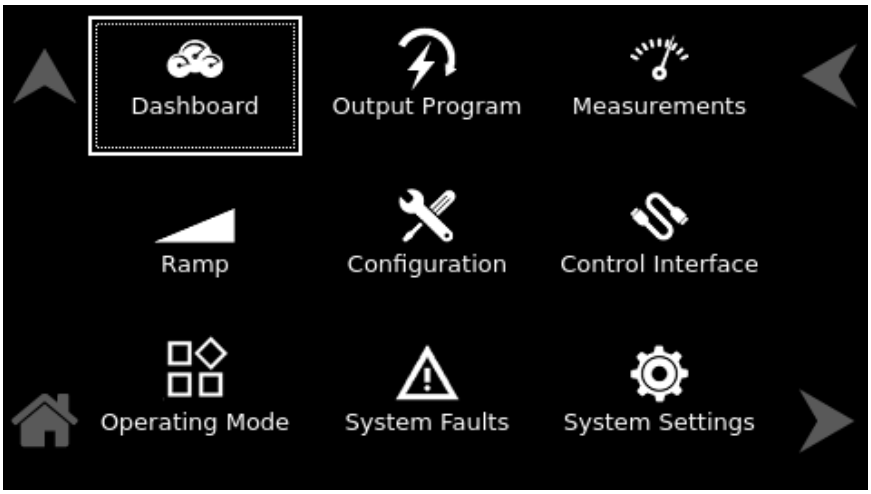


Figure 10-3. Home Screen Top-Level Menu

10.2.1 DASHBOARD SCREEN TOP-LEVEL MENU

The DASHBOARD screen top-level menu is used to change output parameters and simultaneously view output measurements. The most used output parameters are in the DASHBOARD screen menu. The DASHBOARD screen is the default menu that is displayed after power-on.

10.2.1.1 CONFIGURING PROGRAMMING TYPE AND REGULATION SETTINGS

The Regulation Settings Menu allows users to configure the ‘Prog. Type’ (Programming Type) and ‘Regulation Settings’ of the Mi-beam power supply. Refer to Figure 10-4 and Figure 10-5.

The 'Reg. Setting' function on the Dashboard Screen enables users to switch between 'Voltage (CV/CC, CV/CP, CV-Ser. Res and CV)' and 'Current (CC/CV, CP/CC, CC/CP and CC)' Regulation settings. Refer Figure 10-6 to Figure 10-13 and Table 10-9 to Table 10-18.

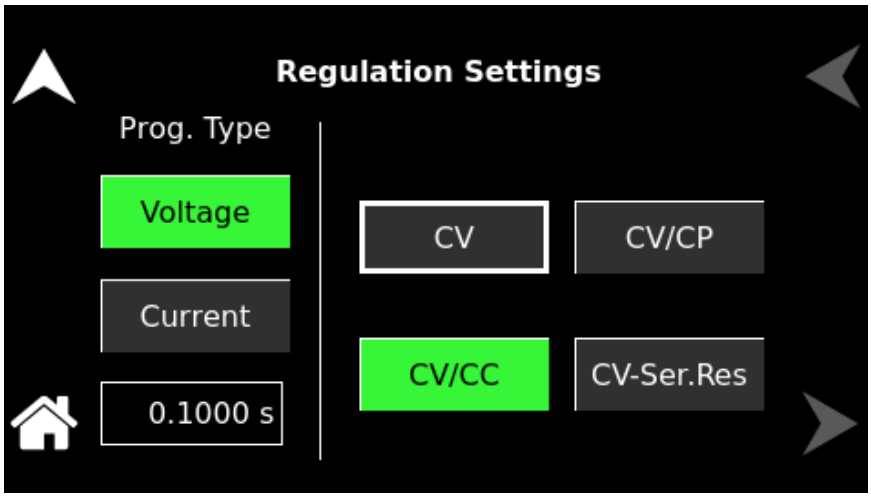


Figure 10-4. Regulation Settings – Voltage programming type

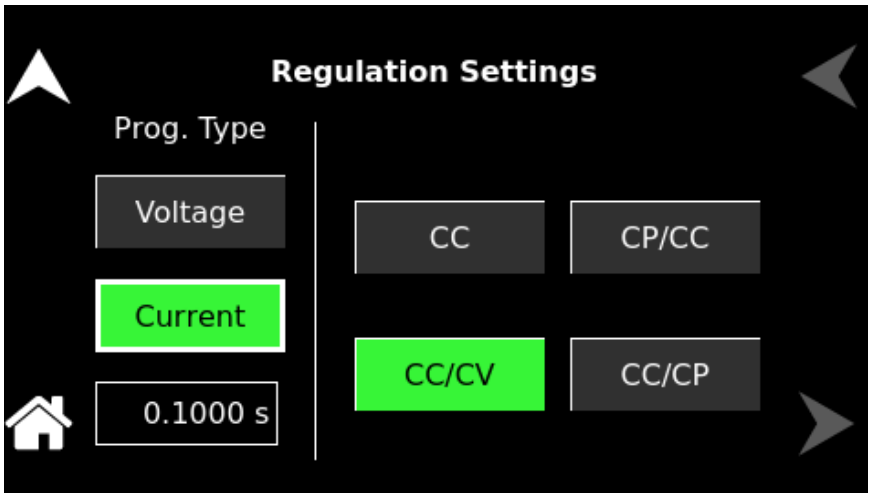


Figure 10-5. Regulation Settings – Current programming type

10.2.1.2 VOLTAGE PROGRAMMING TYPE CV/CC AND CV REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) **Voltage - CV/CC** Regulation setting is shown Figure 10-6,
b) **Voltage - CV** Regulation setting is shown in Figure 10-7,

Refer to Section 9.4.2.2 for navigating to Dashboard-Screen.

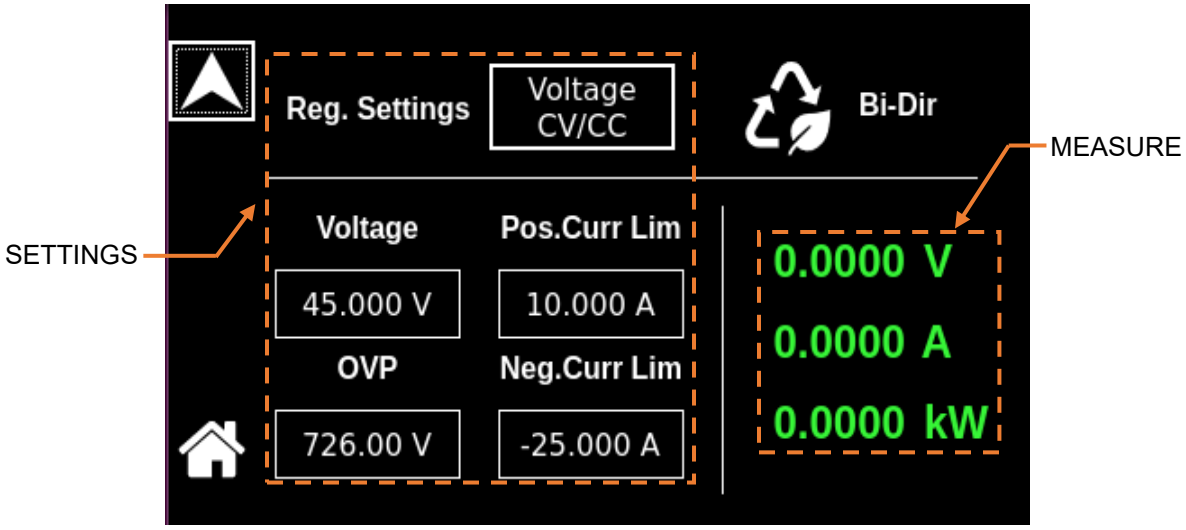


Figure 10-6. Dashboard Screen in CV/CC Mode

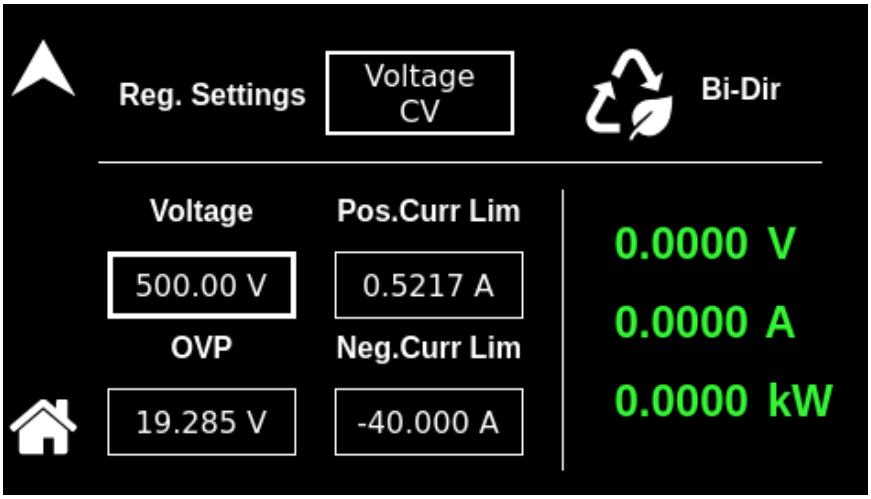


Figure 10-7. Dashboard Screen in CV Mode

The following selections are available in the DASHBOARD screen top-level menu of 'Voltage' Programming type, 'CV/CC' and 'CV' Regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 10-85. **a) Voltage - Constant Voltage/Constant Current (CV/CC):** The output voltage is regulated to the user set value. On reaching the current limit (positive or negative), output would be regulated to the current limit reached. On reaching the power limit (positive or negative), the output voltage would be programmed to zero. **b) Voltage - Constant Voltage (CV):** The output voltage is regulated to the user set value. On reaching the set current limit (positive or negative) or power limit (positive or negative), the output voltage would be programmed to zero.
Voltage	Programs the output voltage of the power supply in volts. Real-time setting is possible using the rotary encoder. When the unit is in series operation (refer to Chapter 6), the Dashboard screen displays Voltage 1 and Voltage 2 for setting the output voltage of Leader and Follower. **NOTE:** CV is the only regulation setting available in Series operation.
Pos. Curr Lim	In CV regulation setting, this functions as a trip limit. In CV/CC regulation setting, on reaching this set value, the output would be regulated to the Pos. Curr Lim. Real-time setting is possible using the rotary encoder.
Neg. Curr Lim	In CV regulation setting, this functions as a trip limit. In CV/CC regulation setting, on reaching this set value, the output would be regulated to the Neg. Curr Lim. Real-time setting is possible using the rotary encoder.
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 10-9. Top-level Screen menu

10.2.1.3 VOLTAGE PROGRAMMING TYPE CV/CP REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) Voltage – CV/CP Regulation setting is shown in Figure 10-8,

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

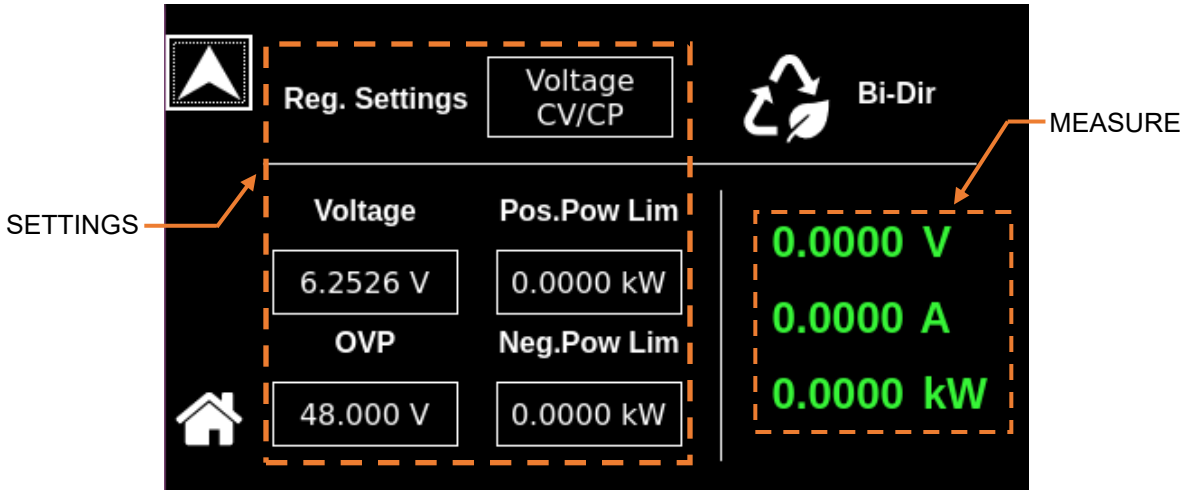


Figure 10-8. Dashboard Screen in CV/CP Mode

The following selections are available in the DASHBOARD screen top-level menu of 'Voltage' Programming type, 'CV/CP' Regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 10-85. **a) Voltage - Constant Voltage/ Constant Power:** The output voltage is regulated to the user set value. On reaching the power limit (positive or negative), output would be regulated to the power limit reached. On reaching the current limit (positive or negative), the output voltage would be programmed to zero.
Voltage	Programs the output Voltage of the supply in volts. Real-time setting is possible using the rotary encoder.
Pos. Pow Lim	Regulates the output upon reaching the Positive Power Limit. Real-time setting is possible using the rotary encoder.
Neg. Pow Lim	Regulates the output upon reaching the Negative Power Limit. Real-time setting is possible using the rotary encoder.
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 10-10. Dashboard screen top-level menu- CV/CP Mode

10.2.1.4 VOLTAGE PROGRAMMING TYPE CV-SER. RES REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) Voltage - CV-Ser. Res Regulation setting is shown in Figure 10-9,

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

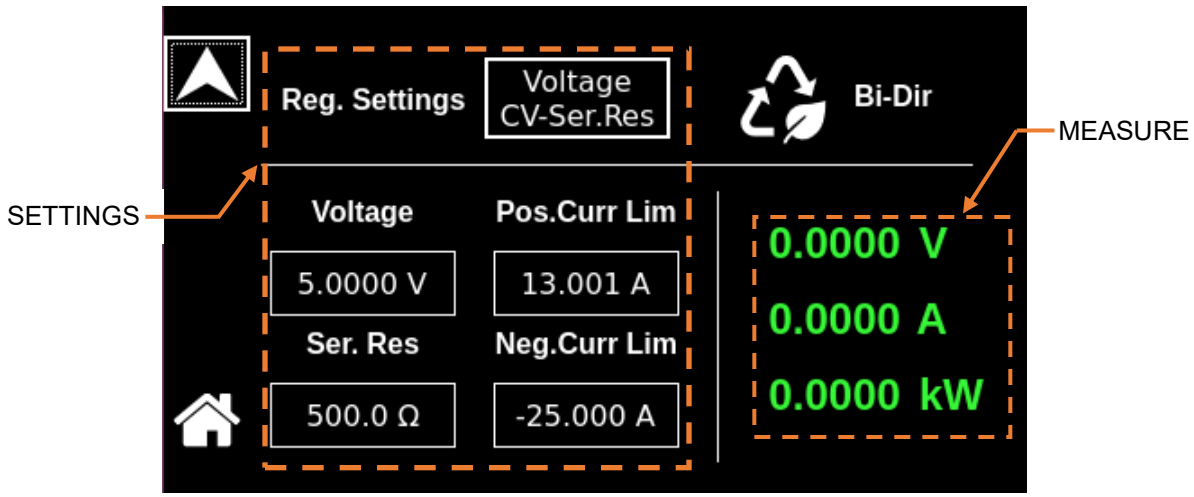


Figure 10-9. Dashboard Screen in CV-Ser. Res Mode

The following selections are available in the DASHBOARD screen top-level menu of 'Voltage' Programming type 'CV-Ser. Res' regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 10-85. **a) Voltage - Constant Voltage Series Resistance (CV – Ser Res):** The user can set the voltage and series resistance. Depending on the current output, the terminal voltage would be varied based on the voltage drop across the series resistance. In the event of reaching the programmed current limit (positive or negative) or power limit (positive or negative) or voltage limit (high or low), the output voltage is programmed to zero.
Voltage	Programs the output voltage of the supply in volts. Real-time setting is possible using the rotary encoder.
Pos. Curr Lim	Programs the output positive current limit in amps and this setting functions as a trip limit. Real-time setting is possible using the rotary encoder.
Ser. Res	Programs the series resistance in ohms. Real-time setting is possible using the rotary encoder.
Neg. Curr Lim	Programs the negative current limit in amps and this setting functions as a trip limit. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 10-11. Dashboard screen top-level menu- CV-Ser. Res Mode

10.2.1.5 CURRENT PROGRAMMING TYPE CC AND CC/CV REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) Current - CC/CV Regulation setting is shown in Figure 10-10,
b) Current - CC Regulation setting is shown in Figure 10-11,

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

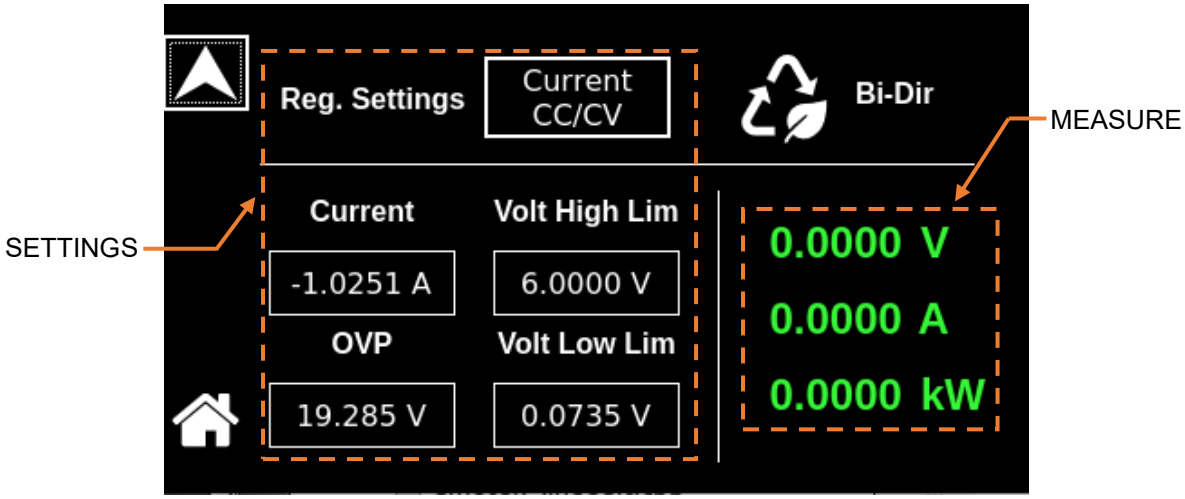


Figure 10-10. Dashboard Screen in CC/CV Mode

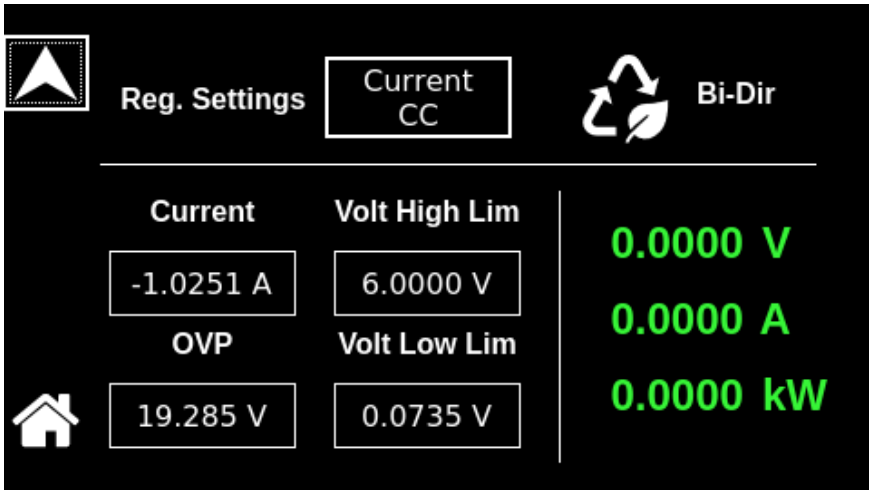


Figure 10-11. Dashboard Screen in CC Mode

The following selections are available in the DASHBOARD screen top-level menu of 'Current' Programming type 'CC/CV' and 'CC' regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 10-87. **a) Current - Constant Current/Constant Voltage (CC/CV):** The output current is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the power limit (positive or negative), the output current would be programmed to zero. **b) Current - Constant Current (CC):** The output current is regulated to the user set value. On reaching the set voltage limit (high or low) or power limit (positive or negative), the output current would be programmed to zero.
Current	Programs the output current in amps. Real-time setting is possible using the rotary encoder.
Volt High Lim	In CC mode, this setting functions as a trip limit. In CC/CV mode, it regulates the output upon reaching the voltage high limit. Real-time setting is possible using the rotary encoder.
Volt Low Lim	In CC mode, this setting functions as a trip limit. In CC/CV mode, it regulates the output upon reaching the voltage low limit. Real-time setting is possible using the rotary encoder.
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 10-12. Dashboard screen top-level menu – CC and CC/CV

10.2.1.6 CURRENT PROGRAMMING TYPE CP/CC REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) Current – CP/CC Regulation setting is shown in Figure 10-12,

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

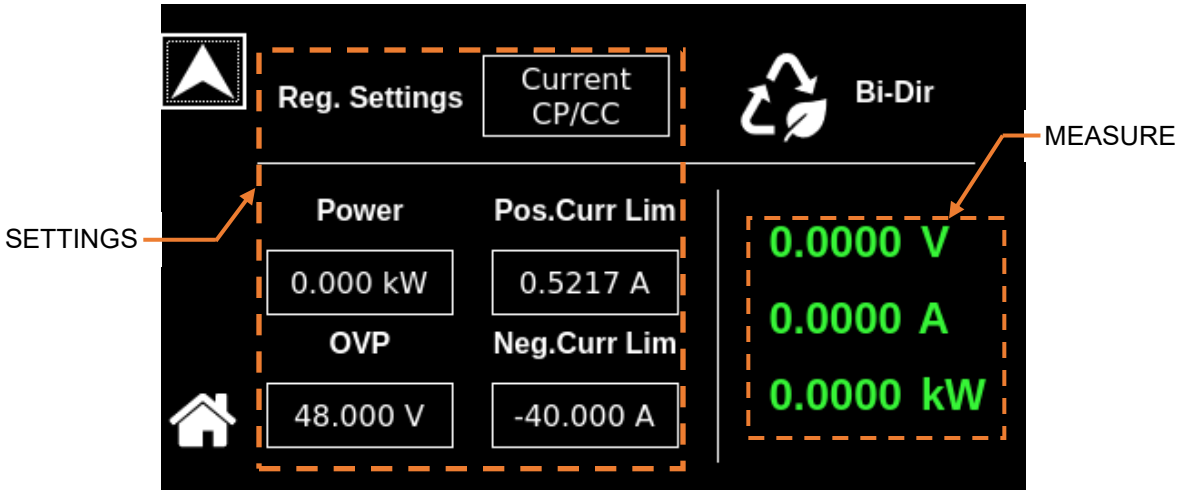


Figure 10-12. Dashboard Screen in CP/CC Mode

The following selections are available in the DASHBOARD screen top-level menu of 'Current' Programming type, 'CP/CC' Regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 10-87. **a) Current - Constant Power/ Constant Current:** The output power is regulated to the user set value. On reaching the current limit (positive or negative), output would be regulated to the current limit reached. On reaching the voltage limit (positive or negative), the output power would be programmed to zero.
Power	Programs the output power of the supply in watts. Real-time setting is possible using the rotary encoder.
Pos. Curr Lim	Regulates the output upon reaching the Positive Current Limit. Real-time setting is possible using the rotary encoder.
Neg. Curr Lim	Regulates the output upon reaching the Negative Current Limit. Real-time setting is possible using the rotary encoder.
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 10-13. Dashboard screen top-level menu- CP/CC Mode

10.2.1.7 CURRENT PROGRAMMING TYPE CC/CP REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) Current – CC/CP Regulation setting is shown in Figure 10-13,

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

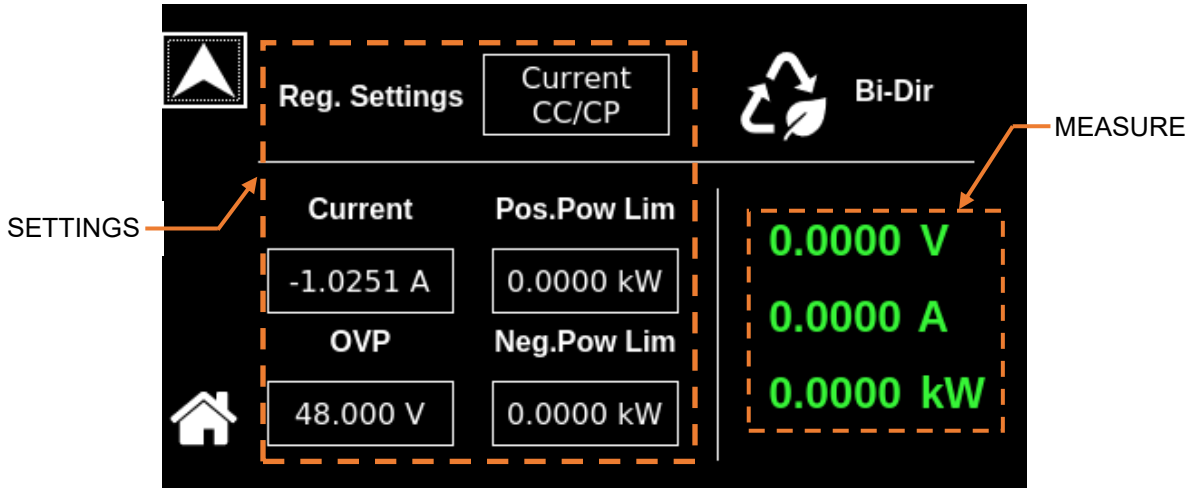


Figure 10-13. Dashboard Screen in CP/CC Mode

The following selections are available in the DASHBOARD screen top-level menu of 'Current' Programming type 'CC/CP' Regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 10-87. **a) Current - Constant Current/ Constant Power:** The output current is regulated to the user set value. On reaching the power limit (positive or negative), output would be regulated to the power limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero.
Current	Programs the output current of the supply in amps. Real-time setting is possible using the rotary encoder.
Pos. Pow Lim	Regulates the output upon reaching the Positive Power Limit. Real-time setting is possible using the rotary encoder.
Neg. Pow Lim	Regulates the output upon reaching the Negative Power Limit. Real-time setting is possible using the rotary encoder.
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 10-14. Dashboard screen top-level menu- CC/CP Mode

10.2.1.8 REAL-TIME PARAMETER ADJUSTMENT

The DASHBOARD screen menu provides the capability for output parameter entry that has real-time, immediate effect on the output. This allows manual adjustment of the output parameters where tuning of a value is desired. Enabling this function requires tapping on a parameter

selection-field box with the encoder switch to select the parameter and display its selection-field highlighted and with a value entry window, refer to Figure 10-14. The rotary encoder can then be used to continuously adjust the parameter value, up and down, as it is rotated. The value change takes immediate effect on the output.

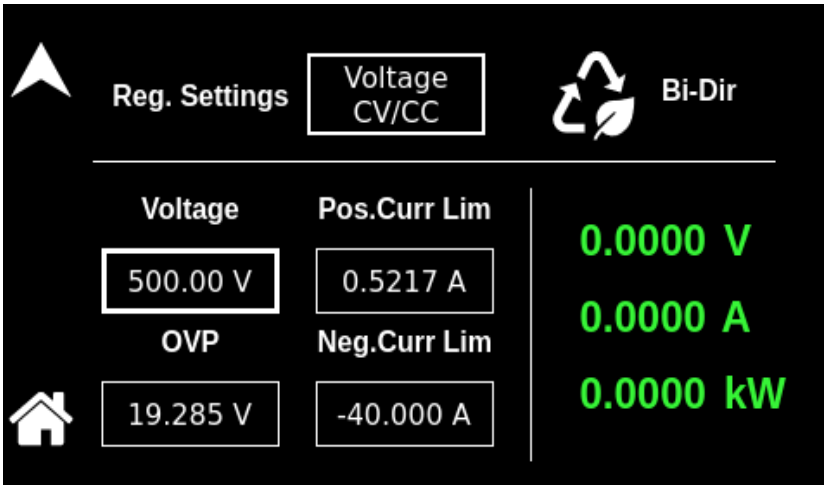


Figure 10-14. Real-Time, Immediate Output Parameter Adjustment

10.2.1.9 DEFAULT SCREEN

The Default screen provides measurement of the DC output voltage, current and power, refer to Figure 10-15. When the Dashboard screen is idle for an interval equal to a set time delay, refer to Figure 10-210 and Figure 10-217. The display will automatically switch to the Default screen. Tap anywhere on the screen to return to the Dashboard screen.

With the understanding of the dashboard screen features, user can perform basic functionality and verify the output voltage, current and power in various modes of operation.

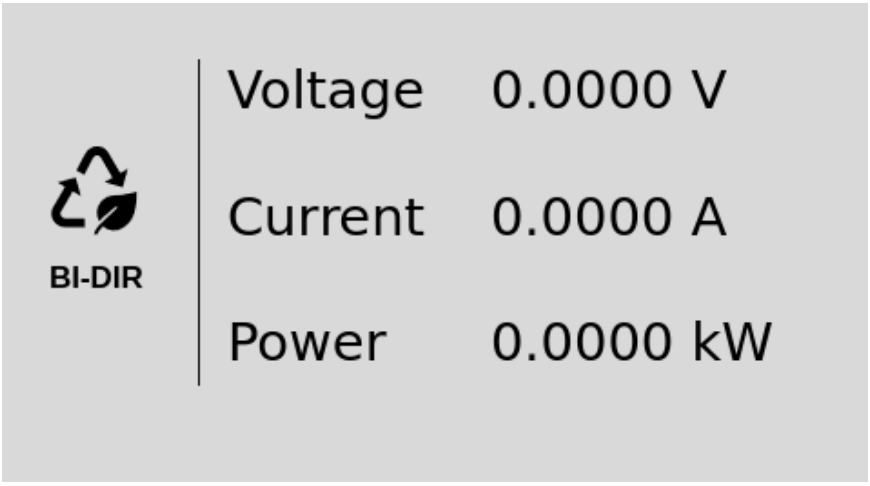


Figure 10-15. Default Screen

10.2.2 OUTPUT PROGRAM SCREEN

The settings in the output program screen will change based on the Programming type and Regulation setting configured. Refer to Section 9.4.2.2 for navigating to Output Program Screen Top-Level Menu.

10.2.2.1 CV/CC, CV/CP AND CV MODE

The Output Program screen provides settings of 'Voltage', 'Positive Current Limit', 'Negative Current Limit', 'Positive Power Limit', 'Negative Power Limit' and 'Output State'. Refer to Figure 10-16.

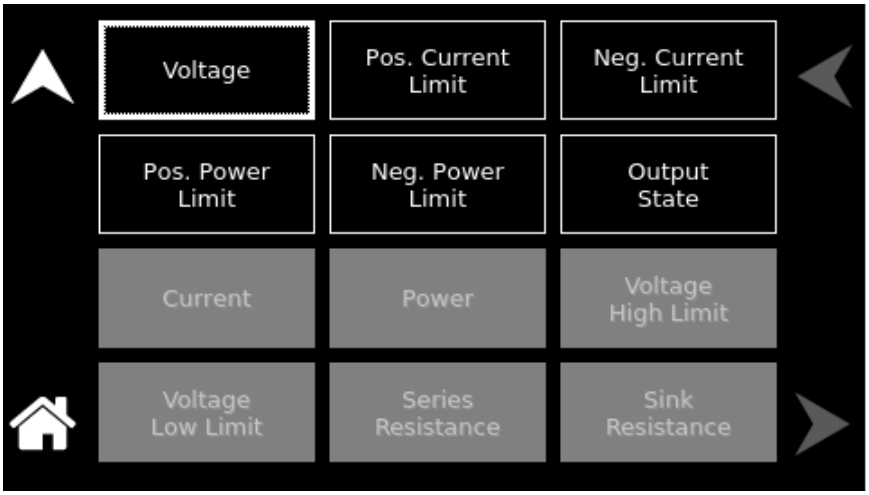


Figure 10-16. Output Program Screen – CV/CC, CV/CP and CV

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in CV/CC, CV/CP and CV mode includes the following functions:

ENTRY	DESCRIPTION
Voltage	User can set a Voltage value within the specified limit. Refer to Figure 10-17.

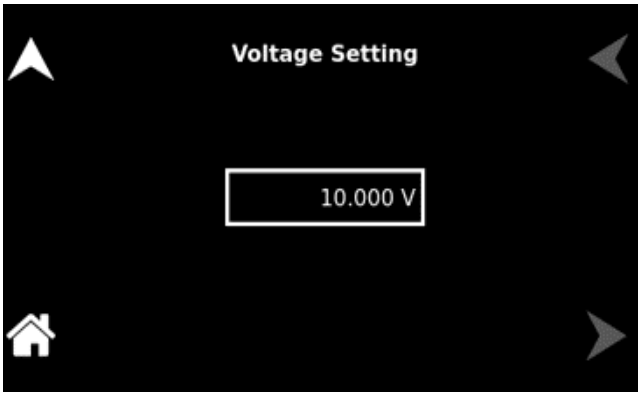


Figure 10-17. Voltage setting screen

ENTRY	DESCRIPTION
	NOTE: When the unit is in series operation (refer to Chapter 6), the Dashboard screen displays Voltage 1 and Voltage 2 for setting the output voltage of Leader and Follower. **NOTE:** Voltage - CV is the only regulation setting in Series operation.
Pos. Current Limit	User can set a positive current value, which functions as a trip limit (CV and CV/CP), or it regulates (CV/CC) the output upon reaching the Positive Current Limit. Refer to Figure 10-18.

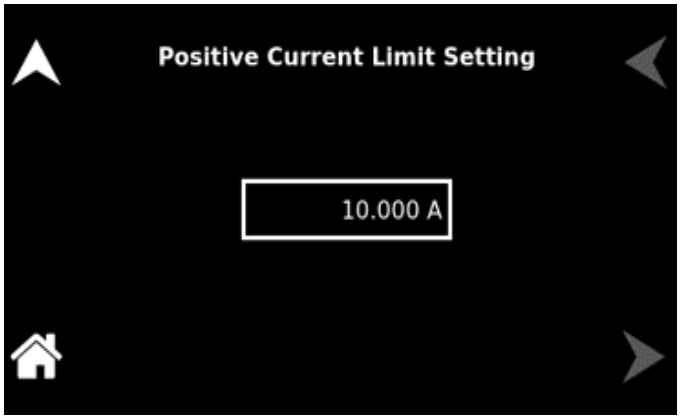


Figure 10-18. Positive Current limit setting screen

Neg. Current Limit	User can set a negative current value, which functions as a trip limit (CV and CV/CP), or it regulates (CV/CC) the output upon reaching the Negative Current Limit. Refer to Figure 10-19.

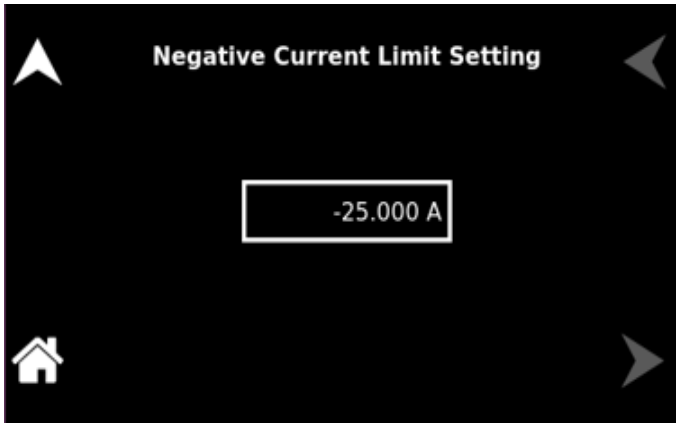


Figure 10-19. Negative Current limit setting screen

Pos. Power Limit	User can set the Positive power limit value which functions as a trip limit (CV and CV/CC), or it regulates (CV/CP) the output upon reaching the Positive Power Limit. Refer to Figure 10-20.

ENTRY	DESCRIPTION

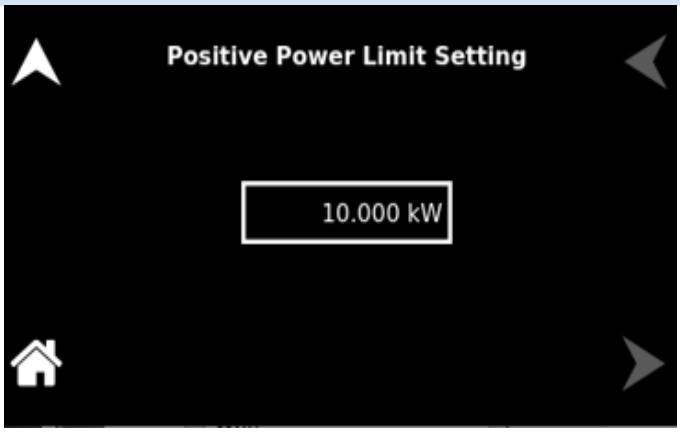


Figure 10-20. Positive Power Limit setting screen

Neg. Power Limit User can set the Negative power limit value which functions as a trip limit (CV and CV/CC), or it regulates (CV/CP) the output upon reaching the Negative Power Limit. Refer to Figure 10-21.

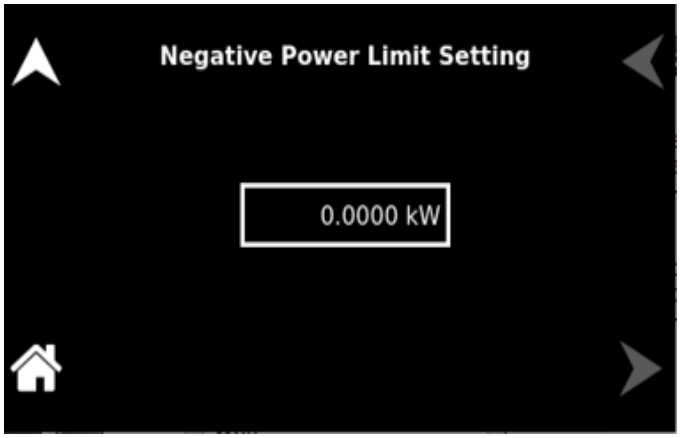


Figure 10-21. Negative Current limit setting screen

Output State User can program the output to ON or OFF state. Refer to Figure 10-22.

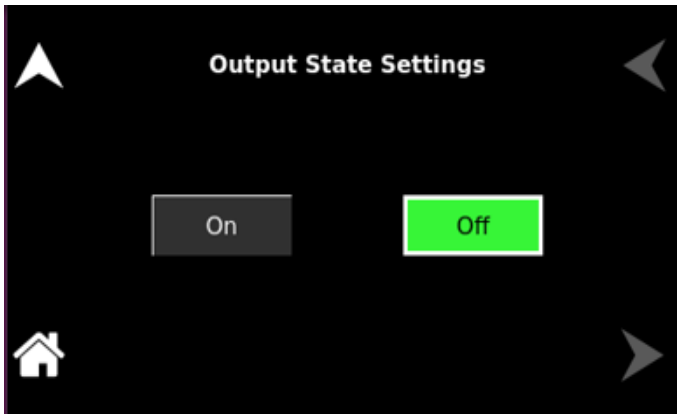


Figure 10-22. Output State Settings

Table 10-15. Output Program Settings in CV/CC and CV Mode

10.2.2.2 CV SER. RES MODE

The Output Program screen provides settings of 'Voltage', 'Series Resistance', 'Voltage High Limit', 'Voltage Low Limit', 'Positive Current Limit', 'Negative Current Limit', 'Positive Power Limit', 'Negative Power Limit', and 'Output State'. Refer to Figure 10-23.

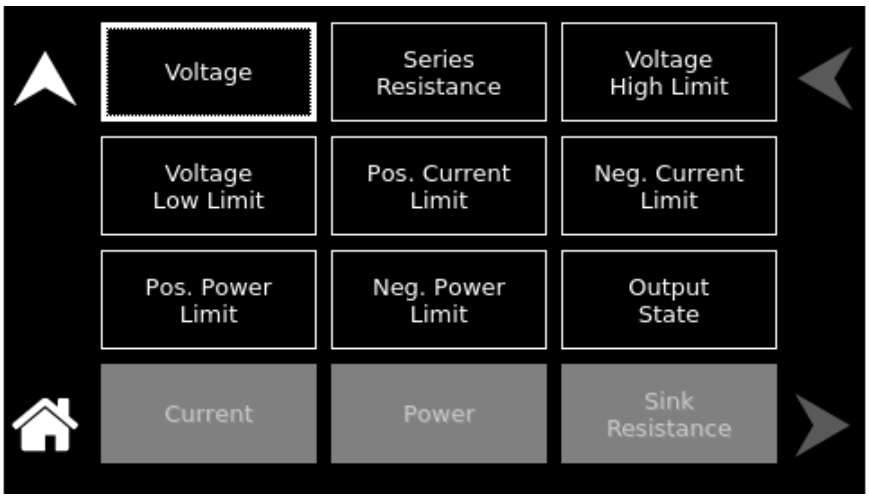


Figure 10-23. Output Program Screen

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in CV Ser. Res mode includes the following functions:

ENTRY	DESCRIPTION
Voltage	User can set a voltage value within the specified limit. Refer to Figure 10-24.

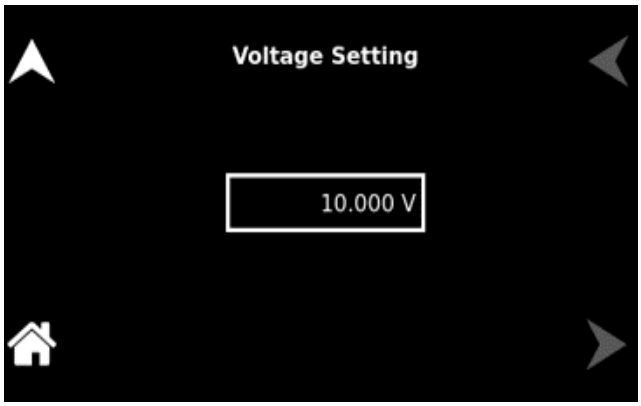


Figure 10-24. Voltage Setting

Series Resistance	User can set the series resistance value within the specified limit. Refer to Figure 10-25.

ENTRY	DESCRIPTION



Figure 10-25. Series Resistance Setting

Voltage High Limit User can set the voltage high limit value, and it regulates upon reaching the Voltage High Limit. Refer to Figure 10-26.

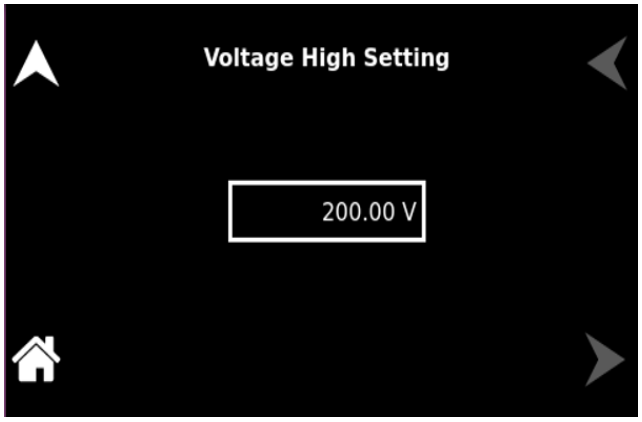


Figure 10-26. Voltage High Setting

Voltage Low Limit User can set the voltage low limit value, and it regulates upon reaching the Voltage Low Limit. Refer to Figure 10-27.

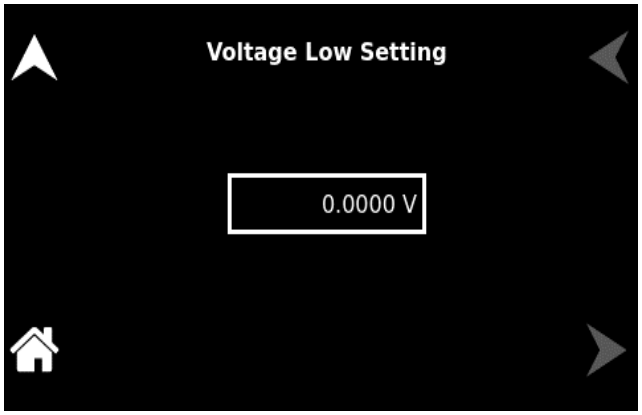


Figure 10-27. Voltage Low Setting

ENTRY	DESCRIPTION
Pos. Current Limit	User can set a Positive Current limit value, and which functions as a trip limit. Refer to Figure 10-28.

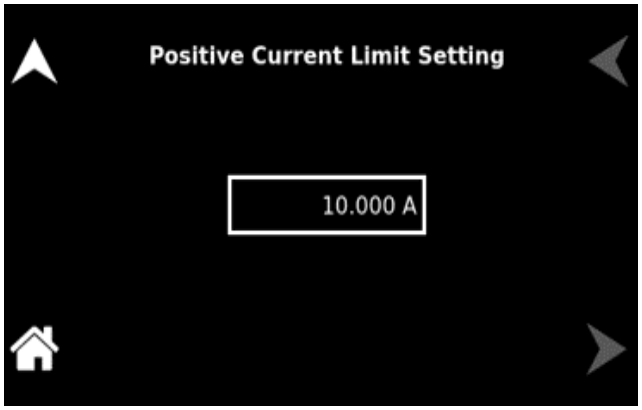


Figure 10-28. Positive Current Limit

Neg. Current Limit	User can set the Negative Current limit value which functions as a trip limit. Refer to Figure 10-29.

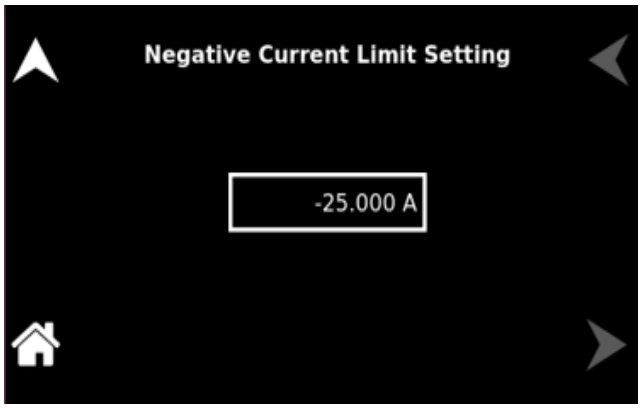


Figure 10-29. Negative Current limit setting screen

Pos. Power Limit	User can set the positive power limit value which functions as a trip limit. Refer to Figure 10-30.

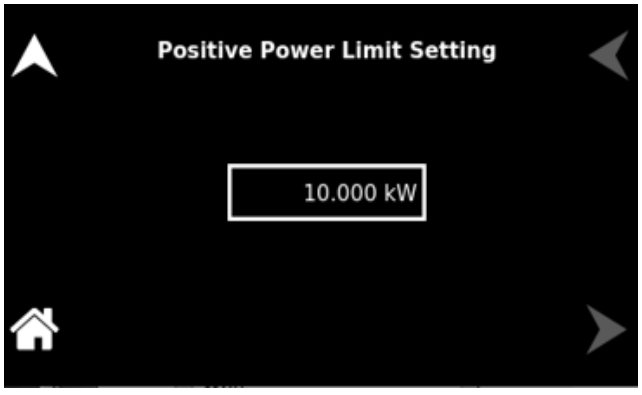


Figure 10-30. Positive Power Limit

ENTRY	DESCRIPTION
Neg. Power Limit	User can set the Negative power Limit value which functions as a trip limit. Refer to Figure 10-31.

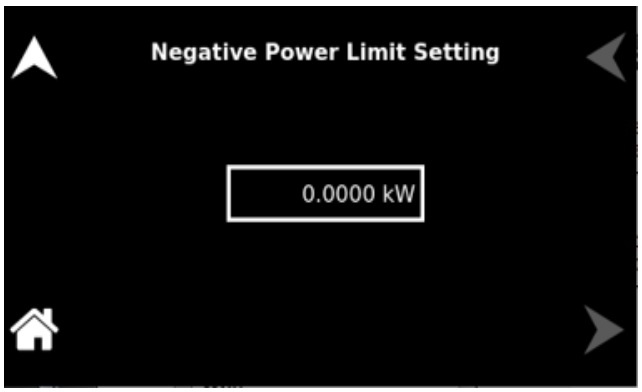


Figure 10-31. Negative Power limit setting screen

Output State	User can program the output to ON or OFF state. Refer to Figure 10-32.

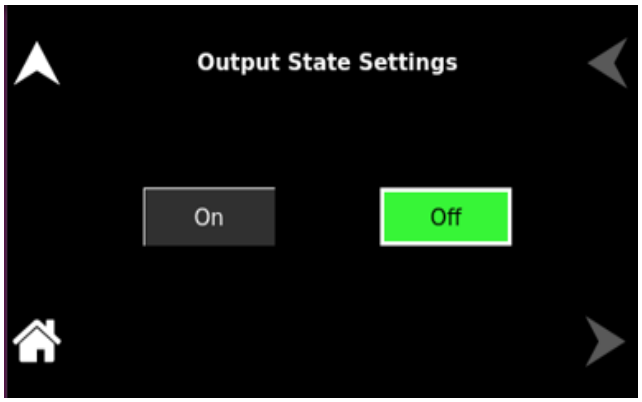


Figure 10-32. Output State

Table 10-16. Output Program Settings in CV-Ser. Res

10.2.2.3 CC/CV, CC/CP AND CC MODE

The Output Program screen in CC/CV, CC/CP and CC mode provides settings of ‘Current, ‘Voltage High Limit’, ‘Voltage Low Limit’, ‘Positive Power Limit’, ‘Negative Power Limit’ and ‘Output State’. Refer to Figure 10-33.

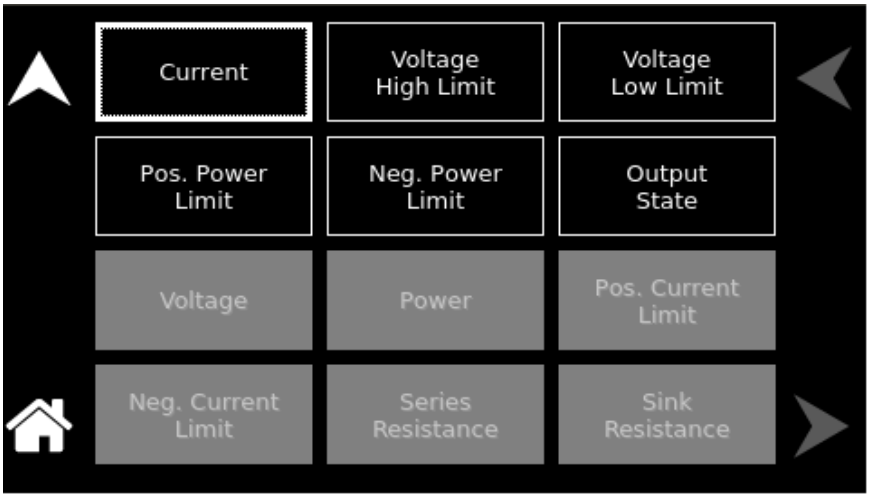


Figure 10-33. Output Program Screen of CC/CV, CC/CP and CC mode

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in CC/CV, CC/CP and CC mode includes the following functions:

ENTRY	DESCRIPTION
Current	User can set the Current value within the specified limit. Refer to Figure 10-34.

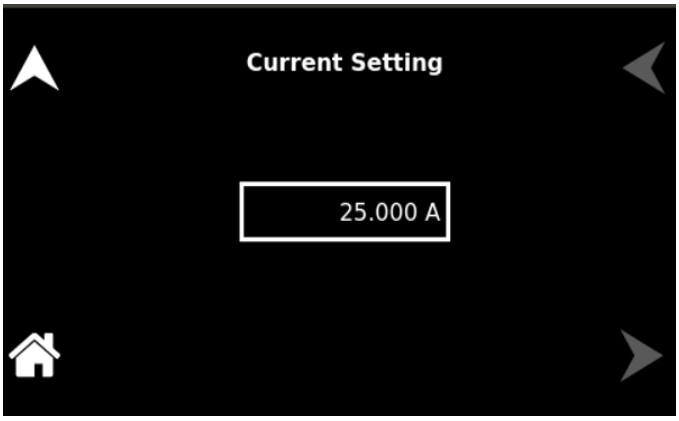


Figure 10-34. Current Setting

Voltage High Limit	User can set the high voltage value, which functions as a trip limit (CC and CC/CP), or it regulates (CC/CV) the output upon reaching the Voltage High Limit. Refer to Figure 10-35.

ENTRY	DESCRIPTION

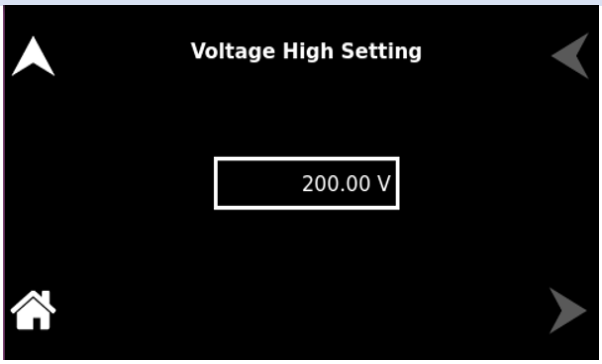


Figure 10-35. Voltage High Setting

Voltage Low Limit User can set the low voltage value, which functions as a trip limit (CC and CC/CP), or it regulates (CC/CV) the output upon reaching the Voltage Low Limit. Refer to Figure 10-36.

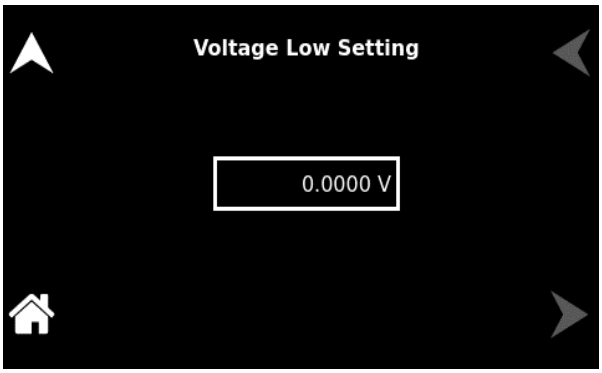


Figure 10-36. Voltage Low Settings

Pos. Power Limit User can set the positive power value, which functions as a trip limit (CC/CV and CC), or it regulates (CC/CP) the output upon reaching the Positive Power Limit. Refer to Figure 10-37.

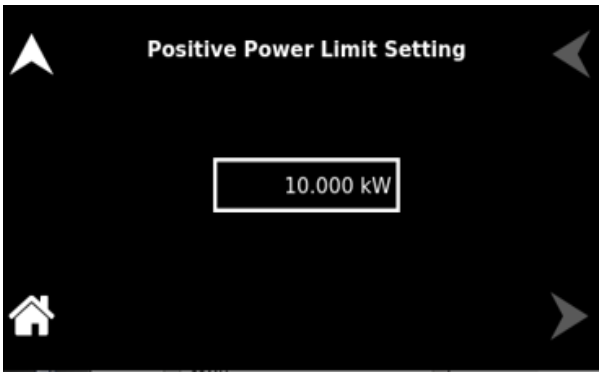


Figure 10-37. Positive Power Limit

Neg. Power Limit User can set the negative power value, which functions as a trip limit (CC/CV and CC), or it regulates (CC/CP) the output upon reaching the Negative Power Limit. Refer to Figure 10-38.

ENTRY	DESCRIPTION

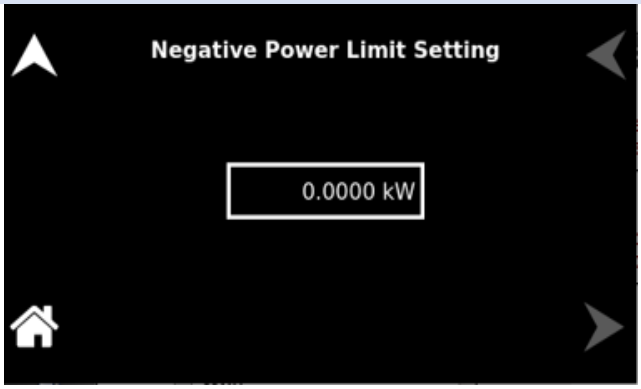


Figure 10-38. Negative Power Limit

Output State User can program the output to ON or OFF state. Refer to Figure 10-39.

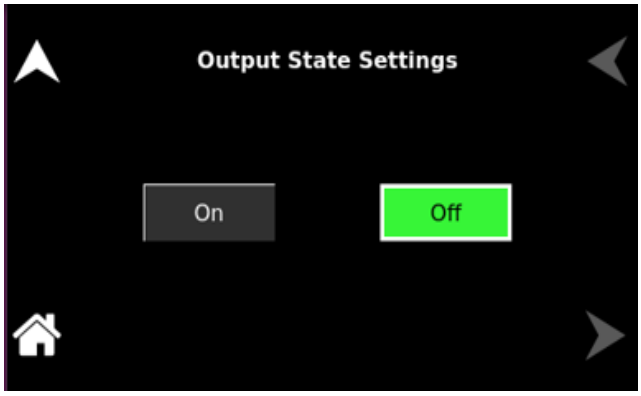


Figure 10-39. Output State Settings

Table 10-17. Output Program Settings in CC/CV, CC/CP and CC Mode

10.2.2.4 CP/CC MODE

The Output Program screen in CP/CC mode provides settings of ‘Power’, ‘Voltage High Limit’, ‘Voltage Low Limit’, ‘Negative Current Limit’, ‘Positive Current Limit’ and ‘Output State’. Refer to Figure 10-40.

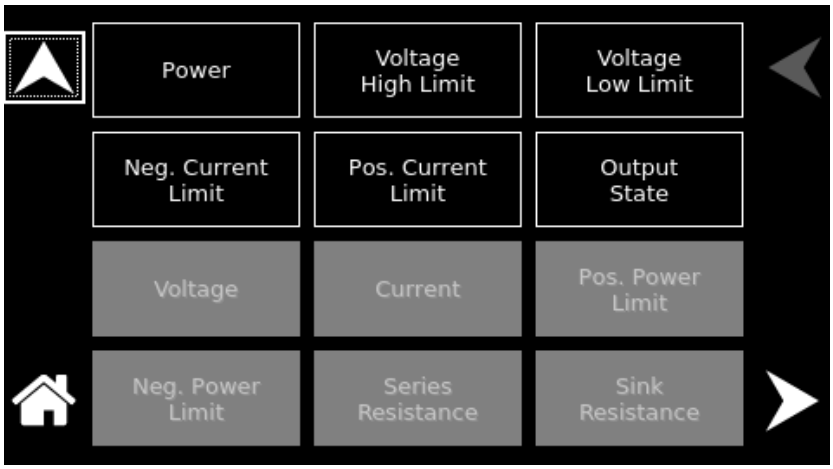


Figure 10-40. Output Program Screen of CP/CC mode

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in CP/CC mode includes the following functions:

ENTRY	DESCRIPTION
Power	User can set the Power value within the specified limit. Refer to Figure 10-41.

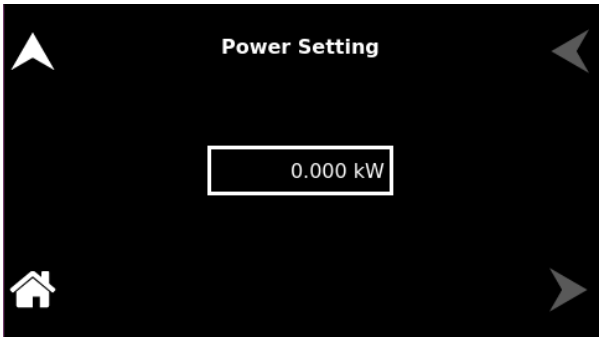


Figure 10-41. Power Setting

Voltage High Limit	User can set the high voltage value, and which functions as a trip limit. Refer to Figure 10-42.

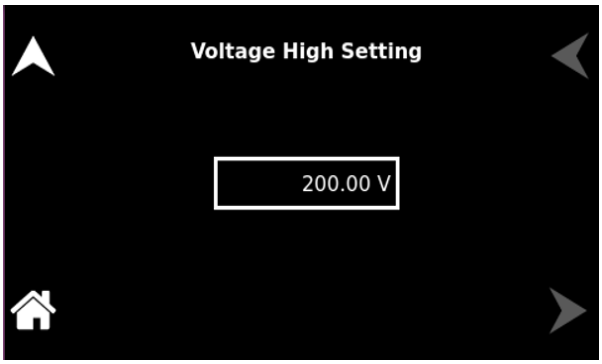


Figure 10-42. Voltage High Setting

ENTRY	DESCRIPTION
Voltage Low Limit	User can set the low voltage value, and which functions as a trip limit. Refer to Figure 10-43.

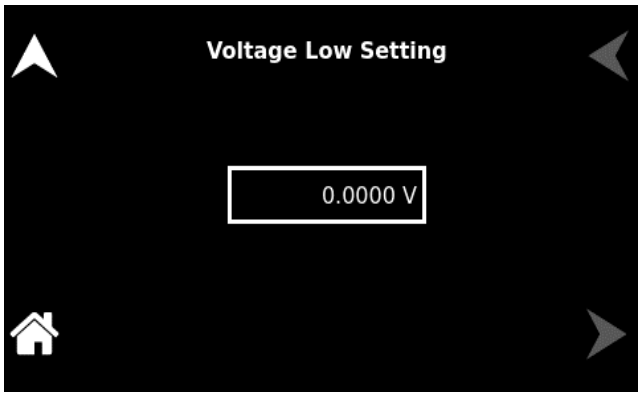


Figure 10-43. Voltage Low Settings

Pos. Current Limit	User can set a positive current limit value, and it regulates the output upon reaching the Positive Current Limit. Refer to Figure 10-44.

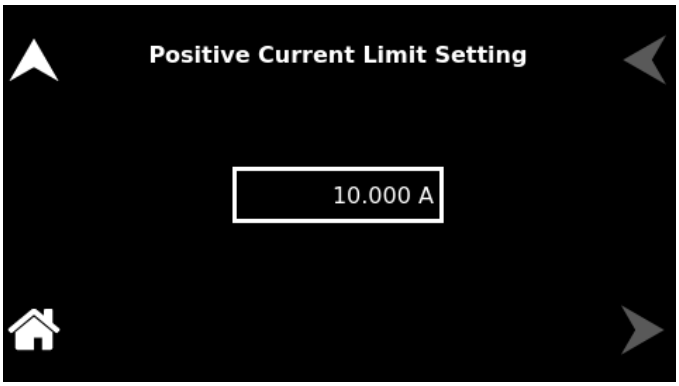


Figure 10-44. Positive Power Limit

Neg. Current Limit	User can set a negative current limit value, and it regulates the output upon reaching the Negative Current Limit. Refer to Figure 10-45.

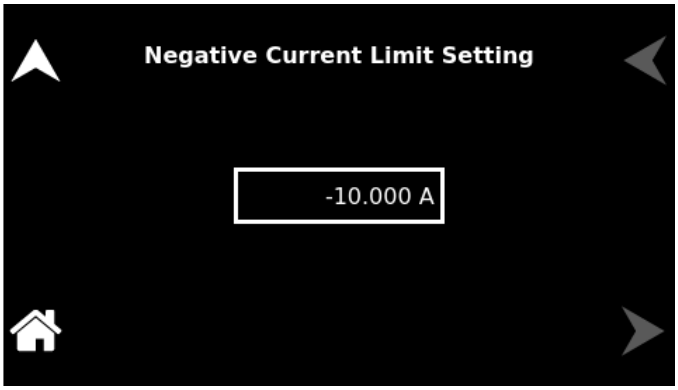


Figure 10-45. Negative Power Limit

Output State	User can program the output to ON or OFF state. Refer to Figure 10-46.

ENTRY	DESCRIPTION

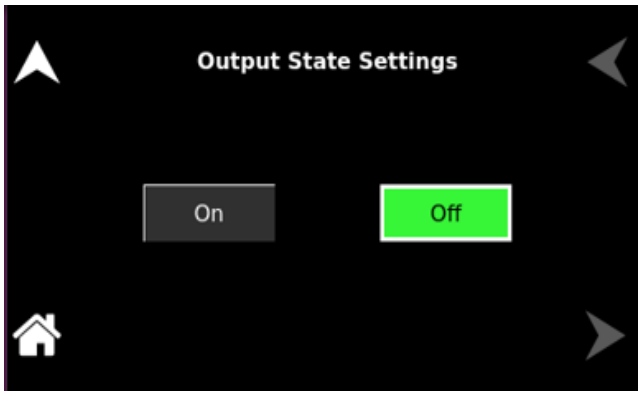


Figure 10-46. Output State Settings

Table 10-18. Output Program Settings in CP/CC Mode

10.2.3 MEASUREMENTS SCREEN

The Measurements screen displays the floating-point values for DC 'Output Voltage', 'Output Current', and 'Output Power'. For the Measurement screen refer to Figure 10-47 and for instructions on how to navigate to the Measurements screen, refer to Section 9.4.2.2.

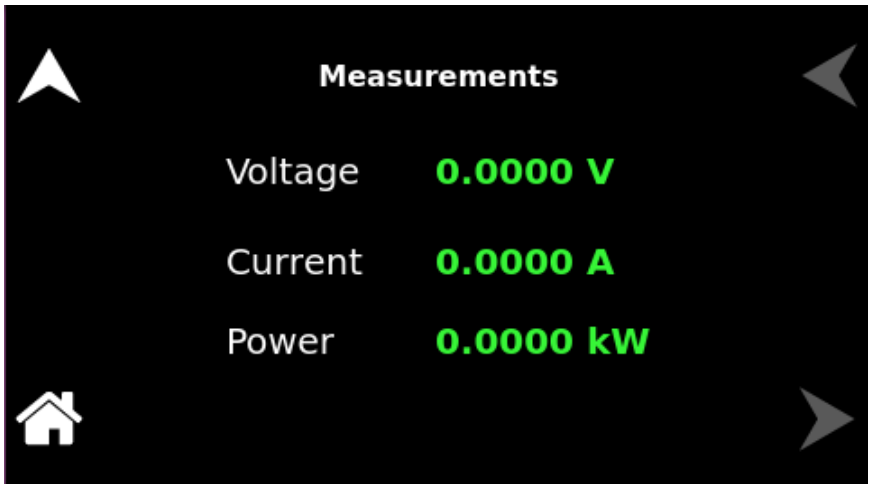


Figure 10-47. Measurements Screen

10.2.4 RAMP SCREEN

The Ramp Screen provides the interface based on the Programming type and the Regulation setting selected, refer to Section 10.2.5.1. The Ramp screen will be displayed according to the Programming type configured 'Voltage Ramp' screen for 'Voltage' Programming type and 'Current Ramp' screen for 'Current' Programming type.

10.2.4.1 VOLTAGE RAMP – CV/CC, CV/CP, CV–SER. RES AND CV

The Voltage Ramp menu allows the user to configure and execute voltage ramp, refer to Figure 10-48. This menu provides the selection of parameters such as From Volt, To Volt, Time, Set Limits, Trigger and Initial Slew.

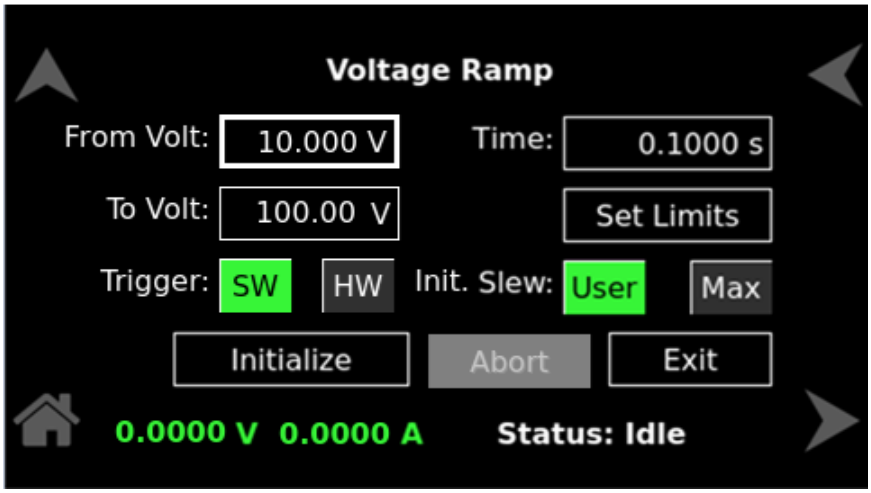


Figure 10-48. Voltage Ramp Screen

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Voltage Ramp menu has the following fields:

ENTRY	DESCRIPTION
From Volt	Sets the start voltage for the ramp. Refer to Figure 10-49.

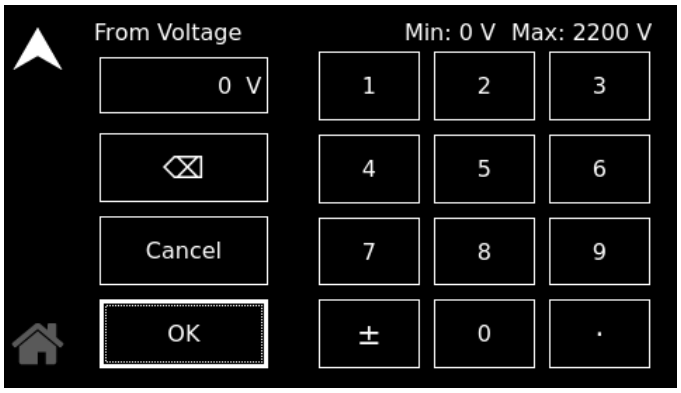


Figure 10-49. From Voltage

ENTRY	DESCRIPTION
To Volt	Sets the end voltage for the ramp. Refer to Figure 10-50.

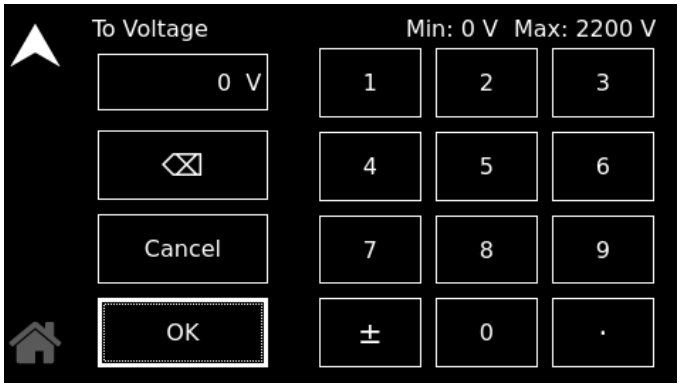


Figure 10-50. To Voltage

Trigger Mode This setting allows the user to configure the input signal to start the ramp execution ('From Volt' to 'To Volt')

a) Software (SW) Trigger Mode:
If 'SW' is selected, post ramp initialization power supply will wait for the software trigger to start the ramp, displaying the status as 'Waiting for Trigger'.

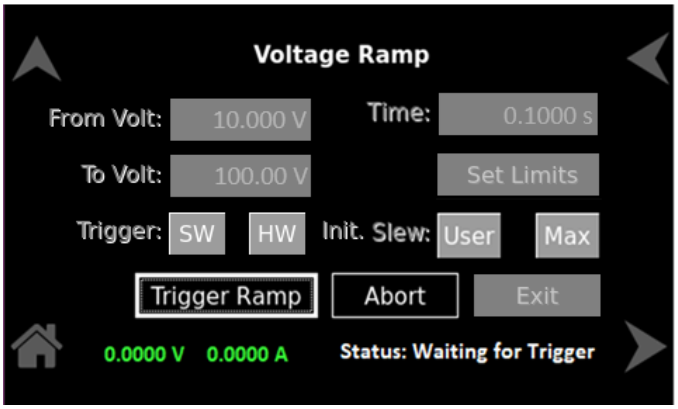


Figure 10-51. Software Trigger Mode

b) Hardware (HW) Trigger Mode:
If 'HW' is selected, post ramp initialization power supply will wait for the hardware trigger to start the ramp execution, displaying the status as 'Waiting for Trigger'.

ENTRY	DESCRIPTION
	The ramp execution begins when a 10ms active high pulse is applied to the Norcomp connector at pin-18 (RTN) and pin-19 (TRIGGER IN)

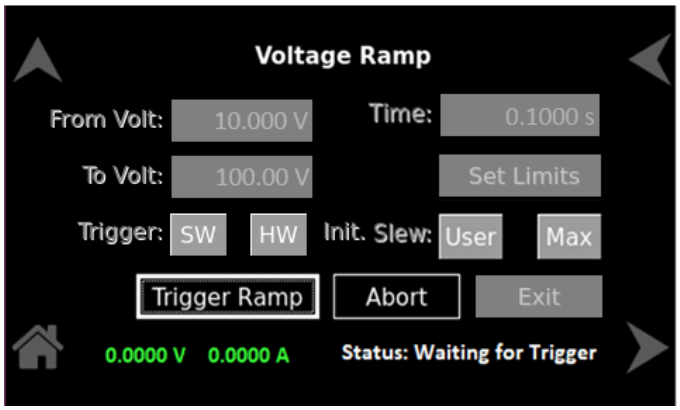


Figure 10-52. Hardware Trigger Mode

Time Sets the time in seconds to reach from 'From Volt' to 'To Volt'. Refer to Figure 10-53.



Figure 10-53. Time

Set Limits User can define the limits for the Ramp execution. Refer to Figure 10-54 and Figure 10-55.



Figure 10-54. Set Limits – CV/CC, CV/CP and CV

ENTRY	DESCRIPTION



Figure 10-55. Set Limits – CV – Ser.Res

Initial Slew This setting allows the user to configure the initial slew, the slew rate at which the power supply reaches from the current output voltage of the power supply to the configured 'From Volt' in the ramp screen. Refer to Section 10.2.5.2.

a) User: When the setting is 'User', the output voltage of the power supply reaches the 'From Volt' (when the ramp is initialized) with the voltage slew rate configured in the 'Configuration Menu'.

b) Max: When the setting is 'Max', the output voltage of the power supply reaches the 'From Volt' (when the ramp is initialized) with maximum slew rate.

Initialize The function of the initialization process is to bring the current device voltage value to the 'From Volt' value programmed in the ramp screen. Click the 'Initialize' button to initialize the ramp, and the progress will be displayed as a percentage in the status bar. Upon completion of the initialization process, the status will indicate as 'Waiting for Trigger'. Refer to Figure 10-56.

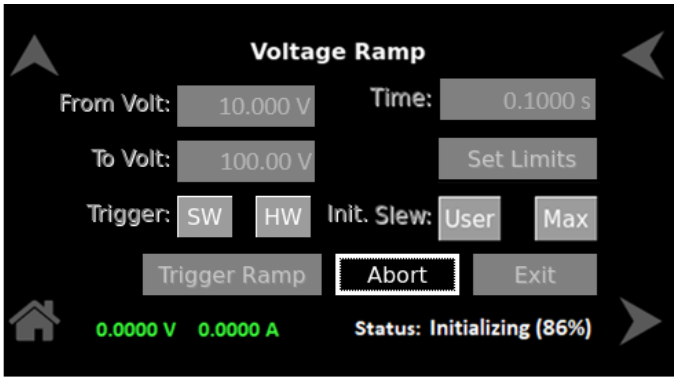


Figure 10-56. Initializing

Trigger Ramp Used to send software trigger to the unit to start the ramp execution. Post initialization of ramp this function is enabled only when 'Trigger' selection is 'SW'. Refer to Figure 10-57.

ENTRY	DESCRIPTION
	If the 'Trigger' selection is set to 'HW', this function is not enabled. The ramp execution begins when a 10ms active high pulse is applied to the Norcomp connector at pin-18 (RTN) and pin-19 (TRIGGER IN).

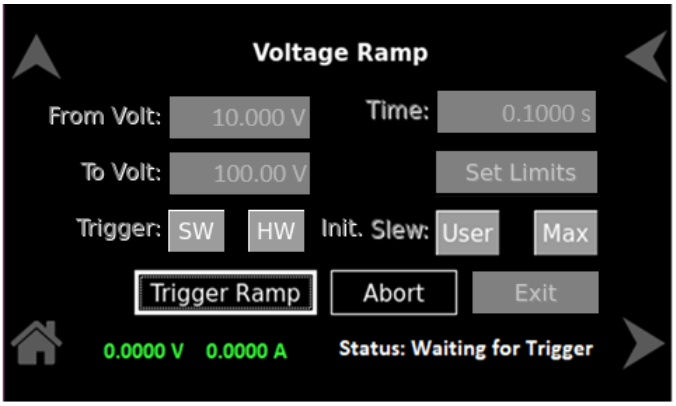


Figure 10-57. Trigger Ramp

Abort User can abort the process at any stage of the ramp execution. The progress of the operation is displayed in the status on the right side of the screen. Refer to Figure 10-58.

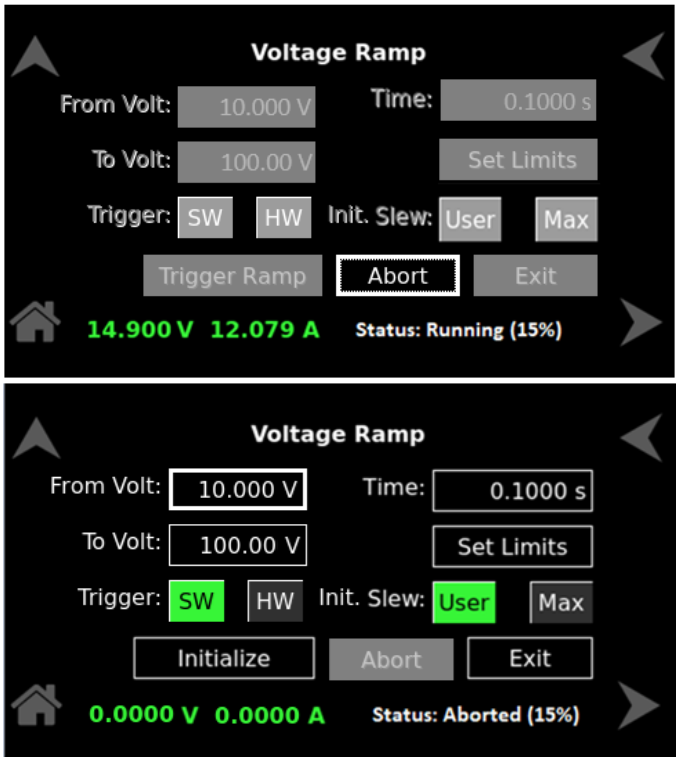


Figure 10-58. Abort

Status This field displays the progress or state of the process.

ENTRY	DESCRIPTION

a) IDLE - When the system is in Idle (not performing any task) situation, refer to Figure 10-59.

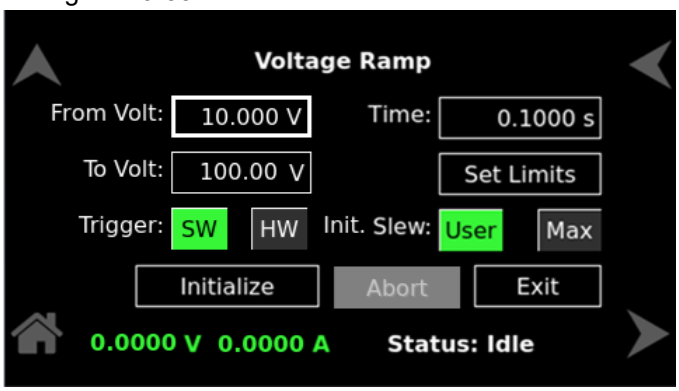


Figure 10-59. Status – IDLE

b) Initializing - When the system is initializing (configuring the current device voltage value to the 'From Volt' value programmed in the ramp screen), and the progress is displayed as a percentage. Refer to Figure 10-60.

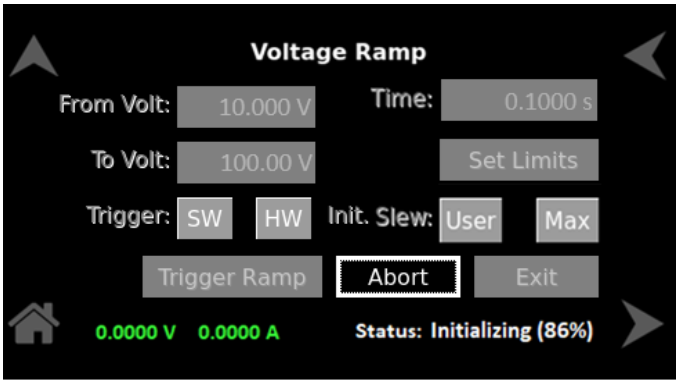


Figure 10-60. Status – Initializing

c) Waiting for Trigger: When the system is waiting for the trigger, refer to Figure 10-61.

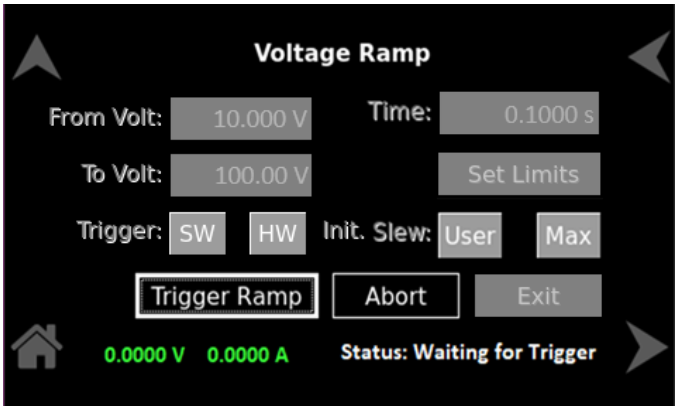


Figure 10-61. Status – Waiting for Trigger

ENTRY	DESCRIPTION

d) Running: When the system is executing the trigger ramp process, refer to Figure 10-62.

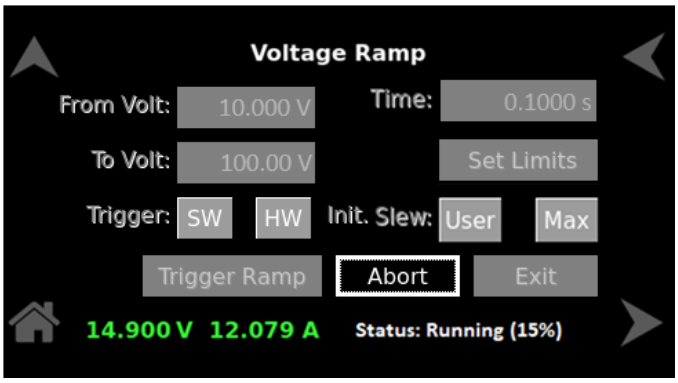


Figure 10-62. Status – Running

e) Aborted: When the process is aborted (Initializing, Waiting for Trigger, Running), 'Aborted' is displayed in the status. Refer to Figure 10-63.

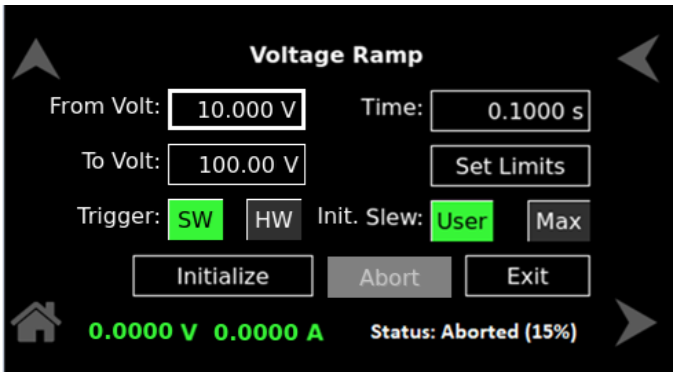


Figure 10-63. Status – Aborted

f) Complete: When the ramp execution (bringing the voltage from 'From Volt' to 'To Volt') is completed. Refer to Figure 10-64.

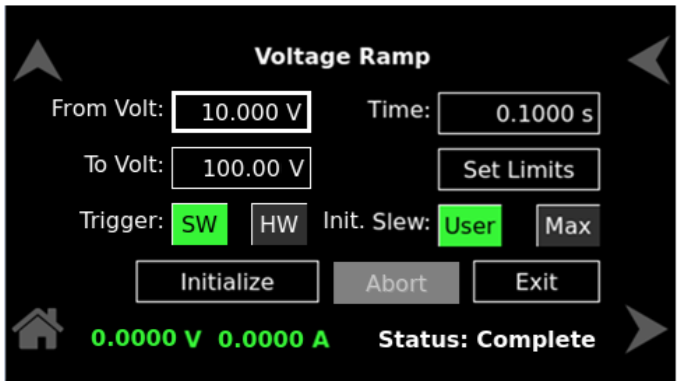


Figure 10-64. Status- Completed

ENTRY	DESCRIPTION
Exit	Exits the Voltage Ramp sub menu and return to Top level menu, refer to Figure 10-3.

NOTE: User cannot set the ‘From Volt’ and ‘To Volt’ to the same value.

NOTE: User cannot exit the Voltage Ramp Screen using HOME and UP arrow. To exit while a process is ongoing, user must first abort the process.

Table 10-19. Voltage Ramp

a) Example 1: Creating a Voltage ramp using Software Trigger mode

- Set the From Volt to 25V
- Set the To Volt to 50V

NOTE: User cannot set the ‘From Volt’ and ‘To Volt’ to the same value.

- Set the Time to 10 s
- Select the Trigger mode as SW
- Select between User or Max for the slew setting according to the user’s requirement
- Click on Initialize
- Observe that the Initialize button changes to the Trigger Ramp button after completion of initializing, and Abort button becomes enabled from a disabled state
- Click on Trigger Ramp
- The status of the Trigger Ramp progress can be seen on the screen
- Observe the voltage ramp signal using oscilloscope
- Clicking on the Abort button will abort the ramp
- Clicking on the Exit button will exit the Voltage Ramp screen.

b) Example 2: Creating a Voltage ramp using Hardware Trigger mode

- Set the Volt to 25V
- Set the To Volt to 50V

NOTE: User cannot set the ‘From Volt’ and ‘To Volt’ to the same value.

- Set the Time to 10 s

- Select the Trigger mode as HW
- Select between User or Max for the slew setting according to the requirements
- Click on Initialize
- Observe that Initialize button change from enable to disable state after completion of initializing, and Abort button becomes enabled
- Give an external trigger i.e. an active high pulse of 10ms on the MOLEX connector pin-19 (TRIGGGER IN) and pin-18 (RTN) to generate the Voltage Ramp
- Observe the voltage ramp signal using oscilloscope
- Clicking on the Abort button will abort the ramp
- Clicking on the Exit button will exit the Voltage Ramp screen.

10.2.4.2 CURRENT RAMP – CC/CV, CC/CP AND CC

The Current Ramp menu allows the users to configure and execute current ramp. This menu provides the selection of parameters such as From Current, Status, To Current, Time, Trigger, Initial Slew and Set Limits. Refer to Figure 10-65.

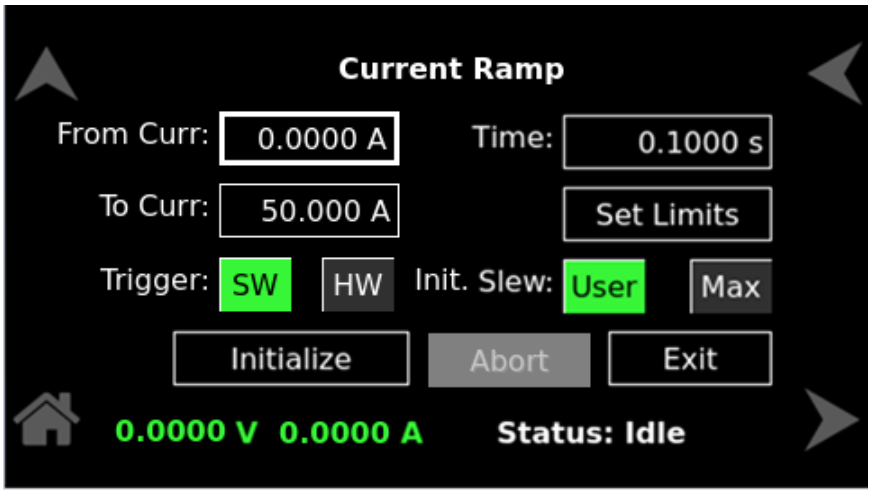


Figure 10-65. Current Ramp Screen

The Current Ramp menu has the following fields:

ENTRY	DESCRIPTION
From Curr	Sets the start current for the ramp. Refer to Figure 10-66.

ENTRY	DESCRIPTION

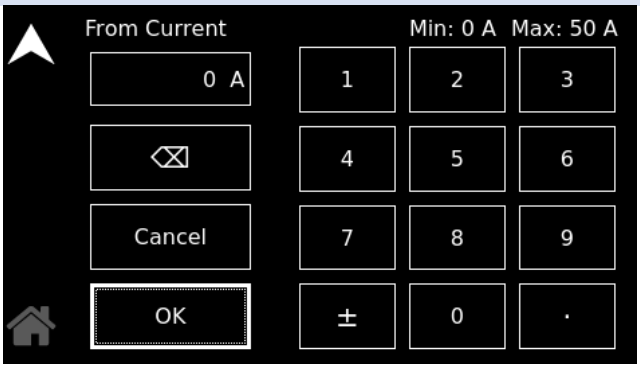


Figure 10-66. From Current

To Curr Sets the end current for the ramp. Refer Figure 10-67.

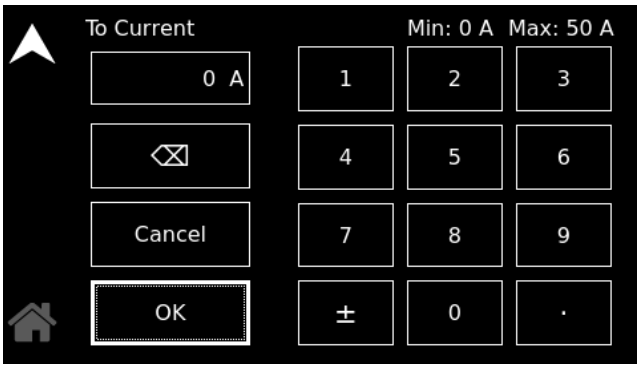


Figure 10-67. To Current

Trigger Mode This setting allows the user to configure the input signal to start the ramp execution ('From Curr' to 'To Curr')

a) Software (SW) Trigger Mode:

If 'SW' is selected, post ramp initialization power supply will wait for the software trigger to start the ramp execution, displaying the status as 'Waiting for Trigger'. Refer to Figure 10-68.

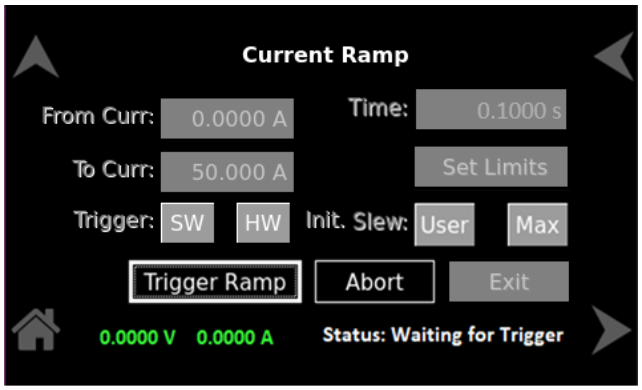


Figure 10-68. SW Mode

ENTRY	DESCRIPTION
	b) Hardware (HW) Trigger Mode: When 'HW' is selected, post ramp initialization power supply will wait for a hardware trigger to start the ramp execution, displaying the status as 'Waiting for Trigger'. The ramp execution begins when a 10ms active high pulse is applied to the Norcomp connector at pin-19 (TRIGGER IN) and pin 18 (RTN). Refer to Figure 10-69.

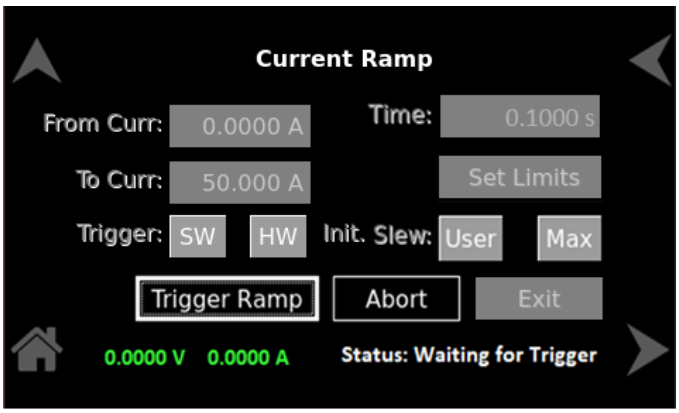


Figure 10-69. HW Mode

Time Sets the time in seconds to reach from 'From Curr' to 'To Curr'. Refer to Figure 10-70.

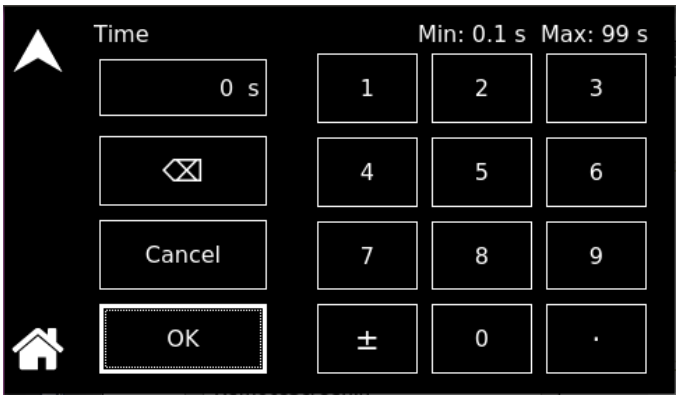


Figure 10-70. Time

Set Limits User can define the limits for the Ramp execution. Refer to Figure 10-71.

ENTRY	DESCRIPTION



Figure 10-71. Set Limits - CC/CV, CC/CP and CC

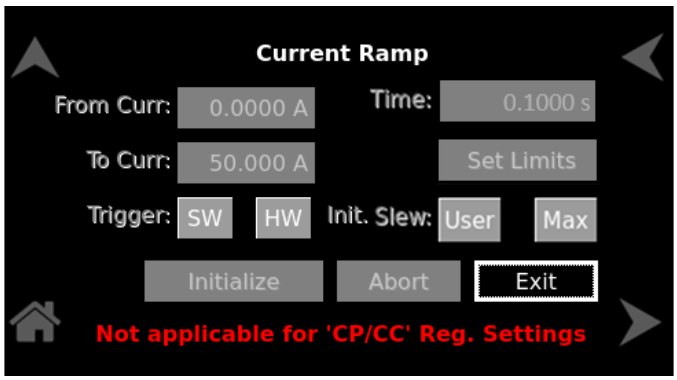


Figure 10-72. Set Limits - CP/CC

Initial Slew This setting allows the user to configure the initial slew, the slew rate at which the power supply reaches from the output Current of the power supply to the configured 'From Curr' in the ramp screen.

a) User: When the setting is 'User', the output current of the power supply reaches the 'From Curr' (when the ramp is initialized) with the voltage slew rate configured in the configuration menu.

b) Max: When the setting is 'Max', the output current of the power supply reaches the 'From Curr' (when the ramp is initialized) with maximum slew rate.

Initialize The function of the initialization process is to bring the current device voltage value to the 'From Curr' value programmed in the ramp screen. Click the 'Initialize' button to initialize the ramp, and the progress will be displayed as a percentage in the status bar. Upon completion of the initialization process, the status will indicate as 'Waiting for Trigger'. Refer to Figure 10-73.

ENTRY	DESCRIPTION

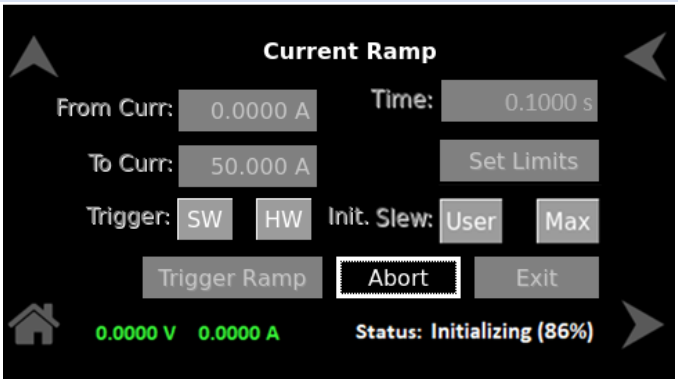


Figure 10-73. Initializing

Trigger Ramp

Used to send software trigger to the unit to start the ramp execution. Post initialization of ramp this function is enabled only when 'Trigger' selection is 'SW'. Refer to Figure 10-74.

If the 'Trigger' selection is set to 'HW', this function is not enabled. The ramp execution begins when a 10ms active high pulse is applied to the Norcomp connector at pin-19 (TRIGGER IN) and pin-18 (RTN).

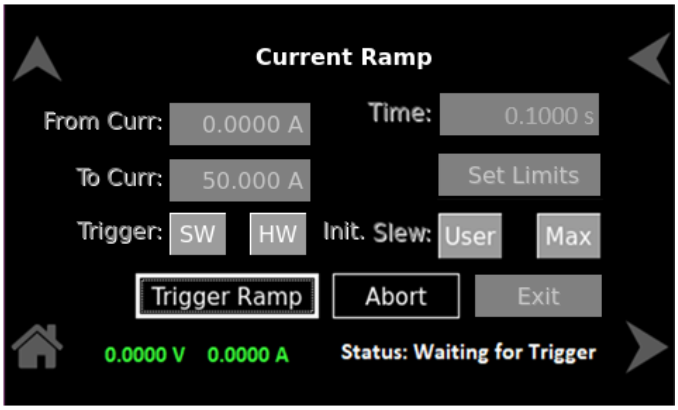
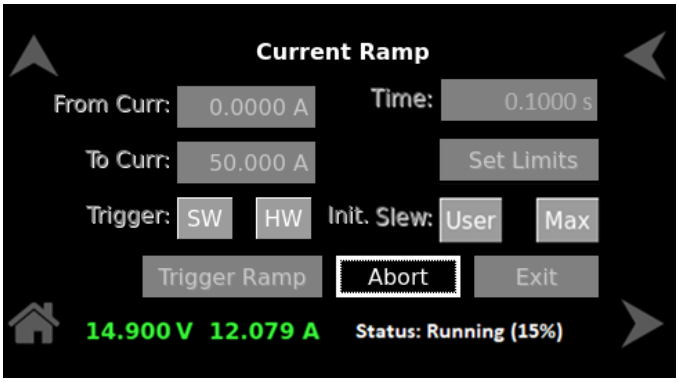


Figure 10-74. Trigger Ramp

Abort

User can abort the process at any stage of the ramp execution. The progress of the operation is displayed in the status on the right side of the screen. Refer to Figure 10-75.



ENTRY	DESCRIPTION

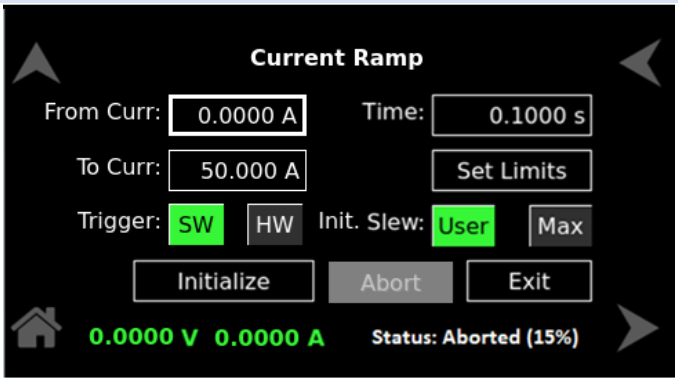


Figure 10-75. Abort – SW

Status This field displays the progress or state of the process.

a) IDLE - When the system is in Idle (not performing any task) situation, refer to Figure 10-76.

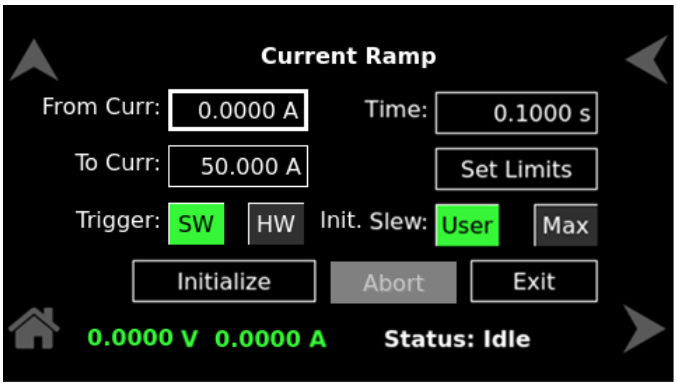


Figure 10-76. Status – IDLE

b) Initializing - When the system is initializing (configuring the device current value to the 'From Curr' value programmed in the ramp screen), and the progress is displayed as a percentage. Refer to Figure 10-77.

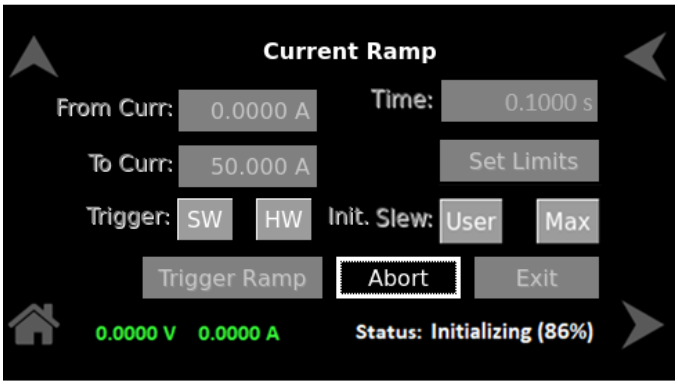


Figure 10-77. Status - Initializing

ENTRY	DESCRIPTION

c) Waiting for Trigger: When the system is waiting for the trigger, refer to Figure 10-78.

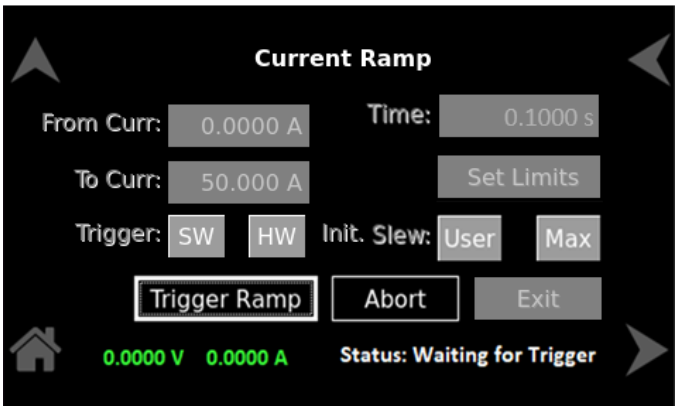


Figure 10-78. Status – Waiting for Trigger

d) Running: When the system is executing the trigger ramp process, refer to Figure 10-79.

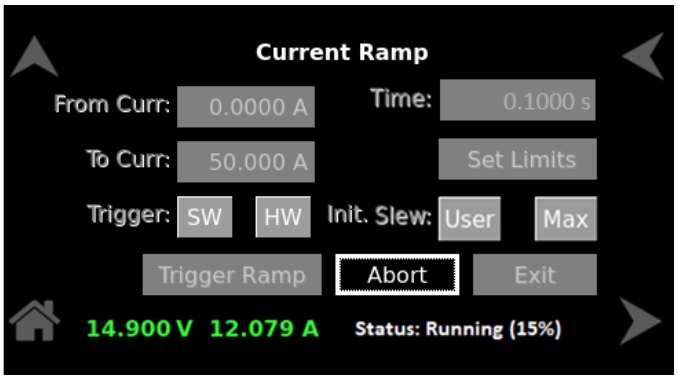


Figure 10-79. Status – Running

e) Aborted: When the process is aborted (Initializing, Waiting for Trigger, Running), 'Aborted' is displayed in the status. Refer to Figure 10-80.

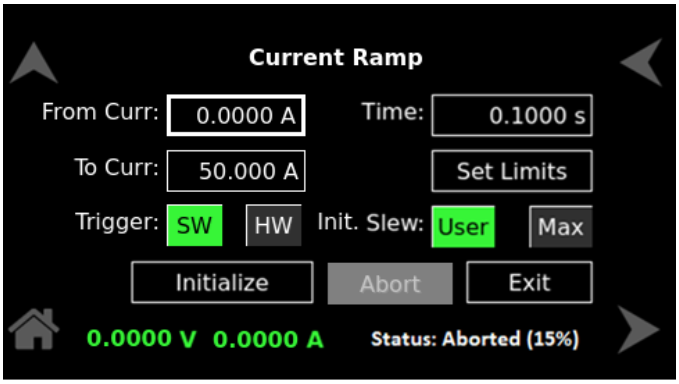


Figure 10-80. Status – Aborted

ENTRY	DESCRIPTION

f) Complete: When the ramp execution (bringing the voltage from 'From Curr' to 'To Curr') is completed. Refer to Figure 10-81.

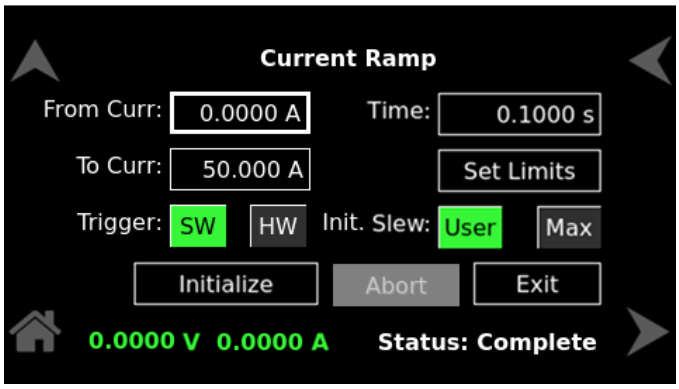


Figure 10-81. Status- Completed

Exit Exits the Current Ramp sub menu and return to Top level menu, refer to Figure 10-3.

NOTE: User cannot set the 'From Curr' and 'To Curr' to the same value.

NOTE: User cannot exit the Current Ramp Screen using HOME and UP arrow. To exit while a process is ongoing, user must first abort the process.

Table 10-20. Current ramp

10.2.4.3 CURRENT RAMP – CP/CC

Current Ramp is not applicable in CP/CC Regulation Settings.

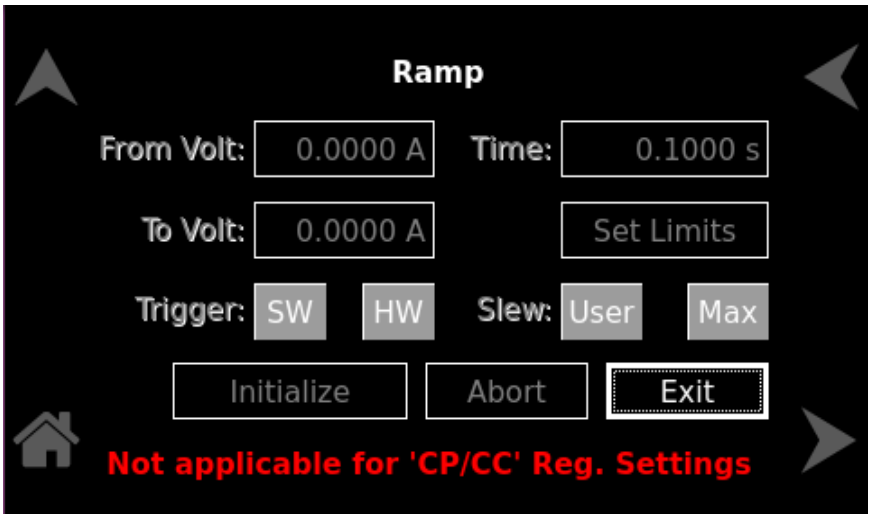


Figure 10-82. Current Ramp - CP/CC

a) Example 1: Creating a Current ramp using Software Trigger mode

- Set the From Current to 10A
- Set the To Curr to 30A

NOTE: User cannot set the 'From Curr' and 'To Curr' to the same value.

- Set the Time to 10s
- Select the Trigger mode as SW
- Select between User or Max for the slew setting according to the user's requirement
- Click on Initialize
- Observe that the Initialize button changes to the Trigger Ramp button after completion of initializing, and Abort button becomes enabled from disabled state
- Click on Trigger Ramp
- The status of the Trigger Ramp progress can be seen on the screen
- Observe the current ramp signal using oscilloscope
- Clicking on the Abort button will abort the ramp
- Clicking on the Exit button will exit the Current Ramp screen.

b) Example 2: Creating a Current ramp using Hardware Trigger mode

- Set the Curr to 10A
- Set the To Curr to 30A

NOTE: User cannot set the 'From Curr' and 'To Curr' to the same value.

- Set the Volt to 25V
- Set the Time to 10s
- Select the Trigger mode as HW
- Select between User or Max for the slew setting according to the user's requirements
- Click on Initialize
- Observe that Initialize button change from enable to disable state after completion of initializing, and Abort button becomes enabled

- Give an external trigger i.e. an active high pulse of 10ms on the MOLEX connector pin-9 (ISO-COMMON) and pin-10 (TRIGGGER IN) to generate the Current Ramp.
- Observe the current ramp signal using oscilloscope
- Clicking on the Abort button will abort the ramp
- Clicking on the Exit button will exit the Current Ramp screen.

10.2.5 CONFIGURATION SCREEN

The Configuration screen provides ‘Regulation Settings’, ‘Slew Rate’, ‘Protection’, ‘User Limits’, ‘External Relay’, ‘Output Sense’, ‘PONS’, ‘Measurement Average Samples’ and ‘Parallel Operation Mode’ (enabled only in parallel operation).

For the top-level menu of the Configuration screen, refer to Figure 10-83 and Figure 10-84 and for instructions on how to navigate, refer to Section 9.4.2.2.



Figure 10-83. Configuration Screen Top-Level Menu



Figure 10-84. Configuration Screen Top-Level Menu – Parallel Operation

10.2.5.1 REGULATION SETTINGS

The Regulation Settings Menu is used to configure the Programming type and Regulation setting of the power supply. Refer to Figure 10-85 and Figure 10-87.

The 'Reg. Setting' function on the Configuration Screen enables users to switch between Voltage (CV/CC, CV/CP, CV-Ser. Res and CV) and Current (CC/CV, CV/CP, CP/CV and CC) Regulation settings.

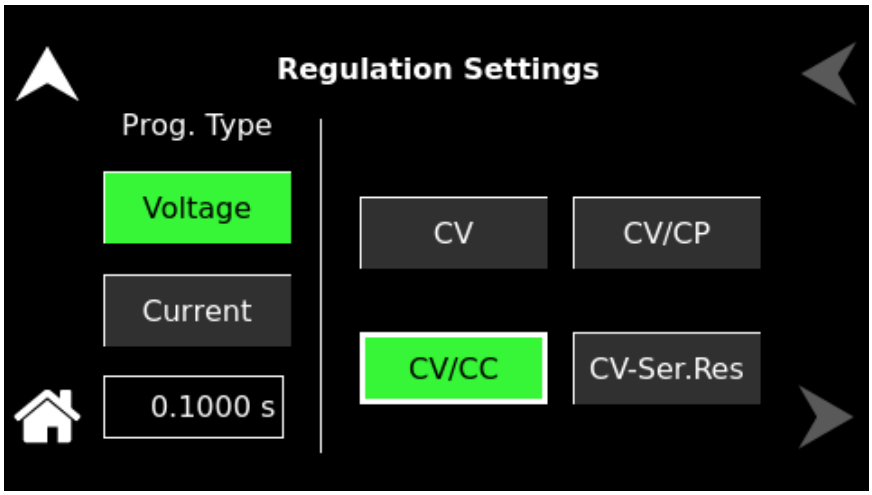


Figure 10-85. Regulation Settings – CV/CC, CV/CP, CV-Ser. Res and CV

a) When the programming type is set to 'Voltage' in the Regulation Settings menu, the following fields are available:

ENTRY	DESCRIPTION
CV/CC	In this regulation setting, output voltage is regulated to the user set value. On reaching the current limit (positive or negative), output would be regulated to the current limit reached. On reaching the power limit (positive or negative), the output voltage would be programmed to zero.
CV/CP	In this regulation setting, output voltage is regulated to the user set value. On reaching the power limit (positive or negative), output would be regulated to the power limit reached. On reaching the current limit (positive or negative), the output voltage would be programmed to zero.
CV-Ser.Res	In this setting, user can set the voltage and series resistance. Depending on the current output, the terminal voltage would be varied based on the voltage drop across the series resistance. In the event of reaching the programmed current limit (positive or negative) or power limit (positive or negative) or voltage limit (high or low), the output voltage is programmed to zero.

ENTRY	DESCRIPTION
CV	In this regulation setting, output voltage is regulated to the user set value. On reaching the set current limit (positive or negative) or power limit (positive or negative), the output voltage would be programmed to zero. **NOTE:** When the unit is in series operation (refer to Chapter 6), the only regulation setting available is Voltage - CV.
Delay	Sets the programmable time delay executed by the supply before setting the output to zero. The minimum time that can be set is 0.1 seconds, and the maximum is 5 seconds. Refer to Figure 10-86.

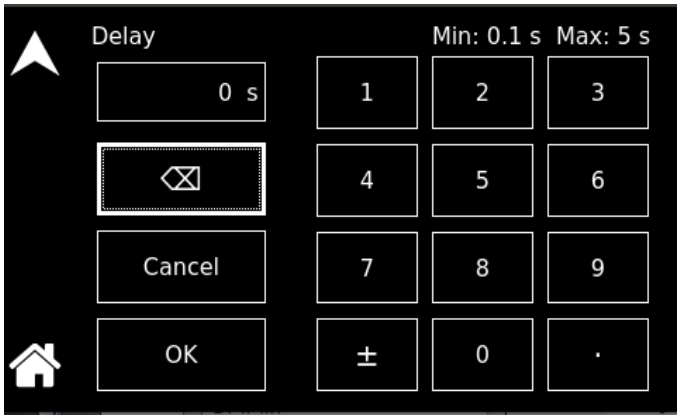


Figure 10-86. Delay Screen

Table 10-21. Regulation Settings

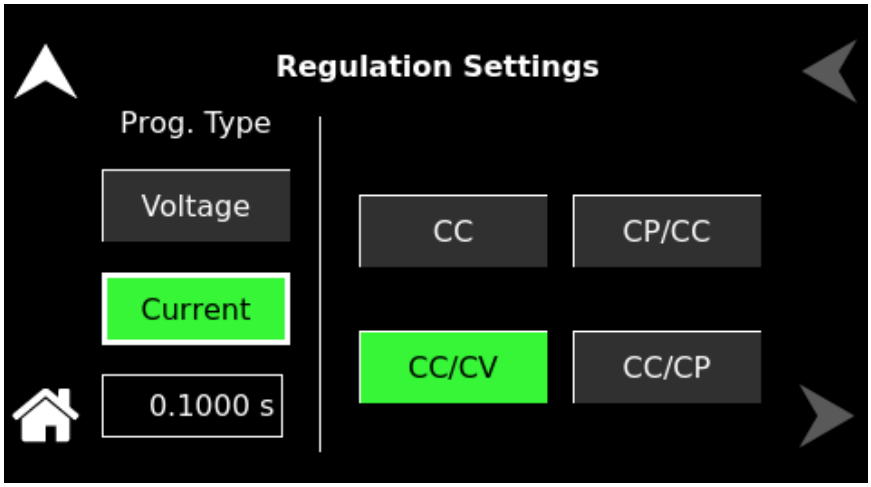


Figure 10-87. Regulation Settings – CC/CV, CP/CC, CC/CP and CC

b) When the programming type is set to 'Current' in the Regulation Settings menu, the following fields are available:

ENTRY	DESCRIPTION
CC/CV	In this regulation setting, output current is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On

ENTRY	DESCRIPTION
	reaching the power limit (positive or negative), the output current would be programmed to zero.
CP/CC	In this regulation setting, output power is regulated to the user set value. On reaching the current limit (positive or negative), output would be regulated to the current limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero.
CC/CP	In this regulation setting, output current is regulated to the user set value. On reaching the power limit (positive or negative), output would be regulated to the power limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero.
CC	In this regulation setting, output current is regulated to the user set value. On reaching the set voltage limit (high or low) or power limit (positive or negative), the output current would be programmed to zero.
Delay	Sets the programmable time delay executed by the supply before setting the output to zero. The minimum time that can be set is 0.1 seconds, and the maximum is 5 seconds. Refer to Figure 10-88.



Figure 10-88. Delay Screen

Table 10-22. Regulation Settings

10.2.5.2 SLEW RATE

In the Slew Rate Settings, users can configure the ‘Voltage’, ‘Current’ and ‘Power’ slew rate. This allows for precise control over the voltage, current and power change, ensuring smoother transitions and better performance of the power supply. Adjusting these settings can help in optimizing the response time and stability of the system.

The Slew Rate provides the interface based on the programming type selected in the ‘Configuration Screen’, refer to section 10.2.5.1. When the program type is set to ‘Voltage-CV/CC, CV-Ser.Res, CV/CP and CV’ in the Regulation setting, the Slew Settings screen that appears will be the Volt Slew rate. Refer to Figure 10-89.

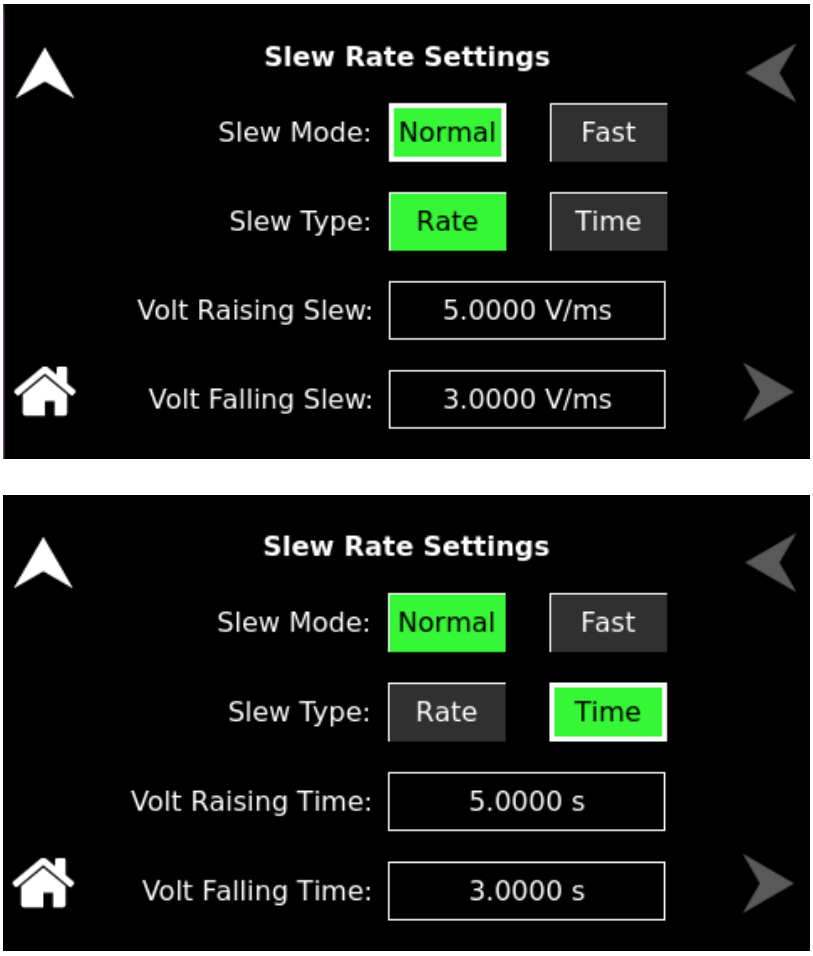


Figure 10-89. Slew Rate Settings

When the program type is set to 'Current – CC/CV, CC/CP and CC' in the Regulation setting, the Slew Settings screen that appears will be the Curr Slew rate. Refer to Figure 10-90.





Figure 10-90. Slew Rate Settings – Current (CC/CV, CC/CP and CC)

When the program type is set to 'Current –CP/CC' in the regulation setting, the Slew Settings screen that appears will be the Pow Slew rate. Refer to Figure 10-91.

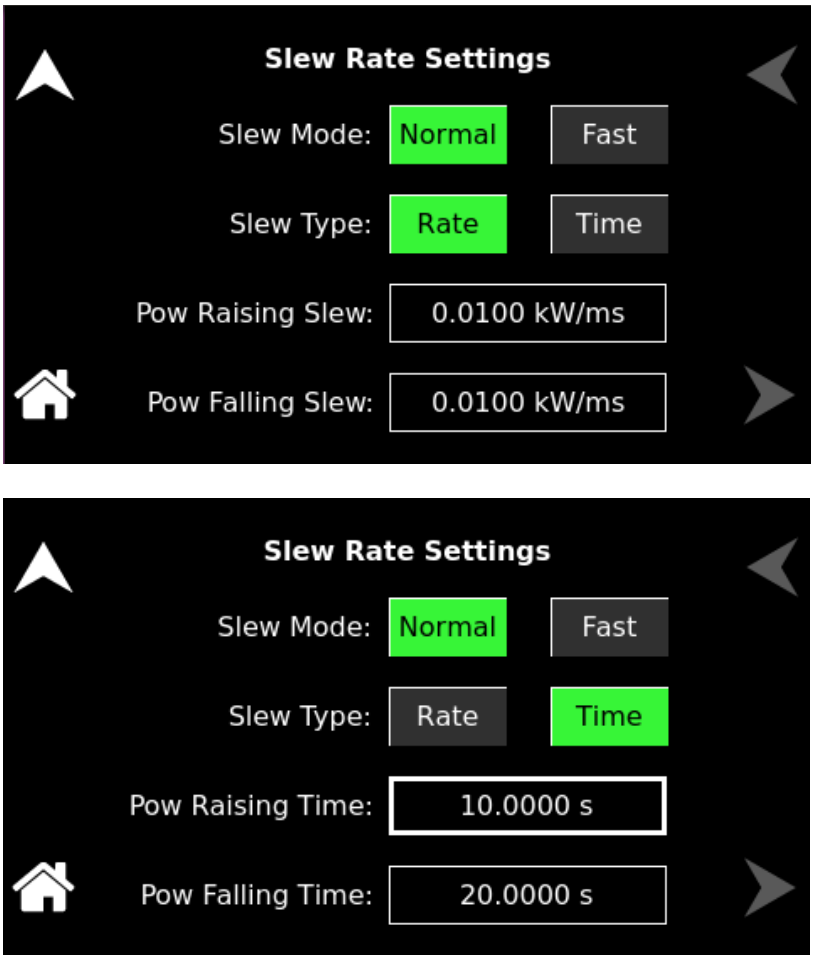


Figure 10-91. Slew Rate Settings – Power (CP/CC)

Refer to Sections 2.11 and 2.12 for detailed information on the ‘Normal’ and ‘Fast’ Slew Modes in the Slew Rate Settings.

10.2.5.3 PROTECTION

In protection settings, users can define Over Voltage Protection (OVP), Positive Overcurrent Protection (Pos. OCP), and Negative Overcurrent Protection (Neg. OCP) in the specified limit to help safeguard their devices from electrical anomalies. Refer to Figure 10-92.

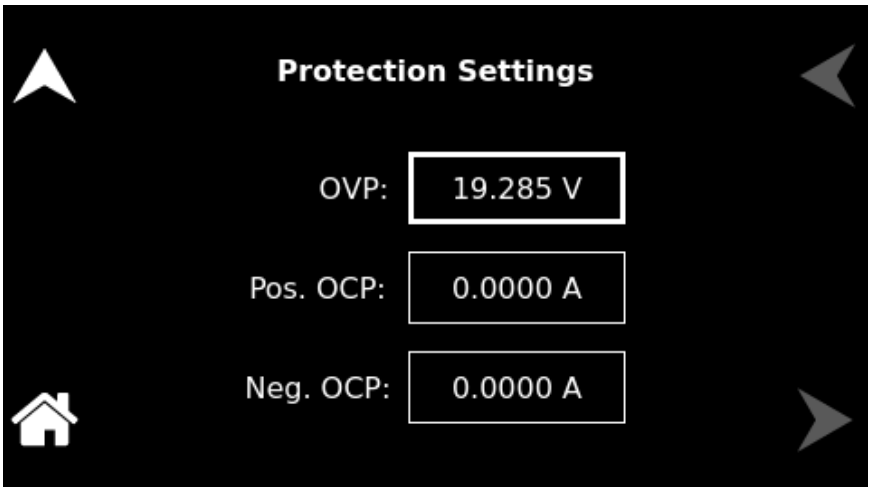


Figure 10-92. Protection Settings

If the units are configured in series operation (refer to Chapter 6), the user can define Over Voltage Protection (OVP) for the leader unit as OVP 1 and for the follower unit as OVP 2. Refer to Figure 10-93.

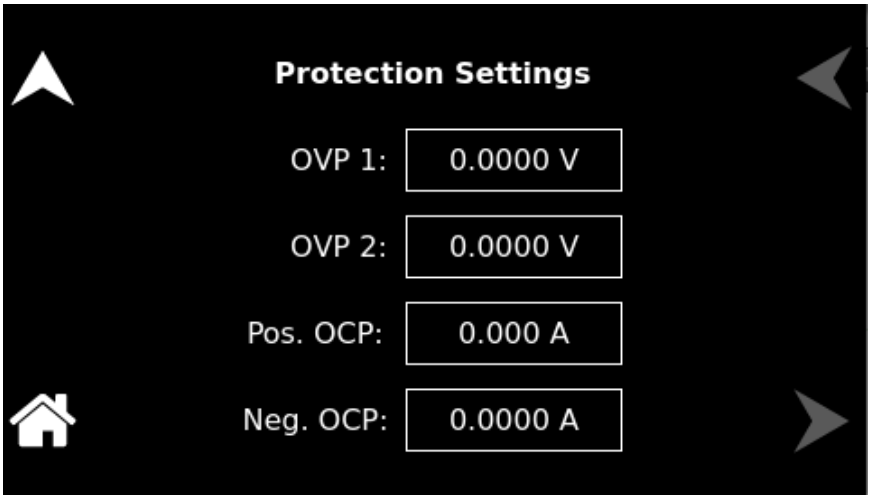


Figure 10-93. Protection Settings- Series Connection

10.2.5.4 EXTERNAL RELAY

The External relay Settings allows the user to set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits.

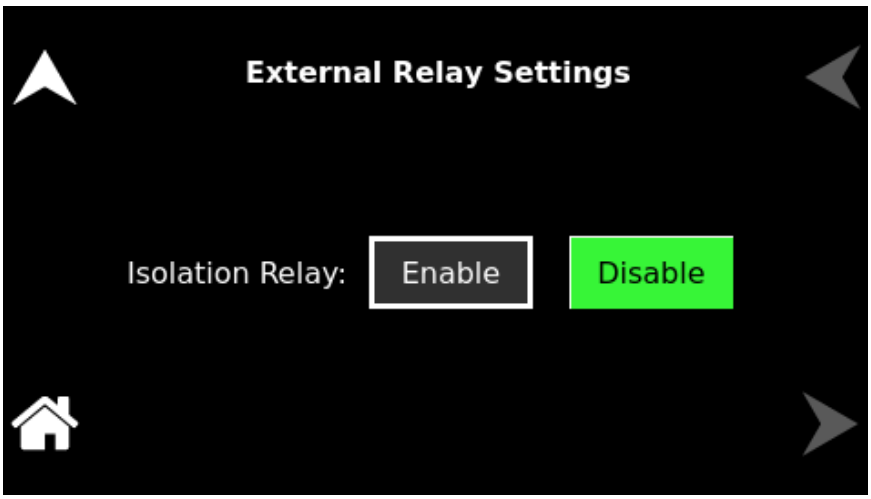


Figure 10-94. External Relay Settings

10.2.5.5 USER LIMITS

In the user limits settings, users can set the maximum allowable voltage, current and power values. This allows users to specify the highest and lowest values the device can reach without exceeding these limits.

When the programming type is set to ‘Voltage’ in the Regulation Settings menu, the user limit screen with an adjustable Voltage option will appear. Refer to Figure 10-95.

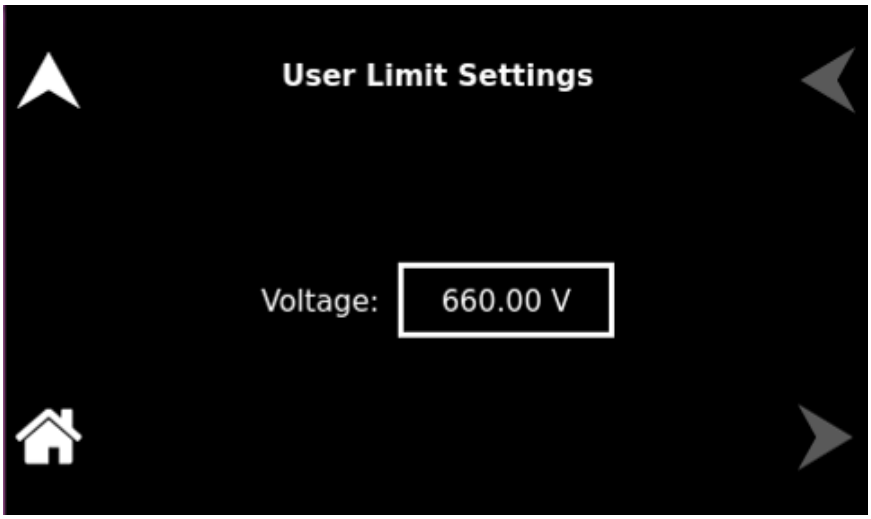


Figure 10-95. User Limit Settings- CV/CC, CV/CP, CV-Ser.Res and CV

When the programming type is set to ‘Current’ in the Regulation Settings menu, the user limit Setting Screen with an adjustable Current High Limit and Current Low Limit will appear. Refer to Figure 10-96.

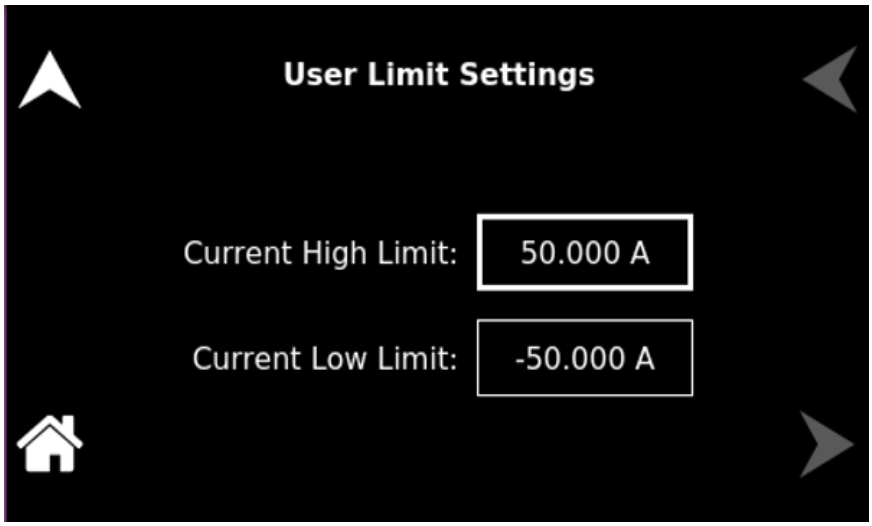


Figure 10-96. User Limit Settings- CC/CV, CC/CP and CC

When the programming type is set to ‘Current– CP/CC’ in the Regulation setting, user limit Setting Screen with an adjustable Power High Limit will appear. Refer to Figure 10-97.

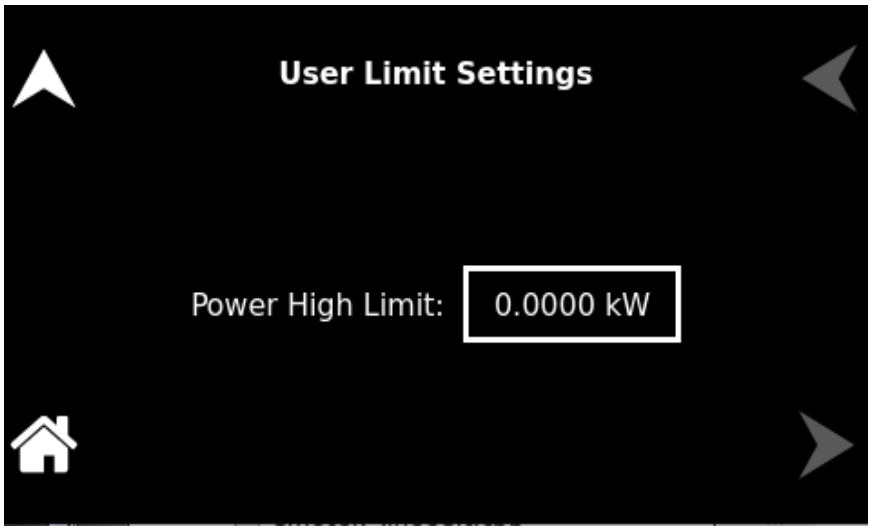


Figure 10-97. User Limit Settings- Current (CP/CC)

10.2.5.6 OUTPUT SENSE

The Output Sense menu allows user to set the output voltage sense of the unit to either local or remote. When Remote is selected as output sense, voltage sense cables must be connected to rear panel of power the supply at RVS (Remote Voltage Sense) connector. Refer to Figure 10-98.

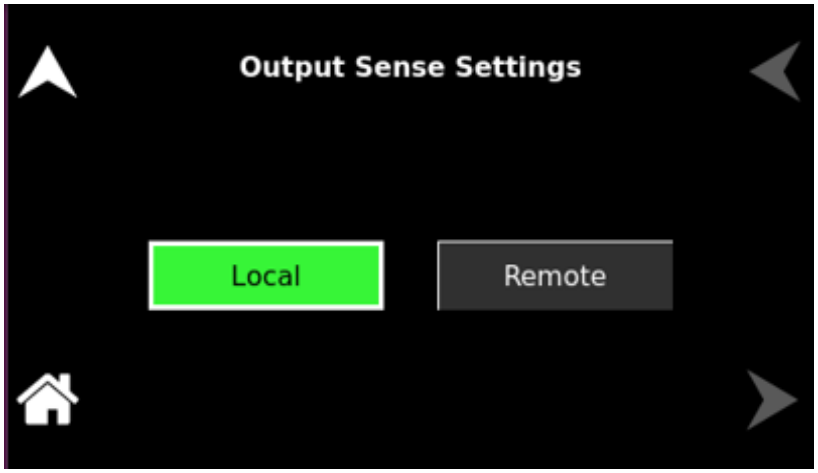


Figure 10-98. Output Sense Settings

10.2.5.7 PONS

The PONS Menu enables users to configure the Power-ON values and set up the power supply based on the chosen mode settings.

When the programming type is set to 'Voltage' in the Regulation Settings menu, the PONS Program Type will display as 'Voltage,' and the PONS Reg. Setting will show the selected mode. Refer to Figure 10-99 to Figure 10-102.

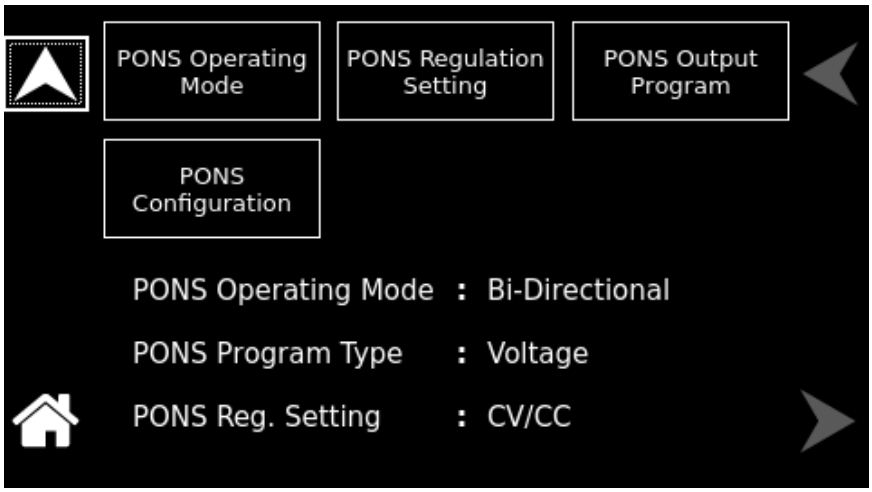


Figure 10-99. PONS Main Screen – CV/CC

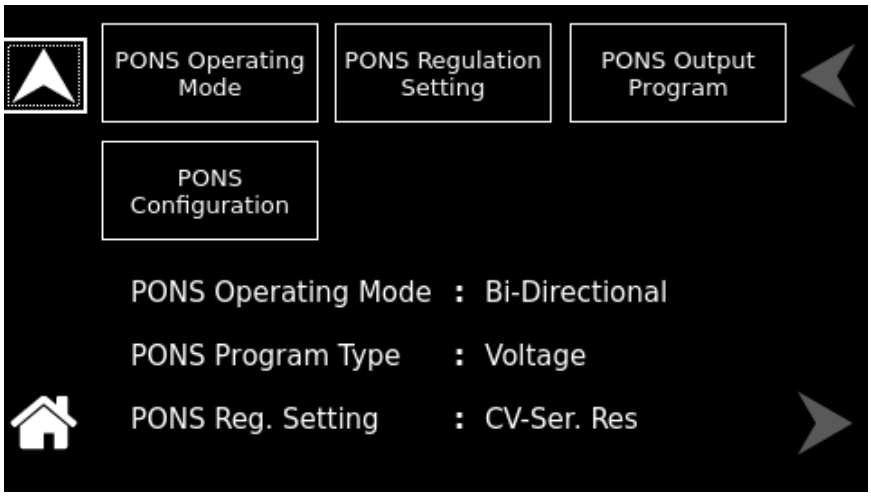


Figure 10-100. PONS Main Screen – CV-Ser. Res

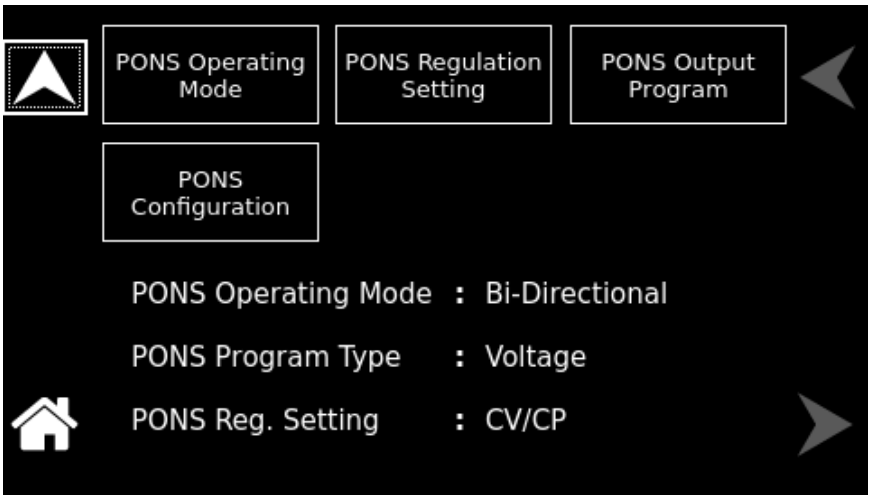


Figure 10-101. PONS Main Screen – CV/CP

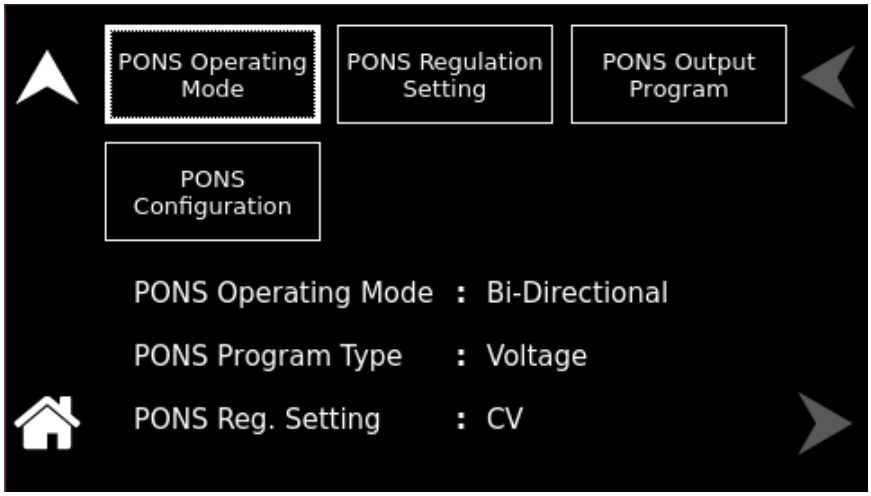


Figure 10-102. PONS Main Screen – CV

When the programming type is set to ‘Current’ in the Regulation Settings menu, the PONS Program Type will display as ‘Current,’ and the PONS Reg. Setting will show the selected mode. Refer to Figure 10-103 to Figure 10-106.

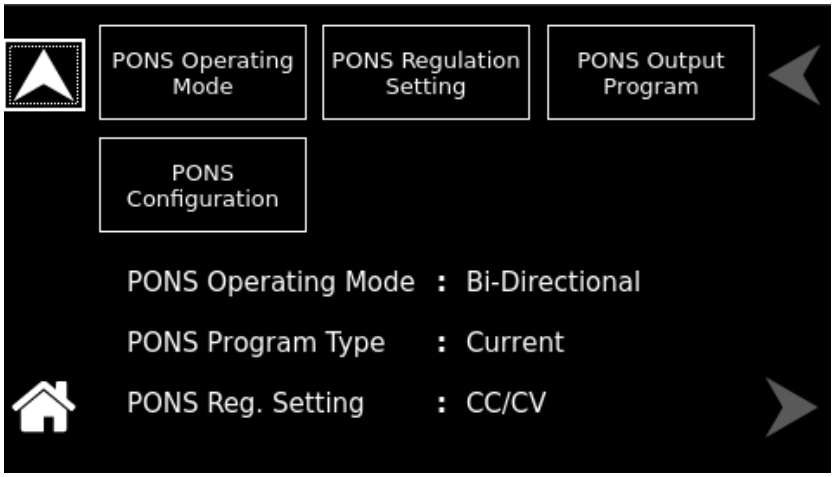


Figure 10-103. PONS Main Screen – CC/CV

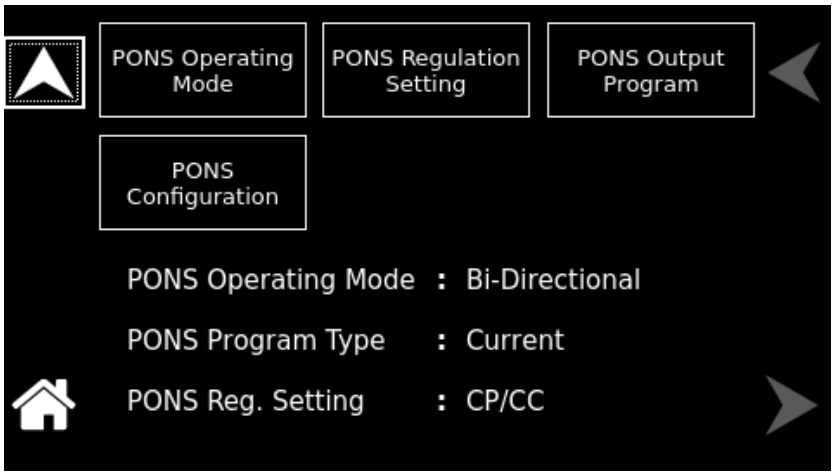


Figure 10-104. PONS Main Screen – CP/CC

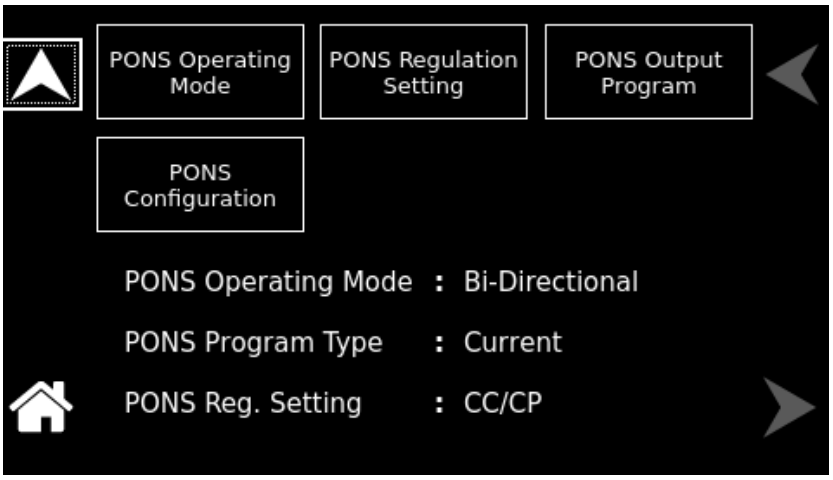


Figure 10-105. PONS Main Screen – CC/CP

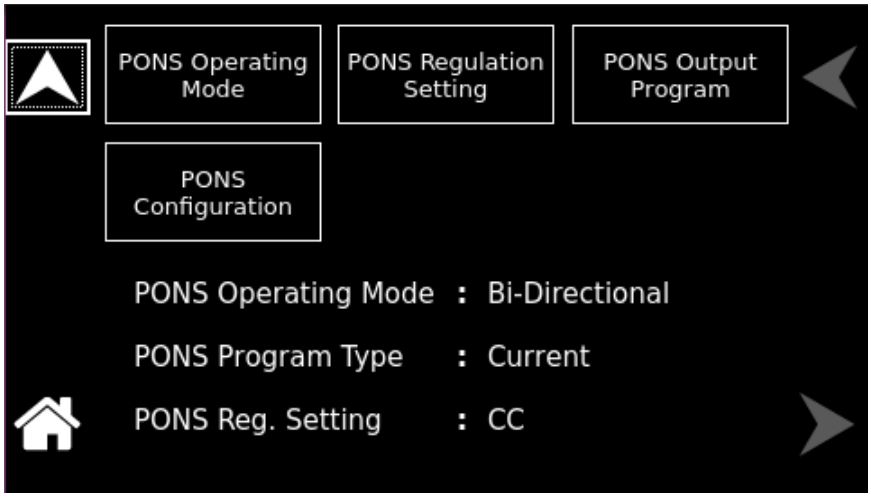


Figure 10-106. PONS Main Screen - CC

10.2.5.7.1 PONS OPERATING MODE

The 'PONS Operating Mode Settings' will not change automatically when the user changes the mode in the ' Operating Mode' settings on the Home screen. Users must separately select the ‘BI-DIR’ mode in the 'PONS Operating Mode Settings', which will update the 'PONS Operating Mode Settings', ‘PONS Regulation’, ‘PONS Output Program’ and the 'PONS Configuration' screens. Refer to Figure 10-107, Figure 10-108, Figure 10-112, Figure 10-118, Figure 10-127, Figure 10-133 and Figure 10-138.

The same applies to other modes such as SOUR, ELOAD, PVSIM, BATSIM and BATTEST. Refer to the Sections 11.2.5.7.1, 12.2.5.7.1, 13.2.4.2.1.5, 14.2.4.7.1 and 15.2.4.7.1.

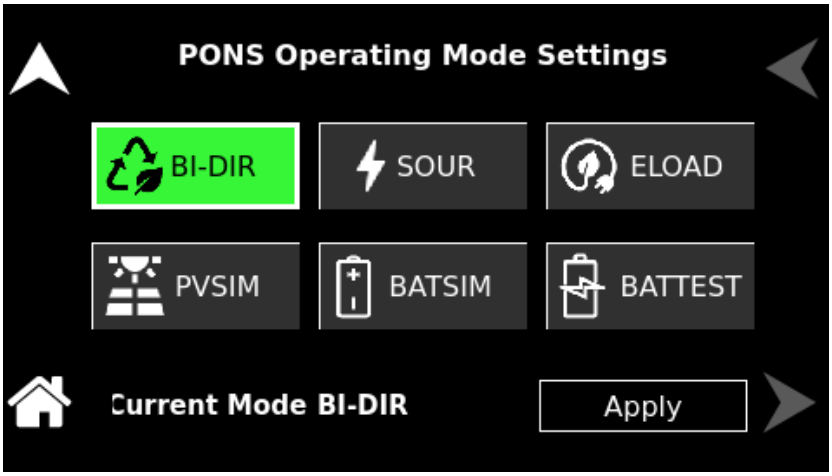


Figure 10-107. PONS Operating Mode Settings

NOTE: When the unit is in series operation, the non-applicable modes 'PVSIM', 'BATSIM', and 'BATTEST' do not appear in 'PONS Operating Mode Settings'.

10.2.5.7.2 PONS REGULATION SETTINGS

The Regulation Settings Menu is used to configure the Programming type and Regulation setting of the power supply. Refer to Figure 10-108 and Figure 10-110.

a) When the programming type is set to 'Voltage' in the Regulation Settings menu, the following fields are available:

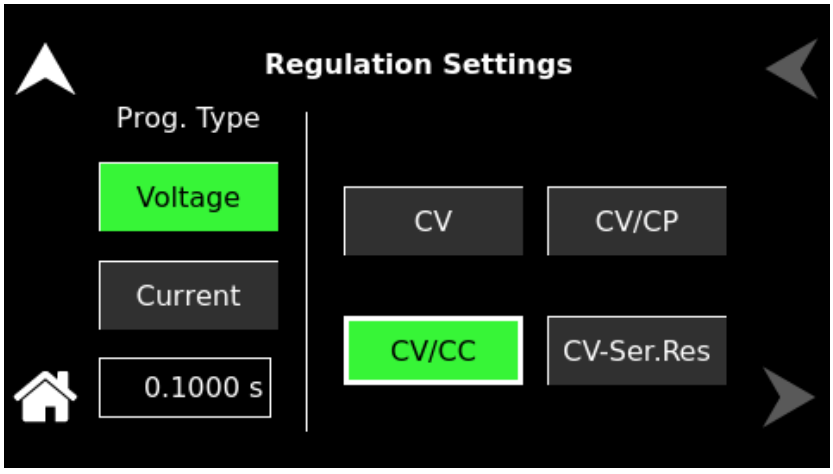


Figure 10-108. PONS regulation Settings

ENTRY	DESCRIPTION
CV/CC	In this regulation setting, output voltage is regulated to the user set value. On reaching the current limit (positive or negative), output would be regulated to the current limit reached. On reaching the power limit (positive or negative), the output voltage would be programmed to zero.

CV/CP In this regulation setting, output voltage is regulated to the user set value. On reaching the power limit (positive or negative), output would be regulated to the power limit reached. On reaching the current limit (positive or negative), the output voltage would be programmed to zero.

CV-Ser.Res In this setting, user can set the voltage and series resistance. Depending on the current output, the terminal voltage would be varied based on the voltage drop across the series resistance. In the event of reaching the programmed current limit (positive or negative) or power limit (positive or negative) or voltage limit (high or low), the output voltage is programmed to zero.

CV In this regulation setting, output voltage is regulated to the user set value. On reaching the set current limit (positive or negative) or power limit (positive or negative), the output voltage would be programmed to zero.

NOTE: When the unit is in series operation (refer to Chapter 6), the only regulation setting available is Voltage - CV.

Delay Sets the programmable time delay executed by the supply before setting the output to zero. The minimum time that can be set is 0.1 seconds, and the maximum is 5 seconds. Refer to Figure 10-109.



Figure 10-109. Delay Screen

Table 10-23. Regulation Settings

b) When the programming type is set to ‘Current’ in the PONS Regulation Settings menu, the following fields are available:

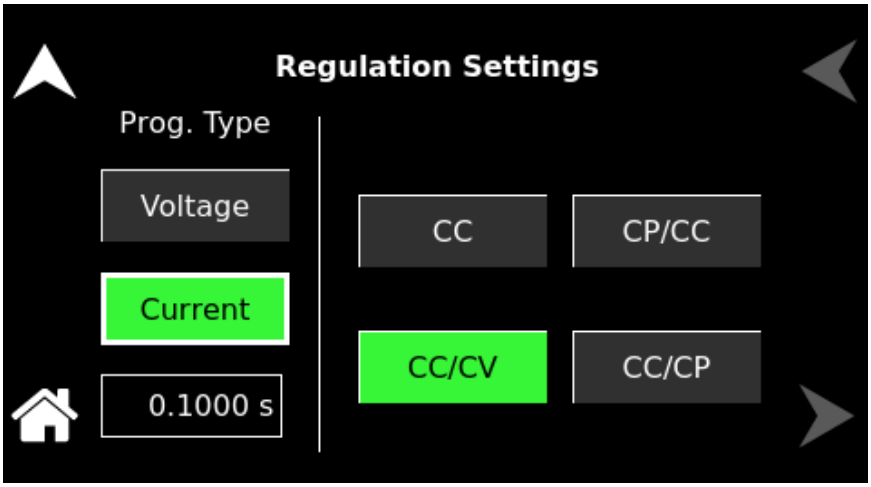


Figure 10-110. PONS regulation Settings

ENTRY	DESCRIPTION
CC/CV	In this regulation setting, output current is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the power limit (positive or negative), the output current would be programmed to zero
CP/CC	In this regulation setting, output power is regulated to the user set value. On reaching the current limit (positive or negative), output would be regulated to the current limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero.
CC/CP	In this regulation setting, output current is regulated to the user set value. On reaching the power limit (positive or negative), output would be regulated to the power limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero.
CC	In this regulation setting, output current is regulated to the user set value. On reaching the set voltage limit (high or low) or power limit (positive or negative), the output current would be programmed to zero.
Delay	Sets the programmable time delay executed by the supply before setting the output to zero. The minimum time that can be set is 0.1 seconds, and the maximum is 5 seconds. Refer to Figure 10-111.

ENTRY	DESCRIPTION

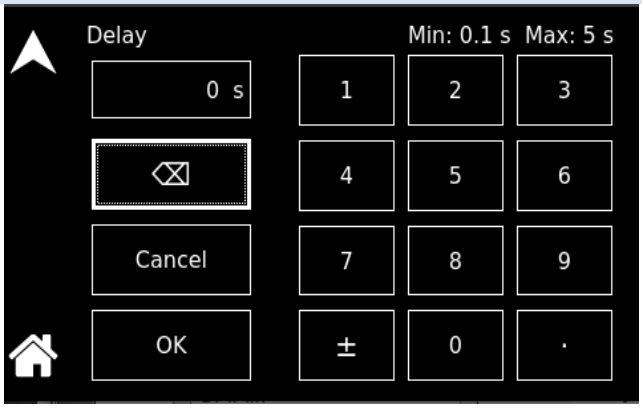


Figure 10-111. Delay Screen

Table 10-24. Regulation Setting

10.2.5.7.3 PONS OUTPUT PROGRAM

a) PONS Output Program (Voltage) – CV/CC, CV/CP and CV

When the regulation setting is selected as 'Voltage (CV/CC, CV/CP and CV)', the screen will display the following parameters: 'PONS Voltage', 'PONS Pos. Curr Limit', 'PONS Neg. Curr Limit', 'PONS Pos. Pow Limit', and 'PONS Neg. Pow Limit'. Refer to Figure 10-112.

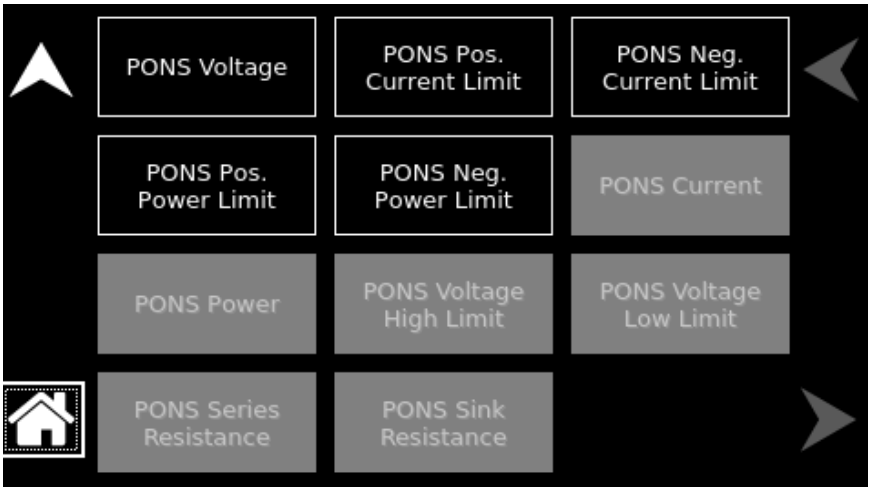


Figure 10-112. Pons Output Program mode – CV/CP, CV/CC and CV

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Voltage	User can set a voltage value within the specified limit. Refer to Figure 10-113.

ENTRY	DESCRIPTION

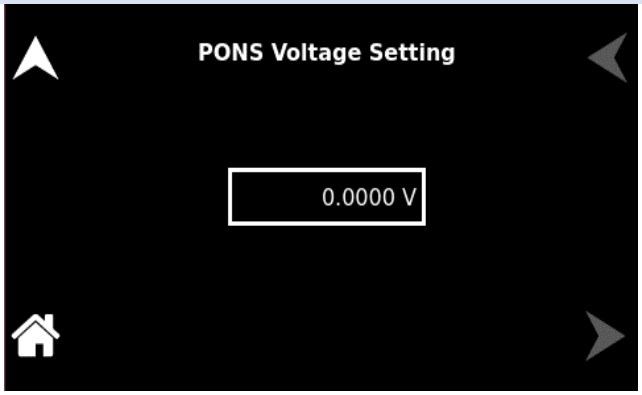


Figure 10-113. PONS Voltage Settings

NOTE: When the unit is in series operation (refer to Chapter 6), the 'PONS voltage setting' screen displays 'Voltage 1' and 'Voltage 2' for setting the output voltage of Leader and Follower.

NOTE: Voltage - CV is the only regulation setting in Series operation.

PONS Pos. Curr Limit

User can set a positive current limit value, which functions as a trip limit (CV and CV/CP), or it regulates the output upon reaching the PONS Pos. Curr Limit (CV/CC). Refer to Figure 10-113.

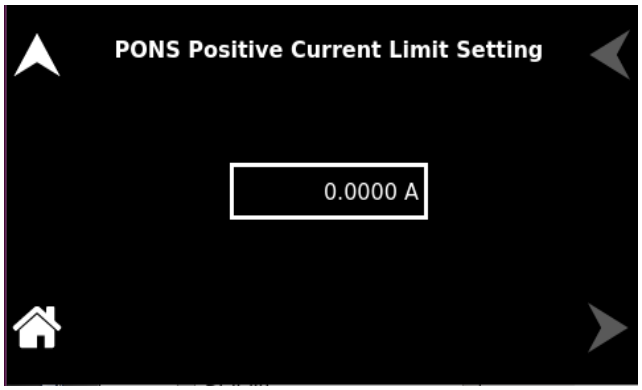


Figure 10-114. PONS Positive Current Limit Settings

PONS Neg. Curr Limit

User can set a negative current limit value, which functions as a trip limit (CV and CV/CP), or it regulates the output upon reaching the PONS Neg. Curr Limit (CV/CC). Refer to Figure 10-114.

ENTRY	DESCRIPTION

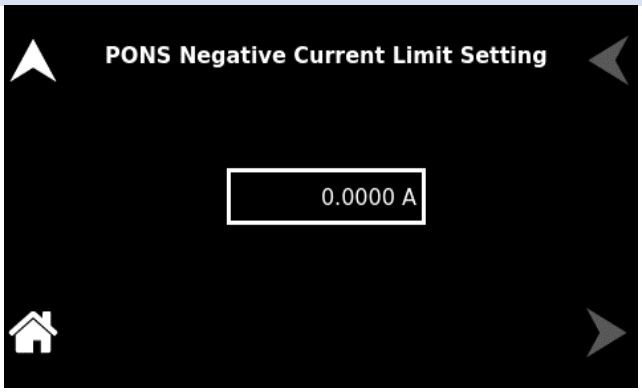


Figure 10-115. PONS Positive Current Limit Settings

PONS Pos. Pow Limit

User can set a positive power limit value, which functions as a trip limit (CV and CV/CC), or it regulates the output upon reaching the PONS Pos. Pow Limit (CV/CP). Refer to Figure 10-115.

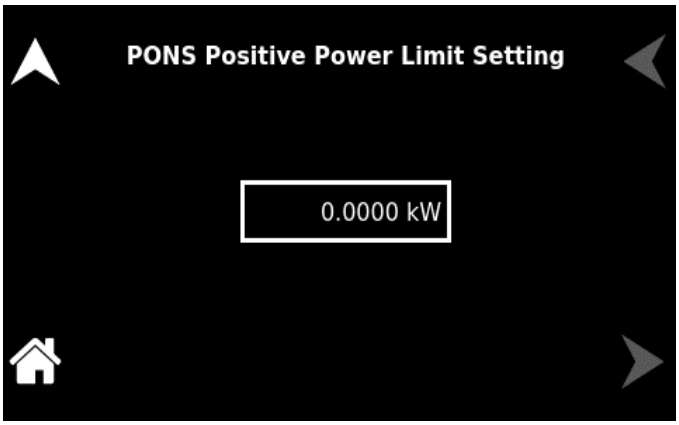


Figure 10-116. PONS Positive Power Limit Setting

ENTRY	DESCRIPTION
PONS Neg. Pow Limit	User can set a negative power limit value, which functions as a trip limit (CV and CV/CC), or it regulates the output upon reaching the PONS Neg. Pow Limit (CV/CP). Refer to Figure 10-117.

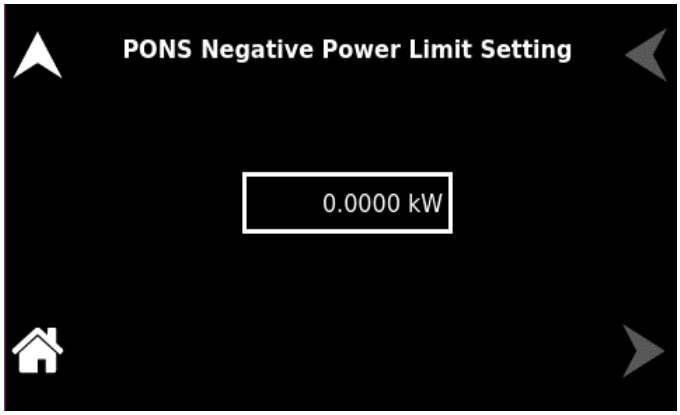


Figure 10-117. PONS Negative Power Limit Setting

Table 10-25. PONS Output Program Settings –CV/CC, CV/CP and CV

b) PONS Output Program (Voltage) – CV- Ser. Res

When the regulation setting is selected as Voltage (CV- Ser. Res), the screen will display the following parameters: PONS Voltage, PONS Pos. Curr Limit, PONS Neg. Current Limit, and PONS Pos. Pow Limit and PONS Neg. Pow Limit. Refer to Figure 10-118.

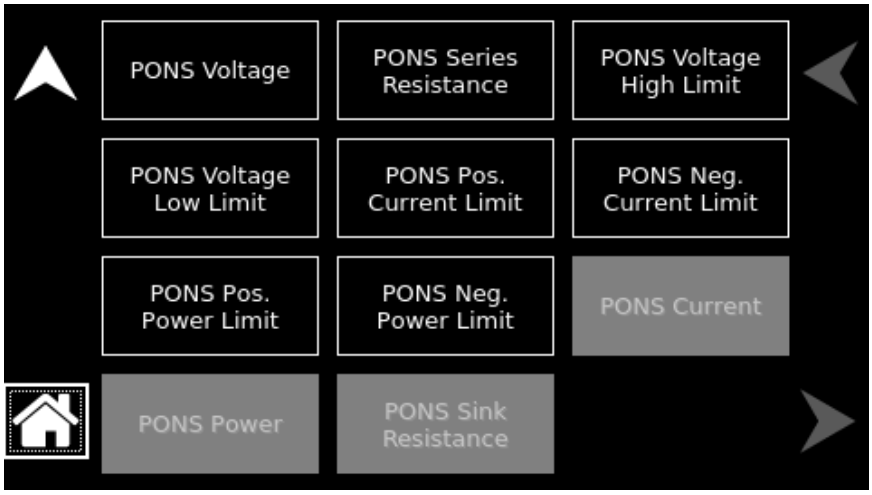


Figure 10-118. Pons Output Program mode – CV -Ser. Res

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Voltage	User can set a voltage value within the specified limit. Refer to Figure 10-119.

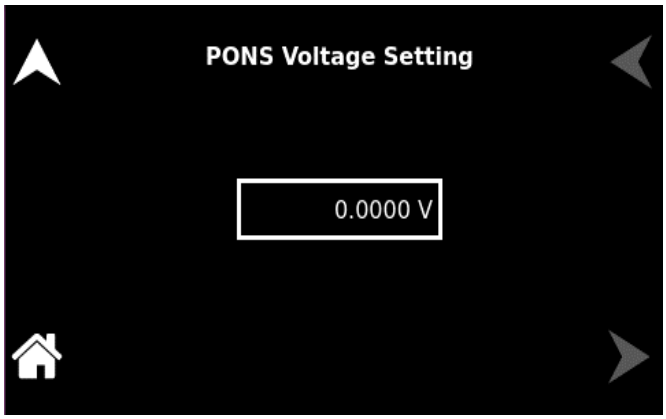


Figure 10-119. PONS Voltage Settings

PONS Series Resistance	User can set the series resistance value within the specified limit. Refer to Figure 10-120.

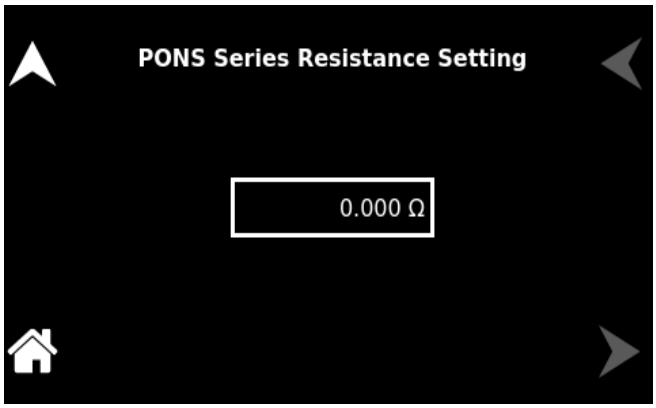


Figure 10-120. PONS Series resistance setting

PONS Voltage High Limit	User can set the high voltage limit value, and it regulates the output upon reaching the PONS Voltage High Limit. Refer to Figure 10-120.

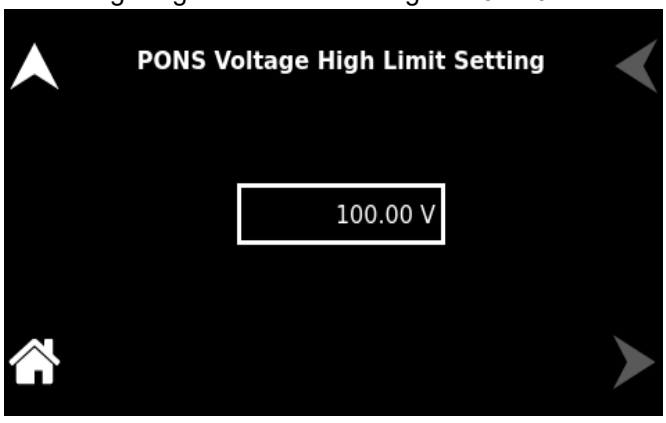


Figure 10-121. PONS Voltage high limit setting

ENTRY	DESCRIPTION
PONS Voltage High Limit	User can set the low voltage limit value, and it regulates the output upon reaching the PONS Voltage Low Limit. Refer to Figure 10-122.

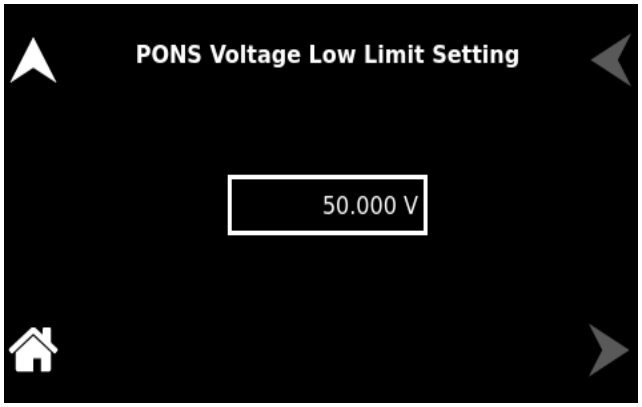


Figure 10-122. PONS Voltage low limit setting

PONS Pos. Curr Limit	User can set the positive current value and which functions as a trip limit. Refer to Figure 10-123.

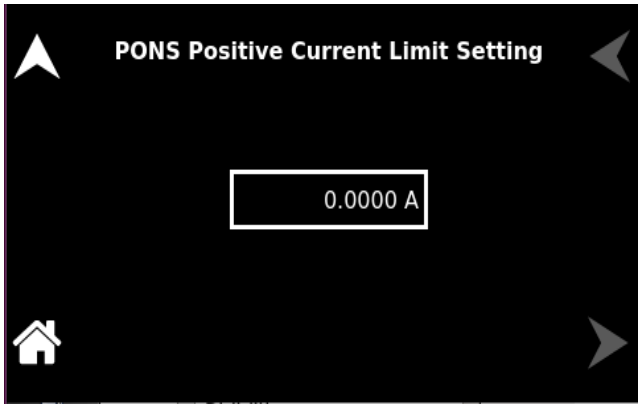


Figure 10-123. PONS* Positive Current Limit *Settings

PONS Neg. Curr Limit	User can set a negative current value, and which functions as a trip limit. Refer to Figure 10-124.

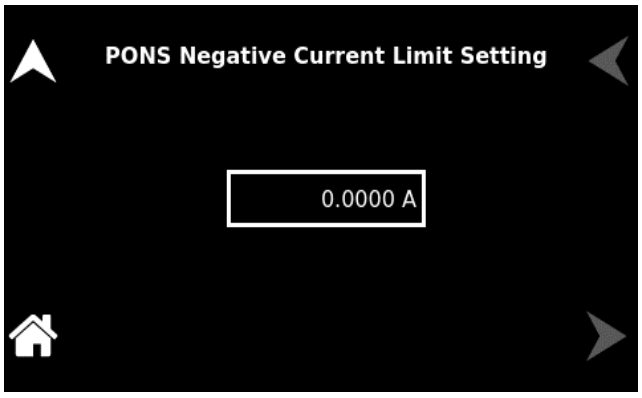


Figure 10-124. PONS Negative Current Limit Setting

ENTRY	DESCRIPTION
PONS Pos. Pow Limit	User can set the positive power value, and which functions as a trip limit. Refer to Figure 10-125.

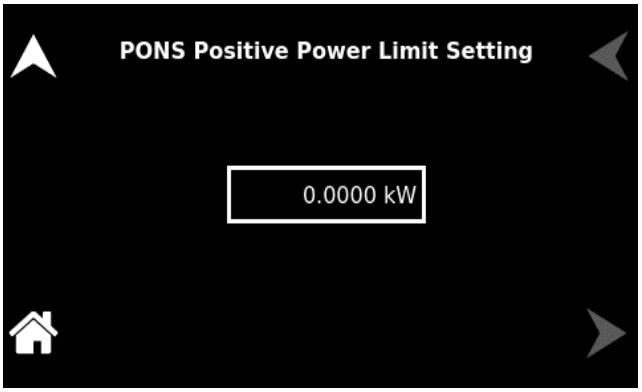


Figure 10-125. PONS Positive Power Limit Settings

PONS Neg. Pow Limit	User can set a negative power limit value, and which functions as a trip limit. Refer to Figure 10-126.

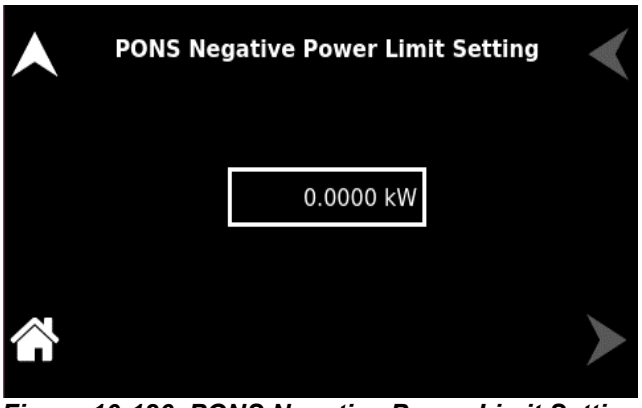


Figure 10-126. PONS Negative Power Limit Setting

Table 10-26. PONS Output Program Settings

c) PONS Output Program (Current) – CC/CV, CC/CP and CC

When the regulation setting is selected as ‘Current (CC/CV, CC/CP and CC)’, the screen will display the following parameters: ‘PONS Current’, ‘PONS Voltage High’, ‘PONS Voltage Low’, ‘PONS Pos. Pow Limit’ and ‘PONS Neg. Pow Limit’. Refer to Figure 10-127.

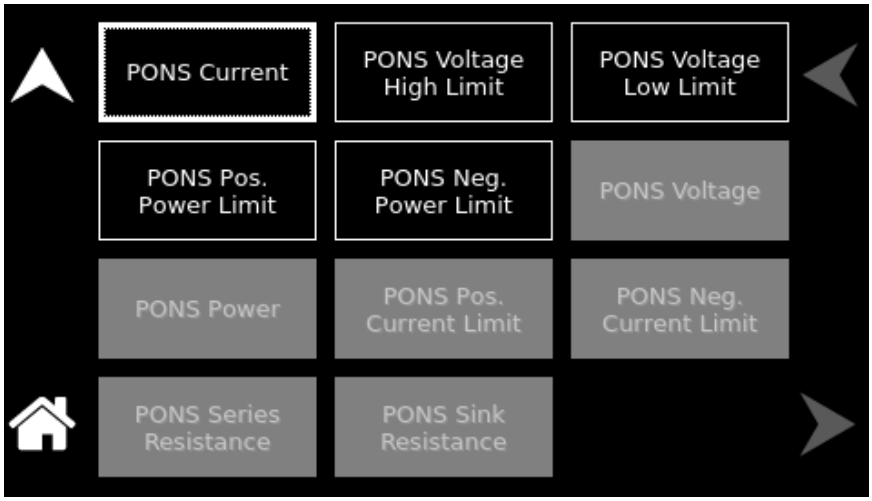


Figure 10-127. Pons Output Program mode – CC/CV, CC/CP and CC

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Current	User can set the Current value within the specified limit. Refer to Figure 10-128.

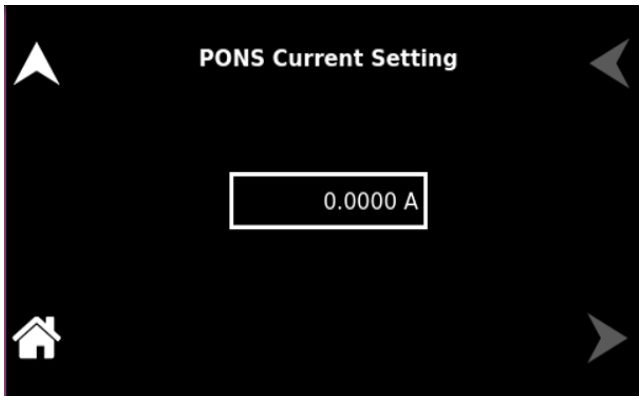


Figure 10-128. PONS Current Setting

PONS Voltage High limit	User can set a high voltage limit value, which functions as a trip limit (CC and CC/CP), or it regulates (CC/CV) the output upon reaching the PONS Voltage High Limit. Refer to Figure 10-129.

ENTRY	DESCRIPTION

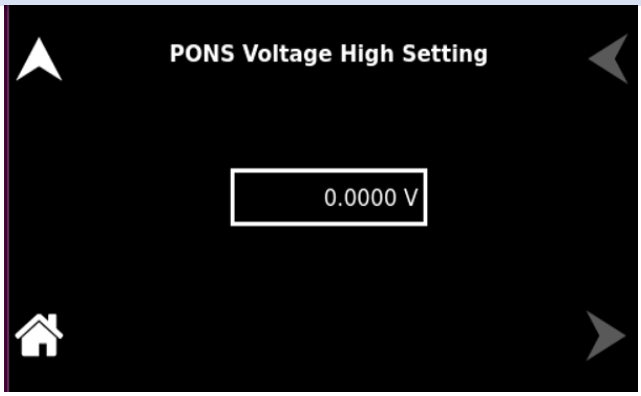


Figure 10-129. PONS Voltage High Setting

PONS Voltage Low Limit

User can set a low voltage limit value, which functions as a trip limit (CC and CC/CP), or it regulates (CC/CV) the output upon reaching the PONS Voltage Low Limit. Refer to Figure 10-130.

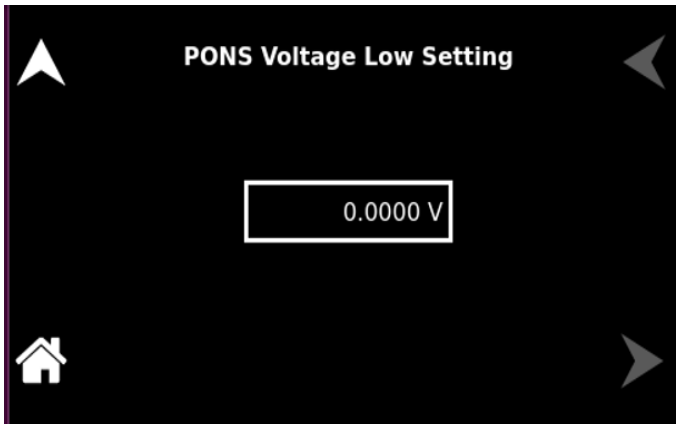


Figure 10-130. PONS Voltage Low Settings

PONS Pos. Power Limit

User can set a positive power limit value, which functions as a trip limit (CC and CC/CV), or it regulates (CC/CP) the output upon reaching the PONS Pos. Power Limit. Refer to Figure 10-131.

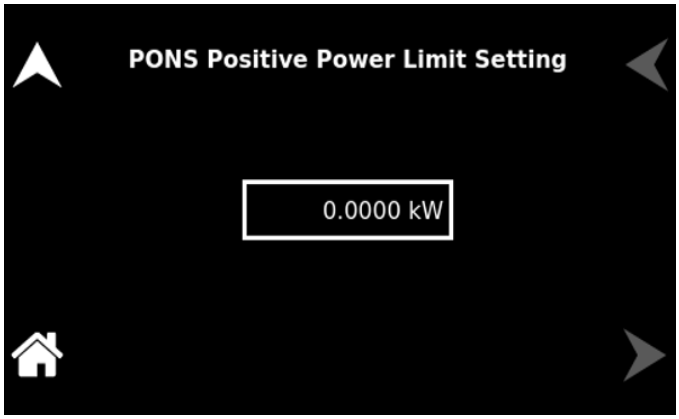


Figure 10-131. PONS Positive Power Limit

ENTRY	DESCRIPTION
PONS Neg. Power Limit	User can set a negative power limit value, which functions as a trip limit (CC and CC/CV), or it regulates (CC/CP) the output upon reaching the PONS Neg. Power Limit. Refer to Figure 10-132.

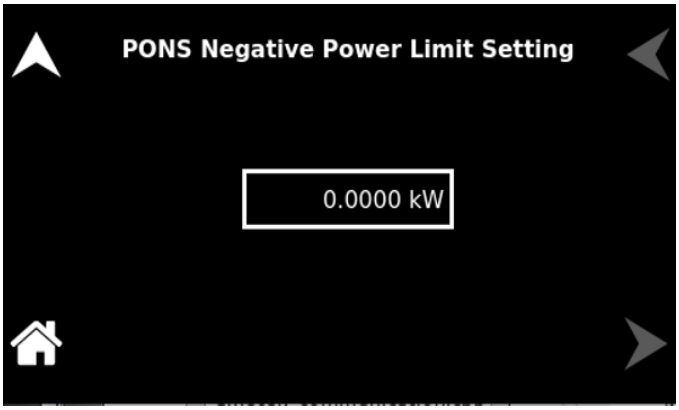


Figure 10-132. PONS Negative Power Limit

Table 10-27. PONS Output Program Settings

d) PONS Output Program (Current) –CP/CC

When the regulation setting is selected as 'Current (CP/CC)', the screen will display the following parameters: 'PONS Power', 'PONS Voltage High Limit', 'PONS Voltage Low Limit', 'PONS Negative Current Limit' and 'PONS Positive Current Limit'. Refer to Figure 10-133.

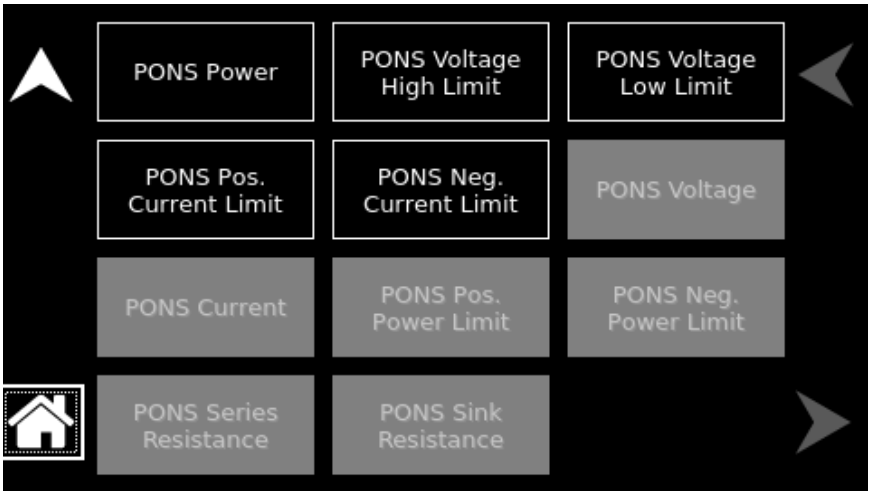


Figure 10-133. Pons Output Program mode – CP/CC

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Power	User can set the Power value within the specified limit. Refer to Figure 10-134.

ENTRY	DESCRIPTION

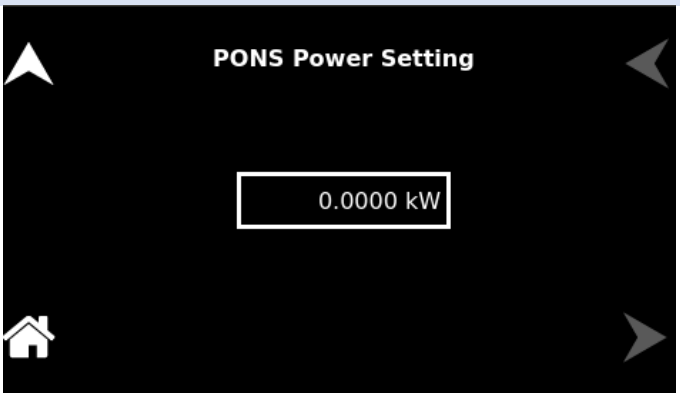


Figure 10-134. PONS Power Setting

PONS Voltage High Limit

User can set the high voltage limit value, and which functions as a trip limit. Refer to Figure 10-135.

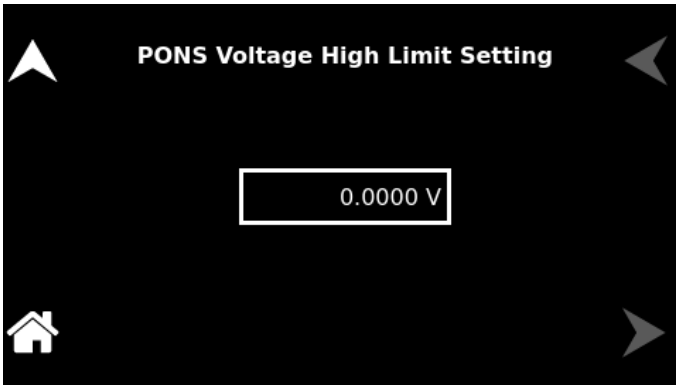


Figure 10-135. PONS Voltage High Setting

PONS Voltage Low Limit

User can set the low voltage value, and which functions as a trip limit. Refer to Figure 10-136.

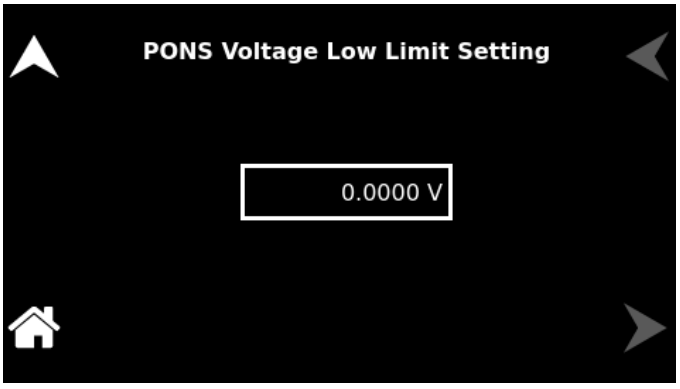


Figure 10-136. PONS Voltage Low Settings

PONS Pos. Current Limit

User can set a positive current limit value, and it regulates the output upon reaching the PONS Pos. Current Limit. Refer to Figure 10-137.

ENTRY	DESCRIPTION

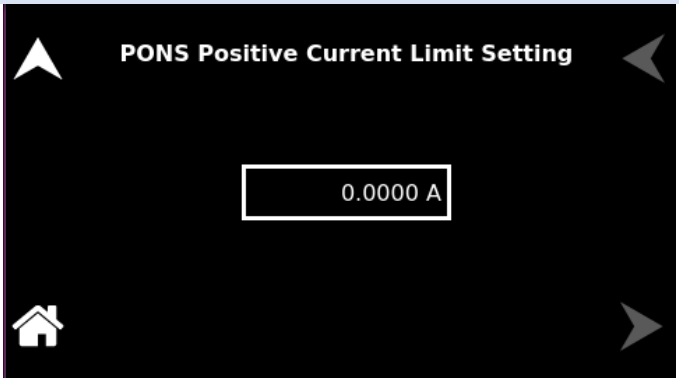


Figure 10-137. PONS Positive Current Limit

PONS Neg. Current Limit

User can set a negative current limit value, and it regulates the output upon reaching the PONS Neg. Current Limit. Refer to Figure 10-138.

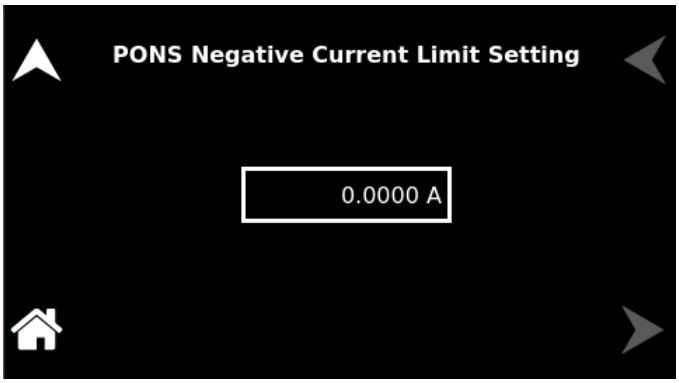


Figure 10-138. PONS Negative Current Limit

Table 10-28. PONS Output Program Settings

10.2.5.7.4 PONS CONFIGURATION

In the PONS Configuration settings, the menu enables users to select ‘PONS Protection’, ‘PONS Slew Rate’, ‘PONS User Limit’, ‘PONS External Relay’, ‘PONS Output Sense’, ‘PONS Measurement Average Samples’, ‘PONS Analog’, ‘PONS Remote Inhibit’, ‘PONS Remote Output’, ‘PONS AC Input Line’, ‘PONS Multi Chassis Operation’ and ‘PONS Parallel Operation Mode’ (enabled only in parallel operation). Refer to Figure 10-139 and Figure 10-140.

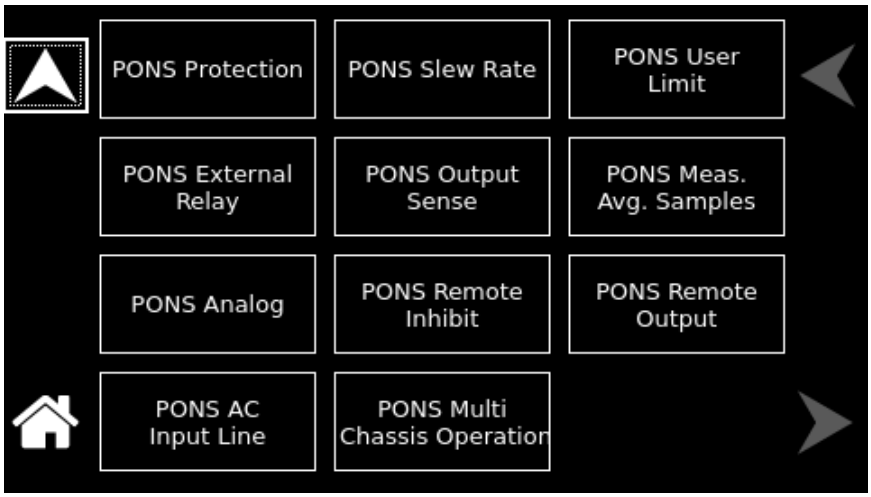


Figure 10-139. PONS Configuration mode

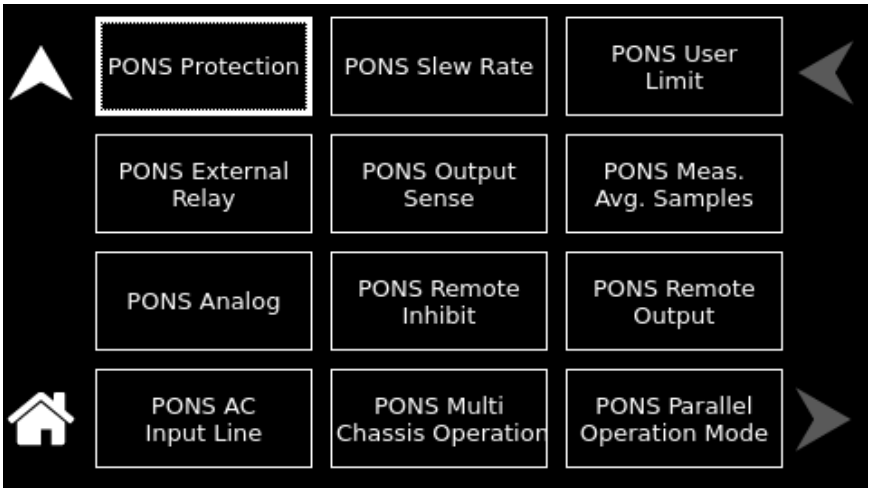


Figure 10-140. PONS Configuration mode – Parallel Operation

When ‘Series’ or ‘Series Split Phase’ is selected in ‘PONS Multi Chassis Operation’, the PONS Configuration settings menu enables users to select ‘PONS Protection’, ‘PONS Slew Rate’, ‘PONS User Limit’, ‘PONS Measurement Average Samples’, ‘PONS Remote Inhibit’, ‘PONS Remote Output’, ‘PONS AC Input Line’, ‘PONS Multi Chassis Operation’. Refer to Figure 10-141.

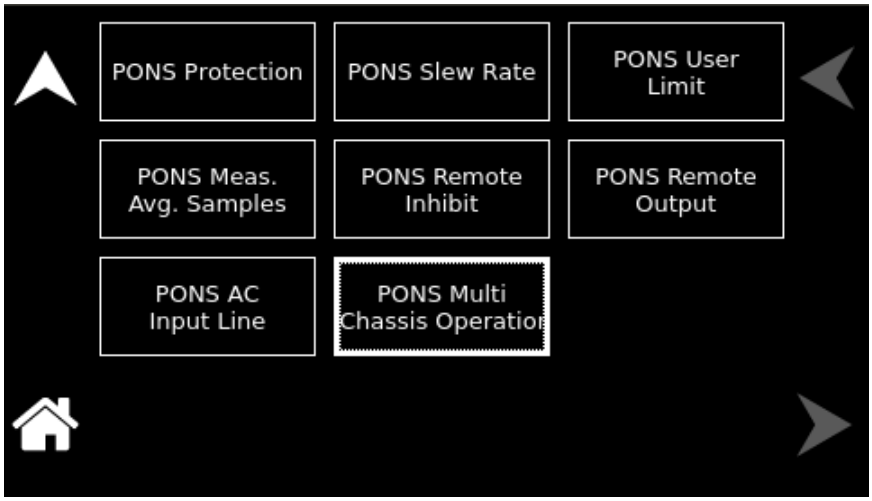


Figure 10-141. PONS Configuration Screen – Series Operation

The PONS Configuration Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Protection	User can define OVP, Pos. OCP and Neg. OCP to help safeguard their devices from electrical anomalies by shutting down the output if it exceeds the preset voltage. Refer to Figure 10-142.

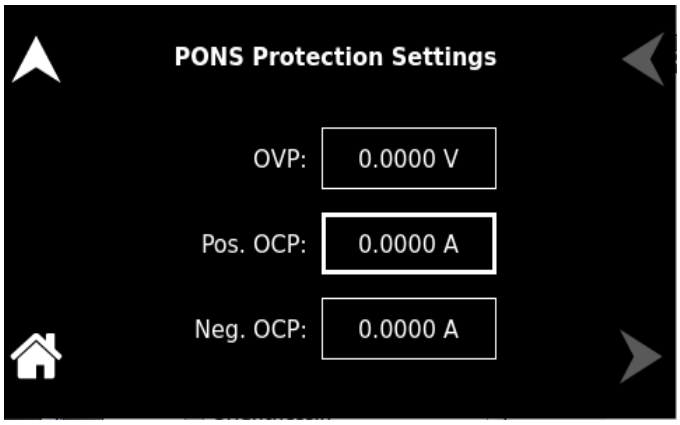
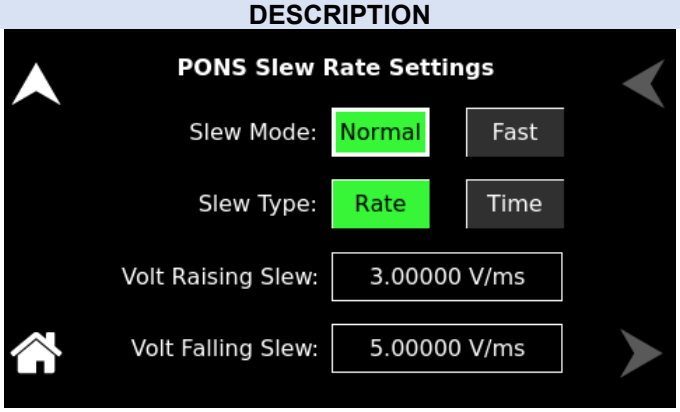


Figure 10-142. PONS Protection Settings

PONS Slew Rate	User can configure the voltage, current and power slew rate. This allows for precise control over the voltage, current and power, ensuring smoother transitions and better performance of the power supply. Adjusting these settings can help in optimizing the response time and stability of the system. Refer to Figure 10-143, Figure 10-144 and Figure 10-145.

ENTRY	DESCRIPTION



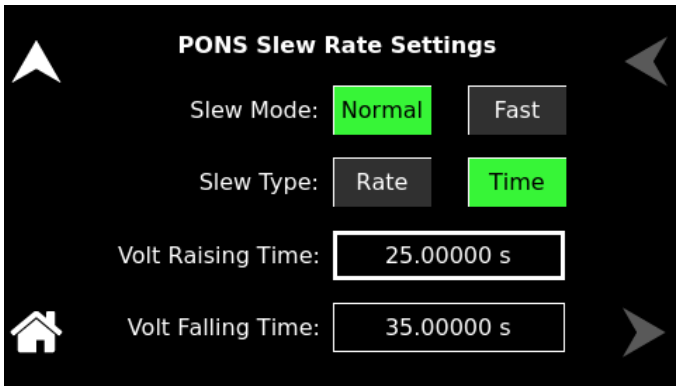
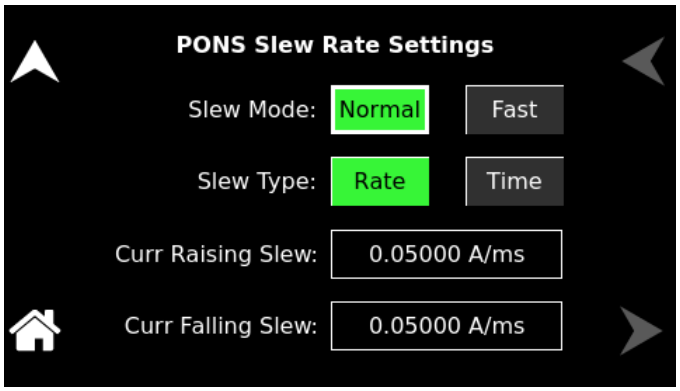


Figure 10-143. PONS Slew Rate Settings – Voltage



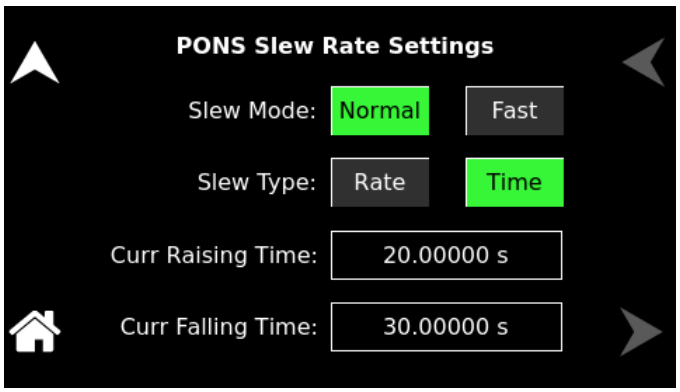


Figure 10-144. PONS Slew Rate Settings – Current(CC/CV, CV/CP and CC)

ENTRY	DESCRIPTION

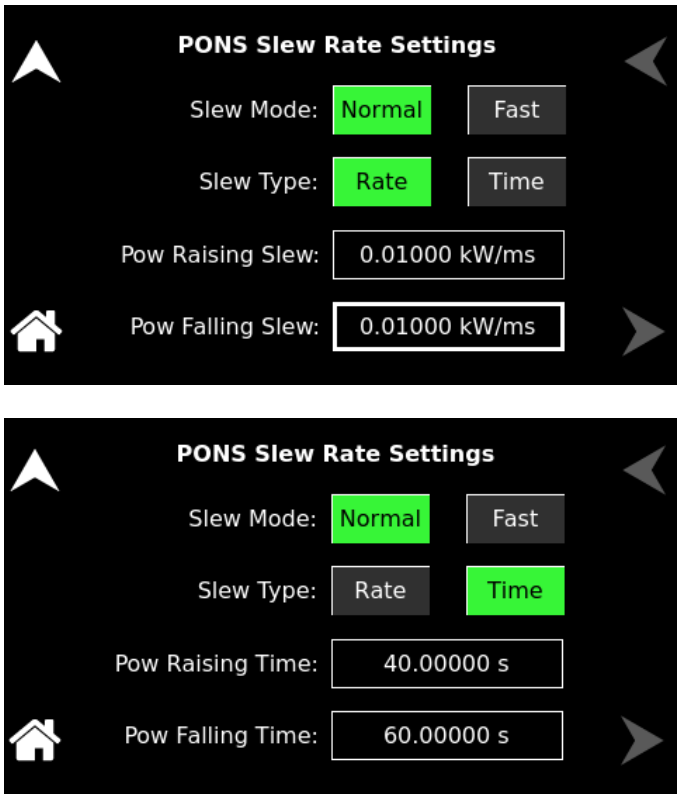


Figure 10-145. Slew Rate Settings – Power (CP/CC)

Refer to Sections 2.11 and 2.12 for detailed information on 'Normal' and 'Fast' Slew Modes in the Slew Rate Settings.

PONS User Limit

Users can set the maximum voltage value and Current High and Current Low limit values. This allows users to specify the values that the device can reach without exceeding these limits. Refer to Figure 10-146, Figure 10-147 and Figure 10-148.

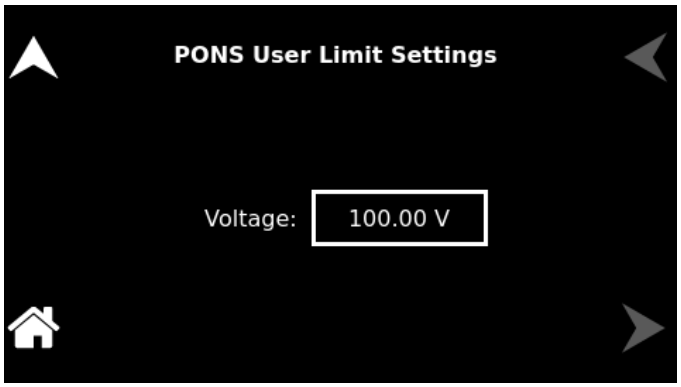


Figure 10-146. PONS User Limit Settings - Voltage

ENTRY	DESCRIPTION

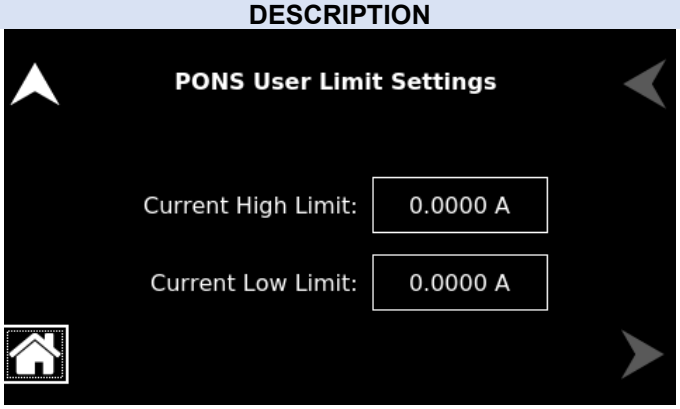


Figure 10-147. PONS User Limit Settings – Current (CC/CV, CC/CP and CC)

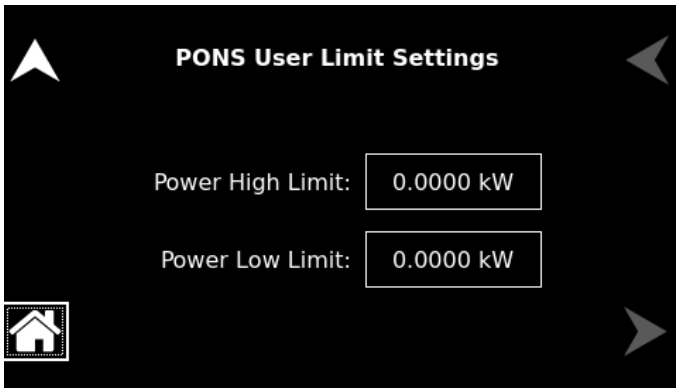


Figure 10-148. User Limit Settings- Current (CP/CC)

PONS External Relay

Users can set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 10-149.

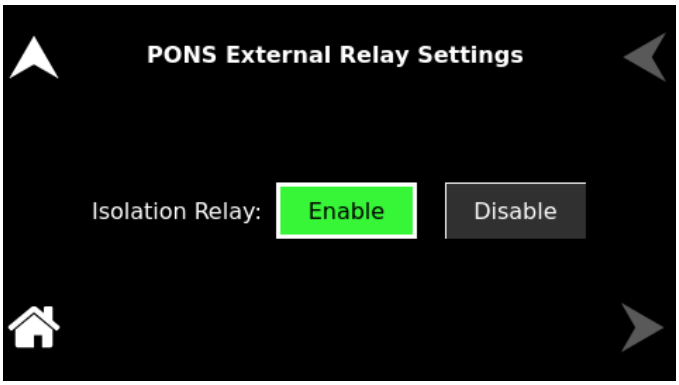


Figure 10-149. PONS External Relay Settings

PONS Output Sense

User can program the PONS output to ‘Local’ or ‘Remote’. Refer to Figure 10-150.

ENTRY	DESCRIPTION

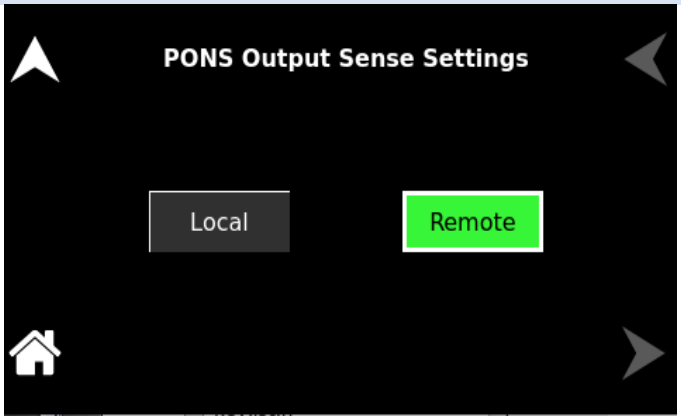


Figure 10-150. PONS Output Sense Settings

PONS Measurement Average Samples

Users can specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 10-151.

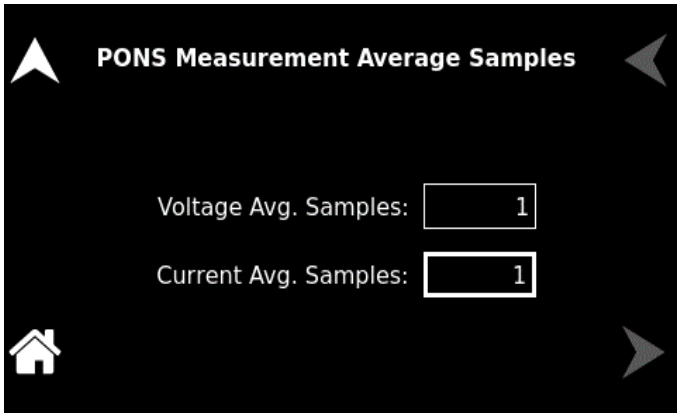


Figure 10-151. PONS Measurement Average Samples

PONS Analog

Configures the PONS Analog programming interface, refer to Figure 10-152.

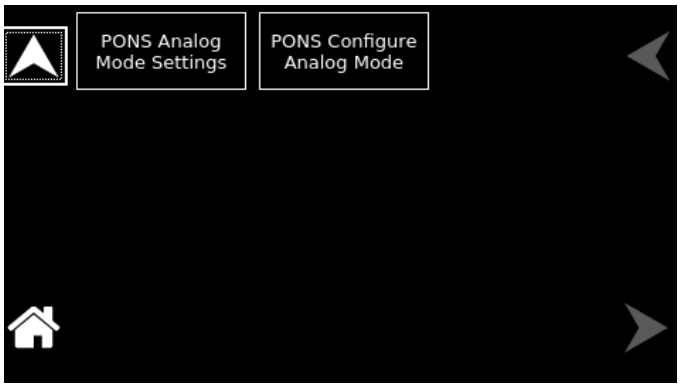


Figure 10-152. PONS Analog Screen

a) PONS Analog Mode Settings

Lists the configuration settings of the PONS Analog Programming interface. Refer to Figure 10-153.

ENTRY	DESCRIPTION

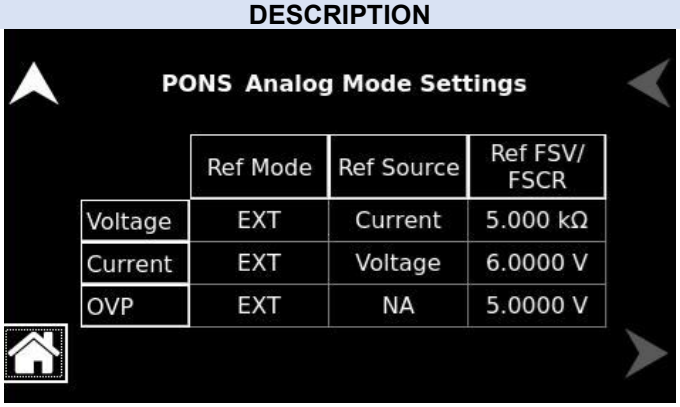


Figure 10-153. PONS Analog Mode Settings

b) PONS Configure Analog Mode

Sets parameter values and controls operation of the PONS Analog Programming interface. Refer to Figure 10-154.

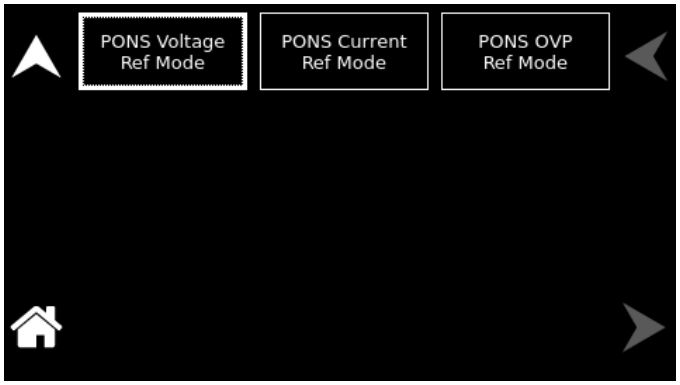
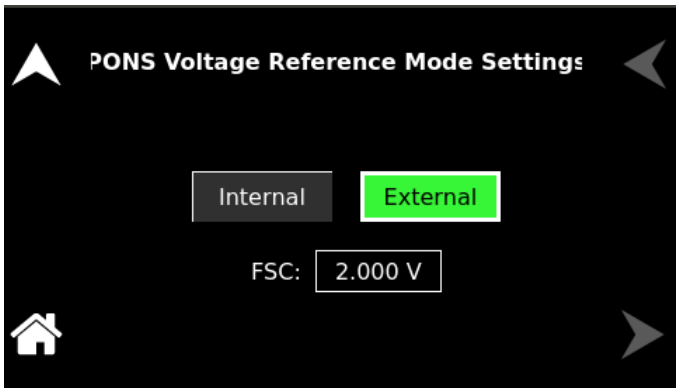


Figure 10-154. PONS Configure Analog Mode Settings

- **PONS Voltage Ref Mode :** Configures the PONS Voltage Reference Mode, refer to Figure 10-154. When the PONS Voltage Reference Mode is set to External, the Voltage setting field on the Dashboard screen and the 'Voltage' in the Output Program screen will be disabled, and these Voltage fields will display as 'EXT'. Refer to Figure 10-155.



ENTRY	DESCRIPTION

Figure 10-155. PONS Voltage Reference Mode

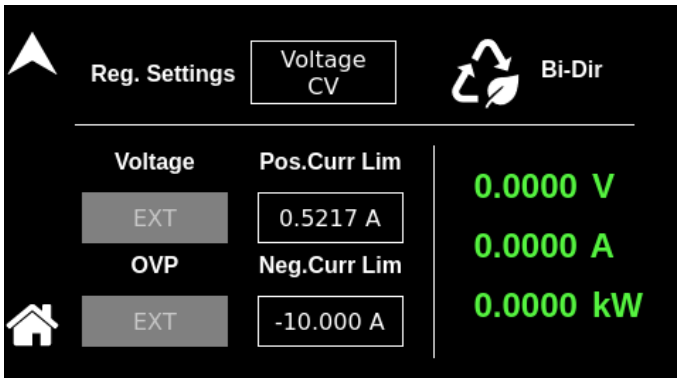


Figure 10-156. Dashboard Screen – Voltage (EXT)

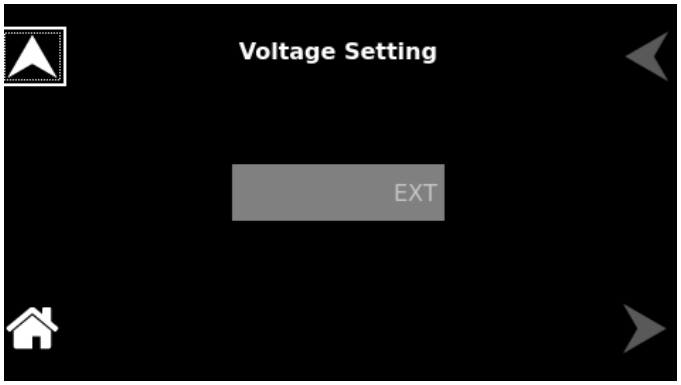


Figure 10-157. Output Program Screen – Voltage (EXT)

When Voltage Reference Mode is selected as Current, FSCR (Full Scale Current Resistance) unit will be kΩ (k Ohms). Refer to Figure 10-158.

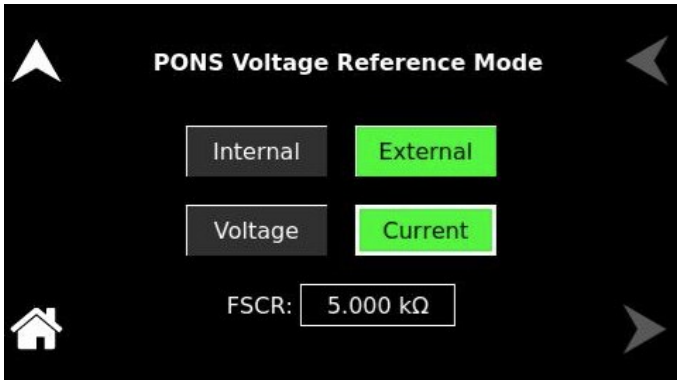


Figure 10-158. PONS Voltage Reference Mode – Resistive

- **PONS Current Ref Mode:** Configures the PONS Current Reference Mode, refer to Figure 10-159. When the PONS Current Reference Mode is set to External, the Voltage setting field on the Dashboard

ENTRY	DESCRIPTION

screen and the ‘Voltage’ option in the Output Program screen will be disabled, and these Voltage fields will display as ‘EXT’. Refer to Figure 10-160.

NOTE: ‘Current’ is only applicable for Bi-directional mode. When you select the ‘Current’, the screen display as ‘Only applicable for Source Mode’.

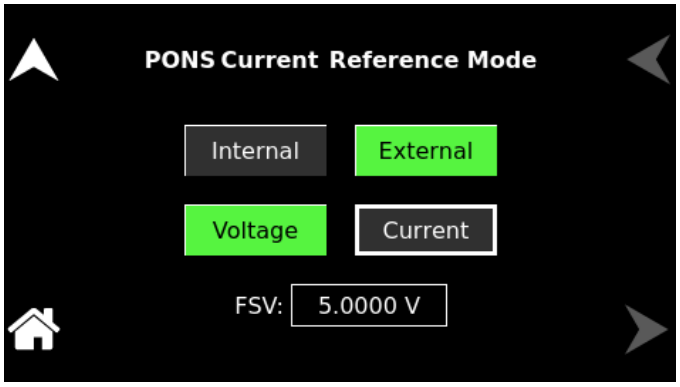


Figure 10-159. PONS Current Reference Mode

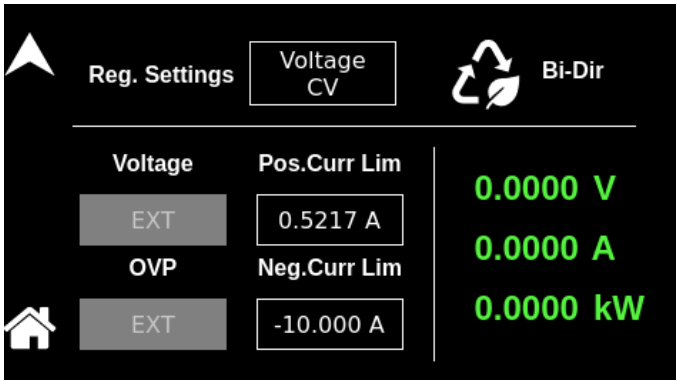


Figure 10-160. Dashboard Screen – Current (EXT)

- **PONS OVP Ref Mode:** Configures the PONS Over Voltage Protection (OVP) Reference Mode. When the PONS OVP Reference Mode is set to External, the OVP setting field on the Dashboard screen and the ‘Protection’ option in the Configuration screen will be disabled, and these OVP fields will display as ‘EXT’ refer to Figure 10-161.

ENTRY	DESCRIPTION

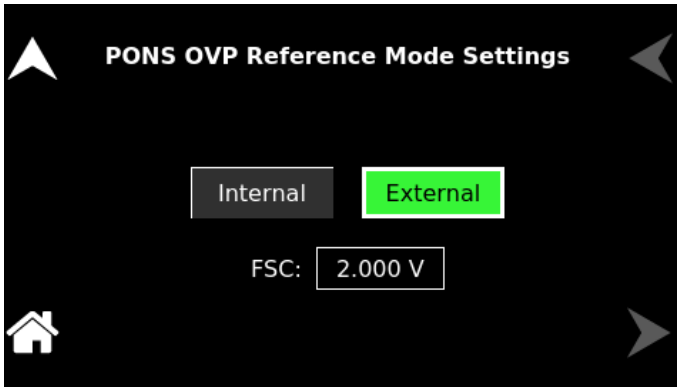


Figure 10-161. PONS OVP Reference Mode

PONS Remote Inhibit

User can control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 10-162.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

Remote inhibit can be configured in three modes;

- **Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output.
- **Live:** after reclosing the contact, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

b) Remote Inhibit Input – Active Source

An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply.

Remote inhibit can be configured in three modes;

- **Latch**: after removing the active voltage source, user needs to clear the fault and turn ON the output.
- **Live:** after removing the active voltage source, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

ENTRY	DESCRIPTION

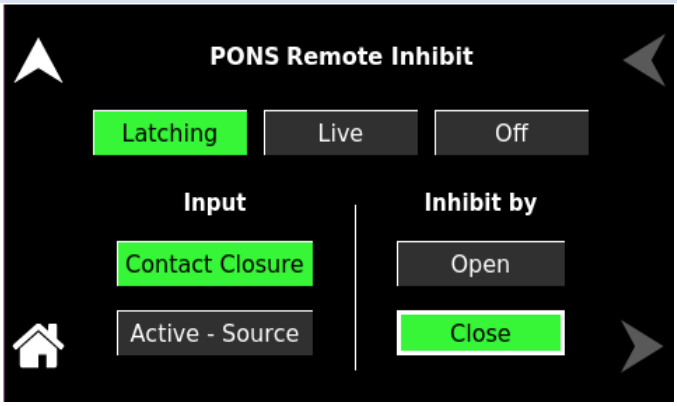


Figure 10-162. PONS remote Inhibit

PONS Remote Output

User can program the PONS Remote output to ON or OFF state. Refer to Figure 10-163.

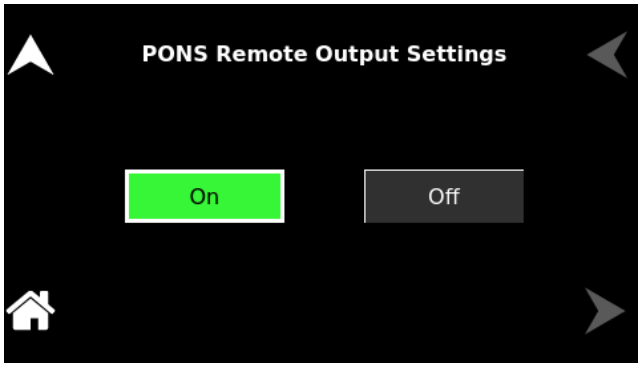


Figure 10-163. PONS Remote Output settings

PONS AC Input Line

User can select either the High Line or Low Line option based on the required input voltage range. Refer to Figure 10-164.

a) High Line: The nominal High Line Input range is 380 to 480 VAC.

b) Low Line: The nominal Low line input range is 200 to 240 VAC.

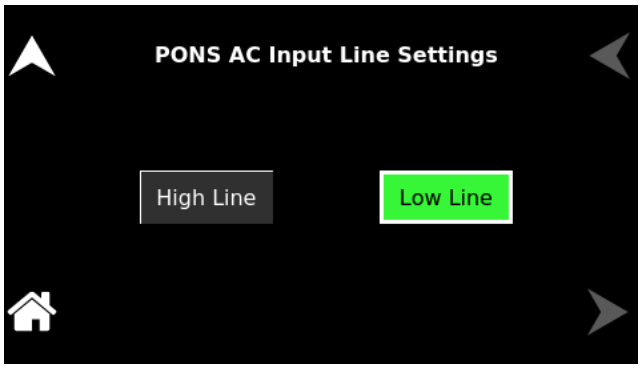


Figure 10-164. AC Input Line Settings

PONS Multi

Users can select the operation setting to Parallel or Series (Grounded or Non-

ENTRY	DESCRIPTION
Chassis Operation	Grounded) or Series Split Phase (Grounded or Non-Grounded). The unit determines the connection type based on the selected option. Refer to Figure 10-165.

NOTE: If the unit is operating in standalone mode and the user selects the Parallel or Series or Series Split phase option, the selection remains enabled on the display; but the setting does not affect unit operation.

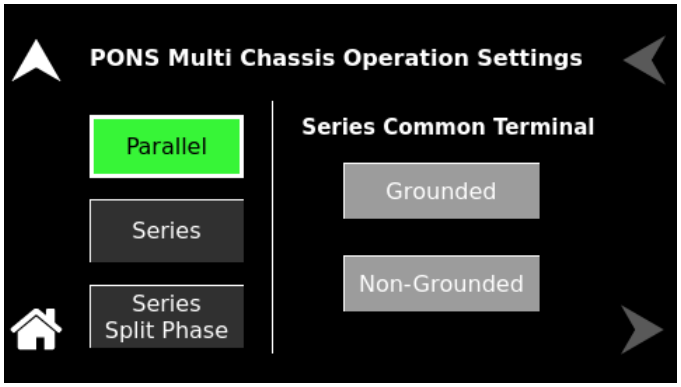
a) Parallel: Configure to perform parallel operation mode. Refer to Chapter 5.

b) Series: Configure to perform series operation mode, used when there is no connection to the load's common terminal from the leader or follower units. Refer to Chapter 6.

- **Grounded:** When either the Leader's negative (-) terminal or the Follower's positive (+) terminal is connected to the chassis earth.
- **Non-Grounded:** When either the Leader's negative (-) terminal or the Follower's positive (+) terminal is not connected to the chassis earth.

c) Series Split Phase: Configure to perform series split phase operation mode used when there is a connection to the load's common terminal from the leader or follower units. Refer to Chapter 6.

- **Grounded:** When either the Leader's negative (-) terminal or the Follower's positive (+) terminal is connected to the chassis earth.
- **Non-Grounded:** When either the Leader's negative (-) terminal or the Follower's positive (+) terminal is not connected to the chassis earth.



ENTRY	DESCRIPTION

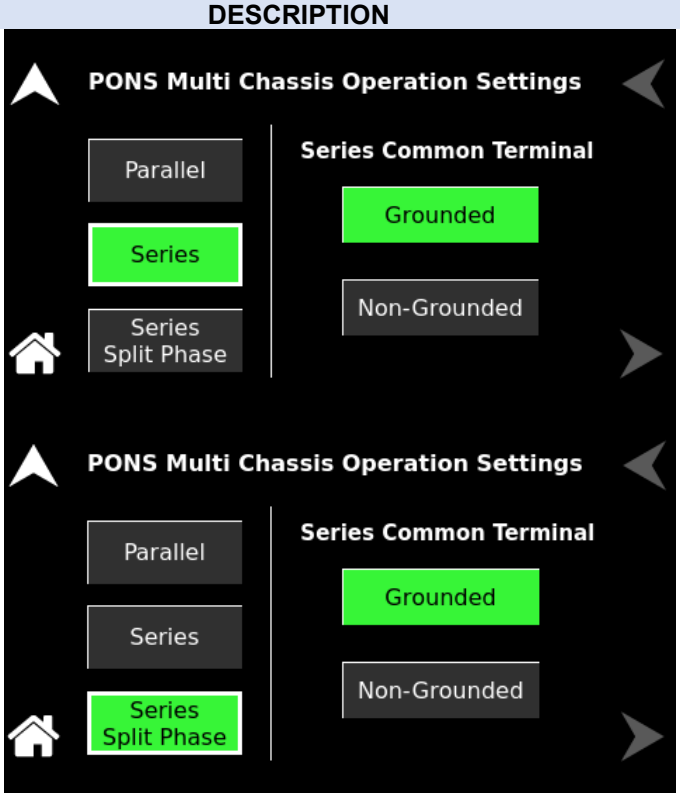


Figure 10-165. PONS Parallel Multi Chassis Operation Settings

PONS Parallel Operation Mode

User can select the operation mode settings to Max Power or Max Current. Refer to Figure 10-166.

NOTE: Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel.

a) **Max Power:** Configure to deliver maximum power by limiting the overall current.

b) **Max Current:** Configure to deliver maximum current by limiting the overall power.

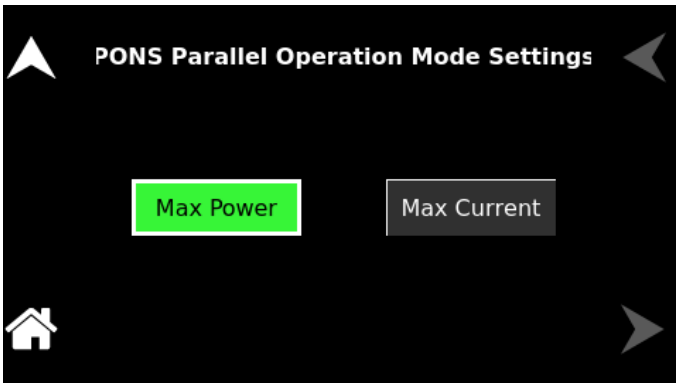


Figure 10-166. PONS Parallel Operation Mode Settings

Table 10-29. PONS Configuration mode

10.2.5.8 MEASUREMENT AVERAGE SAMPLES

The Measurement Average Samples Settings Menu allows the user to specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 10-167.

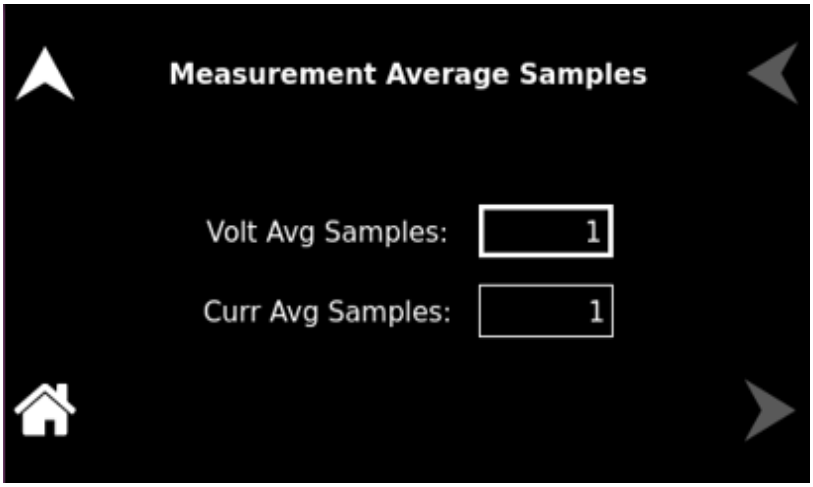


Figure 10-167. Measurement Average Samples

The Measurement Average Samples Settings menu has the following fields:

ENTRY	DESCRIPTION
Volt Avg Samples	Sets the number of voltage readings to average together to reduce noise in the voltage readback. Allows to set a value between 1 to 8.
Curr Avg Samples	Sets the number of current readings to average together to reduce noise in the current readback. Allows to set a value between 1 to 8. The value of 1 (factory default) provides the fastest response time in the readings, but less rejection of noise.

Table 10-30. Measurement Average Sample

10.2.5.9 PARALLEL OPERATION MODE

The Parallel Operation Mode setting is enabled only when the Mi-BEAM power supply is in parallel operation. This menu allows the user to achieve either maximum power or maximum current during parallel operation. When ‘Max Current’ is selected, the system delivers maximum current by limiting the overall power, whereas when ‘Max Power’ is selected, the system delivers maximum power by limiting the overall current. Refer to Figure 10-168.

NOTE: Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel.

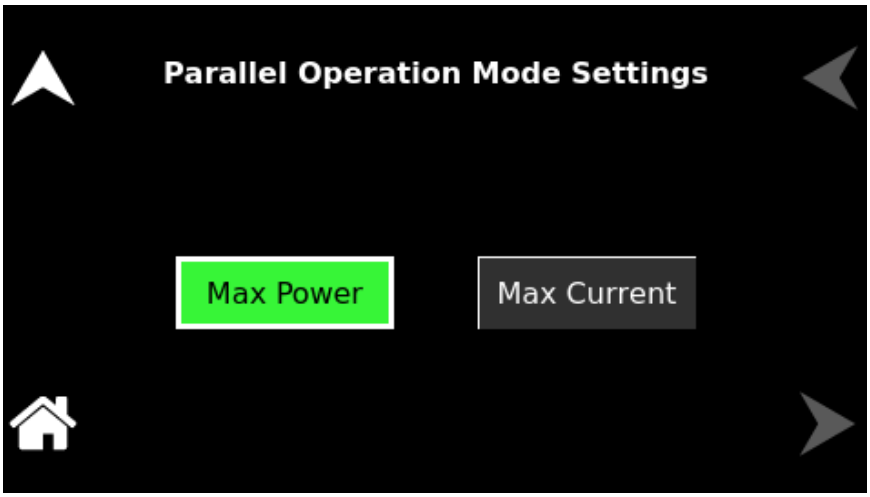


Figure 10-168. Parallel Operation Mode Settings

10.2.6 CONTROL INTERFACE SCREEN

The Control Interface screen provides ‘LAN’, ‘RS232’, ‘USB’, ‘External CAN (Default)’, ‘GPIB’ (available only when Mi-BEAM power supply is equipped with a GPIB interface) ’, ‘Analog, ‘Remote inhibit’ and ‘Remote Output’. For the top-level menu of the Control Interface Screen, refer to Figure 10-169 and for instructions on how to navigate to the Control Interface screen, refer to Section 9.4.2.2.

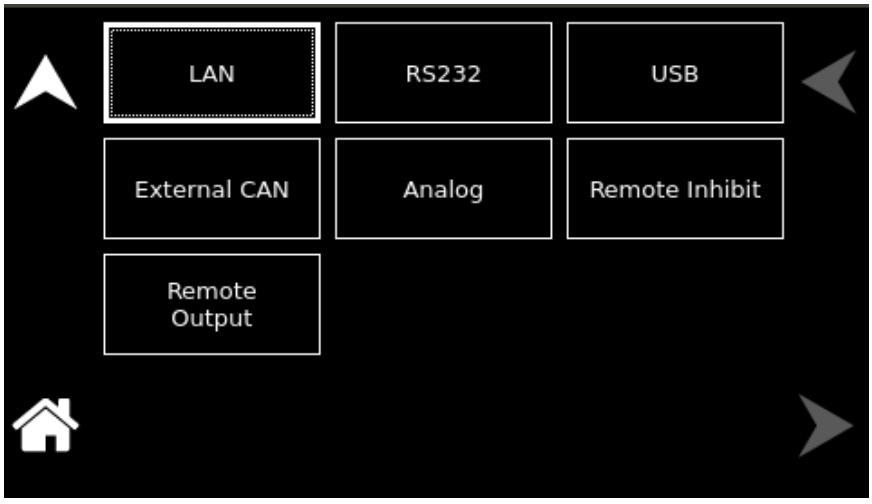


Figure 10-169. Control Interface Screen Top-Level Menu – Default

When the Mi-BEAM power supply is equipped with a GPIB interface, the control interface screen menu changes. Refer to Figure 10-170.

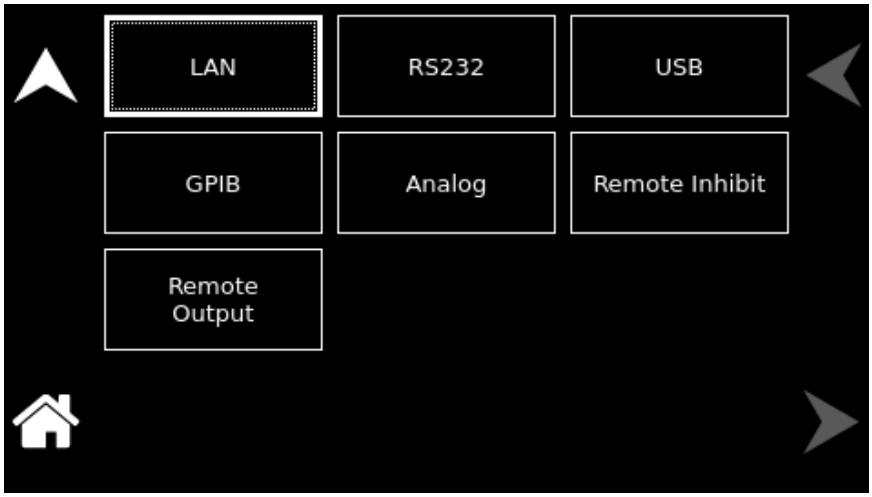


Figure 10-170. Control Interface Screen Top-Level Menu- GPIB Option

The Control interface Settings menu has the following fields:

ENTRY	DESCRIPTION
LAN	Configures the LAN (LXI Ethernet) communications interface, refer to Figure 10-171. After settings are changed, the unit must be turned OFF/ON for them to take effect.

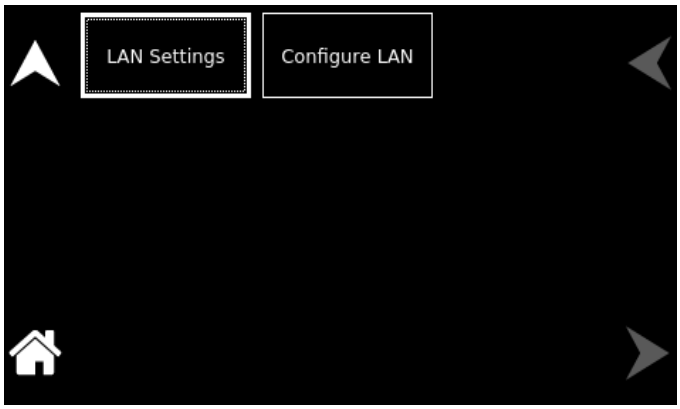


Figure 10-171. LAN Screen

a) LAN SETTINGS

Lists the configuration settings of the LAN interface, and the DNS-SD service name; a number, (n), would be appended to the service name, if necessary, to differentiate duplicate power supply names. Refer to Figure 10-172.

ENTRY	DESCRIPTION

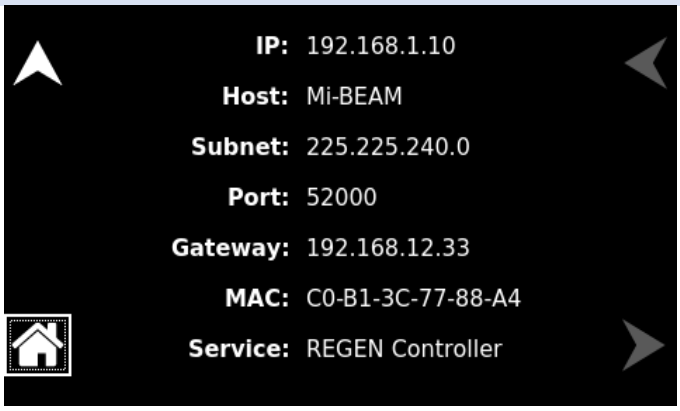


Figure 10-172. LAN Settings

b) LAN CONFIGURE

Sets parameter values and controls operation of the LAN interface, refer to Figure 10-173.

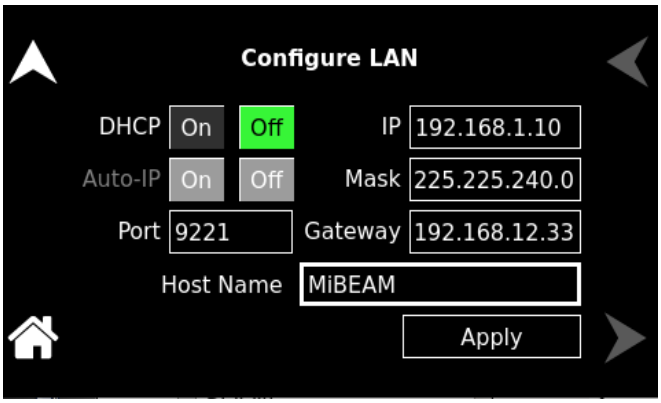


Figure 10-173. Configure LAN

- **DHCP**: Selects whether DHCP is enabled or disabled. Refer to Figure 10-174.

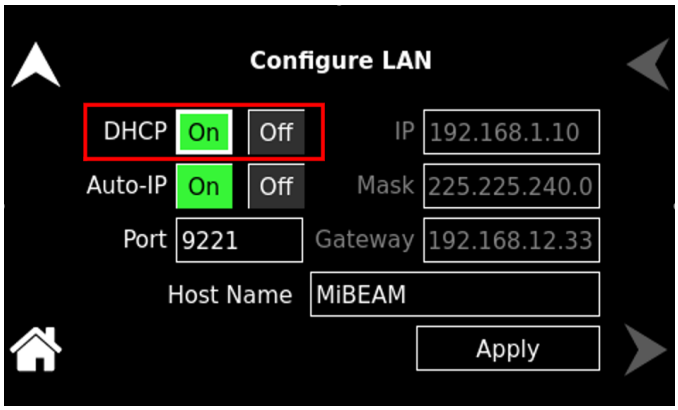


Figure 10-174. LAN Screen – DHCP

NOTE: When DHCP is selected, the IP address is assigned by the network DHCP

ENTRY	DESCRIPTION

server. If DHCP server fails to assign an IP address and Auto-IP is enabled, the unit gets an IP address in the range of 169.254.X.X/

- **Auto-IP**: Enables or disable the Auto-IP configuration, when DHCP is ON. Refer to Figure 10-175.

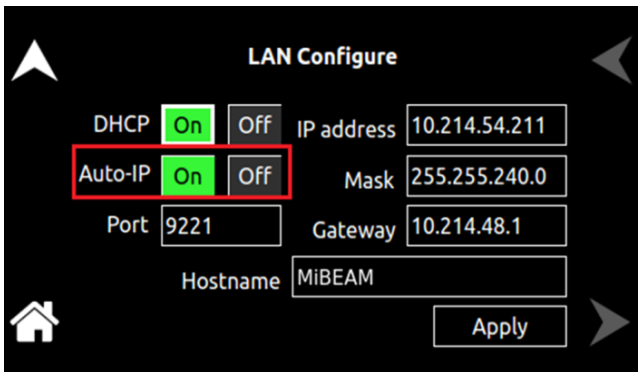


Figure 10-175. LAN Screen - Auto -IP

- **IP Address**: Sets the static IP address for the unit. When DHCP is turned off in the LAN CONFIG sub-menu, AUTO IP is selected, set the IP address to all zeros so that the IP address would be requested from the network; when DHCP is selected, the IP address is assigned by the network DHCP server. Refer to Figure 10-176.

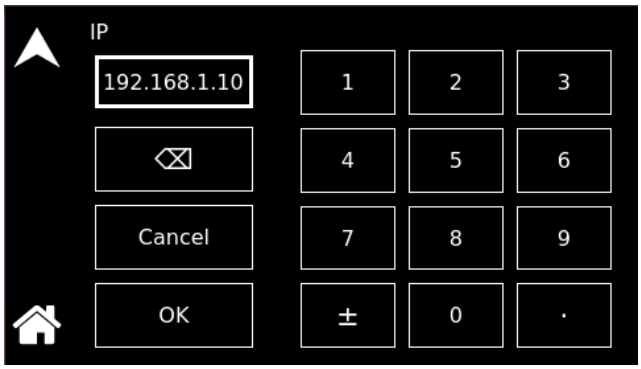
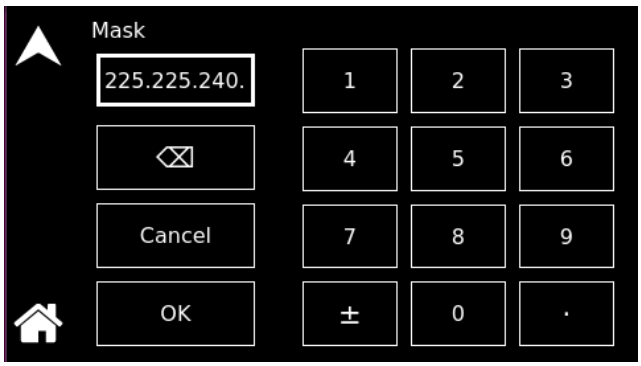


Figure 10-176. LAN Screen - IP Address

- **Subnet Mask**: Sets the subnet mask, when DHCP is turned off in the LAN CONFIG sub-menu. Refer to Figure 10-177.



ENTRY	DESCRIPTION

Figure 10-177. LAN Screen - Subnet Mask

- **Gateway Address**: Sets the gateway address when DHCP is turned off in the LAN CONFIG sub-menu and when AUTO IP is selected, set the gateway address to all zeros so that the gateway address would be requested from the network; when DHCP is selected, the gateway address is assigned by the network DHCP server. Refer to Figure 10-178.

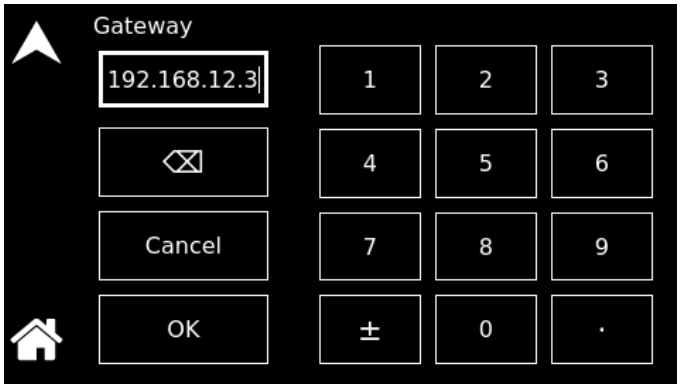


Figure 10-178. LAN Screen - Gateway Address

NOTE: When DHCP is selected, the gateway address is assigned by the network DHCP server.

- **Port**: Sets the port number; the factory-default value is 9221. Refer to Figure 10-179.



Figure 10-179. LAN Screen -Port

- **MAC Address:** Displays the MAC address; the MAC address is listed on a label on the chassis of the unit. Refer to Figure 10-180.

ENTRY	DESCRIPTION



Figure 10-180. MAC Address

- **Host Name**: Allows setting a unique alpha-numeric host name. Refer to Figure 10-181.



Figure 10-181. LAN Screen - Host Name

- **Apply**: Applies the LAN settings to the supply. Refer to Figure 10-182 and Figure 10-183.

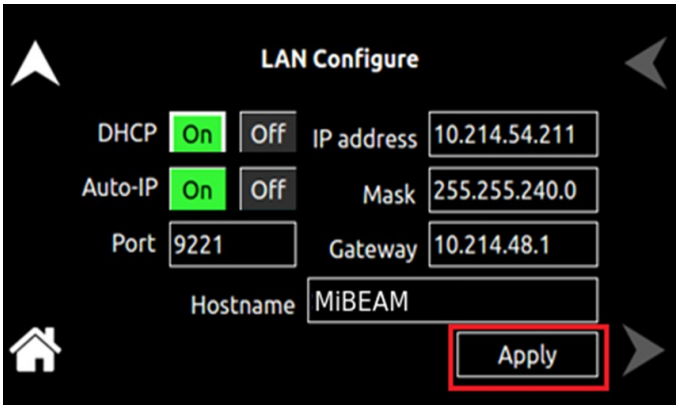


Figure 10-182. LAN Screen – Apply

ENTRY	DESCRIPTION

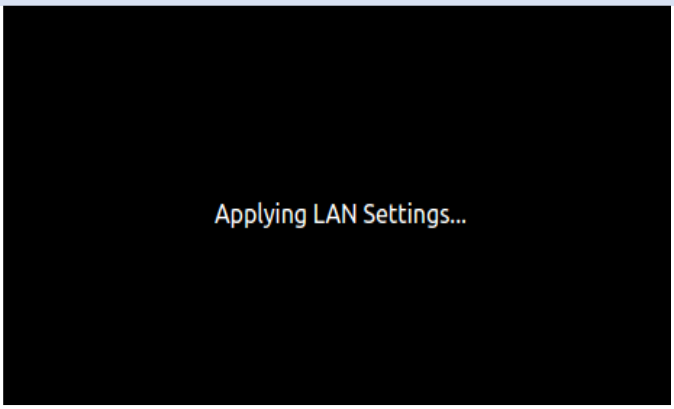


Figure 10-183. LAN Screen - Applying LAN Settings

RS232

Configures the RS-232C communications interface.RS232 has two sub-menus: RS232 Settings and RS232 Configure

a) RS232 Settings: Lists the configured Baud Rate, Stop Bits, Bits and Parity for the RS232 digital interface, refer to Figure 10-184.

- **Baud Rate**: sets baud rate to either 9600, 19200, 38400, 57600 or 115200 baud. The default setting is 115200 baud.
- **Stop Bits** sets the number of stop bits to either 1 or 2 bits. The default setting is 1 stop bit.
- **Data**: sets the number of data bits to either 7 or 8. The default setting is 8 bits.
- **Parity**: sets the parity to either Even, Odd, or no parity, None. The default setting is no parity, None.



Figure 10-184. RS232 Screen -Settings

b) Configure RS232: Configures the RS-232 Baud Rate, refer to Figure 10-185 and Figure 10-186. This setting must match those set for the communications port of the user external controller.

- **Baud Rate**: sets baud rate to either 9600, 19200, 38400, 57600 or 115200 baud. The default setting is 115200 baud.

ENTRY	DESCRIPTION

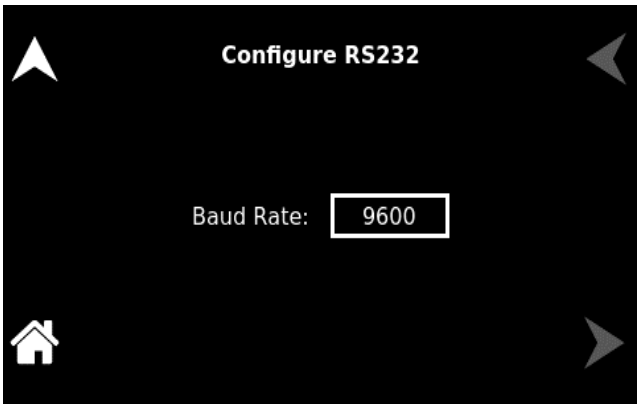


Figure 10-185. RS232 Screen -Configure

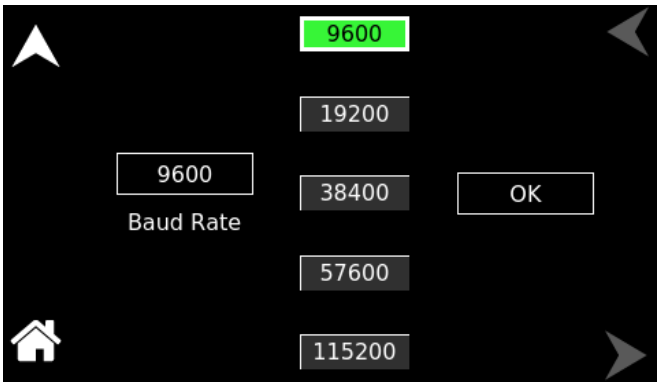


Figure 10-186. Baud Rate Selection

USB Displays the configured Baud Rate. Refer to Figure 10-187.

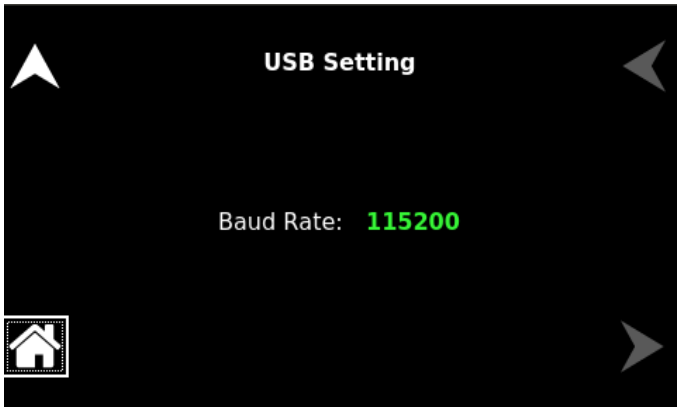


Figure 10-187. USB Setting

External CAN Configures the device Node Address, Baude Rate and Communication Protocol. Refer to Figure 10-188.

ENTRY	DESCRIPTION

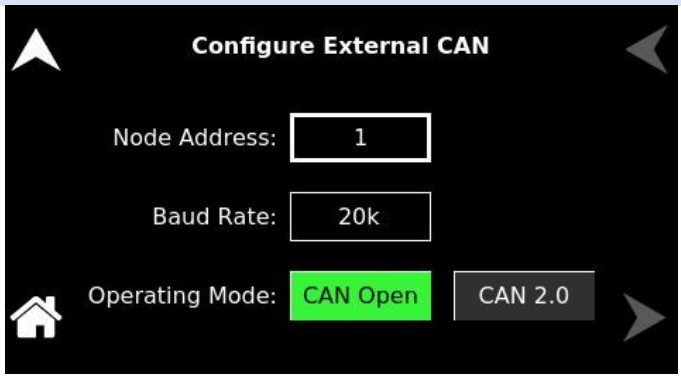


Figure 10-188. Configure External CAN

a) Node Address: Sets the CAN Node Address to the range of 1 to 127. Refer to Figure 10-189.



Figure 10-189. Node Address

b) Baud Rate: Sets baud rate from 20kbps to 1mbps (20k, 40k, 50k, 80k, 100k, 125k, 150k, 200k, 250k, 400k, 500k, 1000 kbps). Refer to Figure 10-190.



Figure 10-190. Baud Rate

ENTRY	DESCRIPTION

c) **Operating Mode:** Sets the communication protocol to CAN2.0 or CANopen. Refer to Figure 10-188.

- **CANopen**
  - Covers basic CANopen configuration, including NMT (Network Management) setup, TPDO (Transmit Process Data Object) mapping, and SDO (Service Data Object) structures.
  - Enables standardized communication and seamless integration into existing industrial CANopen networks.
- **CAN 2.0**
  - Describes the Hardware configuration and use of extended 29-bit identifiers.
  - Supports custom command or response mappings, allowing flexible and proprietary protocol integration.

GPIB Displays and Configures the GPIB Setting. Refer to Figure 10-191.

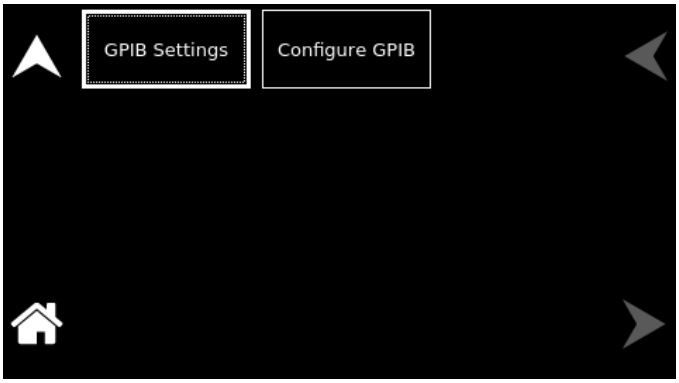
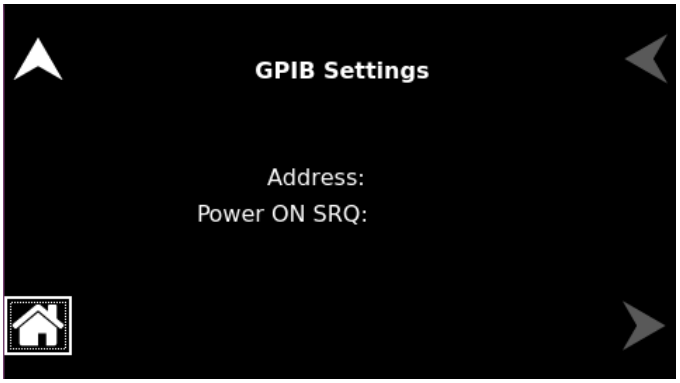


Figure 10-191. GPIB

a) GPIB Settings

Displays the configured address and Power ON SRQ.



ENTRY	DESCRIPTION

Figure 10-192. GPIB Settings

b) Configure GPIB

Configure the IEEE-488 address; the default is 1. The address can be set from 0 through 30.

Also allows to turn On/Off the Power ON Service Request. Power On SRQ set to On causes a GPIB service request to be sent to the computer, when the Power Supply is turned on. Factory Default value for Power On SRQ is Off.

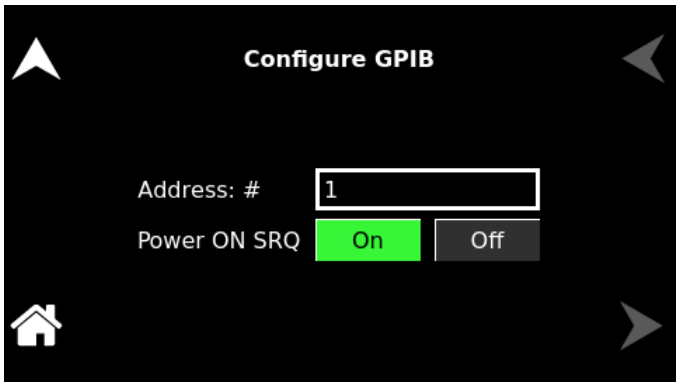


Figure 10-193. Configure GPIB

Analog Configures the Analog programming interface, refer to Figure 10-194.

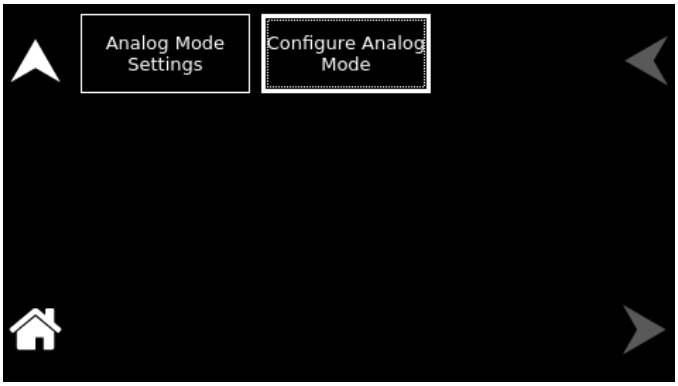


Figure 10-194. Analog Screen

a) Analog Mode Settings

Lists the configuration settings of the Analog Programming interface. Refer to Figure 10-195.

ENTRY	DESCRIPTION

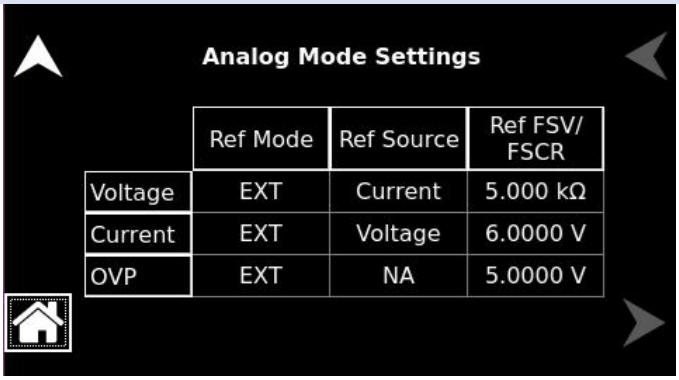


Figure 10-195. Analog Mode Settings

b) Configure Analog Mode

Sets parameter values and controls operation of the Analog Programming interface. Refer to Figure 10-196.

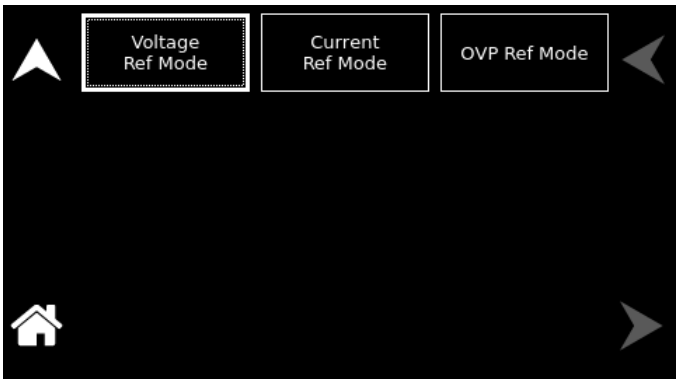


Figure 10-196. Configure Analog Mode Settings

- **Voltage Ref Mode :** Configures the Voltage Reference Mode, refer to Figure 8-193. When the Voltage Reference Mode is set to External, the Voltage setting field on the Dashboard screen and the 'Voltage' option in the Output Program screen will be disabled, and these Voltage fields will display as 'EXT'. Refer to Figure 10-197 to Figure 10-199.

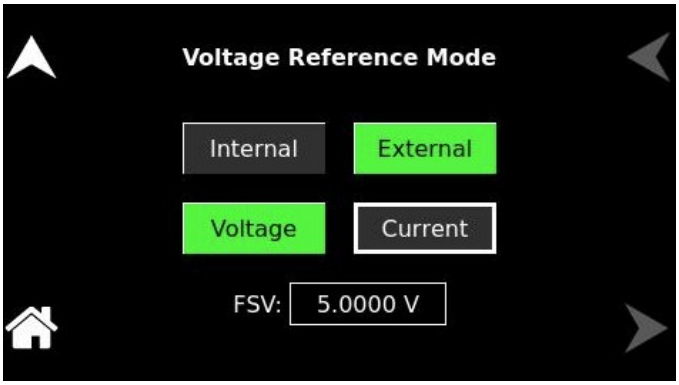


Figure 10-197. Voltage Reference Mode

ENTRY	DESCRIPTION

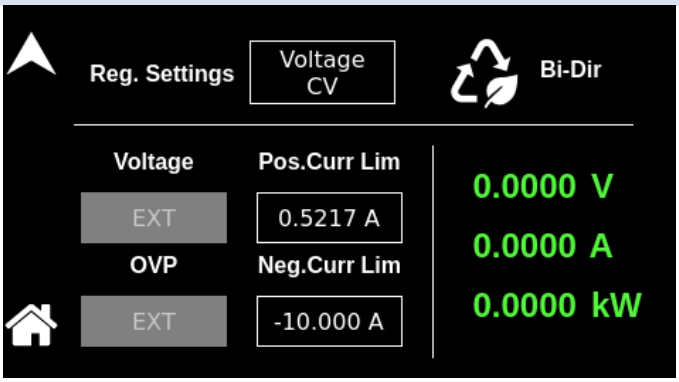


Figure 10-198. Dashboard Screen – Voltage (EXT)

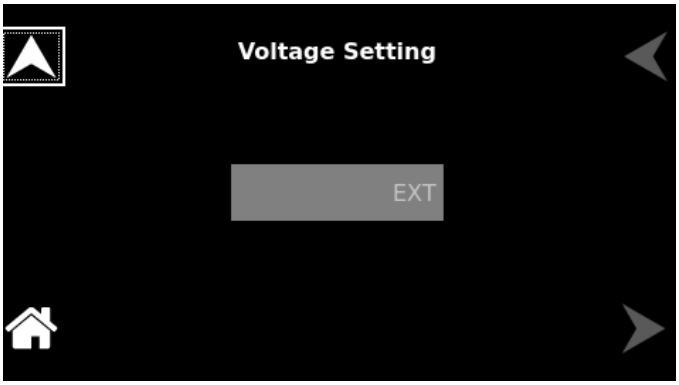


Figure 10-199. Output Program Screen – Voltage (EXT)

When Voltage Reference Mode is selected as Current, FSCR (Full Scale Current Resistance) unit will be kΩ (k Ohms). Refer to Figure 10-200.

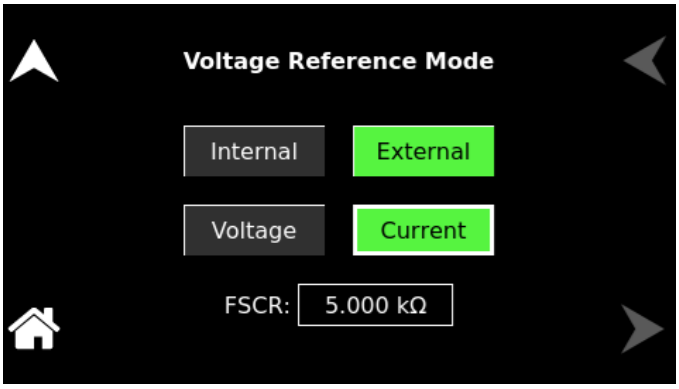


Figure 10-200. Voltage Reference Mode – Resistive

- **Current Ref Mode:** Configures the Current Reference Mode, refer to Figure 10-193. When the Current Reference Mode is set to External, the Voltage setting field on the Dashboard screen and the 'Voltage' option in the Output Program screen will be disabled, and these Voltage fields will display as 'EXT'. Refer to Figure 10-201 and Figure 10-202.

ENTRY	DESCRIPTION

NOTE: 'Current' is only applicable for Bi-directional mode. When you select the 'Current', the screen display as 'Only applicable for Source Mode'.

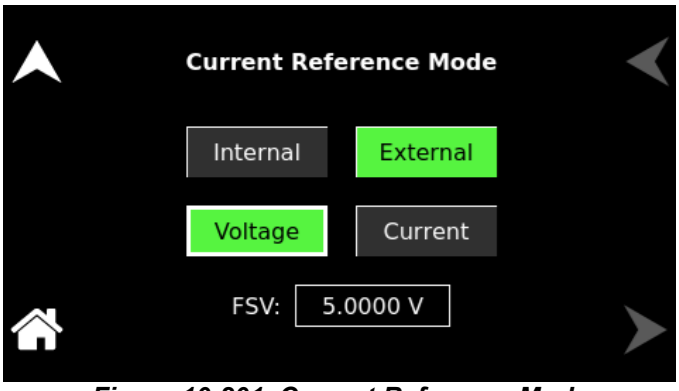


Figure 10-201. Current Reference Mode

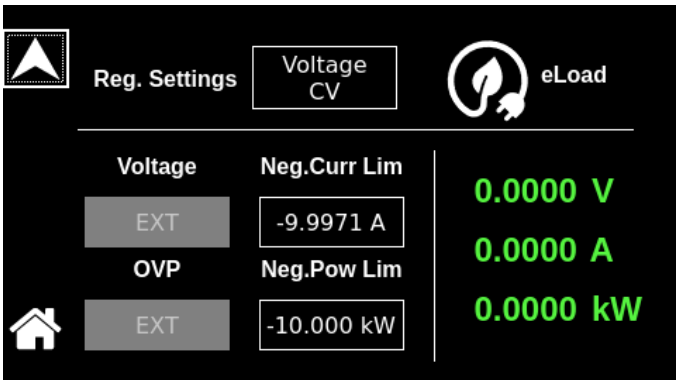


Figure 10-202. Dashboard Screen – Current (EXT)

- **OVP Ref Mode:** Configures the Over Voltage Protection (OVP) Reference Mode. When the OVP Reference Mode is set to External, the OVP setting field on the Dashboard screen and the 'Protection' option in the Configuration screen will be disabled, and these OVP fields will display as 'EXT' refer to Figure 10-203.

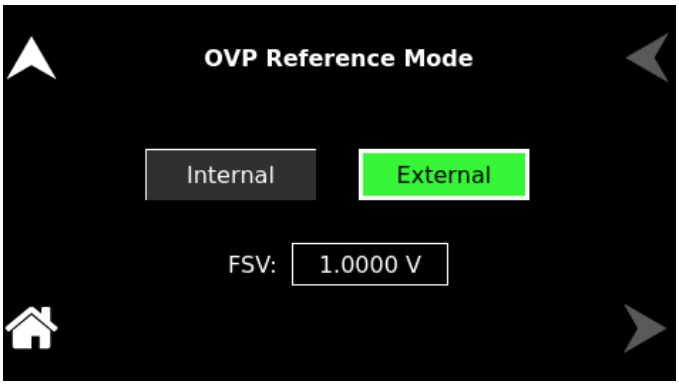


Figure 10-203. OVP Reference Mode

ENTRY	DESCRIPTION
Remote Inhibit	Sets the control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 10-204. **a) Remote Inhibit Input – Contact Closure** Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output. Remote inhibit can be configured in three modes; • **Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output. • **Live:** after reclosing the contact, user needs to turn ON the output. • **OFF:** inhibit function would be disabled. **b) Remote Inhibit Input – Active Source** An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply. Remote inhibit can be configured in three modes; • **Latch:** after removing the active voltage source, user needs to clear the fault and turn ON the output. • **Live:** after removing the active voltage source, user needs to turn ON the output. • **OFF:** inhibit function would be disabled.

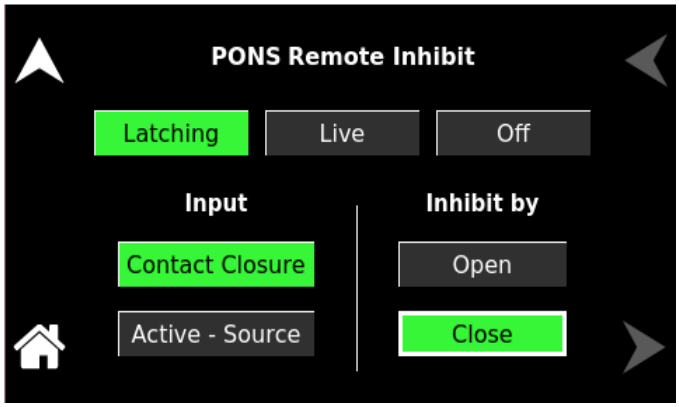


Figure 10-204. PONS Remote Inhibit

Remote Output	Configures the Remote Output to ON or OFF, refer to Figure 10-205.

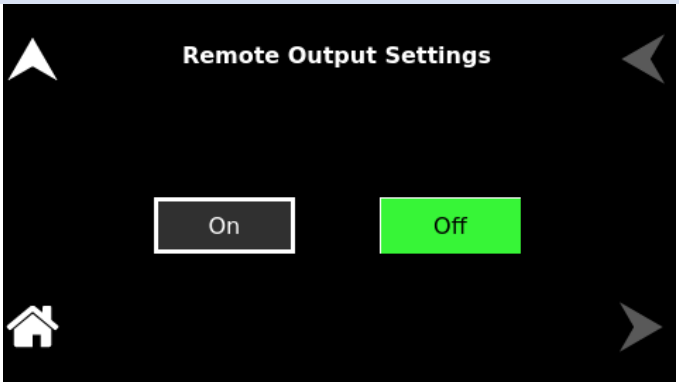
ENTRY	DESCRIPTION
	

Figure 10-205. Remote Output Settings

Table 10-31. System Settings Screen

10.2.7 OPERATING MODE

The Operating Mode Settings screen offers comprehensive guidance on the system modes of the Mi-BEAM Series power supply. This model is engineered for versatile and reliable performance across various applications, ensuring precise and efficient power delivery through its advanced control features. Depending on user requirements, the Mi-BEAM Series supports multiple modes of operation. Refer to the Figure 10-206.

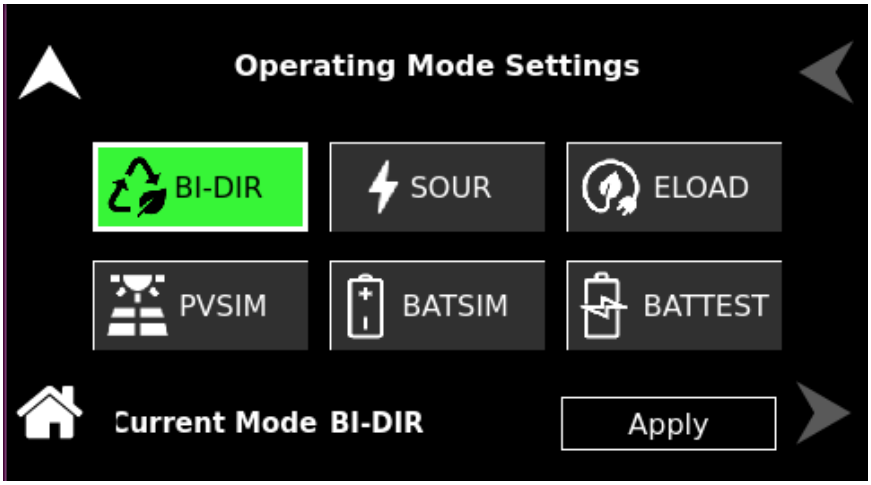


Figure 10-206. Operating Mode

NOTE: When the unit is in series operation, the non-applicable modes ‘PVSIM’, ‘BATSIM’, and ‘BATTEST’ do not appear in ‘Operating Mode Settings’.

10.2.8 SYSTEM SETTINGS SCREEN

The System Settings screen provides information on ‘Hardware Limits’, System Details’, ‘Firmware Version’, ‘LCD’, ‘Default Screen’ and ‘Factory Default’. For the top-level menu of the

System Settings Screen, refer to Figure 10-207 and for instructions on how to navigate, refer to Section 9.4.2.2.

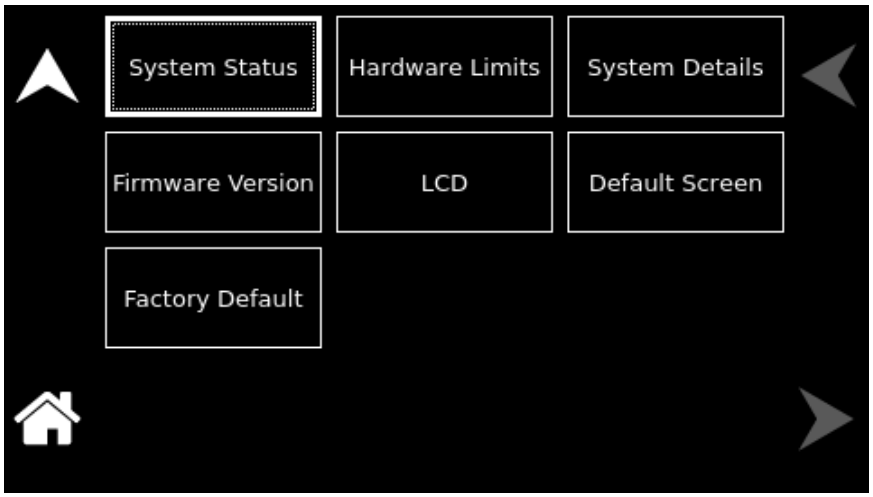


Figure 10-207. System Settings Screen

ENTRY	DESCRIPTION
System Status	Displays the present system status information of the power supply, including the Input Line, Output Sense, Isolation, Chassis Type and No. of chassis. Refer Figure 10-208 to Figure 10-211 . **NOTE:** The chassis type changes depending on the connection configuration; it is identified as Standalone (the power supply operates independently), Multi-chassis Parallel (the power supply is connected in parallel), Multi-chassis Series (the power supply is connected in series), and Multi-chassis Series Split Phase (the power supply is configured in a series split-phase connection).

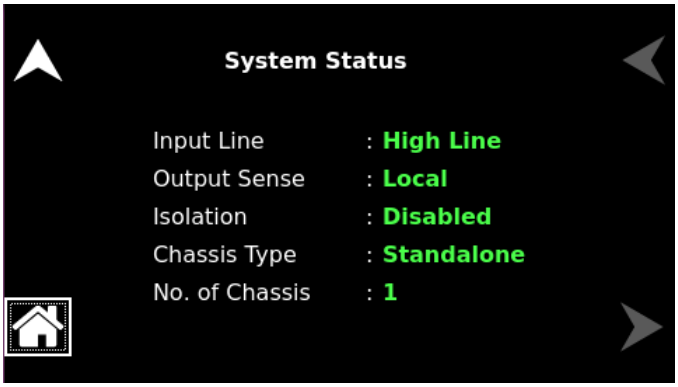


Figure 10-208. System Status – Standalone Unit

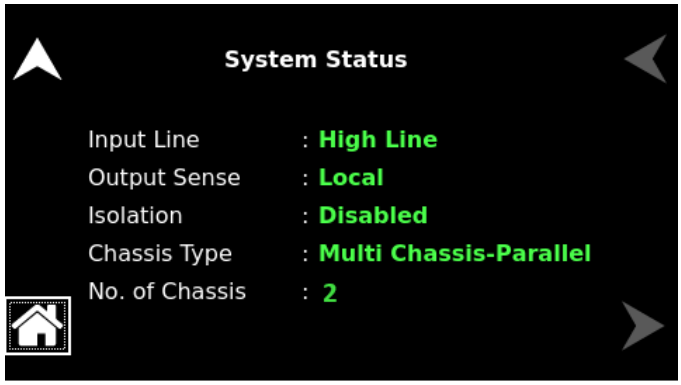


Figure 10-209. System Status – Parallel Operation

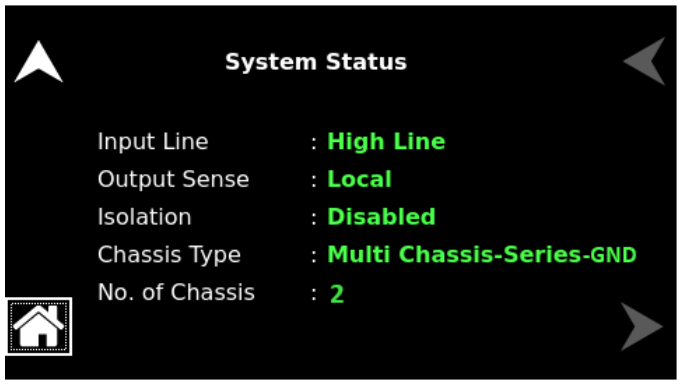


Figure 10-210. System Status – Series Operation

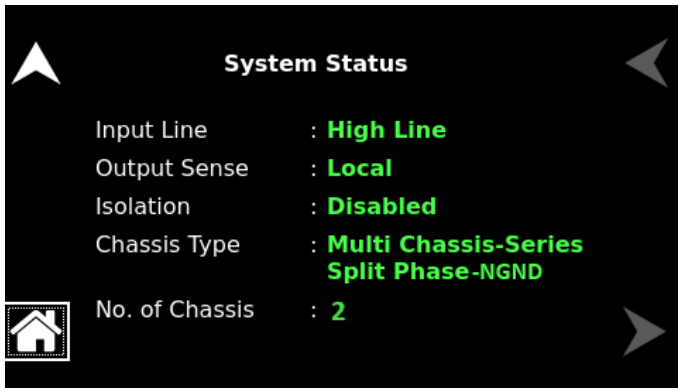


Figure 10-211. System Status – Series Split Phase Operation

Hardware Limits Displays the hardware parameter limit values. Refer to Figure 10-212.



Figure 10-212. Hardware Limits

System Details Displays the information about the power supply, including the Manufacturer, Model Number, Serial Number, Firmware Version, Last Calibration Date, and Operating Mode. Refer to Figure 10-213.

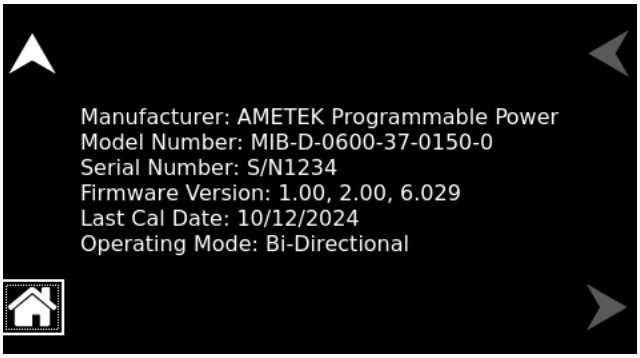


Figure 10-213. System Details

Firmware Version Displays information about the configuration of the power supply, including the Communication Controller, System Interface, Front Panel, Fan Controller, Mod 1 Primary Controller, Mod 1 Secondary Controller, Mod 2 Primary Controller, Mod 2 Secondary Controller, Mod 3 Primary Controller, Mod 3 Secondary Controller. This information helps identify the unit. Refer to Figure 10-214.

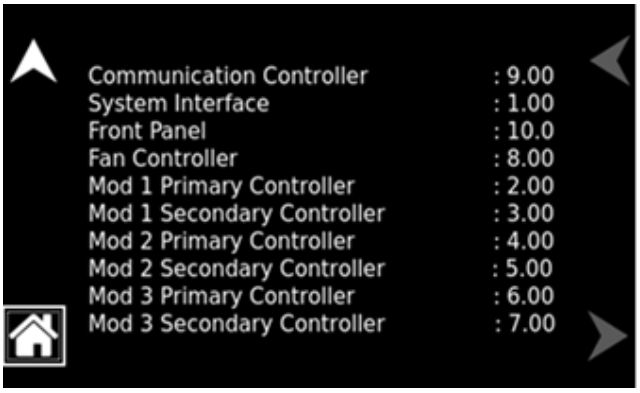


Figure 10-214. Firmware Version

LCD Provides settings for the calibration of the display touchscreen. Refer to Figure 10-215.

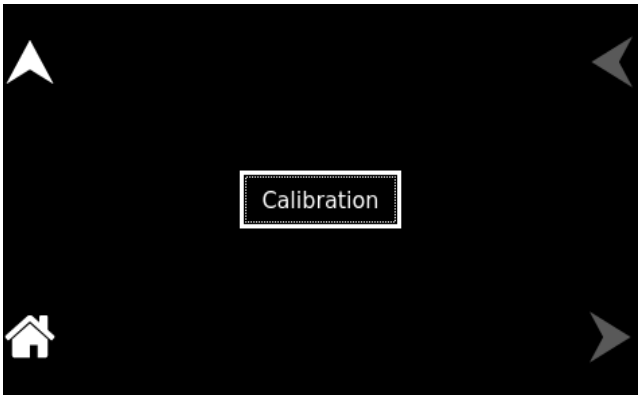


Figure 10-215. LCD

Default Screen

Selects whether the Default screen (showing measured voltage, current and power) is enabled or disabled, refer to Figure 10-216 and Figure 10-217. It allows to set the time out if the default screen is enabled.

a) **Timeout Interval**: Selects the time, in seconds, for how long Dashboard screen must be inactive before the Default screen is displayed.

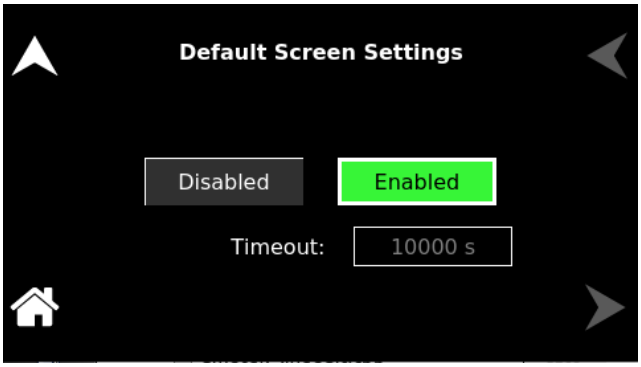


Figure 10-216. Default Screen Settings - Enabled

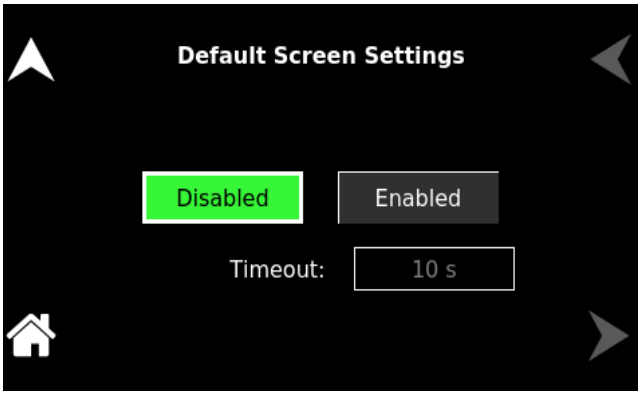


Figure 10-217. Default Screen Settings – Disabled

Factory Default

Set the device to its original factory settings, as it was when it left the manufacturer. Refer to Figure 10-218.

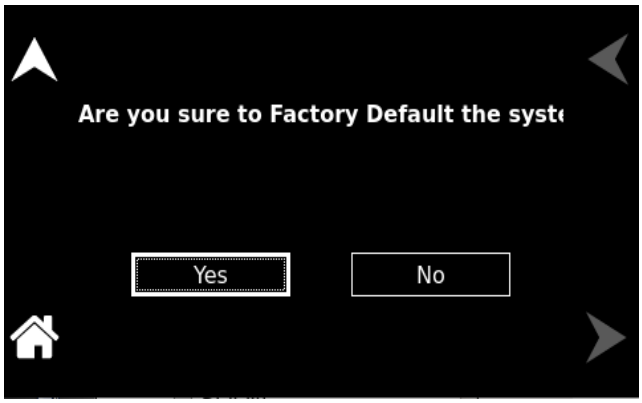


Figure 10-218. Factory Default

Table 10-32. System Settings Screen

10.2.9 SYSTEM FAULTS SCREEN

The System Faults screen provides descriptions of faults that have occurred in a power module. The fault screen appears if any supply fault conditions occur, refer to Figure 10-219. The user should press ‘Clear’ to clear the fault and continue operating the power supply, and press ‘Reload’ to refresh the system faults and check for errors. If no fault has occurred, the screen will display ‘No Fault Occurred’, refer to Figure 10-220.

NOTE: These conditions might resolve themselves; however, if they continue to occur after pressing 'Clear', refer to Chapter 17.

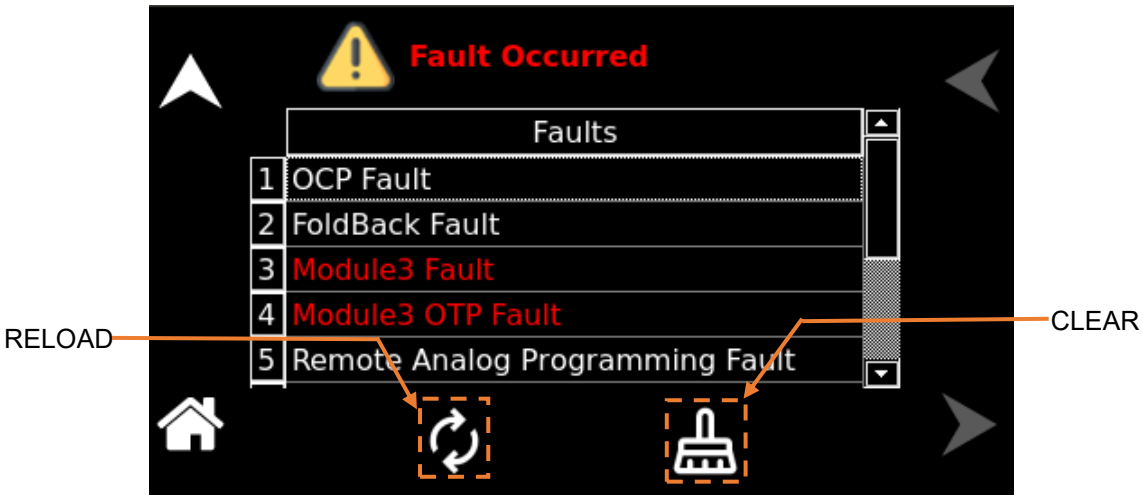


Figure 10-219. System Faults



Figure 10-220. No Fault Occurred Screen

If any fault occurs on the Follower screen, a fault signal is generated. Press 'Faults' to view the details of the faults on the Follower screen. Refer to Figure 10-221.

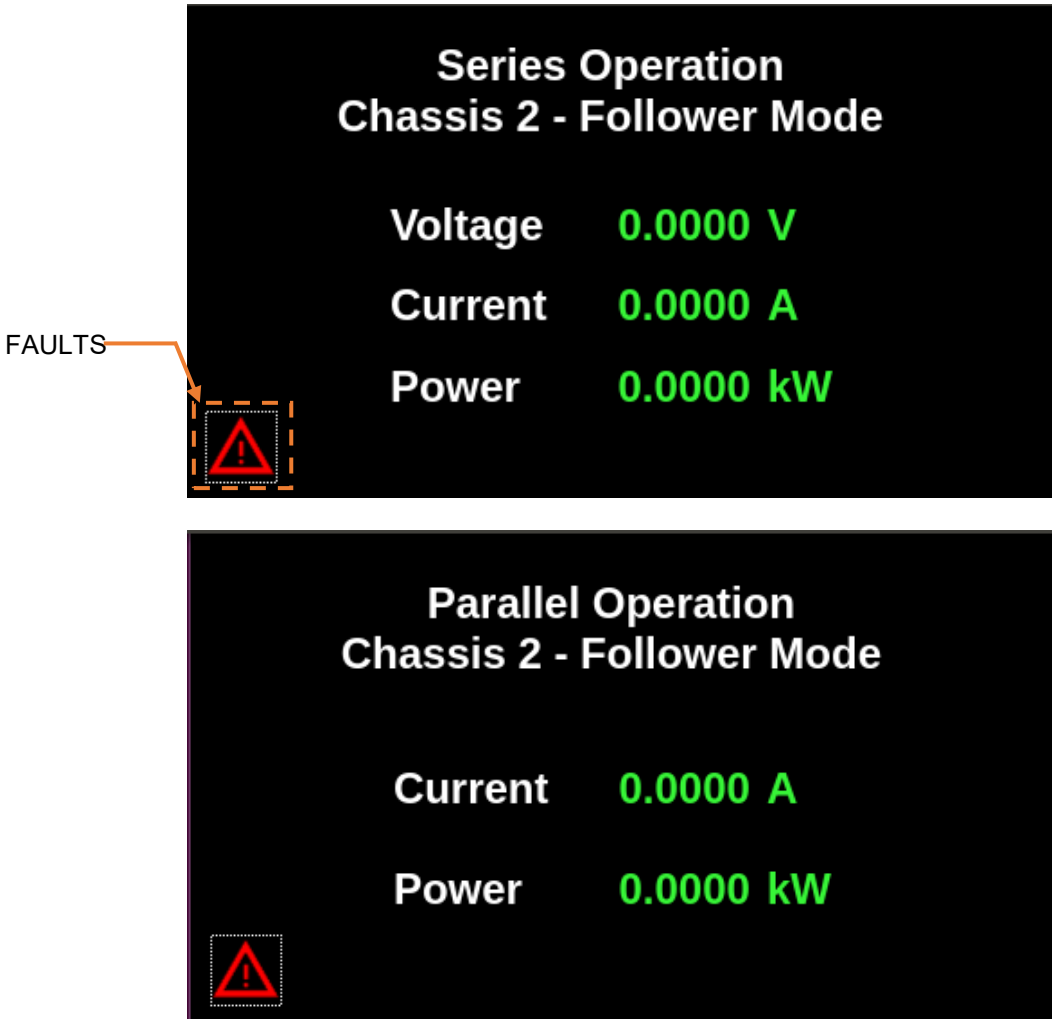


Figure 10-221. Follower Faults Screen

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11 SOURCE MODE OPERATION

11.1 Mi-BEAM CONNECTION TO UUT AND CONFIGURATION

11.1.1 IDENTIFY THE UUT PORT TYPE

Determine if the UUT port is a current type (e.g. DC-Charger output) or a voltage type (e.g. battery or any voltage source).

a) **Current type** – UUT regulates the current
b) **Voltage type** – UUT regulates the voltage

11.1.2 CONFIGURING MI-BEAM FOR CURRENT TYPE UUT

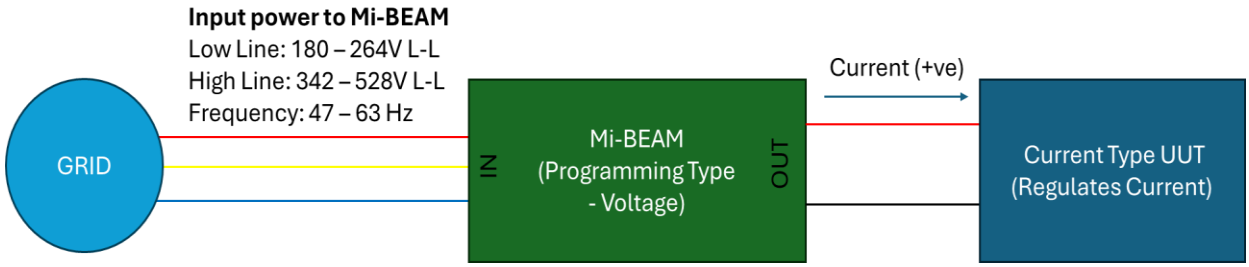


Figure 11-1. Current Type UUT

To configure the Current Type UUT, set the programming type (Prog. type) to 'Voltage' and select the appropriate regulation setting (CV/CC, CV Series Res, CV/CP, CP/CV and CV) in the dashboard. Refer to Section 11.2.1 for detailed instructions.

11.1.2.1 CONSTANT VOLTAGE/ CONSTANT CURRENT (CV/CC)

The power supply regulates the output voltage to the user-set value. On reaching the current limit (positive), the output is regulated to the current limit. On reaching the power limit (positive), the output voltage is programmed to zero, and the output is turned OFF. Refer to Section 11.2.1.2

a) **Configuration:** Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow form Mi-BEAM to UUT. Refer to Figure 11-94.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 11-94.

- **Voltage User Limit:** This setting limits the maximum voltage value that can be set in Mi-BEAM. Refer to Figure 11-97.

b) Setting Limits: The current and power limits can be set from the 'Output program' screen. In this regulation setting, Positive Current limit will be used to perform foldback operation, and Positive Power limit will be used to trip Mi-BEAM. Refer to section 11.2.2.1.

All applicable options based on the programming type 'Voltage' and regulation setting 'CV/CC' are shown in Table 11-1.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM	SERIES RES
VOLT	CV/CC	YES	NA	NA	NA	NA	YES	NA	YES	NA	NA

Table 11-1. Applicable Options – CV/CC

- **Positive Current limit:** On measured current reaching this value, Mi-BEAM will regulate the current at set current limit. This value must be set higher than the desired current which flows from Mi-BEAM to UUT. Refer to Figure 11-19.

- **Positive Power limit:** On measured power reaching this value output of the Mi-BEAM will be turned OFF. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 11-20.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Positive Current Limit and Positive Power Limit) after the delay time configured. Refer to Figure 11-87.

c) Setting Voltage value: Enter the voltage value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OVP. Refer to Figure 11-18.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 11-21.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 11.2.3.

h) End the Test: Once the test is complete, safely disconnect the UUT from the Mi-BEAM and power down the Mi-BEAM if no further tests are required.

11.1.2.2 CONSTANT VOLTAGE SERIES RESISTANCE (CV – SER RES)

The user can set the voltage and series resistance. The terminal voltage varies based on the voltage drop across the series resistance. On reaching the current limit (positive), power limit (positive), or voltage limit (low), the output voltage is programmed to zero, and the output is turned OFF. Refer to Section 11.2.1.4.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow form Mi-BEAM to UUT. Refer to Figure 11-94.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 11-94.

- **Voltage User Limit:** This setting limits the maximum voltage value that can be set in Mi-BEAM. Refer to Figure 11-97.

b) Setting Limits: The current and power limits can be set from the 'Output program' screen. In this regulation setting, Voltage Low Limit, Negative Current limit, Positive Current Limit, and Positive Power Limit will be used to trip Mi-BEAM. Refer to Section 11.2.2.2.

All applicable options based on the programming type 'Voltage' and regulation setting 'CV-Ser. Res ' are shown in Table 11-2.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM	SERIES RES
VOLT	CV-SER RES	YES	NA	NA	NA	YES	YES	NA	YES	NA	YES

Table 11-2. Applicable Options – CV Ser. Res

- **Voltage Low Limit**: On measured voltage reaching this value output of the Mi-BEAM will be turned OFF. This value must be set lower than the voltage flown from Mi-BEAM to UUT. Refer to Figure 11-26.

- **Positive Power limit:** On measured power reaching this value output of the Mi-BEAM will be turned OFF. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 11-27.

- **Positive Current limit:** On measured current reaching this value output of the Mi-BEAM will be turned OFF. This value must be set higher than the current flown from Mi-BEAM to UUT. Refer to Figure 11-25.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage Low Limit, Positive Current Limit, and Positive Power Limit) after the delay time configured. Refer to Figure 11-87.

c) Setting Voltage value: Enter the voltage value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OVP. Refer to Figure 11-23.

d) Series Resistance: Enter the series resistance value to control the voltage drop. Refer to Figure 11-24.

e) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

f) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 11-28.

g) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

h) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 11.2.3.

i) End the Test: Once the test is complete, safely disconnect the UUT from the Mi-BEAM and power down the Mi-BEAM if no further tests are required.

11.1.2.3 CONSTANT VOLTAGE/ CONSTANT POWER (CV/CP)

The power supply regulates the output voltage to the user-set value. If the power limit (positive) is reached, the output is regulated to the power limit. If the current limit (positive) is reached, the output voltage is programmed to zero, and the output is turned OFF. Refer to Section 11.2.1.2.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow form Mi-BEAM to UUT. Refer to Figure 11-94.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 11-94.

- **Voltage User Limit:** This setting limits the maximum voltage value that can be set in Mi-BEAM. Refer to Figure 11-97.

b) Setting Limits: The current and power limits can be set from the 'Output program' screen. In this regulation setting, Positive Power limit will be used to perform foldback operation, and Positive Current Limit is used to trip the Mi-BEAM. Refer to Section 11.2.2.1.

All applicable options based on the programming type 'Voltage' and regulation setting 'CV/CP' are shown in Table 11-3.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POWER SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM	SERIES RES
VOLT	CV/CP	YES	NA	NA	NA	NA	YES	NA	YES	NA	NA

Table 11-3. Applicable Options – CV/CP

- **Positive Power limit:** On measured power reaching this value Mi-BEAM will regulate the power at set power limit. This value must be set higher than the current flown from Mi-BEAM to UUT. Refer to Figure 11-20.
- **Positive Current limit:** On measured current reaching this value output of the Mi-BEAM will be turned OFF. This value must be set higher than the current flown from Mi-BEAM to UUT. Refer to Figure 11-19.
- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Positive Power Limit and Positive Current Limit) after the delay time configured. Refer to Figure 11-87.

c) Setting Voltage value: Enter the voltage value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OVP. Refer to Figure 11-23.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 11-24.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 11.2.3.

h) End the Test: Once the test is complete, safely disconnect the UUT from the Mi-BEAM and power down the Mi-BEAM if no further tests are required.

11.1.2.4 CONSTANT POWER/CONSTANT VOLTAGE (CP/CV)

The power supply regulates the output power to the user-set value. If the voltage limit (high or low) is reached, the output is regulated to the voltage limit. If the current limit (positive) is reached, the output power is programmed to zero, and the output is turned OFF. Refer to section 11.2.1.6.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow form Mi-BEAM to UUT. Refer to Figure 11-94.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 11-94.

- **Power High Limit:** This setting limits the maximum power value that can be set in Mi-BEAM. Refer to Figure 11-97.

b) Setting Limits: The current and power limits can be set from the 'Output program' screen. In this regulation setting, Voltage Low Limit, Voltage High Limit will be used to perform foldback operation, and Positive Current Limit is used to trip the Mi-BEAM. Refer to Section 11.2.2.3.

All applicable options based on the programming type 'Voltage' and regulation setting 'CP/CV' are shown in Table 11-4.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM	SERIES RES
VOLT	CP/CV	NA	NA	YES	YES	YES	YES	NA	NA	NA	NA

Table 11-4. Applicable Options – CP/CV

- **Voltage High Limit**: On measured voltage reaching this value Mi-BEAM will regulate the voltage at set Voltage High Limit. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 11-31.

- **Voltage Low Limit**: On measured voltage reaching this value Mi-BEAM will regulate the voltage at set Voltage Low Limit. This value must be set lower than the voltage flown from Mi-BEAM to UUT. Refer to Figure 11-32.

- **Positive Current limit:** On measured current reaching this value output of the Mi-BEAM will be turned OFF. This value must be set higher than the current flown from Mi-BEAM to UUT. Refer to Figure 11-33.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage Low Limit, Positive Current Limit, and Positive Power Limit) after the delay time configured. Refer to Figure 11-87.

c) Setting Power value: Enter the power value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured protection limit. Refer to Figure 11-30.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 11-34.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 11.2.3.

h) End the Test: Once the test is complete, safely disconnect the UUT from the Mi-BEAM and power down the Mi-BEAM if no further tests are required.

11.1.2.5 CONSTANT VOLTAGE (CV)

The power supply regulates the output voltage to the user-set value. On reaching the current limit (positive) or power limit (positive), the output voltage is programmed to zero, and the output is turned OFF. Refer to Section 11.2.1.2.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow form Mi-BEAM to UUT. Refer to Figure 11-94.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 11-94.

- **Voltage User Limit:** This setting limits the maximum voltage value that can be set in Mi-BEAM. Refer to Figure 11-97.

b) Setting Limits: The current and power limits can be set from the ‘Output program’ screen. In this regulation setting, Positive Current limit and Positive Power limit will be used to trip Mi-BEAM. Refer to section 11.2.2.1.

All applicable options based on the programming type 'Voltage' and regulation setting 'CV' are shown in Table 11-5.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM	SERIES RES
VOLT	CV	YES	NA	NA	NA	NA	YES	NA	YES	NA	NA

Table 11-5. Applicable Options – CV

- **Positive Current Limit:** On measured current reaching this value output of the Mi-BEAM will be turned OFF. This value must be set higher than the current flown from Mi-BEAM to UUT. Refer to Figure 11-19.

- **Positive Power Limit:** On measured power reaching this value output of the Mi-BEAM will be turned OFF. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 11-20.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Positive Current Limit and Positive Power Limit) after the delay time configured. Refer to Figure 11-87.

c) **Setting Voltage value:** Enter the voltage value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OVP. Refer to Figure 11-18.

d) **Connect the UUT to the Mi-BEAM:** Ensure all connections are secure and correctly aligned with the UUT port type.

e) **Output State:** Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 11-21.

f) **Start the Test:** Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) **Monitoring and Adjustments:** Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 11.2.3.

h) **End the Test:** Once the test is complete, safely disconnect the UUT from the Mi-BEAM and power down the Mi-BEAM if no further tests are required.

11.1.3 CONFIGURING MI-BEAM FOR VOLTAGE TYPE UUT

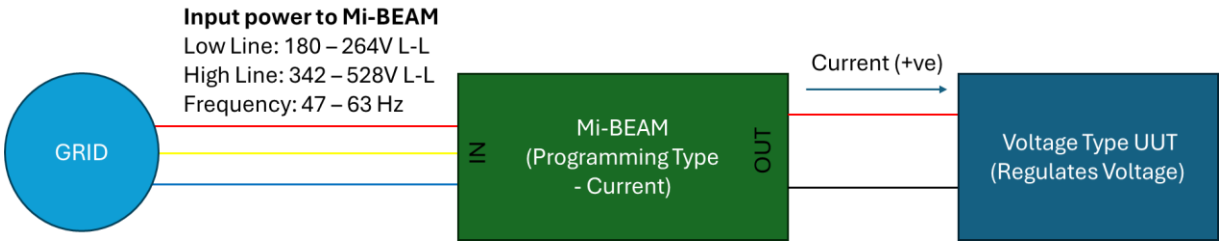


Figure 11-2. Voltage Type UUT

To configure the Voltage Type UUT, set the programming type (Prog. type) to 'Current' and select the appropriate regulation setting (CC/CV, CC/CP, CP/CC and CC) in the dashboard. Refer to Section 11.2.1 for detailed instructions.

11.1.3.1 CONSTANT CURRENT/CONSTANT VOLTAGE (CC/CV)

The power supply regulates the output current to the user-set value. On reaching the voltage limit (high or low), the output is regulated to the voltage limit. On reaching the power limit

(positive), the output current is programmed to zero, and the output is turned OFF. Refer to Section 11.2.1.5.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 11-94.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 11-94.

- **Current User Limit:** This setting limits the maximum current value that can be set in Mi-BEAM. Refer to Figure 11-99.

b) Setting Limits: The voltage and power limits can be set from the 'Output program' screen. In this regulation setting, Voltage High Limit, Voltage Low Limit will be used to perform foldback operation, and Positive Power limit will be used to trip Mi-BEAM. Refer to Section 11.2.2.4.

All applicable options based on the programming type 'Current' and regulation setting 'CC/CV' are shown in Table 11-6.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM	SERIES RES
CURR	CC/CV	NA	YES	NA	YES	YES	NA	NA	YES	NA	NA

Table 11-6. Applicable Options – CC/CV

- **Voltage High Limit:** On measured voltage reaching this value Mi-BEAM will regulate the voltage at set Voltage High Limit. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 11-37.

- **Voltage Low Limit**: On measured voltage reaching this value Mi-BEAM will regulate the voltage at set Voltage Low Limit. This value must be set lower than the voltage flown from Mi-BEAM to UUT. Refer to Figure 11-38.

- **Positive Power limit:** On measured power reaching this value output of the Mi-BEAM will be turned OFF. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 11-39.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage High Limit, Voltage Low Limit, Negative Power Limit and Positive Power Limit) after the delay time configured. Refer to Figure 11-89.

c) **Setting Current value:** Enter the current value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OCP. Refer to Figure 11-36.

d) **Connect the UUT to the Mi-BEAM:** Ensure all connections are secure and correctly aligned with the UUT port type.

e) **Output State:** Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 11-40.

f) **Start the Test:** Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) **Monitoring and Adjustments:** Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded.

h) **End the Test:** Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

11.1.3.2 CONSTANT CURRENT/CONSTANT POWER (CC/CP)

The power supply regulates the output current to the user-set value. If the power limit (positive) is reached, the output is regulated to the power limit. If the voltage limit (high or low) is reached, the output current is programmed to zero, and the output is turned OFF. Refer to Section 11.2.1.5.

a) **Configuration:** Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow form Mi-BEAM to UUT. Refer to Figure 11-94.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 11-94.

- **Current User Limit:** This setting limits the maximum current value that can be set in Mi-BEAM. Refer to Figure 11-99.

b) **Setting Limits**: The current and power limits can be set from the ‘Output program’ screen. In this regulation setting, Positive Power Limit will be used to perform foldback operation and Voltage High Limit, Voltage Low Limit will be used to trip Mi-BEAM. Refer to Section 11.2.2.4.

All applicable options based on the programming type 'Current' and regulation setting 'CC/CP' are shown in Table 11-7.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM	SERIES RES
CURR	CC/CP	NA	YES	NA	YES	YES	NA	NA	YES	NA	NA

Table 11-7. Applicable Options – CC/CP

- **Voltage High Limit**: On measured voltage reaching this value output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 11-37.

- **Voltage Low Limit**: On measured voltage reaching this value output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 11-38.

- **Positive Power limit:** On measured power reaching this value Mi-BEAM will regulate the power at set Positive Power Limit. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 11-39.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage High Limit, Voltage Low Limit, Negative Power Limit and Positive Power Limit) after the delay time configured. Refer to Figure 11-89.

c) **Setting Current value:** Enter the current value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OCP. Refer to Figure 11-36.

d) **Connect the UUT to the Mi-BEAM:** Ensure all connections are secure and correctly aligned with the UUT port type.

e) **Output State:** Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 11-40.

f) **Start the Test:** Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) **Monitoring and Adjustments:** Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded.

h) **End the Test:** Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

11.1.3.3 CONSTANT POWER/CONSTANT CURRENT (CP/CC)

The power supply regulates the output power to the user-set value. If the current limit (positive) is reached, the output is regulated to the current limit. If the voltage limit (high or low) is reached, the output power is programmed to zero, and the output is turned OFF. Refer to Section 11.2.1.6.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow form Mi-BEAM to UUT. Refer to Figure 11-94.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 11-94.

- **Power High User Limit:** This setting limits the maximum power value that can be set in Mi-BEAM. Refer to Figure 11-99.

b) Setting Limits: The voltage and power limits can be set from the 'Output program' screen. In this regulation setting, Positive Power Limit will be used to perform foldback operation and Voltage High Limit, Voltage Low Limit will be used to trip Mi-BEAM. Refer to section 11.2.2.5.

All applicable options based on the programming type 'Current' and regulation setting 'CP/CC' are shown in Table 11-8.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM	SERIES RES
CURR	CP/CC	NA	NA	YES	YES	YES	YES	NA	NA	NA	NA

Table 11-8. Applicable Options – CP/CC

- **Voltage High Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 11-43.

- **Voltage Low Limit**: On measured current reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the voltage flown from Mi-BEAM to UUT. Refer to Figure 11-44.

- **Positive Current Limit:** On measured current reaching this value, Mi-BEAM will regulate the current at set current limit. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 11-45.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage High Limit, Voltage Low Limit, Negative Power Limit and Positive Power Limit) after the delay time configured. Refer to Figure 11-89.

c) Setting Power value: Enter the power value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured protection value. Refer to Figure 11-42.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 11-46.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded.

h) End the Test: Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

11.1.3.4 CONSTANT CURRENT (CC)

The power supply regulates the output current to the user-set value. On reaching the voltage limit (high or low) or power limit (positive), the output current is programmed to zero, and the output is turned OFF. Refer to Section 11.2.1.5.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow form Mi-BEAM to UUT. Refer to Figure 11-94.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 11-94.

- **Current User Limit:** This setting limits the maximum current value that can be set in Mi-BEAM. Refer to Figure 11-99.

b) Setting Limits: The voltage and power limits can be set from the ‘Output program’ screen. In this regulation setting, Voltage high limit, Voltage low limit, Positive Power limit will be used to trip Mi-BEAM. Refer to section 11.2.2.4.

All applicable options based on the programming type 'Current' and regulation setting 'CC' are shown in Table 11-9.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM	SERIES RES
CURR	CC	NA	YES	NA	YES	YES	NA	NA	YES	NA	NA

Table 11-9. Applicable Options – CC

- **Voltage High Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from Mi-BEAM to UUT Refer to Figure 11-37.

- **Voltage Low limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the voltage flown from Mi-BEAM to UUT. Refer to Figure 11-38.

- **Positive Power limit:** On measured power reaching this value output of the Mi-BEAM will be turned OFF. This value must be set higher than the power flown from Mi-BEAM to UUT. Refer to Figure 11-39.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage high limit, Voltage Low Limit and Positive Power Limit) after the delay time configured. Refer to Figure 11-89.

c) Setting Current value: Enter the current value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OCP. Refer to Figure 11-36.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 11-40.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded.

h) End the Test: Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

11.2 FRONT PANEL OPERATION

This chapter provides detailed information on the front panel operation in Source mode. Each menu of a screen could be selected by tapping its associated selection-field box through the touchscreen, or by selecting it with the rotary encoder. Refer to Figure 11-3.

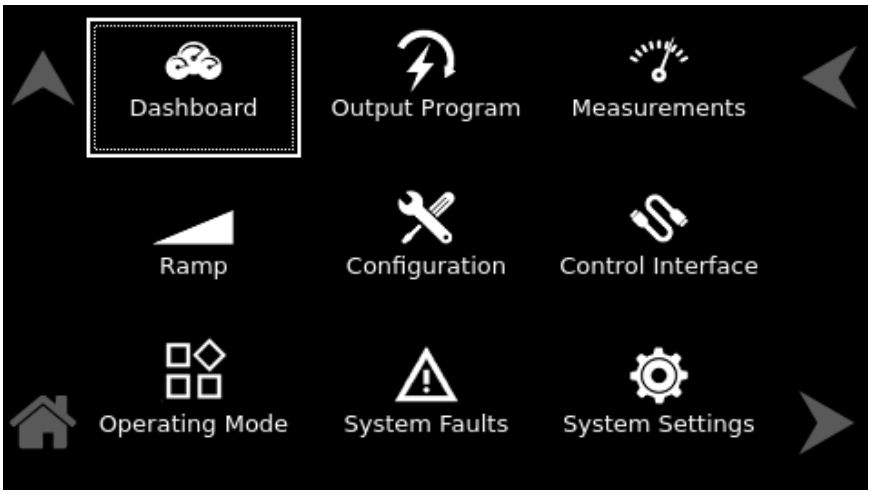


Figure 11-3. Home Screen Top-Level Menu

11.2.1 DASHBOARD SCREEN TOP-LEVEL MENU

The DASHBOARD screen top-level menu is used to change output parameters and simultaneously view output measurements. The most used output parameters are in the DASHBOARD screen menu. The DASHBOARD screen is the default menu that is displayed after power-on.

11.2.1.1 CONFIGURING PROGRAMMING TYPE AND REGULATION SETTINGS

The Regulation Settings Menu allows users to configure the 'Prog. Type' (Programming Type) and 'Regulation Settings' of the Mi-beam power supply. Refer to Figure 11-4 and Figure 11-5.

The 'Reg. Setting' function on the Dashboard Screen enables users to switch between 'Voltage (CV/CC, CV-Ser. Res, CV/CP, CP/CV and CV) ' and 'Current (CC/CV, CP/CC, CC/CP and CC)' Regulation settings. Refer to Figure 11-6 to Figure 11-14 and Table 11-10 to Table 11-19.

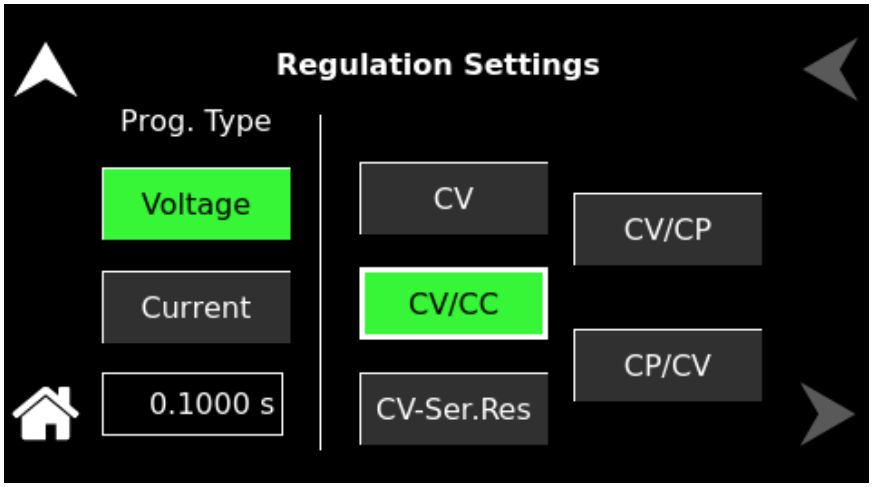


Figure 11-4. Regulation Settings – Voltage

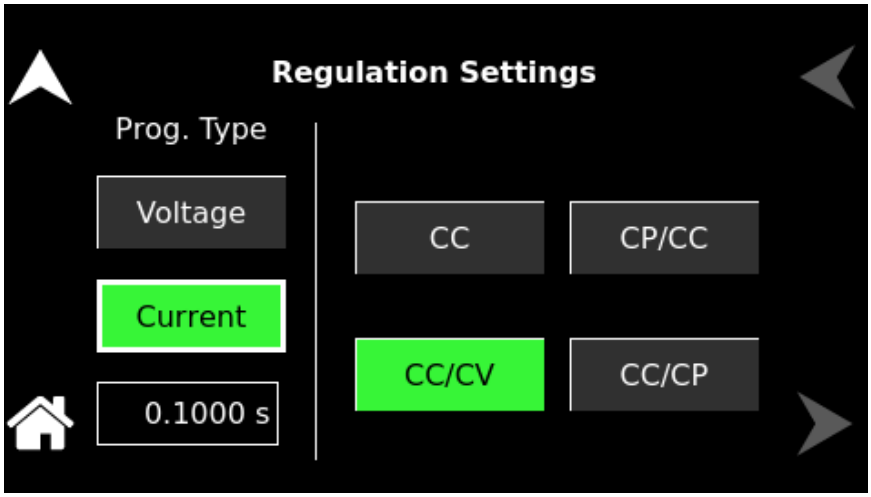


Figure 11-5. Regulation Settings – Current

11.2.1.2 VOLTAGE PROGRAMMING TYPE CV, CV/CC AND CV/CP REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) **Voltage - CV/CC** Regulation setting is shown in Figure 11-6,
b) **Voltage - CV/CP** Regulation setting is shown in Figure 11-7,
c) **Voltage - CV** Regulation setting is shown in Figure 11-8,

Refer to Section 9.4.2.2 for navigating to the Dashboard Screen.

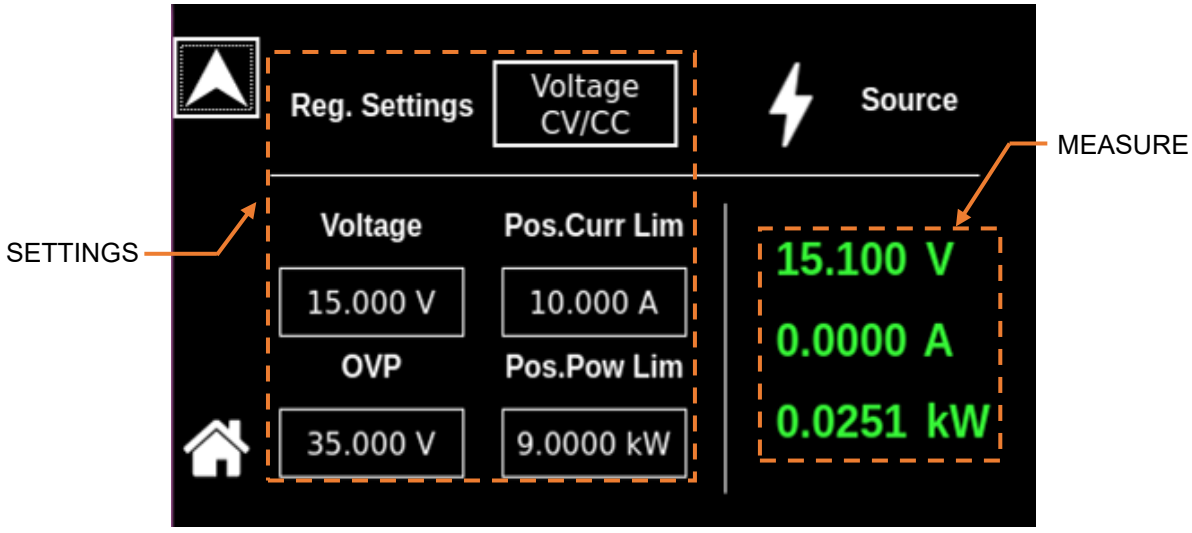


Figure 11-6. Dashboard Screen in Voltage CV/CC Regulation setting



Figure 11-7. Dashboard Screen in Voltage CV/CP Regulation setting

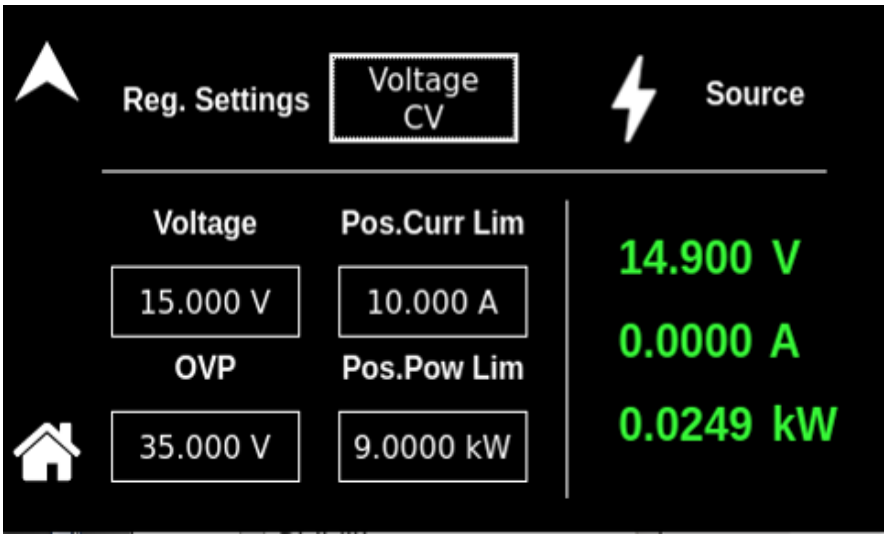


Figure 11-8. Dashboard Screen in Voltage CV Regulation setting

The following selections are available in the DASHBOARD screen top-level menu of 'Voltage' Programming type 'CV/CC', 'CV/CP' and 'CV' Regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 11-86. **a) Voltage - Constant Voltage/Constant Current (CV/CC):** The output voltage is regulated to the user set value. On reaching the current limit (positive), output would be regulated to the current limit reached. On reaching the power limit (positive), the output voltage would be programmed to zero. **b) Voltage - Constant Voltage/Constant Current (CV/CP):** The output voltage is regulated to the user set value. On reaching the power limit (positive), output would be regulated to the

SETTINGS	DESCRIPTION
	power limit reached. On reaching the current limit (positive), the output voltage would be programmed to zero. **c) Voltage - Constant Voltage (CV):** The output voltage is regulated to the user set value. On reaching the set current limit (positive) or power limit (positive), the output voltage would be programmed to zero.
Voltage	Programs the output voltage of the power supply in volts. Real-time setting is possible using the rotary encoder. When the unit is in series operation (refer to Chapter 6), the Dashboard screen displays Voltage 1 and Voltage 2 for setting the output voltage of Leader and Follower. **NOTE:** CV is the only regulation setting available in Series operation.
Pos. Curr Lim	In CV and CV/CP regulation setting, this acts as a trip limit. In CV/CC regulation setting, on reaching this set value the output would be regulated to the Pos. Curr Lim. Real-time setting is possible using the rotary encoder.
Pos. Pow Lim	In CV and CV/CC regulation setting, this acts as a trip limit. In CV/CP regulation setting, on reaching this set value the output would be regulated to the Pos. Pow Lim. Real-time setting is possible using the rotary encoder.
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 11-10. Dashboard screen top-level menu Voltage CV and CV/CC

11.2.1.3 VOLTAGE PROGRAMMING TYPE CP/CV REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) Voltage - CP/CV is shown in Figure 11-9,

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

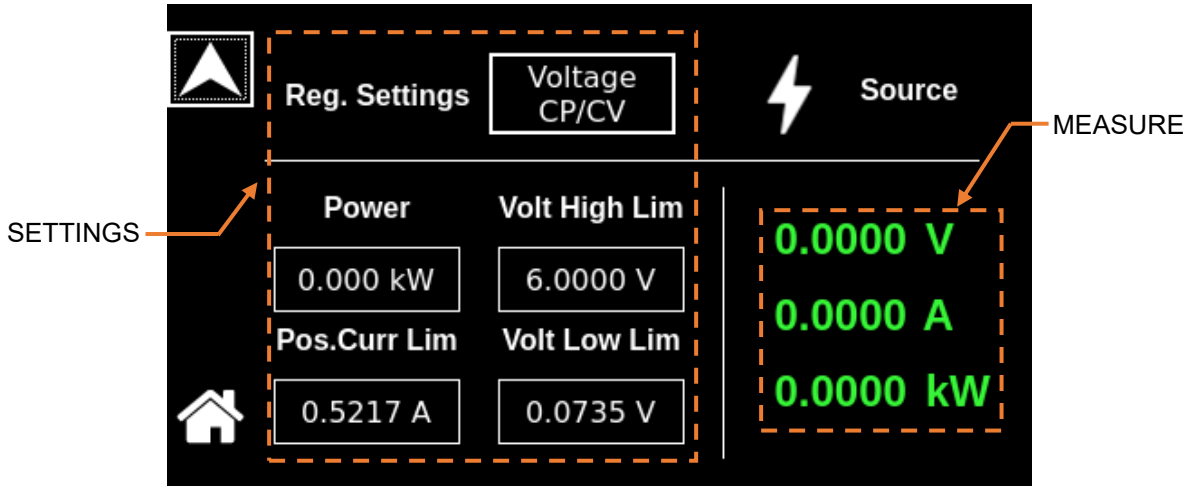


Figure 11-9. Dashboard Screen in Voltage CP/CV Regulation setting

The following selections are available in the DASHBOARD screen top-level menu of 'Voltage' Programming type 'CP/CV' Regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 11-86. **a) Voltage - Constant Power/Constant Voltage (CP/CV):** The output power is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the current limit (positive), the output power would be programmed to zero.
Power	Programs the output power of the supply in watts. Real-time setting is possible using the rotary encoder.
Pos. Curr Lim	Programs the output positive current limit and this setting acts as a trip limit. Real-time setting is possible using the rotary encoder.
Volt High Lim	Regulates the output upon reaching the Volt High Lim. Real-time setting is possible using the rotary encoder.
Volt Low Lim	Regulates the output upon reaching the Volt Low Lim. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 11-11. Dashboard screen top-level menu Voltage CP/CV

11.2.1.4 VOLTAGE PROGRAMMING TYPE CV-SER. RES REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) Voltage - CV-Ser. Res is shown in Figure 11-10,

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

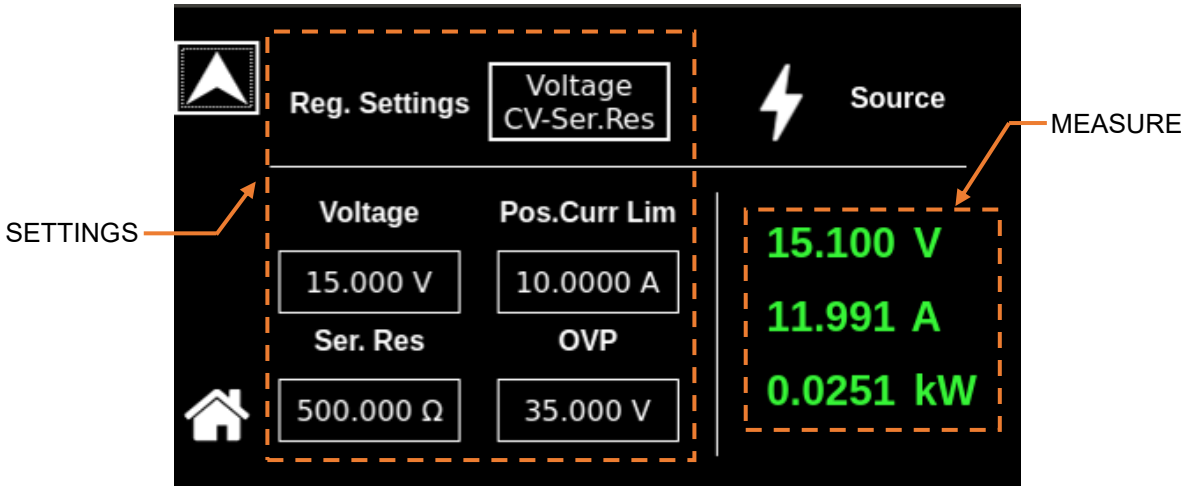


Figure 11-10. Dashboard Screen in CV-Ser. Res Regulation setting

The following selections are available in the DASHBOARD screen top-level menu of 'Voltage' Programming type 'CV-Ser. Res' regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 11-86. **a) Voltage - Constant Voltage Series Resistance (CV – Ser Res):** The user can set the voltage and series resistance. Depending on the current output, the terminal voltage would be varied based on the voltage drop across the series resistance. In the event of reaching the programmed current limit (positive) or power limit (positive) or voltage limit (low), the output voltage is programmed to zero.
Voltage	Programs the output voltage of the supply in volts. Real-time setting is possible using the rotary encoder.
Pos. Curr Lim	Programs the output positive current limit in amps and this setting acts as a trip limit. Real-time setting is possible using the rotary encoder.
Ser. Res	Programs the series resistance in ohms. Real-time setting is possible using the rotary encoder.
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 11-12. Dashboard screen top-level menu- CV-Ser. Res Mode

11.2.1.5 CURRENT PROGRAMMING TYPE CC, CC/CV AND CC/CP REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) **Current - CC/CV** Regulation setting is shown in Figure 11-11,
b) **Current - CC/CP** Regulation setting is shown in Figure 11-12,
c) **Current - CC** Regulation setting is shown in Figure 11-13.

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

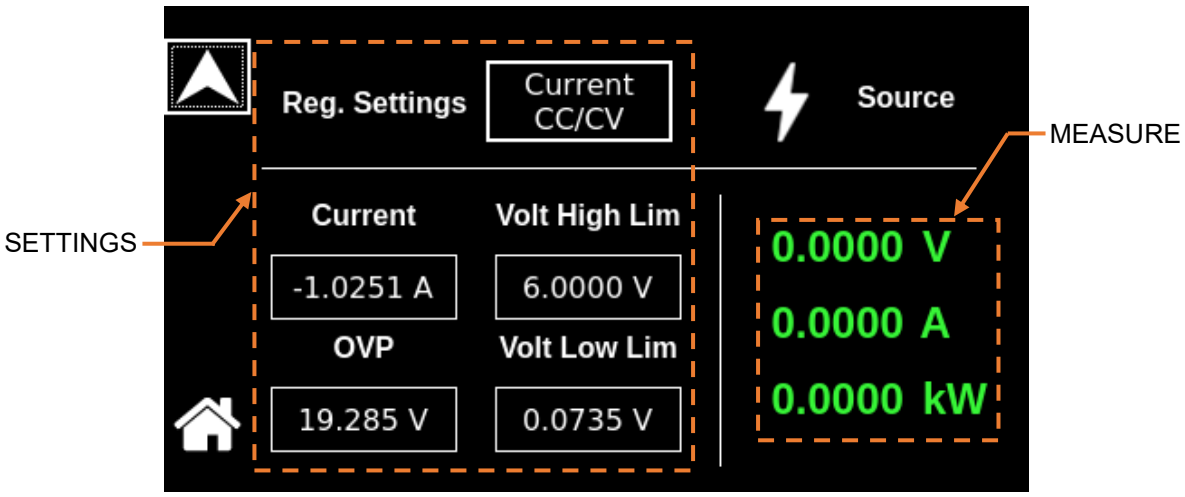


Figure 11-11. Dashboard Screen in Current CC/CV Regulation setting

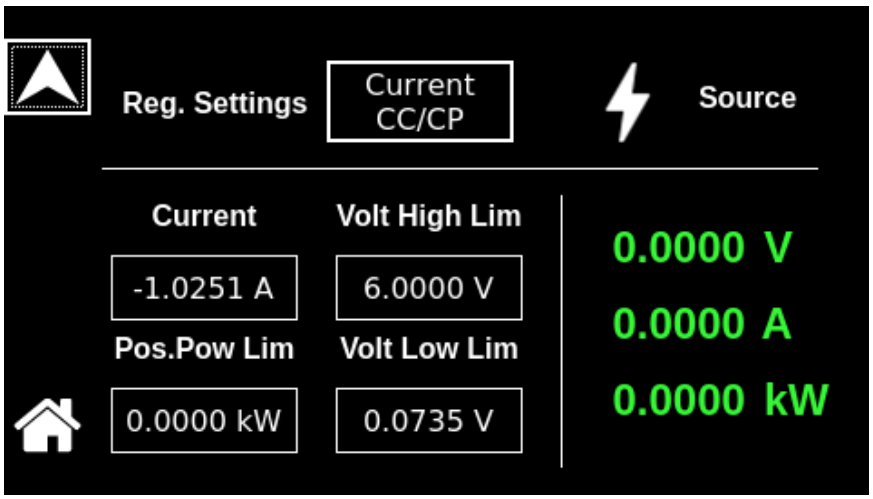


Figure 11-12. Dashboard Screen in Current CC/CP Regulation setting

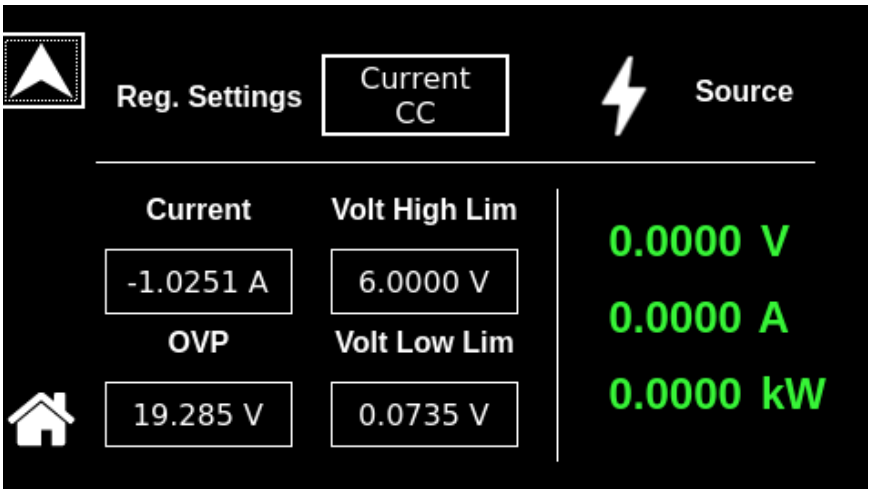


Figure 11-13. Dashboard Screen in Current CC Regulation setting

The following selections are available in the DASHBOARD screen top-level menu of 'Current' Programming type 'CC/CV', 'CC/CP' and 'CC' regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 11-88. **a) Current - Constant Current/Constant Voltage (CC/CV):** The output current is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the power limit (positive), the output current would be programmed to zero. **b) Current - Constant Current/Constant Power (CC/CP):** The output current is regulated to the user set value. On reaching the power limit (positive), output would be regulated to the power limit reached. On reaching the voltage limit (high or low), the output current would be programmed to zero. **c) Current - Constant Current (CC):** The output current is regulated to the user set value. On reaching the set voltage limit (high or low) or power limit (positive), the output current would be programmed to zero.
Current	Programs the output current in amps. Real-time setting is possible using the rotary encoder.
Pos. Pow Lim	In CC and CC/CV Regulation Setting, this functions as a trip limit. In CC/CP Regulation Setting, on reaching this set value the output would be regulated to the Pos. Pow Lim. Real-time setting is possible using the rotary encoder.
Volt High Lim	In CC and CC/CP Regulation Setting, this functions as a trip limit. In CC/CV Regulation Setting, it regulates the output upon reaching the Volt High Lim. Real-time setting is possible using the rotary encoder.
Volt Low Lim	In CC and CC/CP Regulation Setting, this functions as a trip limit. In CC/CV Regulation mode, it regulates the output upon reaching the Volt Low Lim. Real-time setting is possible using the rotary encoder.

SETTINGS	DESCRIPTION
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 11-13. Dashboard screen top-level menu – CC, CC/CV and CC/CP

11.2.1.6 CURRENT PROGRAMMING TYPE CP/CC REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) Current - CP/CC Regulation setting is shown in Figure 11-14,

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

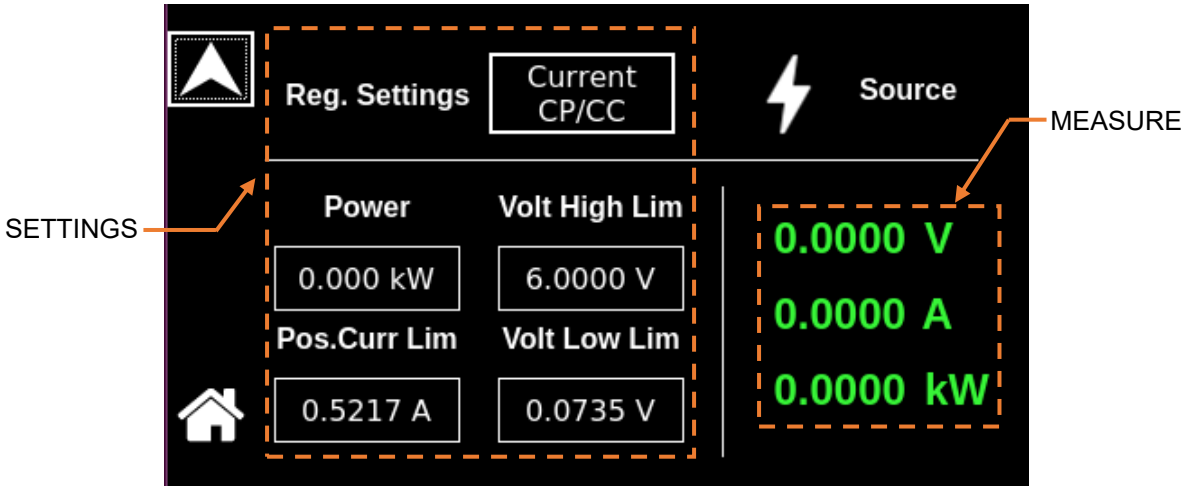


Figure 11-14. Dashboard Screen in Current CP/CC Regulation setting

The following selections are available in the DASHBOARD screen top-level menu of 'Current' Programming type 'CP/CC' Regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 11-41. **a) Current - Constant Power/Constant Current (CP/CC):** The output power is regulated to the user set value. On reaching the current limit (positive), output would be regulated to the current limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero.
Power	Programs the output power of the supply in watts. Real-time setting is possible using the rotary encoder.
Pos. Curr Lim	Programs the output positive current limit in amps and upon

SETTINGS	DESCRIPTION
	reaching this set value the output would be regulated to the Pos. Curr Lim. Real-time setting is possible using the rotary encoder.
Volt High Lim	Programs the voltage high limit and this setting acts as a trip limit. Real-time setting is possible using the rotary encoder.
Volt Low Lim	Programs the voltage low limit and this setting acts as a trip limit. Real-time setting is possible using the rotary encoder.
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 11-14. Dashboard screen top-level menu – CP/CC

11.2.1.7 REAL-TIME PARAMETER ADJUSTMENT

The DASHBOARD screen menu provides the capability for output parameter entry that has real-time, immediate effect on the output. This allows manual adjustment of the output parameters where tuning of a value is desired. Enabling this function requires clicking on a parameter selection-field box with the encoder switch to select the parameter and display its selection-field highlighted and with a value entry window, refer to Figure 11-15. The rotary encoder could then be used to continuously adjust the parameter value, up and down, as it is rotated. The value change takes immediate effect at the output.

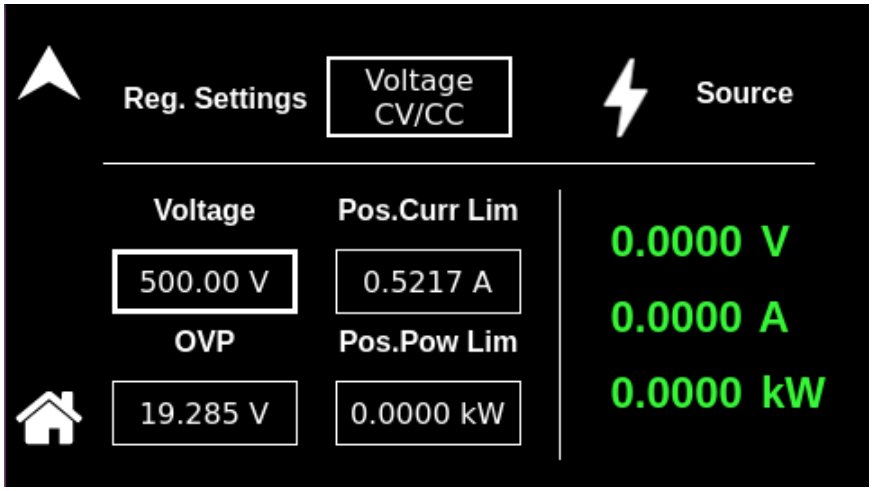


Figure 11-15. Real-Time, Immediate Output Parameter Adjustment

11.2.1.8 DEFAULT SCREEN

The Default screen provides measurement of the DC output ‘Voltage’, ‘Current’ and ‘Power’, refer to Figure 11-16. When the Dashboard screen is idle for an interval equal to a set time delay, refer to Figure 11-219 and Figure 11-220. The display will automatically switch to the Default screen. Tap anywhere on the screen to return to the Dashboard screen.

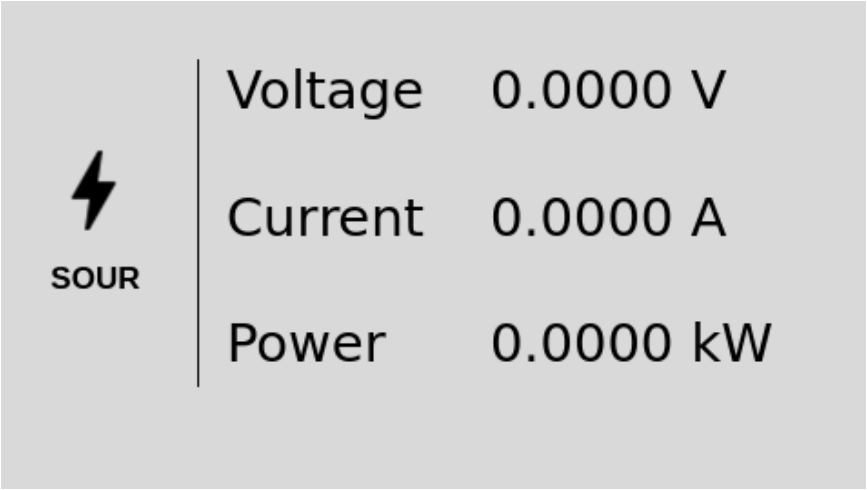


Figure 11-16. Default Screen

With the understanding of the dashboard screen features, user can perform basic functionality and verify the output voltage, current and power in various modes of operation.

11.2.2 OUTPUT PROGRAM SCREEN

The settings in the output program screen will change based on the Programming type and Regulation setting configured. Refer to Section 9.4.2.2 for navigating to Output Program Screen Top-Level Menu.

11.2.2.1 CV/CC, CV/CP AND CV MODE

The Output Program screen provides settings of 'Voltage', 'Positive Current Limit', 'Positive Power Limit', and 'Output State'. Refer to Figure 11-17.

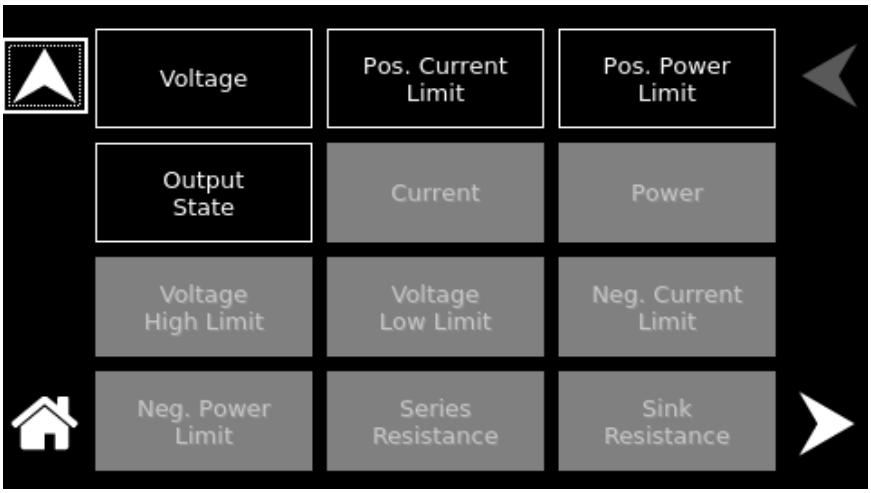


Figure 11-17. Output Program Screen of CV/CC, CV/CP and CV mode

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in CV/CC, CV/CP and CV mode includes the following functions:

ENTRY	DESCRIPTION
Voltage	Users can set a Voltage value within the specified limit. Refer to Figure 11-18.

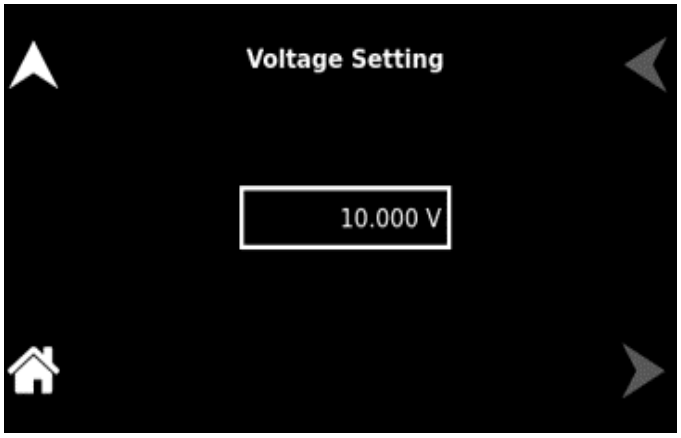


Figure 11-18. Voltage setting screen

NOTE: When the unit is in series operation (refer to Chapter 6), the Dashboard screen displays Voltage 1 and Voltage 2 for setting the output voltage of Leader and Follower.

NOTE: Voltage - CV is the only regulation setting in Series operation.

Pos. Current Limit Users can set a positive current limit value, which functions as trip limit (CV and CV/CP), or it regulates (CV/CC) the output upon reaching the Positive Current Limit. Refer to Figure 11-19.

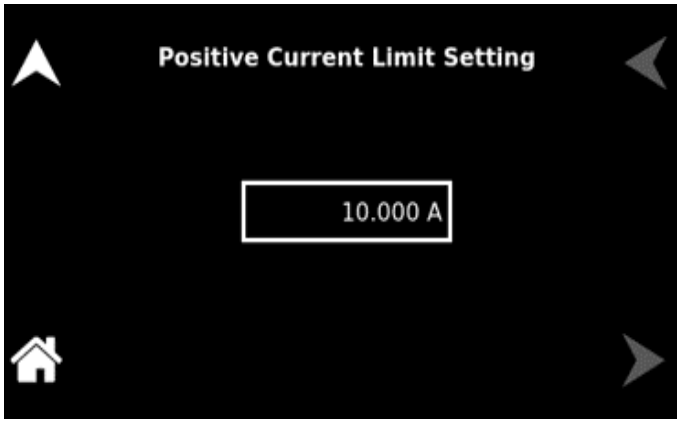


Figure 11-19. Positive Current limit setting screen

Pos. Power Limit User can set a positive power limit value, which functions as a trip limit (CV and CV/CC), or it regulates (CV/CP) the output upon reaching the Positive power Limit. Refer to Figure 11-20.

ENTRY	DESCRIPTION

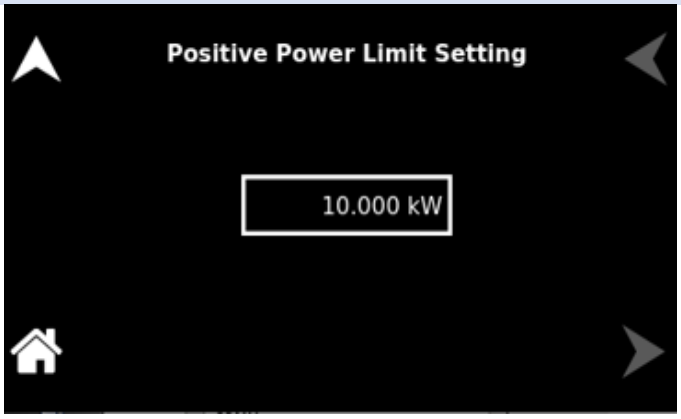


Figure 11-20. Positive Power limit setting screen

Output State Users can program the output to ON or OFF state. Refer to Figure 11-21.

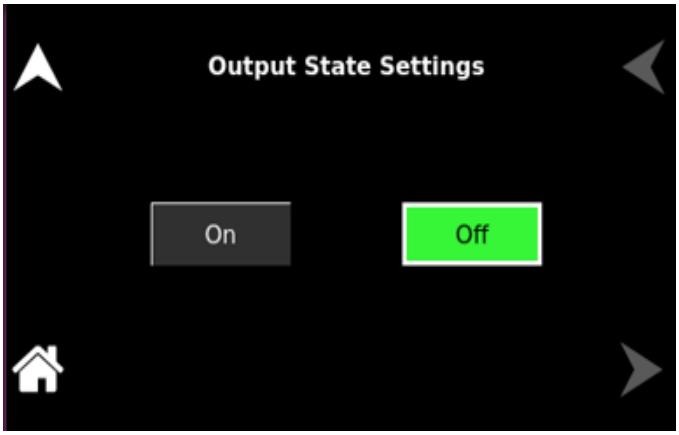


Figure 11-21. Output State Settings

Table 11-15. Output Program Settings in CV/CC, CV/CP and CV Mode

11.2.2.2 CV SER. RES MODE

The Output Program screen provides settings of ‘Voltage’, ‘Series Resistance’, ‘Positive Current Limit’, ‘Voltage Low Limit’, ‘Positive Power Limit’, and ‘Output State’. Refer to Figure 11-22.

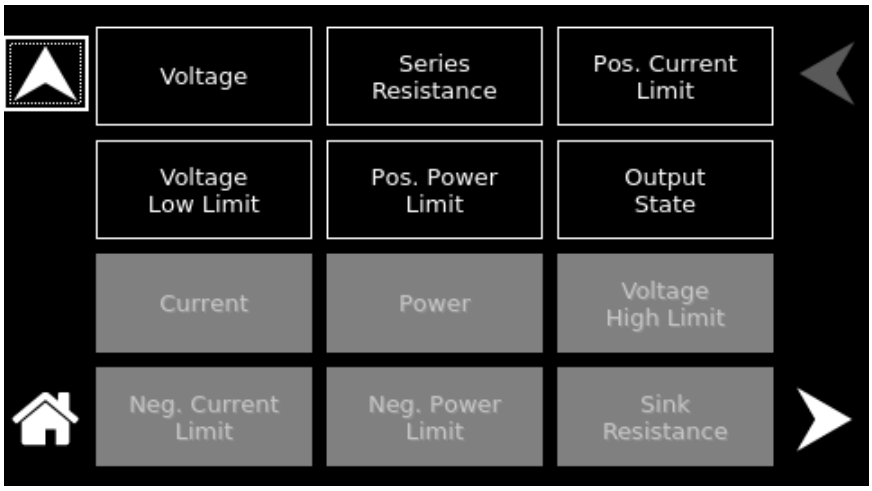


Figure 11-22. Output Program Screen of CV Ser. Res mode

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in CV Ser. Res mode includes the following functions:

ENTRY	DESCRIPTION
Voltage	Users can set a voltage value within the specified limit. Refer to Figure 11-23.

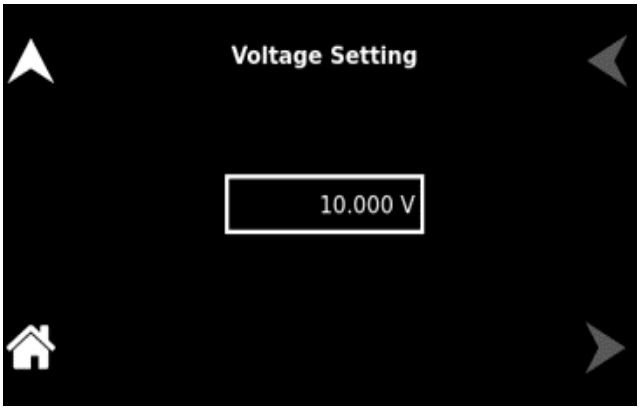


Figure 11-23. Voltage Setting

Series Resistance	Users can set the series resistance value within the specified limit. Refer to Figure 11-24.

ENTRY	DESCRIPTION



Figure 11-24. Series Resistance Setting

Pos. Current Limit

Users can set a positive current limit value and this functions as a trip limit. Refer to Figure 11-25.

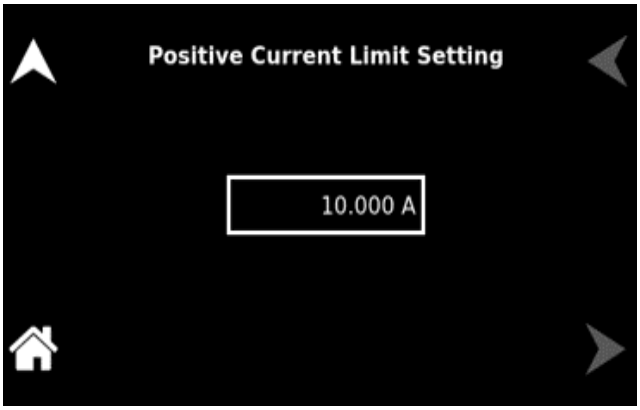


Figure 11-25. Positive Current Limit

Voltage Low Limit

Users can set the voltage low limit value, and it regulates upon reaching the Voltage Low Limit. Refer to Figure 11-26.

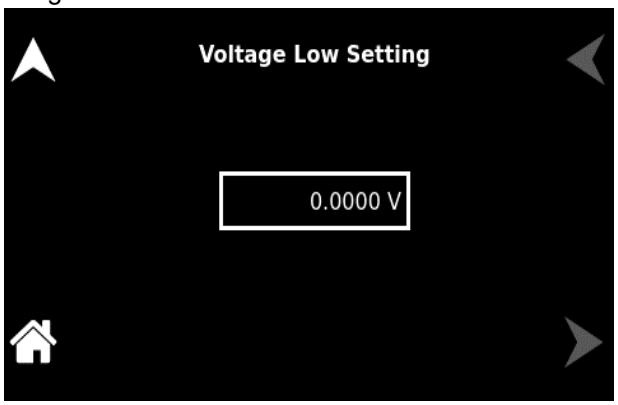


Figure 11-26. Voltage Low Setting

Pos. Power Limit

Users can set a positive power limit value, and which functions as a trip limit. Refer to Figure 11-27.

ENTRY	DESCRIPTION

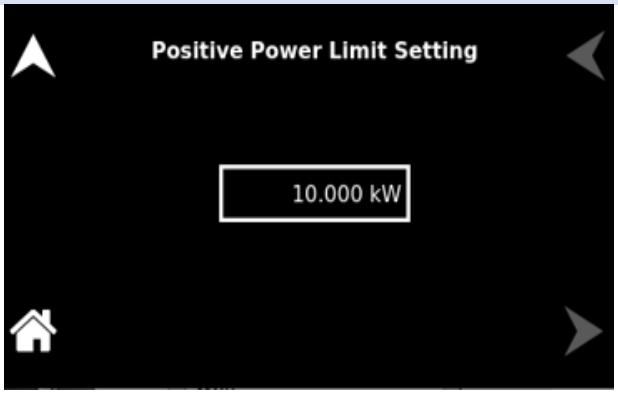


Figure 11-27. Positive Power Limit

Output State Users can program the output to ON or OFF state. Refer to Figure 11-28.

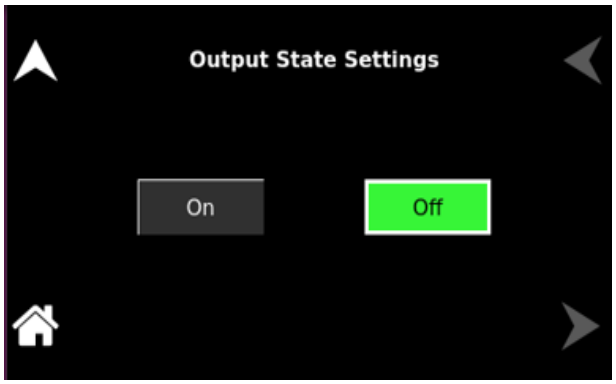


Figure 11-28. Output State

Table 11-16. Output Program Settings in CV Ser. Res Mode

11.2.2.3 CP/CV MODE

The Output Program screen provides the settings of ‘Power’, ‘Voltage High Limit’, ‘Voltage Low Limit’, ‘Positive Current Limit’, and ‘Output State’. Refer to Figure 11-29.

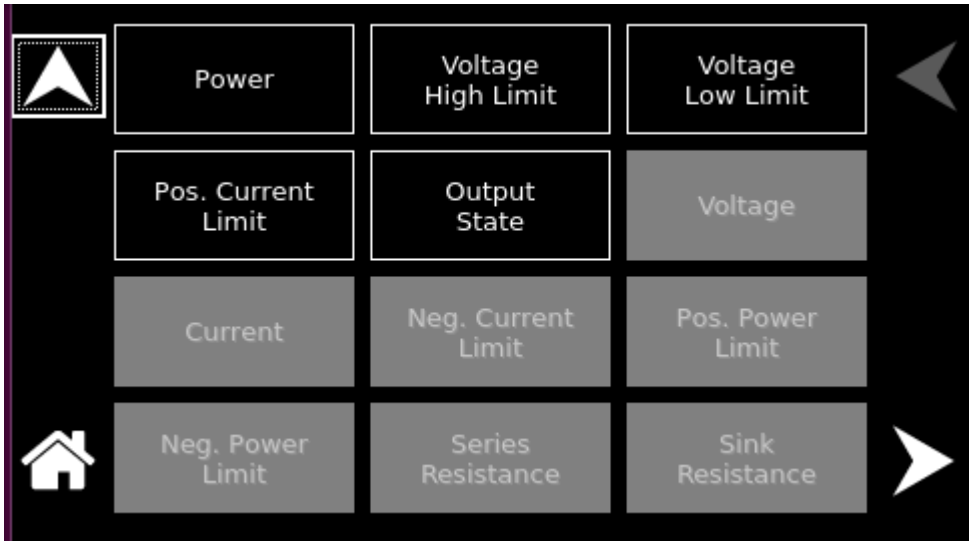


Figure 11-29. Output Program Screen of CP/CV mode

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in CP/CV mode includes the following functions:

ENTRY	DESCRIPTION
Power	Users can set a power value within the specified limit. Refer to Figure 11-30.
Voltage High Limit	Users can set the voltage high limit value, and it regulates the output upon reaching the Voltage High Limit. Refer to Figure 11-31.

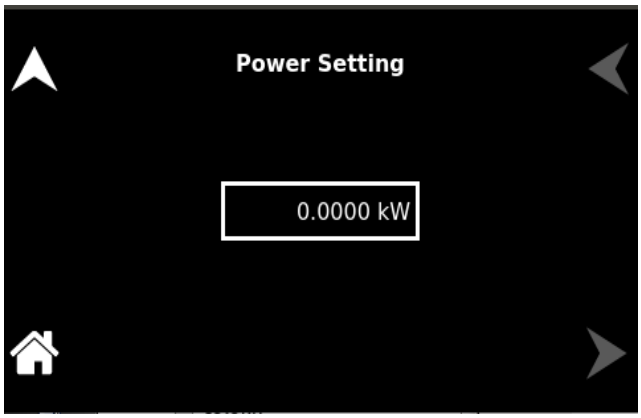


Figure 11-30. Power Settings

ENTRY	DESCRIPTION

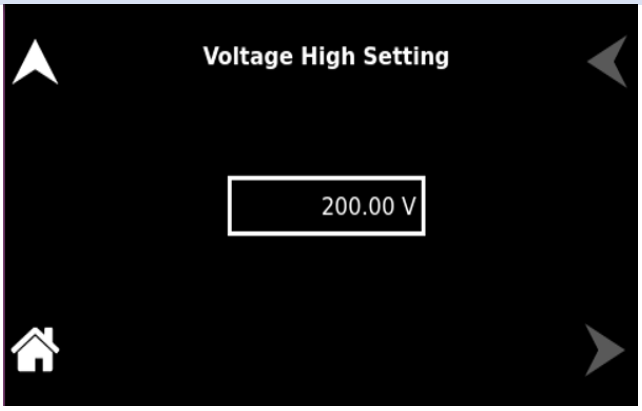


Figure 11-31. Volt High Setting

Voltage Low Limit

Users can set the voltage high limit value, and it regulates the output upon reaching the Voltage Low Limit. Refer to Figure 11-32.

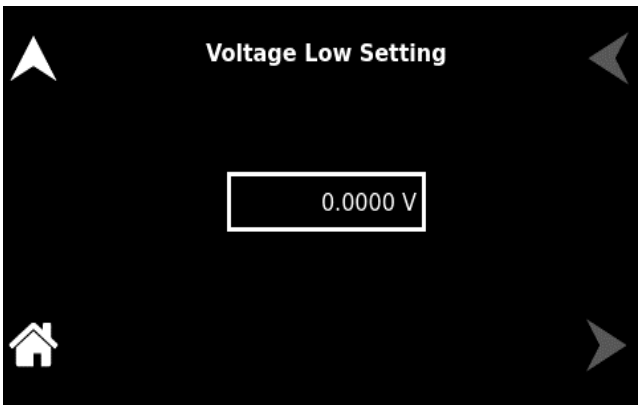


Figure 11-32. Voltage Low Setting

Pos. Current Limit

Users can set a Positive Current limit value, and this functions as a trip limit. Refer to Figure 11-33.

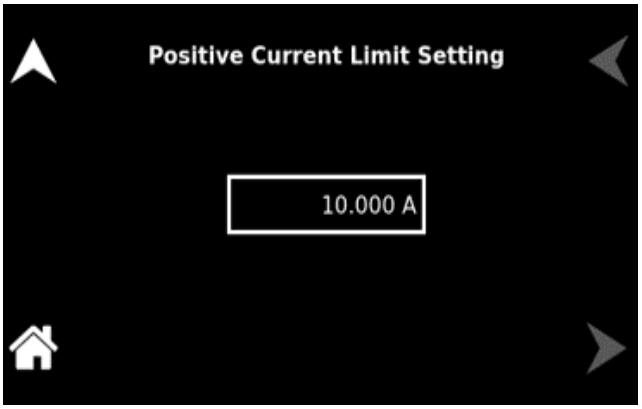


Figure 11-33. Pos. Current Limit Setting

ENTRY	DESCRIPTION
Output State	Users can program the output to ON or OFF state. Refer to Figure 11-34.

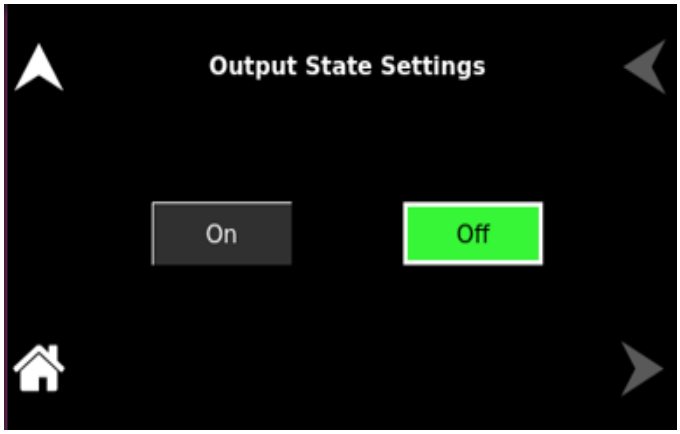


Figure 11-34. Output State

Table 11-17. Output Program Settings in CP/CV

11.2.2.4 CC/CV, CC/CP AND CC MODE

The Output Program screen provides the settings of 'Current', 'Voltage High Limit', 'Voltage Low Limit', 'Positive Power Limit', and 'Output State'. Refer to Figure 11-35.

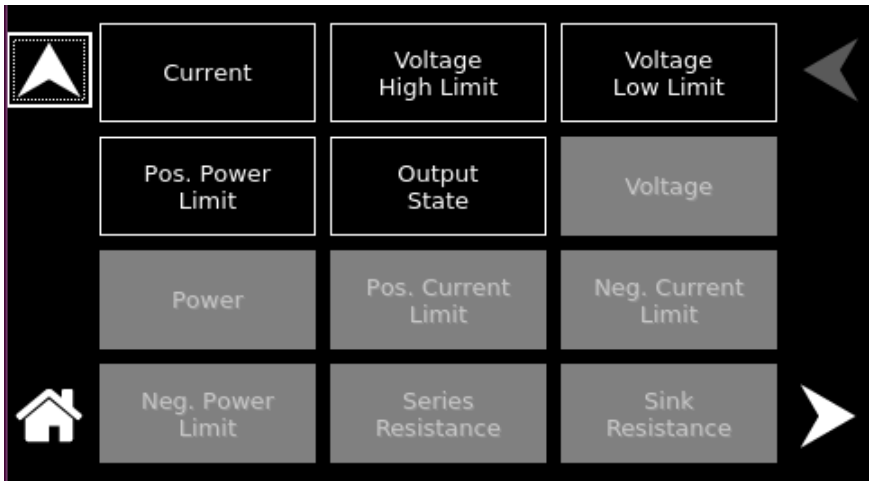


Figure 11-35. Output Program Screen of CC/CV,CC/CP and CC mode

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in CC/CV, CC/CP and CC mode includes the following functions:

ENTRY	DESCRIPTION
Current	Users can set the Current value within the specified limit. Refer to Figure 11-36.

ENTRY	DESCRIPTION

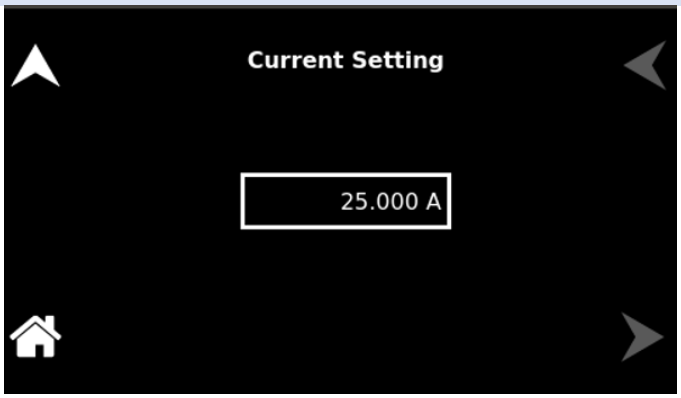


Figure 11-36. Current Setting

Voltage High Limit

Users can set a Volt high limit value, which functions as a trip limit (CC and CC/CP), or it regulates (CC/CV) the output upon reaching the Voltage High Limit. Refer to Figure 11-37.

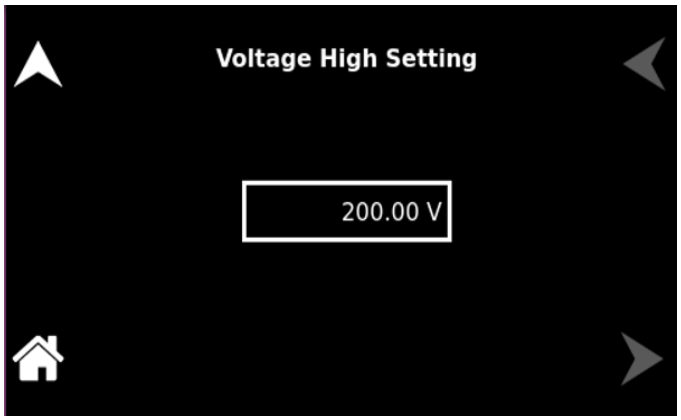


Figure 11-37. Voltage High Setting

Voltage Low Limit

Users can set a Volt low limit value, which functions as a trip limit (CC and CC/CP), or it regulates (CC/CV) the output upon reaching the Voltage Low Limit. Refer to Figure 11-38.

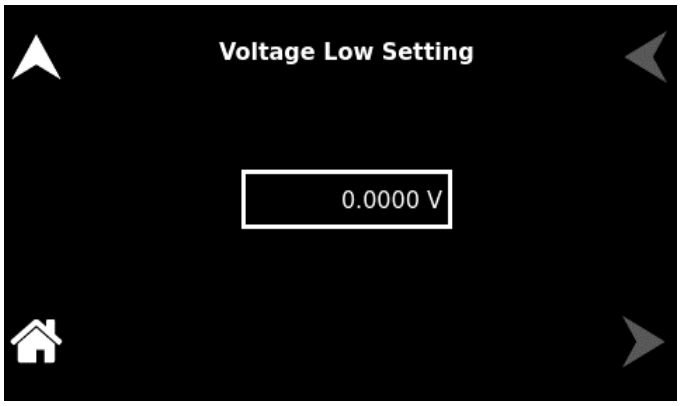


Figure 11-38. Voltage Low Settings

ENTRY	DESCRIPTION
Pos. Power Limit	Users can set a Positive Power limit value, which functions as a trip limit (CC and CC/CV), or it regulates (CV/CP) the output upon reaching the Positive Power Limit. Refer to Figure 11-39.

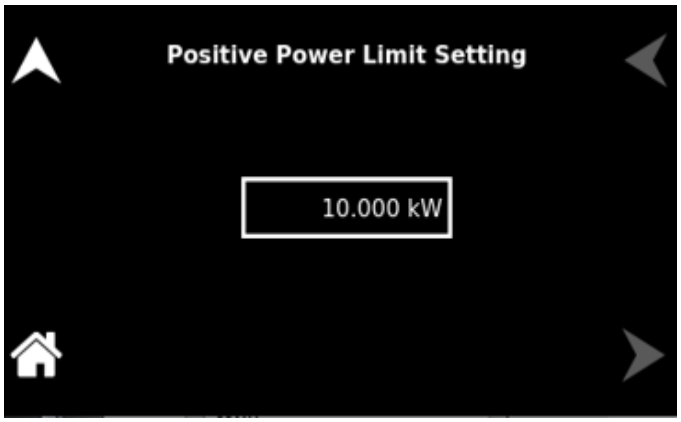


Figure 11-39. Positive Power Limit

Output State	Users can program the output to ON or OFF state. Refer to Figure 11-40.

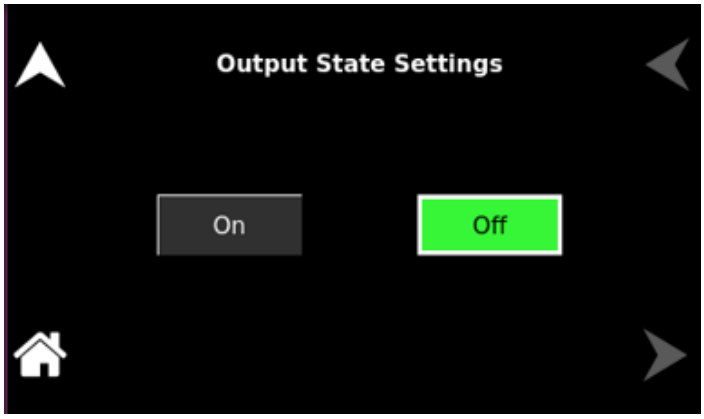


Figure 11-40. Output State Settings

Table 11-18. Output Program Settings in CC/CV, CC/CP and CC mode

11.2.2.5 CP/CC MODE

The Output Program screen provides settings of ‘Power’, ‘Voltage High Limit’, ‘Voltage Low Limit’, ‘Positive Current Limit’, and ‘Output State’. Refer to Figure 11-41.

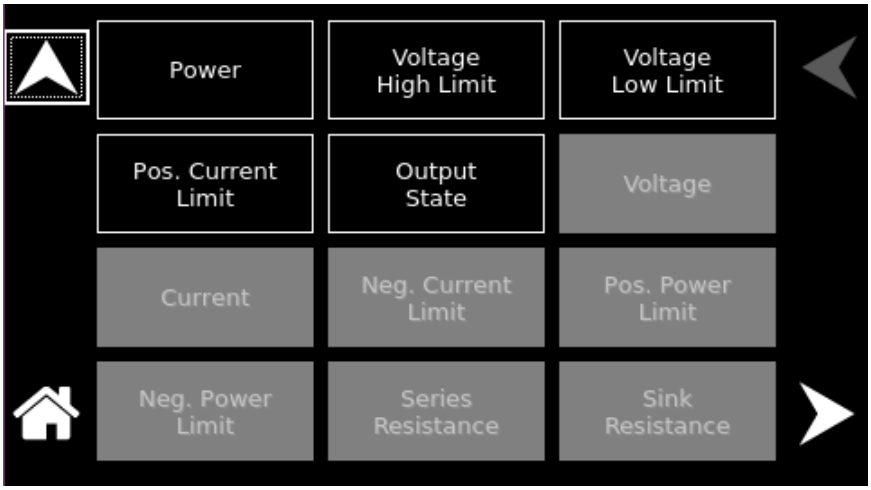


Figure 11-41. Output Program Settings in CP/CC mode

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in CP/CC mode includes the following functions:

ENTRY	DESCRIPTION
Power	Users can set a power value within the specified limit. Refer to Figure 11-42.

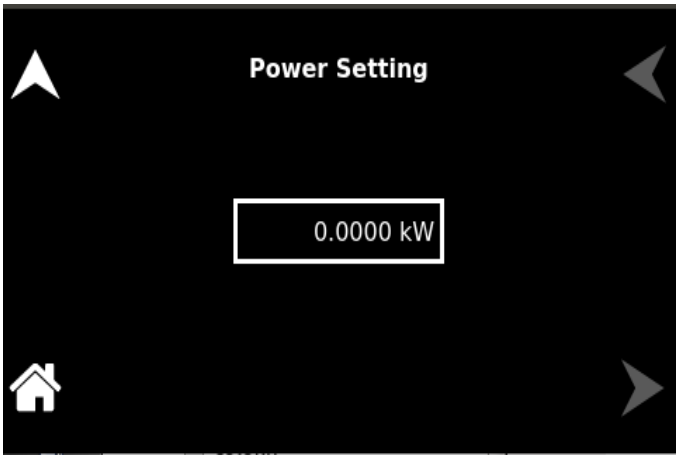


Figure 11-42. Power Settings

Voltage High Limit	Users can set a Volt high limit value, and which functions as a trip limit. Refer to Figure 11-43.

ENTRY	DESCRIPTION

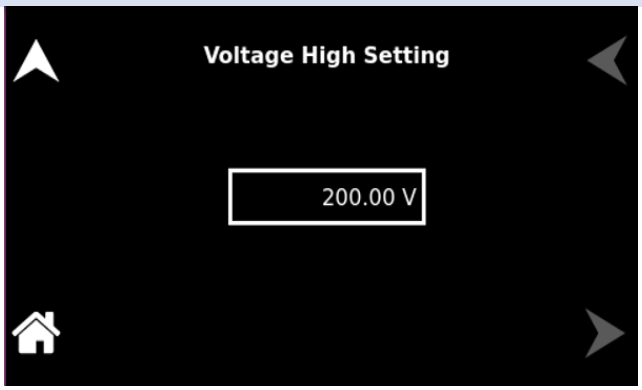


Figure 11-43. Volt High Setting

Voltage Low Limit

Users can set a Voltage Low limit value, and which functions as a trip limit. Refer to Figure 11-44.

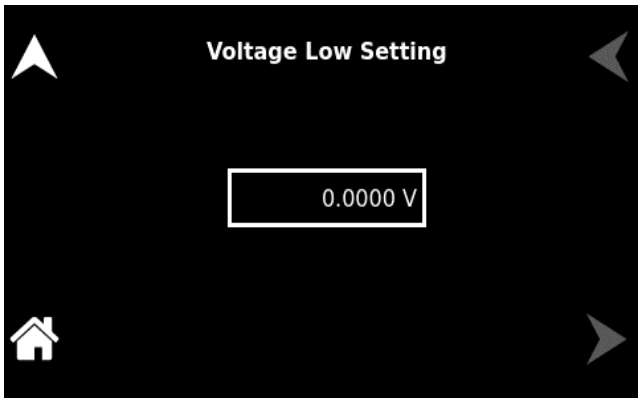


Figure 11-44. Volt Low Setting

Pos. Current Limit

Users can set a Positive Current limit value, and it regulates upon reaching the Pos. Curr Lim. Refer to Figure 11-45.

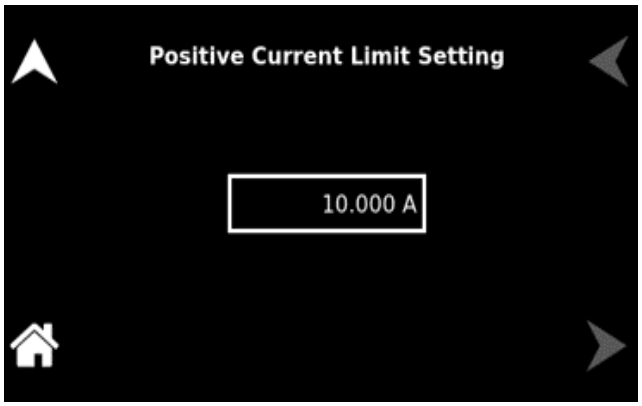


Figure 11-45. Pos. Current Limit Setting

ENTRY	DESCRIPTION
Output State	Users can program the output to ON or OFF state. Refer to Figure 11-46.

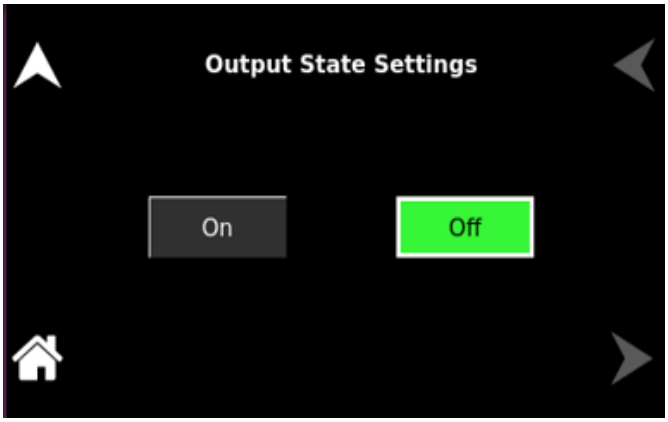


Figure 11-46. Output State

Table 11-19. Output Program Settings CP/CC mode

11.2.3 MEASUREMENTS SCREEN

The Measurements screen displays the floating-point values for DC Output 'Voltage', 'Output Current', and Output 'Power'. For the Measurement screen, refer to Figure 11-47 and for instructions on how to navigate to the Measurements screen, refer to Section 9.4.2.2.

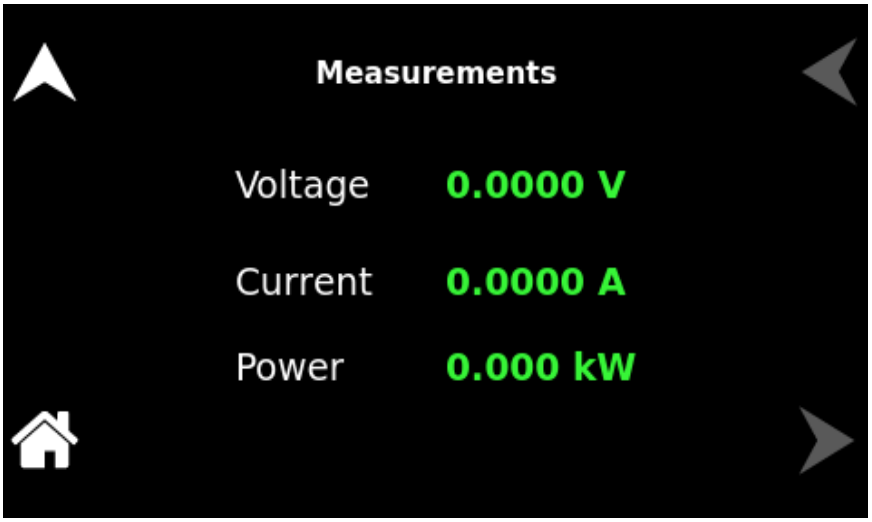


Figure 11-47. Measurements Screen

11.2.4 RAMP SCREEN

The Ramp Screen provides the interface based on the programming type and regulation setting selected, refer to section 11.2.5.1. The Ramp screen will be displayed according to the

Programming type configured ‘Voltage Ramp’ screen for ‘Voltage’ programming type and ‘Current Ramp’ screen for ‘Current’ programming type.

11.2.4.1 VOLTAGE RAMP –CV/CC AND CV – SER. RES, CV/CP AND CV

The Voltage Ramp menu allows the user to configure and execute voltage ramp, refer to Figure 11-48. The Voltage Ramp menu allows the selection of parameters such as ‘From Volt’, ‘To Volt’, ‘Time’, ‘Set Limits’, ‘Trigger’ and ‘Initial Slew’.

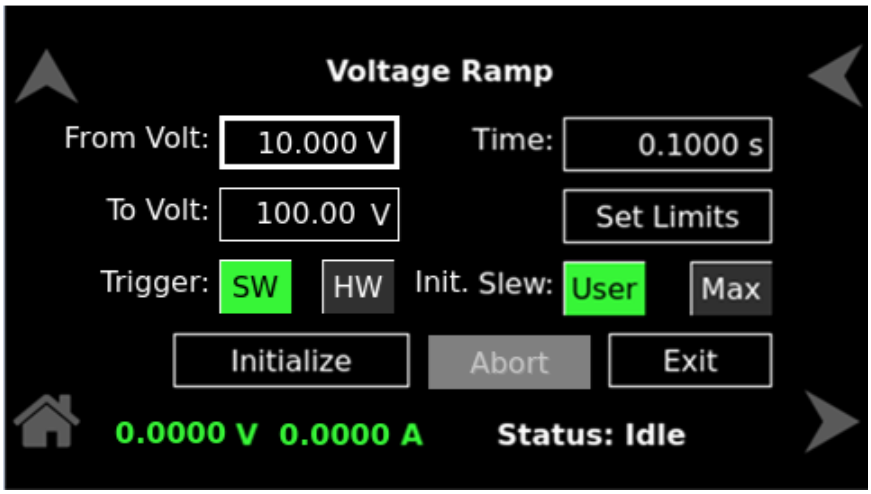


Figure 11-48. Voltage Ramp Screen

The Voltage Ramp menu has the following fields:

ENTRY	DESCRIPTION
From Volt	Sets the start voltage for the ramp. Refer to Figure 11-49.

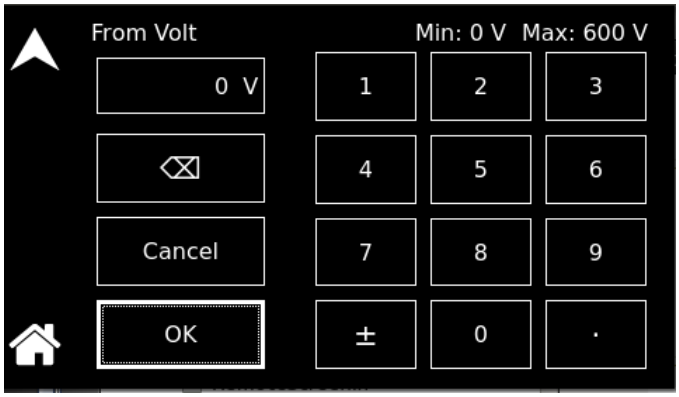


Figure 11-49. From Voltage

To Volt	Sets the end voltage for the ramp. Refer to Figure 11-50.

ENTRY	DESCRIPTION



Figure 11-50. To Voltage

Trigger Mode

This setting allows the user to configure the input signal to start the ramp execution ('From Volt' to 'To Volt')

a) Software (SW) Trigger Mode:
If 'SW' is selected, post ramp initialization power supply will wait for the software trigger to start the ramp, displaying the status as 'Waiting for Trigger'. Refer to Figure 11-51.

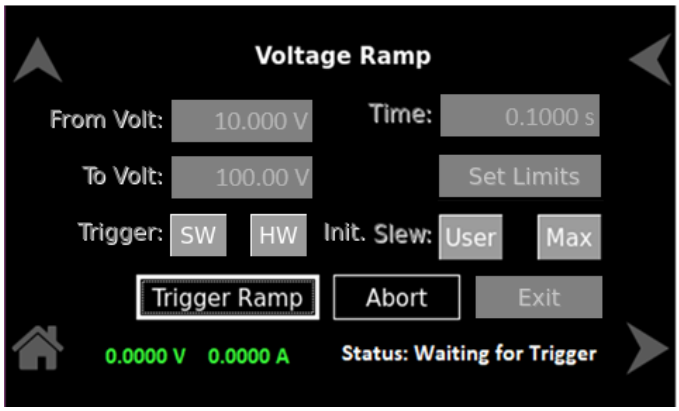


Figure 11-51. Software Trigger Mode

b) Hardware (HW) Trigger Mode:
If 'HW' is selected, post ramp initialization power supply will wait for the hardware trigger to start the ramp execution, displaying the status as 'Waiting for Trigger'.

The ramp execution begins when a 10ms active high pulse is applied to the Norcomp connector at pin-18 (RTN) and pin-19 (TRIGGER IN). Refer to Figure 11-52.

ENTRY	DESCRIPTION

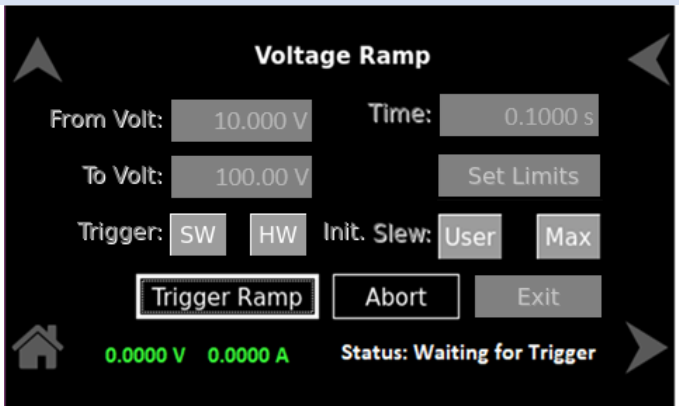


Figure 11-52. Hardware Trigger Mode

Time

Sets the time in seconds to reach from 'From Volt' to 'To Volt'. Refer to Figure 11-53.



Figure 11-53. Time

Set Limits

User can define the limits for the Ramp execution. Refer to Figure 11-54, Figure 11-55 and Figure 11-56.



Figure 11-54. Set Limits – CV/CC and CV

ENTRY	DESCRIPTION



Figure 11-55. Set Limits – CV – Ser.Res



Figure 11-56. Set Limits – CV/CP

Initial Slew

This setting allows the user to configure the initial slew, the slew rate at which the power supply reaches from the current output voltage of the power supply to the configured ‘From Volt’ in the ramp screen.

a) **User:** When the setting is ‘User’, the output voltage of the power supply reaches the ‘From Volt’ (when the ramp is initialized) with the voltage slew rate configured in the configuration menu.

b) **Max:** When the setting is ‘Max’, the output voltage of the power supply reaches the ‘From Volt’ (when the ramp is initialized) with maximum slew rate.

ENTRY	DESCRIPTION
Initialize	The function of the initialization process is to bring the current device voltage value to the 'From Volt' value programmed in the ramp screen. Click the 'Initialize' button to initialize the ramp, and the progress will be displayed as a percentage in the status bar. Upon completion of the initialization process, the status will indicate as 'Waiting for Trigger'. Refer to Figure 11-57.

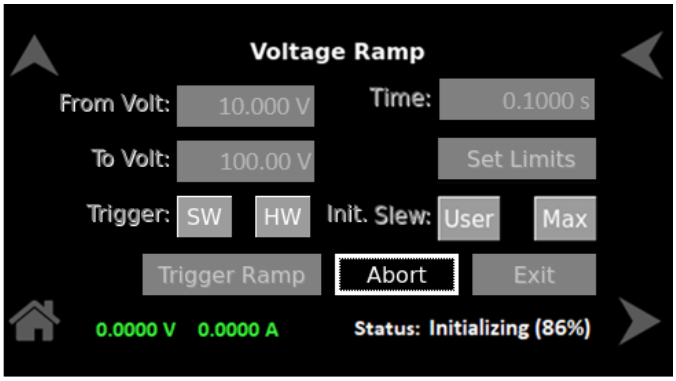


Figure 11-57. Initializing

Trigger Ramp	Used to send software trigger to the unit to start the ramp execution. Post initialization of ramp this function is enabled only when 'Trigger' selection is 'SW'. Refer to Figure 11-58. If the 'Trigger' selection is set to 'HW', this function is not enabled. The ramp execution begins when a 10ms active high pulse is applied to the Norcomp connector at pin-18 (RTN) and pin-19 (TRIGGER IN).

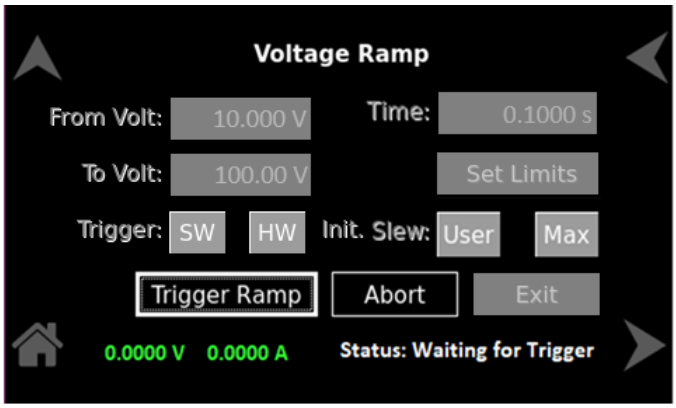


Figure 11-58. Trigger Ramp

ENTRY	DESCRIPTION
Abort	User can abort the process at any stage of the ramp execution. The progress of the operation is displayed in the status on the right side of the screen. Refer to Figure 11-59.

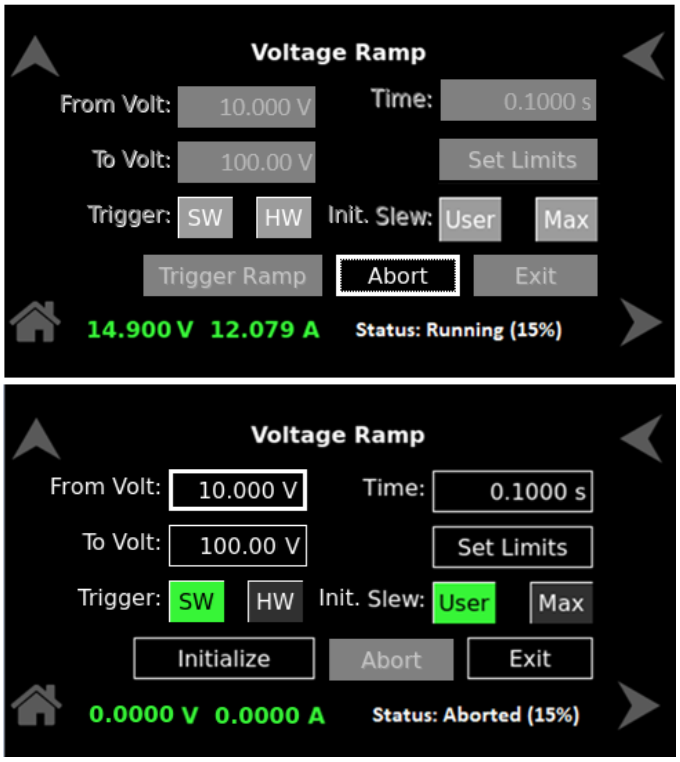


Figure 11-59. Abort

Status This field displays the progress or state of the process.

a) IDLE - When the system is in Idle (not performing any task) situation, refer to Figure 11-60.

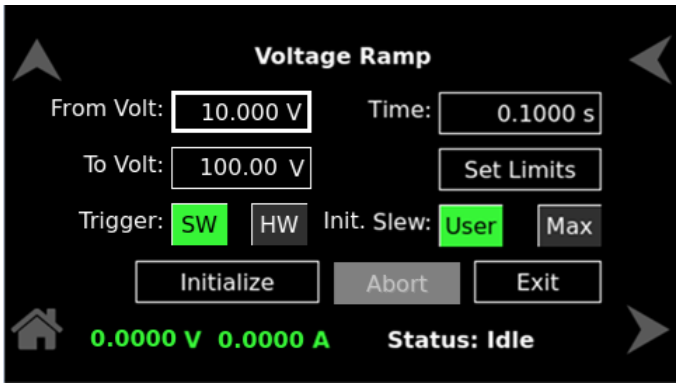


Figure 11-60. Status – IDLE

b) Initializing - When the system is initializing (configuring the current device voltage value to the 'From Volt' value programmed

ENTRY	DESCRIPTION
	in the ramp screen), and the progress is displayed as a percentage. Refer to Figure 11-61.

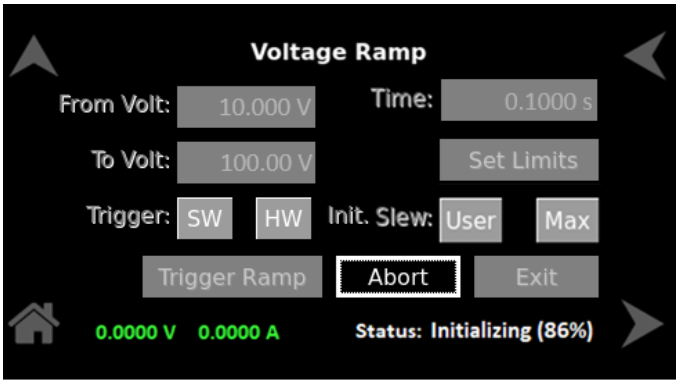


Figure 11-61. Status – Initializing

c) Waiting for Trigger: When the system is waiting for the trigger, refer to Figure 11-62.

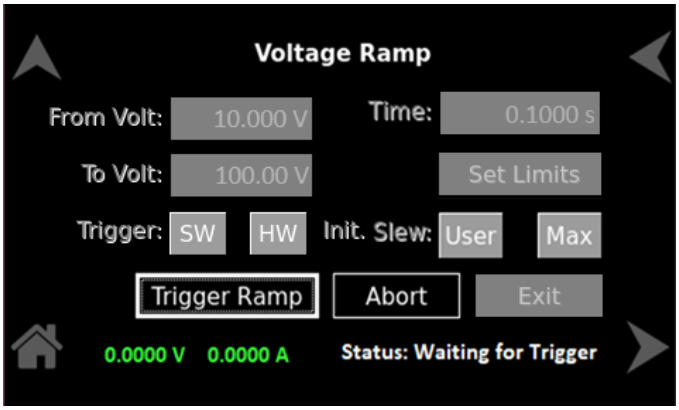


Figure 11-62. Status – Waiting for Trigger

d) Running: When the system is executing the trigger ramp process, refer to Figure 11-63.

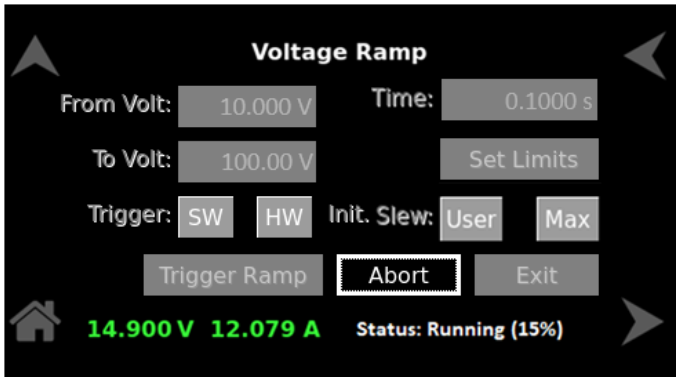


Figure 11-63. Status – Running

ENTRY	DESCRIPTION
	e) Aborted: When the process is aborted (Initializing, Waiting for Trigger, Running), 'Aborted' is displayed in the status. Refer to Figure 11-64.

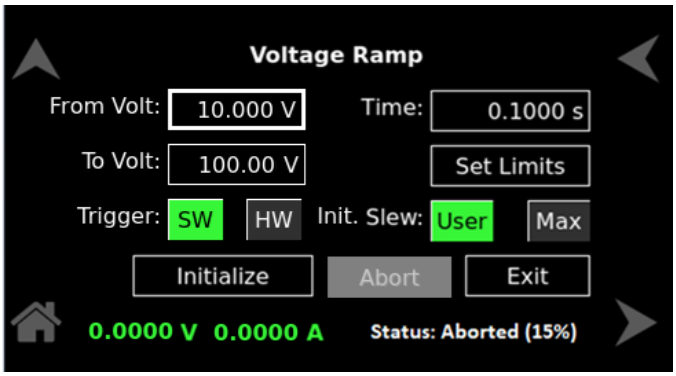


Figure 11-64. Status – Aborted

	f) Complete: When the ramp execution (bringing the voltage from 'From Volt' to 'To Volt') is completed. Refer to Figure 11-65.

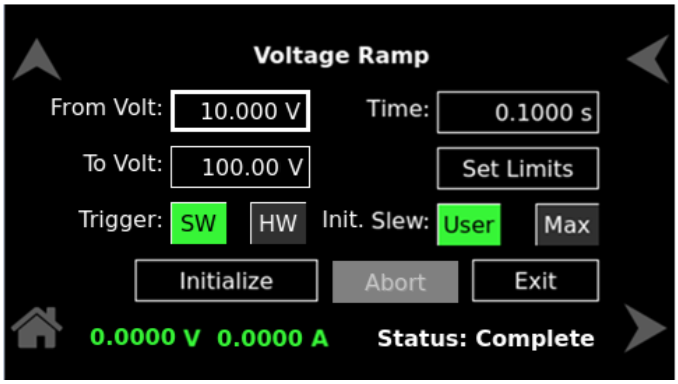


Figure 11-65. Status- Completed

Exit	Exits the Voltage Ramp sub menu and return to Top level menu, refer to Figure 11-3.

NOTE: User cannot set the 'From Volt' and 'To Volt' to the same value.

NOTE: User cannot exit the Voltage Ramp Screen using HOME and UP arrow. To exit while a process is ongoing, user must first abort the process.

Table 11-20. Voltage Ramp

a) Example 1: Creating a Voltage ramp using Software Trigger mode

- Set the From Volt to 25V
- Set the To Volt to 50V

NOTE: User cannot set the ‘From Volt’ and ‘To Volt’ to the same value.

- Set the Time to 10s
- Select the Trigger mode as SW
- Select between User or Max for the slew setting according to the user’s requirement
- Click on Initialize
- Observe that the Initialize button changes to the Trigger Ramp button after completion of initializing, and Abort button becomes enabled from a disabled state
- Click on Trigger Ramp
- The status of the Trigger Ramp progress can be seen on the screen
- Observe the voltage ramp signal using oscilloscope
- Clicking on the Abort button will abort the ramp
- Clicking on the Exit button will exit the Voltage Ramp screen.

b) Example 2: Creating a Voltage ramp using Hardware Trigger mode

- Set the Volt to 25V
- Set the To Volt to 50V

NOTE: User cannot set the ‘From Volt’ and ‘To Volt’ to the same value.

- Set the Time to 10s
- Select the Trigger mode as HW
- Select between User or Max for the slew setting according to the requirements
- Click on Initialize
- Observe that Initialize button change from enable to disable state after completion of initializing, and Abort button becomes enabled
- Give an external trigger i.e. an active high pulse of 10ms on the MOLEX connector pin-19 (TRIGGER IN) and pin-18 (RTN) to generate the Voltage Ramp
- Observe the voltage ramp signal using oscilloscope
- Clicking on the Abort button will abort the ramp

- Clicking on the Exit button will exit the Voltage Ramp screen.

11.2.4.2 VOLTAGE RAMP – CP/CV

Voltage Ramp is not applicable in CP/CV Regulation Settings. Refer to Figure 11-66.

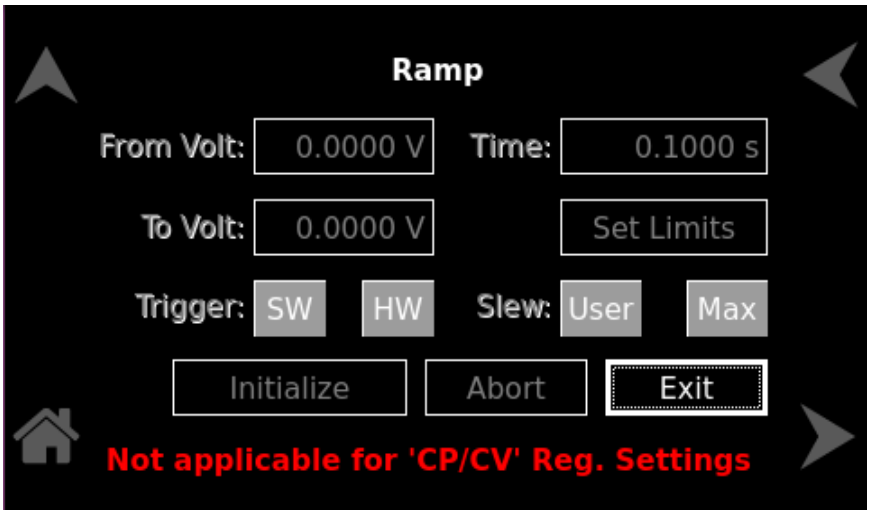


Figure 11-66. Voltage ramp – CP/CV

11.2.4.3 CURRENT RAMP – CC/CV, CC/CP AND CC

The Current Ramp menu allows to configure and execute current ramp, refer to Figure 11-67. The Current Ramp menu allows the selection of parameters such as From Current, Status, To Current, Time, Trigger, Set Limits and Initial Slew.

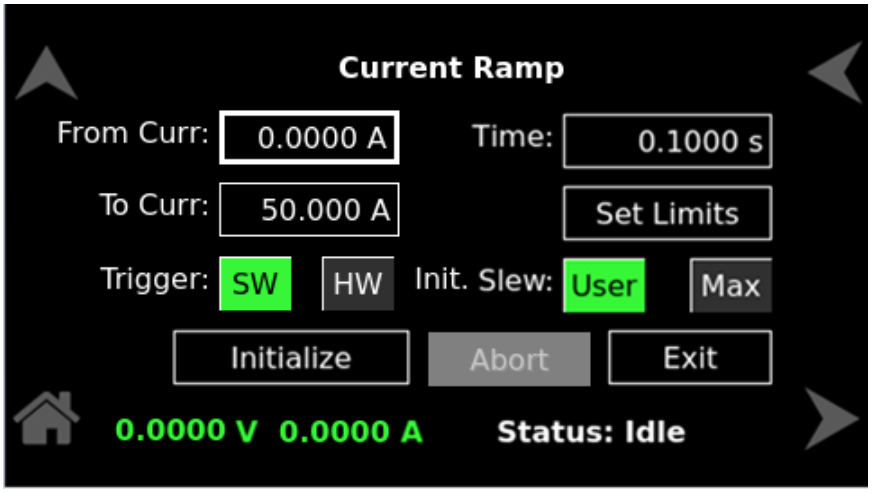


Figure 11-67. Current Ramp Screen

The Current Ramp menu has the following fields:

ENTRY	DESCRIPTION
From Curr	Sets the start current for the ramp. Refer to Figure 11-68.

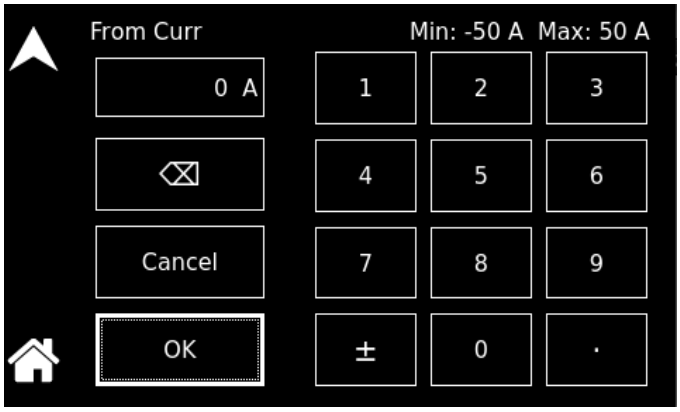


Figure 11-68. From Current

To Curr	Sets the end current for the ramp. Refer to Figure 11-69.

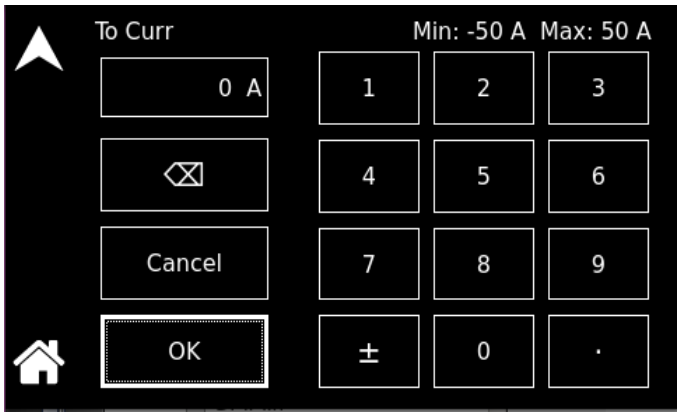


Figure 11-69. To Current

Trigger Mode	This setting allows the user to configure the input signal to start the ramp execution (‘From Curr’ to ‘To Curr’) **a) Software (SW) Trigger Mode:** If ‘SW’ is selected, post ramp initialization power supply will wait for the software trigger to start the ramp execution, displaying the status as ‘Waiting for Trigger’. Refer to Figure 11-70.

ENTRY	DESCRIPTION

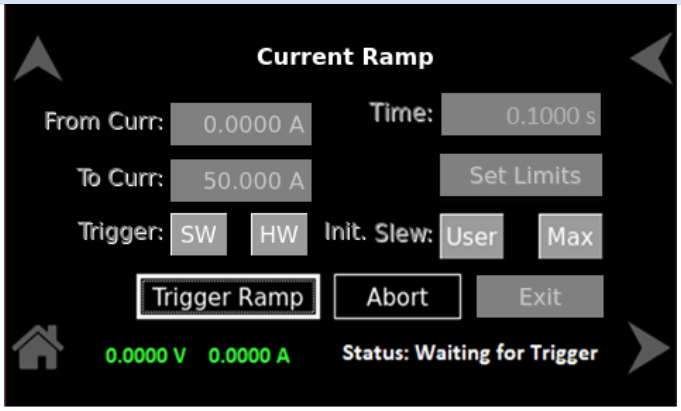


Figure 11-70. SW Mode

b) Hardware (HW) Trigger Mode:

When 'HW' is selected, post ramp initialization power supply will wait for a hardware trigger to start the ramp execution, displaying the status as 'Waiting for Trigger'.

The ramp execution begins when a 10ms active high pulse is applied to the Norcomp connector at pin-18 (RTN) and pin-19 (TRIGGER IN). Refer to Figure 11-71.

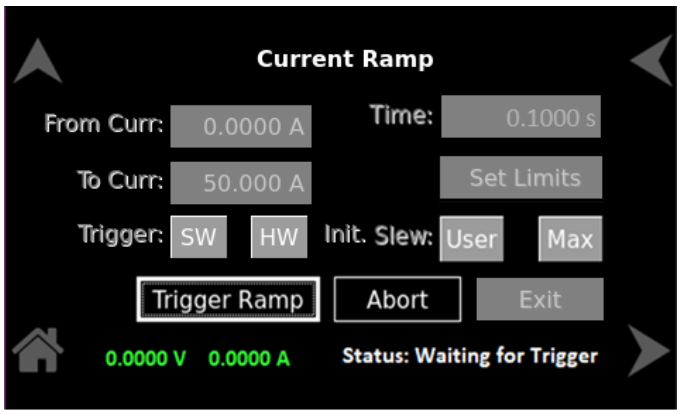


Figure 11-71. HW Mode

ENTRY	DESCRIPTION
Time	Sets the time in seconds to reach from 'From Curr' to 'To Curr'. Refer to Figure 11-72.



Figure 11-72. Time

Set Limits User can define the limits for the Ramp execution. Refer to Figure 11-73.



Figure 11-73. Set Limits - CC/CV, CC/CP and CC

Initial Slew This setting allows the user to configure the initial slew, the slew rate at which the power supply reaches from the output Current of the power supply to the configured 'From Curr' in the ramp screen.

a) User: When the setting is 'User', the output current of the power supply reaches the 'From Curr' (when the ramp is initialized) with the voltage slew rate configured in the configuration menu. Refer to section 11.2.5.2.

b) Max: When the setting is 'Max', the output current of the power supply reaches the 'From Curr' (when the ramp is initialized) with maximum slew rate.

ENTRY	DESCRIPTION
Initialize	The function of the initialization process is to bring the current device voltage value to the 'From Curr' value programmed in the ramp screen. Click the 'Initialize' button to initialize the ramp, and the progress will be displayed as a percentage in the status bar. Upon completion of the initialization process, the status will indicate as 'Waiting for Trigger'. Refer to Figure 11-74.

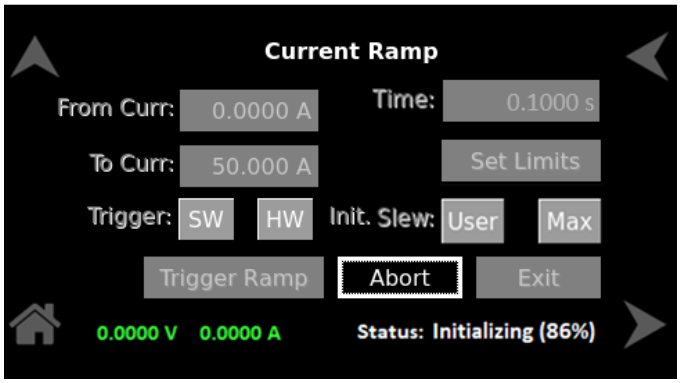


Figure 11-74. Initializing

Trigger Ramp

Used to send software trigger to the unit to start the ramp execution. Post initialization of ramp this function is enabled only when 'Trigger' selection is 'SW'. Refer to Figure 11-75.

If the 'Trigger' selection is set to 'HW', this function is not enabled. The ramp execution begins when a 10ms active high pulse is applied to the Norcomp connector at pin-18 (RTN) and pin-19 (TRIGGER IN).

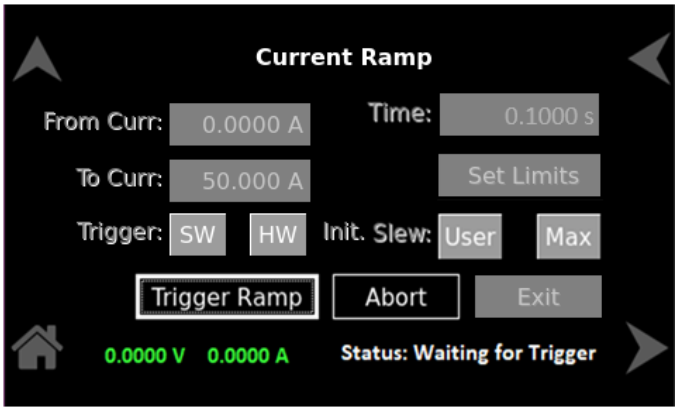


Figure 11-75. Trigger Ramp

ENTRY	DESCRIPTION
Abort	User can abort the process at any stage of the ramp execution. The progress of the operation is displayed in the status on the right side of the screen. Refer to Figure 11-76.

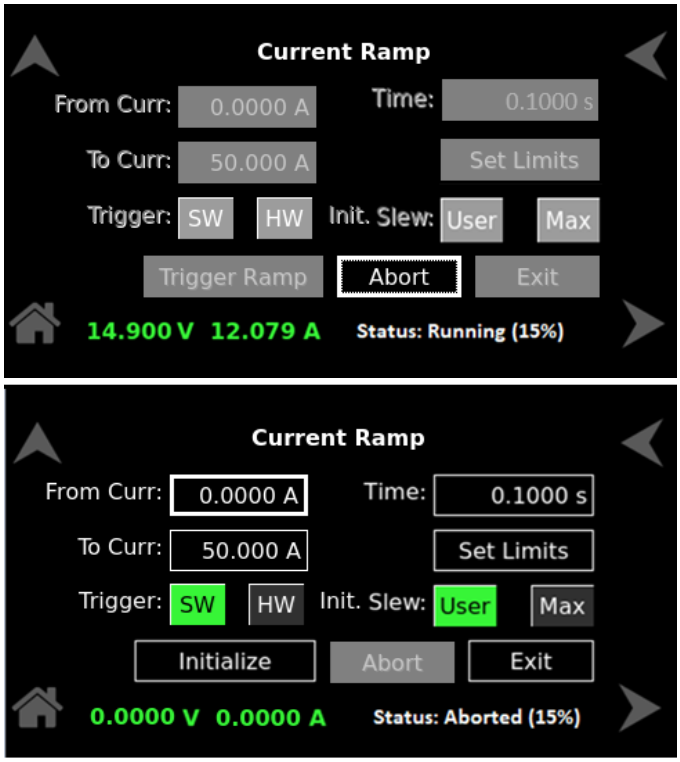


Figure 11-76. Abort – SW

Status This field displays the progress or state of the process.

a) IDLE - When the system is in Idle (not performing any task) situation, refer to Figure 11-77.

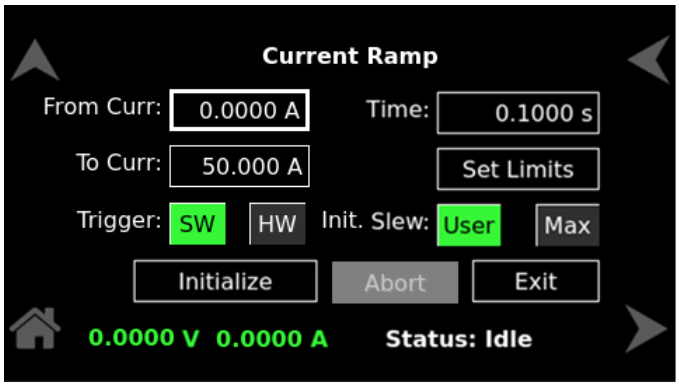


Figure 11-77. Status – IDLE

b) Initializing - When the system is initializing (configuring the device current value to the 'From Curr' value programmed in the ramp screen), and the progress is displayed as a percentage. Refer to Figure 11-78.

ENTRY	DESCRIPTION

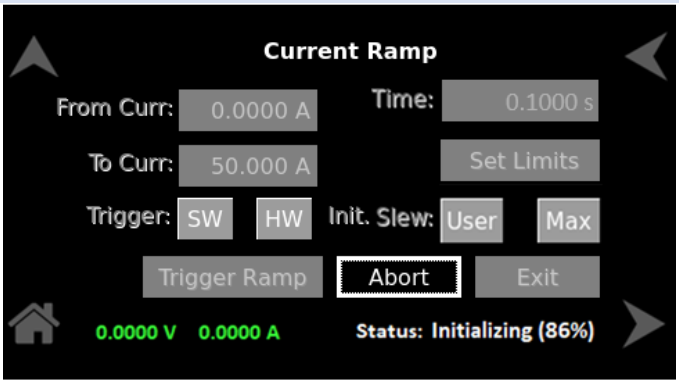


Figure 11-78. Status - Initializing

c) Waiting for Trigger: When the system is waiting for the trigger, refer to Figure 11-79.

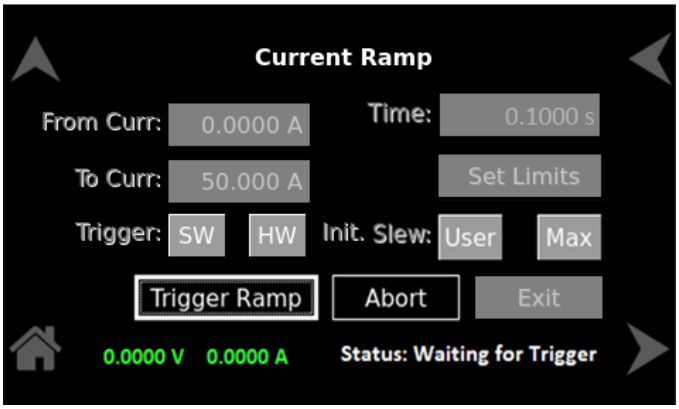


Figure 11-79. Status – Waiting for Trigger

d) Running: When the system is executing the trigger ramp process, refer to Figure 11-80.

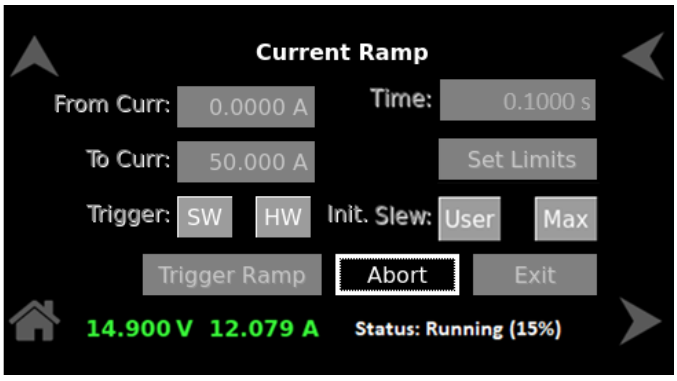


Figure 11-80. Status – Running

e) Aborted: When the process is aborted (Initializing, Waiting for Trigger, Running), 'Aborted' is displayed in the status. Refer to Figure 11-81.

ENTRY	DESCRIPTION

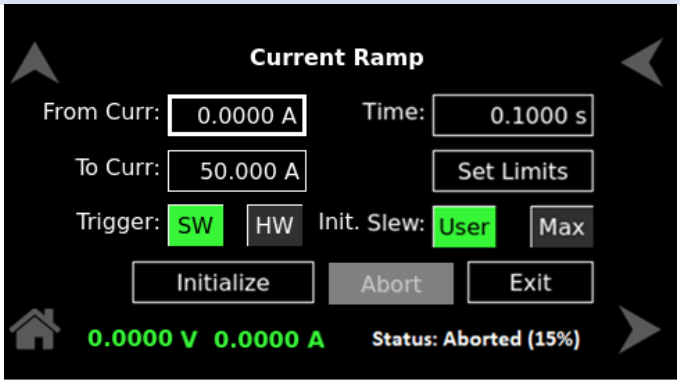


Figure 11-81. Status – Aborted

f) Complete: When the ramp execution (bringing the voltage from “From Curr” to “To Curr”) is completed. Refer to Figure 11-82.

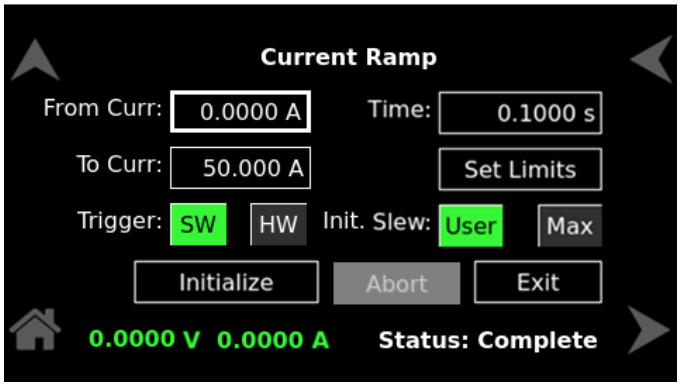


Figure 11-82. Status- Completed

Exit	Exits the Current Ramp sub menu and return to Top level menu, refer to Figure 11-3.

NOTE: User cannot set the ‘From Curr’ and ‘To Curr’ to the same value.

NOTE: User cannot exit the Current Ramp Screen using HOME and UP arrow. To exit while a process is ongoing, user must first abort the process.

Table 11-21. Current ramp

a) Example 1: Creating a Current ramp using Software Trigger mode

- Set the From Current to 10A
- Set the To Curr to 30A

NOTE: User cannot set the ‘From Curr’ and ‘To Curr’ to the same value.

- Set the Time to 10s

- Select the Trigger mode as SW
- Select between User or Max for the slew setting according to the user's requirement
- Click on Initialize
- Observe that the Initialize button changes to the Trigger Ramp button after completion of initializing, and Abort button becomes enabled from disabled state
- Click on Trigger Ramp
- The status of the Trigger Ramp progress can be seen on the screen
- Observe the current ramp signal using oscilloscope
- Clicking on the Abort button will abort the ramp
- Clicking on the Exit button will exit the Current Ramp screen.

b) Example 2: Creating a Current ramp using Hardware Trigger mode

- Set the Curr to 10A
- Set the To Curr to 30A
- Set the Volt to 25V

NOTE: User cannot set the 'From Curr' and 'To Curr' to the same value.

- Set the Time to 10s
- Select the Trigger mode as HW
- Select between User or Max for the slew setting according to the users' requirements
- Click on Initialize
- Observe that Initialize button change from enable to disable state after completion of initializing, and Abort button becomes enabled
- Give an external trigger i.e. an active high pulse of 10ms on the MOLEX connector pin-19 (TRIGGER IN) and pin-18 (RTN) to generate the Current Ramp.
- Observe the current ramp signal using oscilloscope
- Clicking on the Abort button will abort the ramp
- Clicking on the Exit button will exit the Current Ramp screen.

11.2.4.4 CURRENT RAMP – CP/CC

Current Ramp is not applicable in CP/CC Regulation Settings. Refer to Figure 11-83.

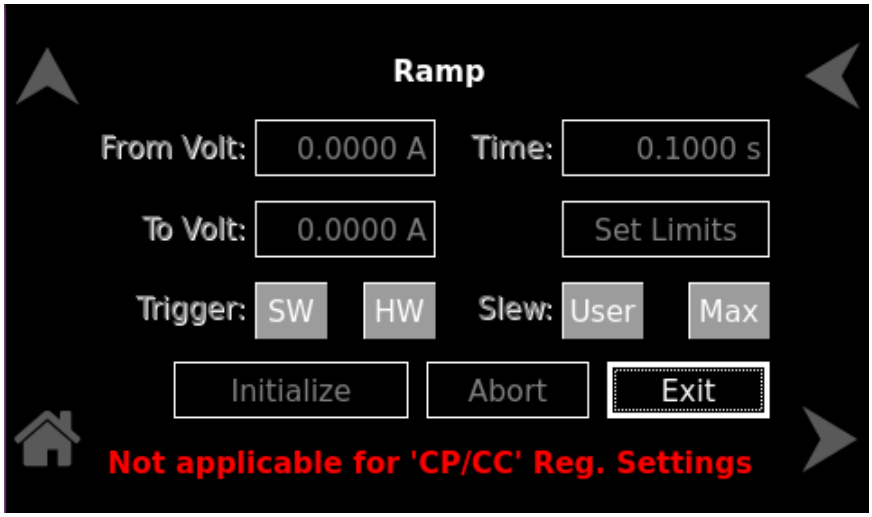


Figure 11-83. Current Ramp - CP/CC

11.2.5 CONFIGURATION SCREEN

The Configuration screen provides ‘Regulation Settings’, ‘Slew Rate’, ‘Protection’, ‘User Limits’, ‘External Relay’, ‘Output Sense’, ‘PONS’, ‘Measurement Average Samples’ and ‘Parallel Operation Mode’ (enabled only in parallel operation).

For the top-level menu of the Configuration screen, refer to Figure 11-84 and Figure 11-85, for instructions on how to navigate, refer to Section 9.4.2.2.

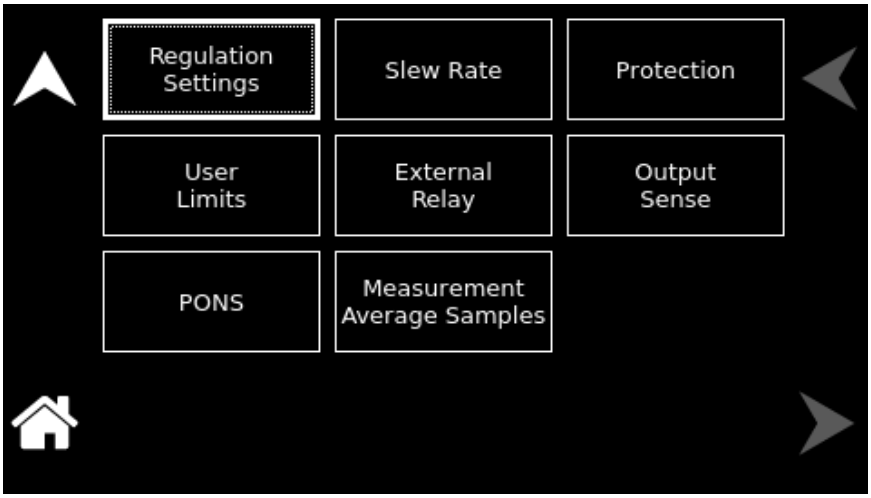


Figure 11-84. Configuration Screen Top-Level Menu

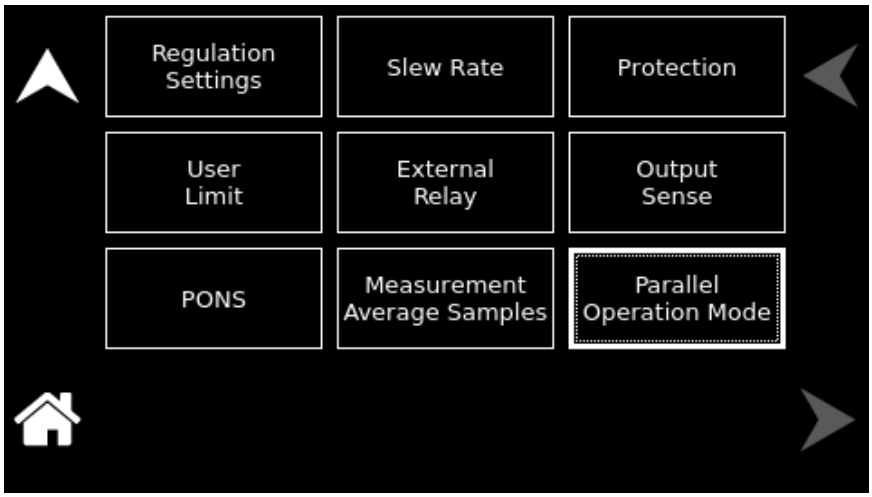


Figure 11-85. Configuration Screen Top-Level Menu – Parallel Operation

11.2.5.1 REGULATION SETTINGS

The Regulation Settings Menu is used to configure the Programming type and Regulation setting of the power supply. Refer to Figure 11-86 and Figure 11-88.

The 'Reg. Setting' function on the Configuration Screen enables users to switch between 'Voltage (CV/CC, CV-Ser. Res, CV/CP, CP/CV and CV) ' and 'Current (CC/CV, CC/CP, CP/CC, and CC) ' regulation settings.

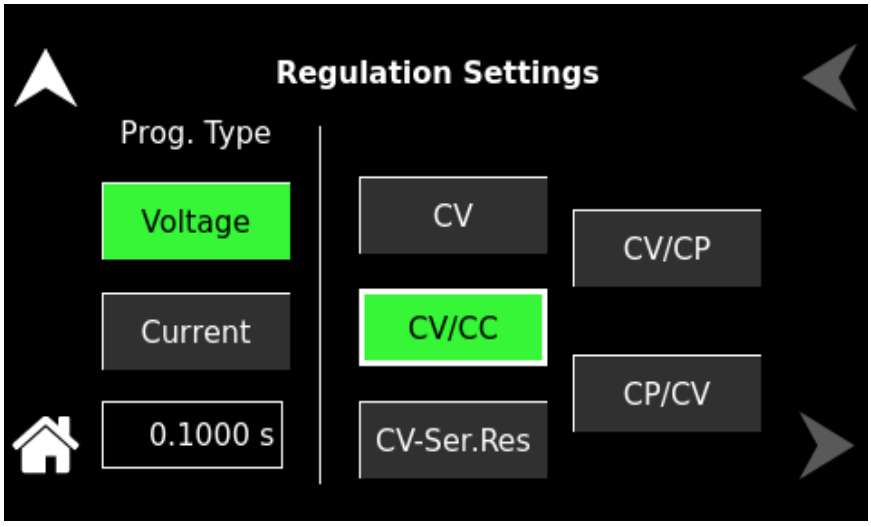


Figure 11-86. Regulation Settings – CV/CC, CV-Ser. Res, CV/CP, CP/CV and CV

a) When the programming type is set to 'Voltage' in the Regulation Settings menu, the following fields are available:

ENTRY	DESCRIPTION
CV/CC	In this regulation setting, output voltage is regulated to the user set value. On reaching the current limit (positive), output would be regulated to the current limit reached. On reaching the power limit (positive), the output voltage would be programmed to zero.
CV-Ser.Res	In this regulation setting, user can set the voltage and series resistance. Depending on the current output, the terminal voltage would be varied based on the voltage drop across the series resistance. In the event of reaching the programmed current limit (positive) or power limit (positive) or voltage limit (low), the output voltage is programmed to zero.
CV/CP	In this regulation setting, output voltage is regulated to the user set value. On reaching the power limit (positive), output would be regulated to the power limit reached. On reaching the current limit (positive), the output voltage would be programmed to zero.
CP/CV	In this regulation setting, output power is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the current limit (positive), the output power would be programmed to zero.
CV	In this regulation setting, output voltage is regulated to the user set value. On reaching the set current limit (positive) or power limit (positive), the output voltage would be programmed to zero. **NOTE:** When the unit is in series operation (refer to Chapter 6), the only regulation setting available is Voltage - CV.
Delay	Sets the programmable time delay executed by the supply before setting the output to zero. The minimum time that can be set is 0.1 seconds, and the maximum is 5 seconds. Refer to Figure 11-87.



Figure 11-87. Delay Screen

Table 11-22. Regulation Settings

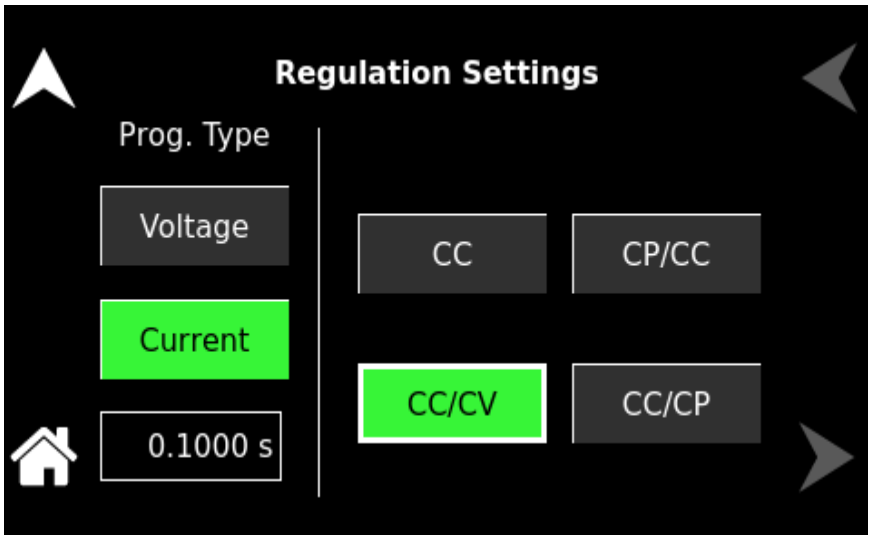


Figure 11-88. Regulation Settings – CC/CV,CC/CP, CP/CC, and CC

b) When the programming type is set to 'Current' in the Regulation Settings menu, the following fields are available:

ENTRY	DESCRIPTION
CC/CV	In this regulation setting, output current is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the power limit (positive), the output current would be programmed to zero.
CP/CC	In this regulation setting, output power is regulated to the user set value. On reaching the current limit (positive), output would be regulated to the current limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero.
CC/CP	In this regulation setting, output current is regulated to the user set value. On reaching the power limit (positive), output would be regulated to the power limit reached. On reaching the voltage limit (high or low), the output current would be programmed to zero.
CC	In this regulation setting, output current is regulated to the user set value. On reaching the set voltage limit (high or low) or power limit (positive), the output current would be programmed to zero.
Delay	Sets the programmable time delay executed by the supply before setting the output to zero. The minimum time that can be set is 0.1 seconds, and the maximum is 5 seconds. Refer to Figure 11-89.

ENTRY	DESCRIPTION

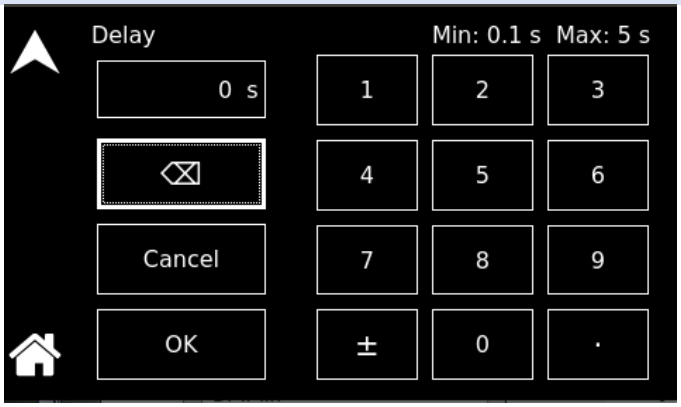


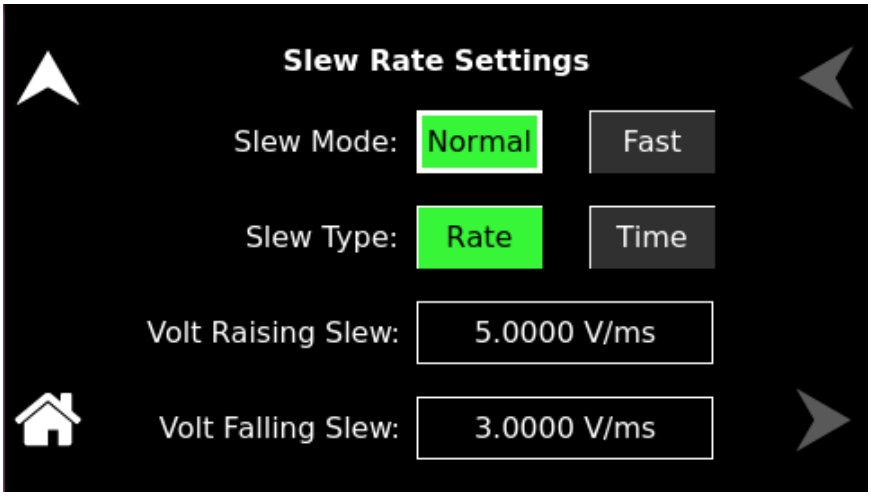
Figure 11-89. Delay Screen

Table 11-23. Regulation Settings

11.2.5.2 SLEW RATE

In the Slew Rate Settings, users can configure the voltage, current and power slew rate. This allows for precise control over the voltage, current and power change, ensuring smoother transitions and better performance of the power supply. Adjusting these settings can help in optimizing the response time and stability of the system.

The Slew Rate provides the interface based on the programming type selected in the configuration screen, refer to section 11.2.5.1. When the program type is set to 'Voltage- CV/CC, CV-Ser.Res, CV/CP and CV' in the regulation setting, the Slew Settings screen that appears will be the 'Volt Slew Rate'. Refer to Figure 11-90.



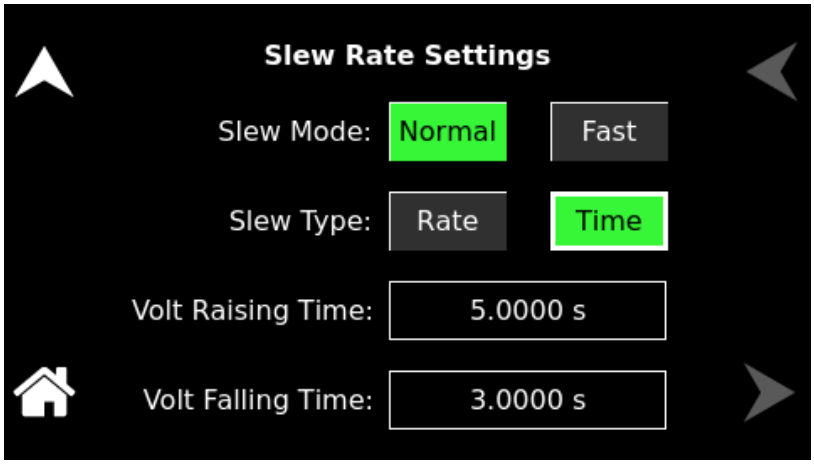


Figure 11-90. Slew Rate Settings - Voltage (CV/CC, CV-Ser.Res, CV/CP and CV)

When the program type is set to 'Voltage - CP/CV' in the regulation setting, the Slew Settings screen that appears will be the 'Pow Slew Rate'. Refer to Figure 11-91.





Figure 11-91. Slew Rate Settings – Power (CP/CV)

When the program type is set to ‘Current – CC/CV, CC/CP and CC’ in the regulation setting, the Slew Settings screen that appears will be the ‘Curr Slew Rate’. Refer to Figure 11-92.

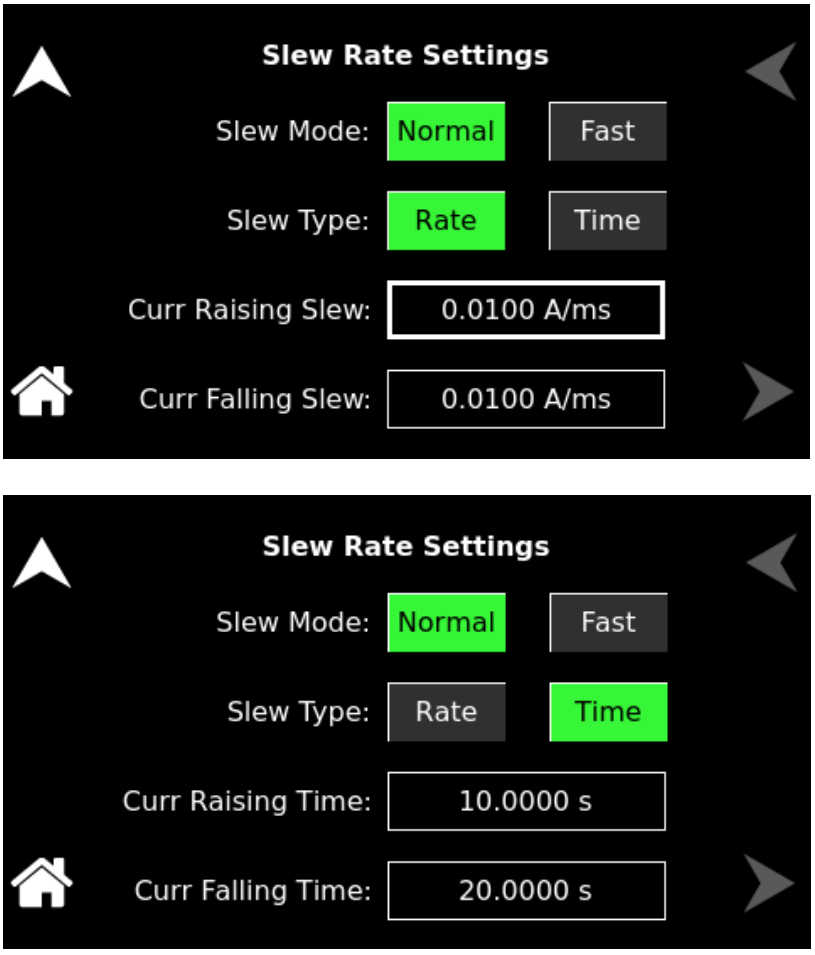


Figure 11-92. Slew Rate Settings – Current (CC/CV, CC/CP and CC)

When the program type is set to ‘Current –CP/CC’ in the regulation setting, the Slew Settings screen that appears will be the ‘Pow Slew Rate’. Refer to Figure 11-93.





Figure 11-93. Slew Rate Settings – Power (CP/CC)

Refer to Sections 2.11 and 2.12 for detailed information on the 'Normal' and 'Fast' Slew Modes in the Slew Rate Settings.

11.2.5.3 PROTECTION

In protection settings, users can define 'Output Overvoltage Protection (OVP)' and 'Positive Overcurrent Protection (Pos. OCP)' to help safeguard their devices from electrical anomalies. Refer to Figure 11-94.

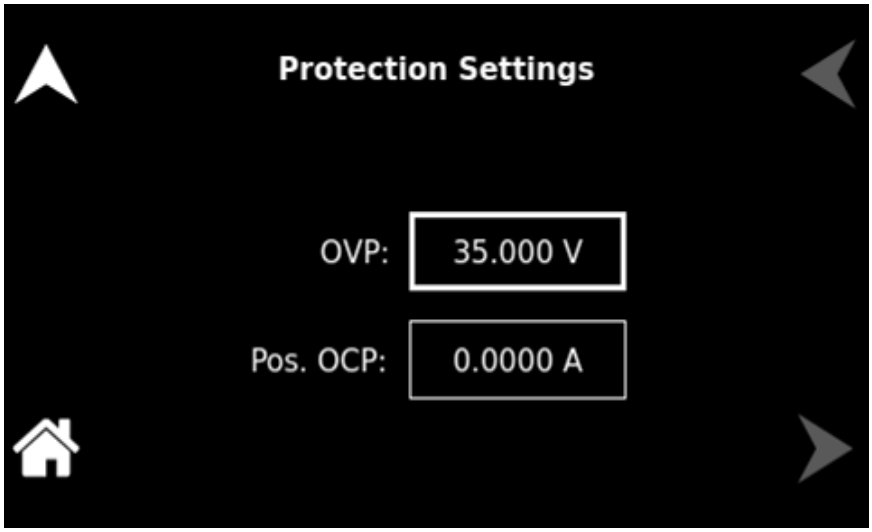


Figure 11-94. Protection Settings

If the units are configured in series operation (refer to Chapter 6), the user can define Over Voltage Protection (OVP) for the leader unit as OVP 1 and for the follower unit as OVP 2. Refer to Figure 11-95.

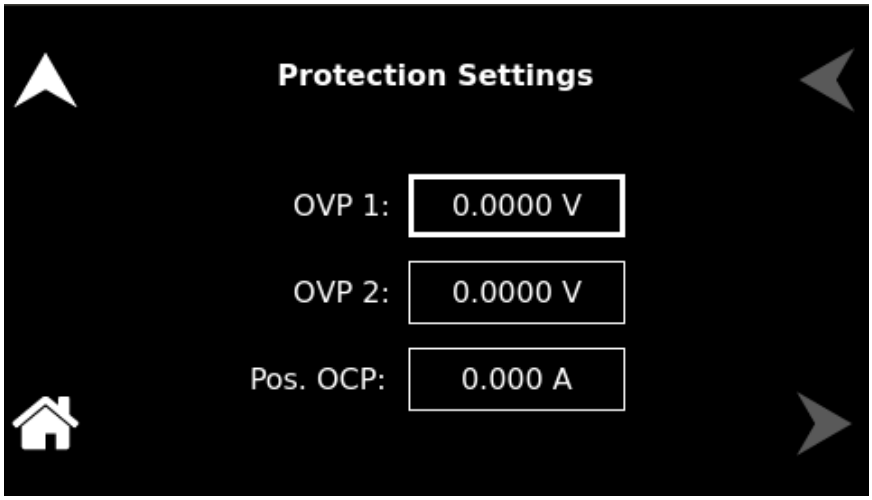


Figure 11-95. Protection Settings- Series Connection

11.2.5.4 EXTERNAL RELAY

The External relay Settings allows the user to set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 11-96.

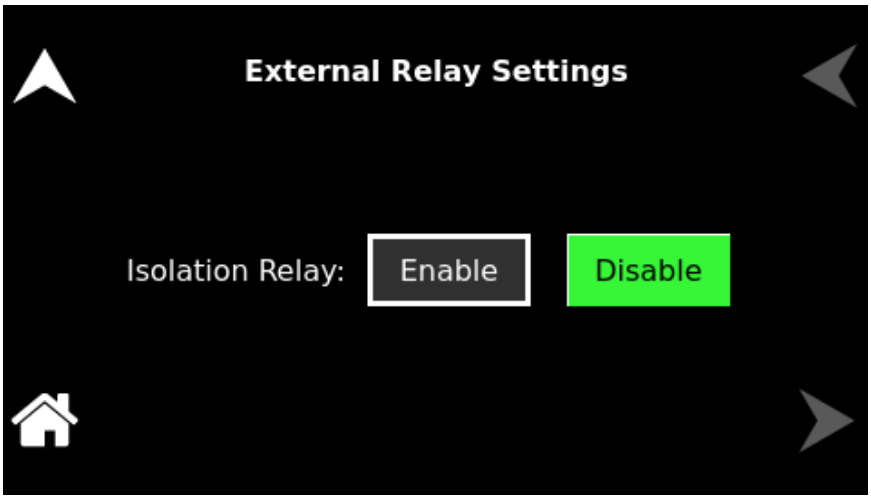


Figure 11-96. External Relay Settings

11.2.5.5 USER LIMITS

In the user limits settings, users can set the maximum allowable voltage, current and power values. This allows users to specify the highest values the device can reach without exceeding these limits.

When the programming type is set to ‘Voltage- CV/CC, CV-Ser.Res, CV/CP and CV’ in the Regulation Settings menu, the user limit screen that appear will be ‘Voltage’. Refer to Figure 11-97.

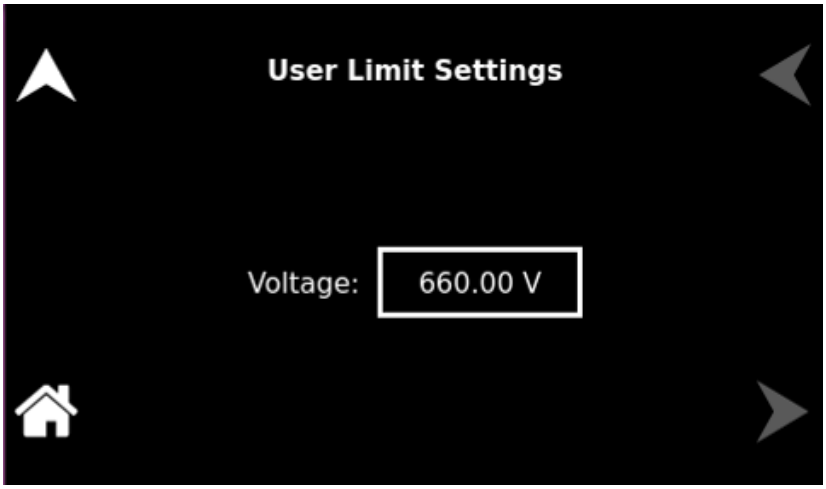


Figure 11-97. User Limit Settings- Voltage (CV/CC, CV-Ser.Res, CV/CP and CV)

When the program type is set to ‘Voltage - CP/CV’ in the regulation setting, the User limit Settings screen that appears will be the ‘Power High Limit’. Refer to Figure 11-98.

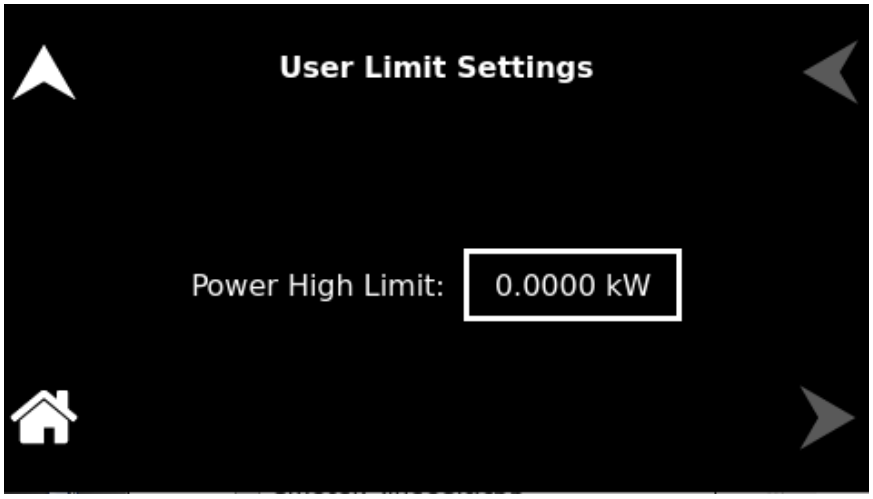


Figure 11-98. User Limit Settings- Voltage (CP/CV)

When the programming type is set to ‘Current– CC/CV, CC/CP and CC’ in the regulation setting, the User limit settings screen that appears will be ‘Current High Limit’. Refer to Figure 11-99.

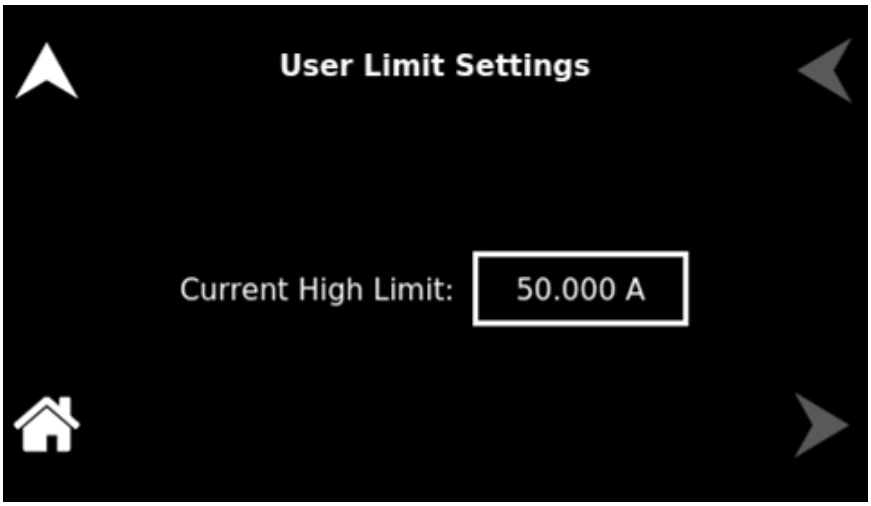


Figure 11-99. User Limit Settings- Current (CC/CV, CC/CP and CC)

When the programming type is set to ‘Current– CP/CC’ in the regulation setting, the User limit settings screen that appears will be ‘Power High Limit’. Refer to Figure 11-100.

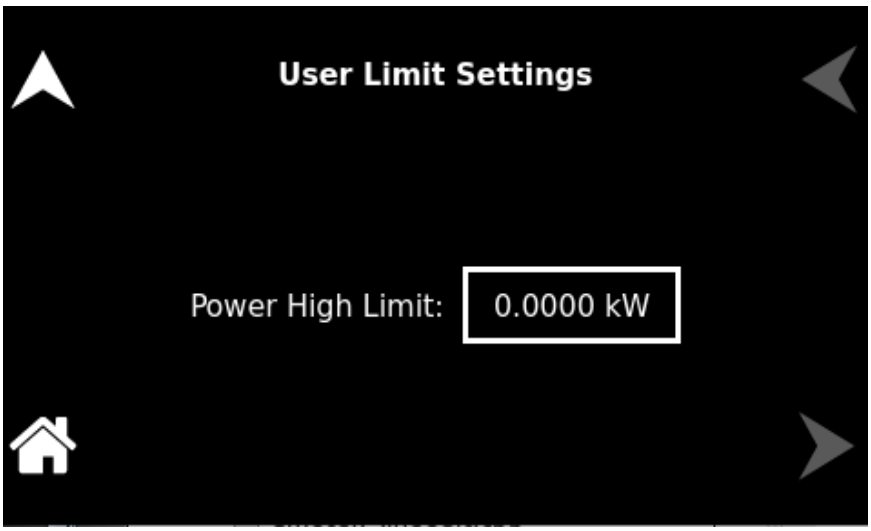


Figure 11-100. User Limit Settings- Current (CP/CC)

11.2.5.6 OUTPUT SENSE

The Output Sense menu allows user to set the output voltage sense of the unit to either ‘Local’ or ‘Remote’. When Remote is selected as output sense, voltage sense cables must be connected to rear panel of power the supply at RVS (Remote Voltage Sense) connector. Refer to Figure 11-101.

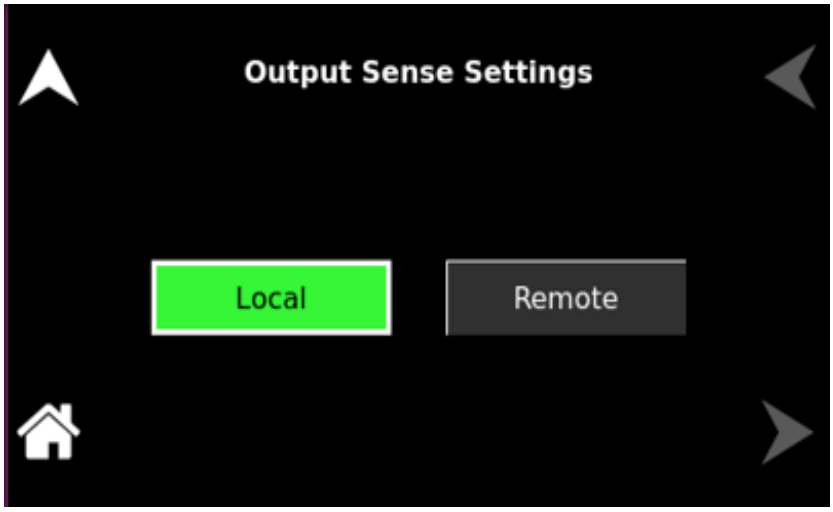


Figure 11-101. Output Sense Settings

11.2.5.7 PONS

The PONS Menu enables users to configure the Power-ON values and set up the power supply based on their chosen mode regulation settings.

When the Programming type is set to 'Voltage' in the Regulation Settings menu, the PONS Program Type will display as 'Voltage,' and the PONS Reg. Setting will show the selected mode. Refer Figure 11-102 to Figure 11-106.

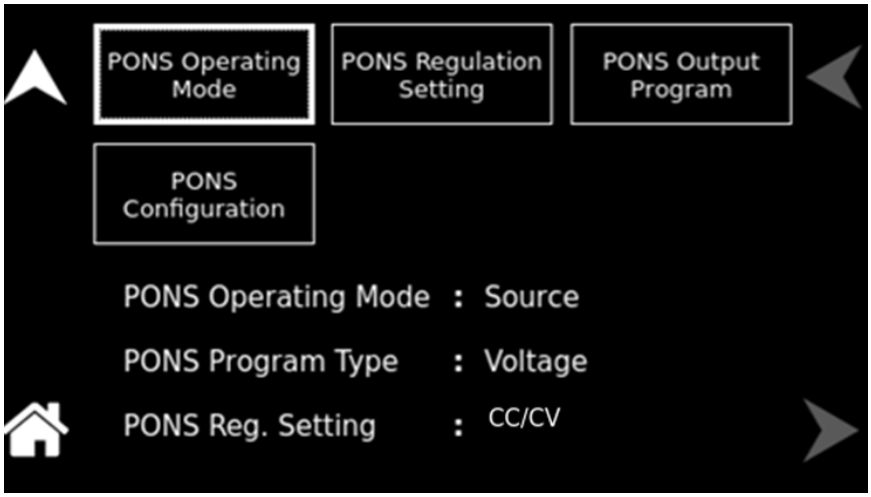


Figure 11-102. PONS Main Screen – CV/CC

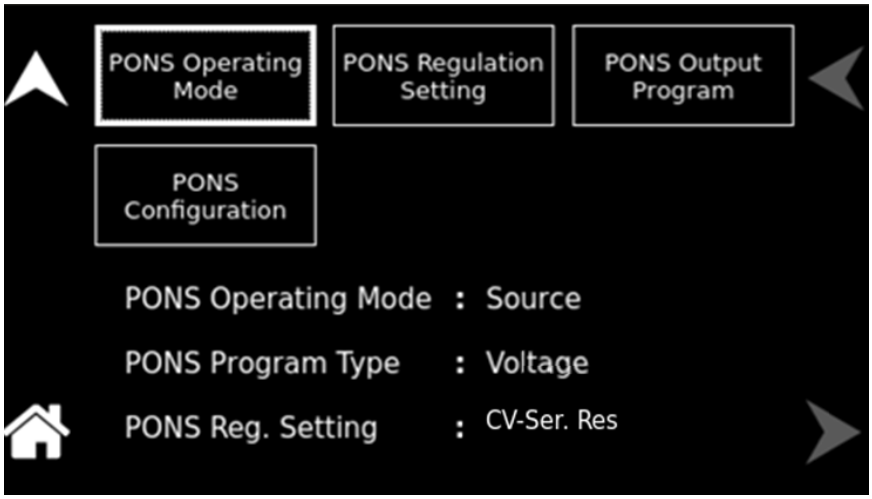


Figure 11-103. PONS Main Screen – CV-Ser. Res

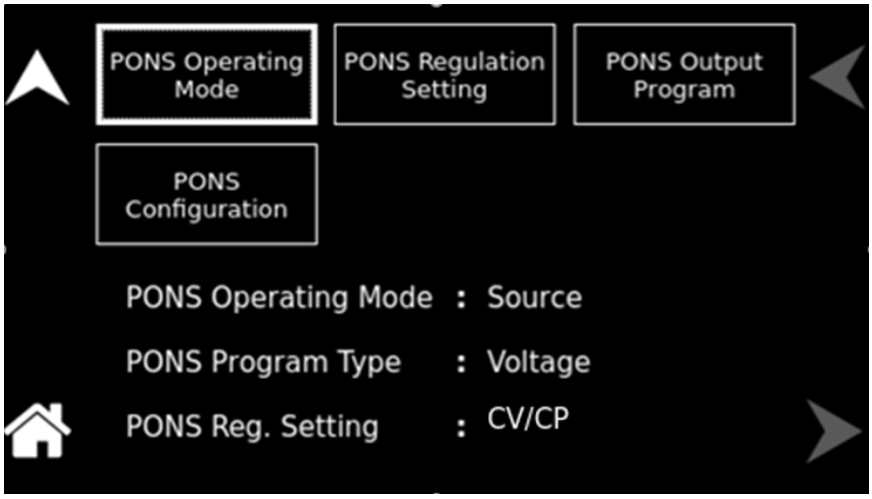


Figure 11-104. PONS Main Screen – CV/CP

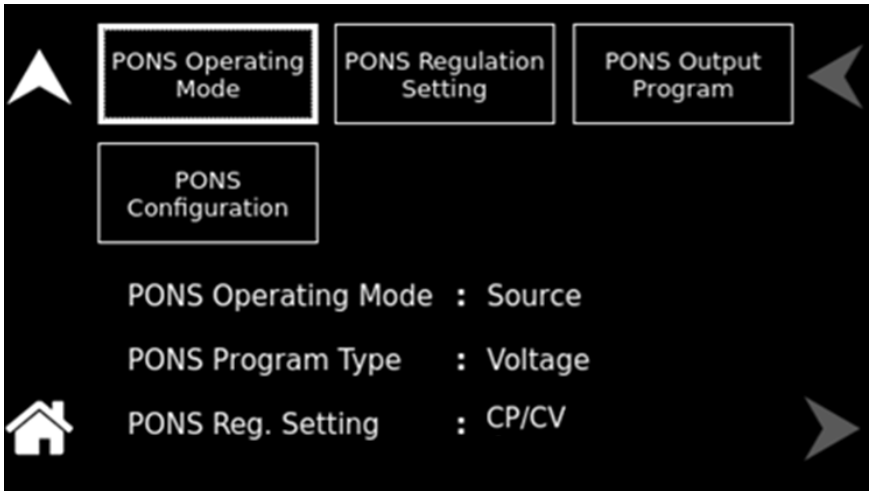


Figure 11-105. PONS Main Screen – CP/CV

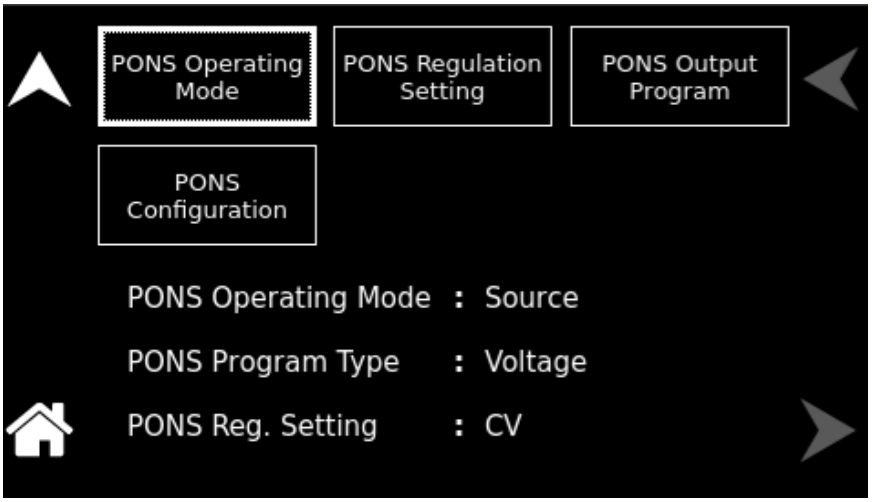


Figure 11-106. PONS Main Screen - CV

When the Programming type is set to 'Current' in the Regulation Settings menu, the PONS Program Type will display as 'Current,' and the PONS Reg. Setting will show the selected mode. Refer Figure 11-107 to Figure 11-110.

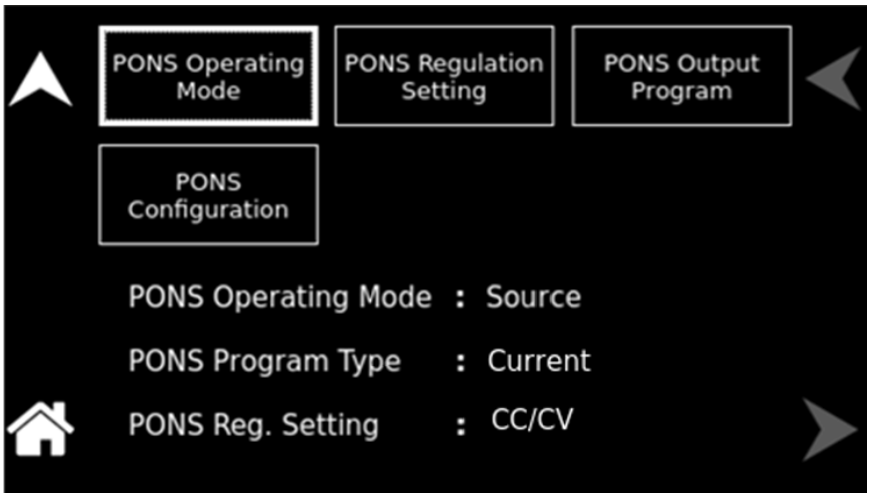


Figure 11-107. PONS Main Screen – CC/CV

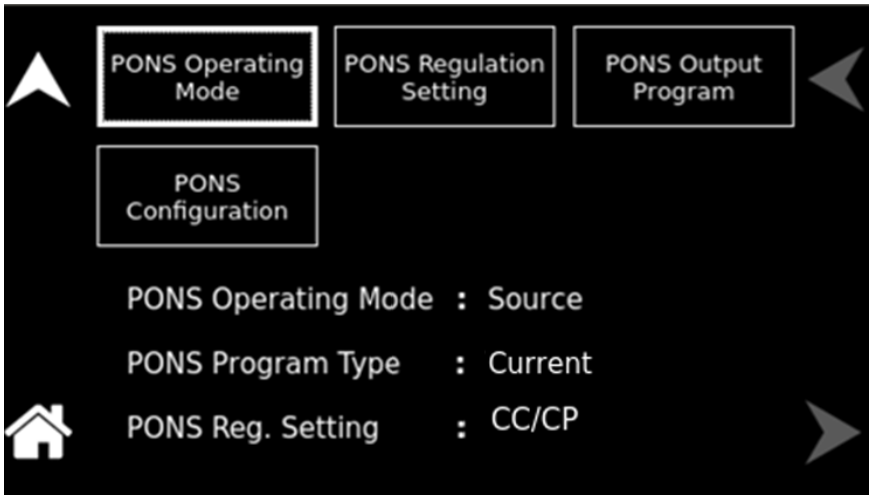


Figure 11-108. PONS Main Screen – CC/CP

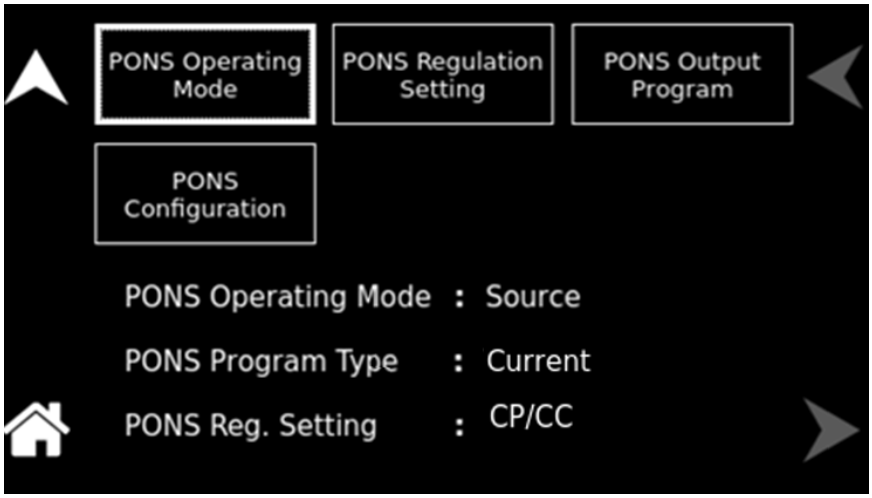


Figure 11-109. PONS Main Screen – CP/CC

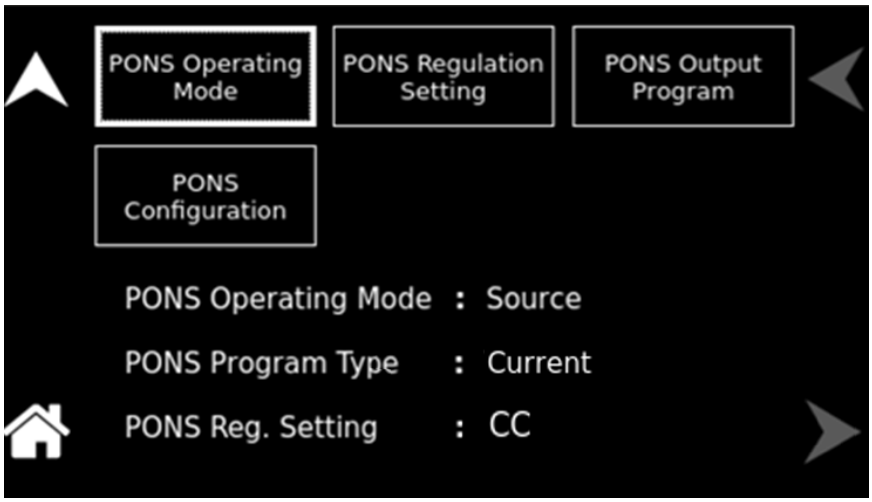


Figure 11-110. PONS Main Screen – CC

11.2.5.7.1 PONS OPERATING MODE

The ‘PONS Operating Mode Settings’ will not change automatically when the user changes the mode in the ‘Operating Mode’ settings on the Home screen. Users must separately select the ‘SOUR’ mode in the 'PONS Operating Mode Settings', which will update the 'PONS Operating Mode Settings', ‘PONS Regulation’, ‘PONS Output Program’ and the 'PONS Configuration' screens. Refer to Figure 11-111, Figure 11-112, Figure 11-114, Figure 11-116, Figure 11-120, Figure 11-126, Figure 11-131, Figure 11-137 and Figure 11-142.

The same applies to other modes such as Bi-DIR, ELOAD, PVSIM, BATSIM and BATTEST. Refer to the Sections 10.2.5.7.1, 12.2.5.7.1, 13.2.4.2.1.5, 14.2.4.7.1 and 15.2.4.7.1.

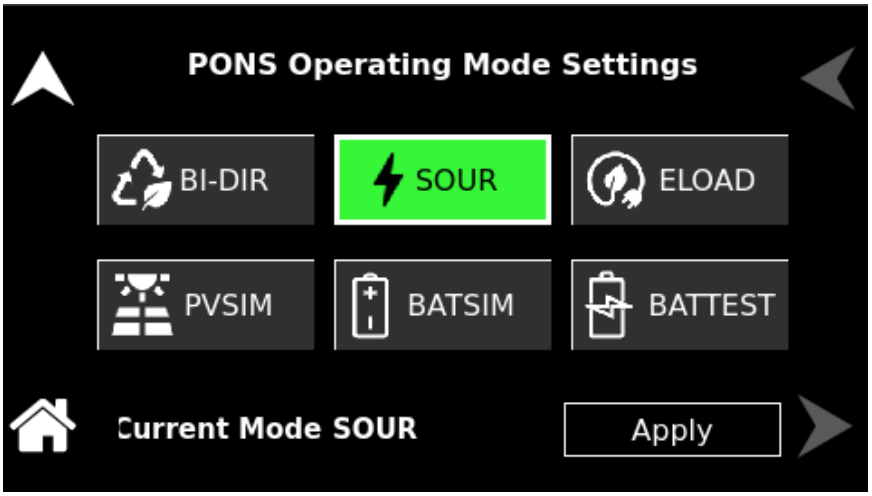


Figure 11-111. PONS Operating Mode Settings

NOTE: When the unit is in series operation, the non-applicable modes ‘PVSIM’, ‘BATSIM’, and ‘BATTEST’ do not appear in ‘PONS Operating Mode Settings’.

11.2.5.7.2 PONS REGULATION SETTINGS

The Regulation Settings Menu is used to configure the Regulation mode of the power supply. Refer to Figure 11-112 and Figure 11-114.

a) When the programming type is set to ‘Voltage’ in the Regulation Settings menu, the following fields are available:

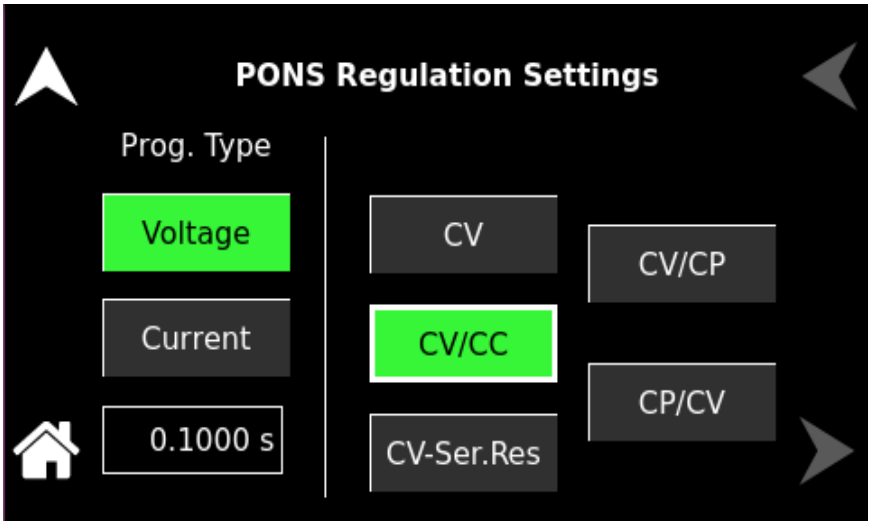


Figure 11-112. PONS regulation Settings

ENTRY	DESCRIPTION
CV/CC	In this regulation setting, output voltage is regulated to the user set value. On reaching the current limit (positive), output would be regulated to the current limit reached. On reaching the power limit (positive), the output voltage would be programmed to zero.
CV-Ser.Res	In this regulation setting, user can set the voltage and series resistance. Depending on the current output, the terminal voltage would be varied based on the voltage drop across the series resistance. In the event of reaching the programmed current limit (positive) or power limit (positive) or voltage limit (low), the output voltage is programmed to zero.
CV/CP	In this regulation setting, output voltage is regulated to the user set value. On reaching the power limit (positive), output would be regulated to the power limit reached. On reaching the current limit (positive), the output voltage would be programmed to zero.
CP/CV	In this regulation setting, output power is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the current limit (positive), the output power would be programmed to zero.
CV	In this regulation setting, output voltage is regulated to the user set value. On reaching the set current limit (positive) or power limit (positive), the output voltage would be programmed to zero. **NOTE:** When the unit is in series operation (refer to Chapter 6), the only regulation setting available is Voltage - CV.

ENTRY	DESCRIPTION
Delay	Sets the programmable time delay executed by the supply before setting the output to zero. The minimum time that can be set is 0.1 seconds, and the maximum is 5 seconds. Refer to Figure 11-113.

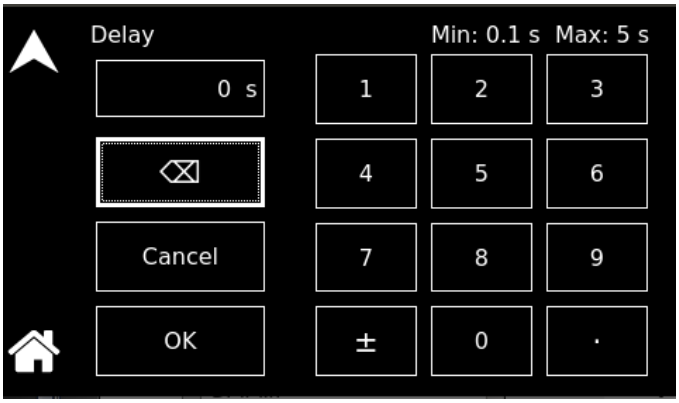


Figure 11-113. Delay Screen

Table 11-24. Regulation Settings

b) When the programming type is set to 'Current' in the Regulation Settings menu, the following fields are available:

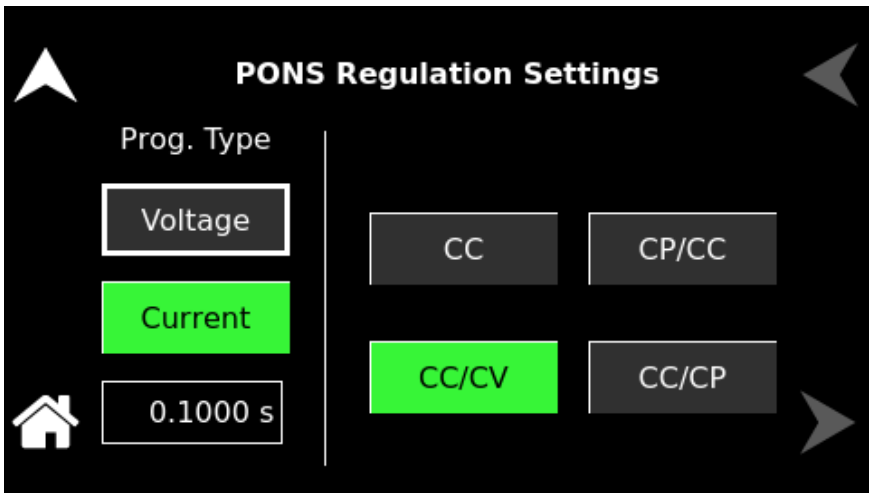


Figure 11-114. PONS regulation Settings

ENTRY	DESCRIPTION
CC/CV	In this regulation setting, output current is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the power limit (positive), the output current would be programmed to zero.
CP/CC	In this regulation setting, output power is regulated to the user set value. On reaching the current limit (positive), output would be regulated to the current limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero.

ENTRY	DESCRIPTION
CC/CP	In this regulation setting, output current is regulated to the user set value. On reaching the power limit (positive), output would be regulated to the power limit reached. On reaching the voltage limit (high or low), the output current would be programmed to zero.
CC	In this regulation setting, output current is regulated to the user set value. On reaching the set voltage limit (high or low) or power limit (positive), the output current would be programmed to zero.
Delay	Sets the programmable time delay executed by the supply before setting the output to zero. The minimum time that can be set is 0.1 seconds, and the maximum is 5 seconds. Refer to Figure 11-115.



Figure 11-115. Delay Screen

Table 11-25. Regulation Setting

11.2.5.7.3 PONS OUTPUT PROGRAM

a) PONS Output Program (Voltage) - CV/CC, CV/CP and CV

When the regulation setting is selected as ‘Voltage (CV/CC, CV/CP and CV) ’, the screen will display the following parameters: ‘PONS Voltage’, ‘PONS Pos. Curr Limit’ and ‘PONS Pos. Pow Limit’. Refer to Figure 11-116.

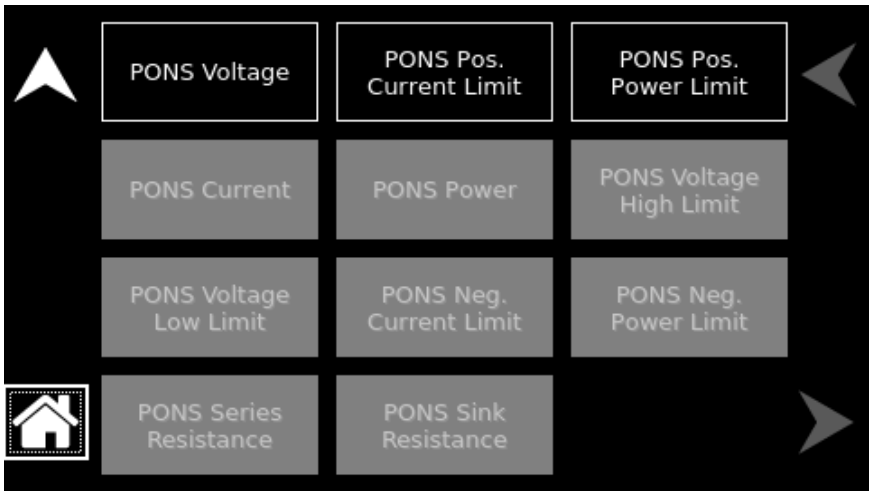


Figure 11-116. Pons Output Program mode – CV/CC, CV/CP and CV

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Voltage	Users can set a voltage value within the specified limit. Refer to Figure 11-117.

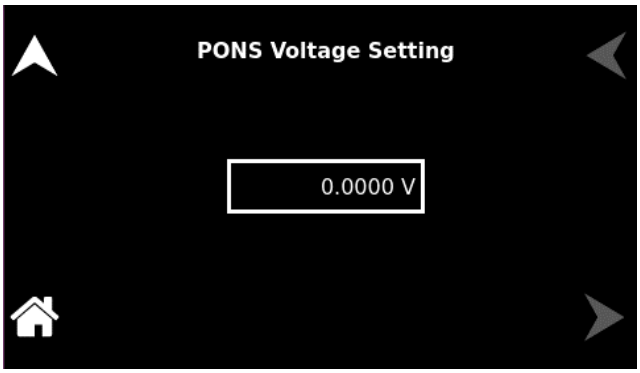


Figure 11-117. PONS Voltage Settings

NOTE: When the unit is in series operation (refer to Chapter 6), the 'PONS voltage setting' screen displays 'Voltage 1' and 'Voltage 2' for setting the output voltage of Leader and Follower.

NOTE: Voltage - CV is the only regulation setting in Series operation.

PONS Pos. Curr Limit	Users can set a positive current limit value, which functions as a trip limit (CV and CV/CP), or it regulates (CV/CC) the output upon reaching the PONS Pos. Curr Limit. Refer to Figure 11-118.

ENTRY	DESCRIPTION

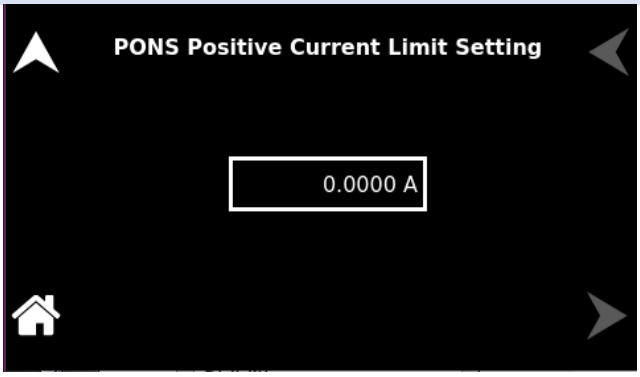


Figure 11-118. PONS Positive Current Limit Settings

PONS Pos. Pow Limit

Users can set a positive power limit value, which functions as a trip limit (CV and CV/CC), or it regulates (CV/CP) the output upon reaching the PONS Pos. Pow Limit. Refer to Figure 11-119.

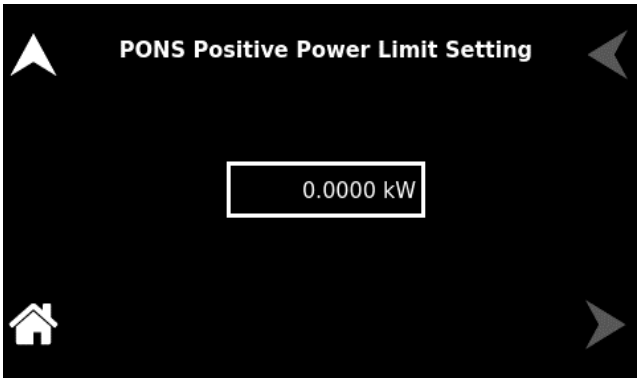


Figure 11-119. PONS Positive Power Limit Setting

Table 11-26. PONS Output Program Settings – CV/CC, CV/CP and CV

b) PONS Output Program (Voltage) – CV- Ser. Res

When the regulation setting is selected as ‘Voltage (CV- Ser. Res) ’, the screen will display the following parameters: ‘PONS Voltage’, ‘PONS Series Resistance’, ‘PONS Pos. Current Limit’, and ‘PONS Voltage Low Limit’ and ‘PONS Pos. Pow Limit’. Refer to Figure 11-120.

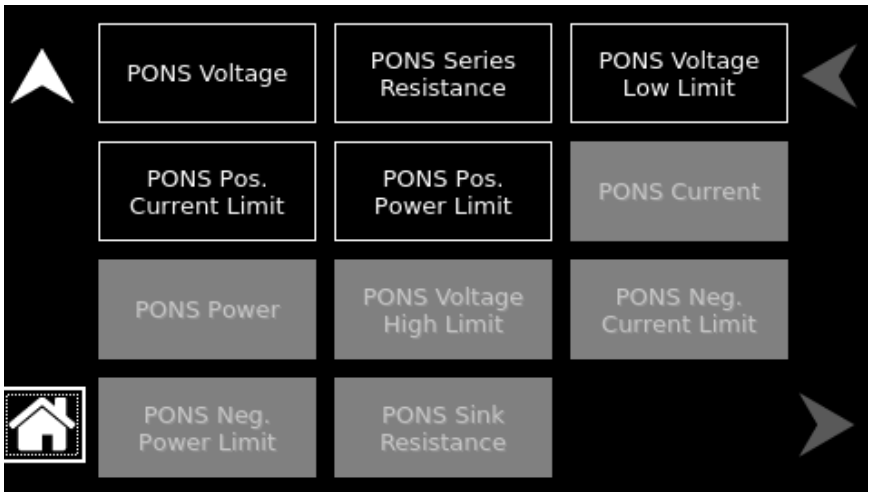


Figure 11-120. Pons Output Program mode – CV -Ser. Res

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Voltage	Users can set a voltage value within the specified limit. Refer to Figure 11-121.

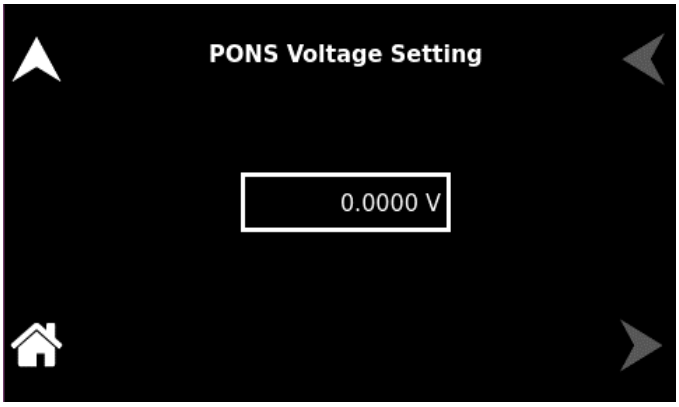
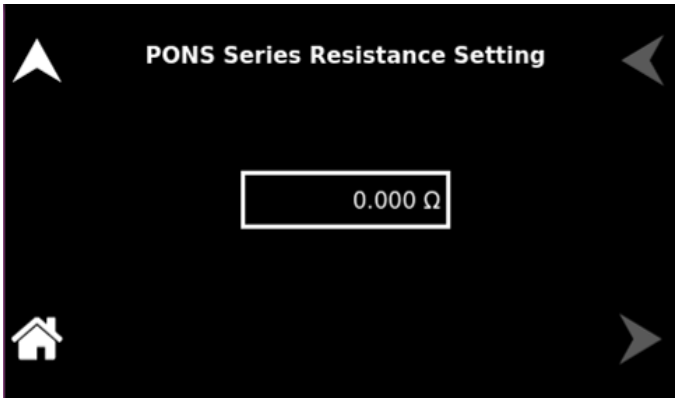


Figure 11-121. PONS Voltage Settings

PONS Series Resistance	Users can set the series resistance value within the specified limit. Refer to Figure 11-122.



ENTRY	DESCRIPTION

Figure 11-122. PONS* Series Resistance *Settings

PONS Pos. Curr Limit

Users can set a positive current limit value and which functions as a trip limit. Refer to Figure 11-123.

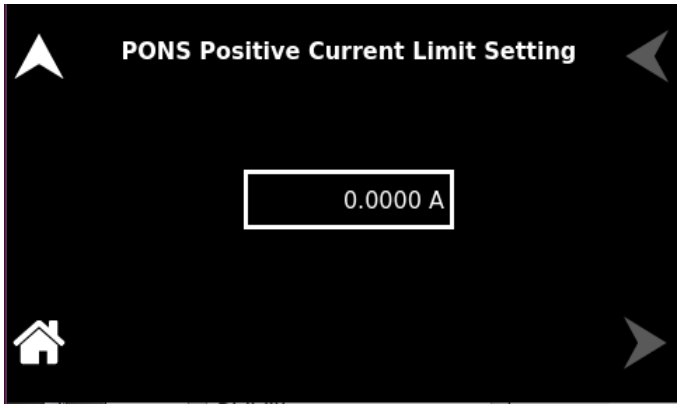


Figure 11-123. PONS Positive Current Limit Settings

PONS Voltage Low Limit

Users can set the voltage low limit value, and it regulates upon reaching the Voltage Low Limit. Refer to Figure 11-124.

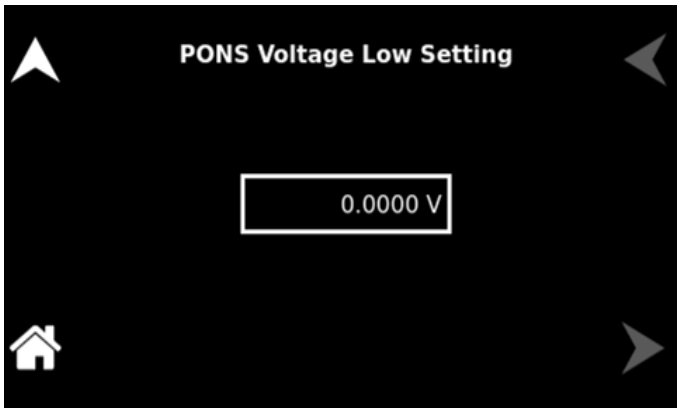


Figure 11-124. PONS* Voltage Low *Settings

PONS Pos. Pow Limit

Users can set a positive power limit value and which functions as a trip limit. Refer to Figure 11-125.

ENTRY	DESCRIPTION

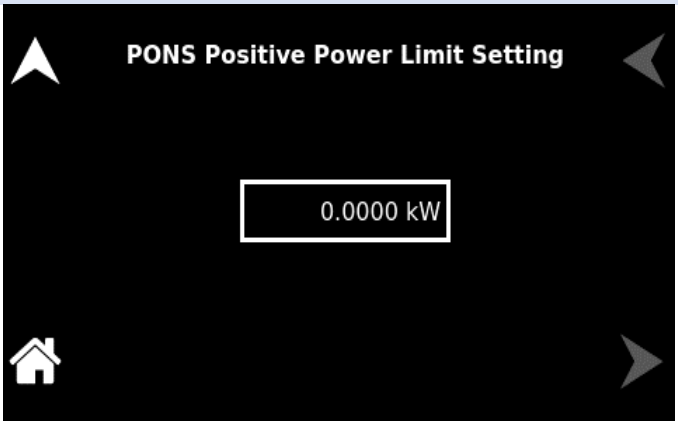


Figure 11-125. PONS Positive Power Limit Setting

Table 11-27. PONS Output Program Settings

c) PONS Output Program (Voltage) – CP/CV

When the regulation setting is selected as ‘Voltage (CP/CV) ’ the screen will display the following parameters: ‘PONS Power’, ‘PONS Voltage High Limit’, ‘PONS Voltage Low Limit’ and ‘PONS Pos. Current Limit’. Refer to Figure 11-126.

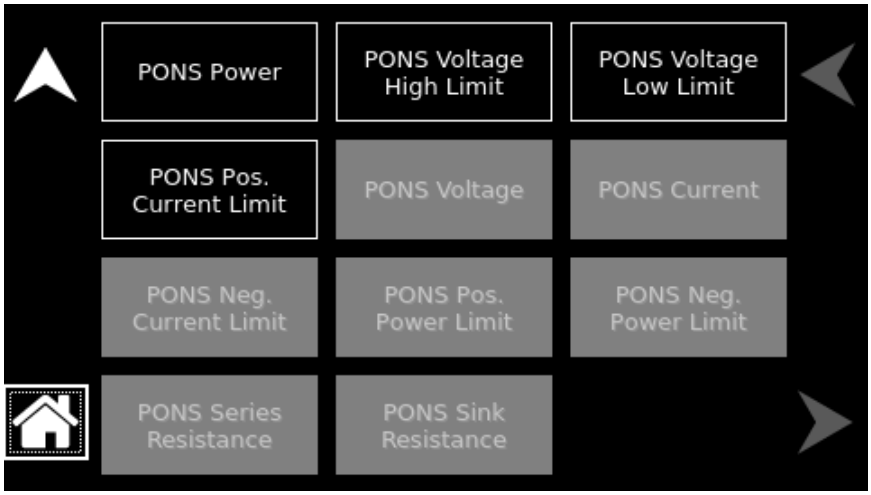


Figure 11-126. Pons Output Program mode – CP/CV

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Power	Users can set a power value within the specified limit. Refer to Figure 11-127.
PONS Voltage High Limit	Users can set the voltage high limit value, and it regulates the output upon reaching the PONS Voltage High Limit. Refer to Figure 11-128.
PONS Voltage Low Limit	Users can set the voltage low limit value, and it regulates the output upon reaching the PONS Voltage Low Limit. Refer to Figure 11-129.
PONS Pos.	Users can set a positive current limit value, and which functions as a trip limit. Refer to Figure 11-130.

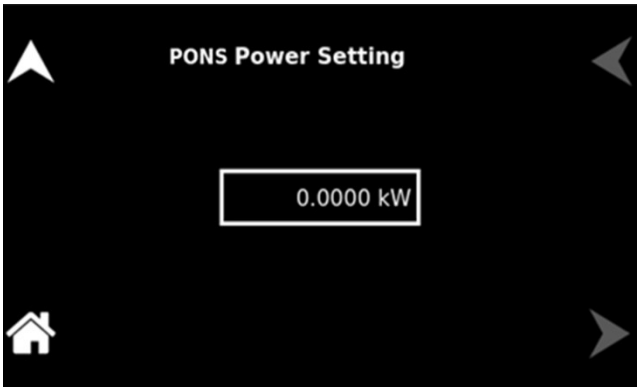


Figure 11-127. Power Settings

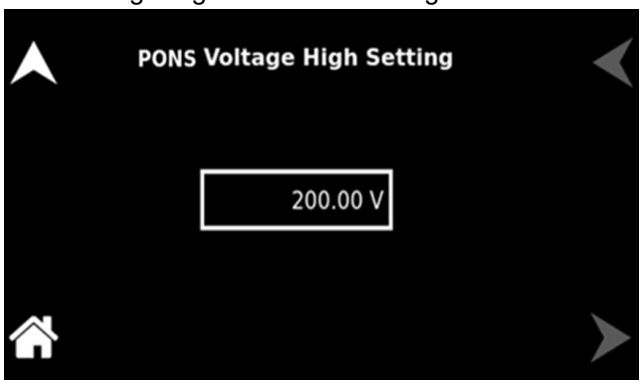


Figure 11-128. Voltage High Setting

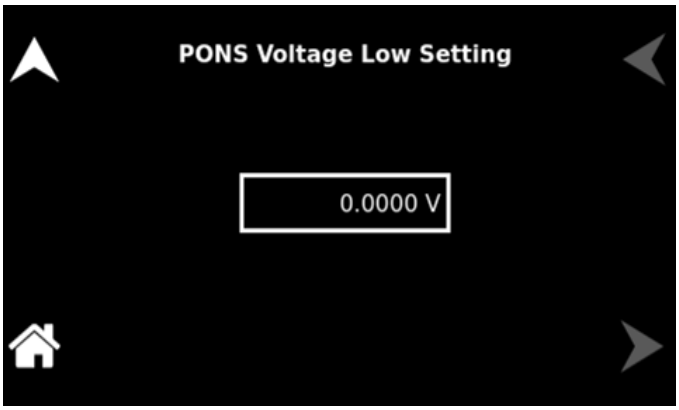


Figure 11-129. Voltage Low Setting

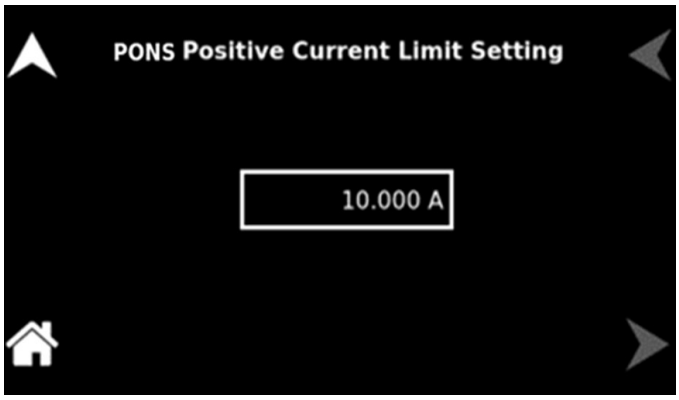
ENTRY	DESCRIPTION
Current Limit	

Figure 11-130. Pos. Current Limit Setting

Table 11-28. PONS Output Program Settings

b) PONS Output Program (Current) - CC/CV, CC/CP and CC

When the regulation setting is selected as ‘Current (CC/CV, CC/CP and CC) ’ the screen will display the following parameters: ‘PONS Current’, ‘PONS Voltage High Limit’, ‘PONS Voltage Low Limit’ and ‘PONS Pos. Pow Limit’. Refer to Figure 11-131.

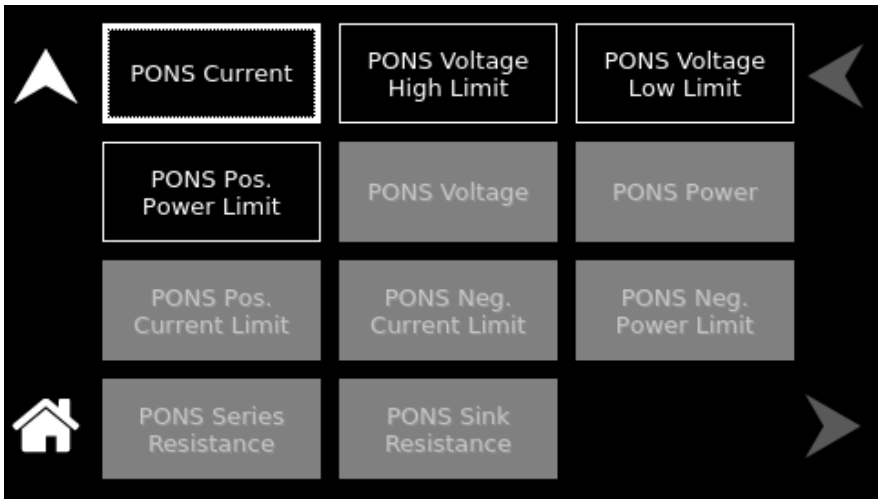


***Figure 11-131. Pons Output Program mode* –CC/CV, CC/CP and CC**

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Current	Users can set the Current value within the specified limit. Refer to Figure 11-132.

ENTRY	DESCRIPTION

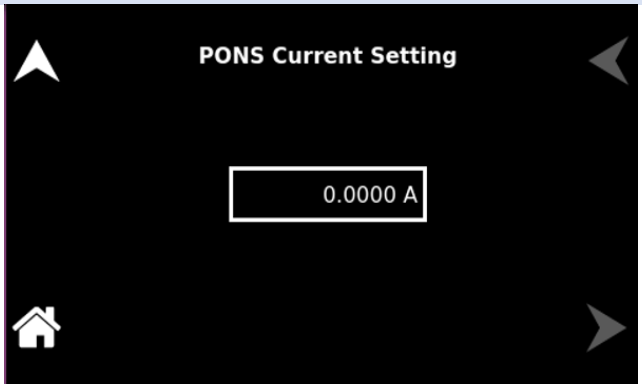


Figure 11-132. Current Setting

PONS Voltage High Limit

Users can set a voltage high limit value, which functions as a trip limit (CC and CC/CP), or it regulates (CC/CV) the output upon reaching the PONS Voltage High Limit. Refer to Figure 11-133.

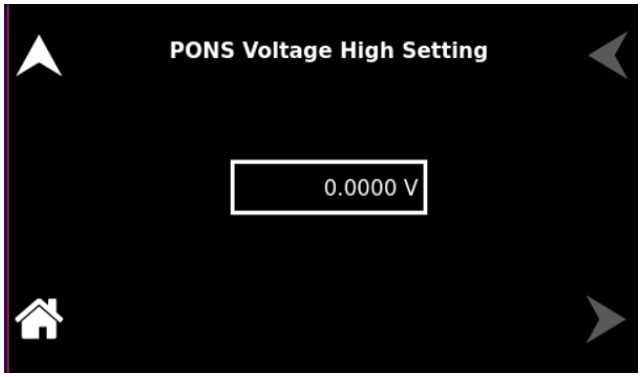


Figure 11-133. Voltage High Setting

PONS Voltage Low Limit

Users can set a voltage low limit value, which functions as a trip limit (CC and CC/CP), or it regulates (CC/CV) the output upon reaching the PONS Voltage Low Limit. Refer to Figure 11-134.

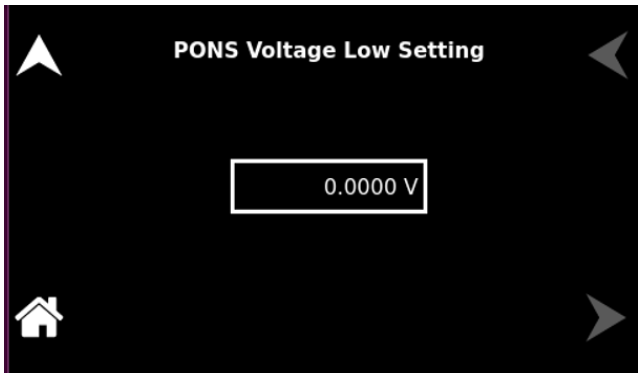


Figure 11-134. Voltage Low Settings

PONS Pos. Power Limit

Users can set a positive power limit value, which functions as a trip limit (CC and CC/CV), or it regulates (CC/CP) the output upon reaching the PONS Pos. Power Limit. Refer to Figure 11-135.

ENTRY	DESCRIPTION

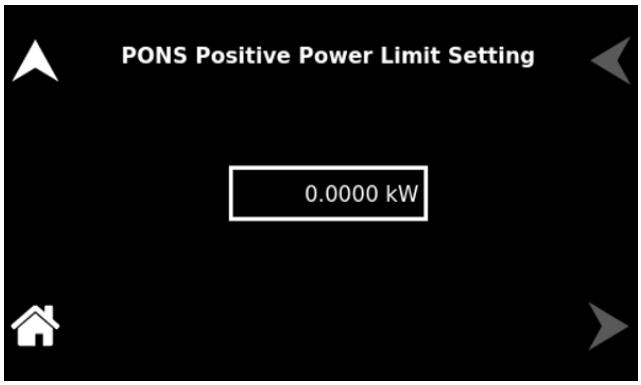


Figure 11-135. Positive Power Limit

PONS Output State Users can program the output to ON or OFF state. Refer to Figure 11-136.

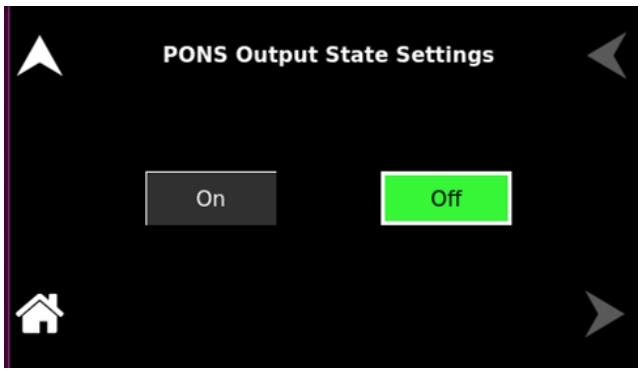


Figure 11-136. Output State Settings

Table 11-29. PONS Output Program Settings

c) PONS Output Program (Current) - CP/CC

When the regulation setting is selected as ‘Current (CP/CV) ’ the screen will display the following parameters: ‘PONS Power’, ‘PONS Voltage High Limit’, ‘PONS Voltage Low Limit’ and ‘PONS Pos. Current Limit’. Refer to Figure 11-137.

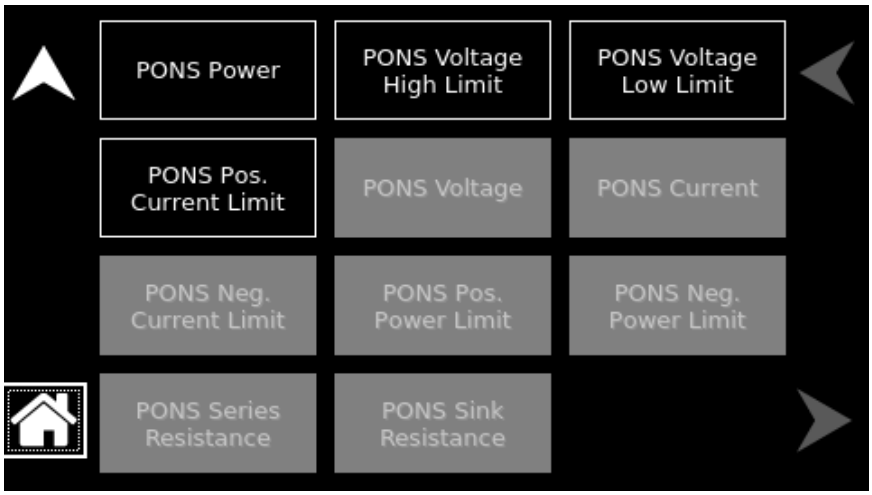


***Figure 11-137. Pons Output Program mode* – CP/CC**

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Power	Users can set a power value within the specified limit. Refer to Figure 11-138.

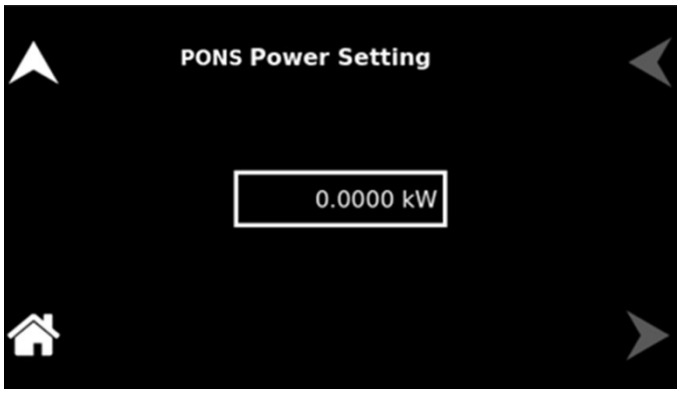


Figure 11-138. PONS Power Settings

PONS Voltage High Limit	Users can set voltage high limit value within the specified limit and this functions as a trip limit. Refer to Figure 11-139.

ENTRY	DESCRIPTION

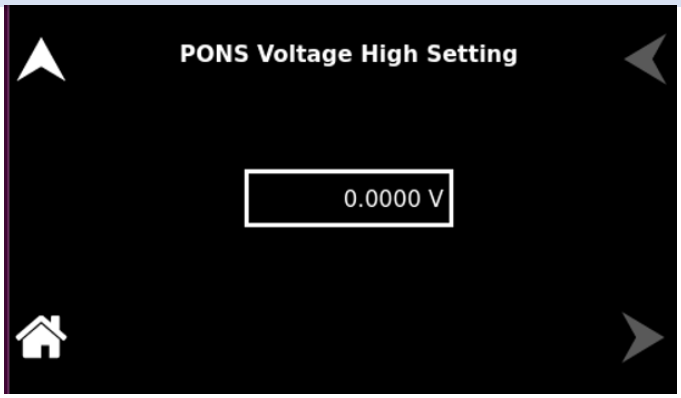


Figure 11-139. PONS Voltage High Setting

PONS Voltage Low Limit

Users can set a voltage low limit value within the specified limit and this functions as a trip limit. Refer to Figure 11-140.

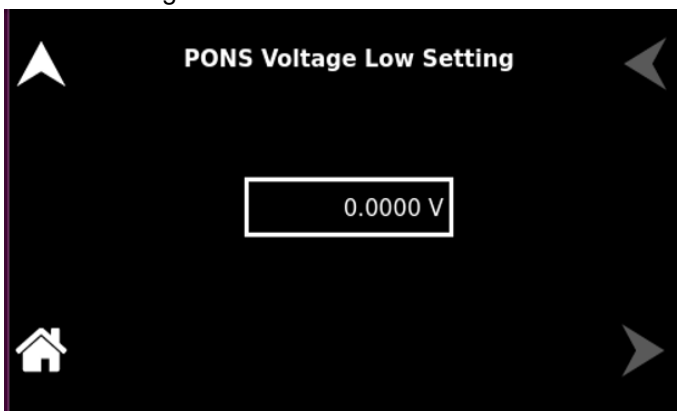


Figure 11-140. PONS Volt Low Setting

PONS Pos. Current Limit

Users can set a positive current limit value, and which regulates upon reaching the PONS Pos. Current Limit. Refer to Figure 11-141.

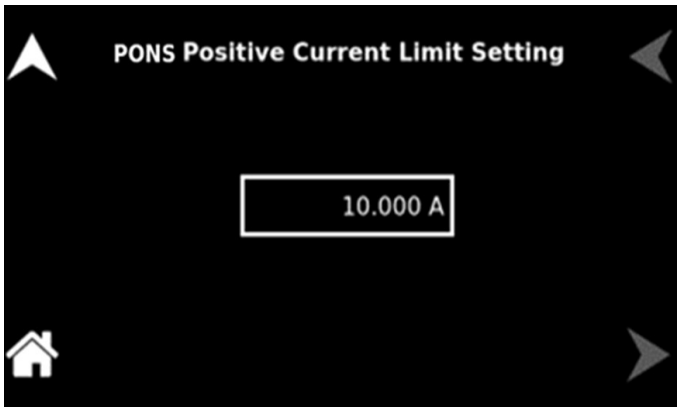


Figure 11-141. PONS Pos. Current Limit Setting

Table 11-30. PONS Output Program Settings

11.2.5.7.4 PONS CONFIGURATION

In the PONS Configuration settings, the menu enables users to select ‘PONS Protection’, ‘PONS Slew Rate’, ‘PONS User Limit’, ‘PONS External Relay’, ‘PONS Output Sense’, ‘PONS Measurement Average Samples’, ‘PONS Analog’, ‘PONS Remote Inhibit’, ‘PONS Remote Output’, ‘PONS AC Input Line’, ‘PONS Multi Chassis Operation’ and ‘PONS Parallel Operation Mode’ (enabled only in parallel operation). Refer to Figure 11-142 and Figure 11-143.

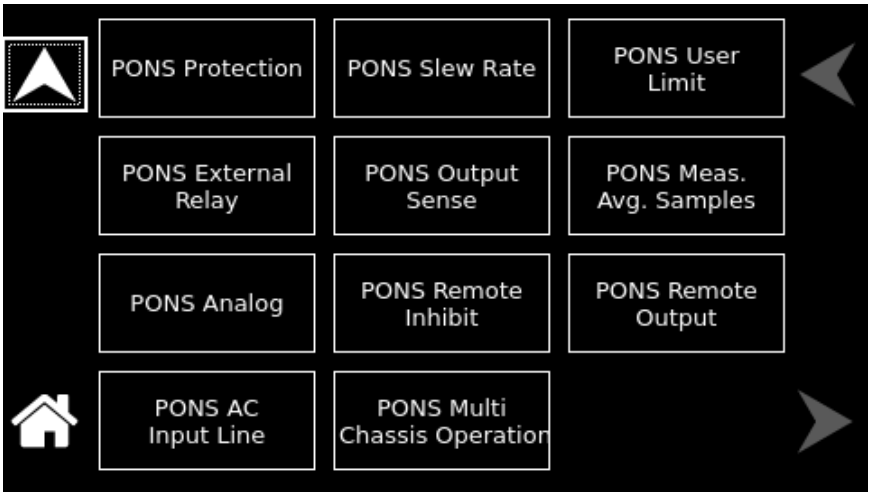


Figure 11-142. PONS Configuration mode

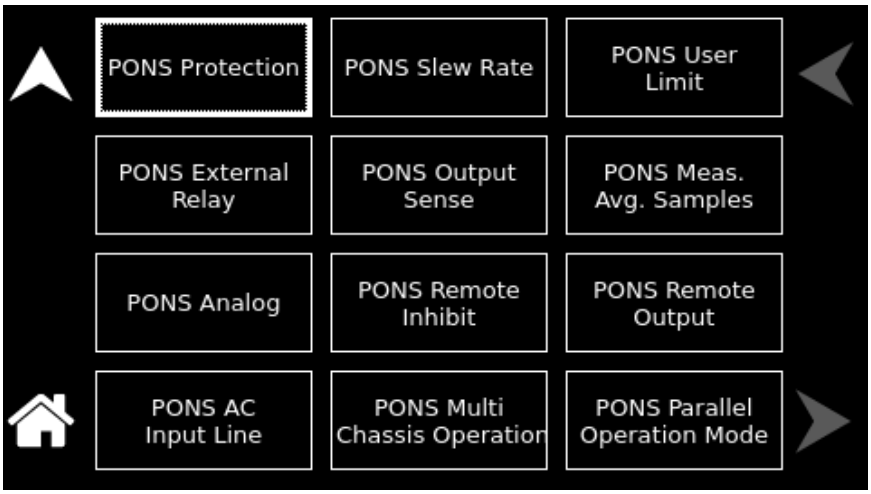


Figure 11-143. PONS Configuration mode – Parallel Operation

When ‘Series’ or ‘Series Split Phase’ is selected in ‘PONS Multi Chassis Operation’, the PONS Configuration settings menu enables users to select ‘PONS Protection’, ‘PONS Slew Rate’, ‘PONS User Limit’, ‘PONS Measurement Average Samples’, ‘PONS Remote Inhibit’, ‘PONS Remote Output’, ‘PONS AC Input Line’, ‘PONS Multi Chassis Operation’. Refer to Figure 11-144.

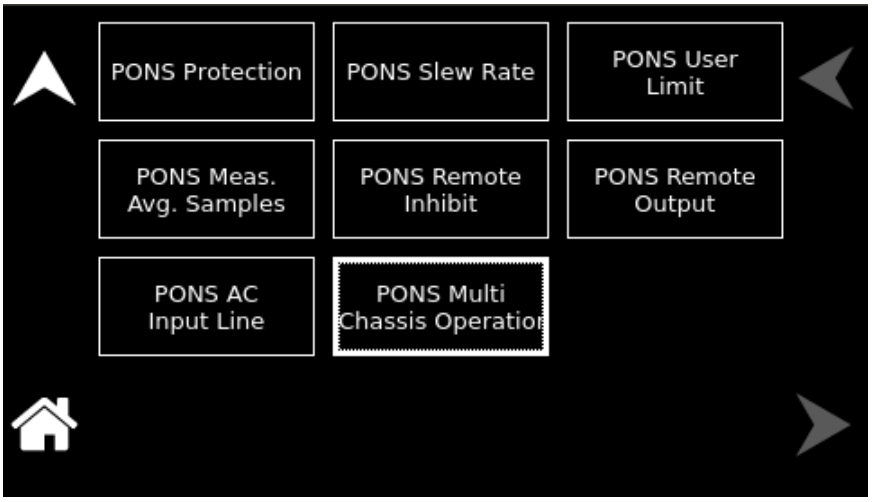


Figure 11-144. PONS Configuration Screen – Series Operation

The PONS Configuration Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Protection	Users can define OVP and Pos. OCP to help safeguard their devices from electrical anomalies by shutting down the output if it exceeds the preset voltage. Refer to Figure 11-145.

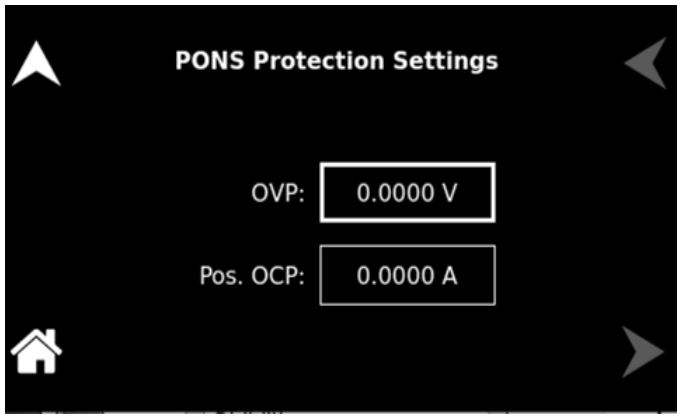
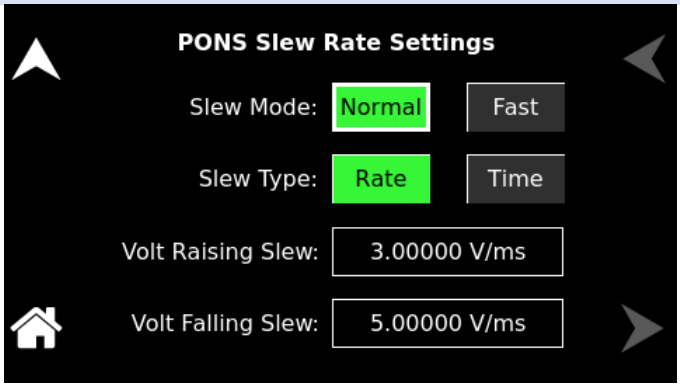


Figure 11-145. PONS Protection Settings

PONS Slew Rate	Users can configure the voltage, current and power slew rate. This allows for precise control over the voltage, current and power ensuring smoother transitions and better performance of the power supply. Adjusting these settings can help in optimizing the response time and stability of the system. Refer Figure 11-146 to Figure 11-148.

ENTRY	DESCRIPTION



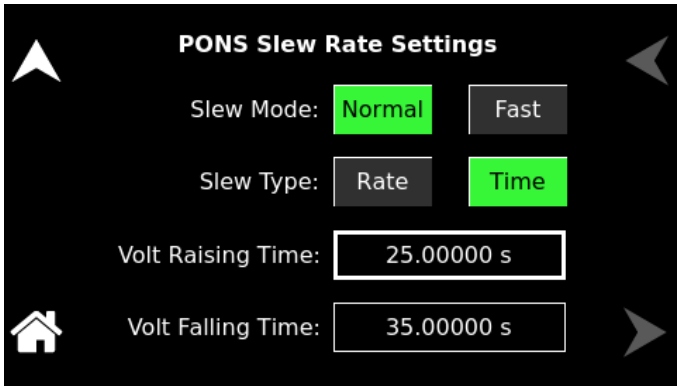
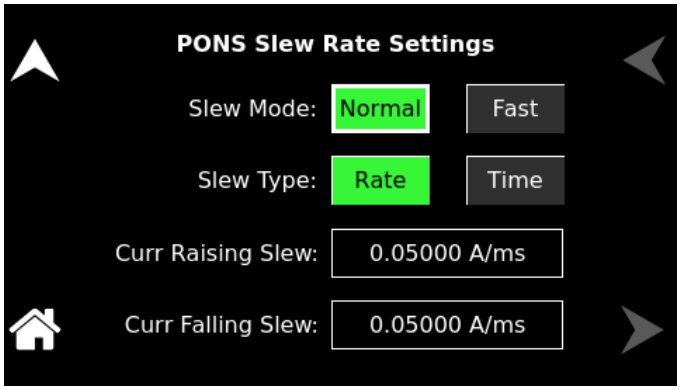


Figure 11-146. PONS Slew Rate Settings – Voltage (CV/CC, CV-Ser.Res, CV/CP and CV)



ENTRY	DESCRIPTION

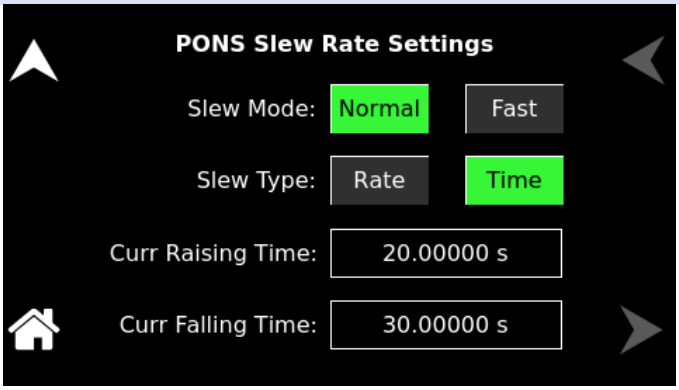


Figure 11-147. PONS Slew Rate Settings – Current (CC/CV, CC/CP and CC)

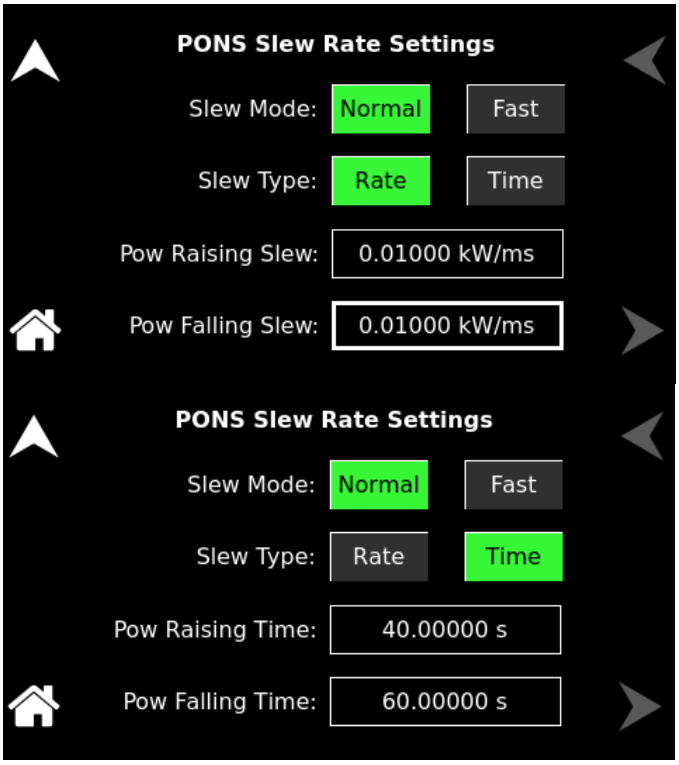


Figure 11-148. PONS Slew Rate Settings – Power (CP/CV and CP/CC)

Refer to Sections 2.11 and 2.12 for detailed information on ‘Normal’ and ‘Fast’ Slew Modes in the Slew Rate Settings.

PONS User Limit

Users can set the Voltage, Current High Limit and Power High Limit values. Refer Figure 11-149 to Figure 11-151.

ENTRY	DESCRIPTION

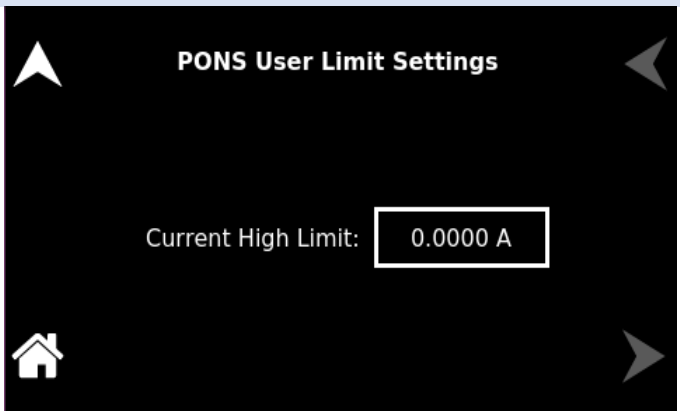


Figure 11-149. PONS User Limit Settings- Current (CC/CV, CC/CP and CC)

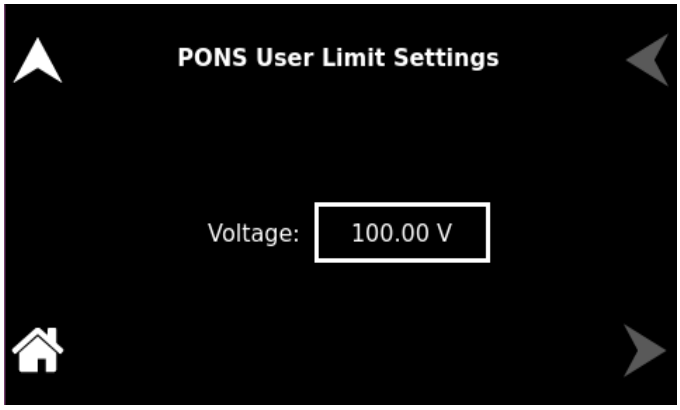


Figure 11-150. PONS User Limit Settings – Voltage (CV/CC, CV-Ser.Res, CV/CP and CV)

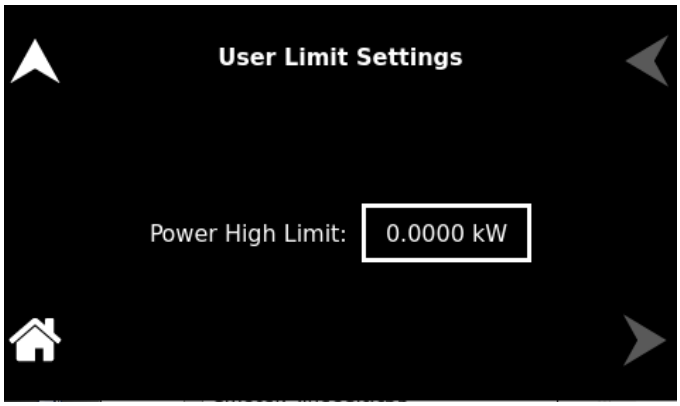


Figure 11-151. PONS User Limit Settings – Power (CP/CV and CP/CC)

ENTRY	DESCRIPTION
PONS External Relay	Users can set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 11-152.

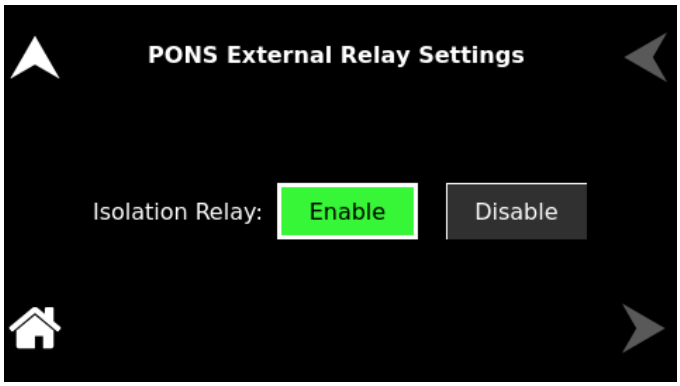


Figure 11-152. PONS External Relay Settings

PONS Output Sense Settings	User can program the PONS output to ‘Local’ or ‘Remote’. Refer to Figure 11-153.

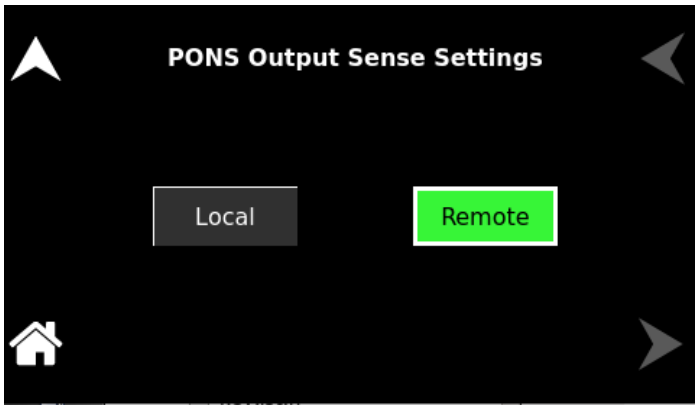


Figure 11-153. PONS Output Sense Settings

PONS Measurement Average Samples	Users can specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 11-154.

ENTRY	DESCRIPTION

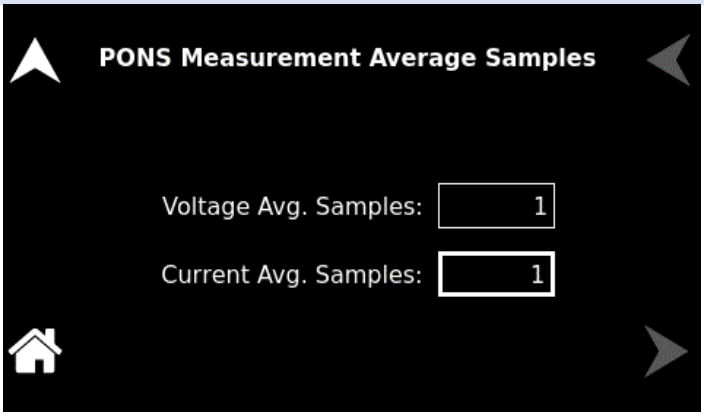


Figure 11-154. PONS Measurement Average Samples

PONS Analog Configures the PONS Analog programming interface, refer to Figure 11-155.

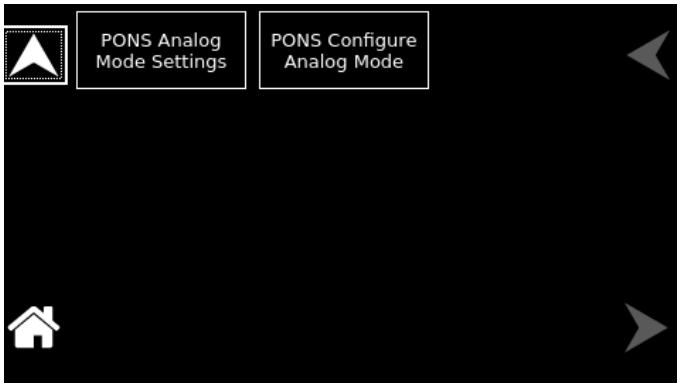


Figure 11-155. PONS Analog Screen

a) PONS Analog Mode Settings

Lists the configuration settings of the PONS Analog Programming interface. Refer to Figure 11-156.

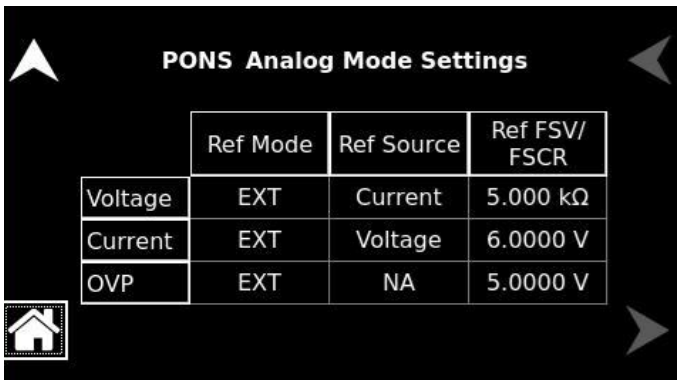


Figure 11-156. PONS Analog Mode Settings

b) PONS Configure Analog Mode

Sets parameter values and controls operation of the PONS Analog Programming interface. Refer to Figure 11-157.

ENTRY	DESCRIPTION

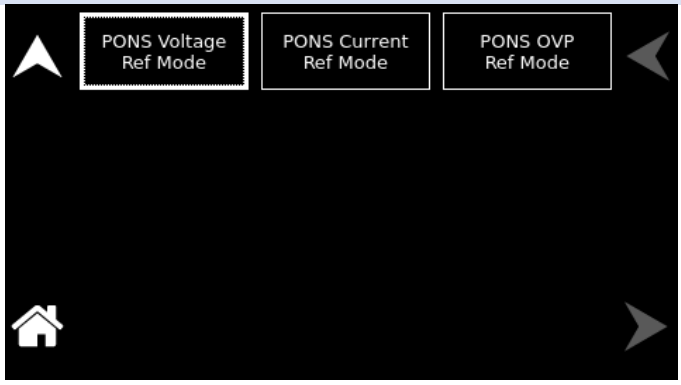


Figure 11-157. PONS Configure Analog Mode Settings

- **PONS Voltage Ref Mode :** Configures the PONS Voltage Reference Mode, refer to Figure 11-157. When the PONS Voltage Reference Mode is set to External, the Voltage setting field on the Dashboard screen and the 'Voltage' option in the Output Program screen will be disabled, and these Voltage fields will display as 'EXT'. Refer to Figure 11-158.

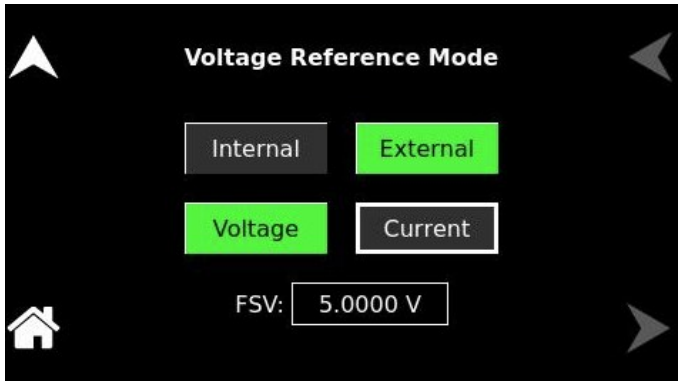


Figure 11-158. PONS Voltage Reference Mode

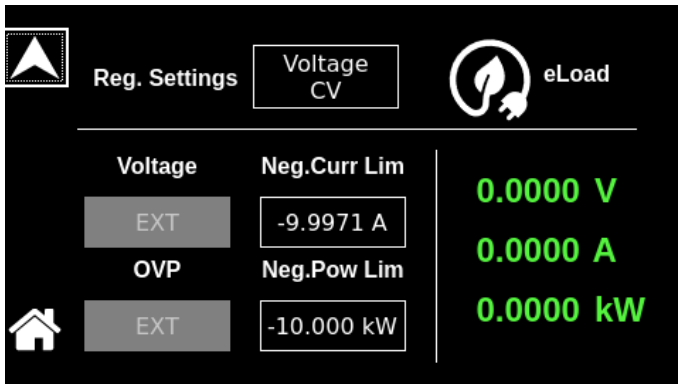


Figure 11-159. Dashboard Screen – Voltage (EXT)

ENTRY	DESCRIPTION

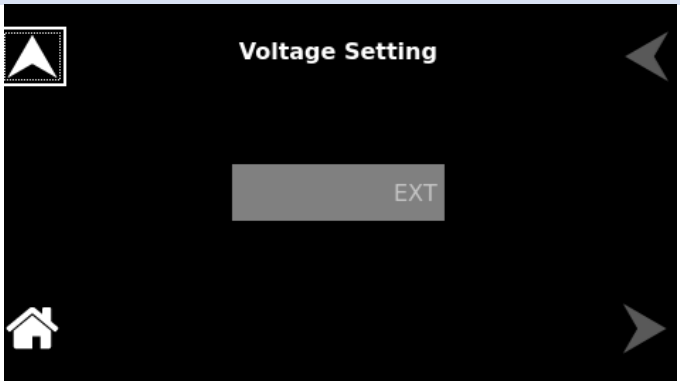


Figure 11-160. Output Program Screen – Voltage (EXT)

- When Voltage Reference Mode is selected as Current, FSCR (Full Scale Current Resistance) unit will be kΩ (k Ohms). Refer to Figure 11-161.

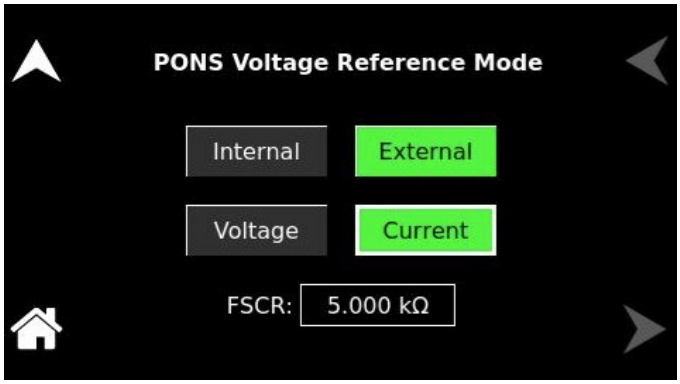


Figure 11-161. PONS Voltage Reference Mode – Resistive

- **PONS Current Ref Mode:** Configures the PONS Current Reference Mode, refer to Figure 11-157. When the PONS Current Reference Mode is set to External, the Voltage setting field on the Dashboard screen and the 'Voltage' option in the Output Program screen will be disabled, and these Voltage fields will display as 'EXT'. Refer to Figure 11-162 and Figure 11-163.

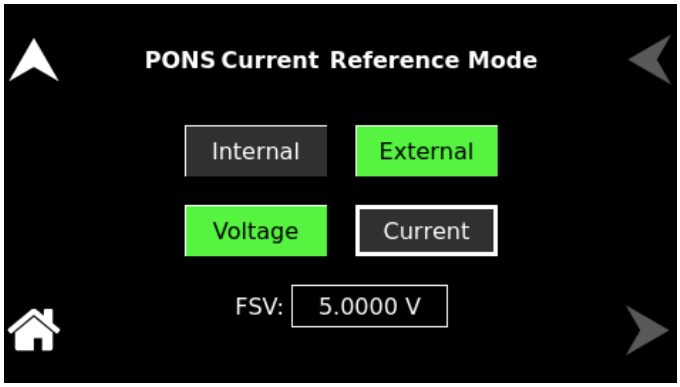


Figure 11-162. PONS Current Reference Mode

ENTRY	DESCRIPTION

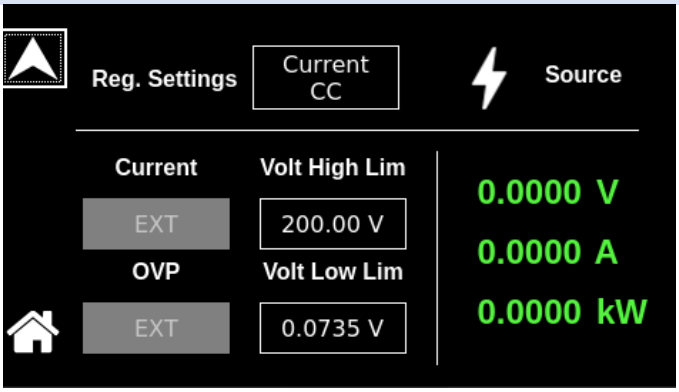


Figure 11-163. Dashboard Screen – Current (EXT)

- **PONS OVP Ref Mode:** Configures the PONS Over Voltage Protection (OVP) Reference Mode. When the PONS OVP Reference Mode is set to External, the OVP setting field on the Dashboard screen and the 'Protection' option in the Configuration screen will be disabled, and these OVP fields will display as 'EXT' refer to Figure 11-164.

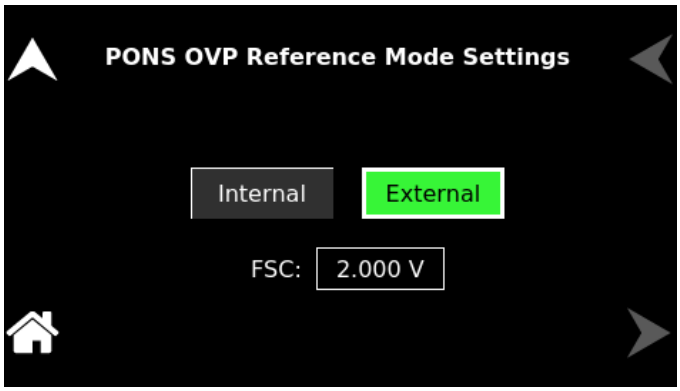


Figure 11-164. PONS OVP Reference Mode

PONS Remote Inhibit

User can control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 11-165.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

Remote inhibit can be configured in three modes;

- **Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output.

ENTRY	DESCRIPTION

- **Live:** after reclosing the contact, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

b) Remote Inhibit Input – Active Source

An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply.

Remote inhibit can be configured in three modes;

- **Latch:** after removing the active voltage source, user needs to clear the fault and turn ON the output.
- **Live:** after removing the active voltage source, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

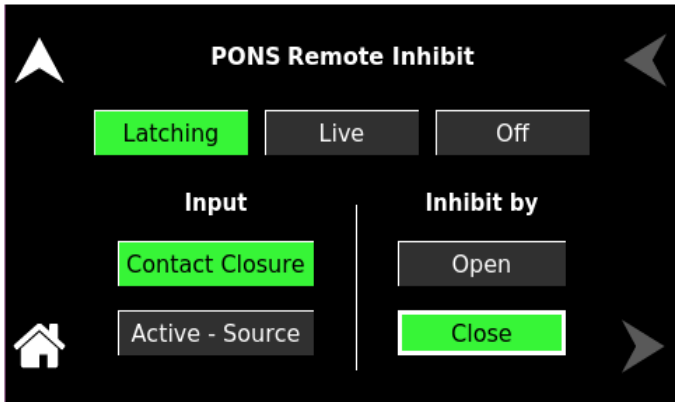


Figure 11-165. PONS remote Inhibit

PONS Remote Output

User can program the PONS Remote output to ON or OFF state. Refer to Figure 11-166.

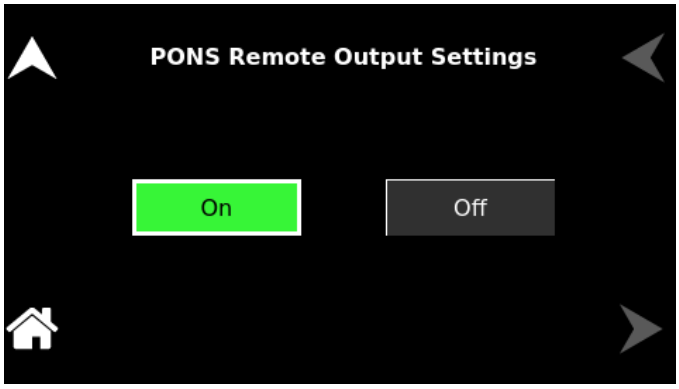


Figure 11-166. PONS Remote Output settings

AC Input Line

User can select either the High Line or Low Line option based on the required input voltage range. Refer to Figure 11-167.

ENTRY	DESCRIPTION

a) **High Line:** The nominal High Line Input range is 380 to 480 VAC.

b) **Low Line:** The nominal Low line input range is 200 to 240 VAC.

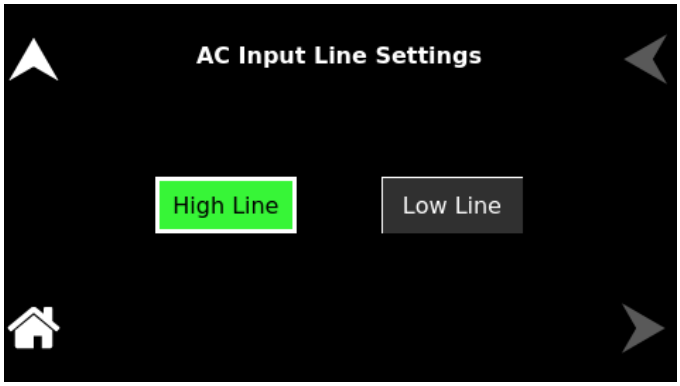


Figure 11-167. AC Input Line Settings

PONS Multi Chassis Operation

Users can select the operation setting to Parallel or Series (Grounded or Non-Grounded) or Series Split Phase (Grounded or Non-Grounded). The unit determines the connection type based on the selected option. Refer to Figure 11-168.

NOTE: If the unit is operating in standalone mode and the user selects the Parallel or Series or Series Split phase option, the selection remains enabled on the display; however, the setting does not affect unit operation.

a) **Parallel:** Configure to perform parallel operation mode. Refer to Chapter 5.

b) **Series**: Configure to perform series operation mode, used when there is no connection to the load's common terminal from the leader and follower units. Refer to Chapter 6.

- **Grounded:** When either the Leader's negative (-) terminal or the Follower's positive (+) terminal is connected to the chassis earth.
- **Non-Grounded:** When either the Leader's negative (-) terminal or the Follower's positive (+) terminal is not connected to the chassis earth.

c) **Series Split Phase**: Configure to perform series split phase operation mode used when there is a connection to the load's common terminal from the leader and follower units. Refer to Chapter 6.

- **Grounded:** When either the Leader's negative (-) terminal or the Follower's positive (+) terminal is connected to the chassis earth.
- **Non-Grounded:** When either the Leader's negative (-) terminal or the Follower's positive (+) terminal is not connected to the chassis earth.

ENTRY	DESCRIPTION

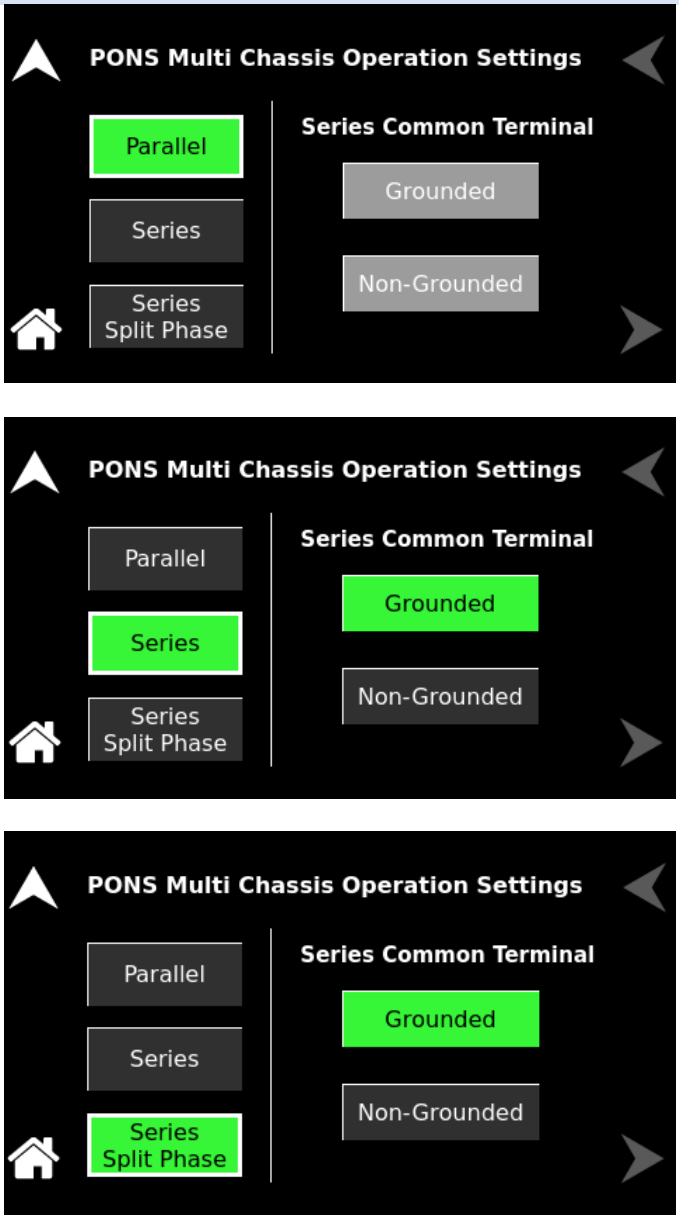


Figure 11-168. PONS Parallel Multi Chassis Operation Settings

PONS Parallel Operation Mode

User can select the parallel operation mode settings to Max Power or Max Current. Refer to Figure 11-169.

NOTE: Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel.

a) Max Power: Configure to deliver maximum power by limiting the overall current.

b) Max Current: Configure to deliver maximum current by limiting the overall power.

ENTRY	DESCRIPTION

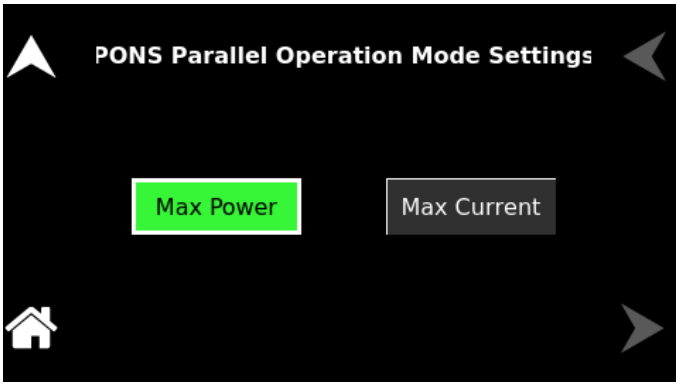


Figure 11-169. PONS Parallel Operation Mode Settings

Table 11-31. PONS Configuration mode

11.2.5.8 MEASUREMENT AVERAGE SAMPLES

The Measurement Average Samples Settings Menu allows the user to specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 11-170.

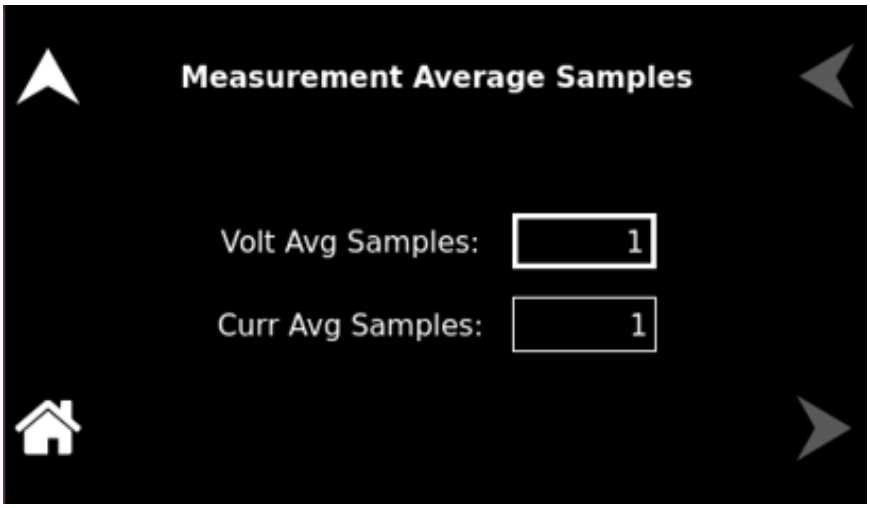


Figure 11-170. Measurement Average Samples

The Measurement Average Samples Settings menu has the following fields:

ENTRY	DESCRIPTION
Volt Avg Samples	Sets the number of voltage readings to average together to reduce noise in the voltage readback. Allows to set a value between 1 to 8.
Curr Avg Samples	Sets the number of current readings to average together to reduce noise in the current readback. Allows to set a value between 1 to 8. The value of 1 (factory default) provides the fastest response time in the readings, but less rejection of noise.

Table 11-32. Measurement Average Samples Settings menu

11.2.5.9 PARALLEL OPERATION MODE

The Parallel Operation Mode setting is enabled only when the Mi-BEAM power supply is in parallel operation. This menu allows the user to achieve either maximum power or maximum current during parallel operation. When 'Max Current' is selected, the system delivers maximum current by limiting the overall power, whereas when 'Max Power' is selected, the system delivers maximum power by limiting the overall current. Refer to Figure 11-171.

NOTE: Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel.

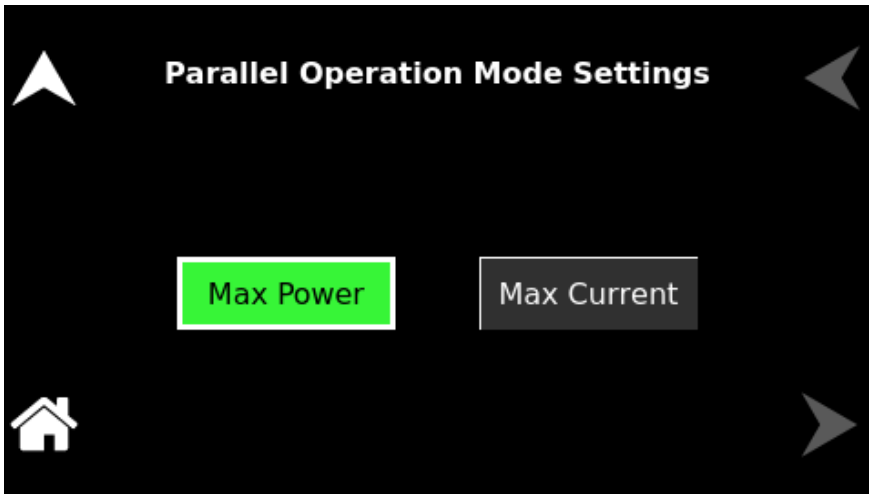


Figure 11-171. Parallel Operation Mode Settings

11.2.6 CONTROL INTERFACE SCREEN

The Control Interface screen provides 'LAN', 'RS232', 'USB', 'External CAN (Default)', 'GPIB' (available only when Mi-BEAM power supply is equipped with a GPIB interface), 'Analog, 'Remote inhibit' and 'Remote Output'. For the top-level menu of the Control Interface Screen, refer to Figure 11-172 and for instructions on how to navigate to the Control Interface screen, refer to Section 9.4.2.2.

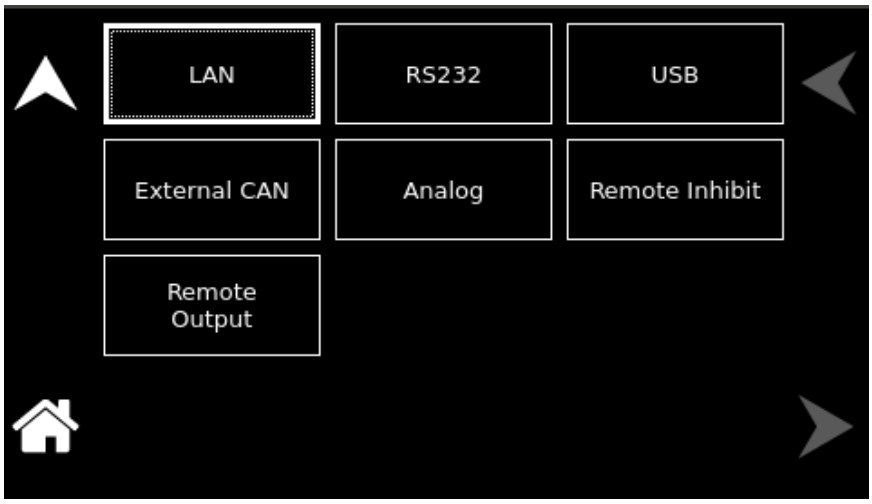


Figure 11-172. Control Interface Screen Top-Level Menu

When the Mi-BEAM power supply is equipped with a GPIB interface, the control interface screen menu changes. Refer to Figure 11-173.

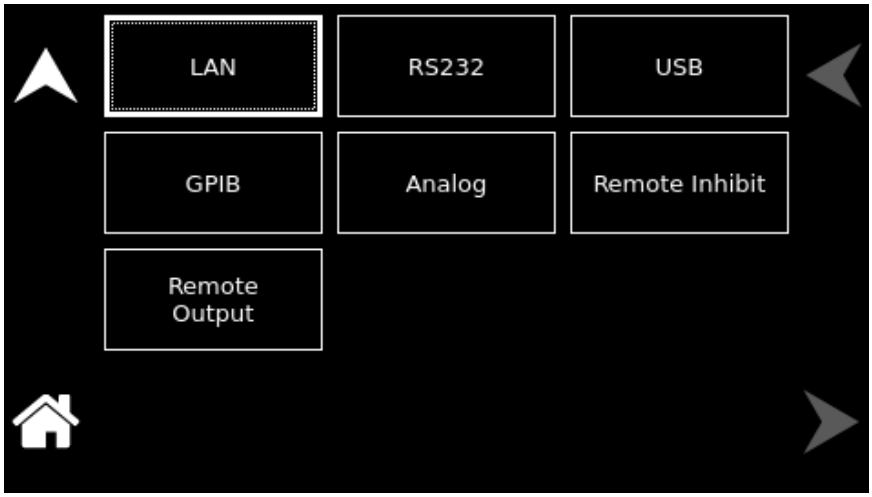


Figure 11-173. Control Interface Screen Top-Level Menu- GPIB Option

The Control interface Settings menu has the following fields:

ENTRY	DESCRIPTION
LAN	Configures the LAN (LXI Ethernet) communications interface, refer to Figure 11-174. After settings are changed, the unit must be turned OFF/ON for them to take effect.



Figure 11-174. LAN Screen

a) LAN SETTINGS

Lists the configuration settings of the LAN interface, and the DNS-SD service name; a number, (n), would be appended to the service name, if necessary, to differentiate duplicate power supply names. Refer to Figure 11-175.

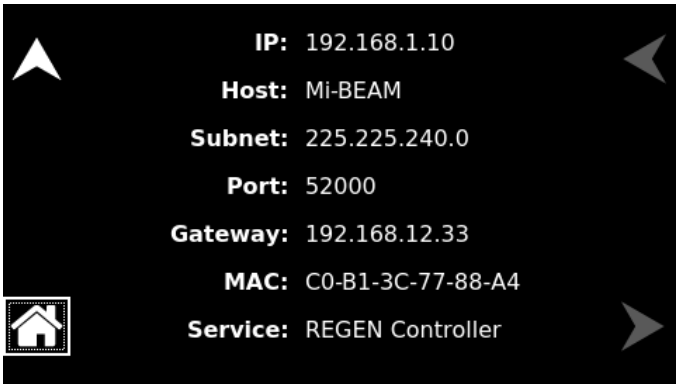


Figure 11-175. LAN Settings

b) LAN CONFIGURE

Sets parameter values and controls operation of the LAN interface, refer to Figure 11-176.

ENTRY	DESCRIPTION

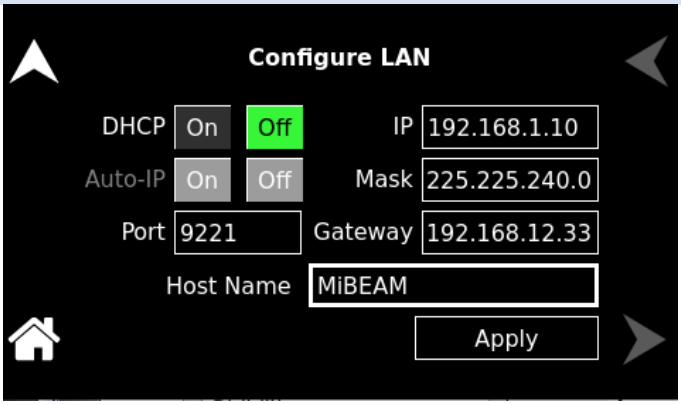


Figure 11-176. Configure LAN

- **DHCP**: Selects whether DHCP is enabled or disabled. Refer to Figure 11-177.

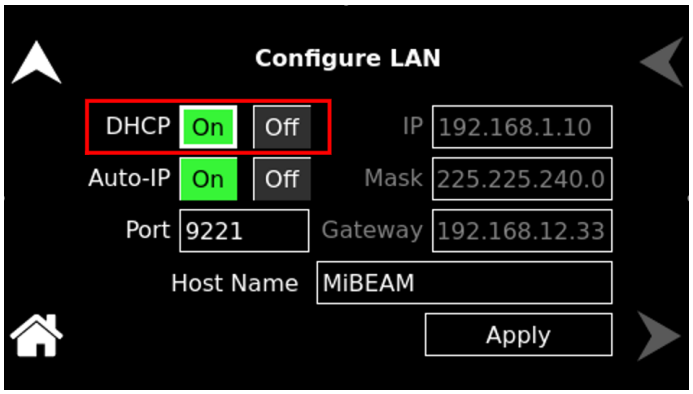


Figure 11-177. LAN Screen – DHCP

NOTE: When DHCP is selected, the IP address is assigned by the network DHCP server. If DHCP server fails to assign an IP address and Auto-IP is enabled, the unit gets an IP address in the range of 169.254.X.X.

- **Auto-IP**: Enables or disable the Auto-IP configuration, when DHCP is ON. Refer to Figure 11-178.

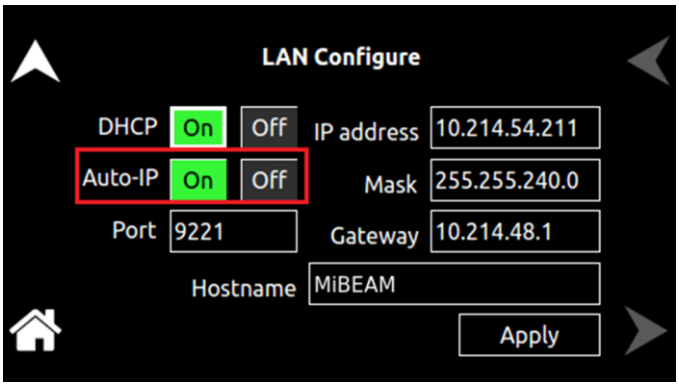


Figure 11-178. LAN Screen - Auto -IP

- **IP Address**: Sets the static IP address for the unit. When DHCP is turned

ENTRY	DESCRIPTION
	off in the LAN CONFIG sub-menu, AUTO IP is selected, set the IP address to all zeros so that the IP address would be requested from the network; when DHCP is selected, the IP address is assigned by the network DHCP server. Refer to Figure 11-179.

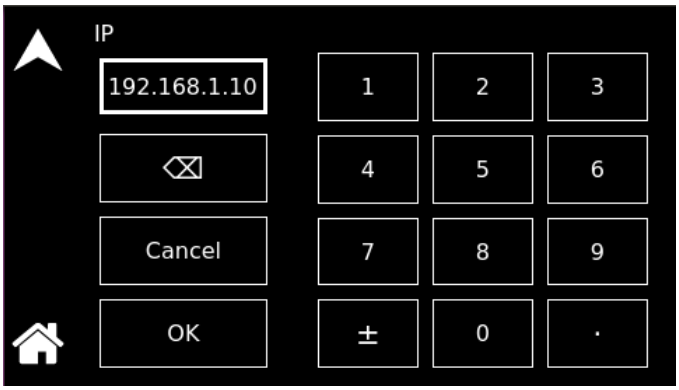


Figure 11-179. LAN Screen - IP Address

- **Subnet Mask**: Sets the subnet mask for use in static IP configuration. Refer to Figure 11-180.

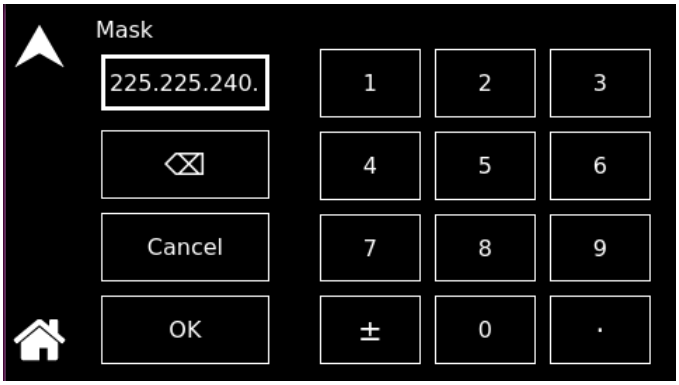


Figure 11-180. LAN Screen - Subnet Mask

- **Gateway Address**: Sets the gateway address when DHCP is turned off in the LAN CONFIG sub-menu and when AUTO IP is selected, set the gateway address to all zeros so that the gateway address would be requested from the network; when DHCP is selected, the gateway address is assigned by the network DHCP server. Refer to Figure 11-181.

ENTRY	DESCRIPTION

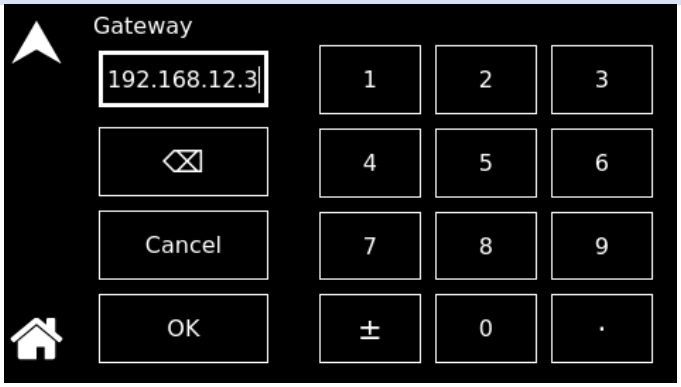


Figure 11-181. LAN Screen - Gateway Address

NOTE: When DHCP is selected, the gateway address is assigned by the network DHCP server.

- **Port**: sets the port number; the factory-default value is 9221. Refer to Figure 11-182.



Figure 11-182. LAN Screen -Port

- **MAC Address:** Displays the MAC address; the MAC address is listed on a label on the chassis of the unit. Refer to Figure 11-183.

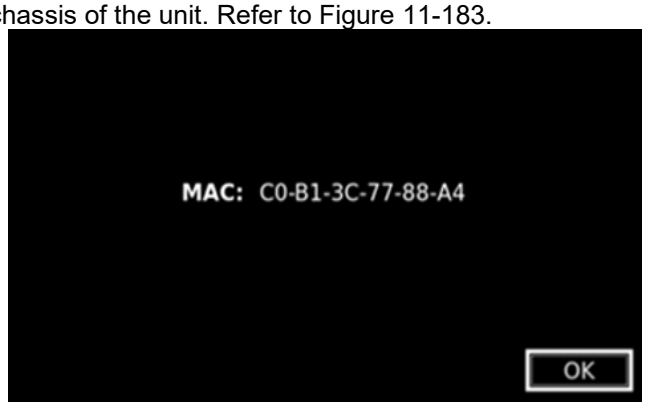


Figure 11-183. MAC Address

- **Host Name**: Allows setting a unique alpha-numeric host name. Refer to Figure 11-184.

ENTRY	DESCRIPTION



Figure 11-184. LAN Screen - Host Name

- **Apply**: Applies the LAN settings to the supply. Refer to Figure 11-185 and Figure 11-186.

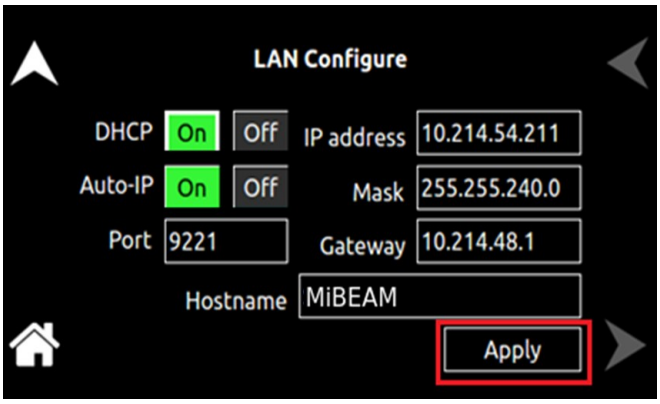


Figure 11-185. LAN Screen – Apply

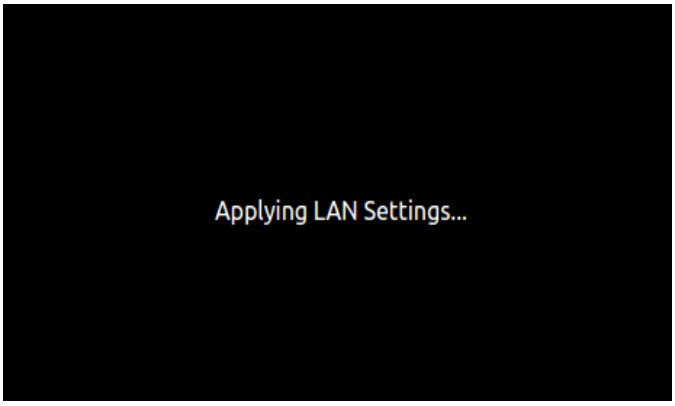


Figure 11-186. LAN Screen - Applying LAN Settings

RS232

Configures the RS-232C communications interface.RS232 has two sub-menus: RS232 Settings and RS232 Configure

a) **RS232 Settings:** Lists the configured Baud Rate, Stop Bits, Bits and Parity for the RS232 digital interface, refer to Figure 11-187.

- **Baud Rate**: sets baud rate to either 9600, 19200, 38400, 57600 or

ENTRY	DESCRIPTION

115200 baud. The default setting is 115200 baud.

- **Stop Bits** sets the number of stop bits to either 1 or 2 bits. The default setting is 1 stop bit.
- **Data**: sets the number of data bits to either 7 or 8. The default setting is 8 bits.
- **Parity**: sets the parity to either Even, Odd, or no parity, None. The default setting is no parity, None.



Figure 11-187. RS232 Screen -Settings

b) Configure RS232: Configures the RS-232 Baud Rate, refer to Figure 11-188 and Figure 11-189. This setting must match those set for the communications port of the user external controller.

- **Baud Rate**: sets baud rate to either 9600, 19200, 38400, 57600 or 115200 baud. The default setting is 115200 baud

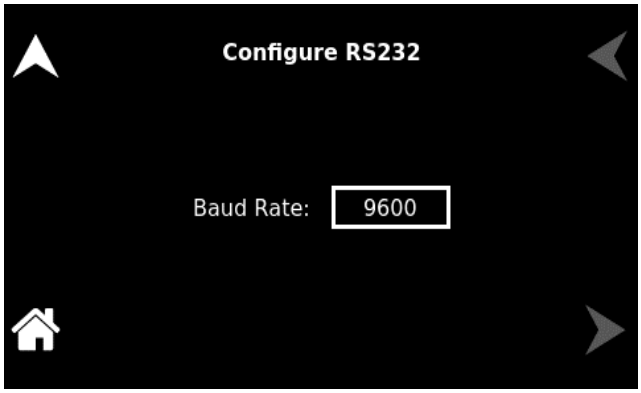


Figure 11-188. RS232 Screen -Configure

ENTRY	DESCRIPTION

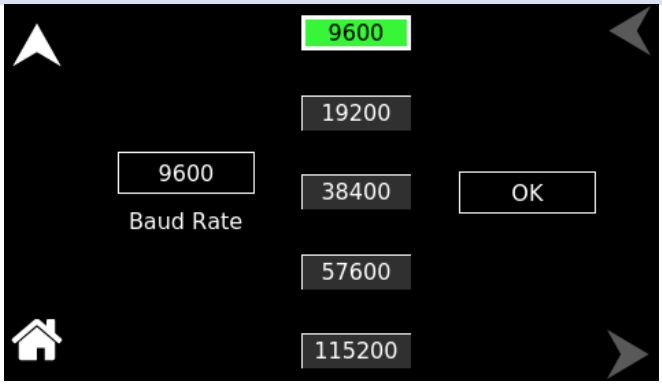


Figure 11-189. Baud Rate Selection

USB

Displays the configured Baud Rate. Refer to Figure 11-190.



Figure 11-190. USB Setting

External CAN

Configures the device Node Address, Baude Rate and Communication Protocol. Refer to Figure 11-191.

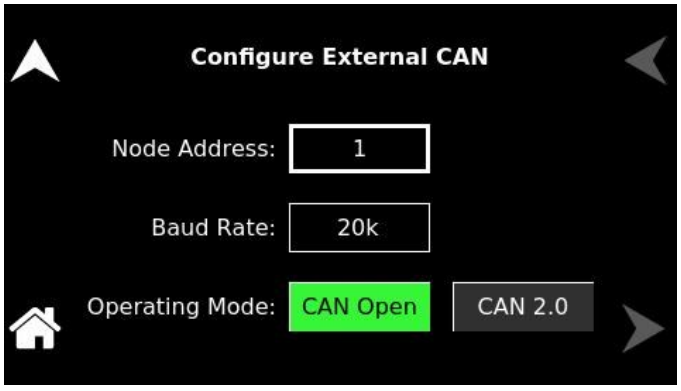


Figure 11-191. Configure External CAN

ENTRY	DESCRIPTION

a) Node Address: Sets the CAN Node Address to the range of 1 to 127. Refer to Figure 11-192.



Figure 11-192. Node Address

b) Baud Rate: Sets baud rate from 20kbps to 1mbps (20k, 40k, 50k, 80k, 100k, 125k, 150k, 200k, 250k, 400k, 500k, 1000 kbps). Refer to Figure 11-193.



Figure 11-193. Baud Rate

c) Operating Mode: Sets the communication protocol to CAN2.0 or CANopen. Refer to Figure 11-191.

- **CANopen**
  - Covers basic CANopen configuration, including NMT (Network Management) setup, TPDO (Transmit Process Data Object) mapping, and SDO (Service Data Object) structures.
  - Enables standardized communication and seamless integration into existing industrial CANopen networks.
- **CAN 2.0**

ENTRY	DESCRIPTION
	○ Describes the Hardware configuration and use of extended 29-bit identifiers. ○ Supports custom command or response mappings, allowing flexible and proprietary protocol integration.
GPIB	Displays and Configures the GPIB Setting. Refer to Figure 11-194.

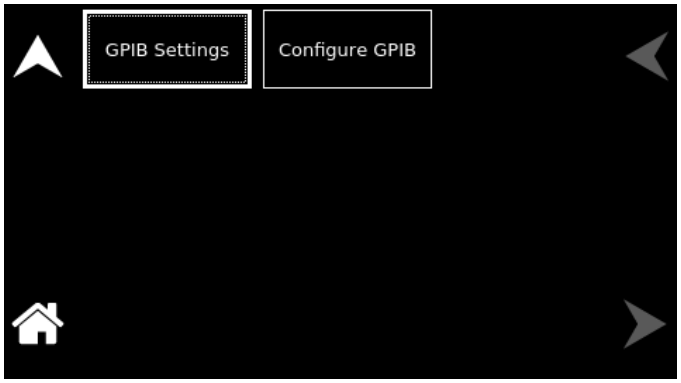


Figure 11-194. GPIB

a) GPIB Settings

Displays the configured address and Power ON SRQ.

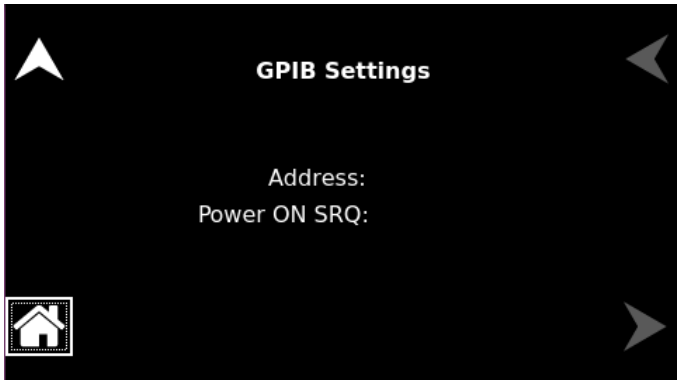


Figure 11-195. GPIB Settings

b) Configure GPIB

Configure the IEEE-488 address; the default is 1. The address can be set from 0 through 30.

ENTRY	DESCRIPTION
	Also allows to turn On/Off the Power ON Service Request. Power On SRQ set to On causes a GPIB service request to be sent to the computer, when the Power Supply is turned on. Factory Default value for Power On SRQ is Off.

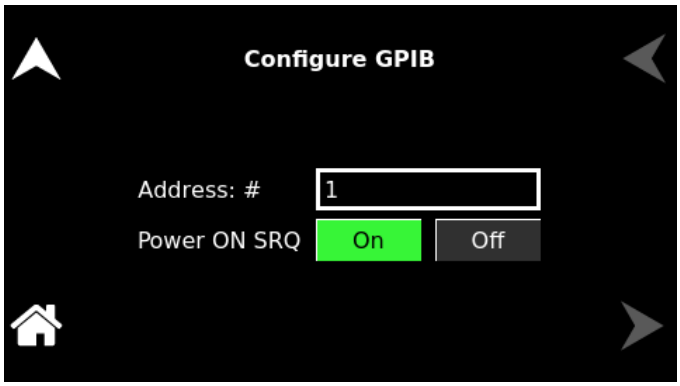


Figure 11-196. Configure GPIB

Analog Configures the Analog programming interface, refer to Figure 11-197.

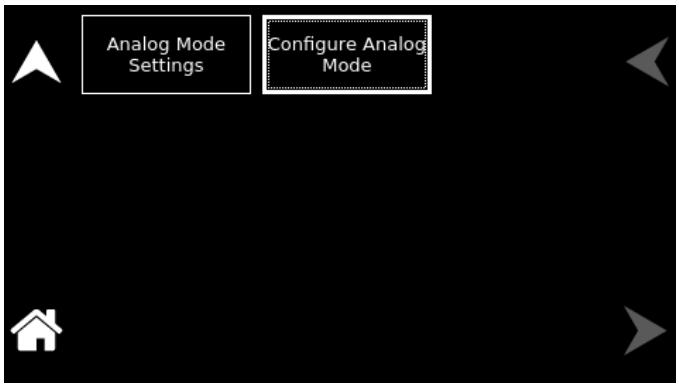


Figure 11-197. Analog Screen

a) Analog Mode Settings

Lists the configuration settings of the Analog Programming interface. Refer to Figure 11-198.

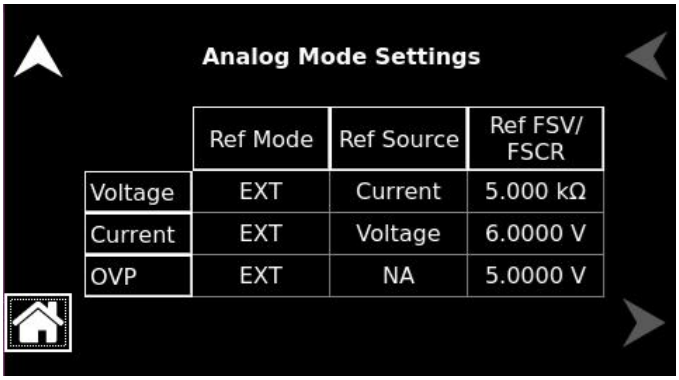


Figure 11-198. Analog Mode Settings

ENTRY	DESCRIPTION

b) Configure Analog Mode

Sets parameter values and controls operation of the Analog Programming interface. Refer to Figure 11-199.

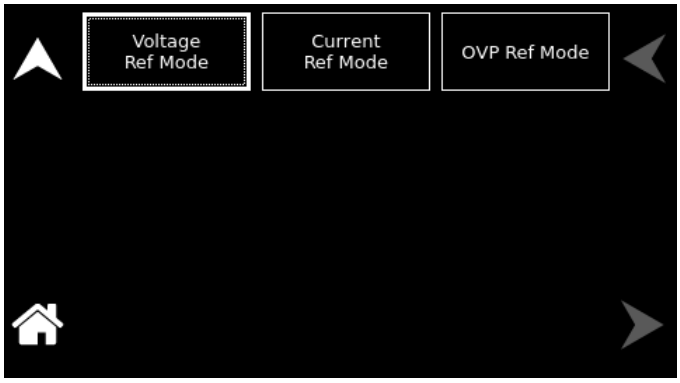


Figure 11-199. Configure Analog Mode Settings

- **Voltage Ref Mode :** Configures the Voltage Reference Mode, refer to Figure 11-199. When the Voltage Reference Mode is set to External, the Voltage setting field on the Dashboard screen and the 'Voltage' option in the Output Program screen will be disabled, and these Voltage fields will display as 'EXT'. Refer to Figure 11-200 to Figure 11-202.

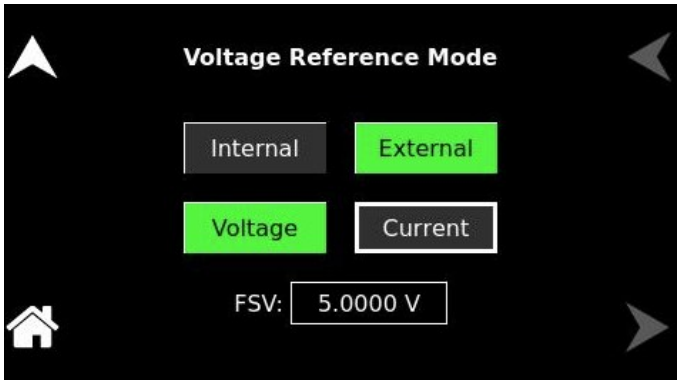


Figure 11-200. Voltage Reference Mode

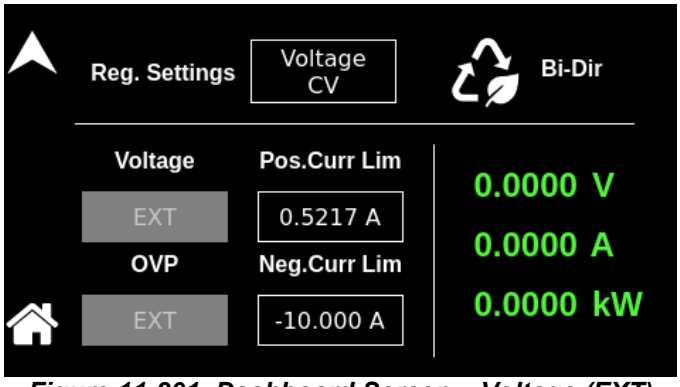


Figure 11-201. Dashboard Screen – Voltage (EXT)

ENTRY	DESCRIPTION

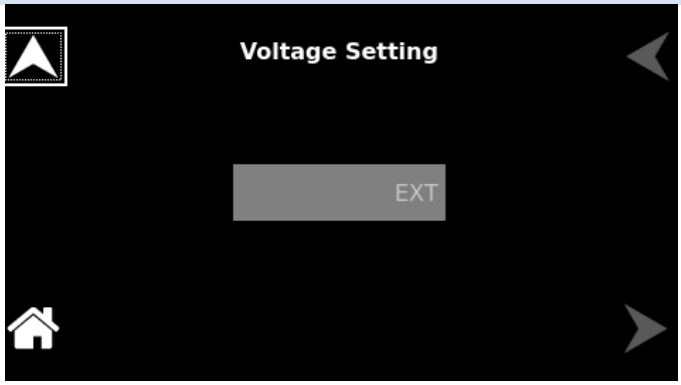


Figure 11-202. Output Program Screen – Voltage (EXT)

When Voltage Reference Mode is selected as Current, FSCR (Full Scale Current Resistance) unit will be kΩ (k Ohms). Refer to Figure 11-203.

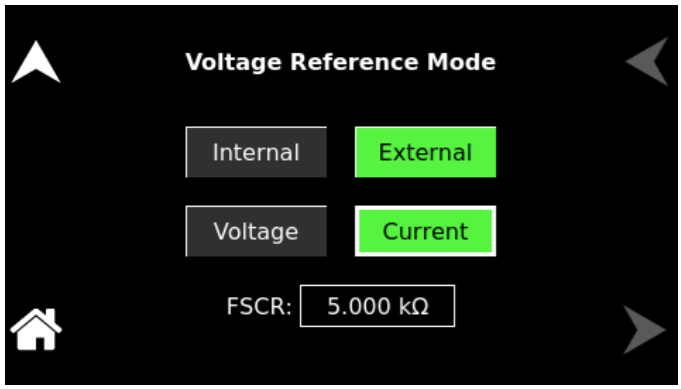
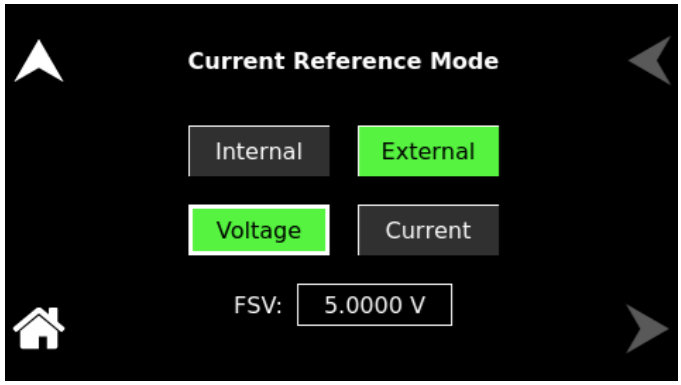


Figure 11-203. Voltage Reference Mode – Resistive

- **Current Ref Mode:** Configures the Current Reference Mode, refer to Figure 11-199. When the Current Reference Mode is set to External, the Voltage setting field on the Dashboard screen and the 'Voltage' option in the Output Program screen will be disabled, and these Voltage fields will display as 'EXT'. Refer to Figure 11-204 and Figure 11-205.

  NOTE: 'Current' is only applicable for Bi-directional mode. When you select the 'Current', the screen display as 'Only applicable for Source Mode'



ENTRY	DESCRIPTION

Figure 11-204. Current Reference Mode

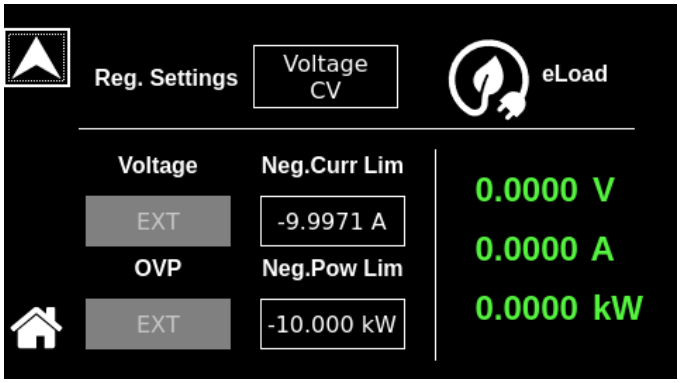


Figure 11-205. Dashboard Screen – Current (EXT)

- **OVP Ref Mode:** Configures the Over Voltage Protection (OVP) Reference Mode. When the OVP Reference Mode is set to External, the OVP setting field on the Dashboard screen and the 'Protection' option in the Configuration screen will be disabled, and these OVP fields will display as 'EXT' refer to Figure 11-206.

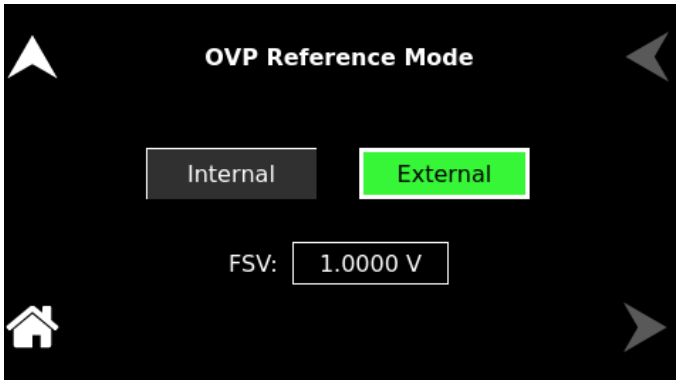


Figure 11-206. OVP Reference Mode

PONS Remote Inhibit

Sets the control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 11-207.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

Remote inhibit can be configured in three modes;

- **Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output.

ENTRY	DESCRIPTION
	• **Live:** after reclosing the contact, user needs to turn ON the output. • **OFF:** inhibit function would be disabled. **b) Remote Inhibit Input – Active Source** An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply. Remote inhibit can be configured in three modes; • **Latch:** after removing the active voltage source, user needs to clear the fault and turn ON the output. • **Live:** after removing the active voltage source, user needs to turn ON the output. • **OFF:** inhibit function would be disabled.

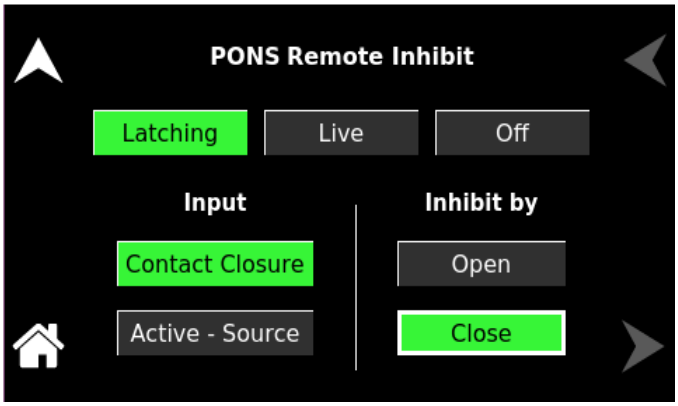


Figure 11-207. PONS remote Inhibit

Remote Output

Configures the Remote Output to ON or OFF, refer to Figure 11-208.

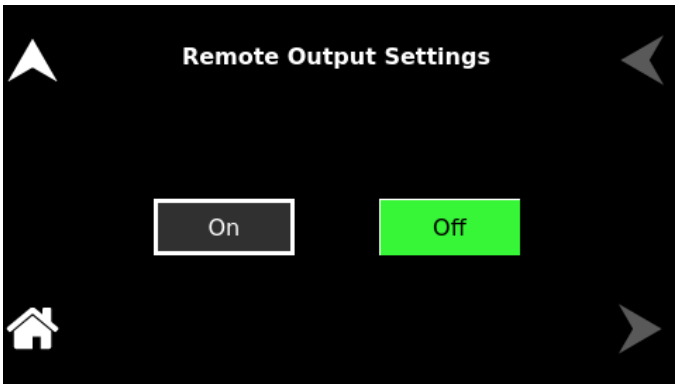


Figure 11-208. Remote Output Settings

Table 11-33. System Setting Screen

11.2.7 OPERATING MODE

The Operating Mode Settings screen offers comprehensive guidance on the system modes of the Mi-BEAM Series power supply. This model is engineered for versatile and reliable performance across various applications, ensuring precise and efficient power delivery through its advanced control features. Depending on user requirements, the Mi-BEAM Series supports multiple modes of operation. Refer to the Figure 11-209.

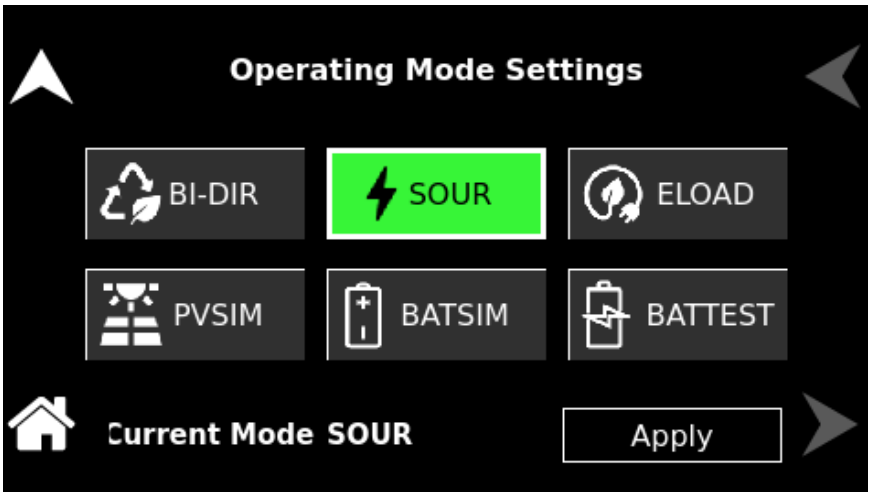


Figure 11-209. Operating Mode Settings

NOTE: When the unit is in series operation, the non-applicable modes ‘PVSIM’, ‘BATSIM’, and ‘BATTEST’ do not appear in ‘Operating Mode Settings’.

11.2.8 SYSTEM SETTINGS SCREEN

The System Settings screen provides the settings of ‘Hardware Limits’, ‘System Details’ ‘Firmware Version’, ‘LCD’, ‘Default Screen’ and ‘Factory Default’. For the top-level menu of the System Settings Screen, refer to Figure 11-210 and for instructions on how to navigate, refer to Section 9.4.2.2.

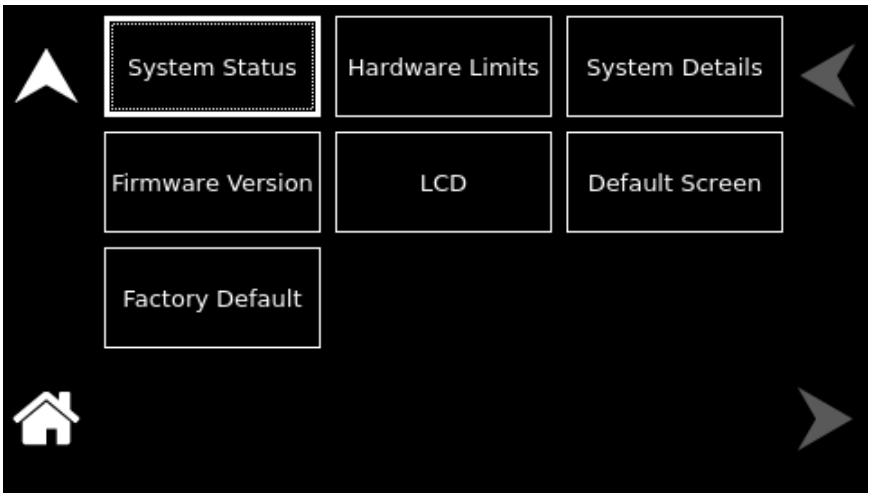


Figure 11-210. System Settings Screen

ENTRY	DESCRIPTION
System Status	Displays the present system status information of the power supply, including the Input Line, Output Sense, Isolation, Chassis Type and No. of chassis. Refer Figure 11-211 to Figure 11-214. **NOTE:** The chassis type changes depending on the connection configuration; it is identified as Standalone (the power supply operates independently), Multi-chassis Parallel (the power supply is connected in parallel), Multi-chassis Series (the power supply is connected in series), and Multi-chassis Series Split Phase (the power supply is configured in a series split-phase connection).

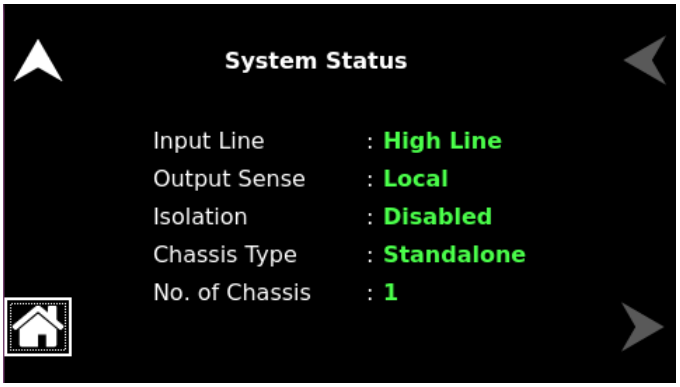


Figure 11-211. System Status– Standalone Unit

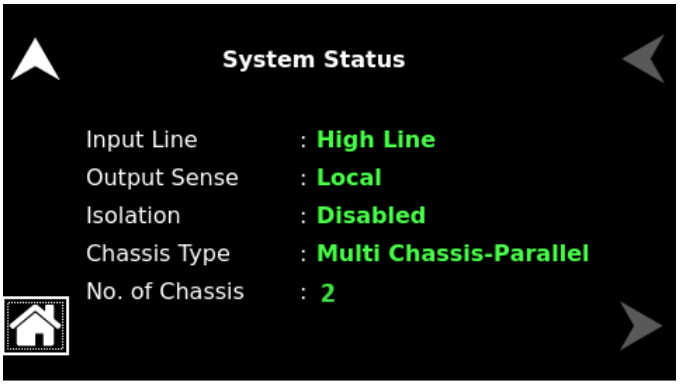


Figure 11-212. System Status – Parallel Operation

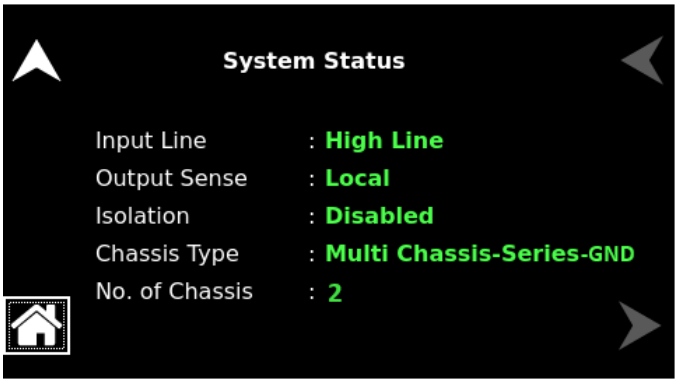


Figure 11-213. System Status – Series Operation

ENTRY	DESCRIPTION

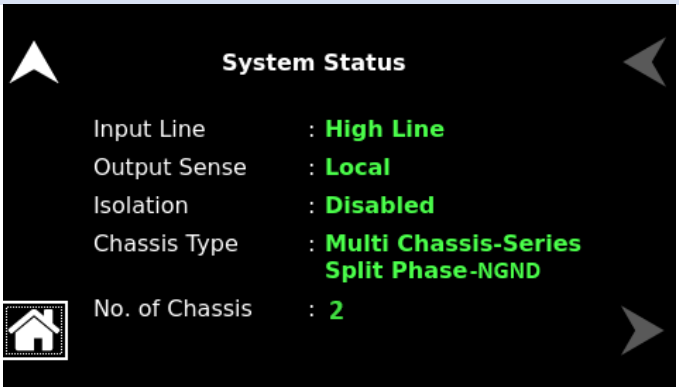


Figure 11-214. System Status – Series Split Phase Operation

Hardware Limits Displays the hardware parameter limit values. Refer to Figure 11-215.



Figure 11-215. Hardware Limits

System Details Displays information about the user's device, including the Manufacturer, Model Number, Serial Number, Last Calibration Date, and Operating Mode. Refer to Figure 11-216.

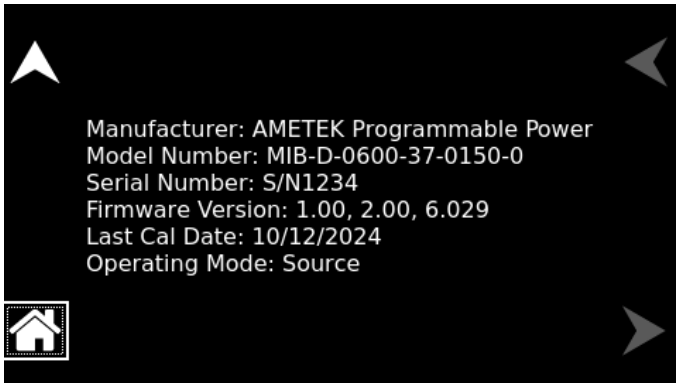


Figure 11-216. System Details

Firmware Version Displays information about the configuration of the power supply, including the Communication Controller, System Interface, Front Panel, Fan Controller, Mod 1 Primary Controller, Mod 1 Secondary Controller, Mod 2 Primary Controller, Mod 2 Secondary Controller, Mod 3 Primary Controller, Mod 3 Secondary Controller. This information helps identify the unit. Refer to Figure 11-217.

ENTRY	DESCRIPTION

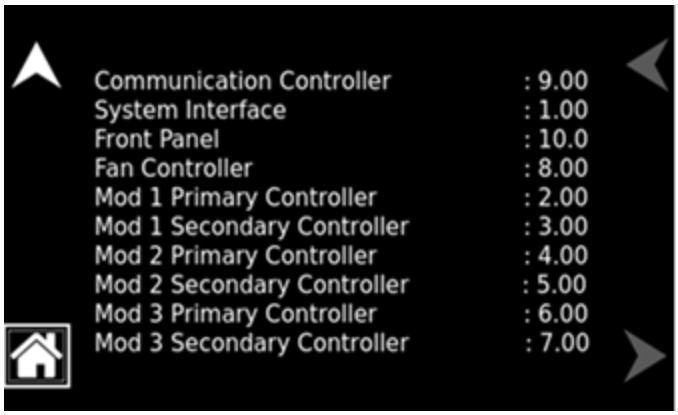


Figure 11-217. Firmware Version

LCD Provides settings for the calibration of the display touchscreen. Refer to Figure 11-218.

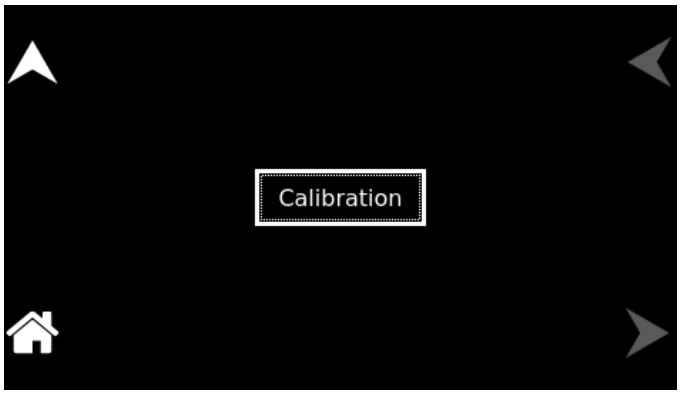


Figure 11-218. LCD

Default Screen Selects whether the Default screen (showing measured voltage, current and power) is enabled or disabled, refer to Figure 11-219 and Figure 11-220. It allows to set the time out if the default screen is enabled.

a) **Timeout Interval**: Selects the time, in seconds, for how long Dashboard screen must be inactive before the Default screen is displayed.

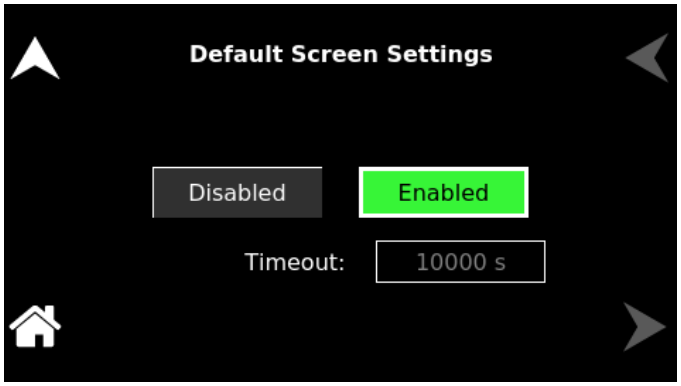


Figure 11-219. Default Screen Settings - Enabled

ENTRY	DESCRIPTION

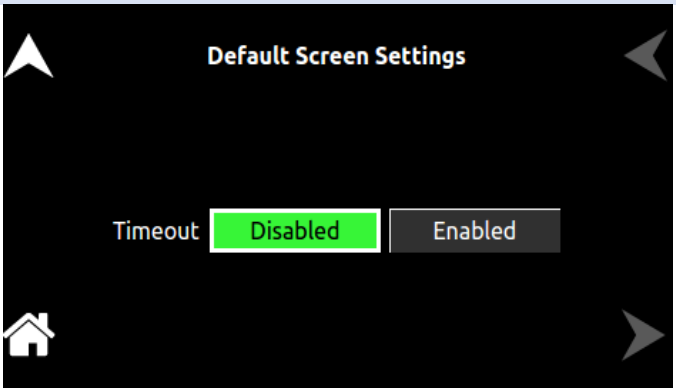


Figure 11-220. Default Screen Settings – Disabled

Factory Default Set the device to its original factory settings, as it was when it left the manufacturer. Refer to Figure 11-221.

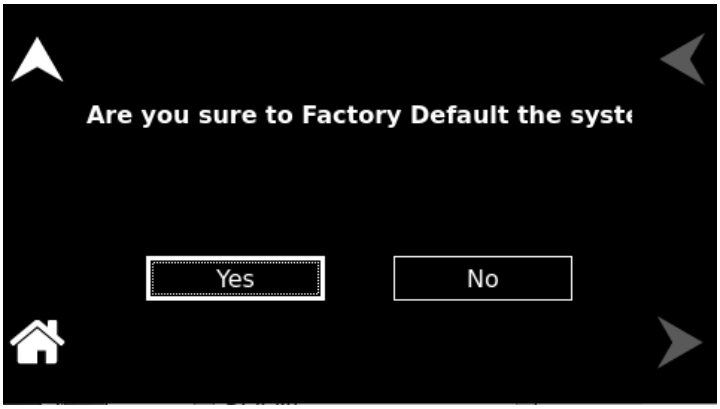


Figure 11-221. Factory Default

Table 11-34. System Setting Screen

11.2.9 SYSTEM FAULTS SCREEN

The System Faults screen provides descriptions of faults that have occurred in a power module. The fault screen appears if any supply fault conditions occur, refer to Figure 11-222. The user should press ‘Clear’ to clear the fault and continue operating the power supply, and press ‘Reload’ to refresh the system faults and check for errors. If no fault has occurred, the screen will display ‘No Fault Occurred’, refer to Figure 11-223.

NOTE: These conditions might resolve themselves; however, if they continue to occur after pressing 'Clear', refer to Chapter 17.

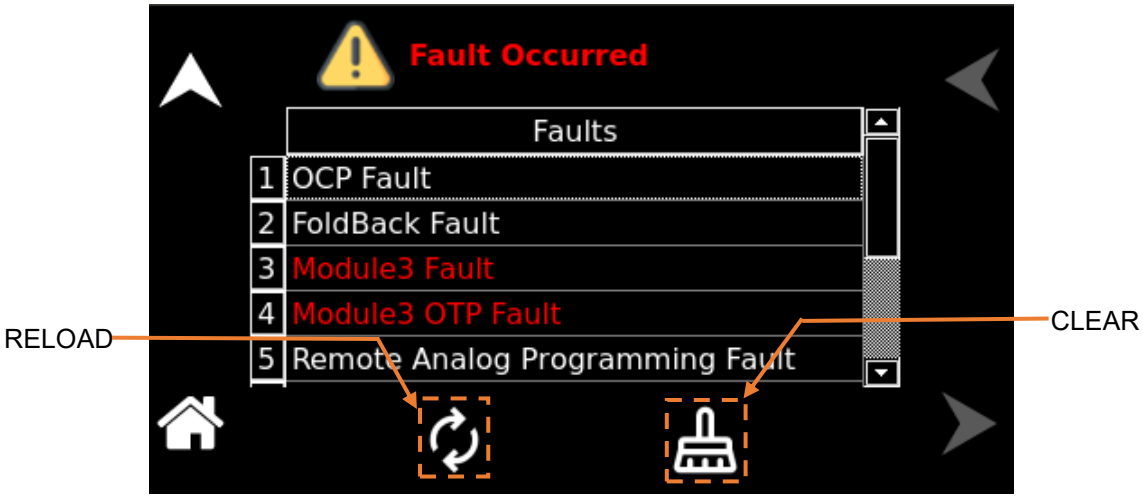
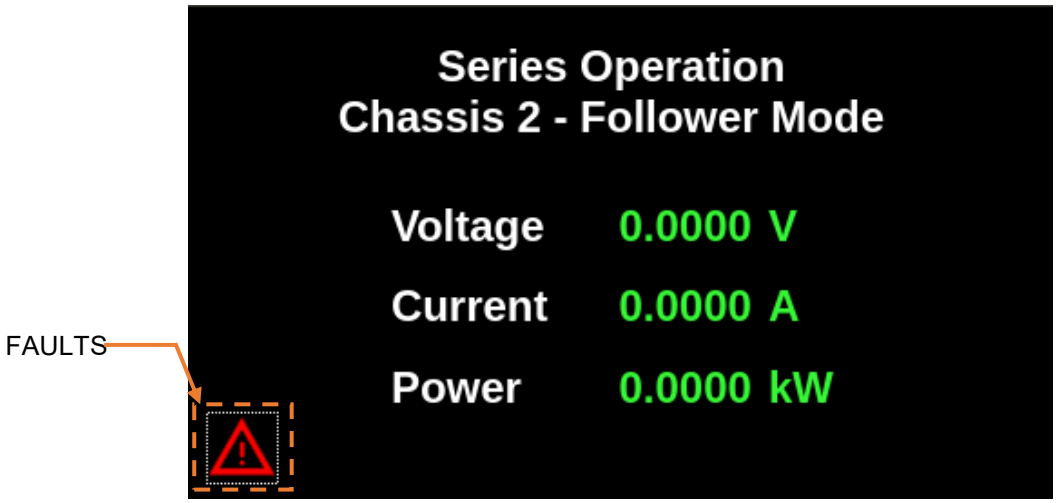


Figure 11-222. System Faults



Figure 11-223. No Fault Occurred Screen

If any fault occurs on the Follower screen, a fault signal is generated. Press ‘Faults’ to view the fault details on the Follower screen. Refer to Figure 11-224.



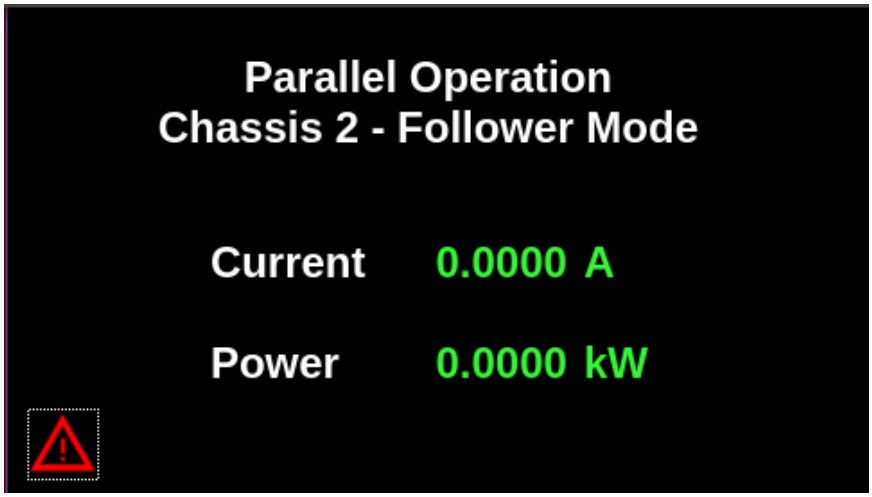


Figure 11-224. Follower Faults Screen

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12 ELOAD MODE OPERATION

12.1 Mi-BEAM CONNECTION TO UUT AND CONFIGURATION

12.1.1 IDENTIFY THE UUT PORT TYPE

Determine if the UUT port is a current type (e.g. DC-Charger output) or a voltage type (e.g. battery or any voltage source).

a) Current type – UUT regulates the current
b) Voltage type – UUT regulates the voltage

12.1.2 CONFIGURING MI-BEAM FOR CURRENT TYPE UUT

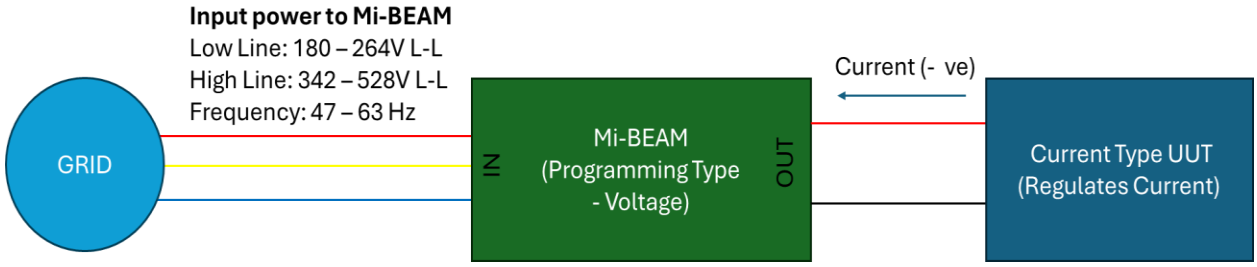


Figure 12-1. Current Type UUT

To configure the Current Type UUT, set the programming type (Prog. type) to 'Voltage' and select the appropriate regulation setting (CV/CC, CV/CP CR/CV, CP/CV and CV) in the dashboard. Refer to Section 12.2.1 for detailed instructions.

12.1.2.1 CONSTANT VOLTAGE/ CONSTANT CURRENT (CV/CC)

The power supply regulates the output voltage to the user-set value. On reaching the current limit (negative), output would be regulated to the current limit reached. On reaching the power limit (negative), the output voltage would be programmed to zero and the output is turned OFF. Refer to Section 12.2.1.2.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must

be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 12-101.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 12-101.

- **Voltage User Limit:** This setting limits the voltage value that can be set in Mi-BEAM. Refer to Figure 12-104.

b) Setting Limits: The current and power limits can be set from the 'Output program' screen. In this regulation setting, Negative Current limit will be used to perform foldback operation, and Negative Power limit will be used to trip Mi-BEAM. Refer to Section 12.2.2.1.

All applicable options based on the programming type 'Voltage' and regulation setting 'CV/CC' are shown in Table 12-1.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
VOLT	CV/CC	YES	NA	NA	NA	NA	NA	YES	NA	YES

Table 12-1. Applicable Options – CV/CC

- **Negative Current limit:** On measured current reaching this value, Mi-BEAM will regulate the current at set Negative Current Limit. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 12-20.

- **Negative Power limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the power flown from UUT to Mi-BEAM. Refer to Figure 12-21.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Negative Current Limit and Negative Power Limit) after the delay time configured. Refer to Figure 12-93.

c) Setting Voltage value: Enter the voltage value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OVP. Refer to Figure 12-19.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 12-22.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 12.2.3.

h) End the Test: Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

12.1.2.2 CONSTANT RESISTANCE/ CONSTANT VOLTAGE (CR/CV)

The power supply regulates the output resistance to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the current limit (negative), the output voltage would be programmed to zero and the output is turned OFF. Refer to Section 12.2.1.3.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 12-101.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 12-101.

b) Setting Limits: The current and power limits can be set from the 'Output program' screen. In this regulation setting, Voltage High Limit, Voltage Low Limit, Negative Current limit, and Negative Power limit will be used to trip Mi-BEAM. Refer to Section 12.2.2.3.

All applicable options based on the programming type 'Voltage' and regulation setting 'CR/CV' are shown in Table 12-2.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
VOLT	CR/CV	NA	NA	NA	YES	YES	NA	YES	NA	NA

Table 12-2. Applicable Options – CR/CV

- **Voltage High Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from UUT to Mi-BEAM. Refer to Figure 12-31.

- **Voltage Low Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the voltage flown from UUT to Mi-BEAM. Refer to Figure 12-32.

- **Negative Current limit:** On measured current reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 12-33.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage High Limit, Voltage Low Limit, Negative Current Limit and Negative Power Limit) after the delay time configured. Refer to Figure 12-93.

c) **Sink Resistance:** Enter the sink resistance value to control the voltage drop. Refer to Figure 12-30.

d) **Connect the UUT to the Mi-BEAM:** Ensure all connections are secure and correctly aligned with the UUT port type.

e) **Output State:** Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 12-34.

f) **Start the Test:** Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) **Monitoring and Adjustments:** Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 12.2.3.

h) **End the Test:** Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

12.1.2.3 CONSTANT VOLTAGE/ CONSTANT POWER (CV/CP)

The power supply regulates the output voltage to the user-set value. On reaching the power limit (negative), output would be regulated to the power limit reached. On reaching the current limit (negative), the output voltage would be programmed to zero, and the output is turned OFF. Refer to Section 12.2.1.2.

a) **Configuration:** Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 12-101.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 12-101.

- **Voltage User Limit:** This setting limits the voltage value that can be set in Mi-BEAM. Refer to Figure 12-104.

b) **Setting Limits:** The current and power limits can be set from the ‘Output program’ screen. In this regulation setting, Positive Power limit will be used to perform foldback operation, and Negative Current Limit is used to trip the Mi-BEAM. Refer to Section 11.2.2.1.

   All applicable options based on the programming type 'Voltage' and regulation setting 'CV/CP' are shown in Table 12-3.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
VOLT	CV/CP	YES	NA	NA	NA	NA	NA	YES	NA	YES

Table 12-3. Applicable Options – CV/CP

- **Negative Current limit:** On measured current reaching this value output of the Mi-BEAM will be turned OFF. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 12-20.

- **Negative Power limit:** On measured power reaching this value, Mi-BEAM will regulate the power at set Negative Power Limit. This value must be set lower than the power flown from UUT to Mi-BEAM. Refer to Figure 12-21.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Negative Current Limit and Negative Power Limit) for the delay time configured. Refer to Figure 12-93.

c) Setting Voltage value: Enter the voltage value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OVP. Refer to Figure 12-19.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 12-22.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 12.2.3.

h) End the Test: Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

12.1.2.4 CONSTANT POWER/CONSTANT VOLTAGE (CP/CV)

The power supply regulates the output power to the user-set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the current limit (negative), the output power would be programmed to zero, and the output is turned OFF. Refer to Section 12.2.1.4.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 12-101.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 12-101.

- **Power Low User Limit:** This setting limits the minimum power value that can be set in Mi-BEAM. Refer to Figure 12-105.

b) Setting Limits: The current and power limits can be set from the 'Output program' screen. In this regulation setting, Voltage Low Limit and Voltage High Limit will be used to perform foldback operation and Negative Current limit is used to trip the Mi-BEAM. Refer to Section 12.2.2.

All applicable options based on the programming type 'Voltage' and regulation setting 'CP/CV' are shown in Table 12-3.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
VOLT	CP/CV	NA	NA	YES	YES	YES	NA	YES	NA	NA

Table 12-4. Applicable Options – CP/CV

- **Voltage High Limit:** On measured voltage reaching this value Mi-BEAM will regulate the voltage at set Voltage High Limit. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 12-25.

- **Voltage Low Limit**: On measured voltage reaching this value, Mi-BEAM will regulate the voltage at set Voltage Low Limit. This value must be set lower than the voltage flown from Mi-BEAM to UUT. Refer to Figure 12-26.

- **Negative Current limit:** On measured current reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 12-27.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage Low Limit, Voltage High Limit and Negative Current Limit) for the delay time configured. Refer to Figure 12-93.

c) Setting Power value: Enter the power value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured protection limit. Refer to Figure 12-24.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 12-28.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 12.2.3.

h) End the Test: Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

12.1.2.5 CONSTANT VOLTAGE (CV)

The power supply regulates the output voltage to the user-set value. On reaching the set current limit (negative) or power limit (negative), the output voltage would be programmed to zero and the output is turned OFF. Refer to Section 12.2.1.2.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 12-101.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 12-101.

- **Voltage User Limit:** This setting limits the voltage value that can be set in Mi-BEAM. Refer to Figure 12-104.

b) Setting Limits: The current and power limits can be set from the 'Output program' screen. In this regulation setting, Negative Current limit and Negative Power limit will be used to trip Mi-BEAM. Refer to Section 12.2.2.1.

All applicable options based on the programming type 'Voltage' and regulation setting 'CV' are shown in Table 6-1.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
VOLT	CV	YES	NA	NA	NA	NA	NA	YES)	NA	YES

Table 12-5. Applicable Options – CV

- **Negative Current limit:** On measured current reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 12-20.

- **Negative Power limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the power flown from UUT to Mi-BEAM. Refer to Figure 12-21.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Negative Current Limit and Negative Power Limit) for the delay time configured. Refer to Figure 12-93.

c) **Setting Voltage value:** Enter the voltage value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured OVP. Refer to Figure 12-19.

d) **Connect the UUT to the Mi-BEAM:** Ensure all connections are secure and correctly aligned with the UUT port type.

e) **Output State:** Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 12-22.

f) **Start the Test:** Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) **Monitoring and Adjustments:** Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 12.2.3.

h) **End the Test:** Once the test is complete, turn OFF the output and input and safely disconnect the UUT from the Mi-BEAM.

12.1.3 CONFIGURING MI-BEAM FOR VOLTAGE TYPE UUT

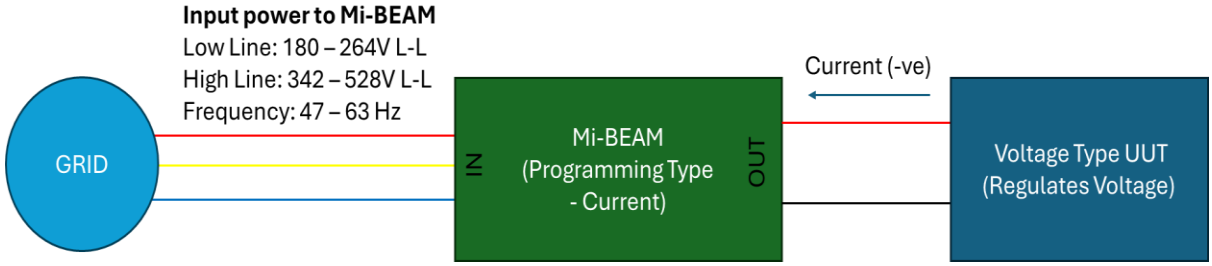


Figure 12-2. Voltage Type UUT

To configure the Voltage Type UUT, set the programming type (Prog. type) to ‘Current’ and select the appropriate regulation setting (CC/CV, CC/CP, CP/CC, CR/CC and CC) in the dashboard. Refer to Section 12.2.1 for detailed instructions.

12.1.3.1 CONSTANT CURRENT/CONSTANT VOLTAGE (CC/CV)

The power supply regulates the output current to the user-set value. On reaching the voltage limit (high or low), the output is regulated to the voltage limit reached. On reaching the power limit (negative), the output current is programmed to zero, and the output is turned OFF. Refer to Section 12.2.1.5.

a) **Configuration:** Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 12-101.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 12-101.

- **Current Low User Limit:** This setting limits the current value that can be set in Mi-BEAM. Refer to Figure 12-106.

b) Setting Limits: The voltage and power limits can be set from the 'Output program' screen. In this regulation setting, Voltage High Limit, Voltage Low Limit will be used to perform foldback operation, and Negative Power limit will be used to trip Mi-BEAM. Refer to Section 12.2.2.4.

All applicable options based on the programming type Current' and regulation setting 'CC/CV' are shown in Table 12-6.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
CURR	CC/CV	NA	YES	NA	YES	YES	NA	NA	NA	YES

Table 12-6. Applicable Options – CC/CV

- **Voltage High Limit**: On measured voltage reaching this value, Mi-BEAM will regulate the voltage at set Voltage High Limit. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 12-37.

- **Voltage Low Limit**: On measured voltage reaching this value, Mi-BEAM will regulate the voltage at set Voltage Low Limit. This value must be set lower than the voltage flown from Mi-BEAM to UUT. Refer to Figure 12-38.

- **Negative Power limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the power flown from UUT to Mi-BEAM. Refer to Figure 12-39.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage High Limit, Voltage Low Limit and Negative Power Limit) for the delay time configured. Refer to Figure 12-95.

c) Setting Current value: Enter the current value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured Neg. OCP. Refer to Figure 12-36.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 12-41.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 12.2.3.

h) End the Test: Once the test is complete, safely disconnect the UUT from the Mi-BEAM and power down the Mi-BEAM if no further tests are required.

12.1.3.2 CONSTANT CURRENT/CONSTANT POWER (CC/CP)

The power supply regulates the output current to the user-set value. If the power limit (positive) is reached, the output is regulated to the power limit reached. If the voltage limit (high or low) is reached, the output current is programmed to zero and the output is turned OFF. Refer to Section 12.2.1.5.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 12-101.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 12-101.

- **Current Low Limit:** This setting limits the current value that can be set in Mi-BEAM. Refer to Figure 12-106.

b) Setting Limits: The voltage and power limits can be set from the 'Output program' screen. In this regulation setting, Voltage High Limit, Voltage Low Limit will be used to perform foldback operation, and Negative Power limit will be used to trip Mi-BEAM. Refer to Section 12.2.2.4.

All applicable options based on the programming type 'Current' and regulation setting 'CC/CP' are shown in Table 12-7.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
CURR	CC/CP	NA	YES	NA	YES	YES	NA	NA	NA	YES

Table 12-7. Applicable Options – CC/CP

- **Voltage High Limit**: On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 12-37.

- **Voltage Low Limit**: On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the voltage flown from Mi-BEAM to UUT. Refer to Figure 12-38.

- **Negative Power limit:** On measured power reaching this value, Mi-BEAM will regulate the power at set Negative Power Limit. This value must be set lower than the power flown from UUT to Mi-BEAM. Refer to Figure 12-39.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage High Limit, Voltage Low Limit and Negative Power Limit) for the delay time configured. Refer to Figure 12-95.

c) Setting Current value: Enter the current value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured Neg. OCP. Refer to Figure 12-36.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 12-41.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 12.2.3.

h) End the Test: Once the test is complete, safely disconnect the UUT from the Mi-BEAM and power down the Mi-BEAM if no further tests are required.

12.1.3.3 CONSTANT POWER/CONSTANT CURRENT (CP/CC)

The power supply regulates the output power to the user-set value. On reaching the current limit (negative), output would be regulated to the current limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero, and the output is turned OFF. Refer to Section 12.2.1.6.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 12-101.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 12-101.

- **Power Low Limit:** This setting limits the maximum power value that can be set in Mi-BEAM. Refer to Figure 12-107.

b) Setting Limits: The voltage and power limits can be set from the 'Output program' screen. In this regulation setting, Negative Current Limit will be used to perform foldback operation and Voltage High Limit, Voltage Low Limit will be used to trip Mi-BEAM. Refer to Section 12.2.2.5.

All applicable options based on the programming type 'Current' and regulation setting 'CP/CC' are shown in Table 12-8.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
CURR	CP/CC	NA	NA	YES	YES	YES	NA	YES	NA	NA

Table 12-8. Applicable Options – CP/CC

- **Voltage High Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 12-43.

- **Voltage Low Limit**: On measured current reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 12-44.

- **Negative Current limit:** On measured current reaching this value, Mi-BEAM will regulate the current at set negative current limit. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 12-45.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage High Limit, Voltage Low Limit and Negative Power Limit) for the delay time configured. Refer to Figure 12-95.

c) Setting Power value: Enter the power value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured protection value. Refer to Figure 12-42.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 12-46.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 12.2.3.

h) End the Test: Once the test is complete, safely disconnect the UUT from the Mi-BEAM and power down the Mi-BEAM if no further tests are required.

12.1.3.4 CONSTANT RESISTANCE/ CONSTANT CURRENT (CR/CC)

The power supply regulates the output resistance to the user set value. On reaching the current limit (negative), output would be regulated to the current limit reached. On reaching the voltage limit (high or low), the output current would be programmed to zero, and the output is turned OFF. Refer to Section 12.2.1.7.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 12-101.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 12-101.

b) Setting Limits: The current and power limits can be set from the 'Output program' screen. In this regulation setting, Negative Current limit will be used to perform foldback operation and Voltage High Limit, Voltage Low Limit, Negative Power Limit will be used to trip Mi-BEAM. Refer to Section 12.2.2.6.

All applicable options based on the programming type 'Current' and regulation setting 'CR/CC' are shown in Table 12-9.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
CURR	CR/CC	NA	NA	NA	YES	YES	NA	YES	NA	NA

Table 12-9. Applicable Options – CR/CC

- **Voltage High Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the voltage flown from UUT to Mi-BEAM. Refer to Figure 12-49.

- **Voltage Low Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the voltage flown from UUT to Mi-BEAM. Refer to Figure 12-50.

- **Negative Current limit:** On measured current reaching this value, Mi-BEAM will regulate the current at set Negative Current Limit. This value must be set lower than the current flown from UUT to Mi-BEAM. Refer to Figure 12-51.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage High Limit, Voltage Low Limit, Negative Current Limit and Negative Power Limit) for the delay time configured. Refer to Figure 12-95.

c) Sink Resistance: Enter the sink resistance value to control the voltage drop. Refer to Figure 12-48.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 12-52.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 12.2.3.

h) End the Test: Once the test is complete, safely disconnect the UUT from the Mi-BEAM and power down the Mi-BEAM if no further tests are required.

12.1.3.5 CONSTANT CURRENT (CC)

The power supply regulates the output current to the user-set value. On reaching the set voltage limit (high or low) or power limit (negative), the output current would be programmed to zero and the output is turned OFF. Refer to Section 12.2.1.5.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 12-101.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 12-101.

- **Current Low User Limit:** This setting limits the minimum current value that can be set in Mi-BEAM. Refer to Figure 12-106.

b) Setting Limits: The voltage and power limits can be set from the ‘Output program’ screen. In this regulation setting, Voltage High Limit, Voltage Low Limit and Negative Power limit will be used to trip Mi-BEAM. Refer to Section 12.2.2.4.

All applicable options based on the programming type 'Current' and regulation setting 'CC' are shown in Table 12-10.

PROG TYPE	REG SETTING	VOLT SETTING	CURR SETTING	POW SETTING	VOLT HIGH	VOLT LOW	POS CURR LIM	NEG CURR LIM	POS POW LIM	NEG POW LIM
CURR	CC	NA	YES	NA	YES	YES	NA	NA	NA	YES

Table 12-10. Applicable Options – CC

- **Voltage High Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set higher than the voltage flown from Mi-BEAM to UUT. Refer to Figure 12-37.

- **Voltage Low Limit**: On measured voltage reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the voltage flown from Mi-BEAM to UUT. Refer to Figure 12-38.

- **Negative Power limit:** On measured power reaching this value, output of the Mi-BEAM will be turned OFF. This value must be set lower than the power flown from UUT to Mi-BEAM. Refer to Figure 12-39.

- **Delay time:** Mi-BEAM output will be turned OFF on reaching the limits (Voltage High Limit, Voltage Low Limit and Negative Power Limit) for the delay time configured. Refer to Figure 12-95.

c) **Setting Current value:** Enter the current value which needs to be regulated by the Mi-BEAM. Ensure that the entered value is less than configured Neg. OCP. Refer to Figure 12-36.

d) **Connect the UUT to the Mi-BEAM**: Ensure all connections are secure and correctly aligned with the UUT port type.

e) **Output State:** Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 12-41.

f) **Start the Test:** Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) **Monitoring and Adjustments:** Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 12.2.3.

h) **End the Test:** Once the test is complete, safely disconnect the UUT from the Mi-BEAM and power down the Mi-BEAM if no further tests are required.

12.2 FRONT PANEL OPERATION

This chapter provides detailed information on the front panel operation in eLoad mode. Each menu of a screen could be selected by tapping its associated selection-field box through the touchscreen, or by selecting it with the rotary encoder. Refer to Figure 12-3.

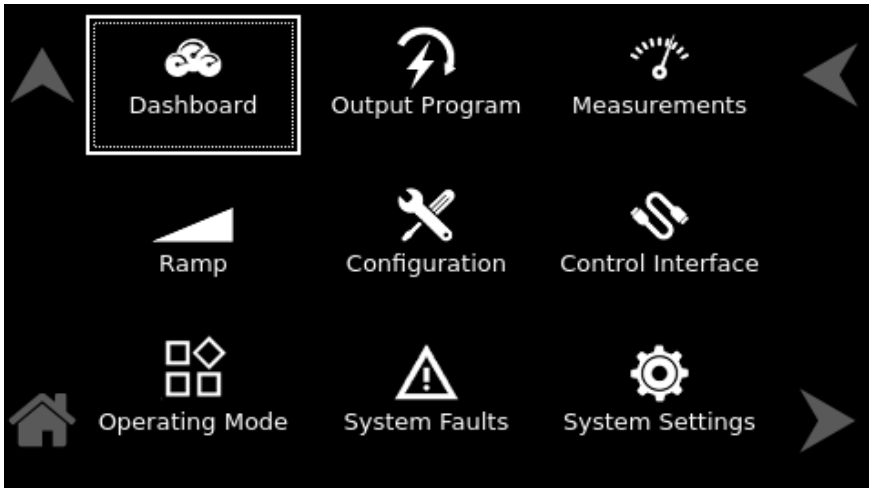


Figure 12-3. Home Screen Top-Level Menu

12.2.1 DASHBOARD SCREEN TOP-LEVEL MENU

The DASHBOARD screen top-level menu is used to change output parameters and simultaneously view output measurements. The most used output parameters are in the DASHBOARD screen menu. The DASHBOARD screen is the default menu that is displayed after power-on.

12.2.1.1 CONFIGURING PROGRAMMING TYPE AND REGULATION SETTINGS

The Regulation Settings Menu allows users to configure the ‘Prog. Type’ (Programming Type) and ‘Regulation Settings’ of the Mi-beam power supply. Refer to Figure 12-4 and Figure 12-5.

The ‘Reg. Setting’ function on the Dashboard Screen enables users to switch between ‘Voltage (CV/CC, CR/CV, CV/CP, CP/CV and CV)’ and ‘Current (CC/CV, CR/CC, CP/CC, CC/CP and CC) ’ Regulation settings. Refer to Figure 12-6 to Figure 12-16 and Table 12-11 to Table 12-16.

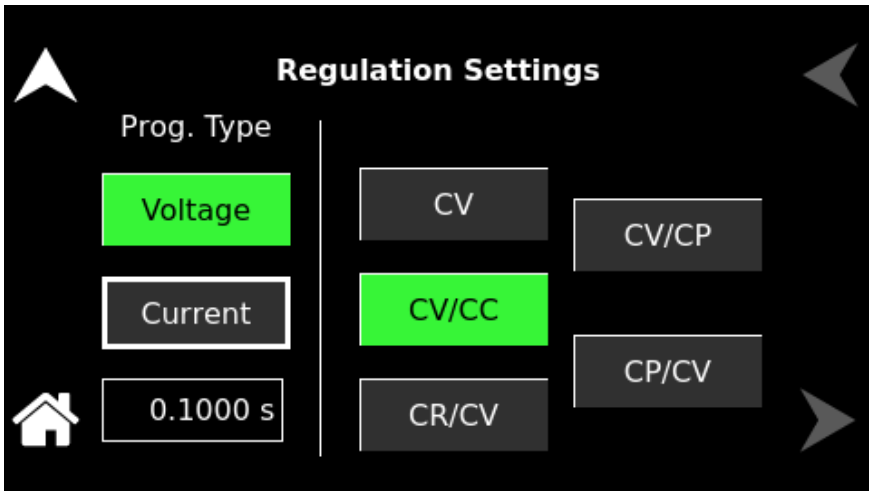


Figure 12-4. Regulation Settings – Voltage

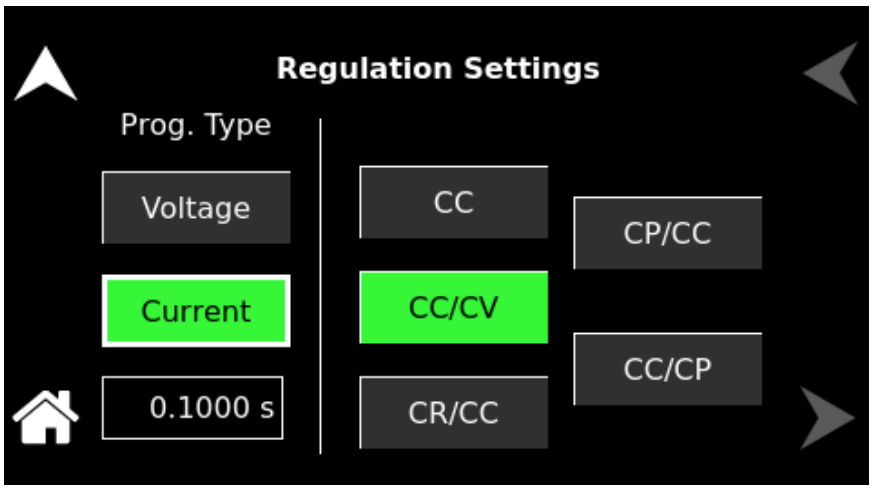


Figure 12-5. Regulation Settings – Current

12.2.1.2 VOLTAGE PROGRAMMING TYPE CV/CC AND CV REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) **Voltage - CV/CC** Regulation settings is shown in Figure 12-6,
b) **Voltage – CV/CP** Regulation settings is shown in Figure 12-7,
c) **Voltage - CV** Regulation settings is shown in Figure 12-8,

Refer to Section 9.4.2.2 for navigating to the Dashboard Screen.

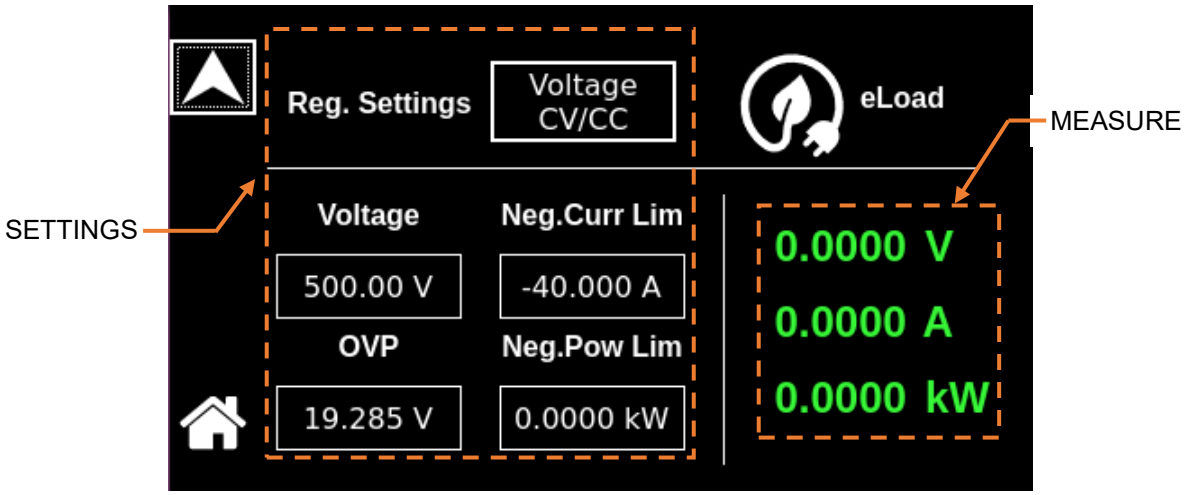


Figure 12-6. Dashboard Screen in Voltage CV/CC Regulation setting

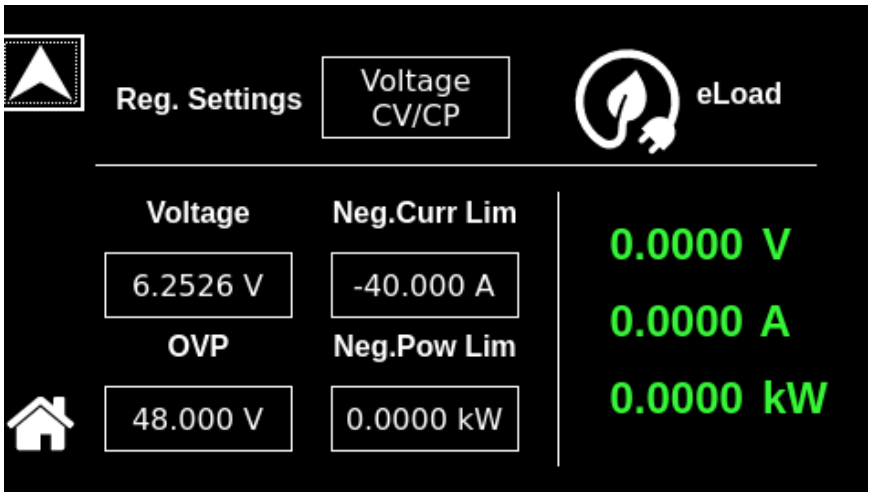


Figure 12-7. Dashboard Screen in Voltage CV/CP Regulation setting



Figure 12-8. Dashboard Screen in Voltage CV Regulation setting

The following selections are available in the DASHBOARD screen top-level menu of 'Voltage' Programming type 'CV/CC, CV/CP and CV' regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 12-92. **a) Voltage - Constant Voltage/Constant Current (CV/CC):** The output voltage is regulated to the user set value. On reaching the current limit (negative), output would be regulated to the current limit reached. On reaching the power limit (negative), the output voltage would be programmed to zero. **b) Voltage - Constant Voltage/Constant Power (CV/CP):** The output voltage is regulated to the user set value. On reaching the power limit (negative), output would be regulated to the power limit reached. On reaching the current limit (negative), the output voltage would be programmed to zero. **c) Voltage - Constant Voltage (CV):** The output voltage is regulated to the user set value. On reaching the set current limit (negative) or power limit (negative), the output voltage would be programmed to zero.
Voltage	Programs the output voltage of the power supply in volts. Real-time setting is possible using the rotary encoder. When the unit is in series operation (refer to Chapter 6), the Dashboard screen displays Voltage 1 and Voltage 2 for setting the output voltage of Leader and Follower. **NOTE:** CV is the only regulation setting available in Series operation.
Neg. Curr Lim	In CV and CV/CP regulation setting, this functions as a trip limit. In CV/CC regulation setting, on reaching this set value the output would be regulated to the Neg. Curr Lim. Real-time setting is possible using the rotary encoder.
Neg. Pow Lim	In CV and CV/CC regulation setting, this functions as a trip limit. In CV/CP regulation setting, on reaching this set value the output would be regulated to the Neg. Pow Lim. Real-time setting is possible using the rotary encoder.
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 12-11. Dashboard screen top-level menu Voltage CV/CC, CV/CP and CV

12.2.1.3 VOLTAGE PROGRAMMING TYPE CR/CV REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) Voltage – CR/CV is shown in Figure 12-9,

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

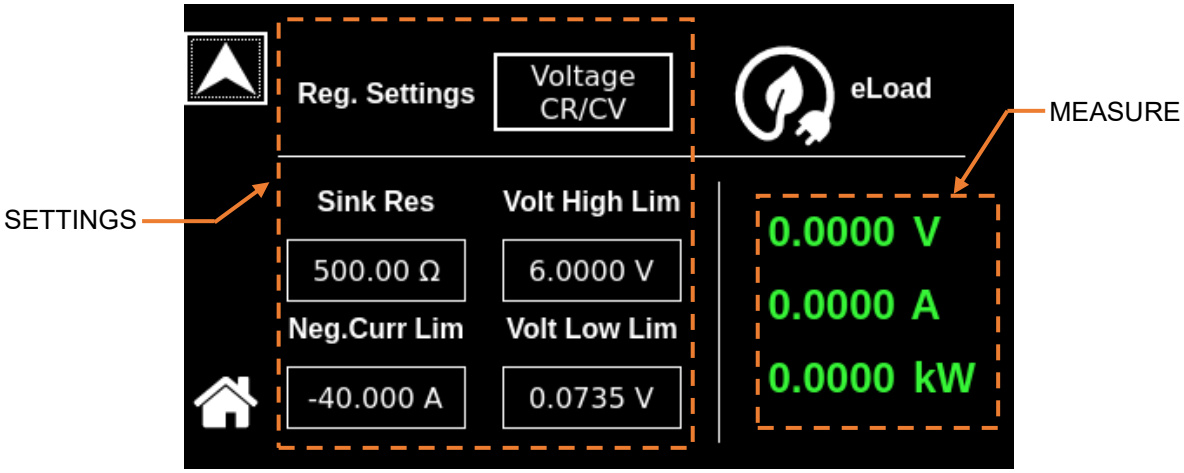


Figure 12-9. Dashboard Screen in CR/CV Regulation setting

The following selections are available in the DASHBOARD screen top-level menu of 'Voltage' Programming type 'CR/CV' Regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 12-92. **a) Voltage - Constant Resistance/ Constant Voltage:** The output resistance is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the current limit (negative), the output voltage would be programmed to zero.
Sink. Res	Programs the sink resistance in ohms. Real-time setting is possible using the rotary encoder.
Volt High Lim	Regulates the output upon reaching the Volt High Lim. Real-time setting is possible using the rotary encoder.
Volt Low Lim	Regulates the output upon reaching the Volt Low Lim. Real-time setting is possible using the rotary encoder.
Neg. Curr Lim	Programs the output negative current limit in amps and this setting functions as a trip limit. Real-time setting is possible using the rotary encoder.
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 12-12. Dashboard screen top-level menu- CR/CV Mode

12.2.1.4 VOLTAGE PROGRAMMING TYPE CP/CV REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) Voltage - CP/CV is shown in Figure 12-10,

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

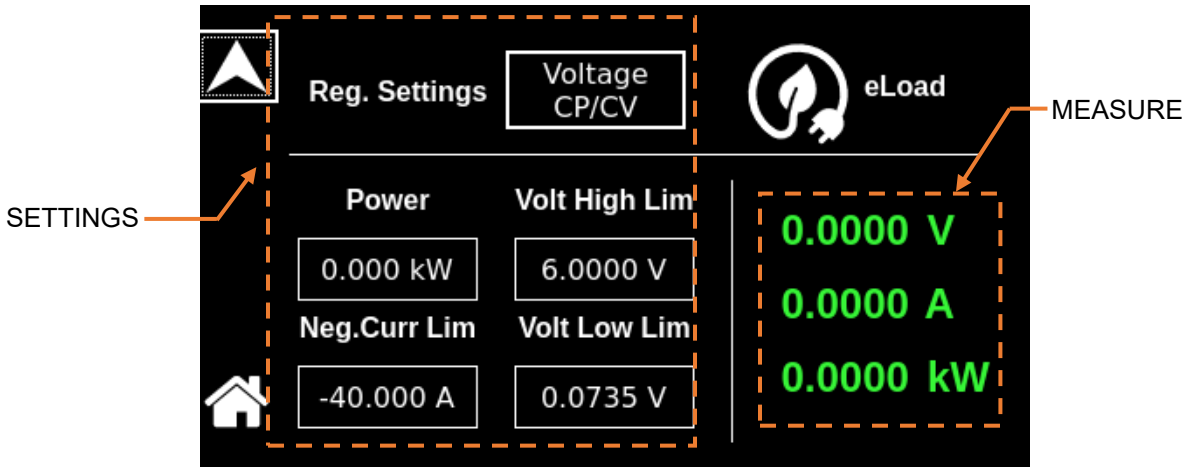


Figure 12-10. Dashboard Screen in Voltage CP/CV Regulation setting

The following selections are available in the DASHBOARD screen top-level menu of 'Voltage' Programming type 'CP/CV' regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 12-92. **a) Voltage - Constant Power/Constant Voltage (CP/CV):** The output power is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the current limit (negative), the output power would be programmed to zero.
Power	Programs the output power of the supply in watts. Real-time setting is possible using the rotary encoder.
Neg. Curr Lim	Programs the output negative current limit in amps and this setting functions as a trip limit. Real-time setting is possible using the rotary encoder.
Volt High Lim	Regulates the output upon reaching the Volt High Lim. Real-time setting is possible using the rotary encoder.
Volt Low Lim	Regulates the output upon reaching the Volt Low Lim. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 12-13. Dashboard screen top-level menu Voltage CP/CV

12.2.1.5 CURRENT PROGRAMMING TYPE CC/CV, CC/CP AND CC REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) **Current - CC/CV** Regulation setting is shown in Figure 12-11,
b) **Current – CC/CP** Regulation setting is shown in Figure 12-12,
c) **Current - CC** Regulation setting is shown in Figure 12-13,

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

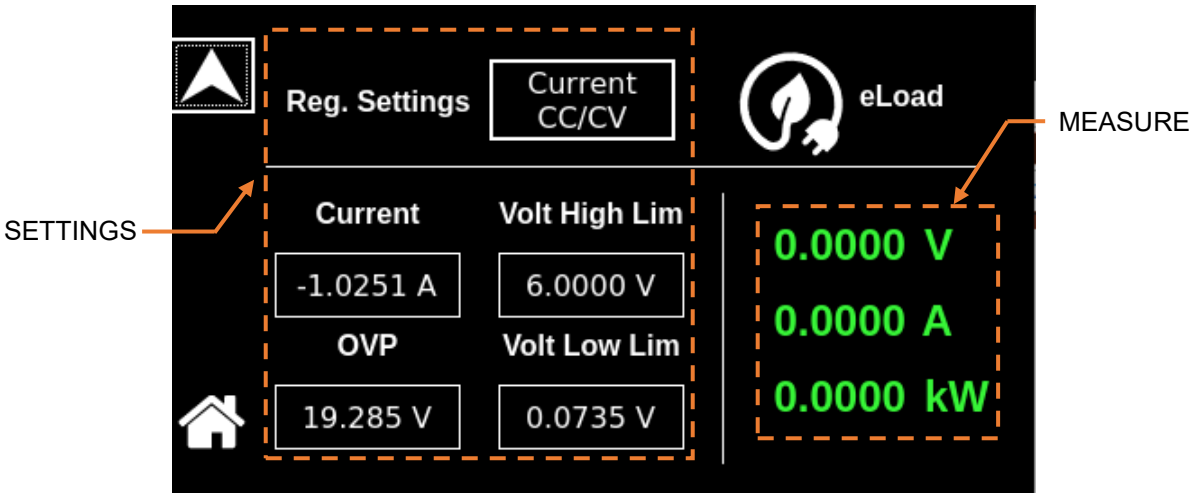


Figure 12-11. Dashboard Screen in Current CC/CV Regulation setting

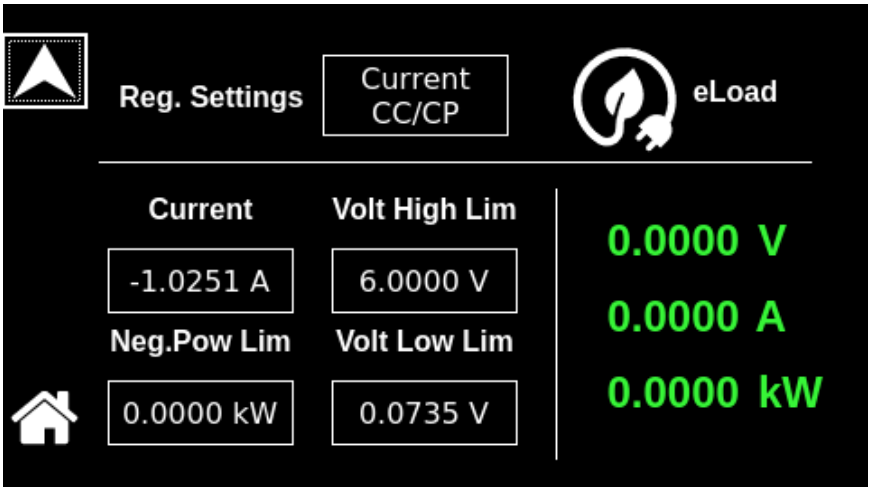


Figure 12-12. Dashboard Screen in Current CC/CP Regulation setting

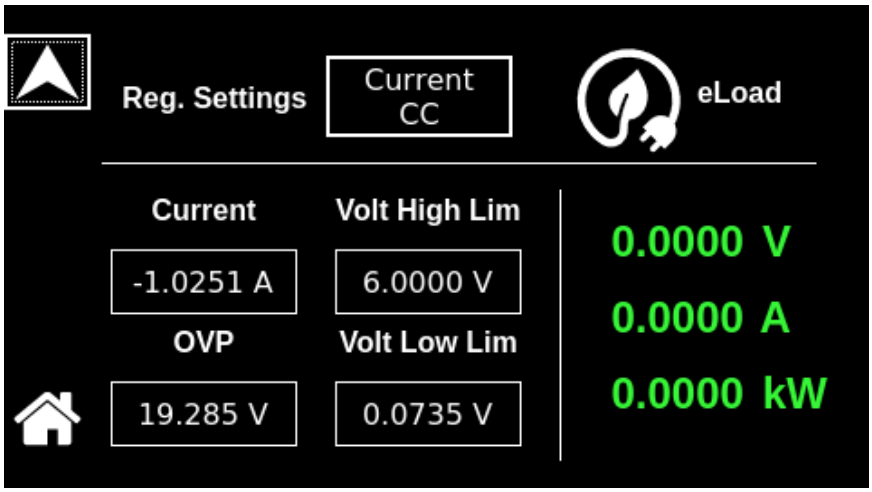


Figure 12-13. Dashboard Screen in Current CC Regulation setting

The following selections are available in the DASHBOARD screen top-level menu of 'Current' Programming type 'CC/CV, CC/CP and CC' regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 12-94. **a) Current - Constant Current/Constant Voltage (CC/CV):** The output current is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the power limit (negative), the output current would be programmed to zero. **b) Current - Constant Current/Constant Power (CC/CP):** The output current is regulated to the user set value. On reaching the power limit (negative), output would be regulated to the power limit reached. On reaching the voltage limit (high or low), the output current would be programmed to zero. **c) Current - Constant Current (CC):** The output current is regulated to the user set value. On reaching the set voltage limit (high or low) or power limit (negative), the output current would be programmed to zero.
Current	Programs the output current in amps. Real-time setting is possible using the rotary encoder.
Volt High Lim	In CC and CC/CP Regulation Setting, this functions as a trip limit. In CC/CV Regulation Setting, it regulates the output upon reaching the Volt High Lim. Real-time setting is possible using the rotary encoder.
Volt Low Lim	In CC and CC/CP Regulation Setting, this functions as a trip limit. In CC/CV Regulation Setting, it regulates the output upon reaching the Volt Low Lim. Real-time setting is possible using the rotary encoder.
Neg. Pow Limit	In CC and CC/CV Regulation Setting, this functions as a trip limit.

SETTINGS	DESCRIPTION
	In CC/CP Regulation Setting, it regulates the output upon reaching the Neg. Pow Limit. Real-time setting is possible using the rotary encoder.
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 12-14. Dashboard screen top-level menu – CC/CV, CC/CP and CC

12.2.1.6 CURRENT PROGRAMMING TYPE CP/CC REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) Current - CP/CC Regulation setting is shown in Figure 12-14,

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

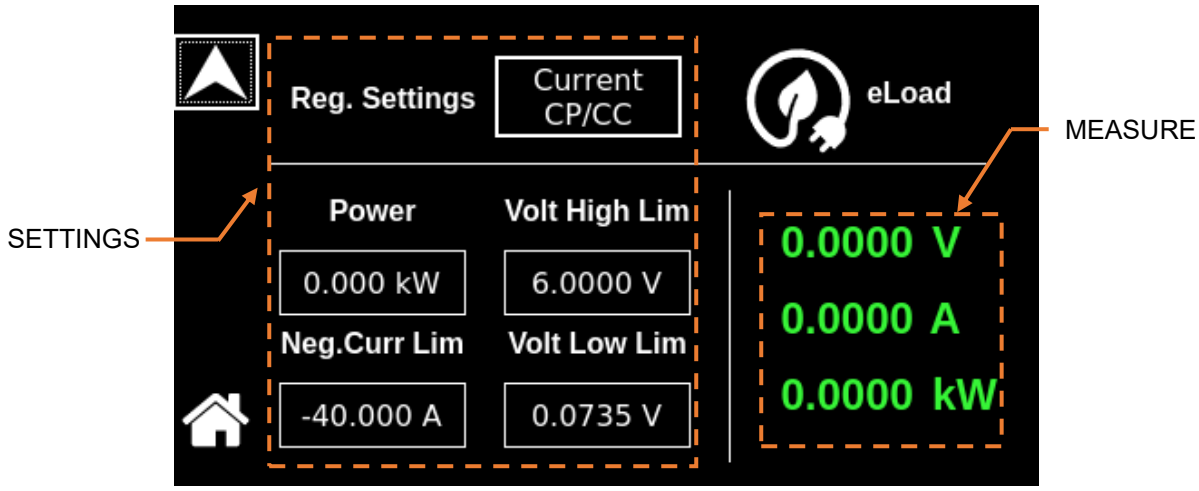


Figure 12-14. Dashboard Screen in Current CP/CC Regulation setting

The following selections are available in the DASHBOARD screen top-level menu of 'Current' Programming type 'CP/CC' regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 12-94. **a) Current - Constant Power/Constant Current (CP/CC):** The output power is regulated to the user set value. On reaching the current limit (negative), output would be regulated to the current limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero.

SETTINGS	DESCRIPTION
Power	Programs the output power of the supply in watts. Real-time setting is possible using the rotary encoder.
Neg. Curr Lim	Programs the output negative current limit in amps, and upon reaching this set value the output would be regulated to the Neg. Curr Lim. Real-time setting is possible using the rotary encoder.
Volt High Lim	Programs the volt high limit and this setting functions as a trip limit. Real-time setting is possible using the rotary encoder.
Volt Low Lim	Programs the volt low limit and this setting functions as a trip limit. Real-time setting is possible using the rotary encoder.
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 12-15. Dashboard screen top-level menu – CP/CC

12.2.1.7 VOLTAGE PROGRAMMING TYPE CR/CC REGULATION SETTING

The top-level menu of the DASHBOARD screen for:

a) Voltage – CR/CC is shown in Figure 12-15,

Refer to Section 9.4.2.2 for navigating to Dashboard Screen.

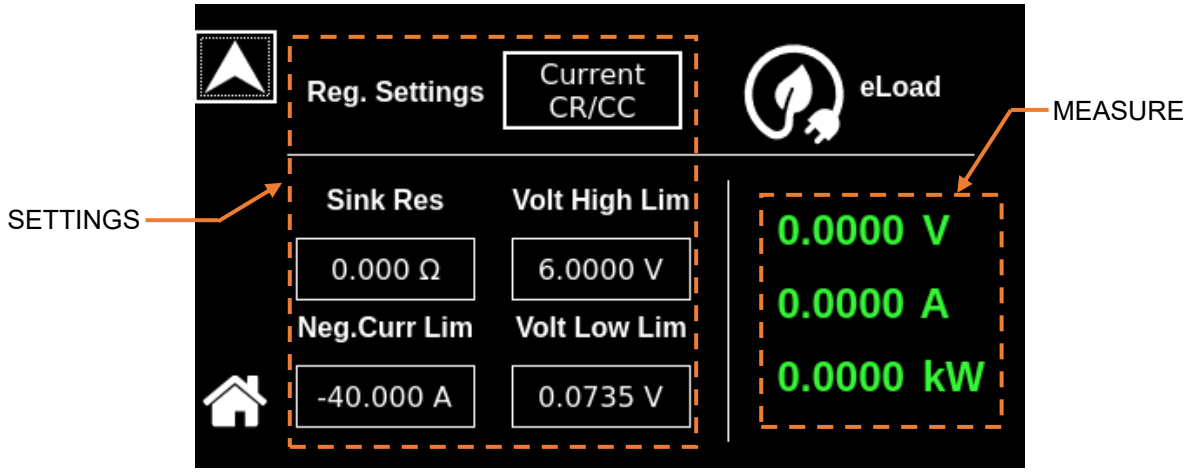


Figure 12-15. Dashboard Screen in CR/CV Regulation setting

The following selections are available in the DASHBOARD screen top-level menu of 'Voltage' Programming type 'CR/CC' Regulation settings:

SETTINGS	DESCRIPTION
Reg. Settings	Sets the Programming type and Regulation setting of the supply. Refer to Figure 12-94.

SETTINGS	DESCRIPTION
	a) **Voltage - Constant Resistance/ Constant Current:** The output resistance is regulated to the user set value. On reaching the current limit (negative), output would be regulated to the current limit reached. On reaching the voltage limit (high or low), the output current would be programmed to zero.
Sink. Res	Programs the sink resistance in ohms. Real-time setting is possible using the rotary encoder.
Volt High Lim	Programs the volt high limit and this setting functions as a trip limit. Real-time setting is possible using the rotary encoder.
Volt Low Lim	Programs the volt low limit and this setting functions as a trip limit. Real-time setting is possible using the rotary encoder.
Neg. Curr Lim	Programs the output negative current limit in amps and regulates upon reaching Neg. Current Lim. Real-time setting is possible using the rotary encoder.
OVP	Programs the overvoltage protection trip point in volts. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.

Table 12-16. Dashboard screen top-level menu- CR/CC Mode

12.2.1.8 REAL-TIME PARAMETER ADJUSTMENT

The DASHBOARD screen menu provides the capability for output parameter entry that has real-time, immediate effect on the output. This allows manual adjustment of the output parameters where tuning of a value is desired. Enabling this function requires clicking on a parameter selection-field box with the encoder switch to select the parameter and display its selection-field highlighted and with a value entry window, refer to Figure 12-16. The rotary encoder could then be used to continuously adjust the parameter value, up and down, as it is rotated. The value change takes immediate effect at the output.



Figure 12-16. Real-Time, Immediate Output Parameter Adjustment

12.2.1.9 DEFAULT SCREEN

The Default screen provides measurement of the DC output ‘Voltage’, ‘Current’ and ‘Power’, refer to Figure 12-17. When the Dashboard screen is idle for an interval equal to a set time delay, refer to Figure 12-231 and Figure 12-232. The display will automatically switch to the Default screen. Tap anywhere on the screen to return to the Dashboard screen.

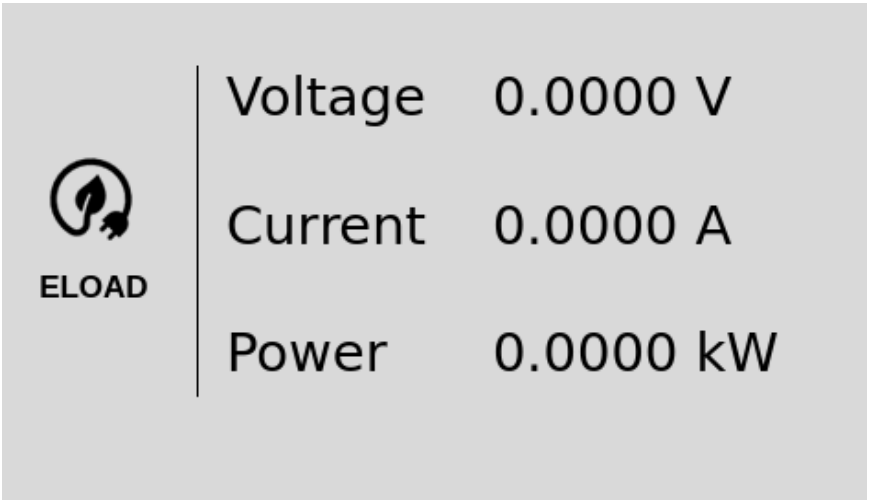


Figure 12-17. Default Screen

With the understanding of the dashboard screen features, user can perform basic functionality and verify the output voltage, current and power in various modes of operation.

12.2.2 OUTPUT PROGRAM SCREEN

The settings in the output program screen will change based on the Programming type and Regulation setting configured. Refer to Section 9.4.2.2 for navigating to Output Program Screen Top-Level Menu.

12.2.2.1 CV/CC, CV/CP AND CV MODE

The Output Program screen provides settings of ‘Voltage’, ‘Negative Current Limit’, ‘Negative Power Limit’, and ‘Output State’. Refer to Figure 12-18.

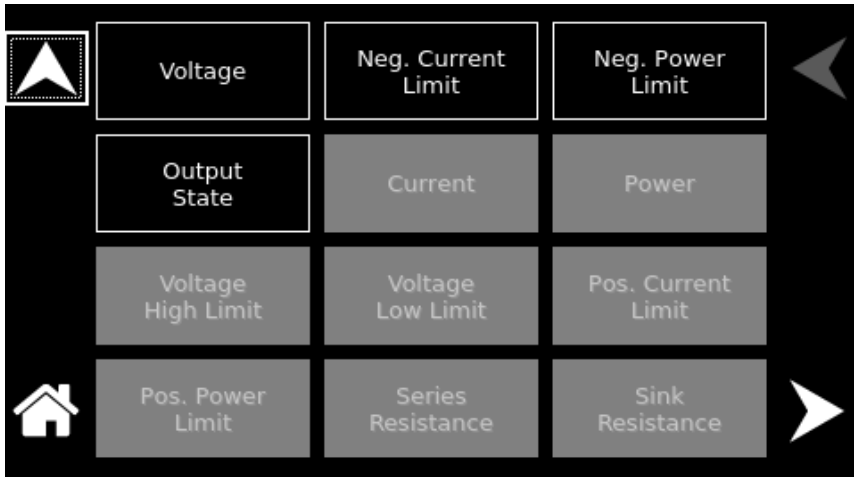


Figure 12-18. Output Program Screen of CV/CC and CV mode

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in CV/CC, CV/CP and CV mode includes the following functions:

ENTRY	DESCRIPTION
Voltage	Users can set a Voltage value within the specified limit. Refer to Figure 12-19.

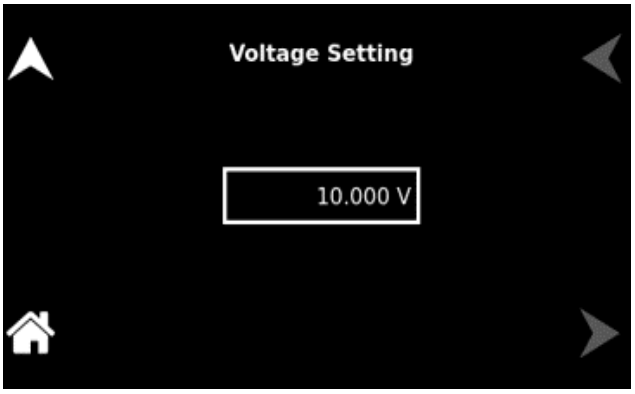


Figure 12-19. Voltage setting screen

NOTE: When the unit is in series operation (refer to Chapter 6), the Dashboard screen displays Voltage 1 and Voltage 2 for setting the output voltage of Leader and Follower.

NOTE: Voltage - CV is the only regulation setting in Series operation.

Neg. Current Limit	Users can set a negative current limit value, which functions as trip limit (CV and CV/CP), or it regulates (CV/CC) the output upon reaching the Neg. Current Limit. Refer to Figure 12-20.

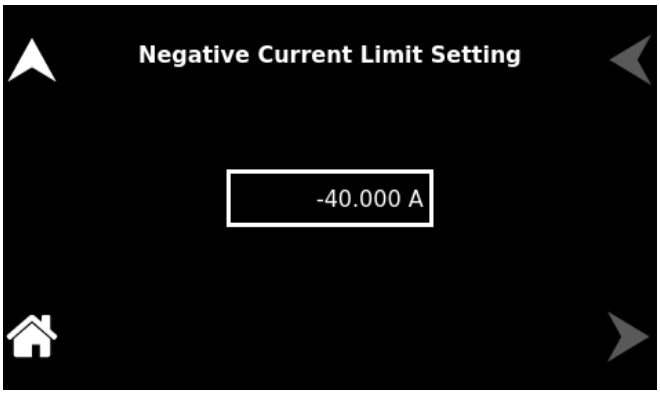


Figure 12-20. Negative Current limit setting screen

ENTRY	DESCRIPTION
Neg. Power Limit	Users can set a negative power limit value, which functions as trip limit (CV and CV/CC), or it regulates (CV/CP) the output upon reaching the Neg. Power Limit. Refer to Figure 12-21.

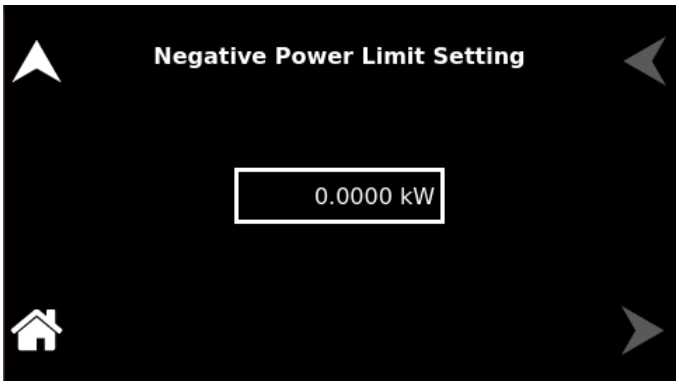


Figure 12-21. Negative Power limit setting screen

Output State	Users can program the output to ON or OFF state. Refer to Figure 12-22.

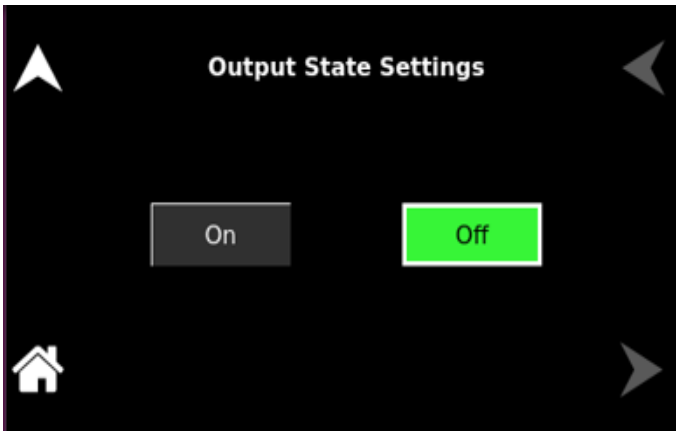


Figure 12-22. Output State Settings

Table 12-17. Output Program Settings in CV/CC and CV Mode

12.2.2.2 CP/CV MODE

The Output Program screen provides settings of ‘Power’, ‘Voltage High Limit’, ‘Voltage Low Limit’, ‘Negative Current Limit’, and ‘Output State’. Refer to Figure 12-23.

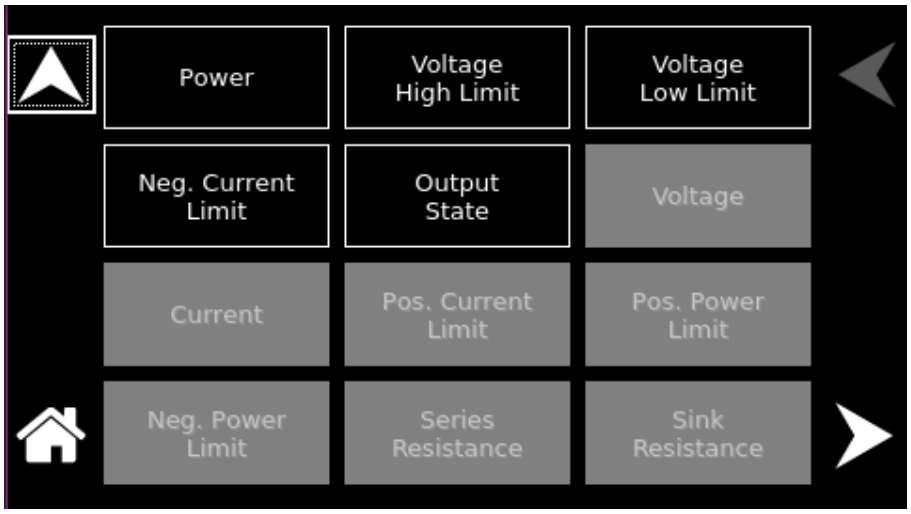


Figure 12-23. Output Program Screen of CP/CV mode

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in CP/CV mode includes the following functions:

ENTRY	DESCRIPTION
Power	Users can set a power value within the specified limit. Refer to Figure 12-24.

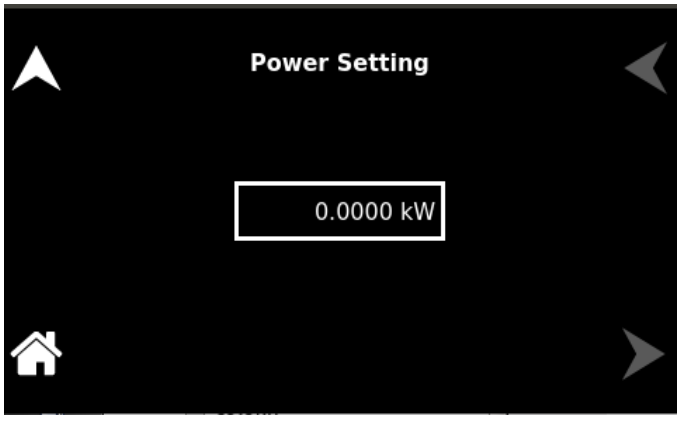


Figure 12-24. Power Setting

Voltage High Limit	Users can set the voltage high limit value, and it regulates the output upon reaching the Voltage High Limit. Refer to Figure 12-25.

ENTRY	DESCRIPTION

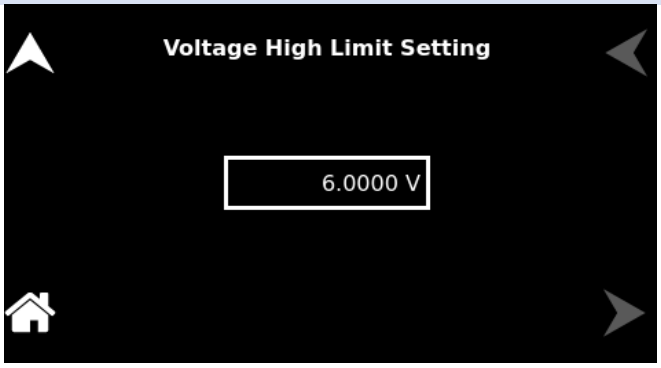


Figure 12-25. Volt High Limit Setting

Voltage Low Limit

Users can set the voltage low limit value, and it regulates the output upon reaching the Voltage Low Limit. Refer to Figure 12-26.

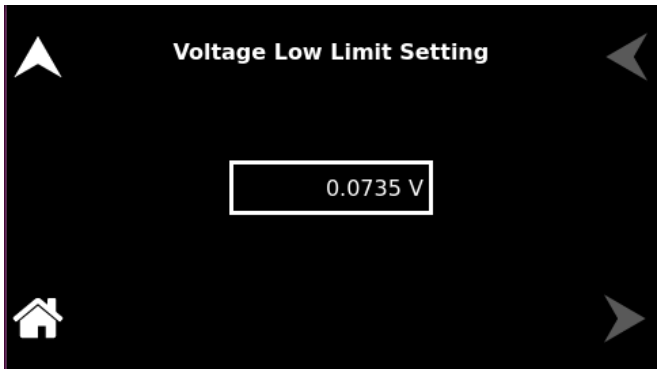


Figure 12-26. Volt Low Limit Setting

Neg. Current Limit

Users can set a negative current limit value, and which functions as a trip limit. Refer to Figure 12-27.

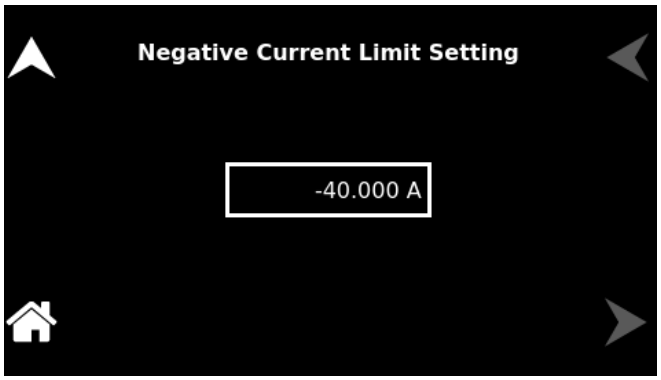


Figure 12-27. Negative Current Limit Setting

Output State

Users can program the output to ON or OFF state. Refer to Figure 12-28.

ENTRY	DESCRIPTION

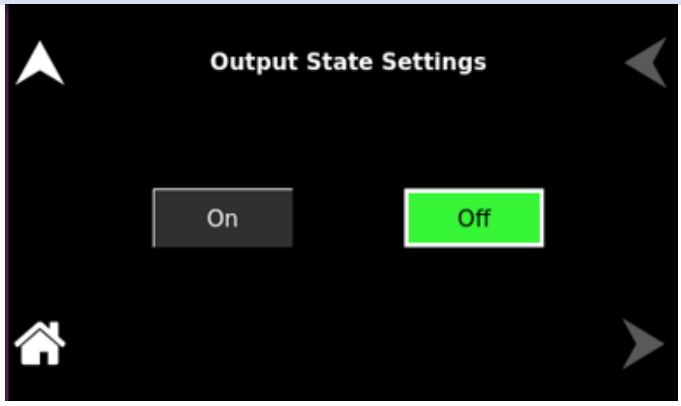


Figure 12-28. Output State

Table 12-18. Output Program Settings in CP/CV

12.2.2.3 CR/CV MODE

The Output Program screen provides settings of ‘Sink Resistance’, ‘Voltage High Limit’, ‘Voltage Low Limit’, ‘Negative Current Limit’, and ‘Output State’. Refer to Figure 12-29.

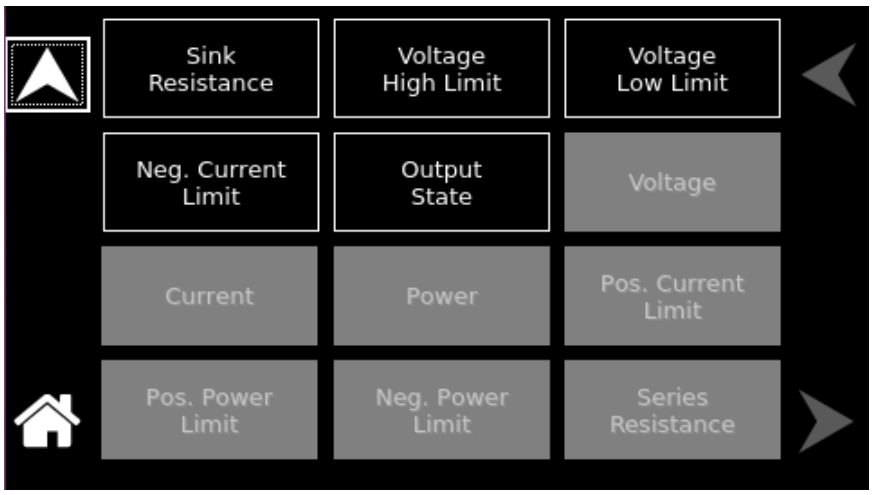


Figure 12-29. Output Program Screen of CV Ser. Res mode

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in CR/CV mode includes the following functions:

ENTRY	DESCRIPTION
Sink Resistance	Users can set the sink resistance value within the specified limit. Refer to Figure 12-30.

ENTRY	DESCRIPTION

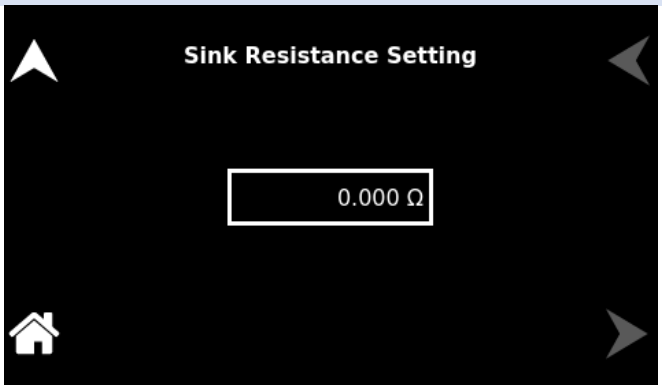


Figure 12-30. Series Resistance Setting

Voltage High Limit Users can set the voltage high limit value, and it regulates the output upon reaching the Voltage High Limit. Refer to Figure 12-31.

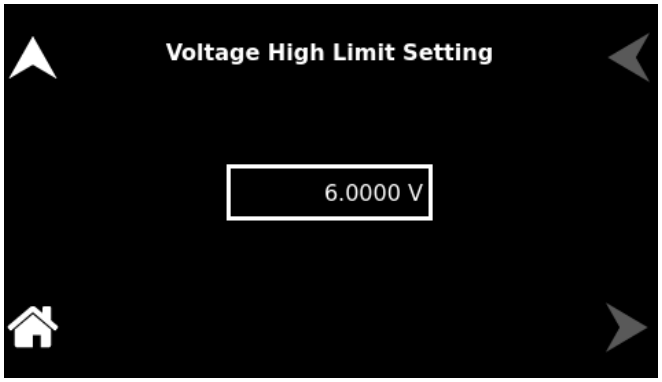


Figure 12-31. Voltage High Limit Setting

Voltage Low Limit Users can set the voltage low limit value, and it regulates the output upon reaching the Voltage Low Limit. Refer to Figure 12-32.

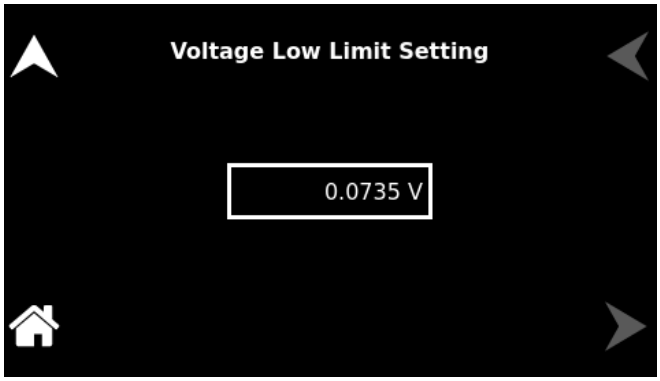


Figure 12-32. Voltage Low Limit Setting

Neg. Current Limit Users can set a negative current limit value, and which functions as a trip limit. Refer to Figure 12-33.

ENTRY	DESCRIPTION

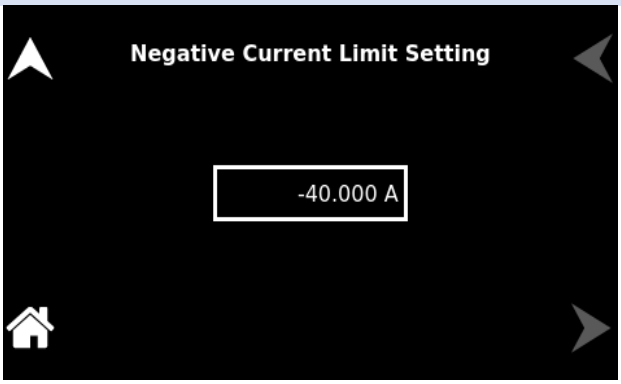


Figure 12-33. Negative Current limit setting screen

Output State Users can program the output to ON or OFF state. Refer to Figure 12-34.

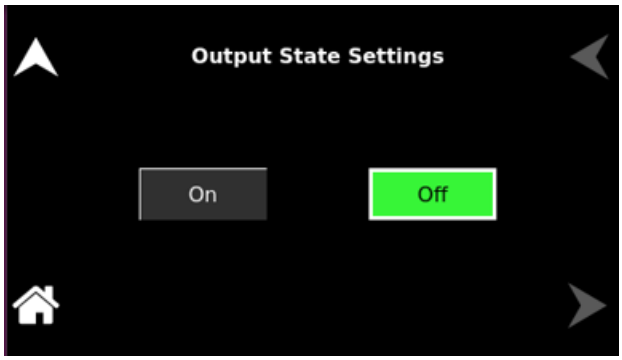


Figure 12-34. Output State

Table 12-19. Output Program Settings in CR/CV Mode

12.2.2.4 CC/CV, CC/CP AND CC MODE

The Output Program screen provides settings of ‘Current’, ‘Voltage High Limit’, ‘Voltage Low Limit’, ‘Negative Power Limit’, and ‘Output State’. Refer to Figure 12-35.

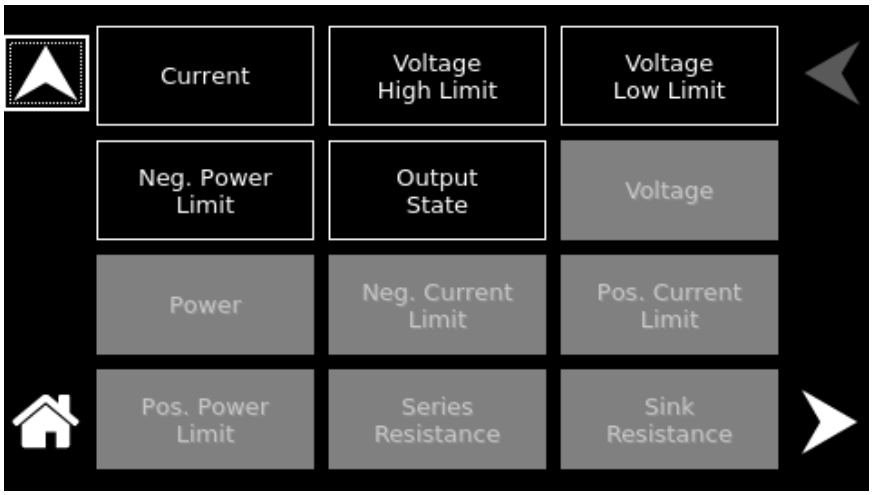


Figure 12-35. Output Program Screen of CC/CV, CC/CP and CC mode

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in CC/CV, CC/CP and CC mode includes the following functions:

ENTRY	DESCRIPTION
Current	Users can set the Current value within the specified limit. Refer to Figure 12-36.

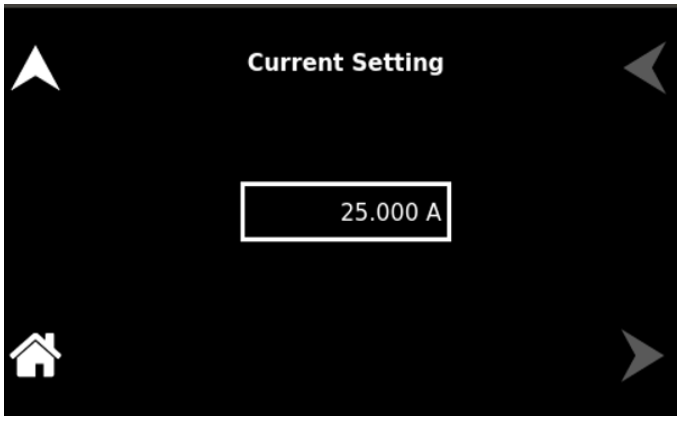


Figure 12-36. Current Setting

Voltage High Limit	Users can set a voltage high limit value, which functions as trip limit (CC and CC/CP), or it regulates (CC/CV) the output upon reaching the Voltage High Limit. Refer to Figure 12-37.

ENTRY	DESCRIPTION

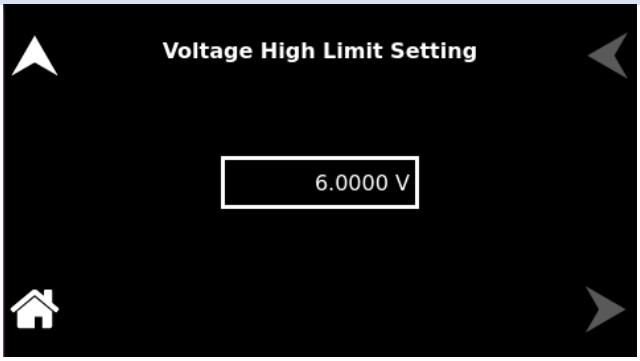


Figure 12-37. Voltage High Setting

Voltage Low Limit Users can set a voltage low limit value, which functions as trip limit (CC and CC/CP), or it regulates (CC/CV) the output upon reaching the Voltage Low Limit. Refer to Figure 12-38.

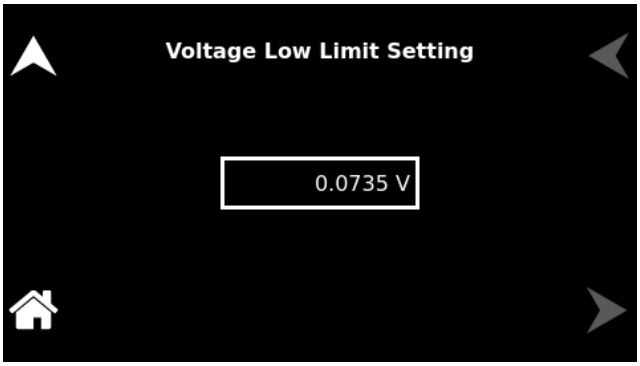


Figure 12-38. Voltage Low Setting

Neg. Power Limit Users can set a negative power limit value, which functions as a trip limit (CC and CC/CV), or it regulates (CC/CP) the output upon reaching the Neg. Power Limit. Refer to Figure 12-39.

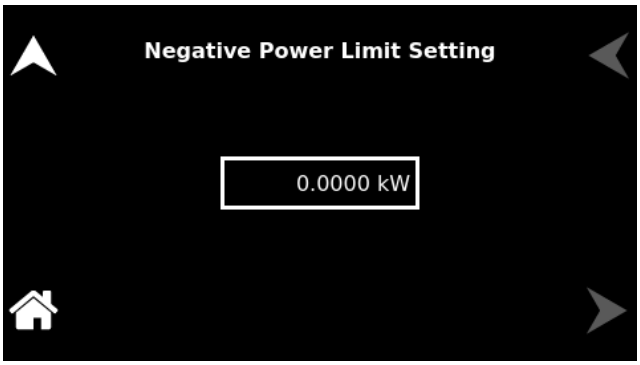


Figure 12-39. Negative Power Limit

ENTRY	DESCRIPTION
Output State	Users can program the output to ON or OFF state. Refer to Figure 12-40.

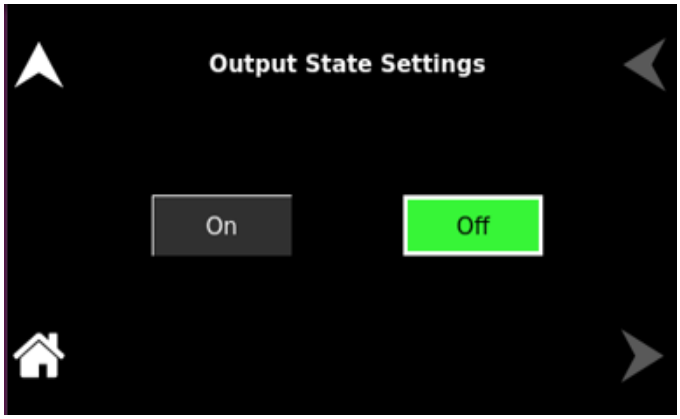


Figure 12-40. Output State Settings

Table 12-20. Output Program Settings in CC/CV, CC/CP and CC mode

12.2.2.5 CP/CC MODE

The Output Program screen provides settings of ‘Power’, ‘Voltage High Limit’, ‘Voltage Low Limit’, ‘Negative Current Limit’, and ‘Output State’. Refer to Figure 12-41.

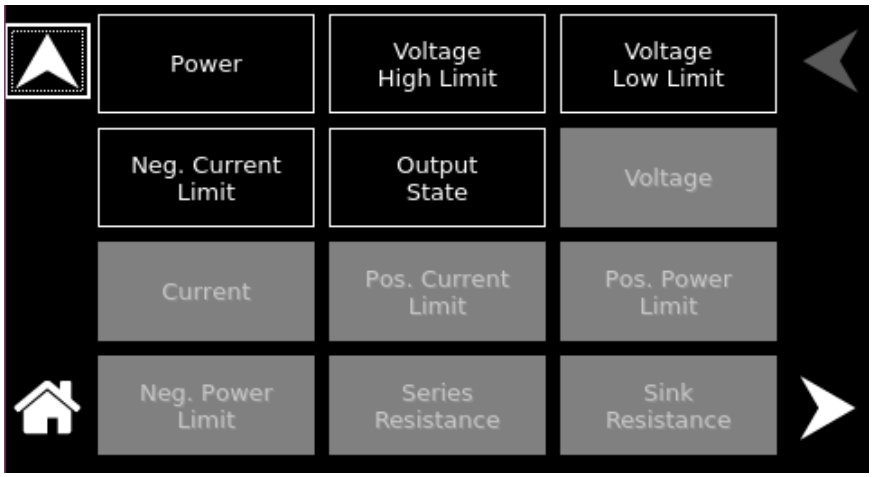


Figure 12-41. Output State Settings in CP/CC

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in ‘CP/CC’ mode includes the following functions:

ENTRY	DESCRIPTION
Power	Users can set a power value within the specified limit. Refer to Figure 12-42.

ENTRY	DESCRIPTION

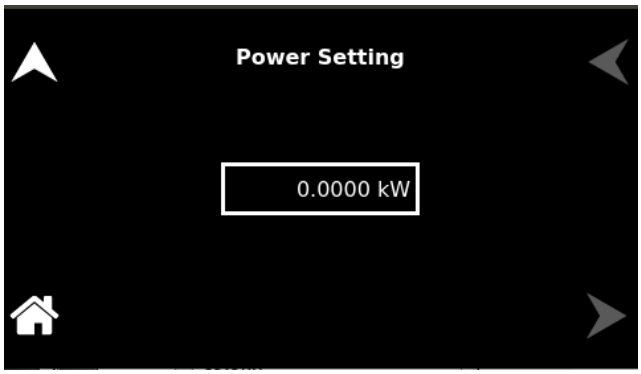


Figure 12-42. Power Settings

Voltage High Limit

Users can set a voltage high limit value, and which functions as a trip limit. Refer to Figure 12-43.

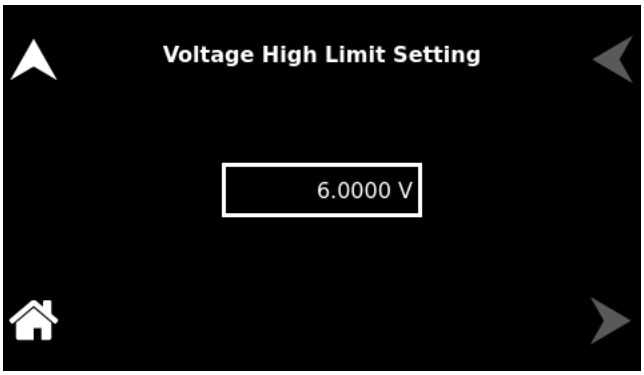


Figure 12-43. Voltage High Limit Setting

Voltage Low Limit

Users can set a voltage low limit value, and which functions as a trip limit. Refer to Figure 12-44.

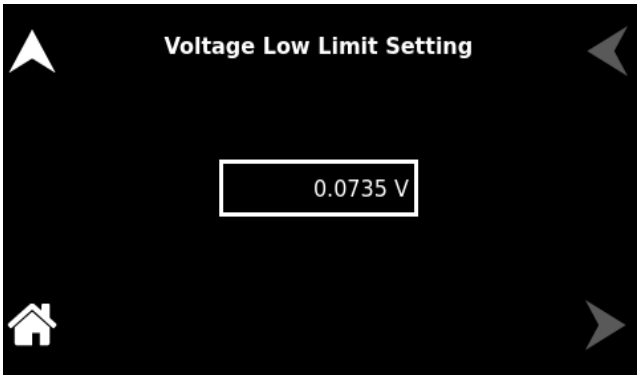


Figure 12-44. Voltage Low Limit Setting

Neg. Current

Users can set a negative current limit value, and it regulates the output upon reaching the Neg. Current Limit. Refer to Figure 12-45.

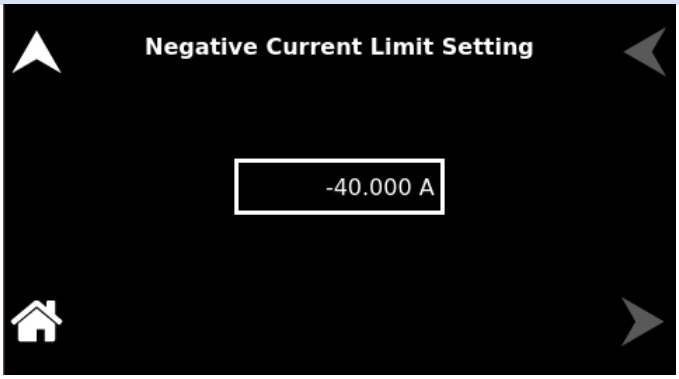
ENTRY	DESCRIPTION
Limit	

Figure 12-45. Negative Current Limit Setting

Output State	Users can program the output to ON or OFF state. Refer to Figure 12-46.

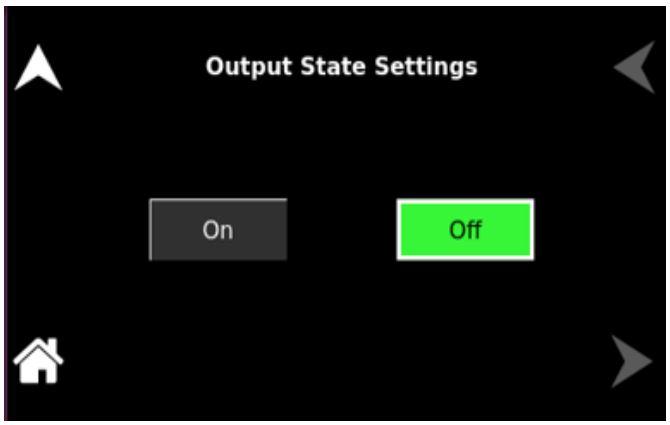


Figure 12-46. Output State

Table 12-21. Output Program Settings CP/CC mode

12.2.2.6 CR/CC MODE

The Output Program screen provides settings of ‘Sink Resistance’, ‘Voltage High Limit’, ‘Voltage Low Limit’, ‘Negative Current Limit’, and ‘Output State’. Refer to Figure 12-47.

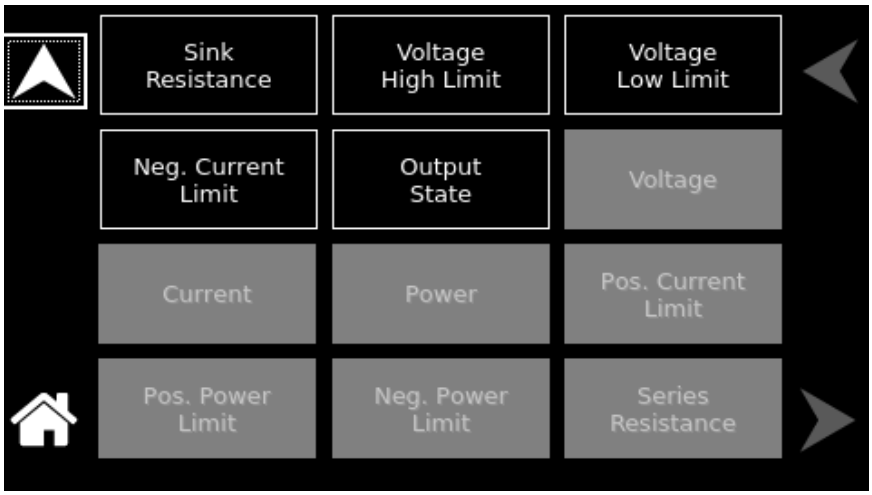


Figure 12-47. Output Program Screen of CR/CC mode

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen in 'CR/CC' mode includes the following functions:

ENTRY	DESCRIPTION
Sink Resistance	Users can set the sink resistance value within the specified limit. Refer to Figure 12-48.

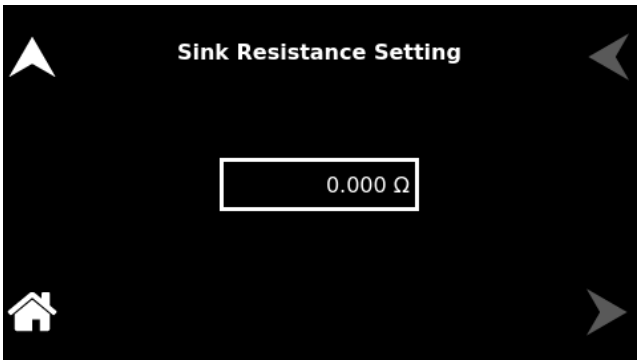
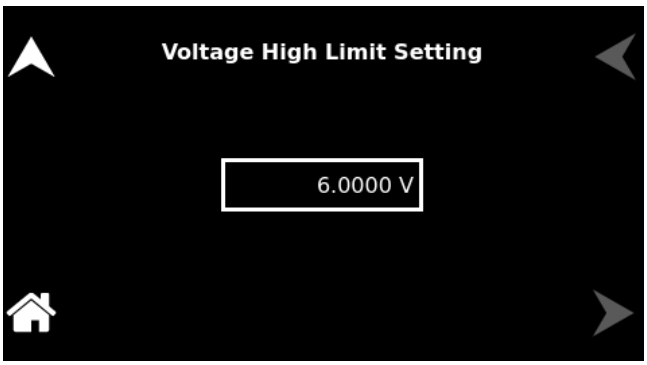


Figure 12-48. Series Resistance Setting

Voltage High Limit	Users can set the voltage high limit value within the specified limit and which functions as a trip limit. Refer to Figure 12-49.



ENTRY	DESCRIPTION

Figure 12-49. Voltage High Limit Setting

Voltage Low Limit

Users can set the voltage low limit value within the specified limit and which functions as a trip limit. Refer to Figure 12-50.

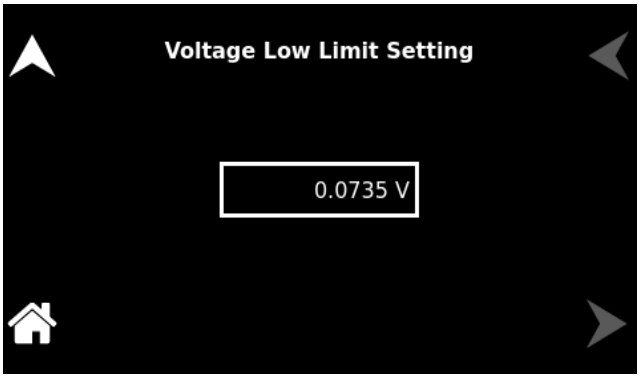


Figure 12-50. Voltage Low Limit Setting

Neg. Current Limit

Users can set a negative current limit value, and it regulates the output upon reaching the Neg. Current Limit. Refer to Figure 12-51.

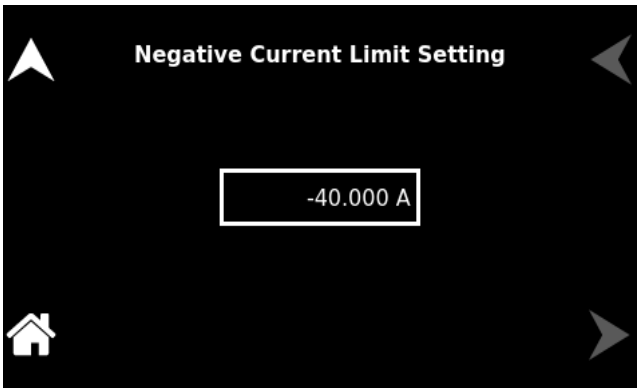
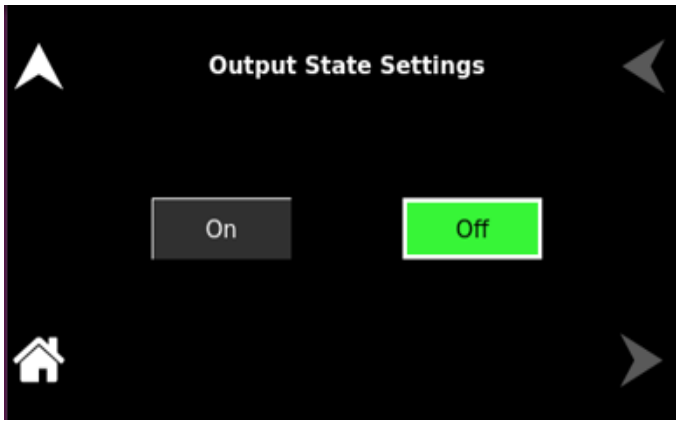


Figure 12-51. Negative Current limit setting screen

Output State

Users can program the output to ON or OFF state. Refer to Figure 12-52.



ENTRY	DESCRIPTION

Figure 12-52. Output State

Table 12-22. Output Program Settings in CR/CC Mode

12.2.3 MEASUREMENTS SCREEN

The Measurements screen displays the floating-point values for DC Output ‘Voltage’, Output ‘Current’, and Output ‘Power’. For the Measurement screen, refer to Figure 12-53 and for instructions on how to navigate to the Measurements screen, refer to Section 9.4.2.2.

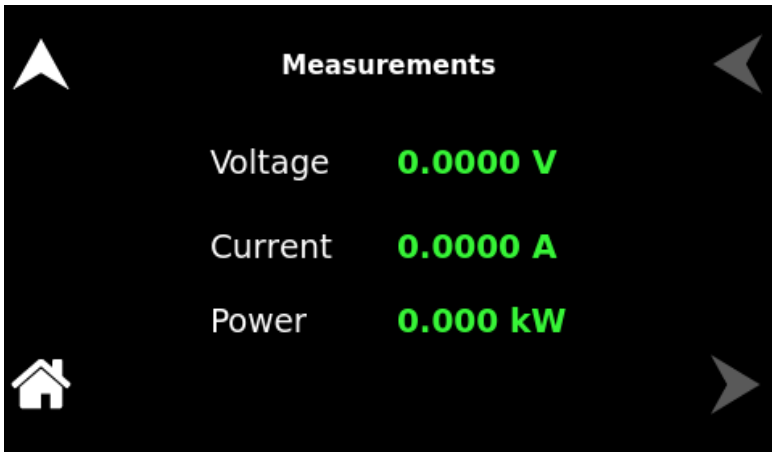


Figure 12-53. Measurements Screen

12.2.4 RAMP SCREEN

The Ramp Screen provides the interface based on the programming type and regulation setting configured (from configuration screen, refer to Section 12.2.5.1). The Ramp screen will be displayed according to the programming type configured, ‘Voltage Ramp’ screen for ‘Voltage’ programming type and ‘Current Ramp’ screen for ‘Current’ programming type.

12.2.4.1 VOLTAGE RAMP – CV/CC, CV/CP, CR/CV AND CV

The Voltage Ramp menu allows the user to configure and execute voltage ramp, refer to Figure 12-54. The Voltage Ramp menu allows the selection of parameters such as ‘From Volt’, ‘To Volt’, ‘Time’, ‘Set Limits’, ‘Trigger’ and ‘Initial Slew’.

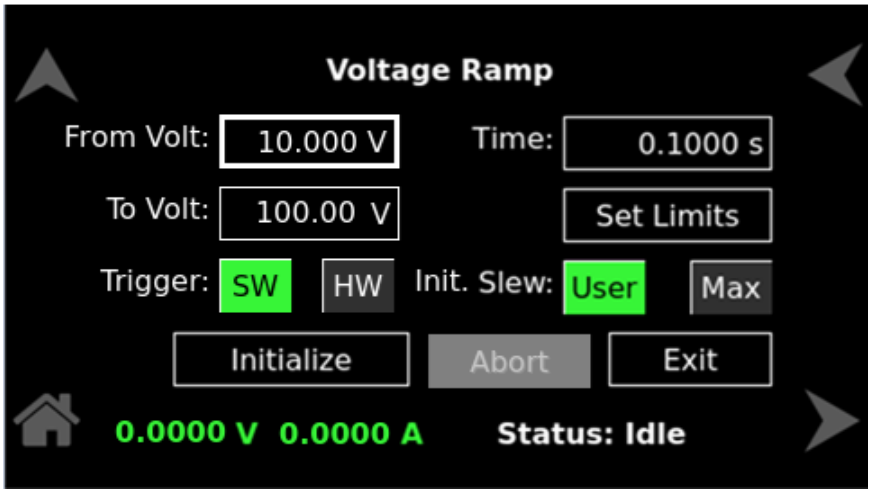


Figure 12-54. Voltage Ramp Screen

The Voltage Ramp menu has the following fields:

ENTRY	DESCRIPTION
From Volt	Sets the start voltage for the ramp. Refer to Figure 12-55.

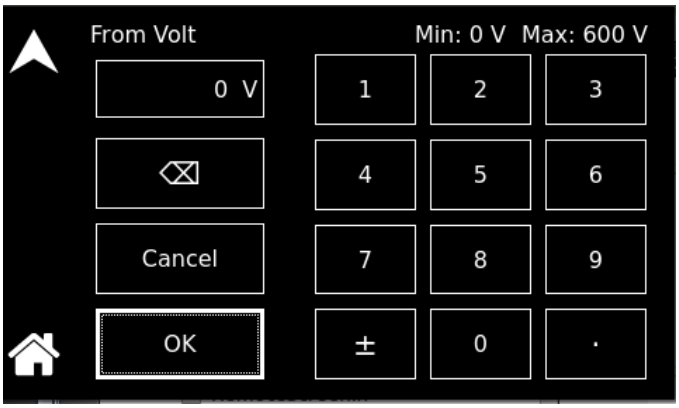


Figure 12-55. From Voltage

To Volt	Sets the end voltage for the ramp. Refer to Figure 12-56.

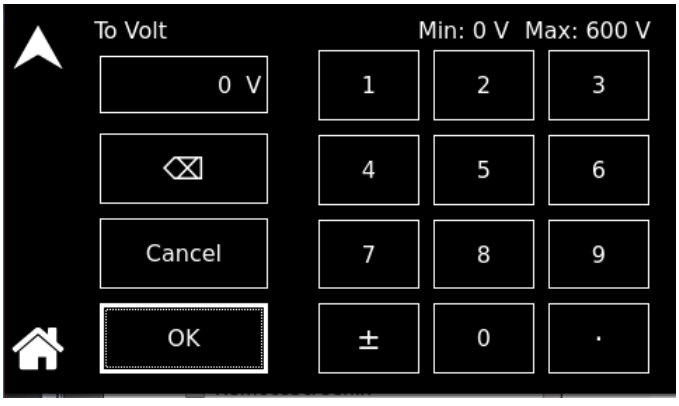


Figure 12-56. To Voltage

ENTRY	DESCRIPTION

Trigger Mode This setting allows the user to configure the input signal to start the ramp execution ('From Volt' to 'To Volt')

a) Software (SW) Trigger Mode:
If 'SW' is selected, post ramp initialization power supply will wait for the software trigger to start the ramp, displaying the status as 'Waiting for Trigger'. Refer to Figure 12-57.

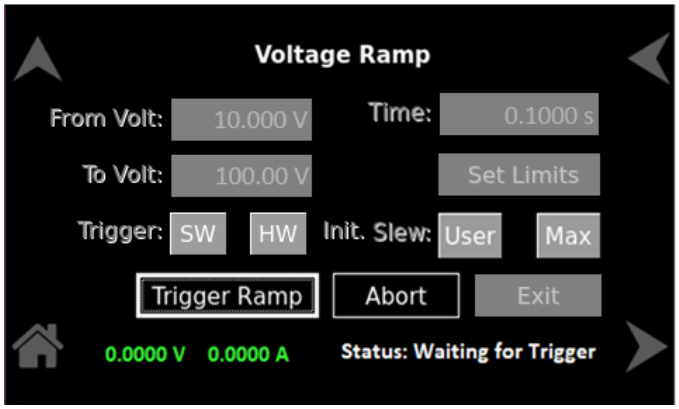


Figure 12-57. Software Trigger Mode

b) Hardware (HW) Trigger Mode:
If 'HW' is selected, post ramp initialization power supply will wait for the hardware trigger to start the ramp execution, displaying the status as 'Waiting for Trigger'.

The ramp execution begins when a 10ms active high pulse is applied to the Norcomp connector at pin-18 (RTN) and pin-19 (TRIGGER IN). Refer to Figure 12-58.

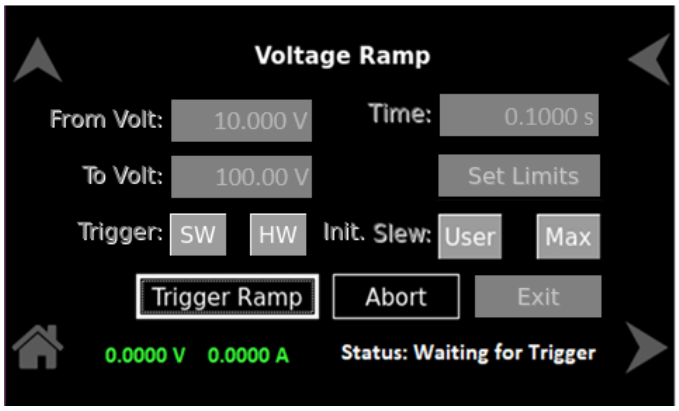


Figure 12-58. Hardware Trigger Mode

ENTRY	DESCRIPTION
Time	Sets the time in seconds to reach from ‘From Volt’ to ‘To Volt’. Refer to Figure 12-59.

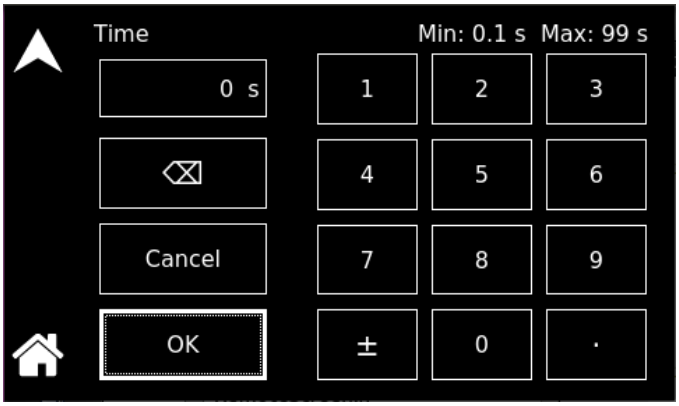


Figure 12-59. Time

Set Limits User can define the limits for the Ramp execution. Refer to Figure 12-60 and Figure 12-61.



Figure 12-60. Set Limits – CV/CC, CV/CP and CV

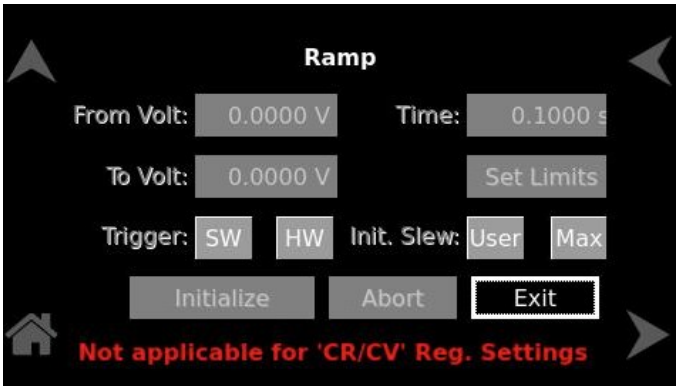


Figure 12-61. Set Limits – CR/CV

ENTRY	DESCRIPTION
Initial Slew	This setting allows the user to configure the initial slew, the slew rate at which the power supply reaches from the current output voltage of the power supply to the configured 'From Volt' in the ramp screen. **a) User:** When the setting is 'User', the output voltage of the power supply reaches the 'From Volt' (when the ramp is initialized) with the voltage slew rate configured in the configuration menu. **b) Max:** When the setting is 'Max', the output voltage of the power supply reaches the 'From Volt' (when the ramp is initialized) with maximum slew rate.
Initialize	The function of the initialization process is to bring the current device voltage value to the 'From Volt' value programmed in the ramp screen. Click the 'Initialize' button to initialize the ramp, and the progress will be displayed as a percentage in the status bar. Upon completion of the initialization process, the status will indicate as 'Waiting for Trigger'. Refer to Figure 12-62.

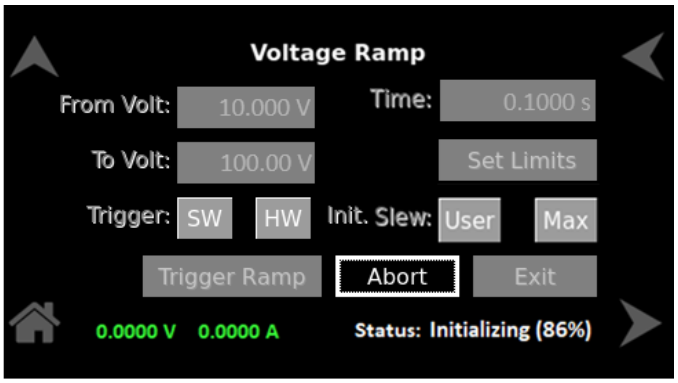


Figure 12-62. Initializing

Trigger Ramp	Used to send software trigger to the unit to start the ramp execution. Post initialization of ramp this function is enabled only when 'Trigger' selection is ''SW'. Refer to Figure 12-63. If the 'Trigger' selection is set to 'HW', this function is not enabled. The ramp execution begins when a 10ms active high pulse is applied to the Norcomp connector at pin-18 (RTN) and pin-19 (TRIGGER IN).

ENTRY	DESCRIPTION

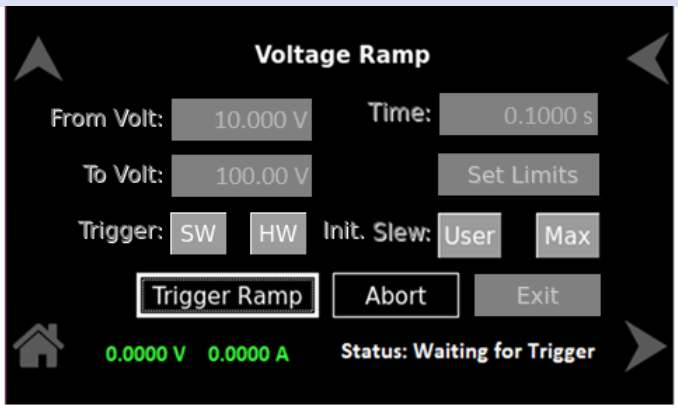


Figure 12-63. Trigger Ramp

Abort User can abort the process at any stage of the ramp execution. The progress of the operation is displayed in the status on the right side of the screen. Refer to Figure 12-64.

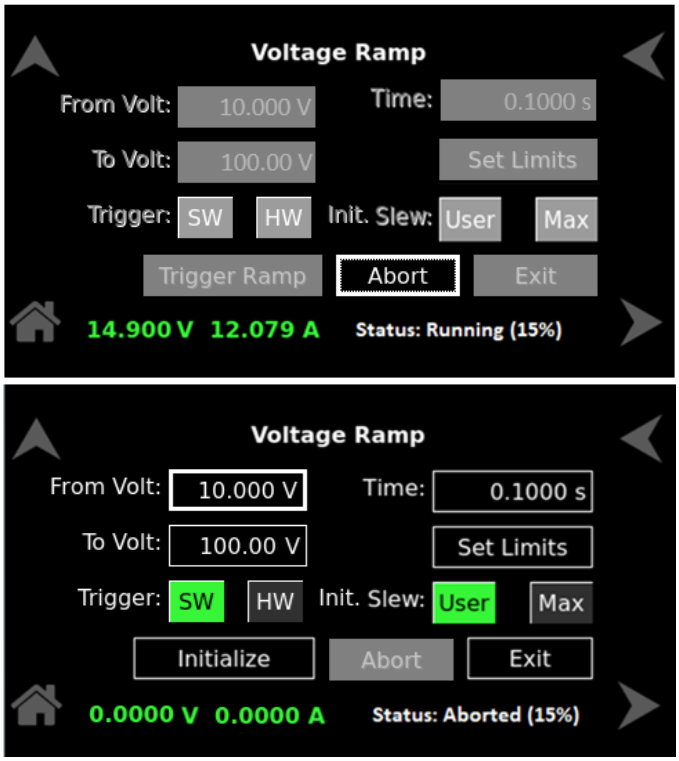


Figure 12-64. Abort

Status This field displays the progress or state of the process.

a) IDLE - When the system is in Idle (not performing any task) situation, refer to Figure 12-65.

ENTRY	DESCRIPTION

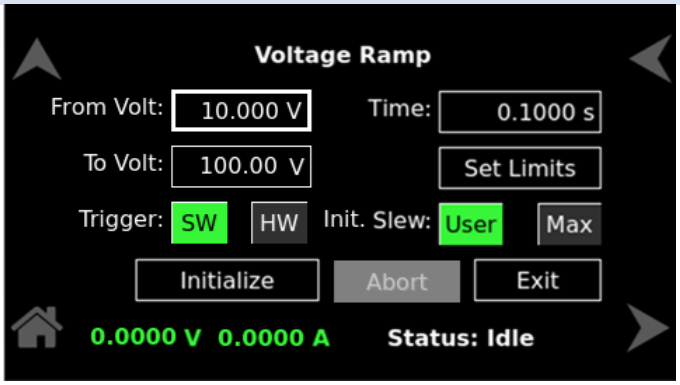


Figure 12-65. Status – IDLE

b) Initializing - When the system is initializing (configuring the current device voltage value to the 'From Volt' value programmed in the ramp screen), and the progress is displayed as a percentage. Refer to Figure 12-66.

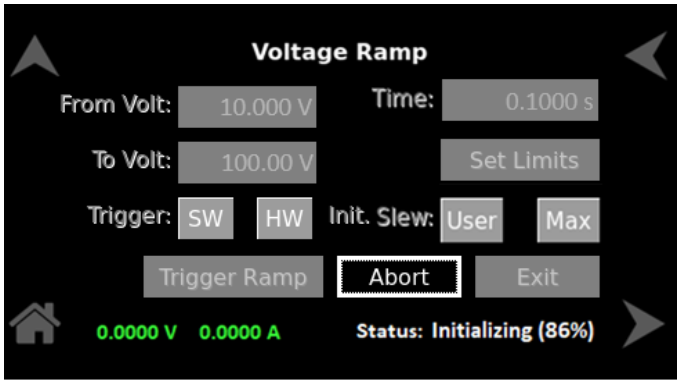


Figure 12-66. Status – Initializing

c) Waiting for Trigger: When the system is waiting for the trigger, refer to Figure 12-67.

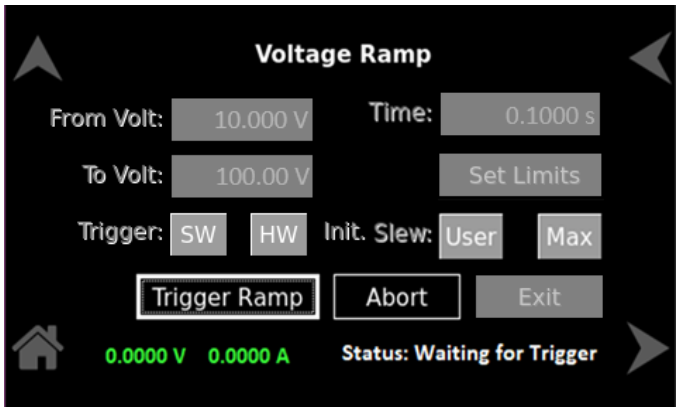


Figure 12-67. Status – Waiting for Trigger

d) Running: When the system is executing the trigger ramp process, refer to Figure 12-68.

ENTRY	DESCRIPTION

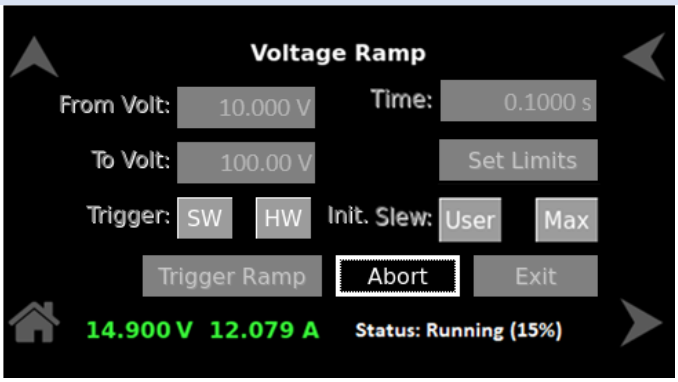


Figure 12-68. Status – Running

e) Aborted: When the process is aborted (Initializing, Waiting for Trigger, Running), 'Aborted' is displayed in the status. Refer to Figure 12-69.

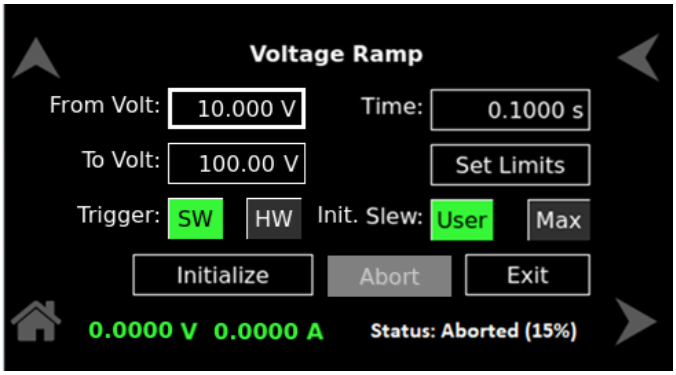


Figure 12-69. Status – Aborted

f) Complete: When the ramp execution (bringing the voltage from 'From Volt' to 'To Volt') is completed. Refer to Figure 12-70.

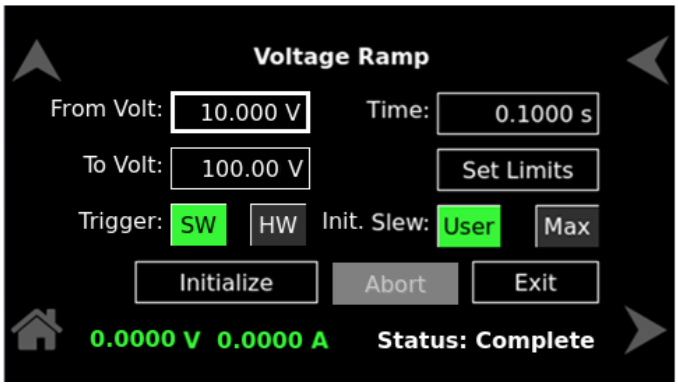


Figure 12-70. Status- Completed

Exit Exits the Voltage Ramp sub menu and return to Top level menu, refer to Figure 11-3.

ENTRY	DESCRIPTION

NOTE: User cannot set the 'From Volt' and 'To Volt' to the same value.

NOTE: User cannot exit the Voltage Ramp Screen using HOME and UP arrow. To exit while a process is ongoing, user must first abort the process.

Table 12-23. Voltage Ramp

a) Example 1: Creating a Voltage ramp using Software Trigger mode

- Set the From Volt to 25V
- Set the To Volt to 50V

NOTE: User cannot set the 'From Volt' and 'To Volt' to the same value.

- Set the Time to 10s
- Select the Trigger mode as SW
- Select between User or Max for the slew setting according to the user's requirement
- Click on Initialize
- Observe that the Initialize button changes to the Trigger Ramp button after completion of initializing, and Abort button becomes enabled from a disabled state
- Click on Trigger Ramp
- The status of the Trigger Ramp progress can be seen on the screen
- Observe the voltage ramp signal using oscilloscope
- Clicking on the Abort button will abort the ramp
- Clicking on the Exit button will exit the Voltage Ramp screen.

b) Example 2: Creating a Voltage ramp using Hardware Trigger mode

- Set the Volt to 25V
- Set the To Volt to 50V

NOTE: User cannot set the 'From Volt' and 'To Volt' to the same value.

- Set the Time to 10s
- Select the Trigger mode as HW
- Select between User or Max for the slew setting according to the requirements

- Click on Initialize
- Observe that Initialize button change from enable to disable state after completion of initializing, and Abort button becomes enabled
- Give an external trigger i.e. an active high pulse of 10ms on the MOLEX connector pin-19 (TRIGGER IN) and pin-18 (RTN) to generate the Voltage Ramp
- Observe the voltage ramp signal using oscilloscope
- Clicking on the Abort button will abort the ramp
- Clicking on the Exit button will exit the Voltage Ramp screen.

12.2.4.2 VOLTAGE RAMP – CP/CV

Voltage Ramp is not applicable in CP/CV Regulation Settings. Refer to Figure 12-71.

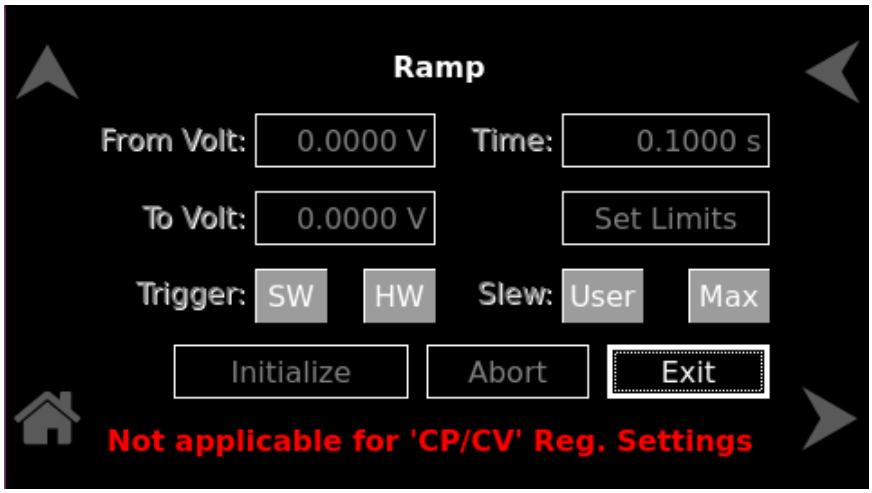


Figure 12-71. Voltage ramp – CP/CV

12.2.4.3 CURRENT RAMP – CC/CV, CR/CC AND CC

The Current Ramp menu allows to configure and execute Current ramp, refer to Figure 12-72. The Current Ramp menu allows the selection of parameters such as ‘From Current’, ‘Status’, ‘To Current’, ‘Time’, ‘Trigger’, ‘Slew’ and ‘Set Limits’.

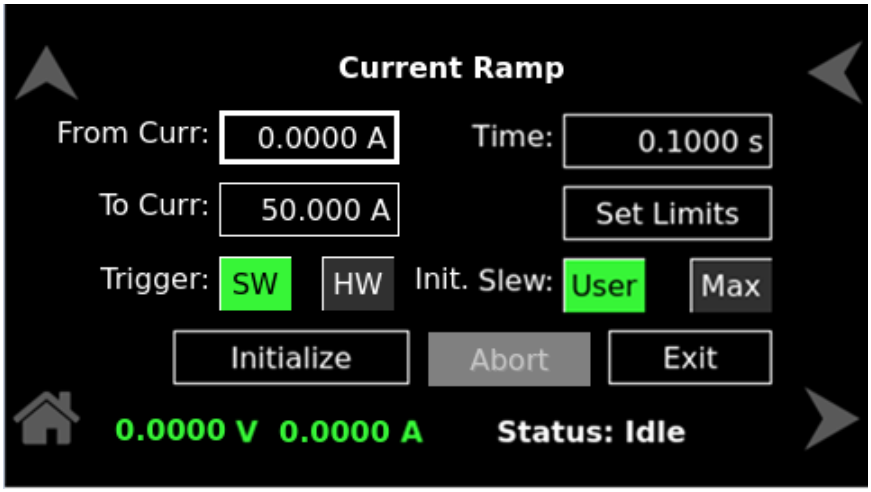


Figure 12-72. Current Ramp Screen

The Current Ramp menu has the following fields:

ENTRY	DESCRIPTION
From Curr	Sets the start current for the ramp. Refer to Figure 12-73.

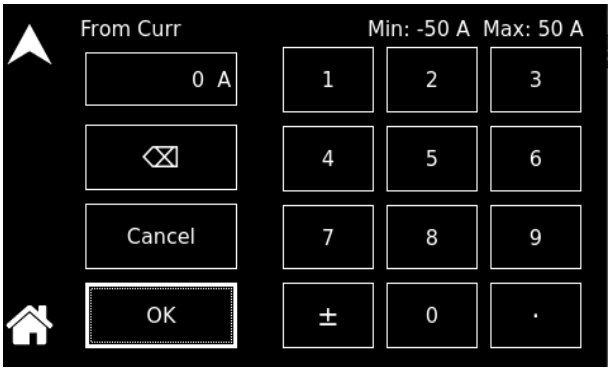


Figure 12-73. From Current

To Curr	Sets the end current for the ramp. Refer to Figure 12-74.

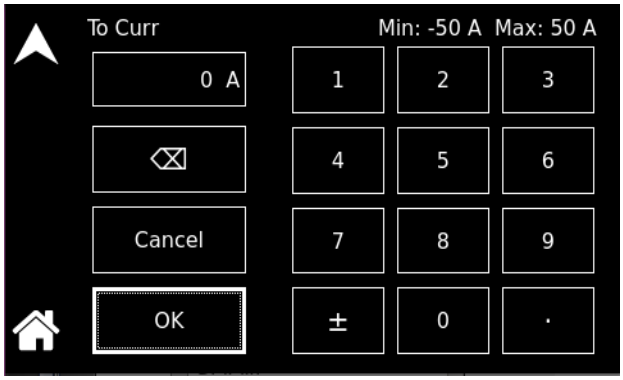


Figure 12-74. To Current

Trigger Mode	This setting allows the user to configure the input signal to start the ramp

ENTRY	DESCRIPTION
	execution (‘From Curr’ to ‘To Curr’)

a) Software (SW) Trigger Mode:

If ‘SW’ is selected, post ramp initialization power supply will wait for the software trigger to start the ramp execution, displaying the status as ‘Waiting for Trigger’. Refer to Figure 12-75.

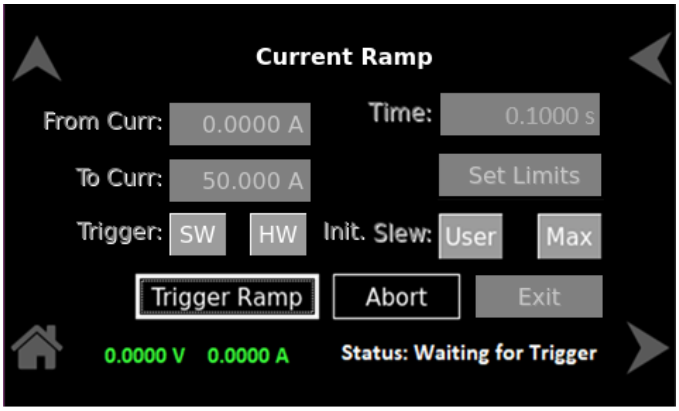


Figure 12-75. SW Mode

b) Hardware (HW) Trigger Mode:

When ‘HW’ is selected, post ramp initialization power supply will wait for a hardware trigger to start the ramp execution, displaying the status as ‘Waiting for Trigger’.

The ramp execution begins when a 10ms active high pulse is applied to the Norcomp connector at pin-18 (RTN) and pin-19 (TRIGGER IN). Refer to Figure 12-76.

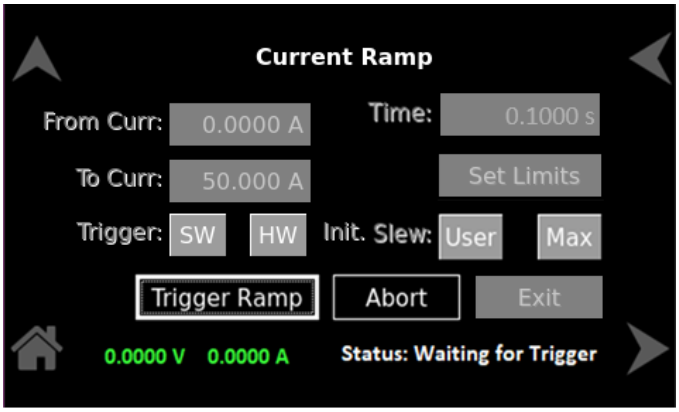


Figure 12-76. HW Mode

Time	Sets the time in seconds to reach from ‘From Curr’ to ‘To Curr’. Refer to Figure 12-77.

ENTRY	DESCRIPTION



Figure 12-77. Time

Set Limits User can define the limits for the Ramp execution. Refer to Figure 12-78 and Figure 12-79.



Figure 12-78. Set Limits - CC/CV, CC/CP and CC

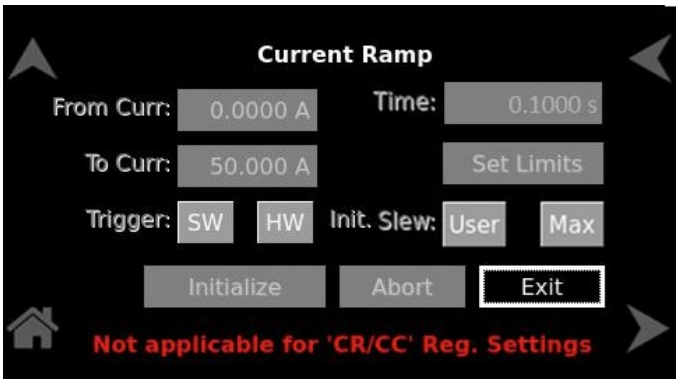


Figure 12-79. Set Limits – CR/CC

Initial Slew This setting allows the user to configure the initial slew, the slew rate at which the power supply reaches from the output Current of the power supply to the configured ‘From Curr’ in the ramp screen.

a) User: When the setting is ‘User’, the output current of the power supply

ENTRY	DESCRIPTION
	reaches the ‘From Curr’ (when the ramp is initialized) with the voltage slew rate configured in the configuration menu. **b) Max:** When the setting is ‘Max’, the output current of the power supply reaches the ‘From Curr’ (when the ramp is initialized) with maximum slew rate.
Initialize	The function of the initialization process is to bring the current device voltage value to the ‘From Curr’ value programmed in the ramp screen. Click the ‘Initialize’ button to initialize the ramp, and the progress will be displayed as a percentage in the status bar. Upon completion of the initialization process, the status will indicate as ’Waiting for Trigger’. Refer to Figure 12-80.

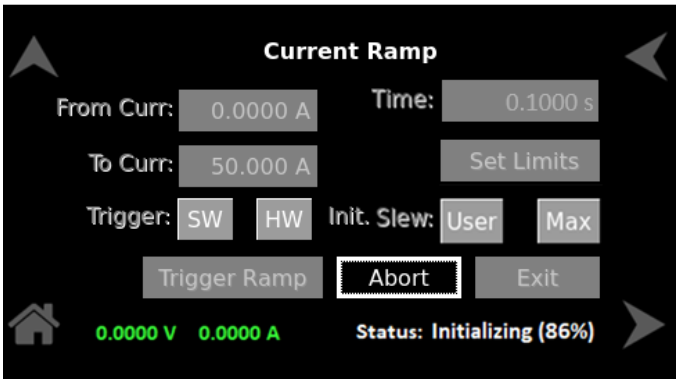


Figure 12-80. Initializing

Trigger Ramp	Used to send software trigger to the unit to start the ramp execution. Post initialization of ramp this function is enabled only when ‘Trigger’ selection is ‘SW’. Refer to Figure 12-81. If the ‘Trigger’ selection is set to ‘HW’, this function is not enabled. The ramp execution begins when a 10ms active high pulse is applied to the Norcomp connector at pin-18 (RTN) and pin-19 (TRIGGER IN).

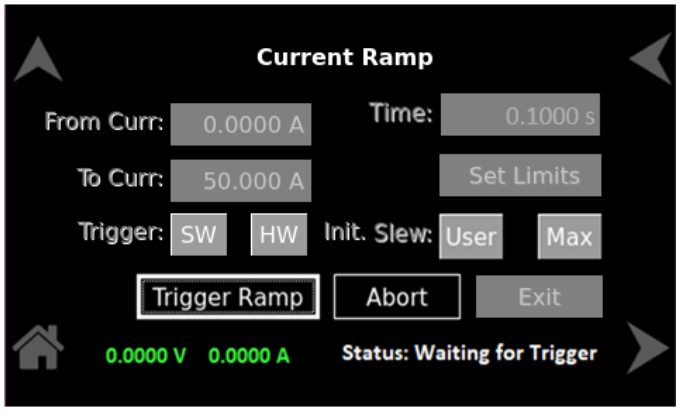


Figure 12-81. Trigger Ramp

Abort	User can abort the process at any stage of the ramp execution. The progress of the operation is displayed in the status on the right side of the screen. Refer to

ENTRY	DESCRIPTION

Figure 12-82.

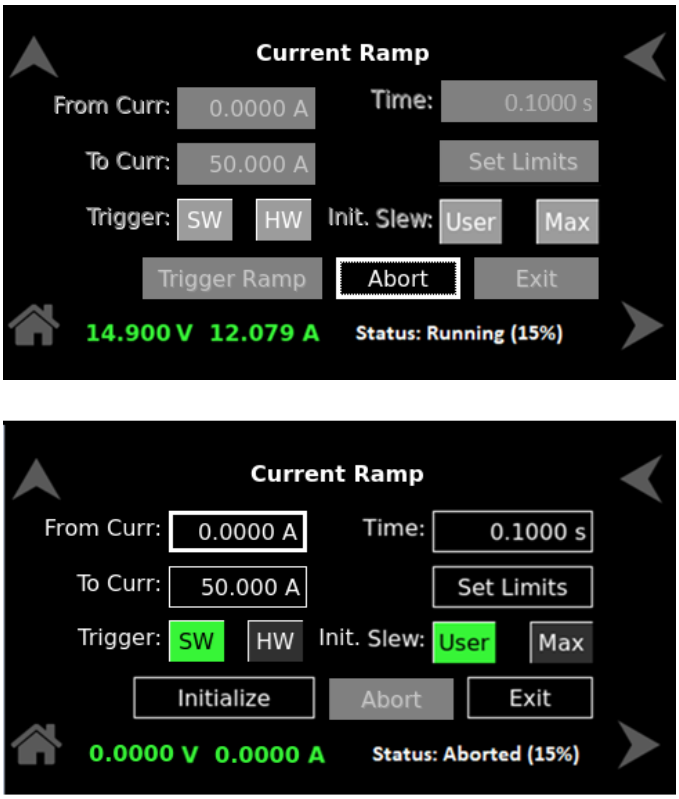


Figure 12-82. Abort – SW

Status This field displays the progress or state of the process.

a) IDLE - When the system is in Idle (not performing any task) situation, refer to Figure 12-83.

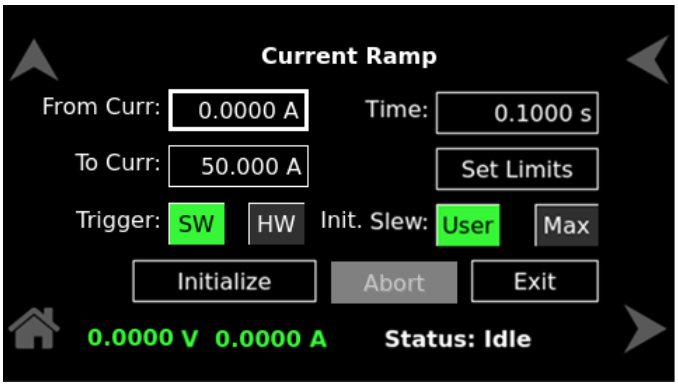


Figure 12-83. Status – IDLE

b) Initializing - When the system is initializing (configuring the device current value to the 'From Curr' value programmed in the ramp screen), and the progress is displayed as a percentage. Refer to Figure 12-84.

ENTRY	DESCRIPTION

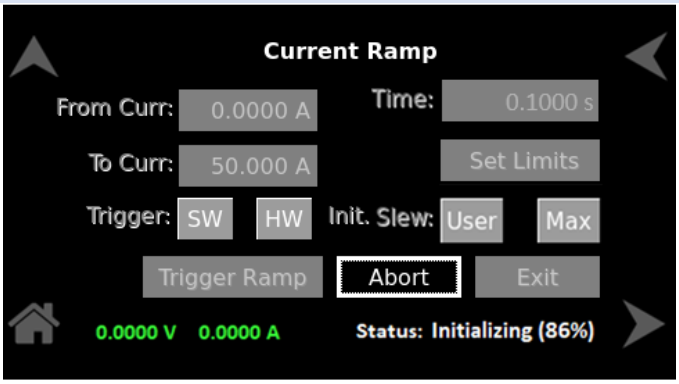


Figure 12-84. Status - Initializing

c) Waiting for Trigger: When the system is waiting for the trigger, refer to Figure 12-85.

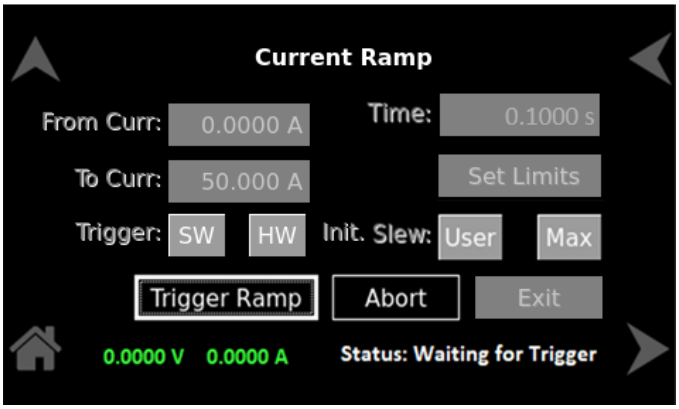


Figure 12-85. Status – Waiting for Trigger

d) Running: When the system is executing the trigger ramp process, refer to Figure 12-86.

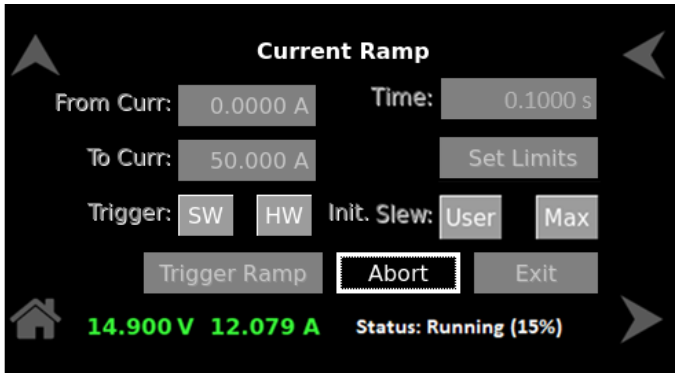


Figure 12-86. Status – Running

e) Aborted: When the process is aborted (Initializing, Waiting for Trigger, Running), 'Aborted' is displayed in the status. Refer to Figure 12-87.

ENTRY	DESCRIPTION

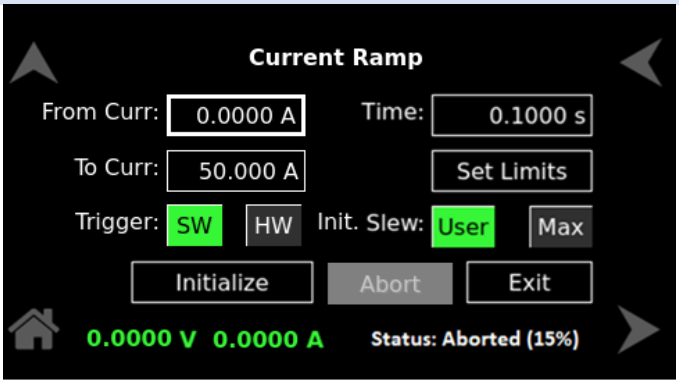


Figure 12-87. Status – Aborted

f) Complete: When the ramp execution (bringing the voltage from “From Curr” to “To Curr”) is completed. Refer to Figure 12-88.

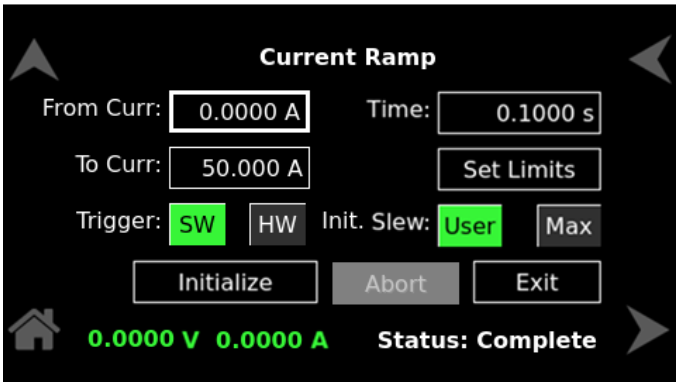


Figure 12-88. Status- Completed

Exit Exits the Current Ramp sub menu and return to Top level menu, refer to Figure 12-3.

NOTE: User cannot set the ‘From Curr’ and ‘To Curr’ to the same value.

NOTE: User cannot exit the Current Ramp Screen using HOME and UP arrow. To exit while a process is ongoing, user must first abort the process.

Table 12-24. Current ramp

a) Example 1: Creating a Current ramp using Software Trigger mode

- Set the From Current to 10A
- Set the To Curr to 30A

NOTE: User cannot set the ‘From Curr’ and ‘To Curr’ to the same value.

- Set the Time to 10s

- Select the Trigger mode as SW
- Select between User or Max for the slew setting according to the user's requirement
- Click on Initialize
- Observe that the Initialize button changes to the Trigger Ramp button after completion of initializing, and Abort button becomes enabled from disabled state
- Click on Trigger Ramp
- The status of the Trigger Ramp progress can be seen on the screen
- Observe the current ramp signal using oscilloscope
- Clicking on the Abort button will abort the ramp
- Clicking on the Exit button will exit the Current Ramp screen.

b) Example 2: Creating a Current ramp using Hardware Trigger mode

- Set the Curr to -10A
- Set the To Curr to -30A

NOTE: User cannot set the 'From Curr' and 'To Curr' to the same value.

- Set the Volt to 25V
- Set the Time to 10s
- Select the Trigger mode as HW
- Select between User or Max for the slew setting according to the users' requirements
- Click on Initialize
- Observe that Initialize button change from enable to disable state after completion of initializing, and Abort button becomes enabled
- Give an external trigger i.e. an active high pulse of 10ms on the MOLEX connector pin-19 (TRIGGER IN) and pin-18 (RTN) to generate the Current Ramp.
- Observe the current ramp signal using oscilloscope
- Clicking on the Abort button will abort the ramp
- Clicking on the Exit button will exit the Current Ramp screen.

12.2.4.4 CURRENT RAMP – CP/CC AND CR/CC

Current Ramp is not applicable in CP/CC and CR/CC Regulation Settings. Refer to Figure 12-89.

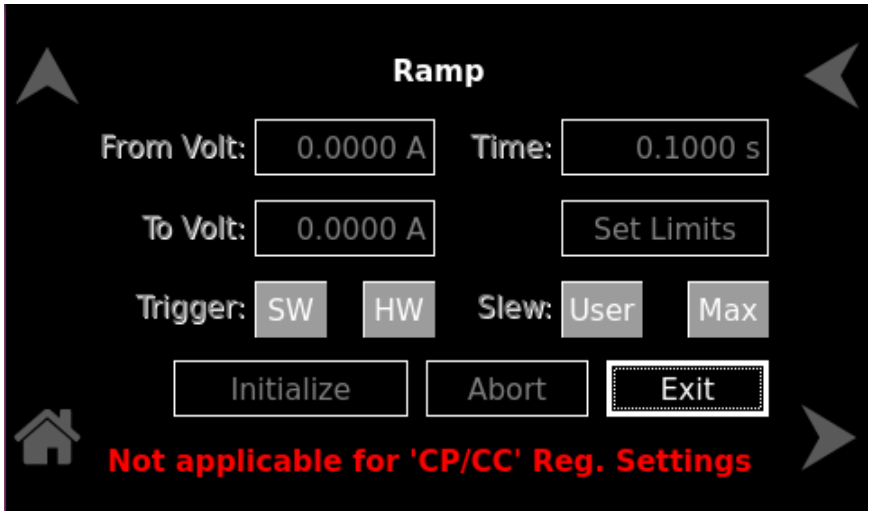


Figure 12-89. Current Ramp - CP/CC

12.2.5 CONFIGURATION SCREEN

The Configuration screen provides 'Regulation Settings', 'Slew Rate', 'Protection', 'User Limits', 'External Relay', 'Output Sense', 'PONS', 'Measurement Average Samples' and 'Parallel Operation Mode' (enabled only in parallel operation).

For the top-level menu of the Configuration screen, refer to Figure 12-90 and for instructions on how to navigate, refer to Section 9.4.2.2.



Figure 12-90. Configuration Screen Top-Level Menu

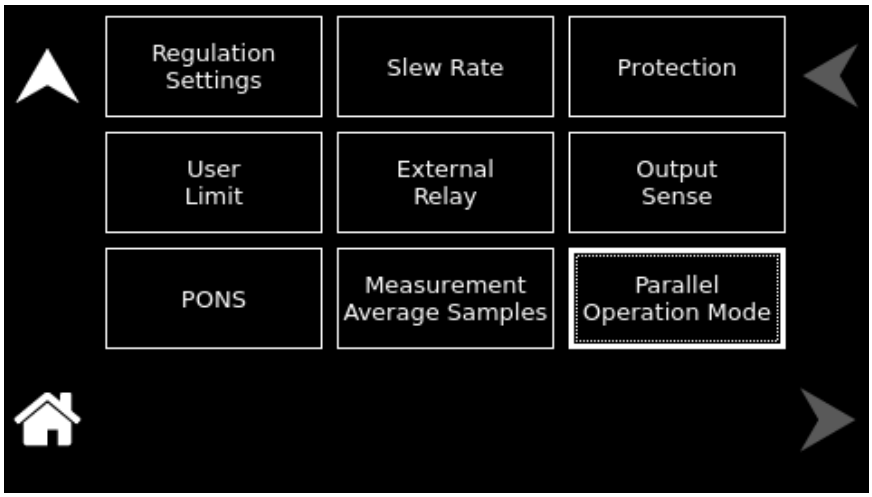


Figure 12-91. Configuration Screen Top-Level Menu – Parallel Operation

12.2.5.1 REGULATION SETTINGS

The Regulation Settings Menu is used to configure the Programming type and Regulation setting of the power supply. Refer to Figure 12-92 and Figure 12-94.

The 'Reg. Setting' function on the Configuration Screen enables users to switch between 'Voltage (CV/CC, CR/CV, CV/CP, CP/CV and CV)' and 'Current (CC/CV, CR/CC, CP/CC, CC/CP and CC) ' regulation settings.

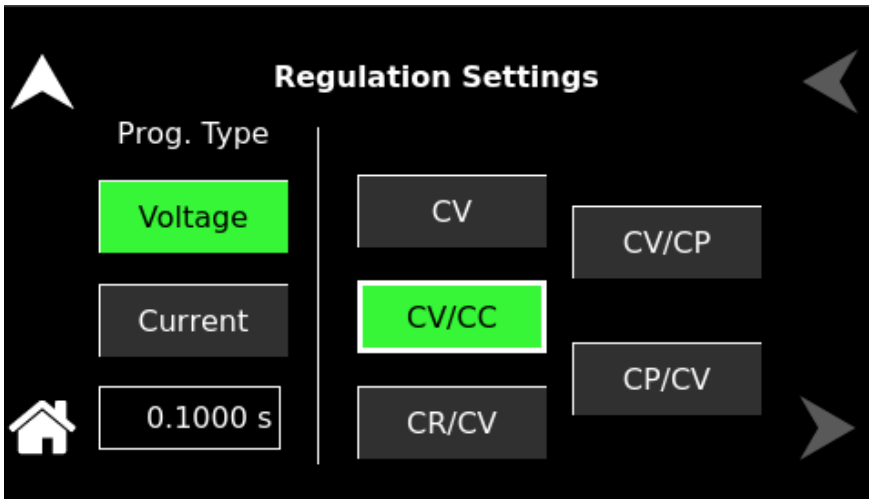


Figure 12-92. Regulation Settings – CV/CC, CR/CV, CV/CP, CP/CV and CV

a) When the programming type is set to 'Voltage' in the Regulation Settings menu, the following fields are available:

ENTRY	DESCRIPTION
CV/CC	In this regulation setting, output voltage is regulated to the user set value. On reaching the current limit (negative), output would be regulated to the current limit reached. On reaching the power limit (negative), the output

ENTRY	DESCRIPTION
	voltage would be programmed to zero.
CR/CV	In this regulation setting, output resistance is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the current limit (negative), the output voltage would be programmed to zero.
CV/CP	In this regulation setting, output voltage is regulated to the user set value. On reaching the power limit (negative), output would be regulated to the power limit reached. On reaching the current limit (negative), the output voltage would be programmed to zero.
CP/CV	In this regulation setting, output power is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the current limit (negative), the output power would be programmed to zero.
CV	In this regulation setting, output voltage is regulated to the user set value. On reaching the set current limit (negative) or power limit (negative), the output voltage would be programmed to zero. **NOTE:** When the unit is in series operation (refer to Chapter 6), the only regulation setting available is Voltage - CV.
Delay	Sets the programmable time delay executed by the supply before setting the output to zero. The minimum time that can be set is 0.1 seconds, and the maximum is 5 seconds. Refer to Figure 12-93.

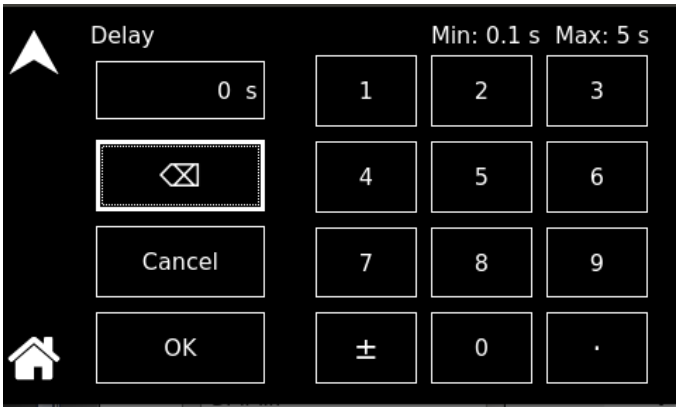


Figure 12-93. Delay Screen

Table 12-25. Regulation Settings

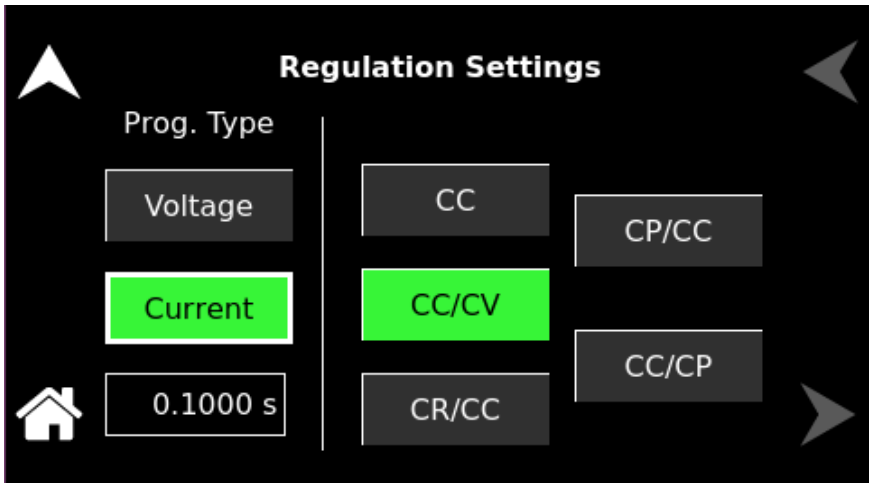


Figure 12-94. Regulation Settings – CC/CV, CR/CC, CP/CC, CC/CP and CC

b) When the programming type is set to 'Current' in the Regulation Settings menu, the following fields are available:

ENTRY	DESCRIPTION
CC/CV	In this regulation setting, output current is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the power limit (negative), the output current would be programmed to zero.
CR/CC	In this regulation setting, output resistance is regulated to the user set value. On reaching the current limit (negative), output would be regulated to the current limit reached. On reaching the voltage limit (high or low), the output current would be programmed to zero.
CP/CC	In this regulation setting, output power is regulated to the user set value. On reaching the current limit (negative), output would be regulated to the current limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero.
CC/CP	In this regulation setting, output power is regulated to the user set value. On reaching the power limit (negative), output would be regulated to the power limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero.
CC	In this regulation setting, output current is regulated to the user set value. On reaching the set voltage limit (high or low) or power limit (negative), the output current would be programmed to zero.
Delay	Sets the programmable time delay executed by the supply before setting the output to zero. The minimum time that can be set is 0.1 seconds, and the maximum is 5 seconds. Refer to Figure 12-95.

ENTRY	DESCRIPTION

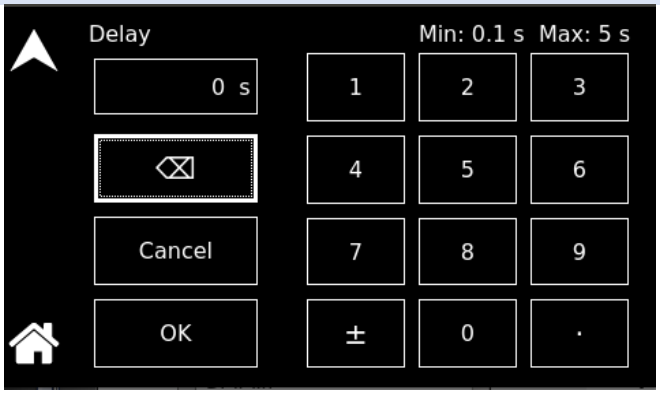


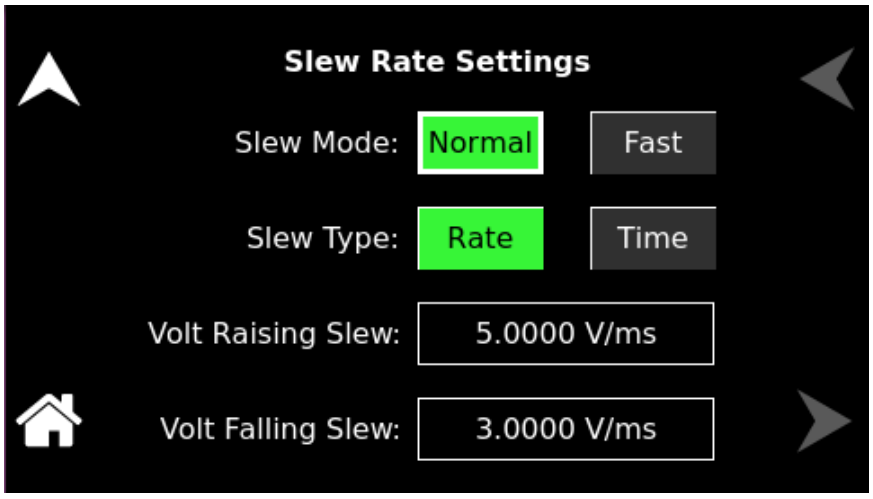
Figure 12-95. Delay Screen

Table 12-26. Regulation Settings

12.2.5.2 SLEW RATE

In the Slew Rate Settings, users can configure the Voltage, Current and Power slew rate. This allows for precise control over the voltage, current and power change, ensuring smoother transitions and better performance of the power supply. Adjusting these settings can help in optimizing the response time and stability of the system.

The Slew Rate provides the interface based on the programming type selected in the configuration screen, refer to Section 12.2.5.1. When the program type is set to 'Voltage – CV/CC, CV/CP and CV' in the regulation setting, the Slew Settings screen that appears will be the 'Volt Slew Rate'. Refer to Figure 12-96.



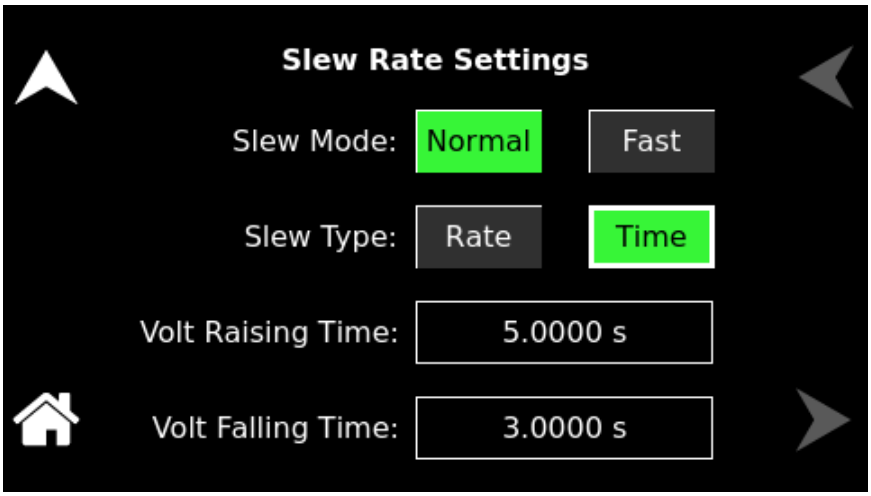


Figure 12-96. Slew Rate Settings – Voltage (CV/CC, CV/CP and CV)

When the program type is set to 'Voltage – CP/CV' in the Regulation setting, the Slew Settings screen that appears will be the 'Pow Slew Rate'. Refer to Figure 12-97.



Figure 12-97. Slew Rate Settings – Voltage (CP/CV)

When the program type is set to ‘Current – CC/CV, CC/CP and CC’ in the Regulation setting, the Slew Settings screen that appears will be the ‘Curr Slew Rate’. Refer to Figure 12-98.

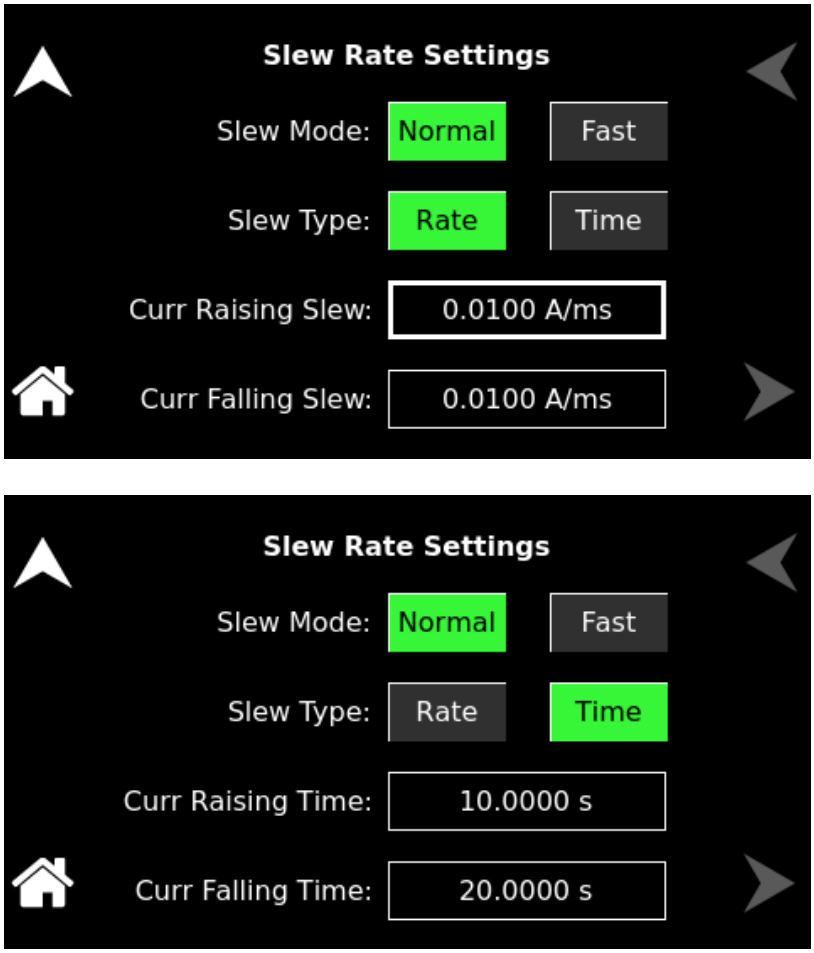


Figure 12-98. Slew Rate Settings – Current (CC/CV and CC)

When the program type is set to ‘Current – CP/CC’ in the Regulation setting, the Slew Settings screen that appears will be ‘Pow Slew rate’. Refer to Figure 12-99.

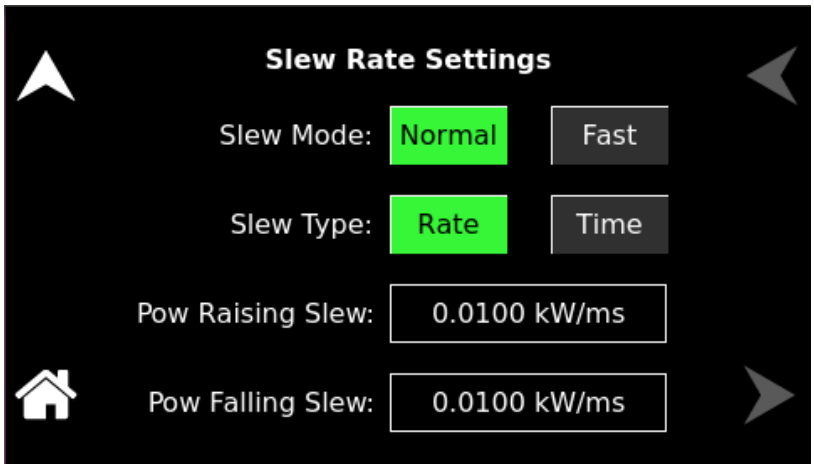
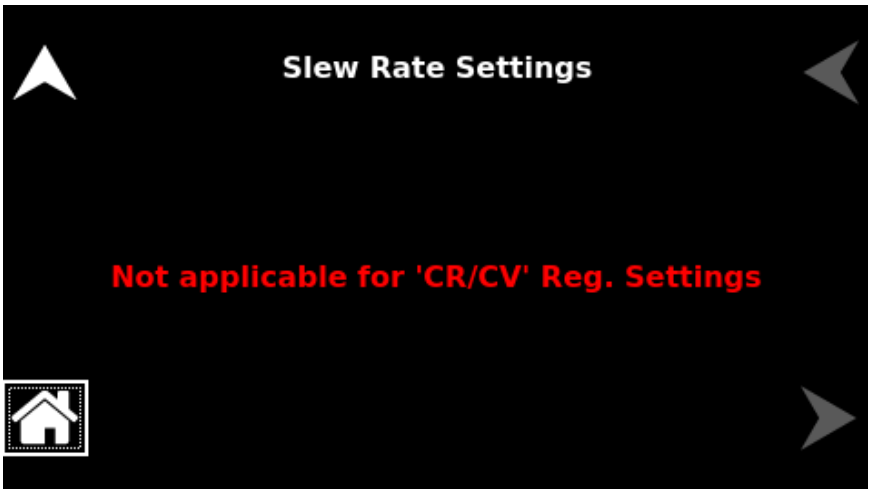




Figure 12-99. Slew Rate Settings – Current (CP/CV)

Refer to Sections 2.11 and 2.12 for detailed information on the ‘Normal’ and ‘Fast’ Slew Modes in the Slew Rate Settings.

Slew rate is not applicable for the sink resistance. When the program type is set to ‘Voltage - CR/CV or Current - CR/CC’ in the regulation settings, the slew settings screen that appears will be ‘Not applicable for ‘CR/CV’ Reg. Settings’ or ‘Not applicable for ‘CR/CC’ Reg. Settings’. Refer to Figure 12-100.



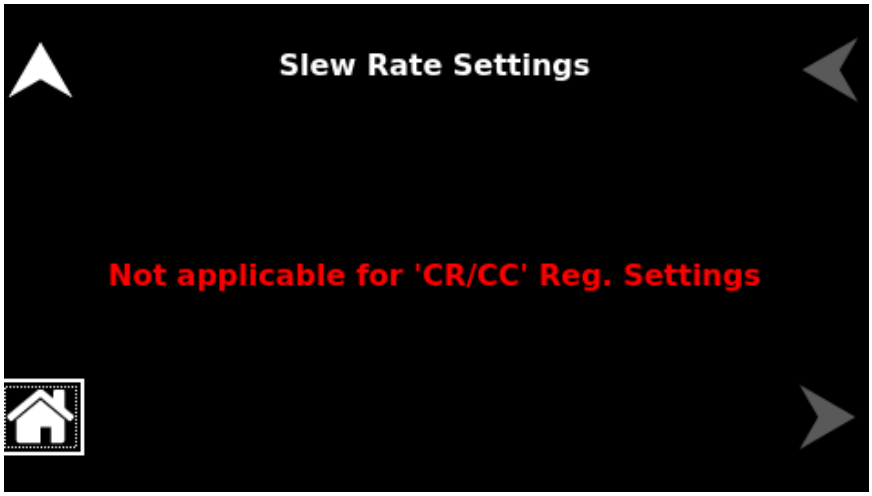


Figure 12-100. Slew Rate Settings – CR/CV and CR/CC

12.2.5.3 PROTECTION

In protection settings, users can define Output Overvoltage Protection (OVP) and Negative Overcurrent Protection (Neg. OCP) to help safeguard their devices from electrical anomalies. Refer to Figure 12-101.

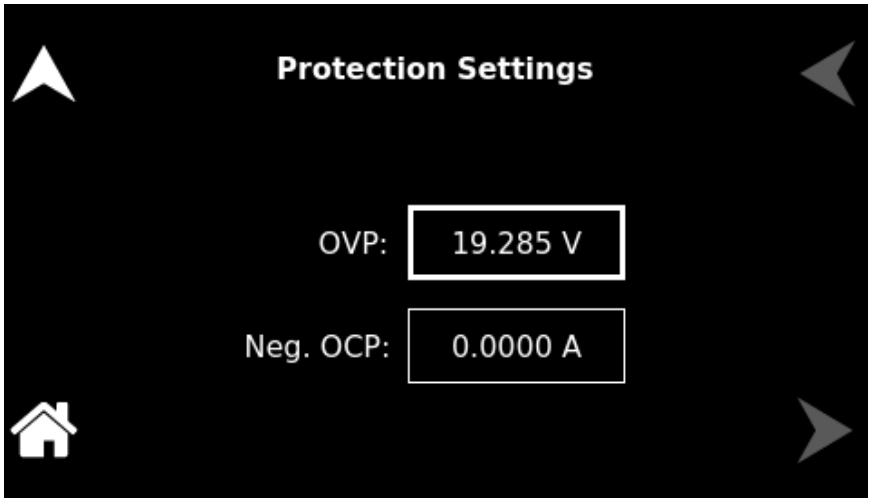


Figure 12-101. Protection Settings

If the units are configured in series operation (refer to Chapter 6), the user can define Over Voltage Protection (OVP) for the leader unit as OVP 1 and for the follower unit as OVP 2. Refer to Figure 12-102.

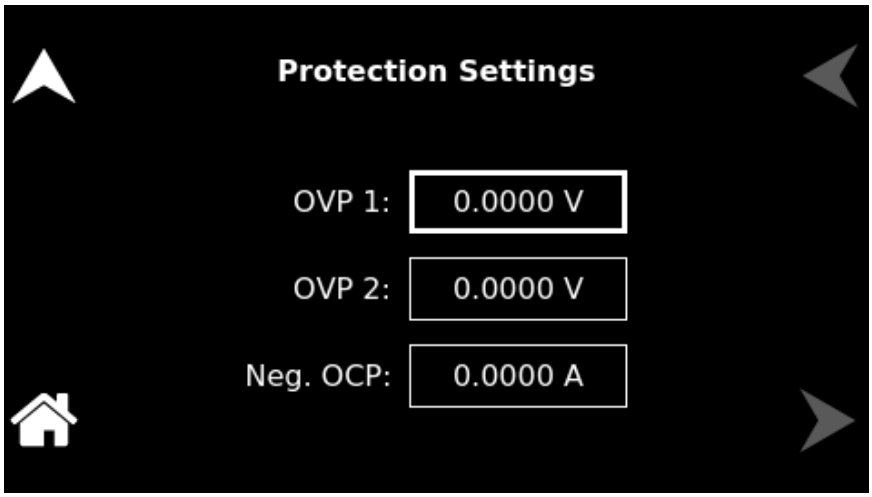


Figure 12-102. Protection Settings- Series Connection

12.2.5.4 EXTERNAL RELAY

The External relay Settings allows the user to set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 12-103.

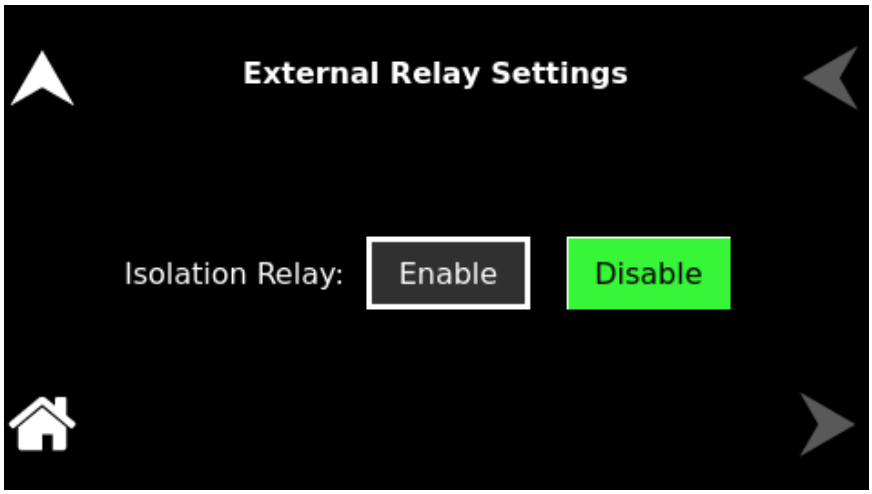


Figure 12-103. Isolation Relay

12.2.5.5 USER LIMITS

In the user limits settings, users can set the maximum allowable voltage, current and power values. This allows users to specify the highest values the device can reach without exceeding these limits.

When the programming type is set to ‘Voltage – CV/CC, CV/CP and CV’ in the Regulation Settings menu, the user limit screen that appears will be ‘Voltage’. Refer to Figure 12-104.

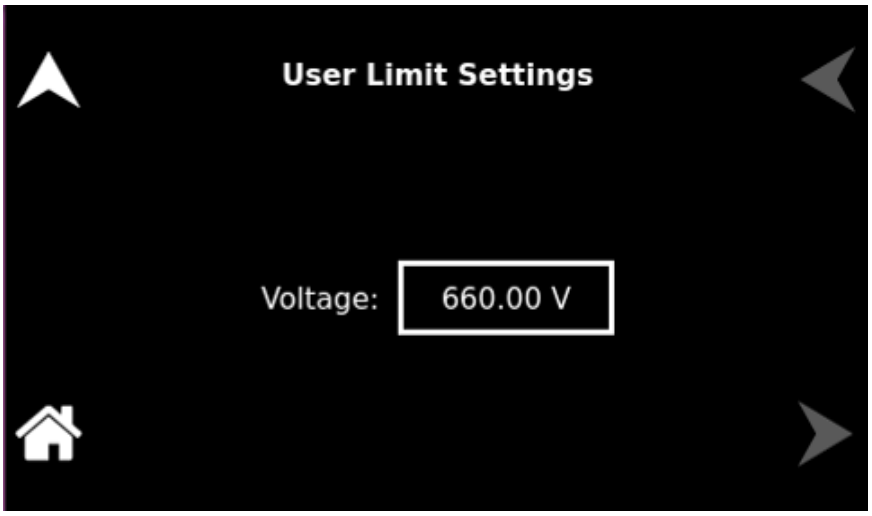


Figure 12-104. User Limit Settings- Voltage (CV/CC, CV/CP and CV)

When the programming type is set to ‘Voltage – CP/CV’ in the Regulation Settings menu, the user limit screen that appears will be ‘Power Low limit’. Refer to Figure 12-105.

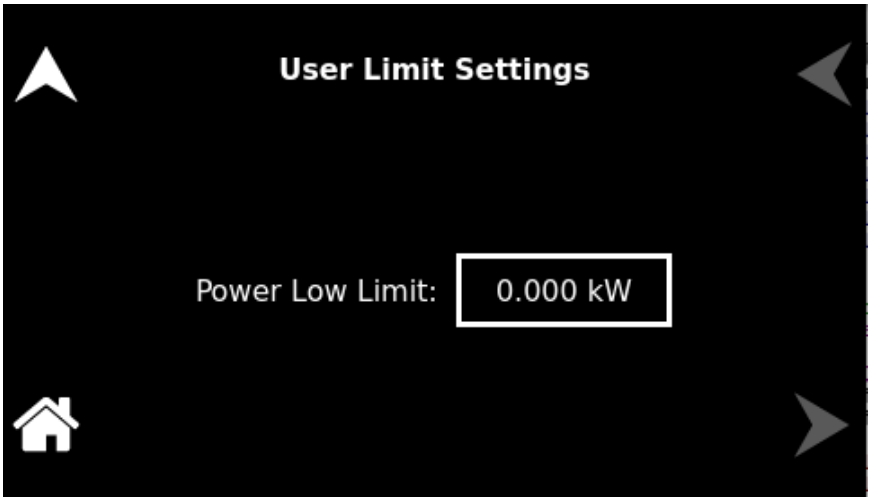


Figure 12-105. User Limit Settings- Power Low Limit (CP/CV)

When the programming type is set to ‘Current- CC/CV, CC/CP and CC’ in the Regulation Settings menu, the user limit screen appears will be ‘Current Low Limit’. Refer to Figure 12-106.

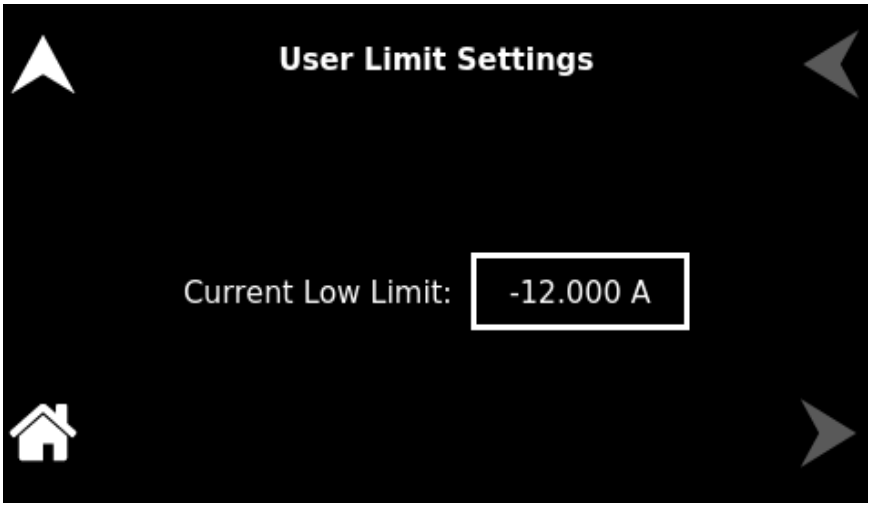


Figure 12-106. User Limit Settings- Current (CC/CV, CC/CP and CC)

When the programming type is set to ‘Current- CP/CC’ in the Regulation Settings menu, the user limit screen appears will be ‘Power Low Limit’. Refer to Figure 12-107.

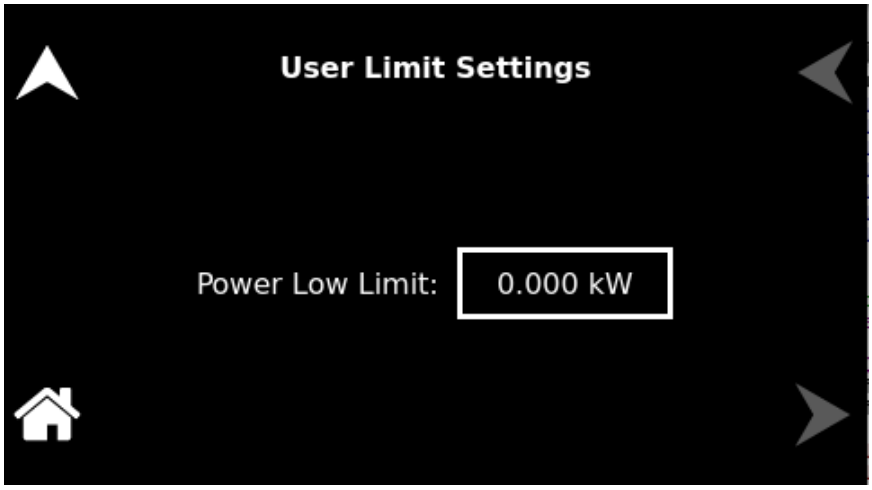


Figure 12-107. User Limit Settings- Power Low Limit (CP/CC)

User limit Settings is not applicable for the sink resistance. When the program type is set to ‘Voltage - CR/CV or Current - CR/CC’ in the regulation settings, the user limit settings screen that appears will be ‘Not applicable for Sink Resistance Regulation Settings’. Refer to Figure 12-108.

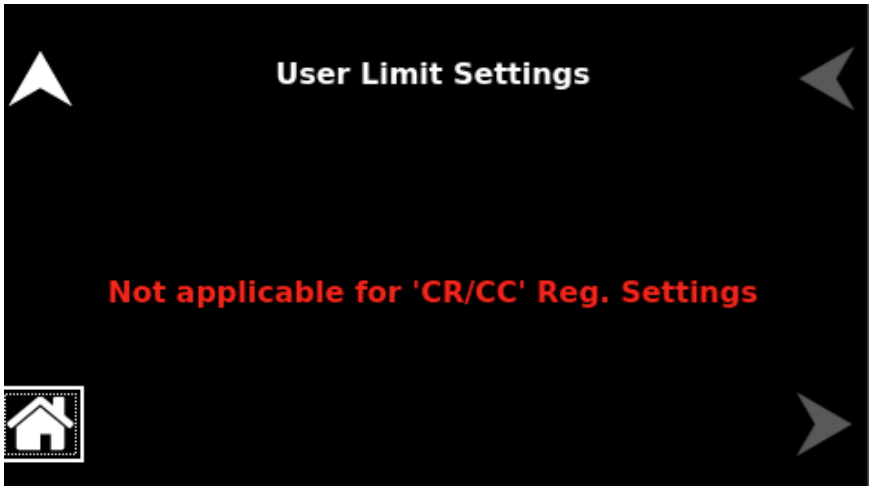


Figure 12-108. User Limit Settings- CR/CV and CR/CC

12.2.5.6 OUTPUT SENSE

The Output Sense menu allows user to set the output voltage sense of the unit to either local or remote. When Remote is selected as output sense, voltage sense cables must be connected to rear panel of power the supply at RVS (Remote Voltage Sense) connector. Refer to Figure 12-109.

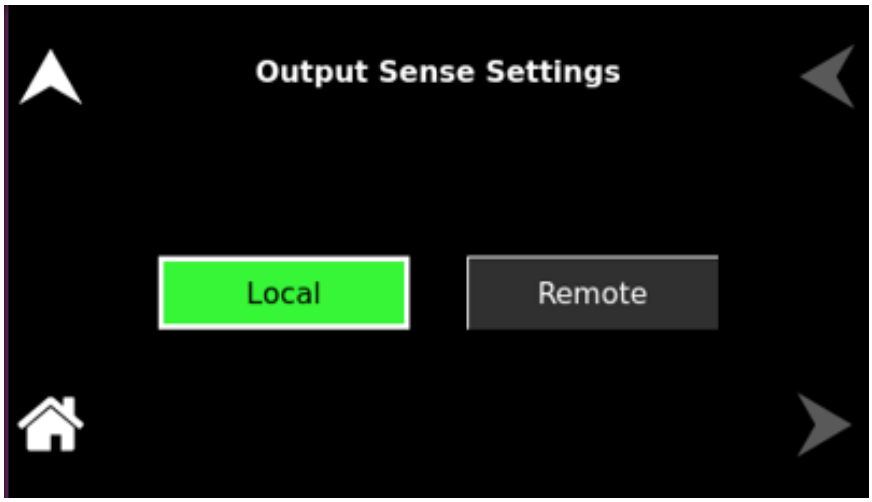


Figure 12-109. Output Sense Settings

12.2.5.7 PONS

The PONS Menu enables users to configure the Power-ON values and set up the power supply based on their chosen mode regulation settings.

When the programming type is set to ‘Voltage’ in the Regulation Settings menu, the PONS Program Type will display as ‘Voltage,’ and the PONS Reg. Setting will show the selected mode. Refer Figure 12-110 to Figure 12-114.

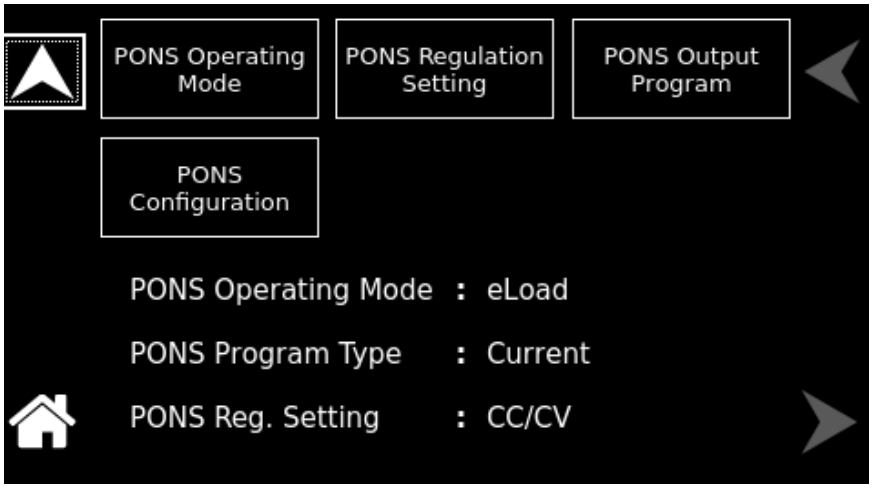


Figure 12-110. PONS Main Screen – CV/CC

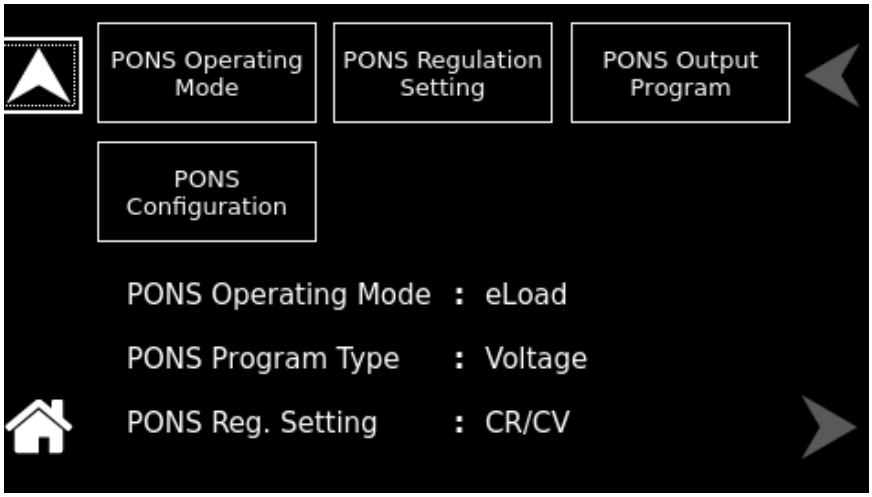


Figure 12-111. PONS Main Screen – CR/CV

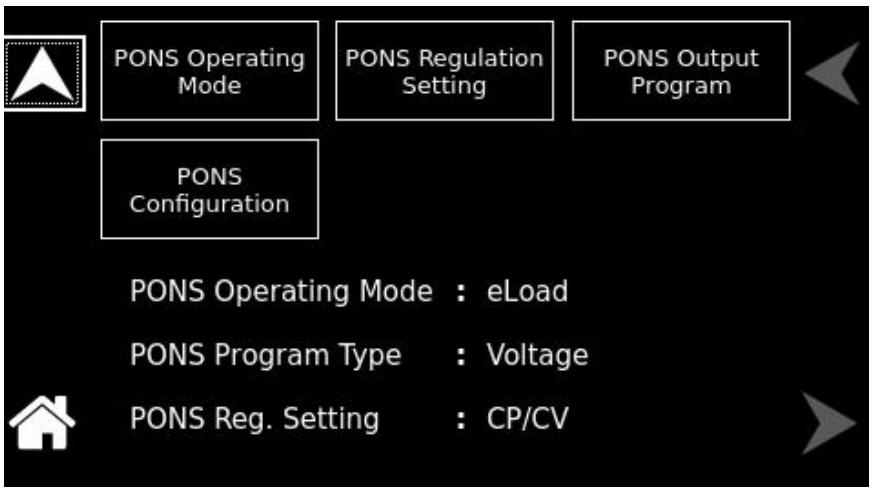


Figure 12-112. PONS Main Screen – CP/CV

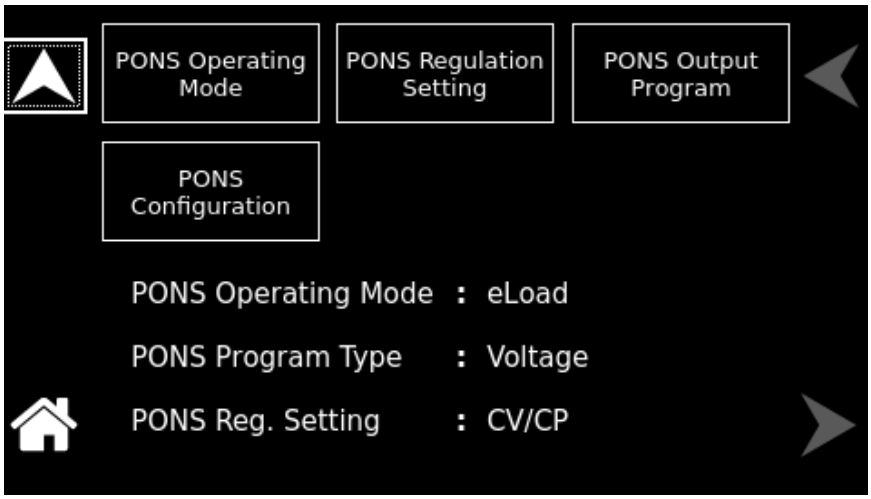


Figure 12-113. PONS Main Screen – CV/CP

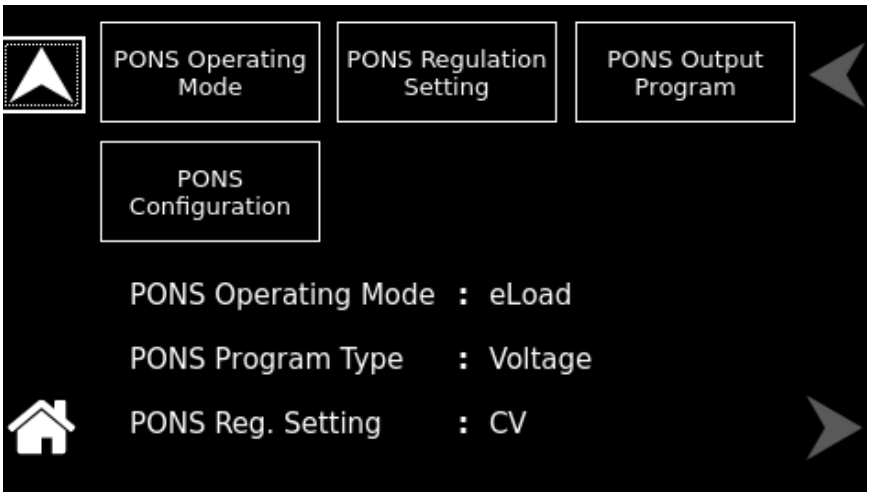


Figure 12-114. PONS Main Screen - CV

When the programming type is set to ‘Current’ in the Regulation Settings menu, the PONS Program Type will display as ‘Current,’ and the PONS Reg. Setting will show the selected mode. Refer to Figure 12-115 to Figure 12-119.

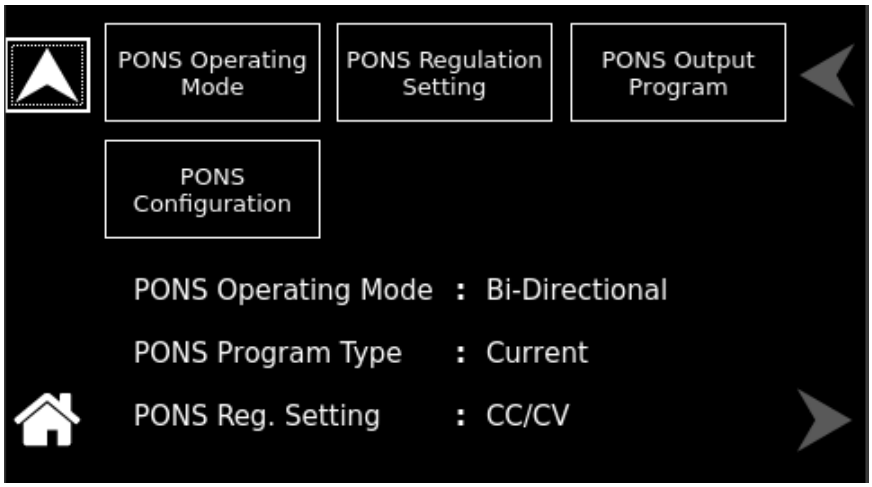


Figure 12-115. PONS Main Screen – CC/CV

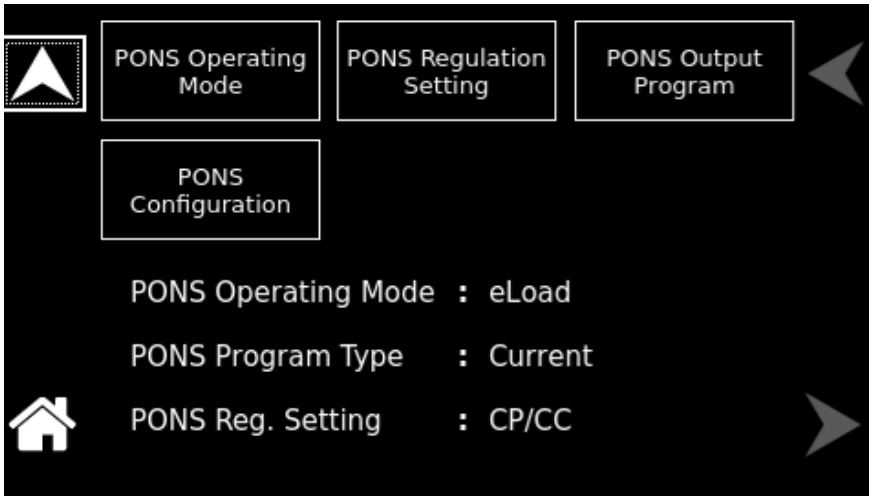


Figure 12-116. PONS Main Screen – CP/CC

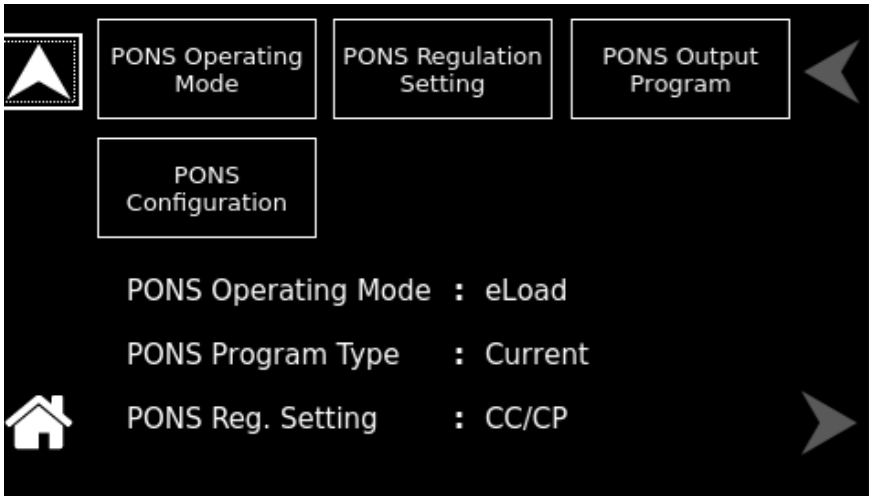


Figure 12-117. PONS Main Screen – CC/CP

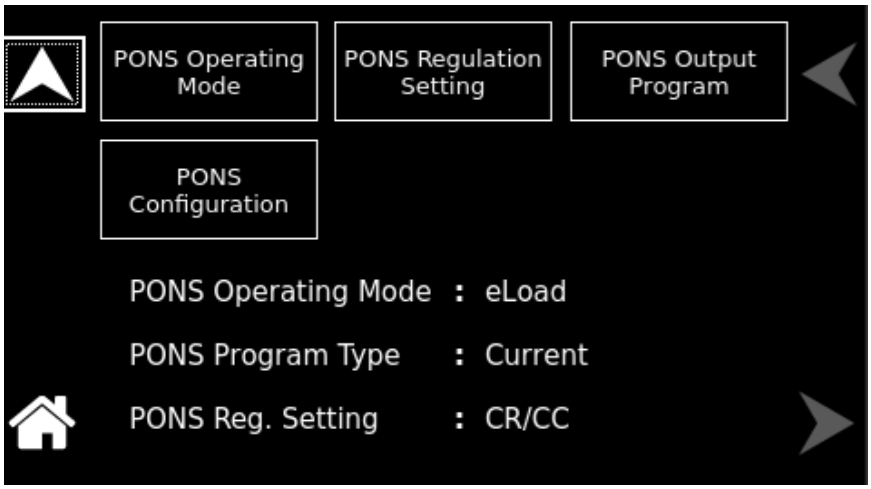


Figure 12-118. PONS Main Screen – CR/CC

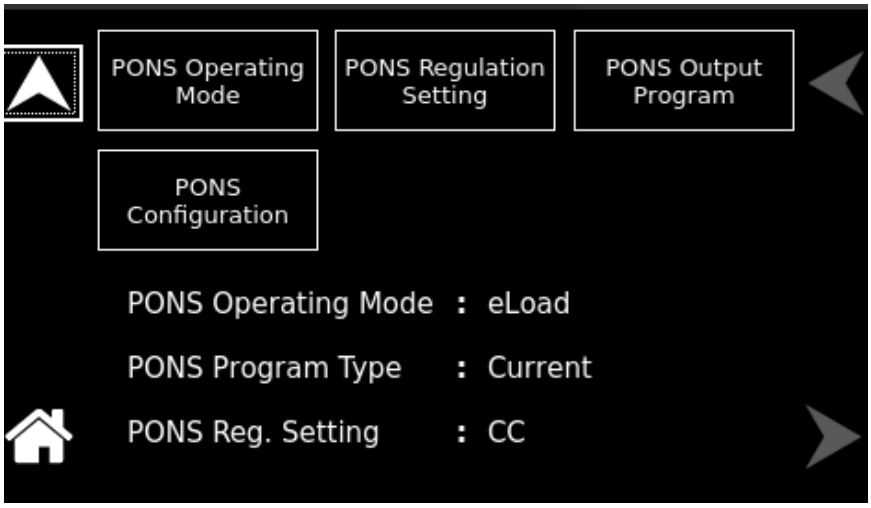


Figure 12-119. PONS Main Screen – CC

12.2.5.7.1 PONS OPERATING MODE

The 'PONS Operating Mode Settings' will not change automatically when the user changes the mode in the 'Operating Mode' settings on the Home screen. Users must separately select the ‘ELOAD’ mode in the 'PONS Operating Mode Settings', which will update the 'PONS Operating Mode Settings', ‘PONS Regulation’, ‘PONS Output Program’ and the 'PONS Configuration' screens. Refer to Figure 12-120, Figure 12-121, Figure 12-123, Figure 12-125, Figure 12-129, Figure 12-134, Figure 12-139, Figure 12-144, Figure 12-149 and Figure 12-154.

The same applies to other modes such as Bi-DIR, SOUR, PVSIM, BATSIM and BATTEST. Refer to the Sections 10.2.5.7.1, 11.2.5.7.1, 13.2.4.2.1.5, 14.2.4.7.1 and 15.2.4.7.1.

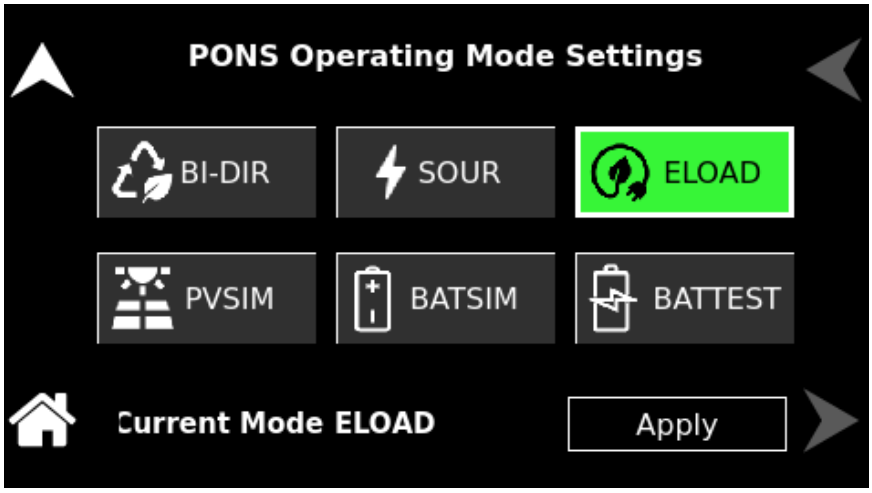


Figure 12-120. PONS Operating Mode Settings

NOTE: When the unit is in series operation, the non-applicable modes ‘PVSIM’, ‘BATSIM’, and ‘BATTEST’ do not appear in ‘PONS Operating Mode Settings’.

12.2.5.7.2 PONS REGULATION SETTINGS

The Regulation Settings Menu is used to configure the Regulation mode of the power supply. Refer to Figure 12-121 and Figure 12-123.

The ‘Reg. Setting’ function on the Configuration Screen enables users to switch between ‘Voltage (CV/CC, CR/CV, CP/CV, CV/CP and CV)’ and ‘Current (CC/CV, CP/CC, CR/CC, CC/CP and CC) ’ regulation settings.

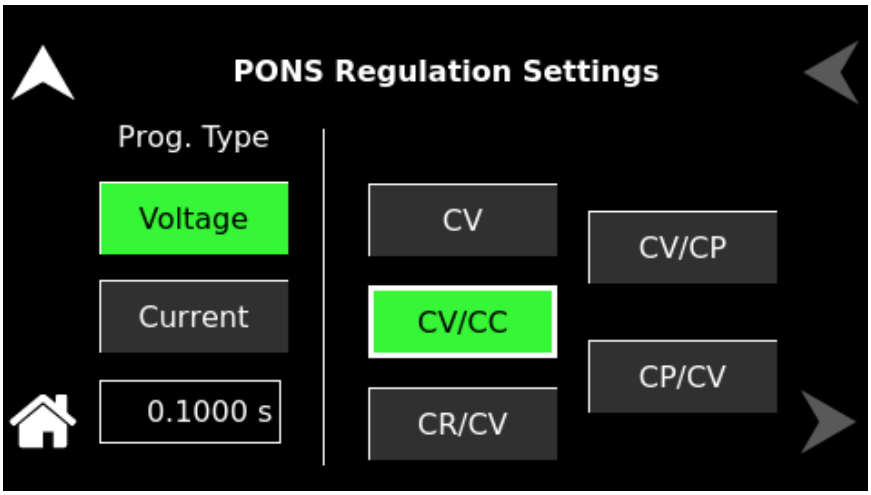


Figure 12-121. PONS regulation Settings

a) When the programming type is set to ‘Voltage’ in the Regulation Settings menu, the following fields are available:

ENTRY	DESCRIPTION
CV/CC	In this regulation setting, output voltage is regulated to the user set value. On reaching the current limit (negative), output would be regulated to the current limit reached. On reaching the power limit (negative), the output voltage would be programmed to zero.
CR/CV	In this regulation setting, output resistance is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the current limit (negative), the output voltage would be programmed to zero.
CV/CP	In this regulation setting, output voltage is regulated to the user set value. On reaching the power limit (negative), output would be regulated to the power limit reached. On reaching the current limit (negative), the output voltage would be programmed to zero.
CP/CV	In this regulation setting, output power is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the current limit (negative), the output power would be programmed to zero.
CV	In this regulation setting, output voltage is regulated to the user set value. On reaching the set current limit (negative) or power limit (negative), the output voltage would be programmed to zero. **NOTE:** When the unit is in series operation (refer to Chapter 6), the only regulation setting available is Voltage - CV.
Delay	Sets the programmable time delay executed by the supply before setting the output to zero. The minimum time that can be set is 0.1 seconds, and the maximum is 5 seconds. Refer to Figure 12-122.

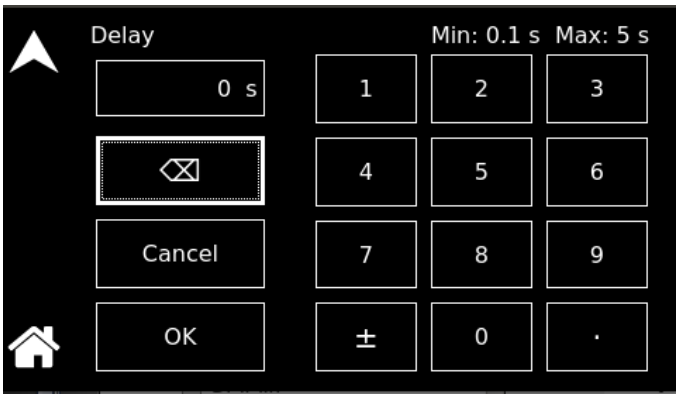


Figure 12-122. Delay Screen

Table 12-27. Regulation Settings

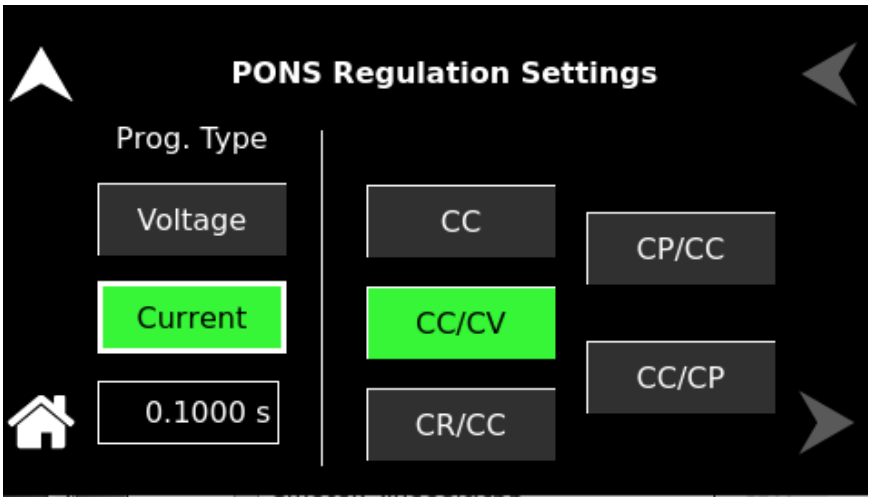


Figure 12-123. PONS regulation Settings

b) When the programming type is set to 'Current' in the Regulation Settings menu, the following fields are available:

ENTRY	DESCRIPTION
CC/CV	In this regulation setting, output current is regulated to the user set value. On reaching the voltage limit (high or low), output would be regulated to the voltage limit reached. On reaching the power limit (negative), the output current would be programmed to zero.
CP/CC	In this regulation setting, output power is regulated to the user set value. On reaching the current limit (negative), output would be regulated to the current limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero.
CR/CC	In this regulation setting, output resistance is regulated to the user set value. On reaching the current limit (negative), output would be regulated to the current limit reached. On reaching the voltage limit (high or low), the output current would be programmed to zero.
CC/CP	In this regulation setting, output power is regulated to the user set value. On reaching the power limit (negative), output would be regulated to the power limit reached. On reaching the voltage limit (high or low), the output power would be programmed to zero.
CC	In this regulation setting, output current is regulated to the user set value. On reaching the set voltage limit (high or low) or power limit (negative), the output current would be programmed to zero.
Delay	Sets the programmable time delay executed by the supply before setting the output to zero. The minimum time that can be set is 0.1 seconds, and the maximum is 5 seconds. Refer to Figure 12-124.

ENTRY	DESCRIPTION

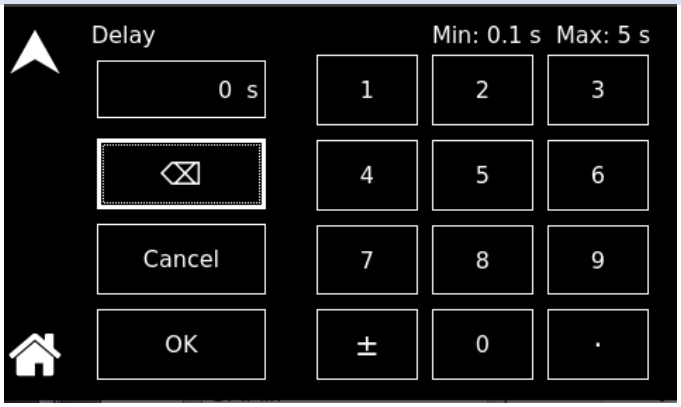


Figure 12-124. Delay Screen

Table 12-28. Regulation Setting

12.2.5.7.3 PONS OUTPUT PROGRAM

a) PONS Output Program (Voltage) - CV/CC, CV/CP and CV

When the regulation setting is selected as ‘Voltage (CV/CC, CV/CP and CV) ’, the screen will display the following parameters: ‘PONS Voltage’, ‘PONS Neg. Curr Limit’ and ‘PONS Neg. Pow Limit’. Refer to Figure 12-125.

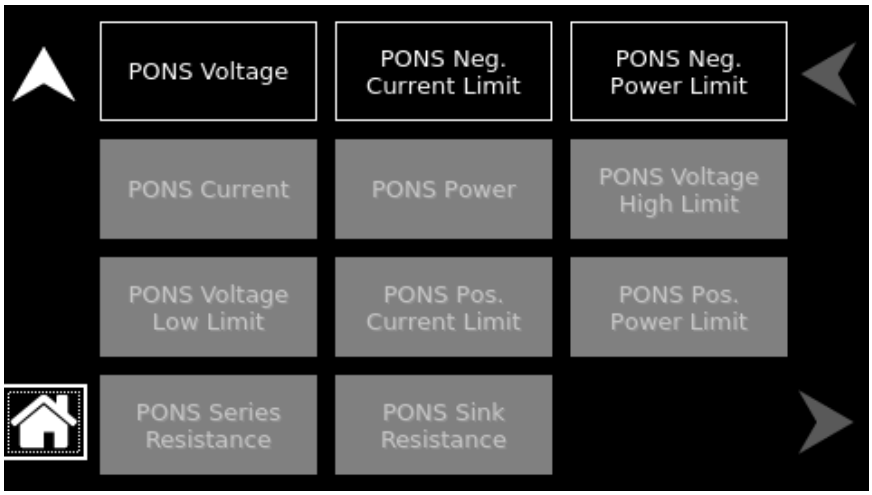


Figure 12-125. Pons Output Program mode – CV/CC and CV

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Voltage	Users can set a voltage value within the specified limit. Refer to Figure 12-126.

ENTRY	DESCRIPTION

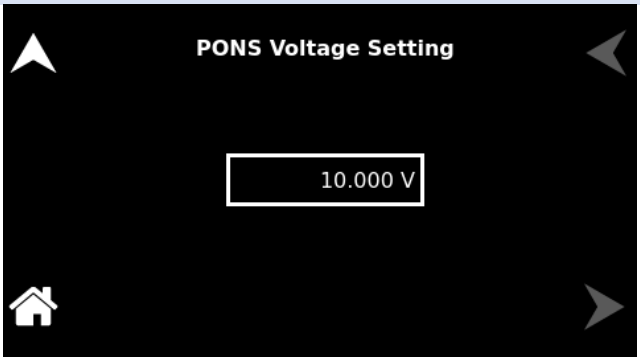


Figure 12-126. PONS Voltage Settings

NOTE: When the unit is in series operation (refer to Chapter 6), the 'PONS voltage setting' screen displays 'Voltage 1' and 'Voltage 2' for setting the output voltage of Leader and Follower.

NOTE: Voltage - CV is the only regulation setting in Series operation.

PONS Neg. Curr Limit Users can set a negative current limit value, which functions as trip limit (CV and CV/CP), or it regulates (CV/CC) the output upon reaching the PONS Neg. Curr Limit. Refer to Figure 12-127.

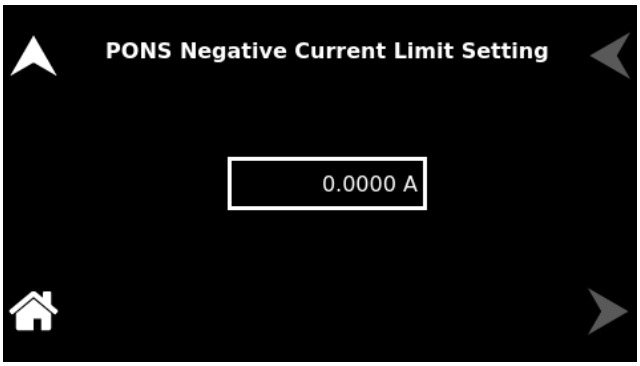


Figure 12-127. PONS Negative Current Limit Settings

PONS Neg. Pow Limit Users can set a negative power limit value, which functions as trip limit (CV and CV/CC), or it regulates (CV/CP) the output upon reaching the PONS Neg. Pow Limit. Refer to Figure 12-128.

ENTRY	DESCRIPTION

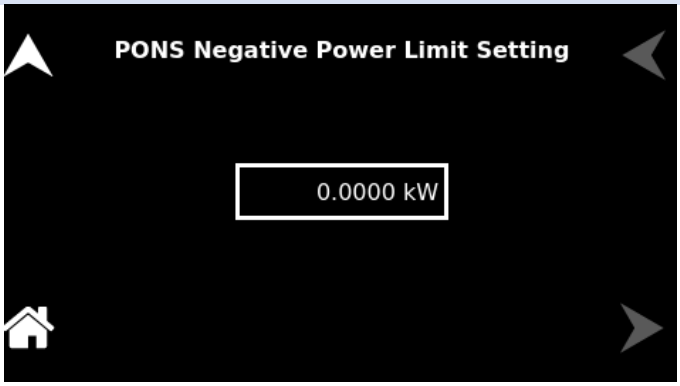


Figure 12-128. PONS Negative Power Limit Setting

Table 12-29. PONS Output Program Settings – CV/CC, CV/CP and CV

b) PONS Output Program (Voltage) – CR/CV

When the regulation setting is selected as ‘’Voltage (CR/CV)’, the screen will display the following parameters: ‘PONS Sink Resistance’, ‘PONS Voltage High Limit’, ‘PONS Voltage Low Limit’, and ‘PONS Neg. Current Limit’. Refer to Figure 12-129.

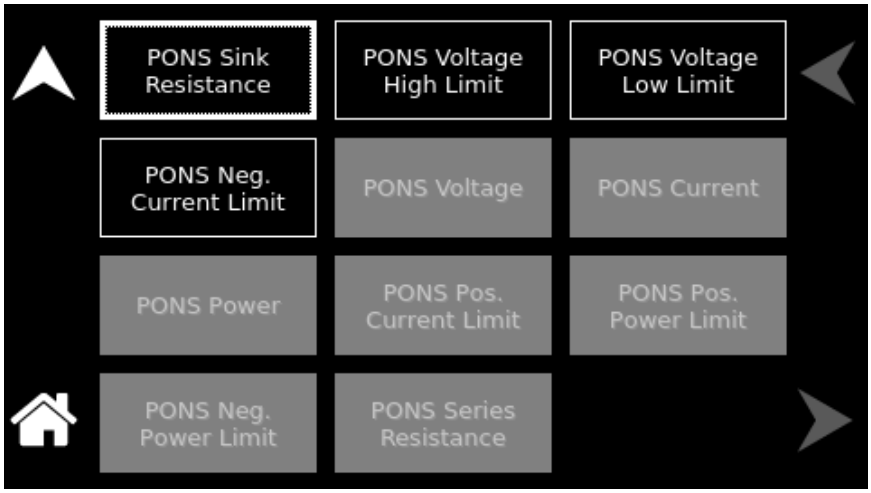


Figure 12-129. Pons Output Program mode – CR/CV

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Sink Resistance	Users can set the sink resistance value within the specified limit. Refer to Figure 12-130.

ENTRY	DESCRIPTION

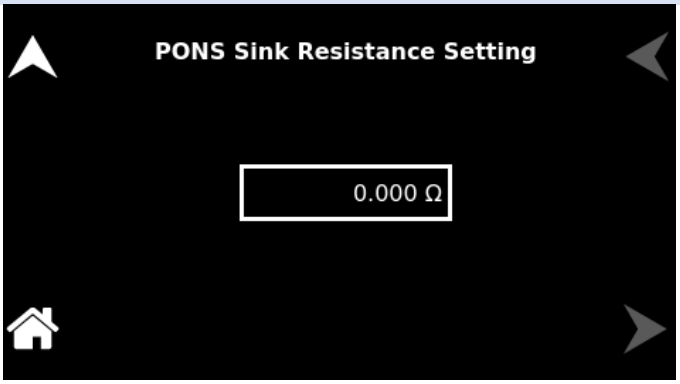


Figure 12-130. Series Resistance Setting

PONS Voltage High Limit

Users can set the voltage high limit value, and it regulates the output upon reaching the PONS Voltage High Limit. Refer to Figure 12-131.

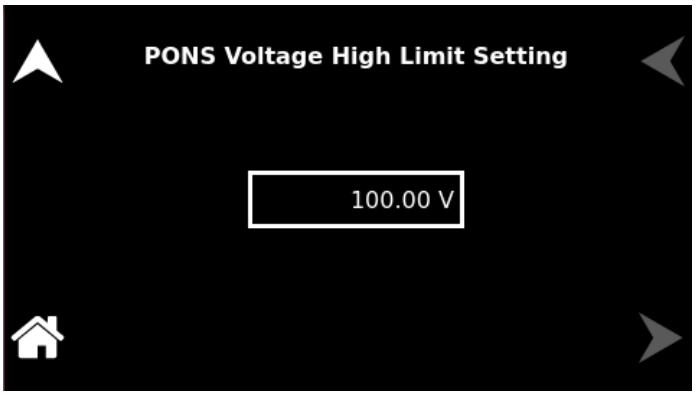


Figure 12-131. Voltage High Limit Setting

PONS Voltage Low Limit

Users can set the voltage low limit value, and it regulates the output upon reaching the PONS Voltage Low Limit. Refer to Figure 12-132.

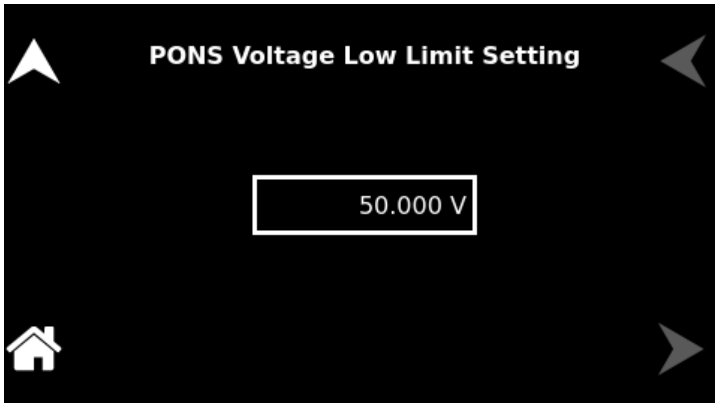


Figure 12-132. Voltage Low Limit Setting

PONS Neg. Current Limit

Users can set a negative current limit value, and which functions as a trip limit. Refer to Figure 12-133.

ENTRY	DESCRIPTION

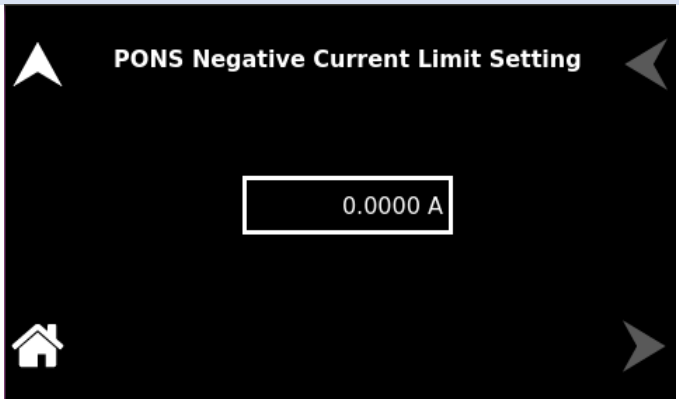


Figure 12-133. Negative Current limit setting screen

Table 12-30. PONS Output Program Settings

c) PONS Output Program (Voltage) – CP/CV

When the regulation setting is selected as ‘Voltage (CP/CV)’ the screen will display the following parameters: ‘PONS Power’, ‘PONS Voltage High Limit’, ‘PONS Voltage Low Limit’, ‘PONS Neg. Current Limit’. Refer to Figure 12-134.

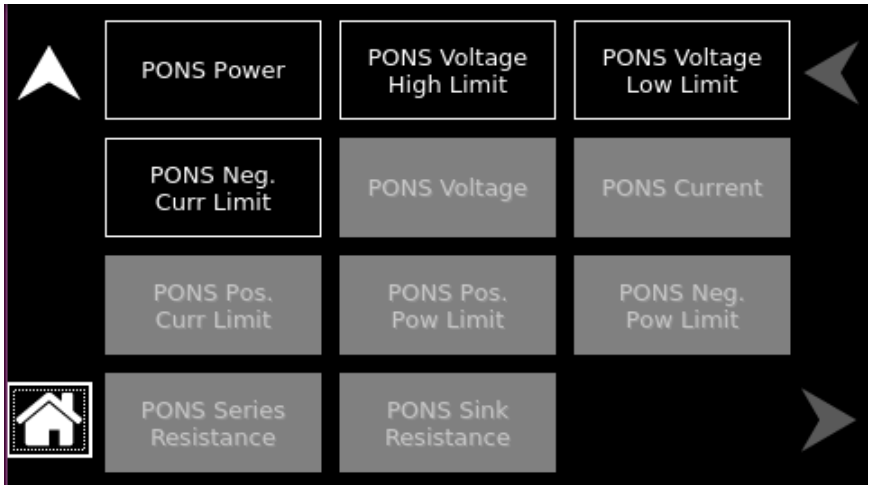


Figure 12-134. Pons Output Program mode – CP/CV

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Power	Users can set a power value within the specified limit. Refer to Figure 12-135.

ENTRY	DESCRIPTION

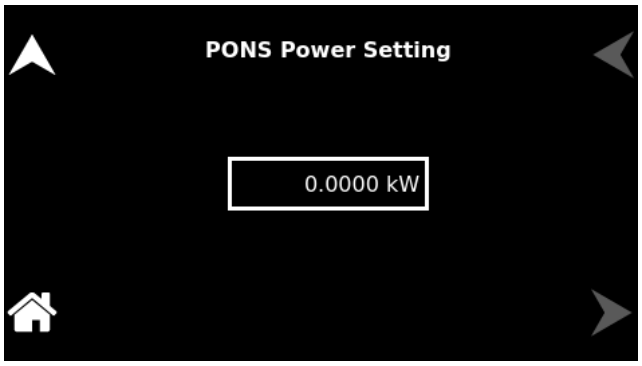


Figure 12-135. PONS Power Setting

PONS Voltage High Limit

Users can set the voltage high limit value, and it regulates the output upon reaching the PONS Voltage High Limit. Refer to Figure 12-136.

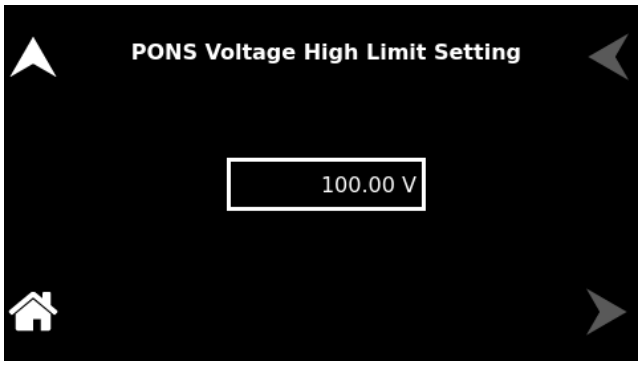


Figure 12-136. Voltage High Limit Setting

PONS Voltage Low Limit

Users can set the voltage high limit value, and it regulates the output upon reaching the PONS Voltage Low limit. Refer to Figure 12-137.

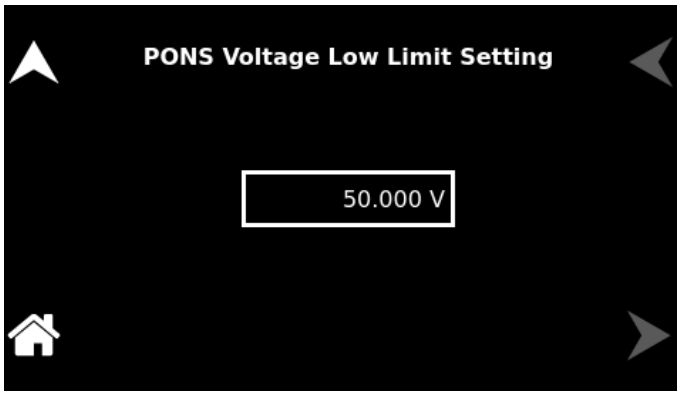


Figure 12-137. Voltage Low Limit Setting

PONS Neg.

Users can set a negative current limit value, and which functions as a trip limit. Refer to Figure 12-138.

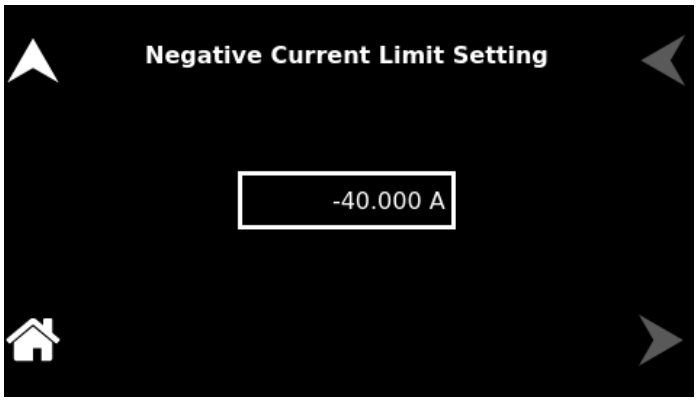
ENTRY	DESCRIPTION
Current Limit	

Figure 12-138. Negative Current Limit Setting

Table 12-31. PONS Output Program Settings

d) PONS Output Program (Current) - CC/CV, CC/CP and CC

When the regulation setting is selected as ‘Current (CC/CV, CC/CP and CC) ’ the screen will display the following parameters: ‘PONS Current’, ‘PONS Voltage High Limit’, ‘PONS Voltage Low Limit’, ‘PONS Pos. Pow Limit’ and ‘PONS Output State’. Refer to Figure 12-139.

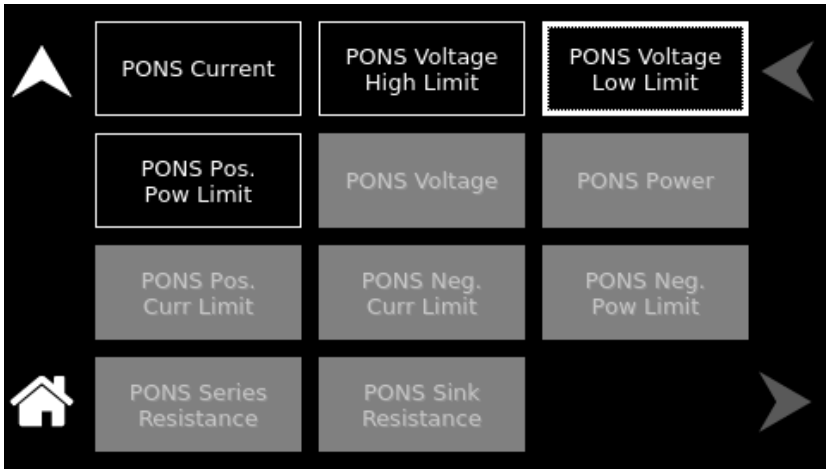


***Figure 12-139. Pons Output Program mode* –CC/CV and CC**

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Current	Users can set the PONS Current value within the specified limit. Refer to Figure 12-140.

ENTRY	DESCRIPTION

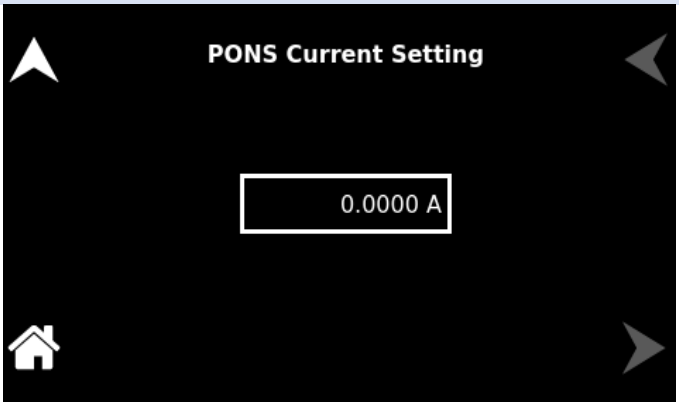


Figure 12-140. Current Setting

PONS Voltage High Limit

Users can set voltage high limit value, which functions as trip limit (CC and CC/CP), or it regulates (CC/CV) the output upon reaching the PONS Voltage High Limit. Refer to Figure 12-141.

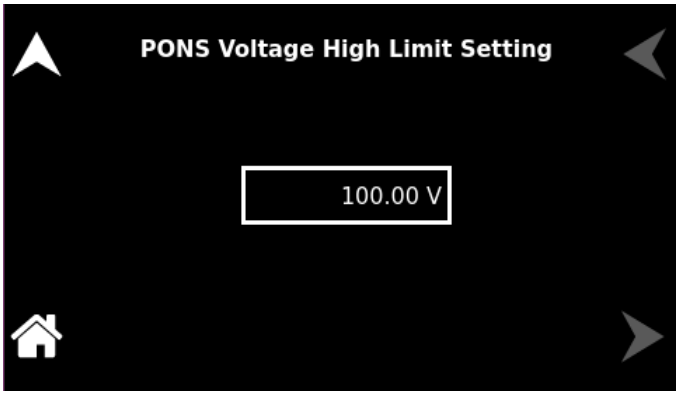


Figure 12-141. Voltage High Setting

PONS Voltage Low Limit

Users can set voltage low limit value, which functions as trip limit (CC and CC/CP), or it regulates (CC/CV) the output upon reaching the PONS Voltage Low Limit. Refer to Figure 12-142.

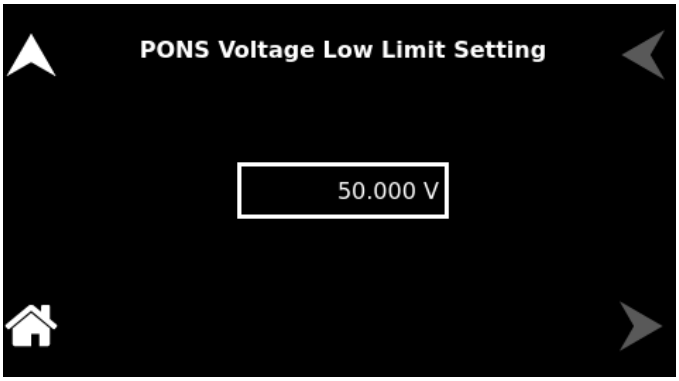


Figure 12-142. Voltage Low Setting

ENTRY	DESCRIPTION
PONS Neg. Power Limit	Users can set a negative power limit value, which functions as a trip limit (CC and CC/CV), or it regulate (CC/CP) the output upon reaching the PONS Neg. Power limit. Refer to Figure 12-143.

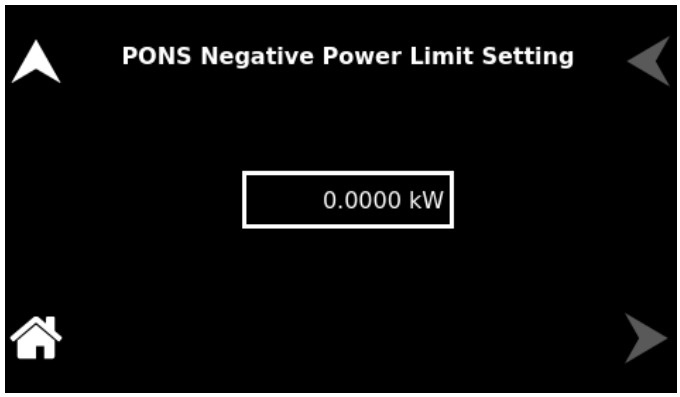


Figure 12-143. Positive Power Limit

Table 12-32. PONS Output Program Settings

e) PONS Output Program (Current) - CP/CC

When the regulation setting is selected as ‘Current (CP/CC) ’ the screen will display the following parameters: ‘PONS Power’, ‘PONS Voltage High Limit’, ‘PONS Voltage Low Limit’, ‘PONS Neg. Current Limit’. Refer to Figure 12-144.

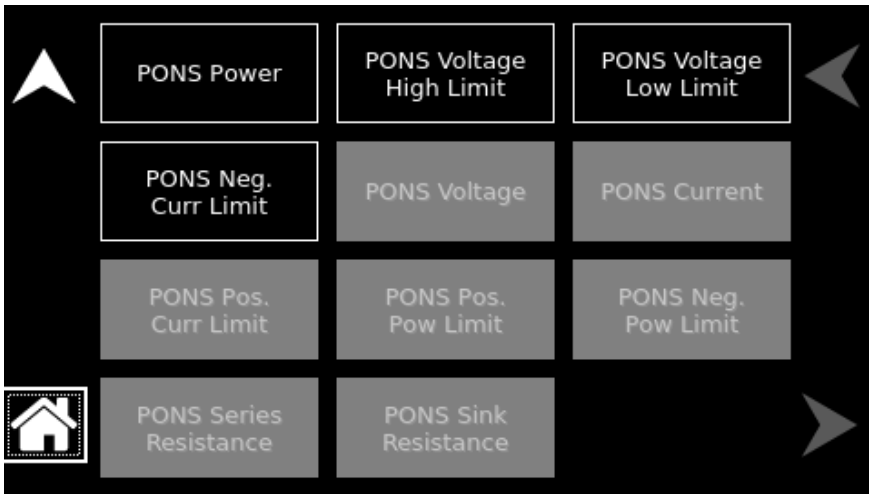


Figure 12-144. Pons Output Program mode – CP/CC

The PONS Output Program Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Power	Users can set PONS power value within the specified limit. Refer to Figure 12-145.

ENTRY	DESCRIPTION

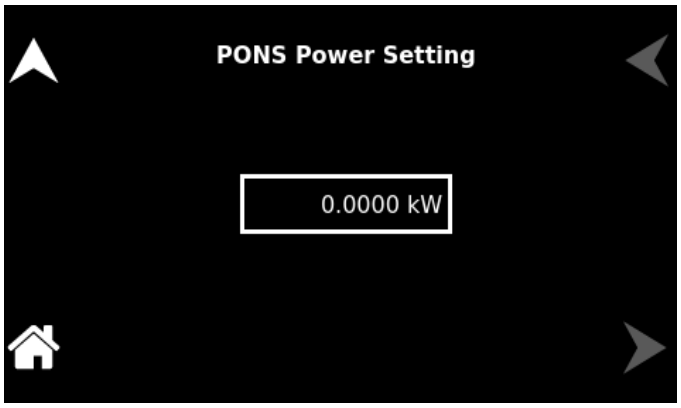


Figure 12-145. Power Settings

PONS Voltage High Limit

Users can set voltage high limit value, and which functions as a trip limit. Refer to Figure 12-146.

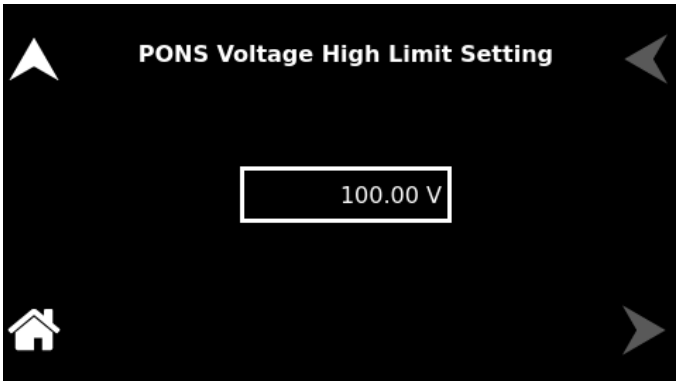


Figure 12-146. Volt High Setting

PONS Voltage Low Limit

Users can set voltage low limit value, and which functions as a trip limit. Refer to Figure 12-147.

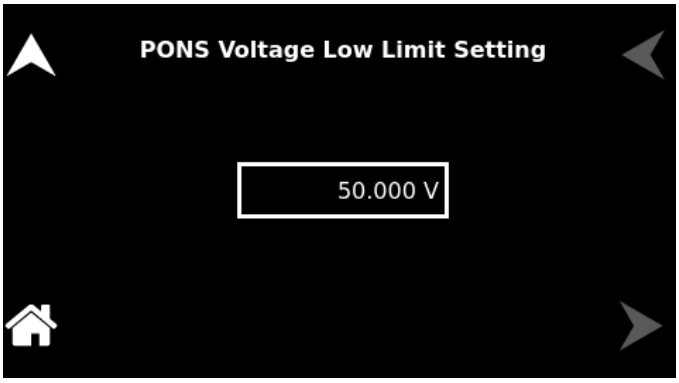


Figure 12-147. Volt Low Setting

ENTRY	DESCRIPTION
PONS Neg. Current Limit	Users can set negative current limit value, and it regulates the output upon reaching the PONS Neg. Current Limit. Refer to Figure 12-148.

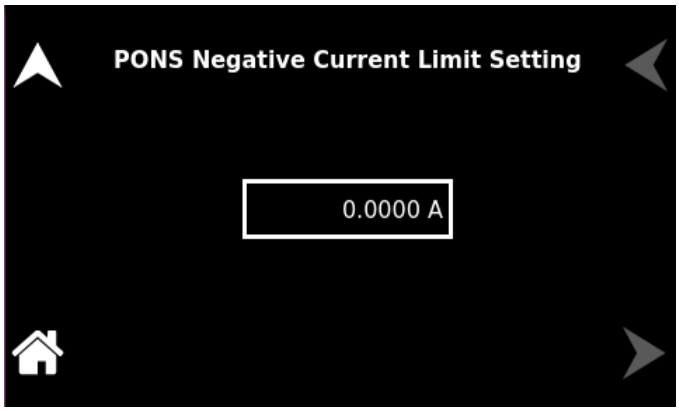


Figure 12-148. Negative Current Limit Setting

Table 12-33. PONS Output Program Setting

f) PONS Output Program (Current) - CR/CC

When the regulation setting is selected as ‘Current (CR/CC) ’ the screen will display the following parameters: ‘PONS Voltage High Limit’, ‘PONS Voltage Low Limit’, and ‘PONS Neg. Current Limit’. Refer to Figure 12-149.

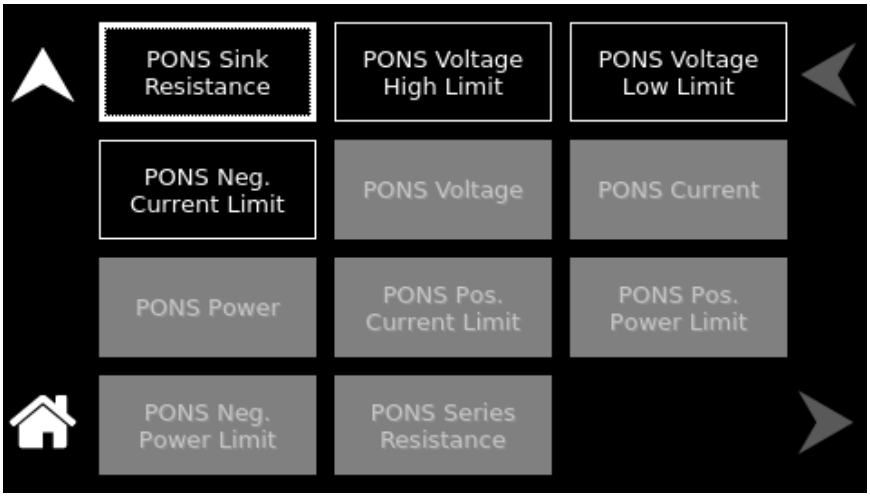


Figure 12-149. PONS Output Program – CR/CC

ENTRY	DESCRIPTION
PONS Sink Resistance	Users can set the sink resistance value within the specified limit. Refer to Figure 12-150.

ENTRY	DESCRIPTION

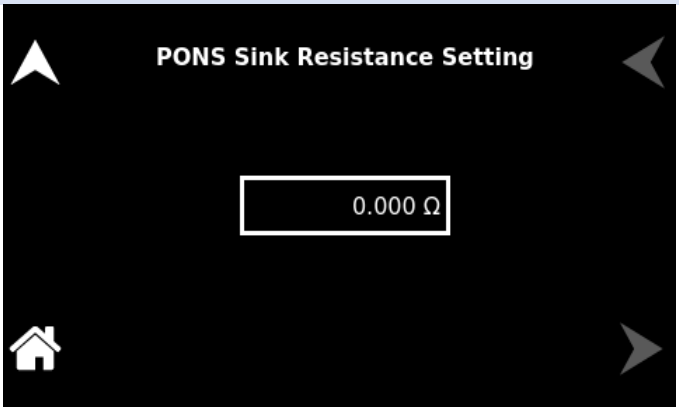


Figure 12-150. Series Resistance Setting

PONS Voltage High Limit Users can set the voltage high limit value, and which functions as a trip limit. Refer to Figure 12-151.

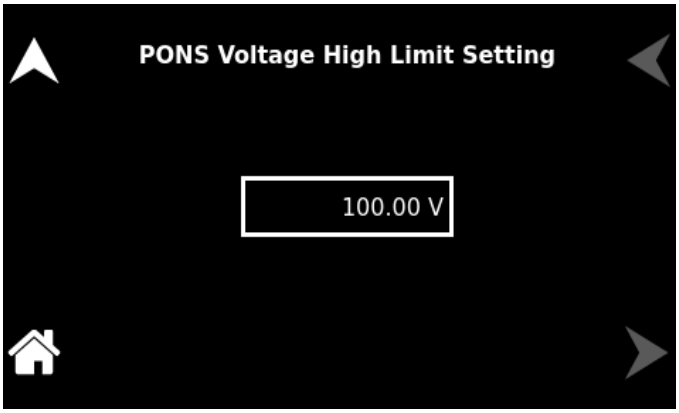


Figure 12-151. Voltage High Limit Setting

PONS Voltage Low Limit Users can set the voltage low limit value, and which functions as a trip limit. Refer to Figure 12-152.

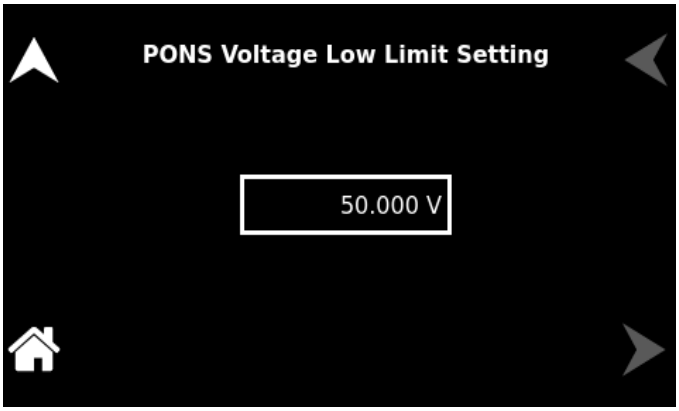


Figure 12-152. Voltage Low Limit Setting

ENTRY	DESCRIPTION
PONS Neg. Current Limit	Users can set a negative current limit value, and it regulates the output upon reaching the PONS Neg. Current Limit. Refer to Figure 12-153.

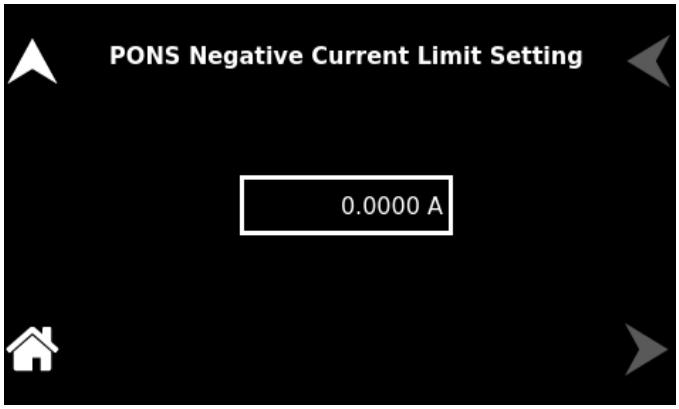


Figure 12-153. Negative Current limit setting screen

Table 12-34. PONS Output Program Settings

12.2.5.7.4 PONS CONFIGURATION

In the PONS Configuration settings, the menu enables users to select 'PONS Protection', 'PONS Slew Rate', 'PONS User Limit', 'PONS External Relay', 'PONS Output Sense', 'PONS Measurement Average Samples', 'PONS Analog', 'PONS Remote Inhibit', 'PONS Remote Output', 'PONS AC Input Line' and 'PONS Parallel Operation Mode (enabled only in parallel operation)'. Refer to Figure 12-154 and Figure 12-155.

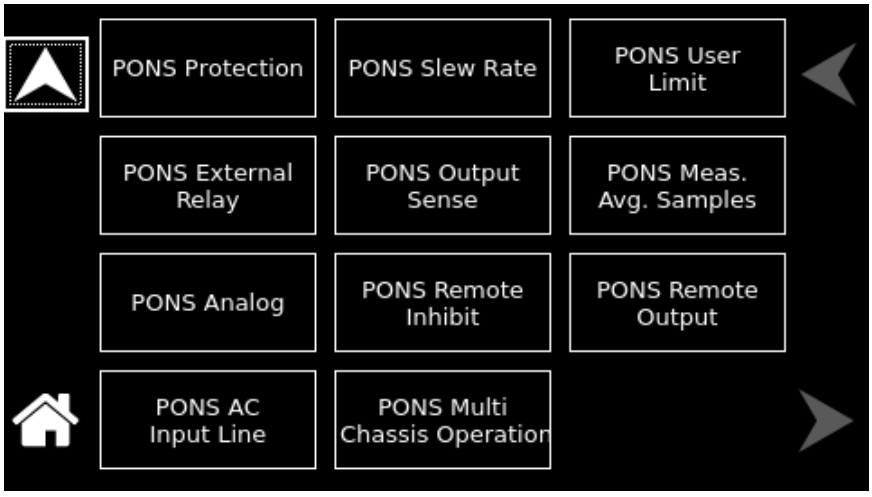


Figure 12-154. PONS Configuration mode

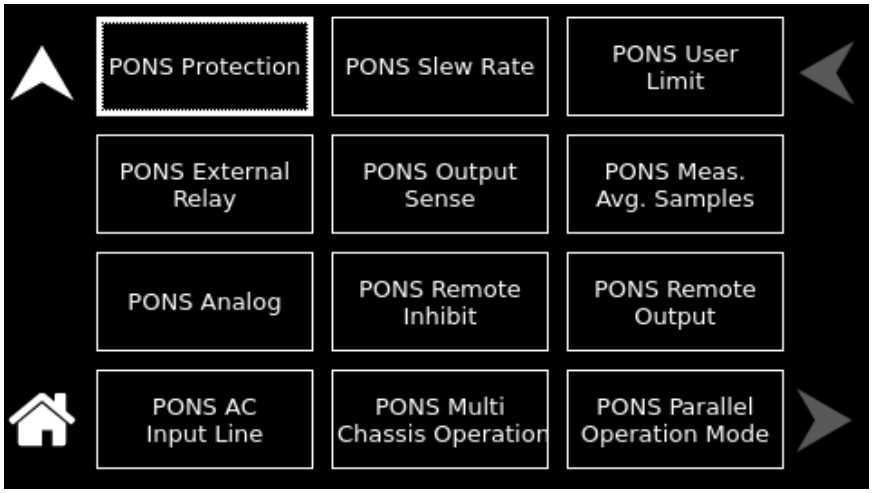


Figure 12-155. PONS Configuration mode – Parallel Operation

When ‘Series’ or ‘Series Split Phase’ is selected in ‘PONS Multi Chassis Operation’, the PONS Configuration settings menu enables users to select ‘PONS Protection’, ‘PONS Slew Rate’, ‘PONS User Limit’, ‘PONS Measurement Average Samples’, ‘PONS Remote Inhibit’, ‘PONS Remote Output’, ‘PONS AC Input Line’, ‘PONS Multi Chassis Operation’. Refer to Figure 12-156.

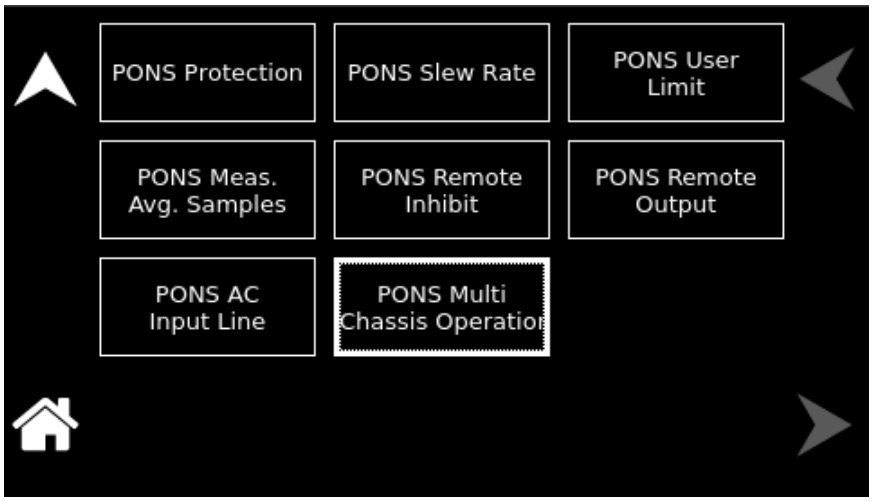


Figure 12-156. PONS Configuration Screen – Series Operation

The PONS Configuration Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Protection	Users can define OVP and Pos. OCP to help safeguard their devices from electrical anomalies by shutting down the output if it exceeds the preset voltage. Refer to Figure 12-157.

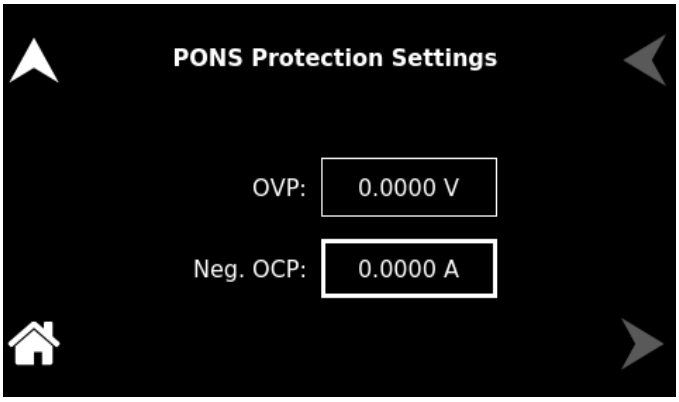


Figure 12-157. PONS Protection Settings

PONS Slew Rate

Users can configure the voltage, current and power slew rate. This allows for precise control over the voltage,current and power, ensuring smoother transitions and better performance of the power supply. Adjusting these settings can help in optimizing the response time and stability of the system. Refer Figure 12-158 to Figure 12-160.

Slew rate is not applicable for the sink resistance. When the program type is set to ‘Voltage - CR/CV or Current - CR/CC’ in the regulation settings, the slew settings screen that appears will be ‘Not applicable for ‘CR/CV’ Reg. Settings’ or ‘Not applicable for ‘CR/CC’ Reg. Settings’.

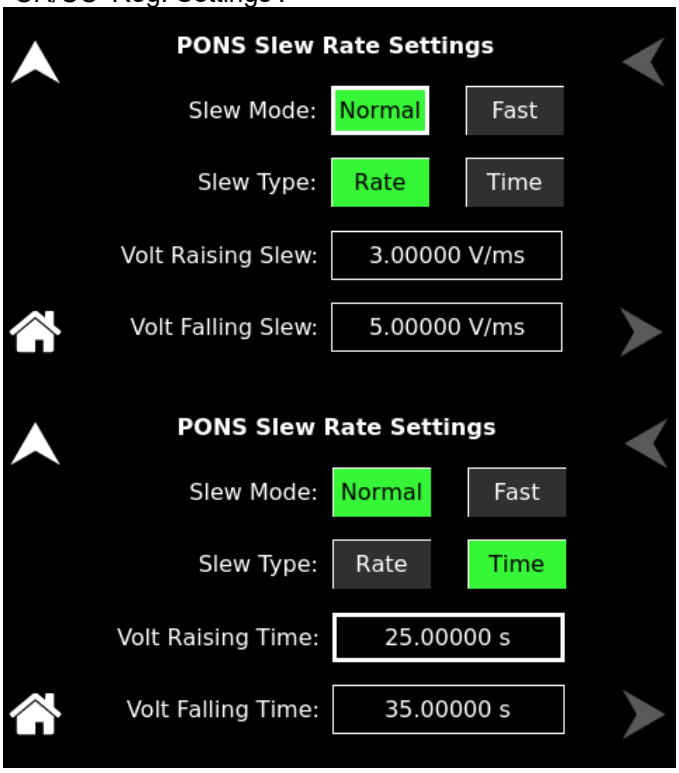
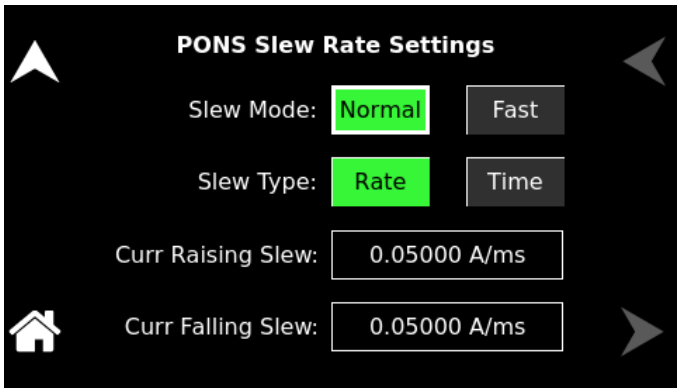


Figure 12-158. PONS Slew Rate Settings – Voltage (CV/CC, CR/CV CV/CP and

ENTRY	DESCRIPTION

CV)



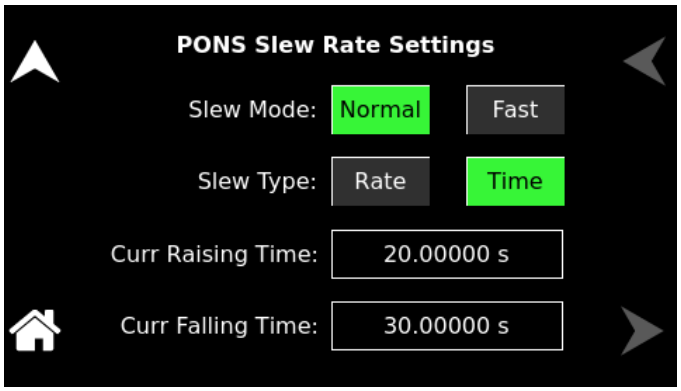
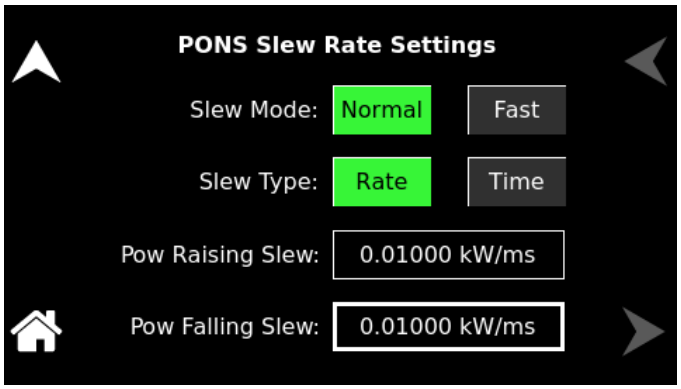


Figure 12-159. PONS Slew Rate Settings – Current (CC/CV, CC/CP, CR/CC and CC)



ENTRY	DESCRIPTION

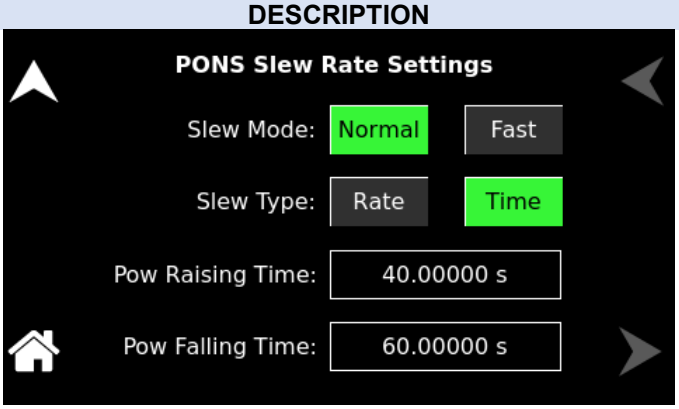


Figure 12-160. PONS Slew Rate Settings – Power (CP/CV and CP/CC)

Refer to Sections 2.11 and 2.12 for detailed information on the 'Normal' and 'Fast' Slew Modes in the Slew Rate Settings.

PONS User Limit

Users can set the voltage, current and power high limit value. Refer Figure 12-161 to Figure 12-163.

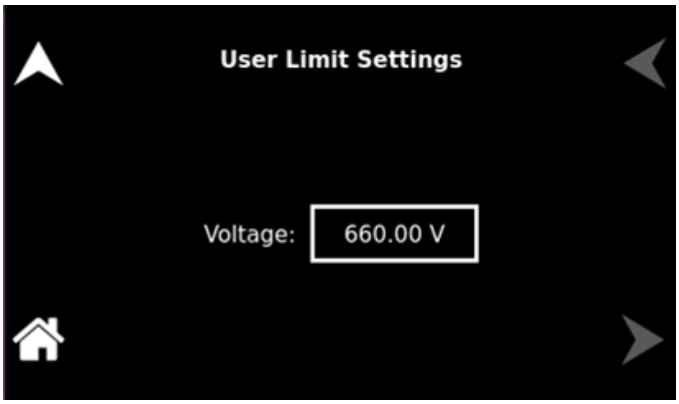


Figure 12-161. PONS User Limit Settings- Voltage (CV/CC, CV/CP and CV)

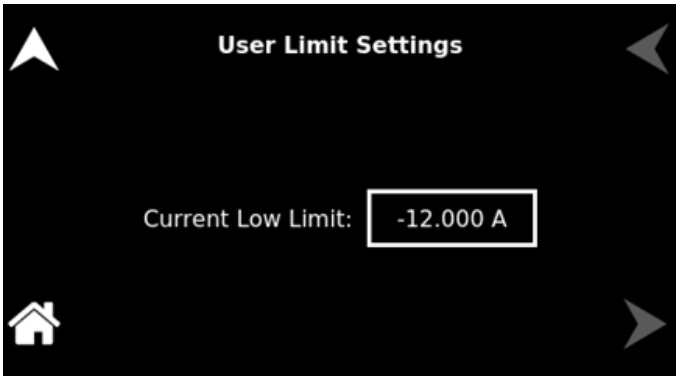


Figure 12-162. PONS User Limit Settings – Current (CC/CV, CC/CP and CC)

ENTRY	DESCRIPTION

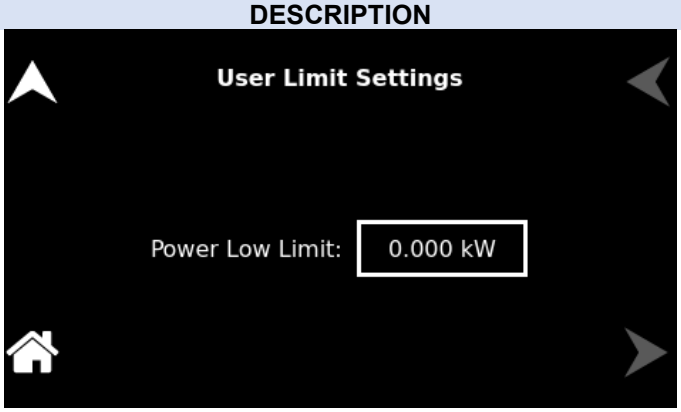


Figure 12-163. PONS User Limit Settings- Power (CP/CV and CP/CC)

User limit Settings is not applicable for the sink resistance. When the program type is set to 'Voltage - CR/CV or Current - CR/CC' in the regulation settings, the user limit settings screen that appears will be 'Not applicable for Sink Resistance Regulation Settings'. Refer to Figure 12-164.

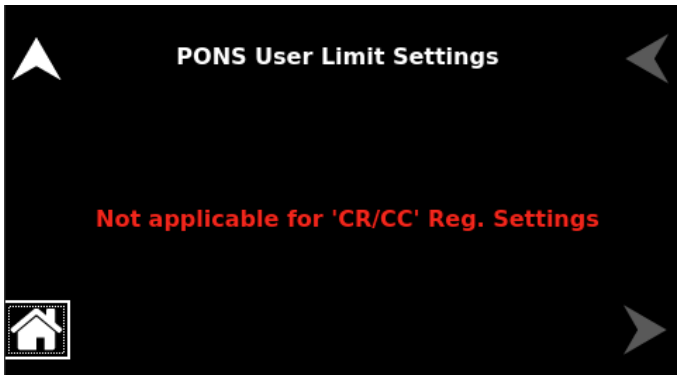


Figure 12-164. User Limit Settings- CR/CV and CR/CC

PONS External Relay

Users can set the isolation relay to either 'Enable' or 'Disable'. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 12-165.

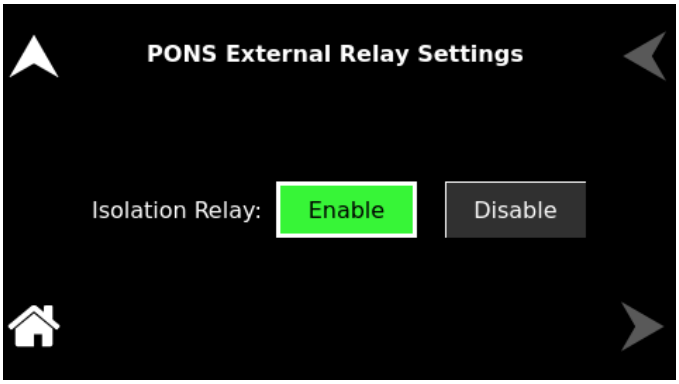


Figure 12-165. PONS External Relay Settings

ENTRY	DESCRIPTION
PONS Output Sense Settings	User can program the PONS output to 'Local' or 'Remote'. Refer to Figure 12-166.

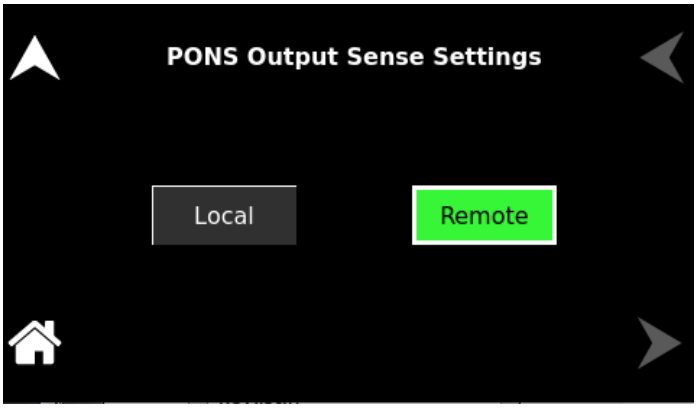


Figure 12-166. PONS Output Sense Settings

PONS Measurement Average Samples	Users can specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 12-167.

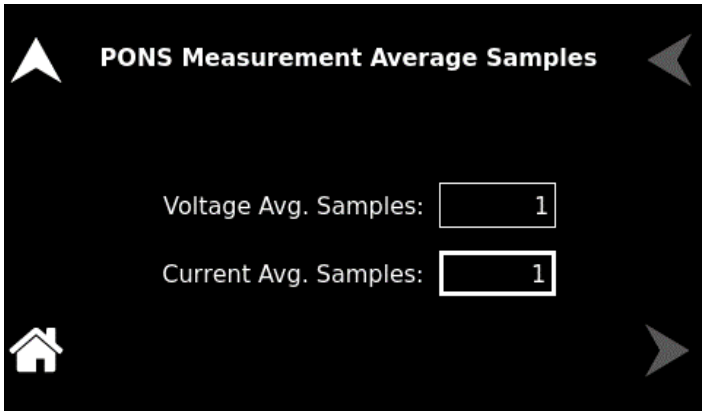


Figure 12-167. PONS Measurement Average Samples

PONS Analog	Configures the PONS Analog programming interface, refer to Figure 12-168.

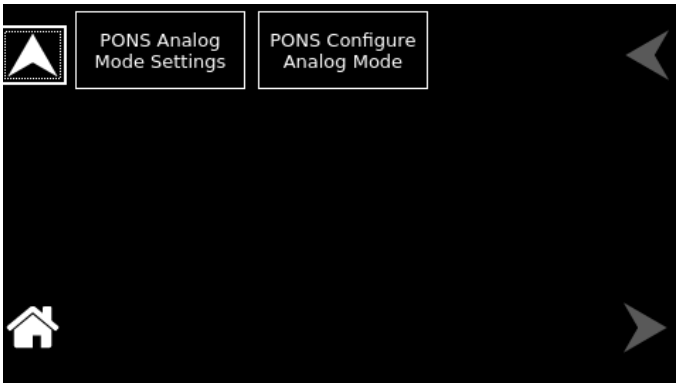


Figure 12-168. PONS Analog Screen

c) PONS Analog Mode Settings

ENTRY	DESCRIPTION

Lists the configuration settings of the PONS Analog Programming interface. Refer to Figure 12-169.

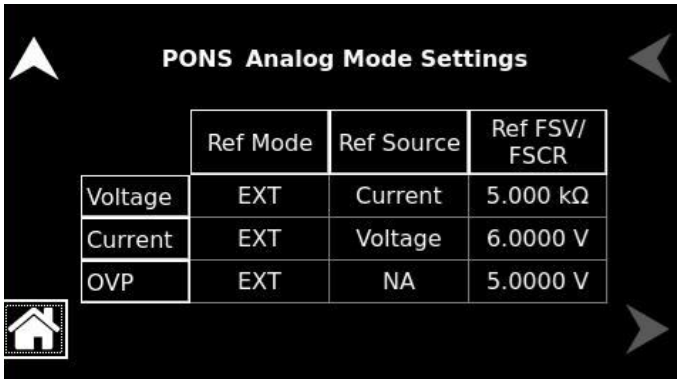


Figure 12-169. PONS Analog Mode Settings

d) PONS Configure Analog Mode

Sets parameter values and controls operation of the PONS Analog Programming interface. Refer to Figure 12-170.

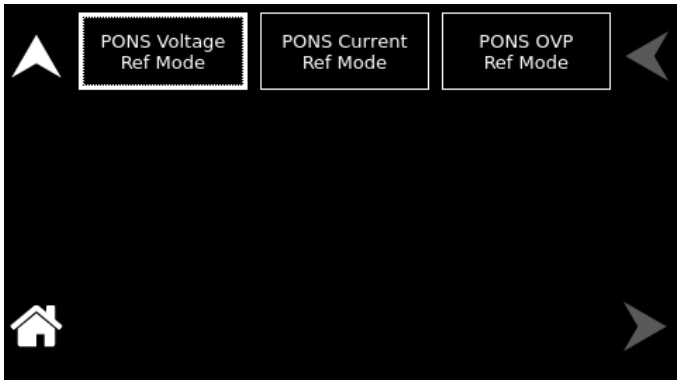
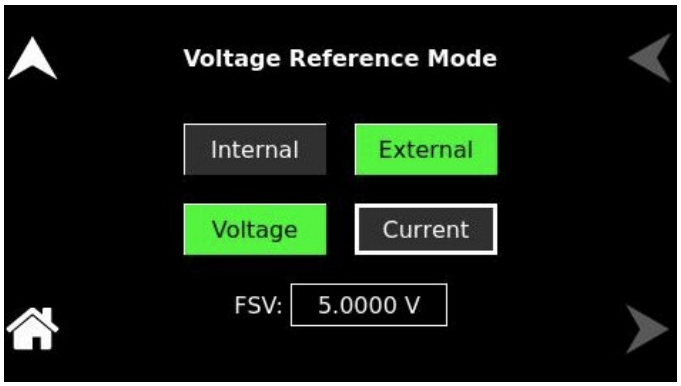


Figure 12-170. PONS Configure Analog Mode Settings

- **PONS Voltage Ref Mode :** Configures the PONS Voltage Reference Mode, refer to Figure 12-171. When the PONS Voltage Reference Mode is set to External, the Voltage setting field on the Dashboard screen and the 'Voltage' option in the Output Program screen will be disabled, and these Voltage fields will display as 'EXT'. Refer Figure 12-172 and Figure 12-173.



ENTRY	DESCRIPTION

Figure 12-171. PONS Voltage Reference Mode

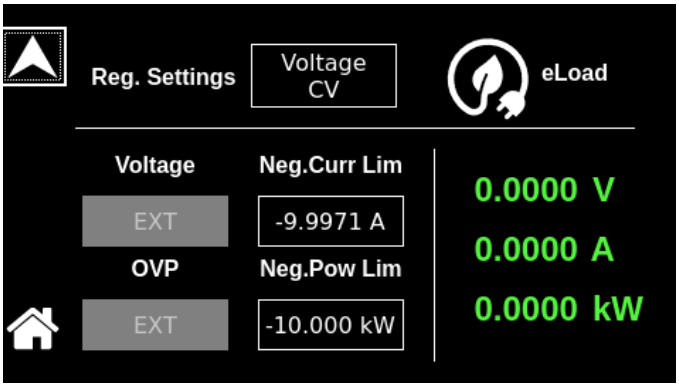


Figure 12-172. Dashboard Screen – Voltage (EXT)

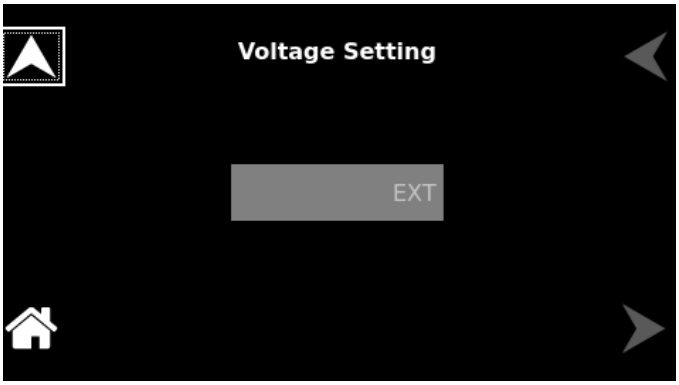


Figure 12-173. Output Program Screen – Voltage (EXT)

When Voltage Reference Mode is selected as Current, FSCR (Full Scale Current Resistance) unit will be kΩ (k Ohms). Refer to Figure 12-174.

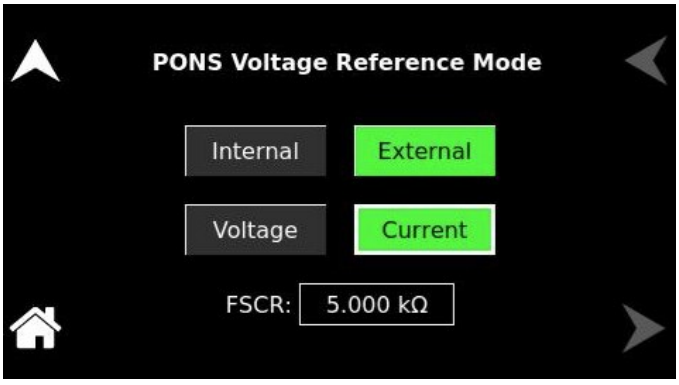


Figure 12-174. PONS Voltage Reference Mode – Resistive

- **PONS Current Ref Mode:** Configures the PONS Current Reference Mode, refer to Figure 12-175. When the PONS Current Reference Mode is set to External, the Voltage setting field on the Dashboard screen and the 'Voltage'

ENTRY	DESCRIPTION

option in the Output Program screen will be disabled, and these Voltage fields will display as ‘EXT’. Refer to Figure 12-176.

NOTE: ‘Current’ is only applicable for eLoad mode. When you select the ‘Current’, the screen display as ‘Only applicable for Source Mode’

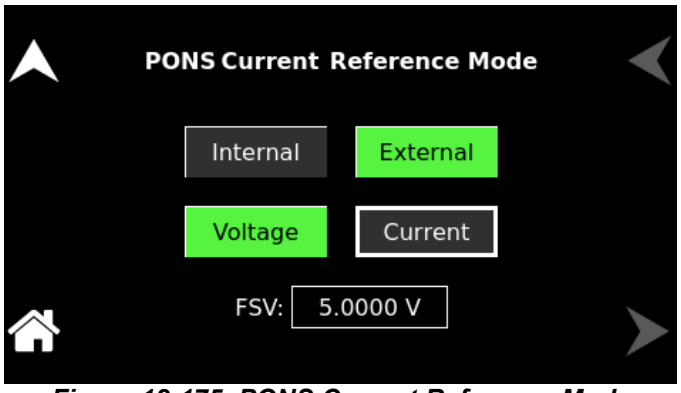


Figure 12-175. PONS Current Reference Mode

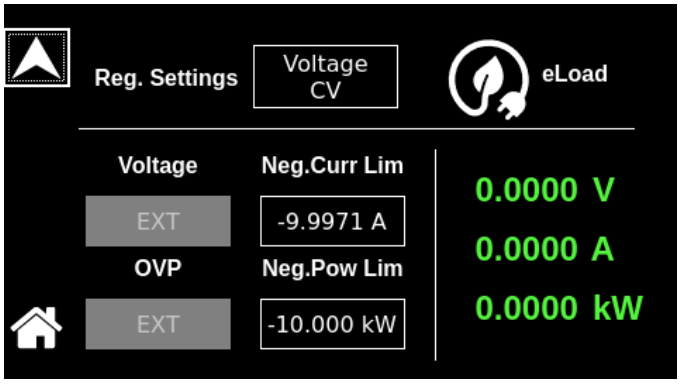
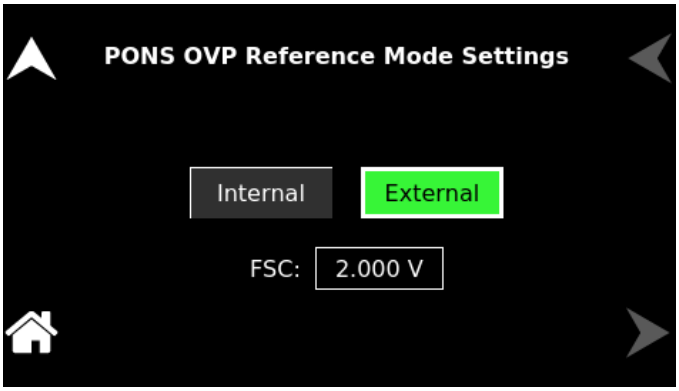


Figure 12-176. Dashboard Screen – Current (EXT)

- **PONS OVP Ref Mode:** Configures the PONS Over Voltage Protection (OVP) Reference Mode. When the PONS OVP Reference Mode is set to External, the OVP setting field on the Dashboard screen and the ‘Protection’ option in the Configuration screen will be disabled, and these OVP fields will display as ‘EXT’ refer to Figure 12-177.



ENTRY	DESCRIPTION

Figure 12-177. PONS OVP Reference Mode

PONS Remote Inhibit

User can control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 12-178.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

Remote inhibit can be configured in three modes;

- **Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output.
- **Live:** after reclosing the contact, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

b) Remote Inhibit Input – Active Source

An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply.

Remote inhibit can be configured in three modes;

- **Latch:** after removing the active voltage source, user needs to clear the fault and turn ON the output.
- **Live:** after removing the active voltage source, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

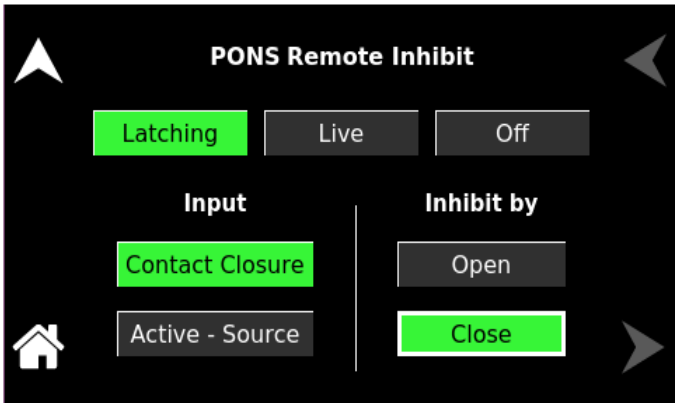


Figure 12-178. PONS remote Inhibit

ENTRY	DESCRIPTION
PONS Remote Output	User can program the PONS Remote output to ON or OFF state. Refer to Figure 12-179.

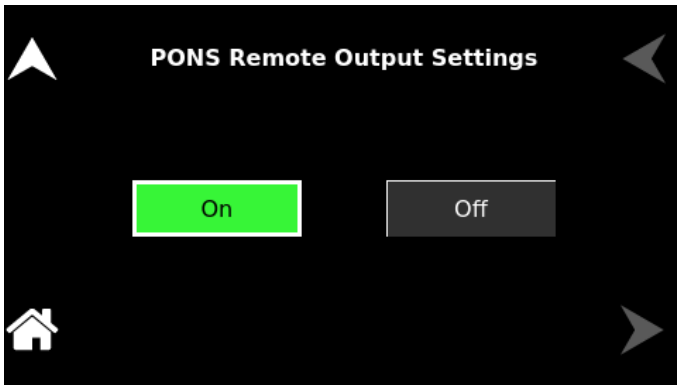


Figure 12-179. PONS Remote Output settings

PONS AC Input Line

User can select either the High Line or Low Line option based on the required input voltage range. Refer to Figure 12-180.

a) High Line: The nominal High Line Input range is 380 to 480 VAC.

b) Low Line: The nominal Low line input range is 200 to 240 VAC.

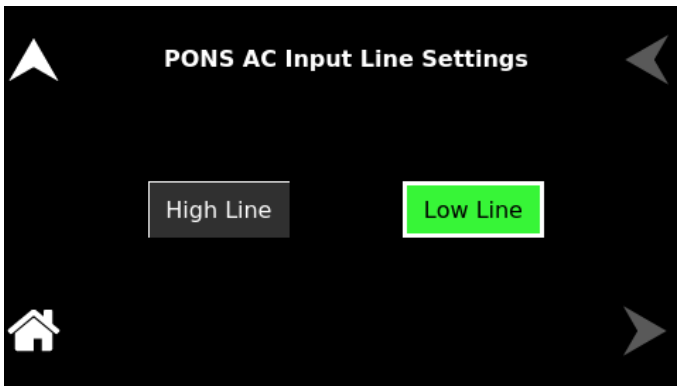


Figure 12-180. AC Input Line Settings

PONS Multi Chassis Operation

Users can select the operation setting to Parallel or Series (Grounded or Non-Grounded) or Series Split Phase (Grounded or Non-Grounded). The unit determines the connection type based on the selected option. Refer to Figure 12-181.

NOTE: If the unit is operating in standalone mode and the user selects the Parallel or Series or Series Split phase option, the selection remains enabled on the display; however, the setting does not affect unit operation.

a) Parallel: Configure to perform parallel operation mode. Refer to Chapter 5.

b) Series: Configure to perform series operation mode, used when there is no connection to the load's common terminal from the leader and follower units.

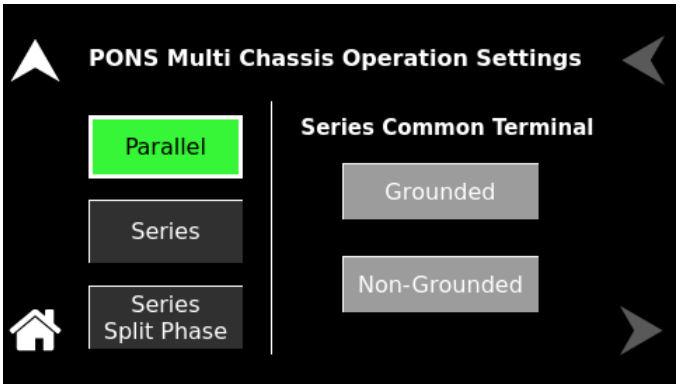
ENTRY	DESCRIPTION

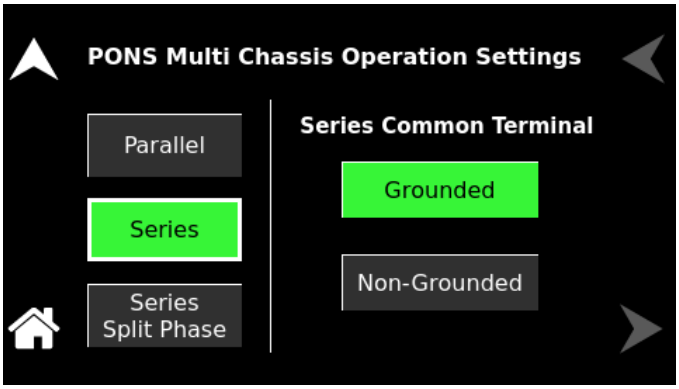
Refer to Chapter 6.

- **Grounded:** When either the Leader's negative (-) terminal or the Follower's positive (+) terminal is connected to the chassis earth.
- **Non-Grounded:** When either the Leader's negative (-) terminal or the Follower's positive (+) terminal is not connected to the chassis earth.

c) Series Split Phase: Configure to perform series split phase operation mode used when there is a connection to the load's common terminal from the leader and follower units. Refer to Chapter 6.

- **Grounded:** When either the Leader's negative (-) terminal or the Follower's positive (+) terminal is connected to the chassis earth.
- **Non-Grounded:** When either the Leader's negative (-) terminal or the Follower's positive (+) terminal is not connected to the chassis earth.





ENTRY	DESCRIPTION

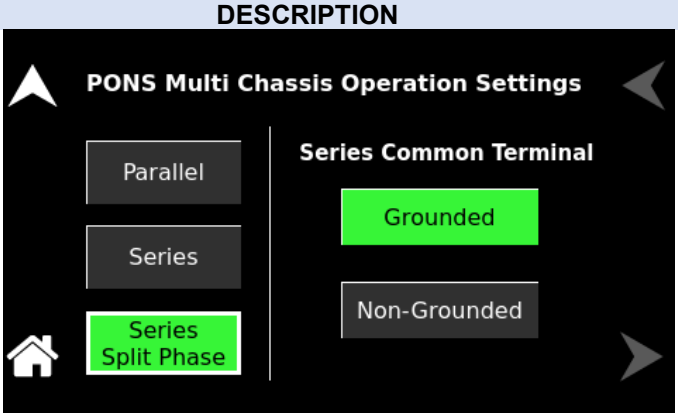


Figure 12-181. PONS Parallel Multi Chassis Operation Settings

When 'Series' or 'Series Split Phase' is selected, the main PONS Configuration screen displays only the supported settings. Refer to Figure 10-141.

PONS Parallel Operation Mode

User can select the parallel operation mode settings to Max Power or Max Current. Refer to Figure 12-182.

NOTE: Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel.

a) Max Power: Configure to deliver maximum power by limiting the overall current.

b) Max Current: Configure to deliver maximum current by limiting the overall power.

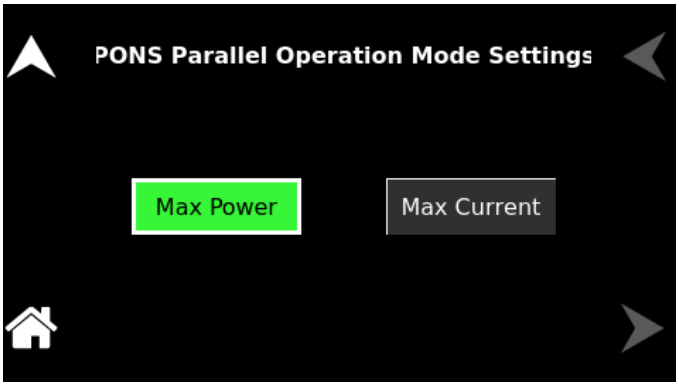


Figure 12-182. PONS Parallel Operation Mode Settings

Table 12-35. PONS Configuration mode

12.2.5.8 MEASUREMENT AVERAGE SAMPLES

The Measurement Average Samples Settings Menu allows the user to specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 12-183.

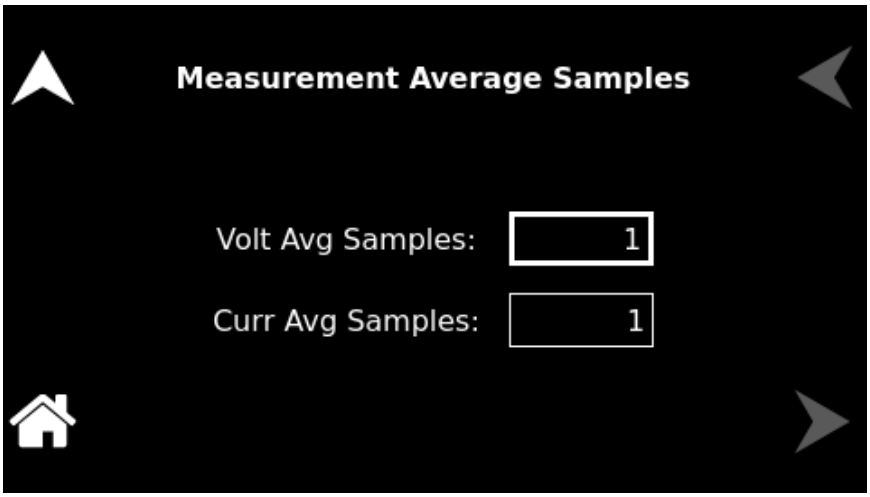


Figure 12-183. Measurement Average Samples

The Measurement Average Samples Settings menu has the following fields:

ENTRY	DESCRIPTION
Volt Avg Samples	Sets the number of voltage readings to average together to reduce noise in the voltage readback. Allows to set a value between 1 to 8.
Curr Avg Samples	Sets the number of current readings to average together to reduce noise in the current readback. Allows to set a value between 1 to 8. The value of 1 (factory default) provides the fastest response time in the readings, but less rejection of noise.

Table 12-36. Measurement Average Samples Settings menu

12.2.5.9 PARALLEL OPERATION MODE

The Parallel Operation Mode setting is enabled only when the Mi-BEAM power supply is in parallel operation. This menu allows the user to achieve either maximum power or maximum current during parallel operation. When ‘Max Current’ is selected, the system delivers maximum current by limiting the overall power, whereas when ‘Max Power’ is selected, the system delivers maximum power by limiting the overall current. Refer to Figure 12-184.

NOTE: Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel.

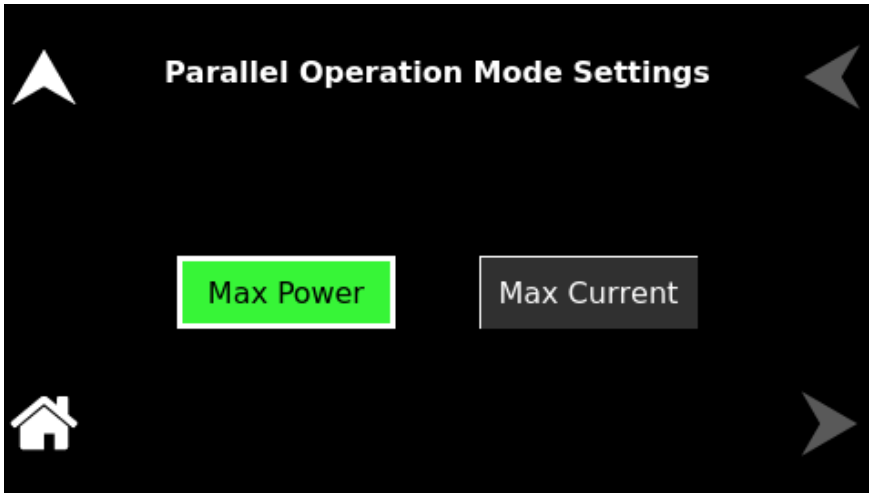


Figure 12-184. Parallel Operation Mode Settings

12.2.6 CONTROL INTERFACE SCREEN

The Control Interface screen provides ‘LAN’, ‘RS232’, ‘USB’, ‘External CAN (Default)’, ‘GPIB’ (available only when Mi-BEAM power supply is equipped with a GPIB interface) ’, ‘Analog, ‘Remote inhibit’ and ‘Remote Output’. For the top-level menu of the Control Interface Screen, refer to Figure 12-185 and for instructions on how to navigate to the Control interface screen, refer to Section 9.4.2.2.

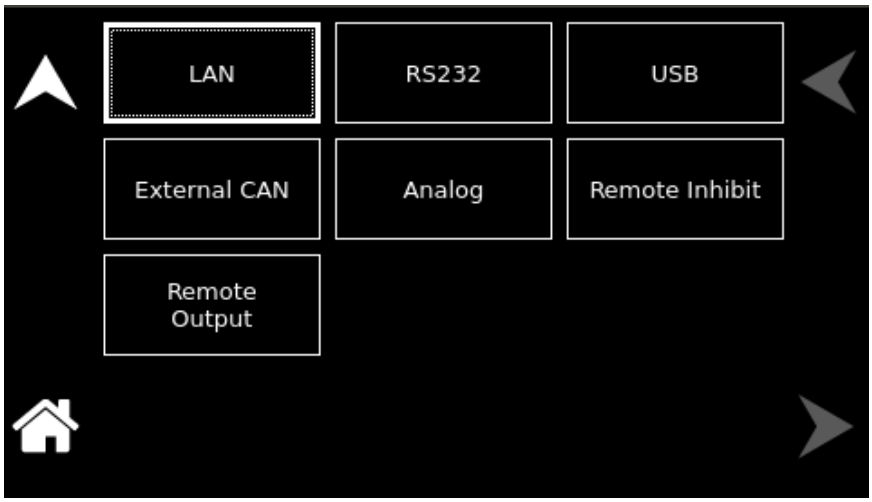


Figure 12-185. Control Interface Screen Top-Level Menu

When the Mi-BEAM power supply is equipped with a GPIB interface, the control interface screen menu changes. Refer to Figure 12-186.

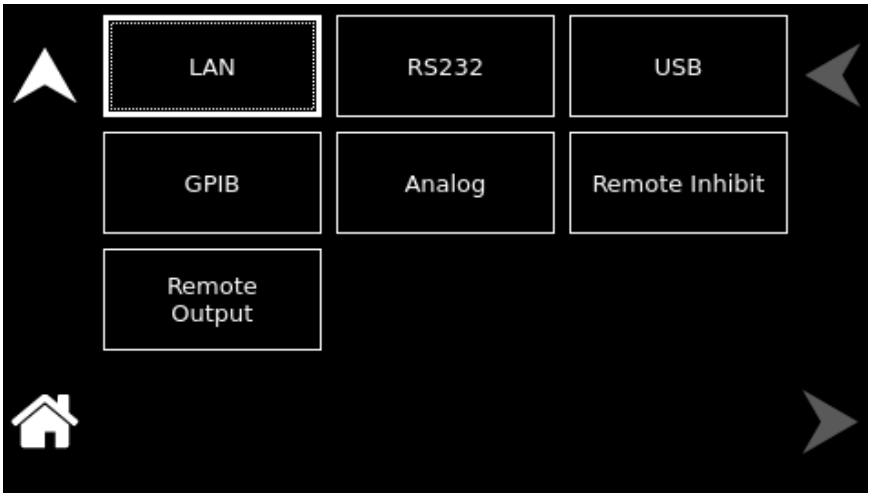


Figure 12-186. Control Interface Screen Top-Level Menu- GPIB Option

The Control interface Settings menu has the following fields:

ENTRY	DESCRIPTION
LAN	Configures the LAN (LXI Ethernet) communications interface, refer to Figure 12-187. After settings are changed, the unit must be turned OFF/ON for them to take effect.



Figure 12-187. LAN Screen

a) LAN SETTINGS

Lists the configuration settings of the LAN interface, and the DNS-SD service name; a number, (n), would be appended to the service name, if necessary, to differentiate duplicate power supply names. Refer to Figure 12-188.

ENTRY	DESCRIPTION

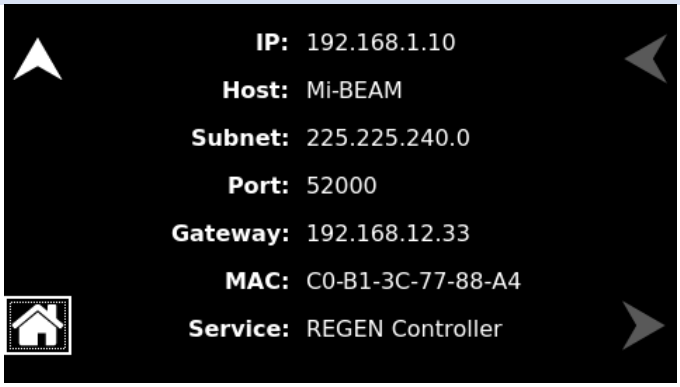


Figure 12-188. LAN Settings

b) LAN CONFIGURE

Sets parameter values and controls operation of the LAN interface, refer to Figure 12-189.

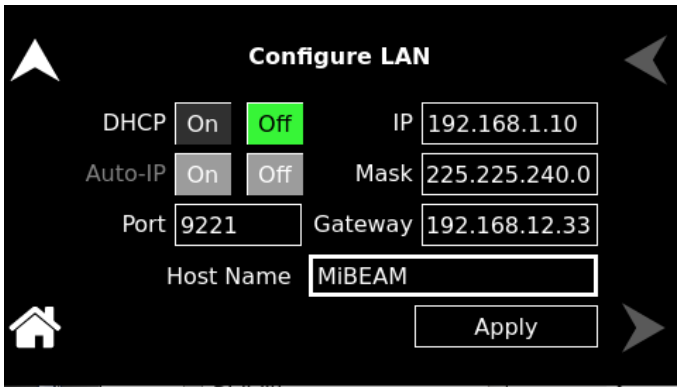


Figure 12-189. Configure LAN

- **DHCP**: Selects whether DHCP is enabled or disabled. Refer to Figure 12-190.

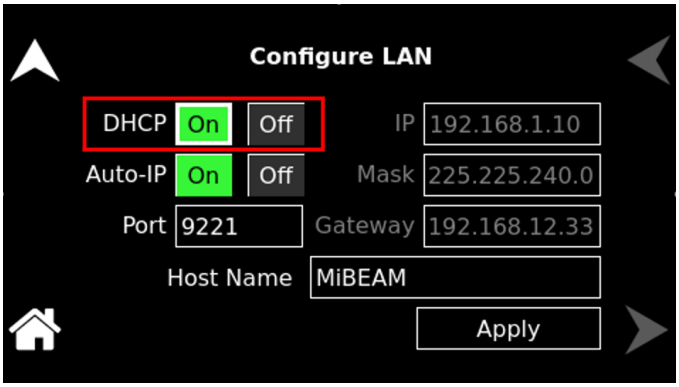


Figure 12-190. LAN Screen – DHCP

NOTE: When DHCP is selected, the IP address is assigned by the network DHCP server. If DHCP server fails to assign an IP address and Auto-IP is

ENTRY	DESCRIPTION

enabled, the unit gets an IP address in the range of 169.254.X.X.

- **Auto-IP**: Enables or disable the Auto-IP configuration, when DHCP is ON. Refer to Figure 12-191.

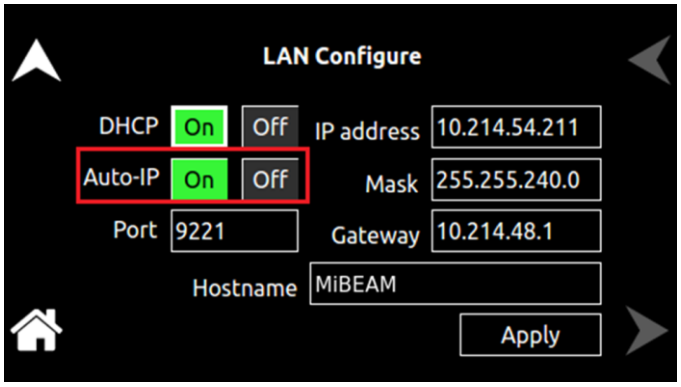


Figure 12-191. LAN Screen - Auto -IP

- **IP Address**: Sets the static IP address for the unit. When DHCP is turned off in the LAN CONFIG sub-menu, AUTO IP is selected, set the IP address to all zeros so that the IP address would be requested from the network; when DHCP is selected, the IP address is assigned by the network DHCP server. Refer to Figure 12-192.

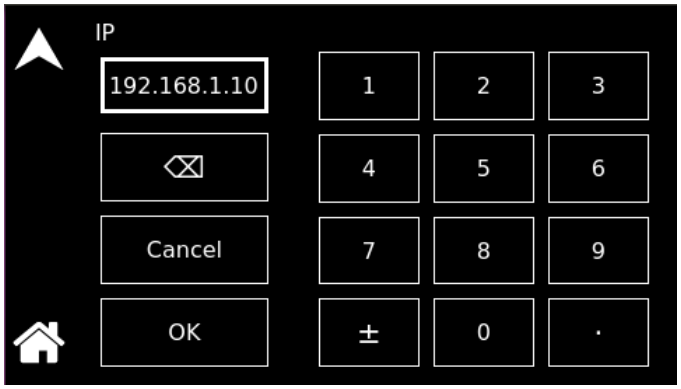


Figure 12-192. LAN Screen - IP Address

- **Subnet Mask**: Sets the subnet mask for use in static IP configuration. Refer to Figure 12-193.

ENTRY	DESCRIPTION

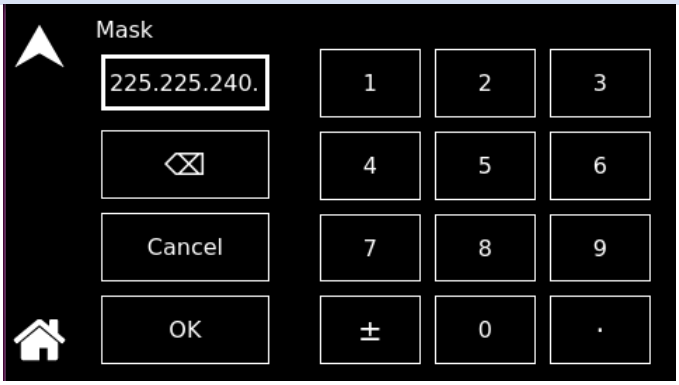


Figure 12-193. LAN Screen - Subnet Mask

- **Gateway Address**: Sets the gateway address when DHCP is turned off in the LAN CONFIG sub-menu and when AUTO IP is selected, set the gateway address to all zeros so that the gateway address would be requested from the network; when DHCP is selected, the gateway address is assigned by the network DHCP server. Refer to Figure 12-194.

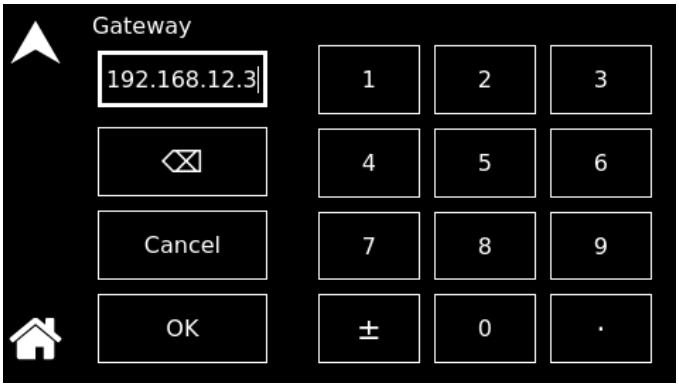


Figure 12-194. LAN Screen - Gateway Address

NOTE: When DHCP is selected, the gateway address is assigned by the network DHCP server.

- **Port**: sets the port number; the factory-default value is 9221. Refer to Figure 12-195.

ENTRY	DESCRIPTION



Figure 12-195. LAN Screen -Port

- **MAC Address:** Displays the MAC address; the MAC address is listed on a label on the chassis of the unit. Refer to Figure 12-196.



Figure 12-196. MAC Address

- **Host Name**: Allows setting a unique alpha-numeric host name. Refer to Figure 12-197.



Figure 12-197. LAN Screen - Host Name

- **Apply**: Applies the LAN settings to the supply. Refer to Figure 12-198 and Figure 12-199.

ENTRY	DESCRIPTION

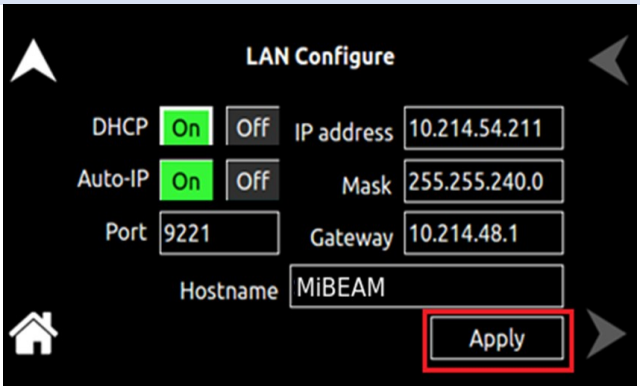


Figure 12-198. LAN Screen – Apply

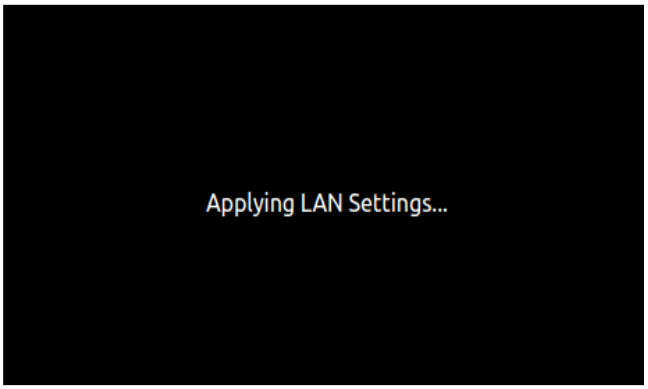


Figure 12-199. LAN Screen - Applying LAN Settings

RS232

Configures the RS-232C communications interface.RS232 has two sub-menus: RS232 Settings and RS232 Configure

a) RS232 Settings: Lists the configured Baud Rate, Stop Bits, Bits and Parity for the RS232 digital interface, refer to Figure 12-200.

- **Baud Rate**: sets baud rate to either 9600, 19200, 38400, 57600 or 115200 baud. The default setting is 115200 baud.
- **Stop Bits** sets the number of stop bits to either 1 or 2 bits. The default setting is 1 stop bit.
- **Data**: sets the number of data bits to either 7 or 8. The default setting is 8 bits.
- **Parity**: sets the parity to either Even, Odd, or no parity, None. The default setting is no parity, None.

ENTRY	DESCRIPTION



Figure 12-200. RS232 Screen -Settings

b) Configure RS232: Configures the RS-232 Baud Rate, refer to Figure 12-201 and Figure 12-202. This setting must match those set for the communications port of the user external controller.

- **Baud Rate**: sets baud rate to either 9600, 19200, 38400, 57600 or 115200 baud. The default setting is 115200 baud

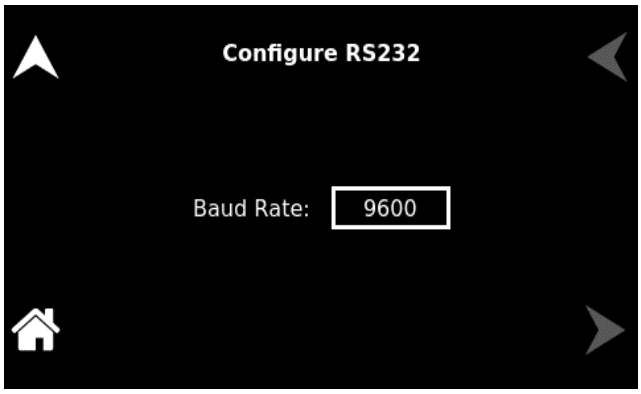


Figure 12-201. RS232 Screen -Configure

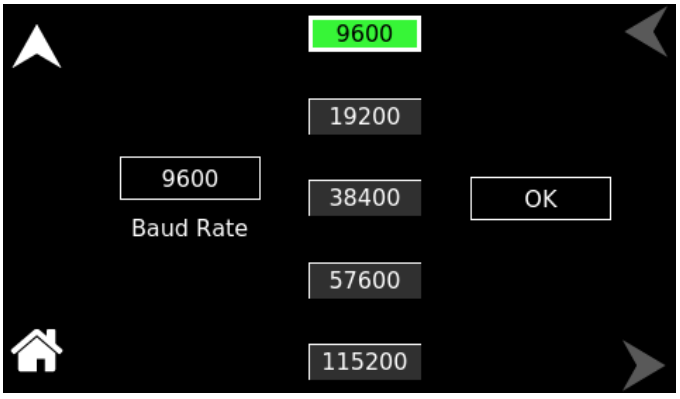


Figure 12-202. Baud Rate Selection

USB Displays the configured Baud Rate. Refer to Figure 12-203.

ENTRY	DESCRIPTION

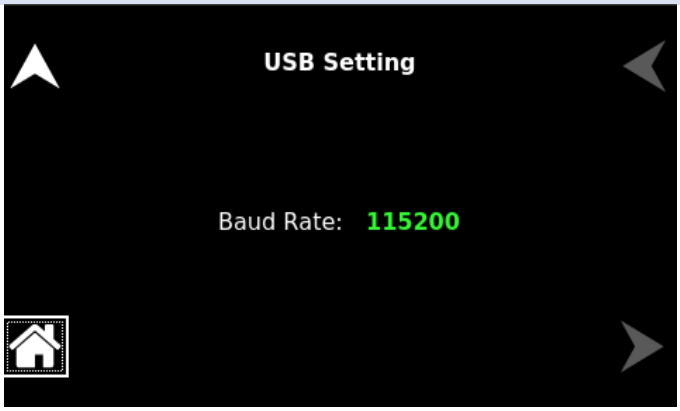


Figure 12-203. USB Setting

External CAN

Configures the device Node Address, Baude Rate and Communication Protocol. Refer to Figure 12-204.

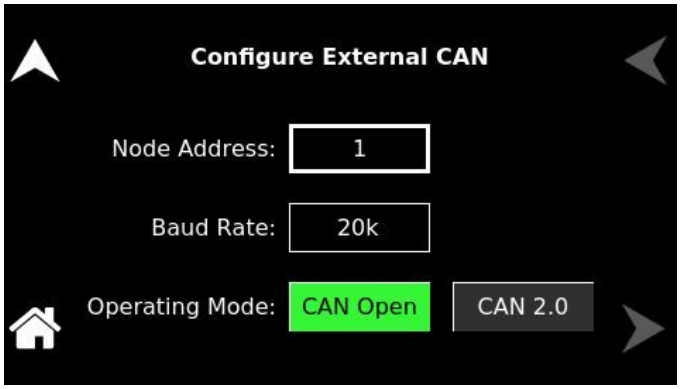


Figure 12-204. Configure External CAN

a) **Node Address:** Sets the CAN Node Address to the range of 1 to 127. Refer to Figure 12-205.

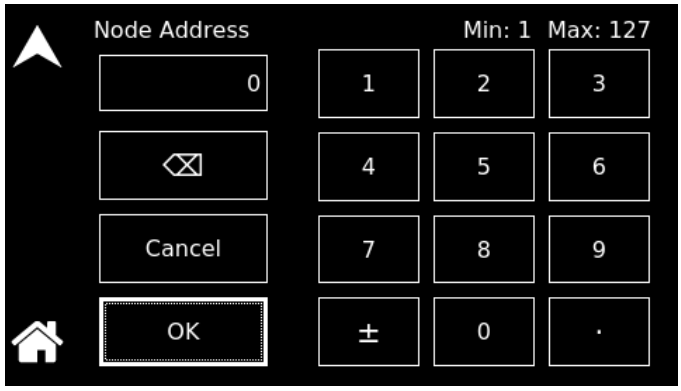


Figure 12-205. Node Address

ENTRY	DESCRIPTION

b) Baud Rate: Sets baud rate from 20kbps to 1mbps (20k, 40k, 50k, 80k, 100k, 125k, 150k, 200k, 250k, 400k, 500k, 1000 kbps). Refer to Figure 12-206.



Figure 12-206. Baud Rate

c) Operating Mode: Sets the communication protocol to CAN2.0 or CANopen. Refer to Figure 12-204.

- **CANopen**
  - Covers basic CANopen configuration, including NMT (Network Management) setup, TPDO (Transmit Process Data Object) mapping, and SDO (Service Data Object) structures.
  - Enables standardized communication and seamless integration into existing industrial CANopen networks.
- **CAN 2.0**
  - Describes the Hardware configuration and use of extended 29-bit identifiers.
  - Supports custom command or response mappings, allowing flexible and proprietary protocol integration.

GPIB Displays and Configures the GPIB Setting. Refer to Figure 12-207.



ENTRY	DESCRIPTION

Figure 12-207. GPIB

a) GPIB Settings

Displays the configured address and Power ON SRQ.

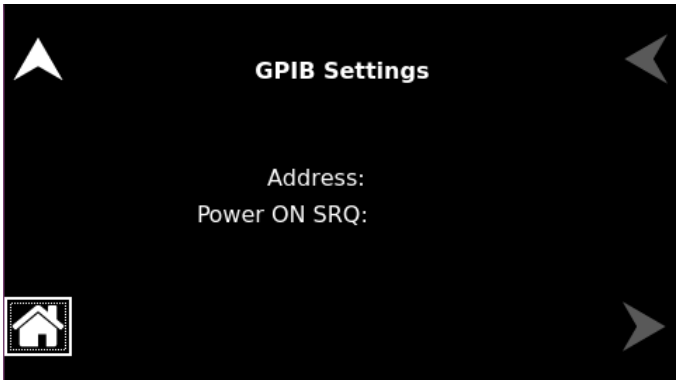


Figure 12-208. GPIB Settings

b) Configure GPIB

Configure the IEEE-488 address; the default is 1. The address can be set from 0 through 30.

Also allows to turn On/Off the Power ON Service Request. Power On SRQ set to On causes a GPIB service request to be sent to the computer, when the Power Supply is turned on. Factory Default value for Power On SRQ is Off.

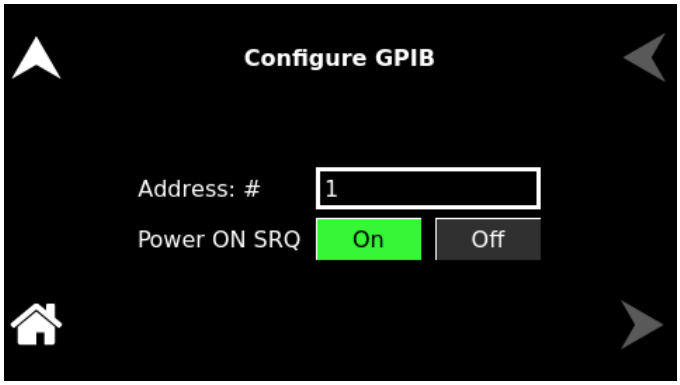


Figure 12-209. Configure GPIB

ENTRY	DESCRIPTION
Analog	Configures the Analog programming interface, refer to Figure 12-210.

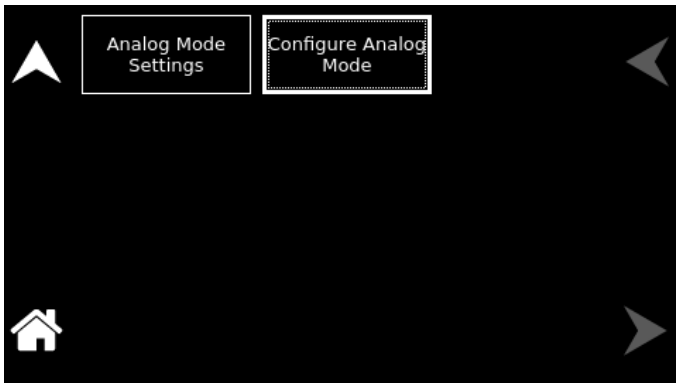


Figure 12-210. Analog Screen

a) Analog Mode Settings

Lists the configuration settings of the Analog Programming interface. Refer to Figure 12-211.

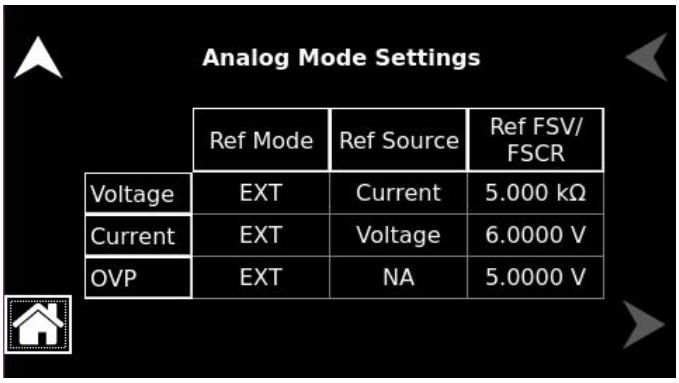


Figure 12-211. Analog Mode Settings

b) Configure Analog Mode

Sets parameter values and controls operation of the Analog Programming interface. Refer to Figure 12-212.

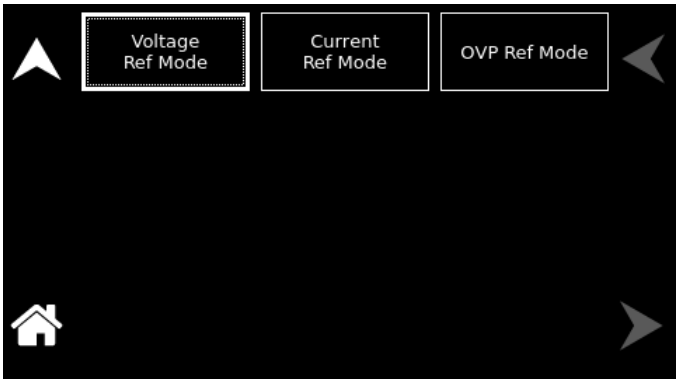


Figure 12-212. Configure Analog Mode Settings

ENTRY	DESCRIPTION

- **Voltage Ref Mode :** Configures the Voltage Reference Mode, refer to Figure 12-213. When the Voltage Reference Mode is set to External, the Voltage setting field on the Dashboard screen and the 'Voltage' option in the Output Program screen will be disabled, and these Voltage fields will display as 'EXT'. Refer Figure 12-214 and Figure 12-215.

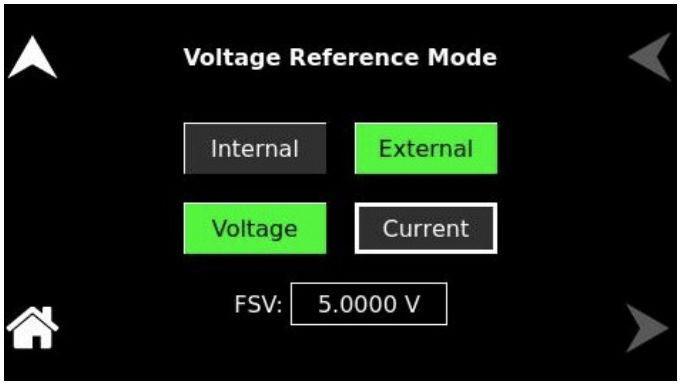


Figure 12-213. Voltage Reference Mode

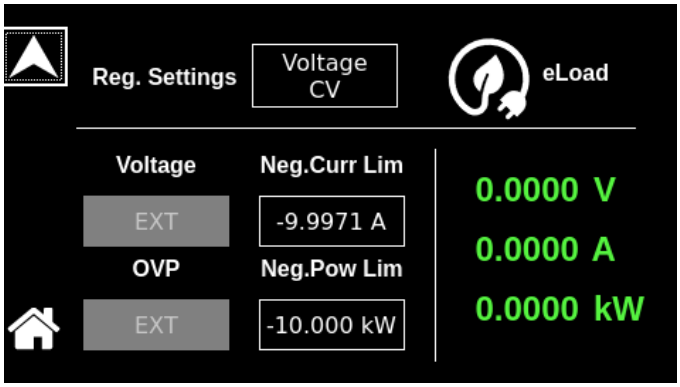


Figure 12-214. Dashboard Screen – Voltage (EXT)

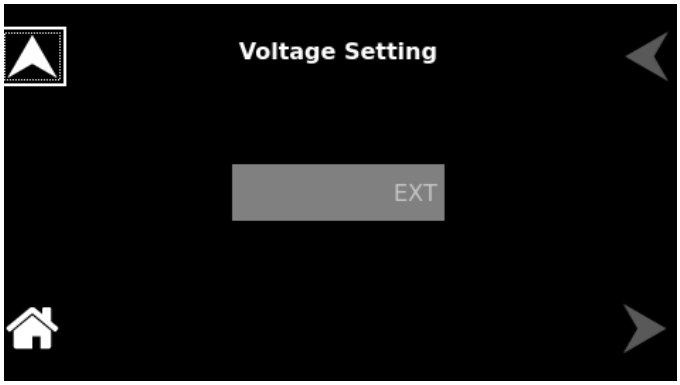


Figure 12-215. Output Program Screen – Voltage (EXT)

When Voltage Reference Mode is selected as Current, FSCR (Full Scale Current Resistance) unit will be kΩ (k Ohms). Refer to Figure 12-216.

ENTRY	DESCRIPTION

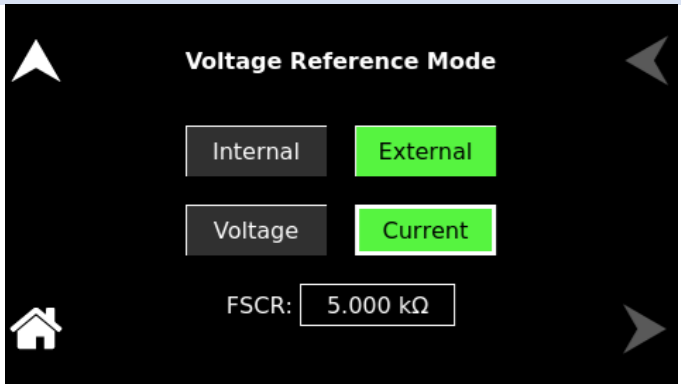


Figure 12-216. Voltage Reference Mode – Resistive

- **Current Ref Mode:** Configures the Current Reference Mode, refer to Figure 12-217. When the Current Reference Mode is set to External, the Voltage setting field on the Dashboard screen and the 'Voltage' option in the Output Program screen will be disabled, and these Voltage fields will display as 'EXT'.

  NOTE: 'Current' is only applicable for Source mode. When you select the 'Current', the screen display as 'Only applicable for Source Mode'

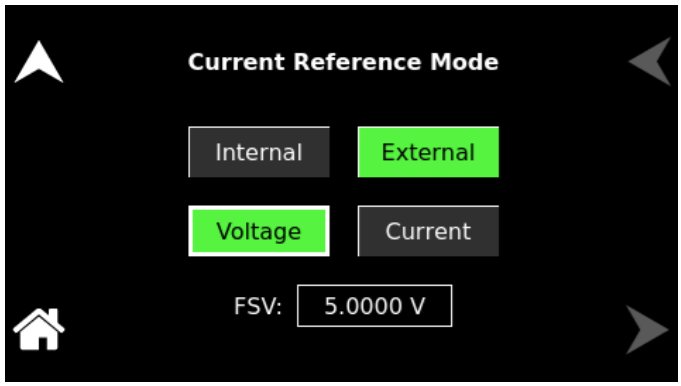


Figure 12-217. Current Reference Mode

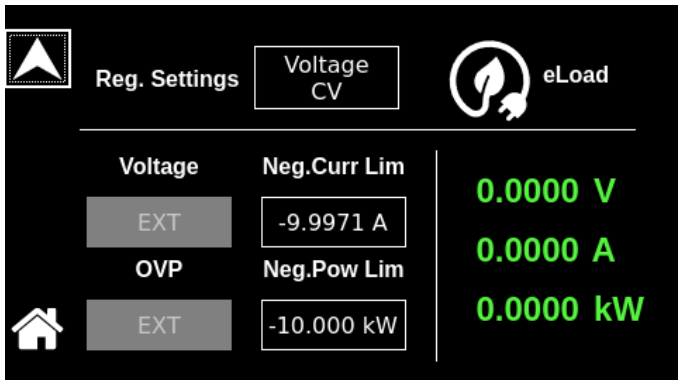


Figure 12-218. Dashboard Screen – Current (EXT)

ENTRY	DESCRIPTION

- **OVP Ref Mode:** Configures the Over Voltage Protection (OVP) Reference Mode. When the OVP Reference Mode is set to External, the OVP setting field on the Dashboard screen and the 'Protection' option in the Configuration screen will be disabled, and these OVP fields will display as 'EXT' refer to Figure 12-219.

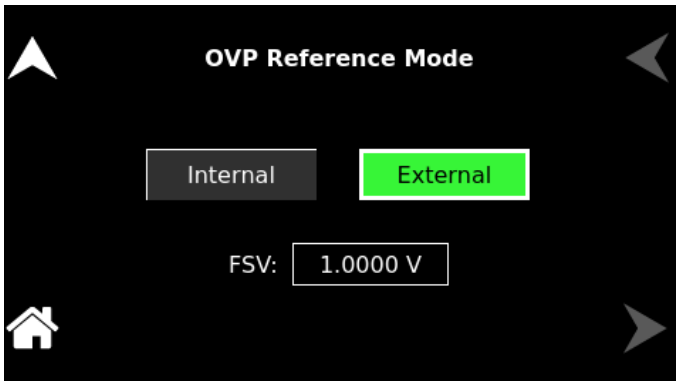


Figure 12-219. OVP Reference Mode

Remote Inhibit

Sets the control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 12-220.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

Remote inhibit can be configured in three modes;

- Latch - after reclosing the contact, user needs to clear the fault and turn ON the output.
- Live - after reclosing the contact, user needs to turn ON the output.
- OFF - inhibit function would be disabled.

b) Remote Inhibit Input – Active Source

An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply.

Remote inhibit can be configured in three modes;

- Latch - after removing the active voltage source, user needs to clear the fault and turn ON the output.
- Live - after removing the active voltage source, user needs to turn ON the output.

ENTRY	DESCRIPTION
	• OFF - inhibit function would be disabled.

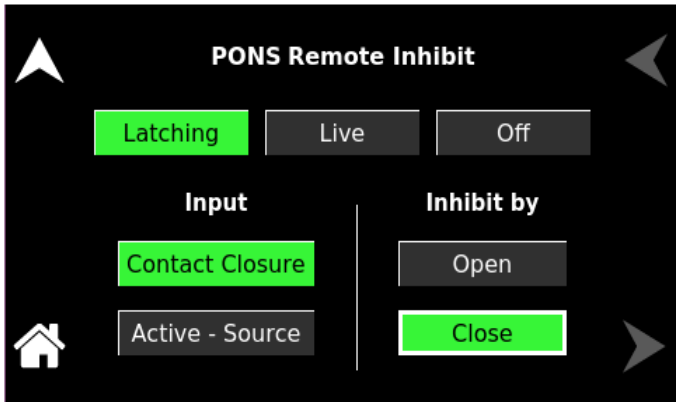


Figure 12-220. PONS remote Inhibit

Table 12-37. System Setting Screen

12.2.7 OPERATING MODE

The Operating Mode Settings screen offers comprehensive guidance on the system modes of the Mi-BEAM Series power supply. This model is engineered for versatile and reliable performance across various applications, ensuring precise and efficient power delivery through its advanced control features. Depending on user requirements, the Mi-BEAM Series supports multiple modes of operation. Refer to the Figure 12-221.

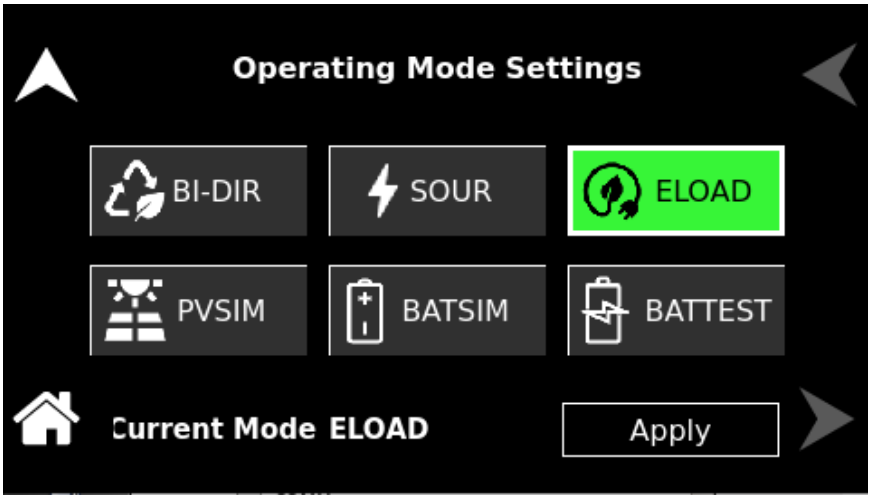


Figure 12-221. Operating Mode Settings

NOTE: When the unit is in series operation, the non-applicable modes ‘PVSIM’, ‘BATSIM’, and ‘BATTEST’ do not appear in ‘Operating Mode Settings’.

12.2.8 SYSTEM SETTINGS SCREEN

The System Settings screen provides the settings of ‘Hardware Limits’, ‘System Details’ ‘Firmware Version’, ‘LCD’, ‘Default Screen’ and ‘Factory Default’. For the top-level menu of the

System Settings Screen, refer to Figure 12-222 and for instructions on how to navigate, refer to Section 9.4.2.2.

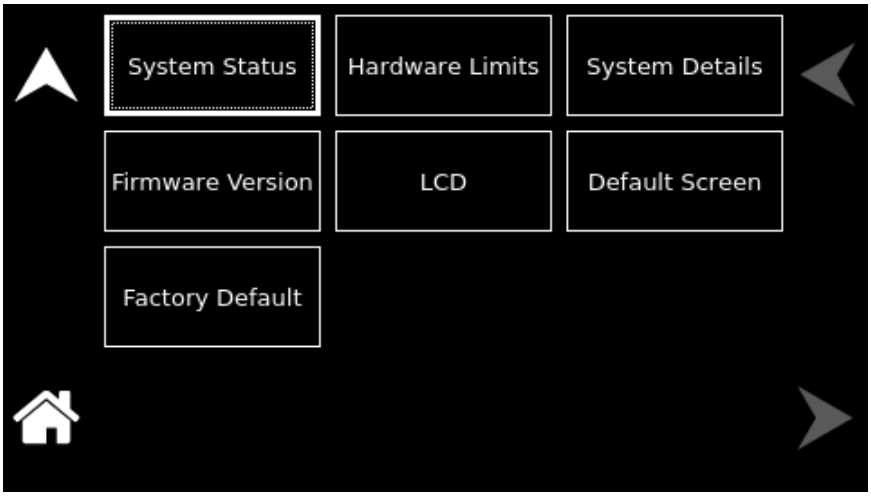


Figure 12-222. System Settings Screen

ENTRY	DESCRIPTION
System Status	Displays the present system status information of the power supply, including the Input Line, Output Sense, Isolation, Chassis Type and No. of chassis. Refer Figure 12-223 to Figure 12-226. **NOTE:** The chassis type changes depending on the connection configuration; it is identified as Standalone (the power supply operates independently), Multi-chassis Parallel (the power supply is connected in parallel), Multi-chassis Series (the power supply is connected in series), and Multi-chassis Series Split Phase (the power supply is configured in a series split-phase connection).

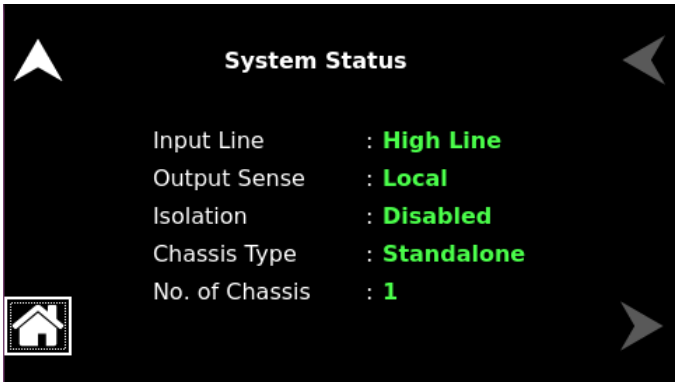


Figure 12-223. System Status – Standalone Unit

ENTRY	DESCRIPTION

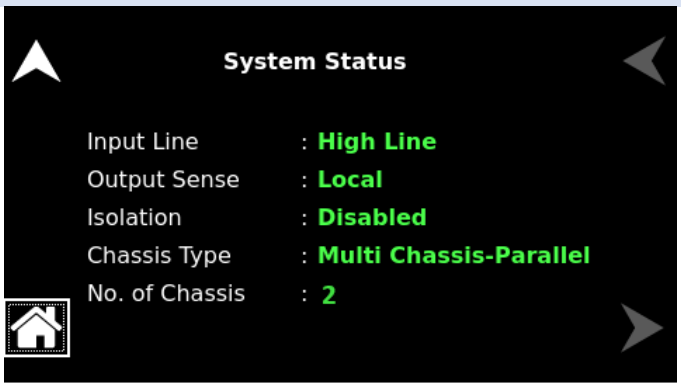


Figure 12-224. System Status – Parallel Operation

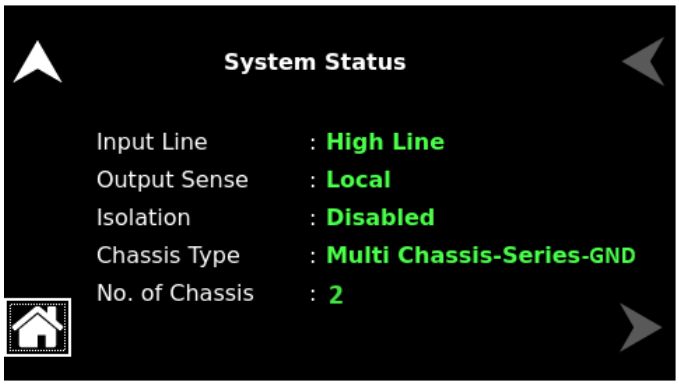


Figure 12-225. System Status – Series Operation

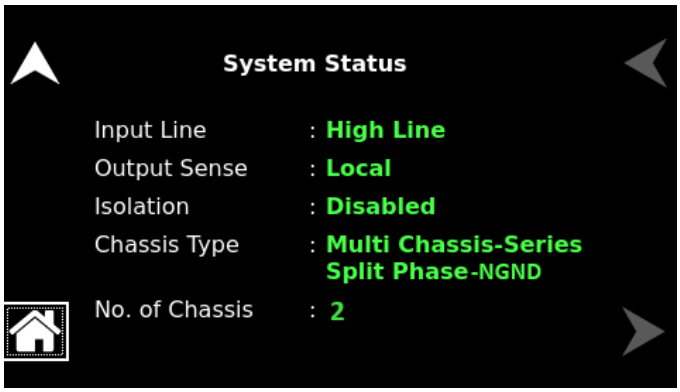


Figure 12-226. System Status – Series Split Phase

ENTRY	DESCRIPTION
Hardware Limits	Displays the hardware parameter limit values. Refer to Figure 12-227.



Figure 12-227. Hardware Limits

System Details Displays information about the user's device, including the Manufacturer, Model Number, Serial Number, Last Calibration Date, and Operating Mode. Refer to Figure 12-228.

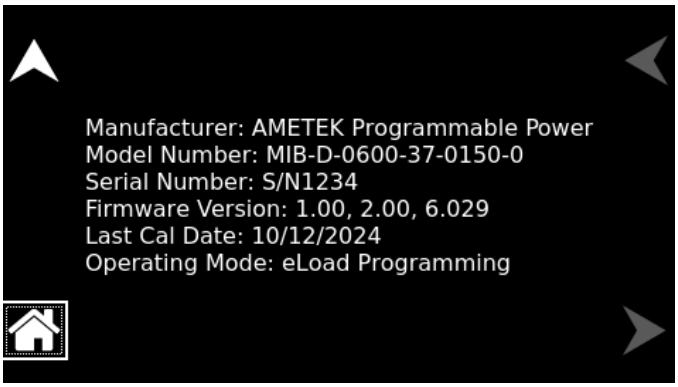


Figure 12-228. System Details

Firmware Version Displays information about the configuration of the power supply, including the Communication Controller, System Interface, Front Panel, Fan Controller, Mod 1 Primary Controller, Mod 1 Secondary Controller, Mod 2 Primary Controller, Mod 2 Secondary Controller, Mod 3 Primary Controller, Mod 3 Secondary Controller. This information helps identify the unit. Refer to Figure 12-229.

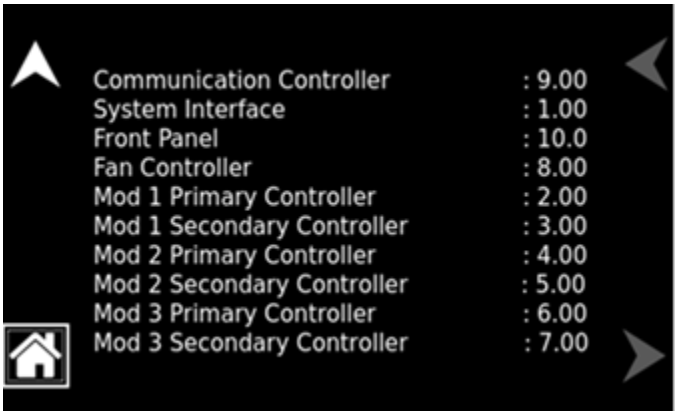


Figure 12-229. Firmware Version

ENTRY	DESCRIPTION

LCD Provides settings for the calibration of the display touchscreen. Refer to Figure 12-230.

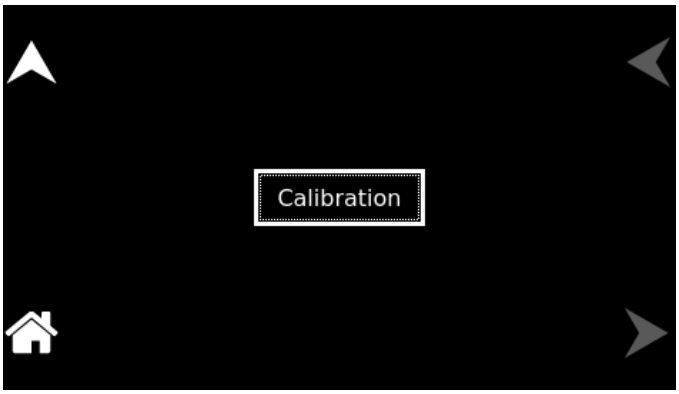


Figure 12-230. LCD

Default Screen Selects whether the Default screen (showing measured voltage, current and power) is enabled or disabled, refer to Figure 12-231 and Figure 12-232. It allows to set the time out if the default screen is enabled.

a) Timeout Interval: Selects the time, in seconds, for how long Dashboard screen must be inactive before the Default screen is displayed.

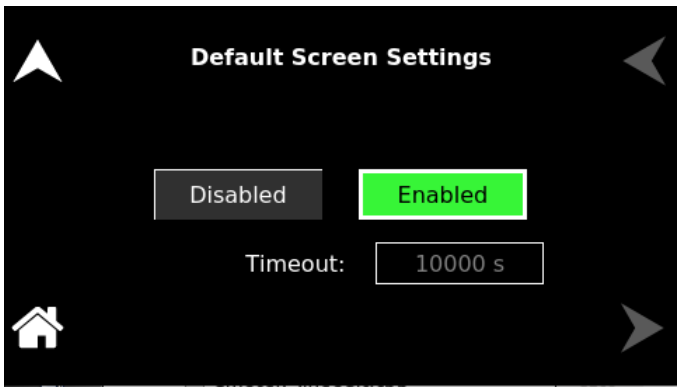


Figure 12-231. Default Screen Settings- Enabled

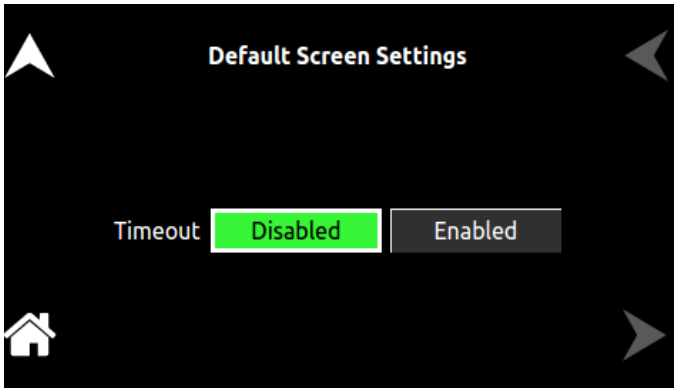


Figure 12-232. Default Screen Settings- Disabled

ENTRY	DESCRIPTION
Factory Default	Set the device to its original factory settings, as it was when it left the manufacturer. Refer to Figure 12-233.

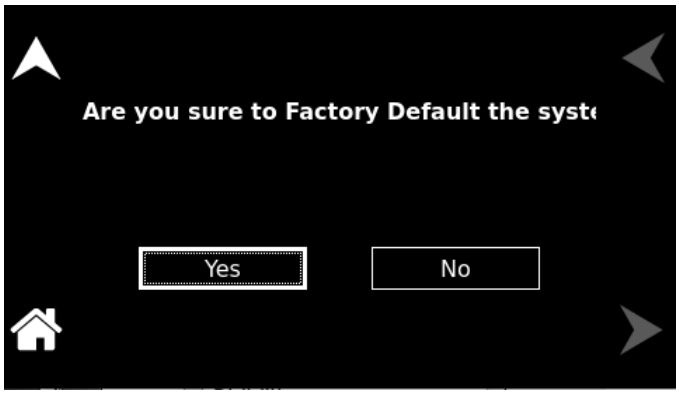


Figure 12-233. Factory Default

Table 12-38. System Setting Screen

12.2.9 SYSTEM FAULTS SCREEN

The System Faults screen provides descriptions of faults that have occurred in a power module. The fault screen appears if any supply fault conditions occur, refer to Figure 12-234. The user should press ‘Clear’ to clear the fault and continue operating the power supply, and press ‘Reload’ to refresh the system faults and check for errors. If no fault has occurred, the screen will display ‘No Fault Occurred’, refer to Figure 12-235.

NOTE: These conditions might resolve themselves; however, if they continue to occur after pressing 'Clear', refer to Chapter 17.

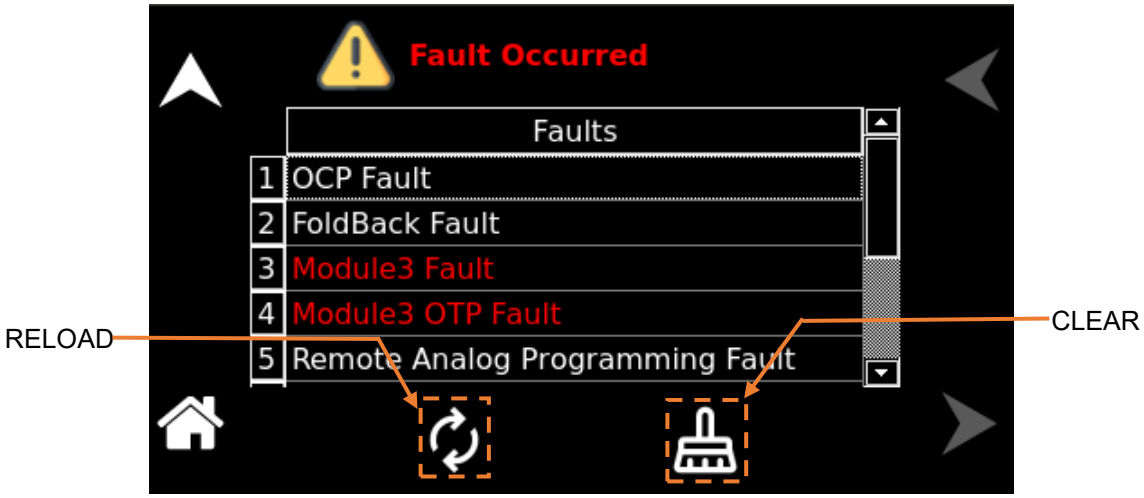


Figure 12-234. System Faults



Figure 12-235. No Fault Occurred Screen

If any fault occurs on the Follower screen, a fault signal is generated. Press 'Faults' to view the fault details on the Follower screen. Refer to Figure 12-236.

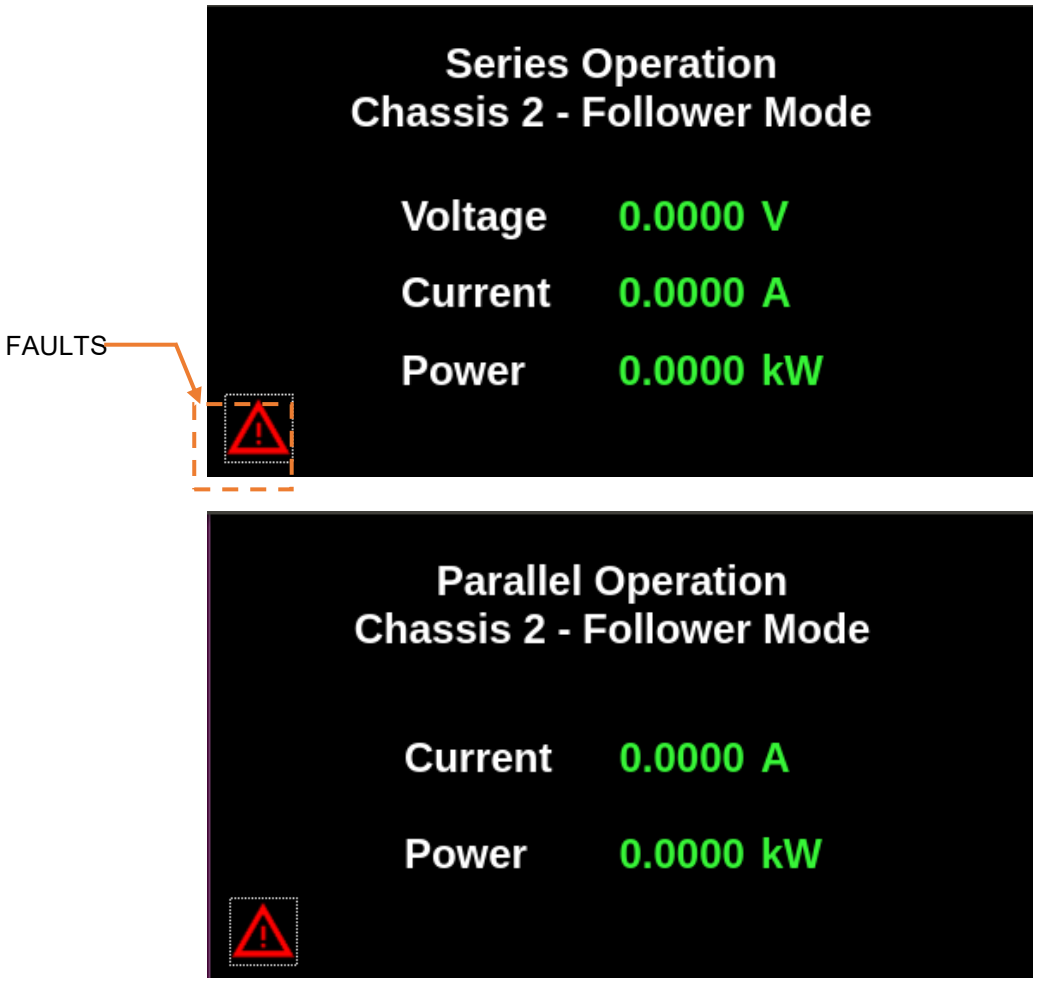


Figure 12-236. Follower Faults Screen

13 PV SIMULATOR MODE OPERATION

This chapter provides comprehensive information on the front panel display in PV Simulator mode, designed to offer an intuitive interface for seamless setup, control, and monitoring of various photovoltaic simulation parameters.

13.1 Mi-BEAM CONNECTION TO UUT AND CONFIGURATION

13.1.1 CONFIGURING MI-BEAM FOR VOLTAGE TYPE UUT

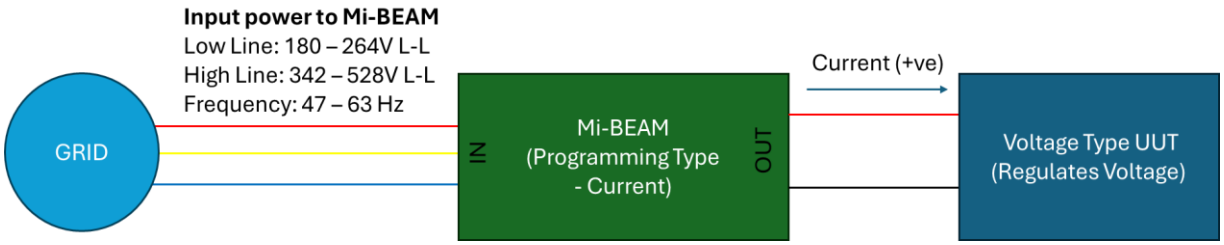


Figure 13-1. Voltage Type UUT

The Mi-BEAM Series power supply in PVSIM operates with a fixed Programming Type (Current) and the Regulation Setting is 'Constant Current/Constant Voltage (CC/CV).

13.1.1.1 OPER. TYPE - STEADY STATE, OPER. MODE - STANDARD, AND CURVE TYPE – SNL

When the settings selected in 'PVSIM Mode Selection Settings (Oper. Type - Steady State, Oper. Mode - Standard, and Curve type - SNL)' are applied in the Configuration Screen, the settings in top-level screens will appear with required options. Refer to Section 13.2.4.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current that flows from Mi-BEAM to UUT. Refer to Figure 13-83.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 13-83.

b) Curve Selection: Define a curve which simulate various PV module characteristics. Refer to Figure 13-50.

c) Setting Irradiance value: Enter the irradiance level value that represents the intensity of sunlight per unit area. Refer to Figure 13-28.

d) Setting Temperature value: Enter the temperature value to simulate the desired environmental conditions. Refer to Figure 13-29.

e) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

f) Output State: Once all the parameters are configured as mentioned above, output can be turned ON. Refer to Figure 13-32.

g) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

h) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 13.2.2.1.3.

i) End the Test: Once the test is complete, power down the system and safely disconnect the UUT from the Mi-BEAM.

13.1.1.2 OPER. TYPE - STEADY STATE, OPER. MODE - STANDARD, AND CURVE TYPE - EN50530 (TEST TYPE – STATIC)

When the settings selected in 'PVSIM Mode Selection Settings (Oper. Type - Steady State, Oper. Mode - Standard, and Curve type - EN50530)' are applied in the Configuration Screen, the top-level screens will appear with required options. Refer to Section 13.2.4.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 13-83.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 13-83.

- **EN50530 Test Type:** Select the Test Type to 'Static' in 'EN50530 Test Type Settings'. Refer to Figure 13-79.

b) Rated Power: Enter the rated power value that the unit to be delivered. Refer to Figure 13-30.

c) Rated Voltage: Enter the rated voltage value that the unit to be delivered. Refer to Figure 13-31.

d) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

e) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 13-32.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 13.2.2.1.3.

h) End the Test: Once the test is complete, power down the system and safely disconnect the UUT from the Mi-BEAM.

13.1.1.3 CURVE TYPE - EN50530 AND TEST TYPE – DYNAMIC

When the settings selected in 'PVSIM Mode Selection Settings (Oper. Type - Steady State, Oper. Mode - Standard, and Curve type - EN50530)' are applied in the Configuration Screen, the top-level screens will appear with required options. Refer to Section 13.2.4.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 13-83.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 13-83.

- **EN50530 Test Type:** Select the Test Type to 'Dynamic' in 'EN505530 Test Type Settings'. Refer to Figure 13-79.

b) Rated Voltage: Enter the rated voltage value that the unit to be delivered. Refer to Figure 13-30.

c) Rated Power: Enter the rated power value that the unit to be delivered. Refer to Figure 13-30.

d) Setting Irradiance value: Enter the irradiance level to measure the intensity of sunlight per unit area. Refer to Figure 13-28.

e) Setting Temperature value: Enter the temperature to simulate the desired environmental conditions. Refer to Figure 13-29.

f) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

g) **Output State:** Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 13-32.

h) **Start the Test:** Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

i) **Monitoring and Adjustments:** Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 13.2.2.1.3.

j) **End the Test:** Once the test is complete, power down the system and safely disconnect the UUT from the Mi-BEAM.

13.1.1.4 OPER. TYPE - STEADY STATE, OPER. MODE - STANDARD, AND CURVE TYPE – USER

When the settings selected in 'PVSIM Mode Selection Settings (Oper. Type - Steady State, Oper. Mode - Standard, and Curve type - User)' are applied in the Configuration Screen, the top-level screens will appear with required options. Refer to Section 13.2.4.

a) **Configuration:** Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 13-83.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 13-83.

b) **Curve Selection:** Users can upload a user defined curve which simulates the PV module characteristics. Refer to Figure 13-50.

c) **Connect the UUT to the Mi-BEAM:** Ensure all connections are secure and correctly aligned with the UUT port type.

d) **Output State:** Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 13-32.

e) **Start the Test:** Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

f) **Monitoring and Adjustments:** Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Section 13.2.2.1.3.

g) **End the Test:** Once the test is complete, power down the system and safely disconnect the UUT from the Mi-BEAM.

13.2 FRONT PANEL OPERATION

This section provides detailed information on the front panel operation in PV Simulator (PVSIM) mode. Each menu of a screen could be selected by tapping its associated selection-field box through the touchscreen, or by selecting it with the rotary encoder. Refer to Figure 13-2.

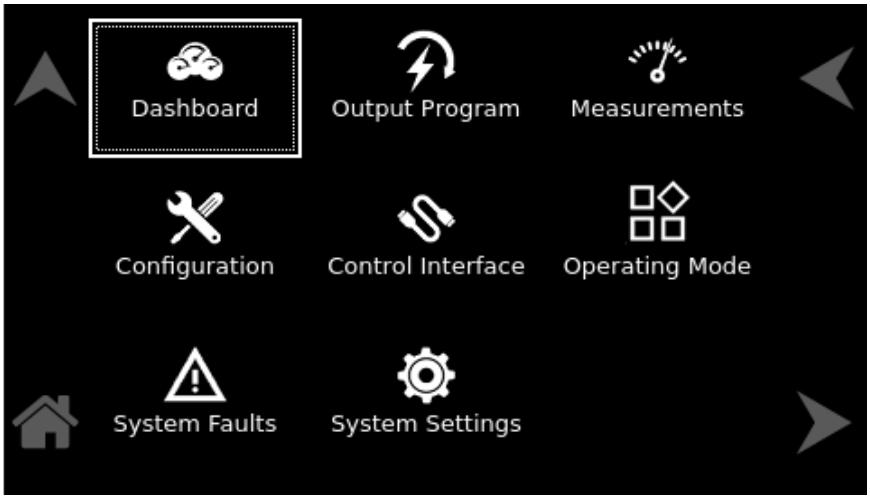


Figure 13-2. Home Screen Top-Level Menu

13.2.1 DASHBOARD SCREEN TOP-LEVEL MENU

The DASHBOARD screen top-level menu is used to change output parameters and simultaneously view output measurements. The most used output parameters are in the DASHBOARD screen menu. The DASHBOARD screen is the default menu that is displayed after power-on.

Note: The PVSIM operates with a fixed programming type, 'Current,' and Regulation setting 'Constant Current/Constant Voltage (CC/CV)'.

13.2.1.1 DASHBOARD SCREENS BASED ON PV MODE CONFIGURED

Dashboard screen will be updated based on the configuration in PVSIM Mode Selection. The 'PVSIM Mode Selection' menu in the 'Configuration' Screen allows the user to configure the settings below:

a) Oper. Type

- Steady State
- Profile

b) Oper. Mode

- Standard
- Array

c) Curve Type

- SNL
- EN50530
- User

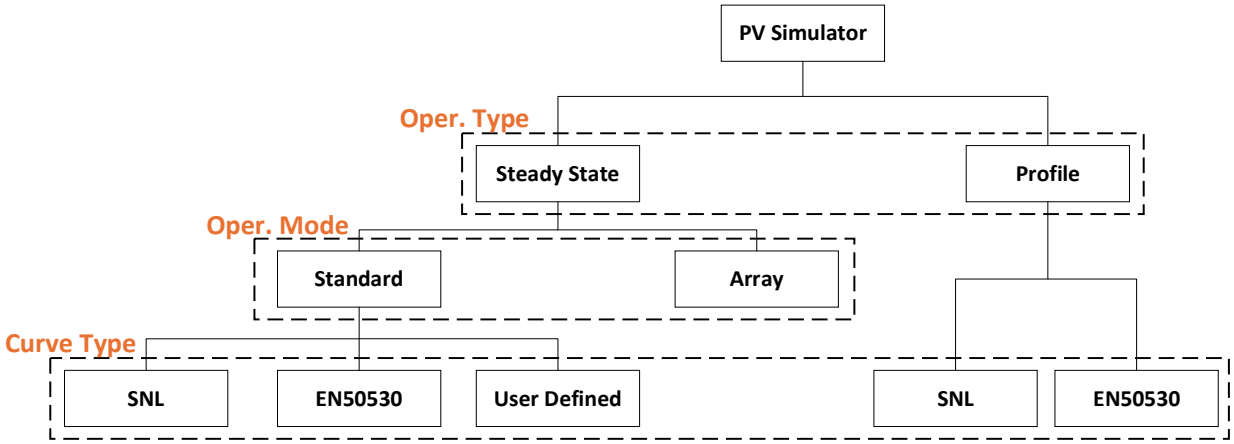


Figure 13-3. PVSIM mode Selection Setting

The front panel will not support all the modes in PV Simulator. To operate all the modes, Virtual panels can be used. Refer to Figure 13-3 for the available PV Simulator modes and the Table 13-1 for the front panel support. The dashboard screen will change based on the user's selection. Refer to Section 13.2.4 for PVSIM mode configuration.

OPER. TYPE	OPER. MODE	CURVE TYPE	FRONT PANEL SUPPORT
Steady State	Standard	SNL	Yes
Steady State	Standard	EN50530	Yes
Steady State	Standard	Userdefined	Partial
Steady State	Standard	NA	Only view in the dashboard.
Profile	NA	SNL	Only view in the dashboard.
Profile	NA	EN50530	Only view in the dashboard.

Table 13-1. PVSIM mode Selection Setting – Front Panel Support

13.2.1.2 DASHBOARD SCREEN – OPER. TYPE : STEADY STATE AND OPER. MODE: STANDARD

When the 'Oper. Type – **Steady State**' and 'Oper. Mode - **Standard**' is selected in the 'PVSIM Mode Selection' menu, the following curve types become available:

a) SNL

b) EN50530

c) Userdefined

The 'Dashboard Screen' will change based on the selected curve type, as described below.

13.2.1.2.1 CURVE TYPE – SNL

When 'PVSIM Mode Selection' is configured as below:

a) Oper. Type – Steady State

b) Oper. Mode – Standard

c) Curve type – SNL

the dashboard screen will appear with options to adjust the 'Curve Selection', 'Irradiance', and 'Temperature' values. Refer to Figure 13-4.

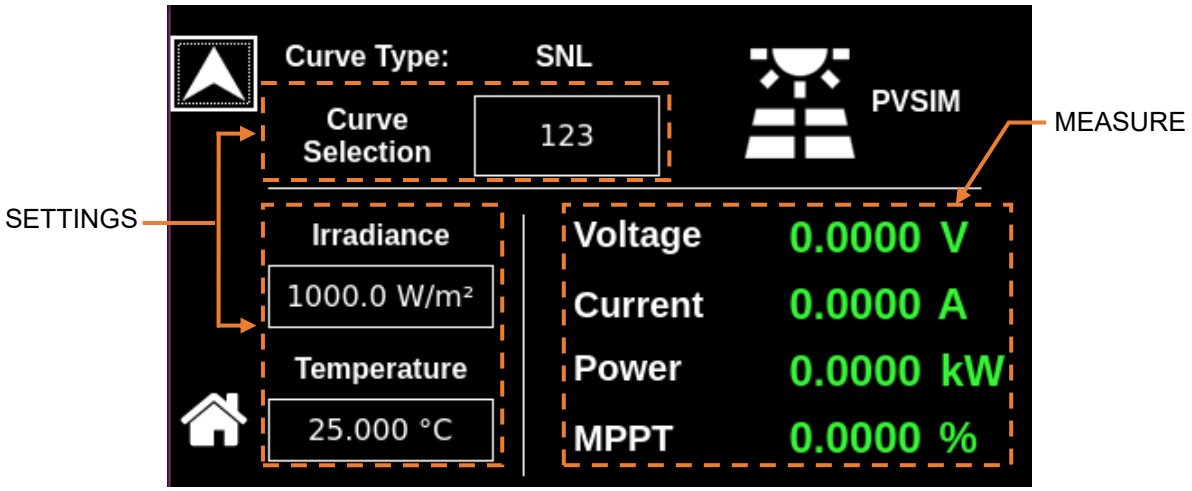


Figure 13-4. Dashboard Screen (Oper. Type - Steady State, Oper. Mode - Standard and Curve Type - SNL)

SETTINGS	DESCRIPTION
Curve Selection[1][2]	The selected curve will be displayed. Users can also select, edit, delete, or load the curve. Refer to Figure 13-50.
Irradiance	Programs the irradiance value for the curve. Real-time setting is possible using the rotary encoder.
Temperature	Programs the temperature value for the curve. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.
MPPT	Displays the floating-point value of Maximum Power Point Tracking of the loaded curve in percentage.
[1] *The '*' symbol before the curve name indicates that the curve is selected but not yet loaded. To load the curve, click the load button available in the 'Curve Selection Setting'. To turn ON the output of the power supply, selected curve must be loaded.* [2] *The 'NONE' indicates that no curve is selected.*	

Table 13-2. Dashboard screen top-level menu (Oper. Type - Steady State, Oper. Mode – Standard and Curve Type - SNL)

13.2.1.2.2 CURVE TYPE - EN50530

When 'PVSIM Mode Selection' is configured as below:

a) Oper. Type – Steady State

b) Oper. Mode – Standard

c) Curve type – EN50530

the dashboard screen will appear with options to adjust 'Test Type (Static or Dynamic) ', 'Irradiance', 'Temperature', 'Rated Power' and 'Rated Volt'. Refer to Figure 13-5 and Figure 13-6.

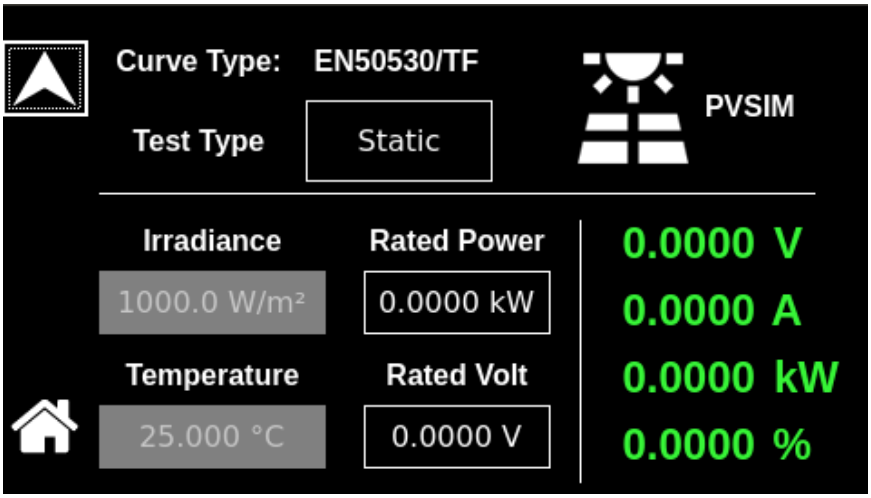


Figure 13-5. EN50530 Test Type Settings - Static

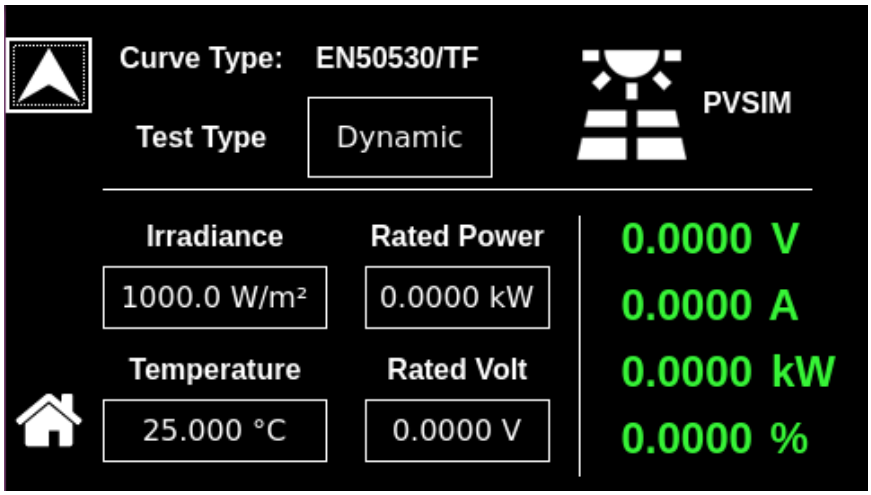


Figure 13-6. EN50530 Test Type Settings- Dynamic

NOTE: The configured 'Technology type' in 'EN50530 Configuration' screen will be displayed on the dashboard along with the curve type for EN50530 curve.

a) When Technology type configured as 'Thin Film' Curve Type will be 'EN50530/TF'

b) When Technology type configured as 'cSi' Curve Type will be 'EN50530/cSi'

13.2.1.2.2.1 CONFIGURING THE TEST TYPES

The 'Test Type' settings in the Dashboard Screen enables users to select between 'Static' and 'Dynamic' test type of EN50530 curve. Refer to Figure 13-7.

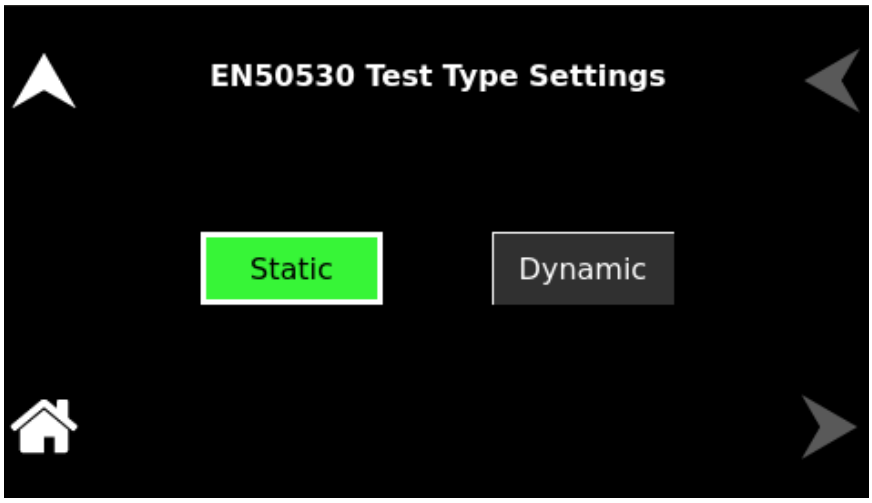


Figure 13-7. EN50530 Test Type Settings

a) EN50530 Test Type - Static

The top-level menu of the DASHBOARD screen is shown in Figure 13-8. Refer to Section 9.4.2.2 for navigating to the Dashboard Screen.

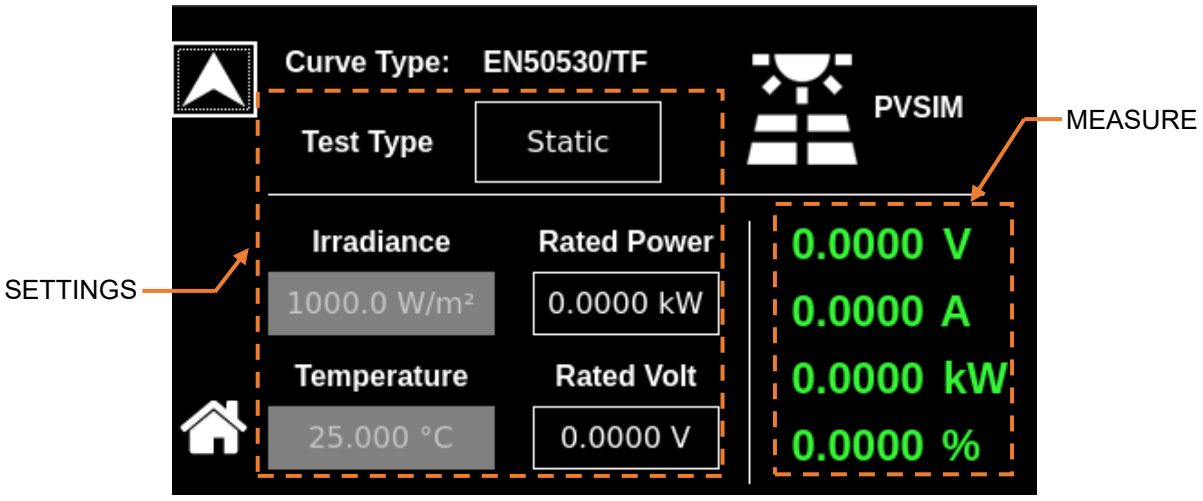


Figure 13-8. Dashboard Screen in Static Test Type

The following selections are available in the DASHBOARD screen top-level menu of Test Type 'Static':

SETTINGS	DESCRIPTION
Test Type	Programs the test type for the EN50530 Curve. Refer to Figure 13-79. **a) Static:** Programs the test type to Static for the EN50530 Curve.

SETTINGS	DESCRIPTION
Rated Power	Programs the rated power value for the curve. Real-time setting is possible using the rotary encoder.
Rated Voltage	Programs the rated voltage value for the curve. Real-time setting is possible using the rotary encoder.
Irradiance(1)	The fixed irradiance value (1000 W/m²) will be displayed.
Temperature(1)	The fixed temperature value (25 °C) will be displayed.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.
MPPT	Displays the floating-point value of Maximum Power Point Tracking of the loaded curve in percentage.
(1) *Standard Test Conditions (STC):* ***a)*** *Irradiance: 1000 W/m²* ***b)*** *Temperature: 25°C*	

Table 13-3. Dashboard screen top-level menu – Static Test Type

b) EN50530 Test Type - Dynamic

The top-level menu of the DASHBOARD screen is shown in Figure 13-9. Refer to Section 9.4.2.2 for navigating to the Dashboard Screen.

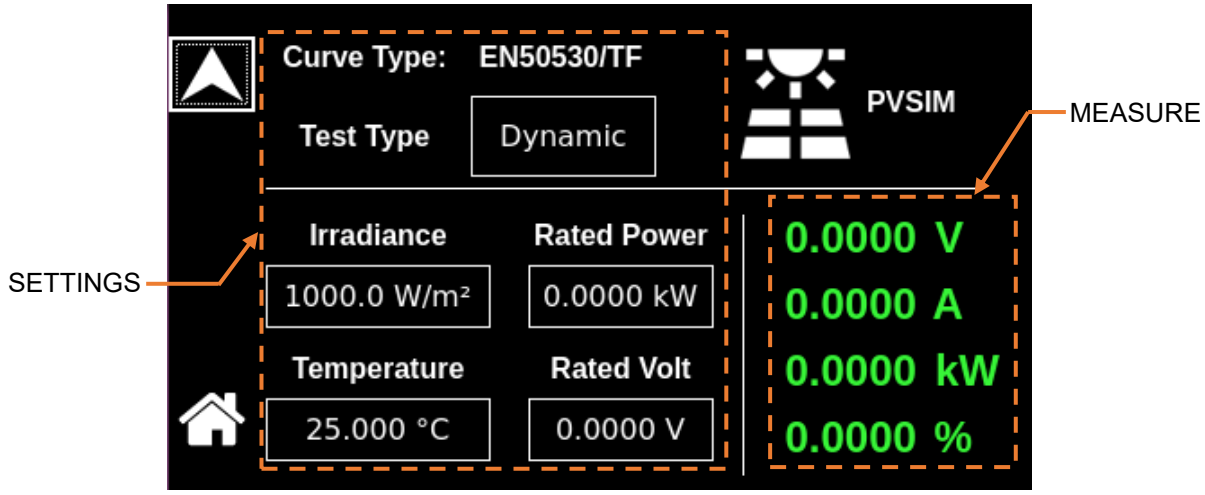


Figure 13-9. Dashboard Screen in Dynamic Test Type

The following selections are available in the DASHBOARD screen top-level menu of Test Type 'Dynamic':

SETTINGS	DESCRIPTION
Test Type	Programs the test type for the EN50530 Curve. Refer to Figure 13-79. **a) Dynamic:** Programs the test type to Dynamic for the EN50530 Curve.
Irradiance	Programs the irradiance value for the curve. Real-time setting is possible using the rotary encoder.
Temperature	Programs the temperature value for the curve. Real-time setting is possible using the rotary encoder.

SETTINGS	DESCRIPTION
Rated Power	Programs the rated power value for the curve. Real-time setting is possible using the rotary encoder.
Rated Voltage	Programs the rated voltage value for the curve. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.
MPPT	Displays the floating-point value of Maximum Power Point Tracking of the loaded curve in percentage.

Table 13-4. Dashboard screen top-level menu – Dynamic Test Type

13.2.1.2.3 CURVE TYPE – USER

When 'PVSIM Mode Selection' is configured as below:

a) Oper. Type – Steady State

b) Oper. Mode – Standard

c) Curve type – User

The dashboard screen will appear with options 'Curve Type', 'Curve Selection', 'Irradiance', and 'Temperature'. Refer to Figure 13-10.

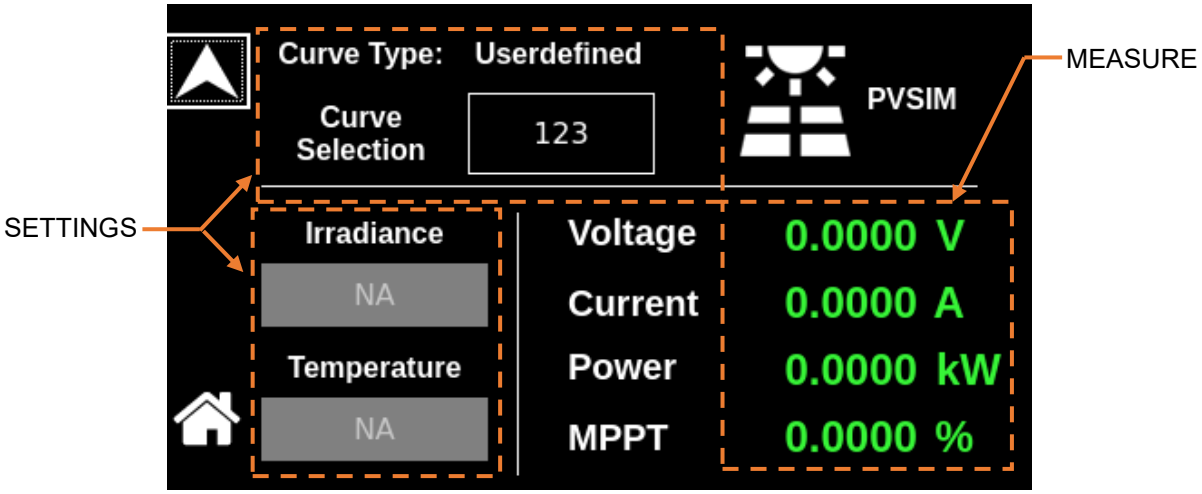


Figure 13-10. Dashboard Screen, Curve Type (Oper. Type -Steady State, Oper. Mode - Standard and Curve Type - Userdefined)

SETTINGS	DESCRIPTION
Curve Selection(1) (2) (3)	The selected curve will be displayed. Users can select, load or delete the curve. Refer to Figure 13-50.
Irradiance	This setting is not valid and will be displayed as NA.
Temperature	This setting is not valid and will be displayed as NA.

MEASURE	DESCRIPTION
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.
MPPT	Displays the floating-point value of Maximum Power Point Tracking of the loaded curve in percentage.
(1) The '' symbol before the curve name indicates that the curve is selected but not yet loaded. To load the curve, click the load button available in the 'Curve Selection Setting'. To turn ON the output of the power supply, selected curve must be loaded* *(2) The 'NONE' indicates that no curve is selected.* *(3) Users cannot create or edit the curve (when the curve selection is User Defined) from front panel, this operation can be performed only from virtual panels.*	

Table 13-5. Dashboard screen top-level menu (Oper. Type - Steady State, Oper. Mode - Standard and Curve Type - Userdefined)

13.2.1.3 DASHBOARD SCREEN – OPER. TYPE : STEADY STATE AND OPER. MODE: ARRAY

When 'PVSIM Mode Selection' is configured as below:

a) Oper. Type – Steady State

b) Oper. Mode – Array

The dashboard screen will appear with options 'PV Mode', 'Curve Name', 'Curve Type', 'Irradiance', and 'Temperature'. Refer to Figure 13-11.

NOTE: The Dashboard Screen is only used to view measurements. All other options are invalid and can only be edited from Virtual panels.

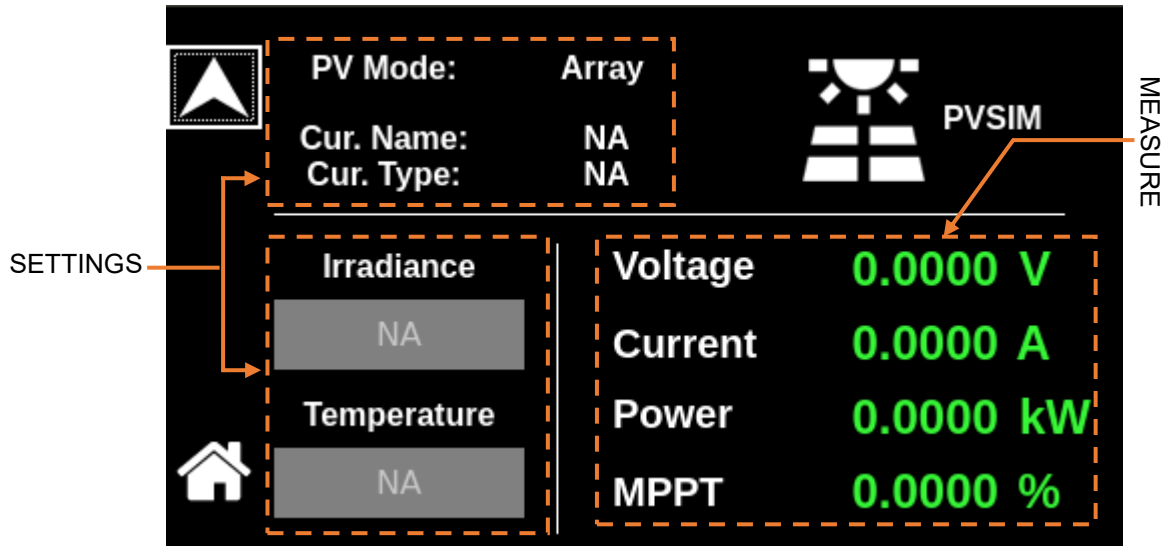


Figure 13-11. Dashboard Screen (Oper. Type – Profile and Curve Type –Array)

SETTINGS[1]	DESCRIPTION
PV Mode	The programed mode in 'PVSIM Mode Selection' menu will be displayed.
Cur. Name	This setting is not valid and will be displayed as NA.
Cur. Type	This setting is not valid and will be displayed as NA.
Irradiance	This setting is not valid and will be displayed as NA.
Temperature	This setting is not valid and will be displayed as NA.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.
MPPT	Displays the floating-point value of Maximum Power Point Tracking of the loaded curve in percentage.
[1] *None of the settings can be changed through the front panel screen; the settings can only be displayed on the front panel for user's reference.*	

Table 13-6. Dashboard screen top-level menu (Oper. Type – Profile, Curve Type – Array)

13.2.1.4 DASHBOARD SCREEN - OPER. TYPE – PROFILE

When the 'Oper. Type – Profile' is selected in the 'PVSIM Mode Selection' menu, the following curve types applicable:

a) SNL

b) EN50530

The 'Dashboard Screen' will change based on the selected curve type, as described below.

NOTE: The Dashboard Screen is only used to view measurements. All other options are invalid and can only be edited from Virtual panels.

13.2.1.4.1 CURVE TYPE –SNL

When 'PVSIM Mode Selection' is configured as below:

a) Oper. Type - Profile

b) Curve type – SNL

The dashboard screen will appear with options 'PV Mode', 'Curve Name', 'Curve Type', 'Irradiance', and 'Temperature'. Refer to Figure 13-12.

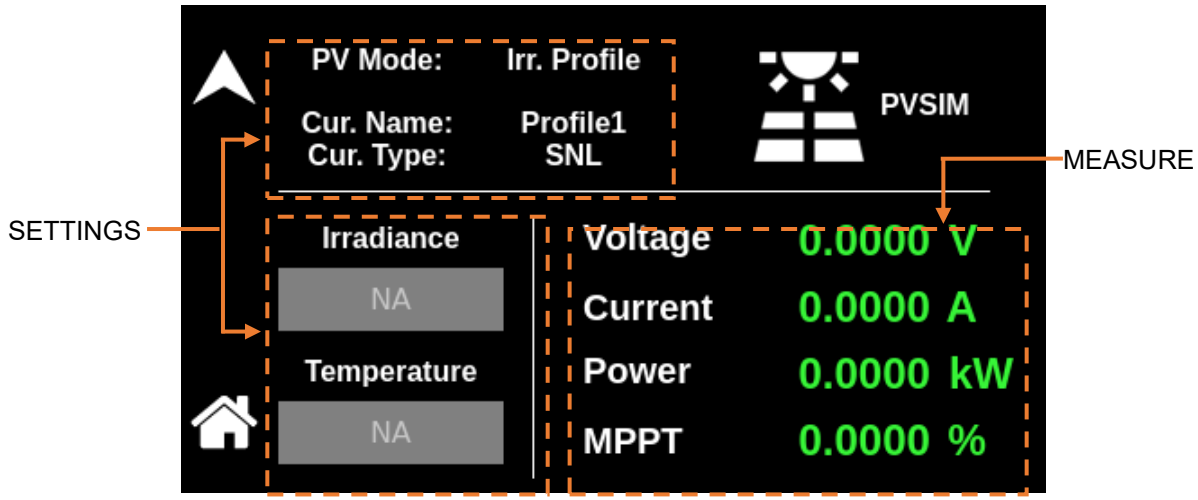


Figure 13-12. Dashboard Screen (Oper. Type – Profile and Curve Type – SNL)

SETTINGS[1]	DESCRIPTION
PV Mode	The programed mode in 'PVSIM Mode Selection' menu will be displayed.
Cur. Name	The selected current name will be displayed.
Cur. Type	The programed curve type will be displayed.
Irradiance[2]	This will be displayed as NA.
Temperature[2]	This will be displayed as NA.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.
MPPT	Displays the floating-point value of Maximum Power Point Tracking of the loaded curve in percentage.
[1] *None of the settings can be changed through the front panel screen; the settings can only be displayed on the front panel for user's reference.* [2] *The values are adjusted from Virtual panels and will not be displayed in the front panel.*	

Table 13-7. Dashboard screen top-level menu (Oper. Type – Profile and Curve Type - SNL)

13.2.1.4.2 CURVE TYPE –EN50530

When 'PVSIM Mode Selection' is configured as below:

a) Oper. Type - Profile

b) Curve type – EN50530

the dashboard screen will appear with 'Test Type (Static or Dynamic)', 'Irradiance', 'Temperature', 'Rated Power' and 'Rated Voltage'. Refer to Figure 13-13 and Figure 13-14.

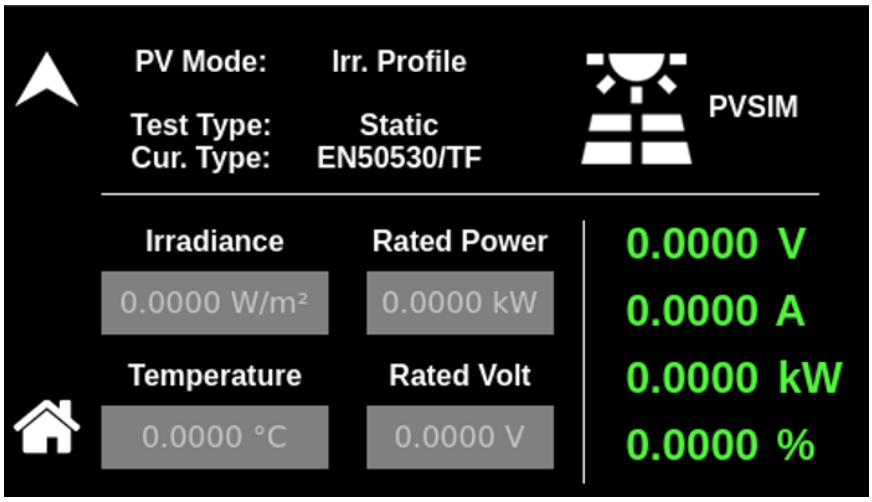


Figure 13-13. EN50530 Test Type Settings - Static

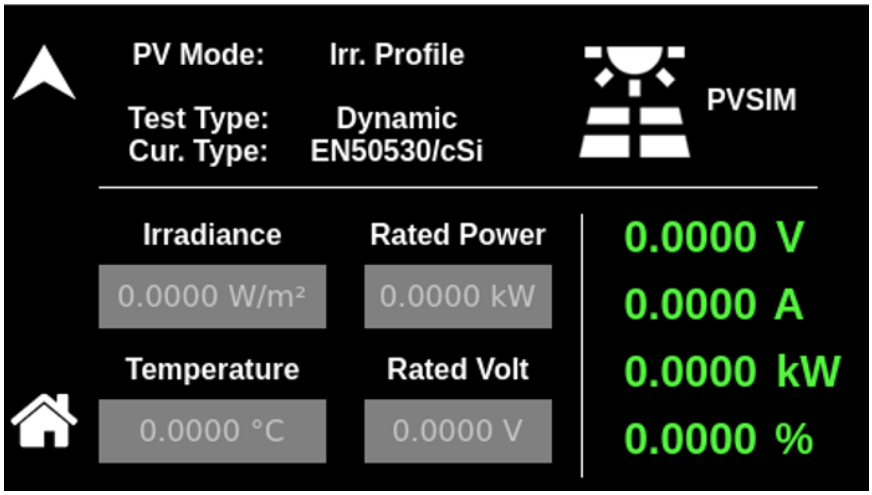


Figure 13-14. EN50530 Test Type Settings – Dynamic

a) EN50530 Test Type- Static/ Dynamic

The top-level menu of the DASHBOARD screen is shown in Figure 13-15 and Figure 13-16. Refer to Section 9.4.2.2 for navigating to the Dashboard Screen.

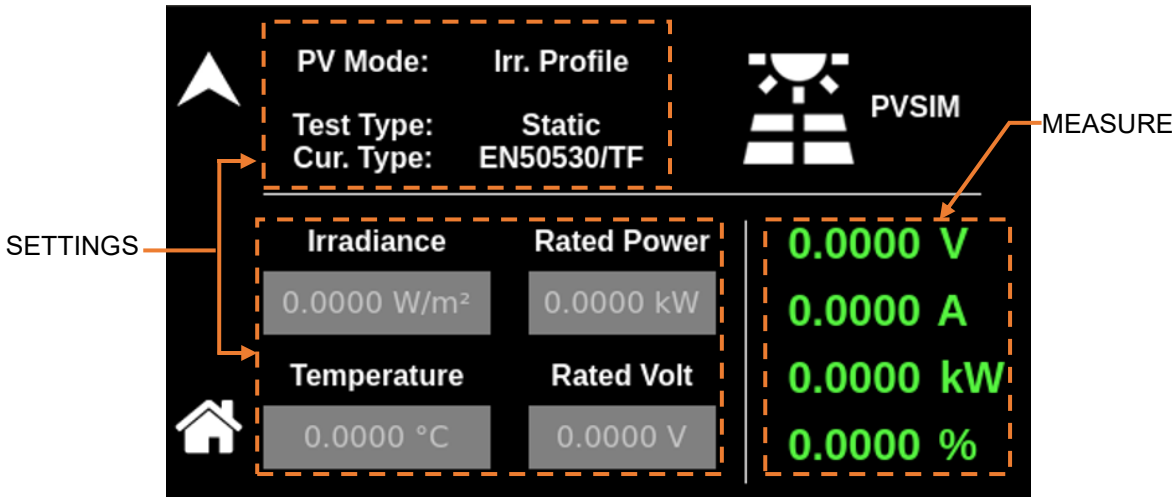


Figure 13-15. Dashboard Screen (Oper. Type – Profile, Test type – Static and Curve Type – EN50530)

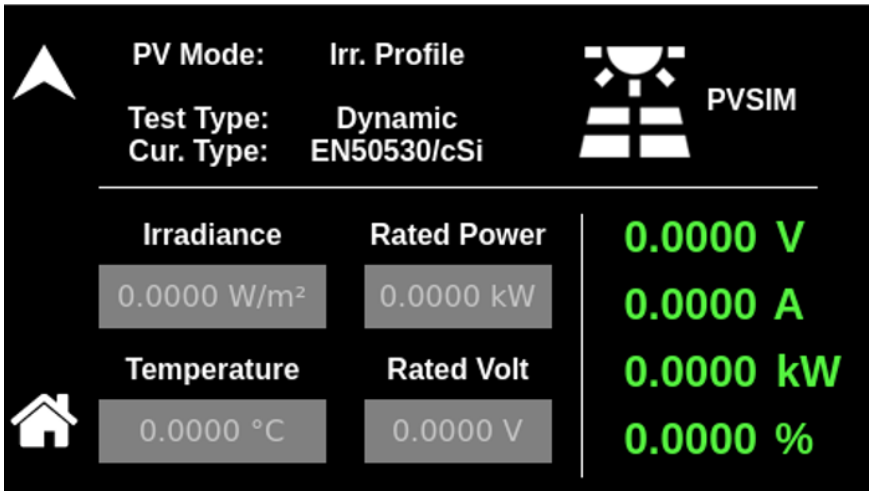


Figure 13-16. Dashboard Screen (Oper. Type – Profile, Test Type – Dynamic and Curve Type – EN50530)

The following selections are available in the DASHBOARD screen top-level menu of Test Type 'Static' or 'Dynamic':

SETTINGS[1]	DESCRIPTION
PV Mode	The programed mode in 'PVSIM Mode Selection' menu will be displayed.
Cur. Name	The selected curve name will be displayed.
Cur. Type	The programed curve type will be displayed.
Irradiance	The programmed irradiance value from the virtual panel is displayed.
Temperature	The programmed temperature value from the virtual panel is displayed.
Rated Power	The programmed rated power value from the virtual panel is displayed.
Rated Volt	The programmed rated volt value from the virtual panel is displayed.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.

SETTINGS[1]	DESCRIPTION
Power	Displays the floating-point value of the DC output power in kW.
MPPT	Displays the floating-point value of Maximum Power Point Tracking of the loaded curve in percentage.
[1] *None of the settings can be changed through the front panel screen; the settings can only be displayed on the front panel for user's reference.*	

Table 13-8. Dashboard screen top-level menu (Oper. Type - Profile and Curve Type - EN50530 and Test Type – Static/Dynamic)

13.2.1.5 REAL-TIME PARAMETER ADJUSTMENT

The DASHBOARD screen menu provides the capability for output parameter entry that has real-time, immediate effect on the output. This allows manual adjustment of the output parameters where tuning of a value is desired. Enabling this function requires clicking on a parameter selection-field box with the encoder switch to select the parameter and display its selection-field highlighted and with a value entry window, refer to Figure 13-17. The rotary encoder could then be used to continuously adjust the parameter value, up and down, as it is rotated. The value change takes immediate effect at the output.

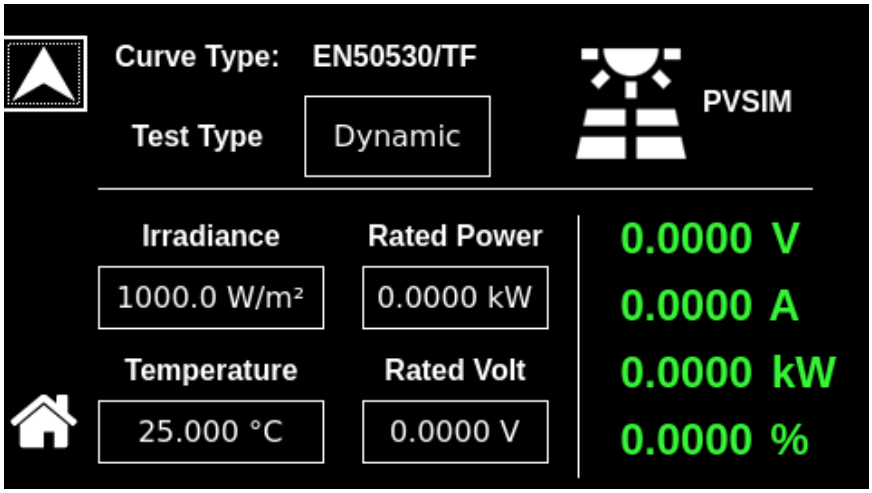


Figure 13-17. Real-Time, Immediate Output Parameter Adjustment

13.2.1.6 DEFAULT SCREEN

The Default screen provides measurement of the DC output voltage, current, power and MPPT, refer to Figure 13-18. When the Dashboard screen is idle for an interval equal to a set time delay, refer to Figure 13-175 and Figure 13-176. The display will automatically switch to the Default screen. Tap anywhere on the screen to return to the Dashboard screen.

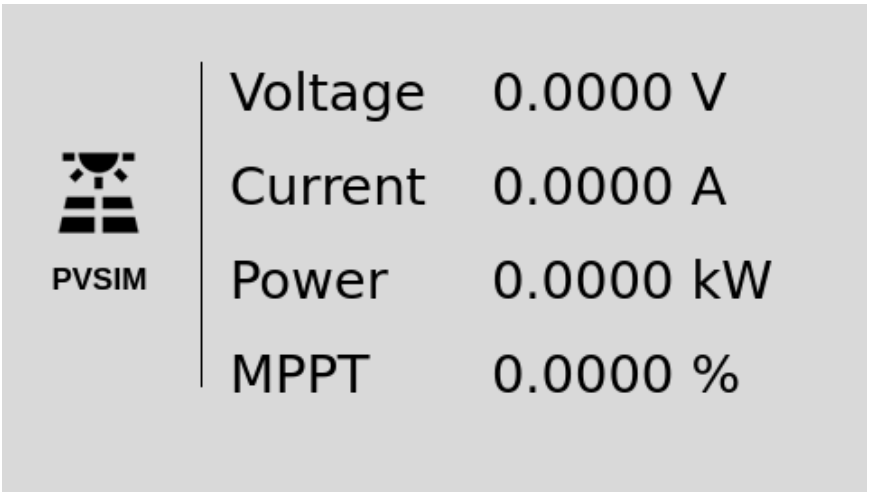


Figure 13-18. Default Screen

With the understanding of the dashboard screen features, user can perform basic functionality and verify the output voltage, current, power and MPPT in various modes of operation.

13.2.2 OUTPUT PROGRAM SCREEN

13.2.2.1 OPER. TYPE - STEADY STATE AND OPER. MODE - STANDARD

When the 'Oper. Type – Steady State' and ‘Oper. Mode – Standard’ is selected in the 'PVSIM Mode Selection' menu, the following curve types applicable:

a) SNL

b) EN50530

c) Userdefined

The ‘Output Program’ screen will change based on the selected curve type, as described below.

13.2.2.1.1 CURVE TYPE – SNL

When ‘PVSIM Mode Selection’ is configured as below:

a) Oper. Type - Steady State

b) Oper. Mode - Standard

c) Curve Type – SNL

The Output Program screen provides the settings of ‘Irradiance’, ‘Temperature’, and ‘Output State’. Refer to Section 9.4.2.2 for navigating to Output Program Screen Top-Level Menu.

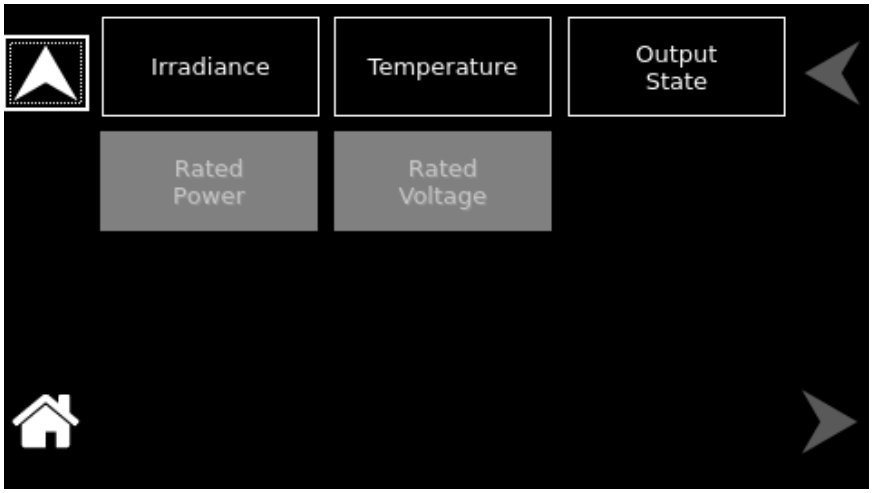


Figure 13-19. Output Program Screen (Oper. Type - Steady State, Oper. Mode - Standard and Curve Type – SNL)

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen includes the following functions:

ENTRY	DESCRIPTION
Irradiance	User can set the irradiance value for the curve. Refer to Figure 13-20.



Figure 13-20. Irradiance Setting

ENTRY	DESCRIPTION
Temperature	User can set the temperature value for the curve. Refer to Figure 13-21.

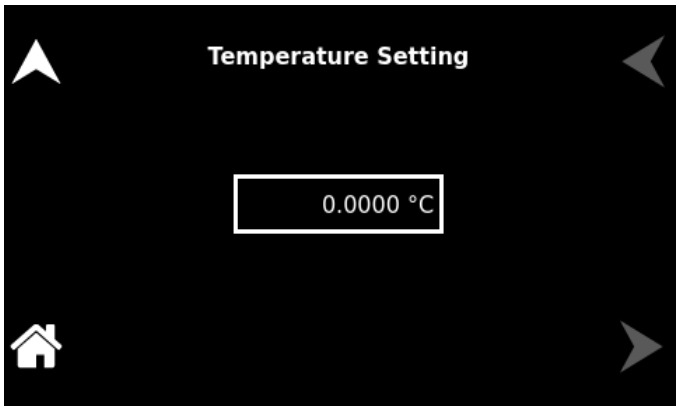


Figure 13-21. Temperature Setting

Output State	User can program the output to ON or OFF state. Refer to Figure 13-22.

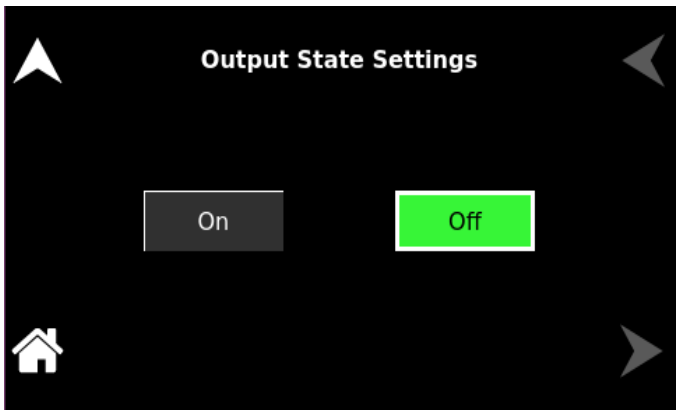


Figure 13-22. Output State Settings

Table 13-9. Output Program screen

13.2.2.1.2 CURVE TYPE – EN50530

a) TEST TYPE – STATIC

When ‘PVSIM Mode Selection’ is configured as below:

- Oper. Type - Steady State
- Oper. Mode – Standard
- Curve Type – EN50530
    - Test Type - Static

The Output Program screen provides the settings of ‘Rated power’, ‘Rated Voltage’ and ‘Output State’. Refer to Section 9.4.2.2 for navigating to Output Program Screen Top-Level Menu.

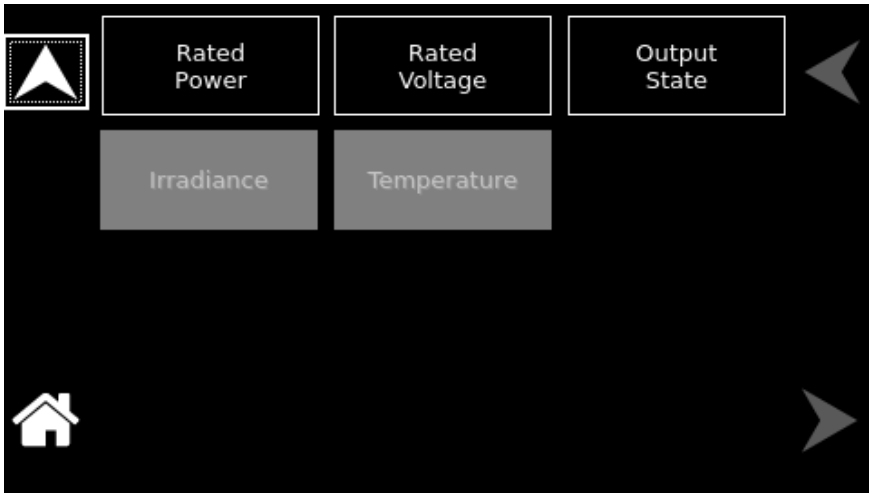


Figure 13-23. Output Program Screen (Curve type – EN50530 and Test type - Static)

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen includes the following functions:

ENTRY	DESCRIPTION
Rated Power	Users can set the rated power value for the curve. Refer to Figure 13-24.

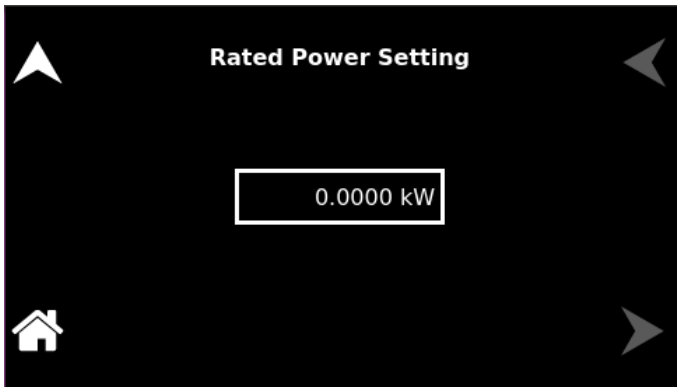


Figure 13-24. Rated Power Setting

Rated Voltage	Users can set the rated voltage value for the curve. Refer to Figure 13-25.

ENTRY	DESCRIPTION

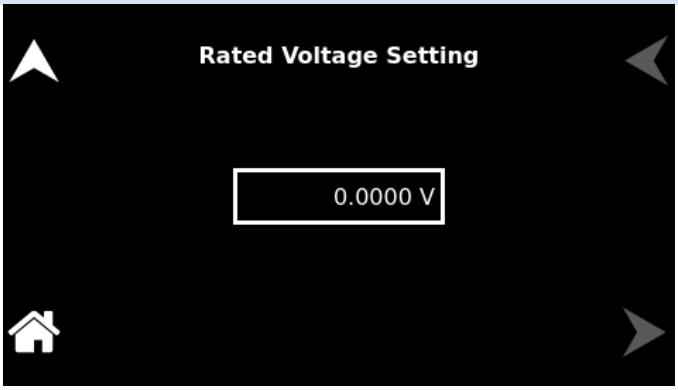


Figure 13-25. Rated Voltage Setting

Output State Users can program the output to ON or OFF state. Refer to Figure 13-26.

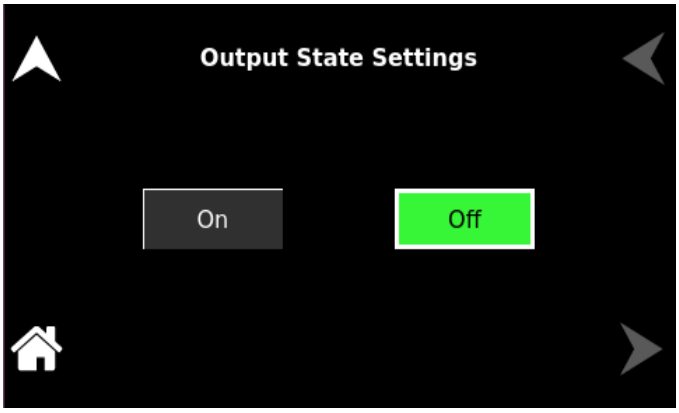


Figure 13-26. Output State Settings

Table 13-10. Output Program screen

b) TEST TYPE – DYNAMIC

When the settings selected ‘PVSIM Mode selection’:

- Oper. Type - Steady State
- Oper. Mode – Standard
- Curve Type – EN50530
    - Test type - ‘Dynamic’

The Output Program screen provides the settings of ‘Irradiance’, ‘Temperature’, ‘Rated power’, ‘Rated Voltage’ and ‘Output State’. Refer to Section 9.4.2.2 for navigating to Output Program Screen Top-Level Menu.

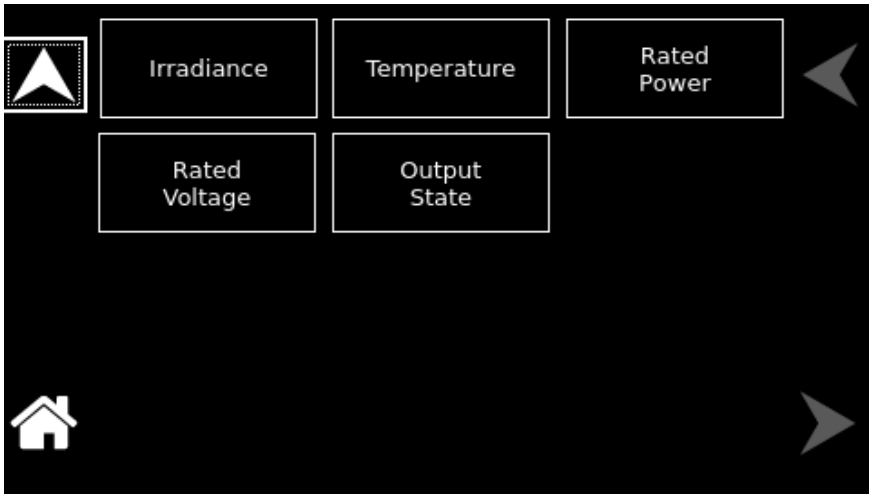


Figure 13-27. Output Program Screen

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen includes the following functions:

ENTRY	DESCRIPTION
Irradiance	Users can set the irradiance value for the curve. Refer to Figure 13-28.



Figure 13-28. Irradiance Setting

ENTRY	DESCRIPTION
Temperature	Users can set the temperature value for the curve. Refer to Figure 13-29.

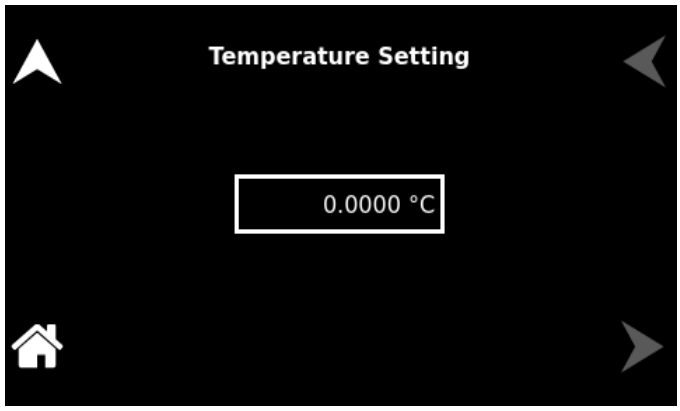


Figure 13-29. Temperature Setting

Rated Power Users can set the rated power value for the curve. Refer to Figure 13-30.

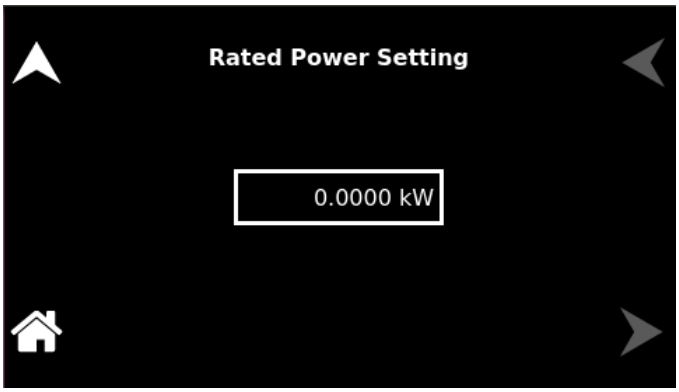


Figure 13-30. Rated Power Setting

Rated Voltage Users can set the rated voltage value for the curve. Refer to Figure 13-31.

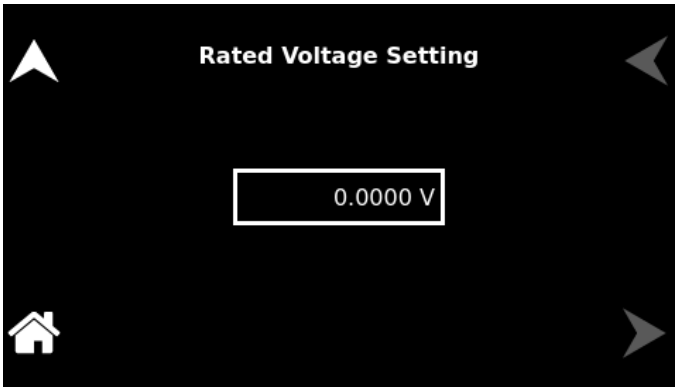


Figure 13-31. Rated Voltage Setting

Output State Users can program the output to ON or OFF state. Refer to Figure 13-32.

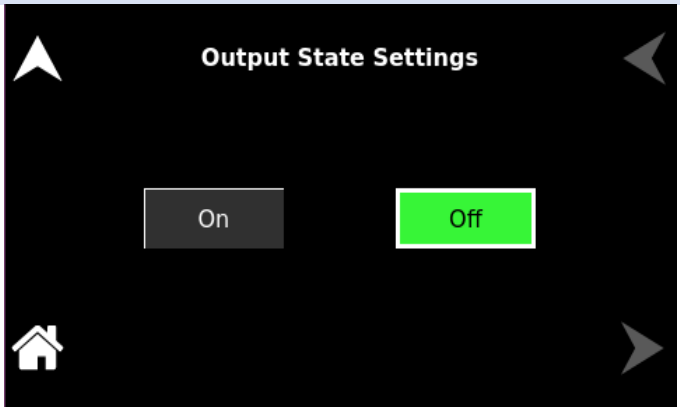
ENTRY	DESCRIPTION
	

Figure 13-32. Output State Settings

Table 13-11. Output Program screen

13.2.2.1.3 CURVE TYPE – USER

When 'PVSIM Mode Selection' is configured as below:

a) Oper. Type - Steady State

b) Oper. Mode – Standard

c) Curve Type - User

The Output Program screen provides the setting of 'Output State'. Refer to Section 9.4.2.2 for navigating to Output Program Screen Top-Level Menu.

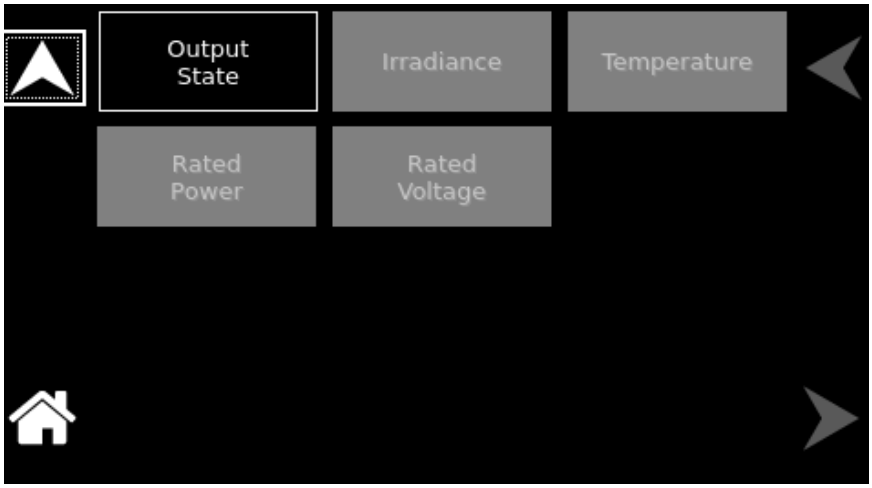


Figure 13-33. Output Program Screen (Oper. Type - Steady State, Oper. Mode - Standard and Curve Type - User)

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen includes the following functions:

ENTRY	DESCRIPTION
Output State	Users can program the output to ON or OFF state. Refer to Figure 13-34.

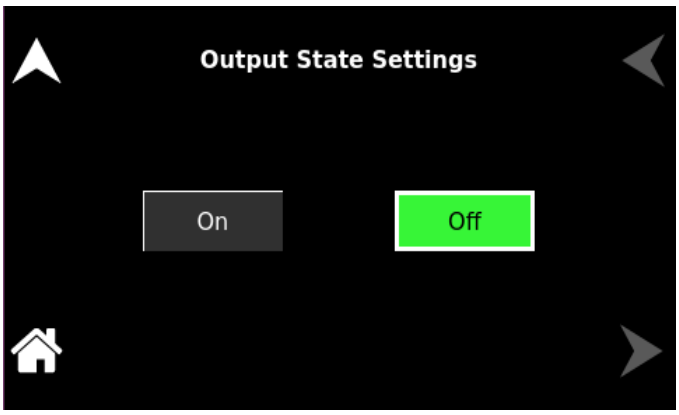


Figure 13-34. Output State Settings

Table 13-12. Output Program screen

13.2.2.2 OPER. MODE – STEADY STATE AND OPER. MODE - ARRAY

When 'PVSIM Mode Selection' is configured as below:

a) Oper. Type - Steady State

b) Oper. Mode – Array

The Output Program screen provides the setting of 'Output State'. Refer to Section 9.4.2.2 for navigating to Output Program Screen Top-Level Menu.

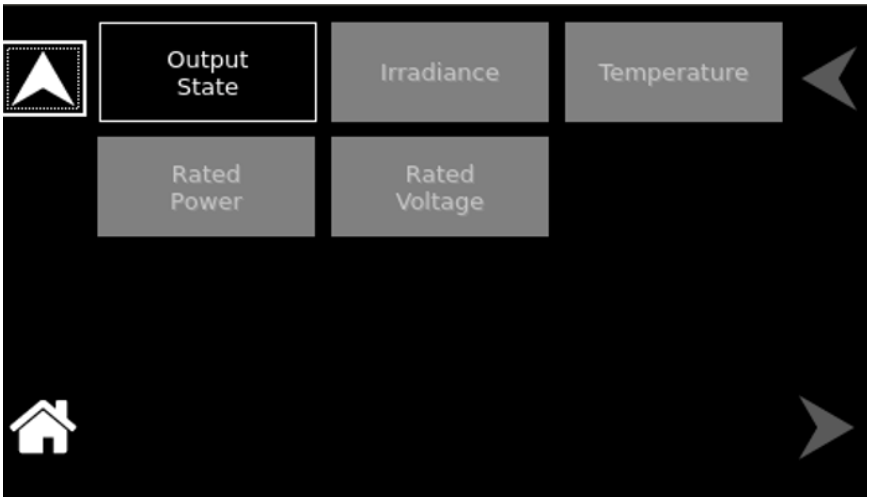


Figure 13-35. Output Program Screen (Oper. Type – Array)

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen includes the following functions:

ENTRY	DESCRIPTION
Output State	Users can program the output to ON or OFF state. Refer to Figure 13-36.

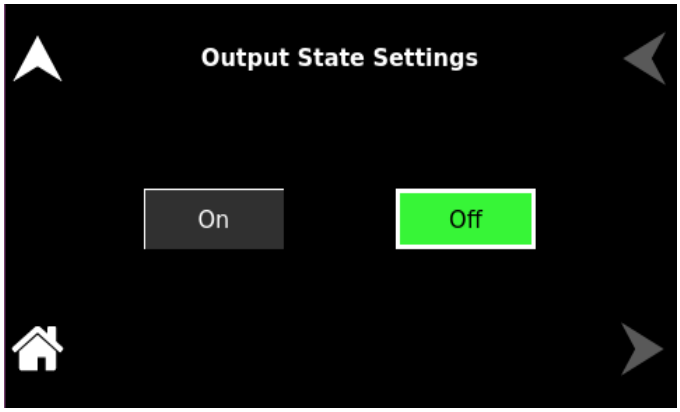


Figure 13-36. Output State Settings

Table 13-13. Output Program screen

13.2.2.1 OPER. TYPE – PROFILE

When the 'Oper. Type – Profile' is selected in the 'PVSIM Mode Selection' menu, the following curve types become available:

a) SNL

b) EN50530

The Output Program' screen will change based on the selected curve type, as described below.

13.2.2.1.1 CURVE TYPE – SNL OR EN50530

When 'PVSIM Mode Selection' is configured as below:

a) Oper. Type – Profile

b) Curve Type - SNL or EN50530

The Output Program screen provides the setting of 'Output State'. Refer to Section 9.4.2.2 for navigating to Output Program Screen Top-Level Menu.

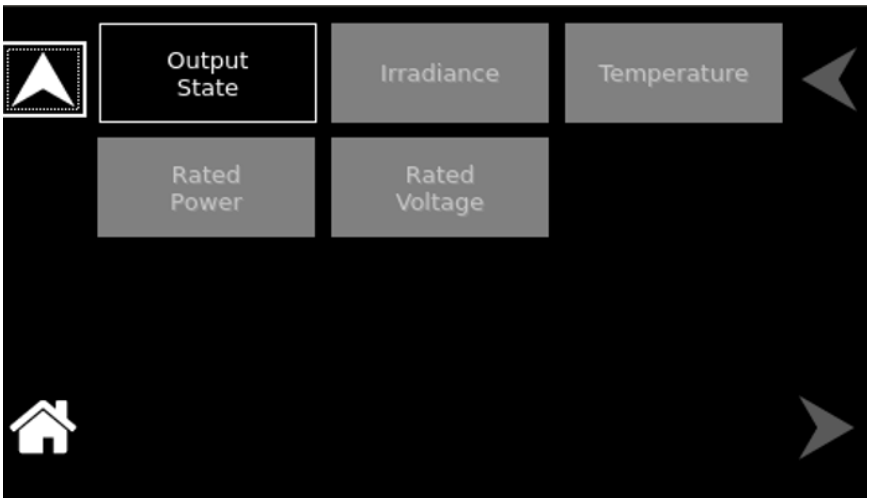


Figure 13-37. Output Program Screen (Oper. Type – Profile and Curve Type – SNL or EN50530)

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen includes the following functions:

ENTRY	DESCRIPTION
Output State	Users can program the output to ON or OFF state. Refer to Figure 13-38.

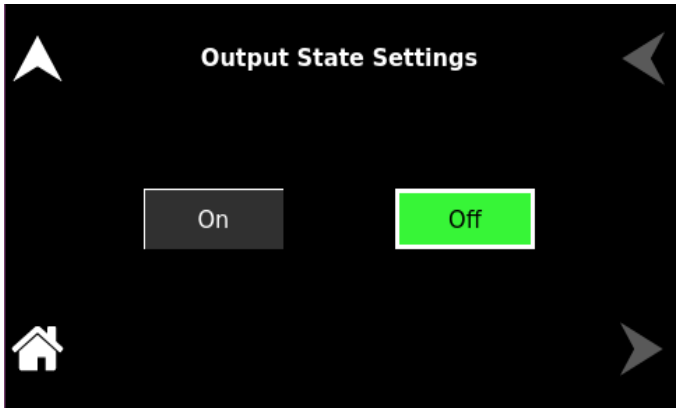


Figure 13-38. Output State Settings

Table 13-14. Output Program screen

13.2.3 MEASUREMENTS SCREEN

The Measurements screen displays the floating-point values for Output ‘Voltage’, Output ‘Current’, Output ‘Power’ and Output ‘MPPT’. For the Measurement screen refer to Figure 13-39 and for instructions on how to navigate to the Measurements screen, refer to Section 9.4.2.2.

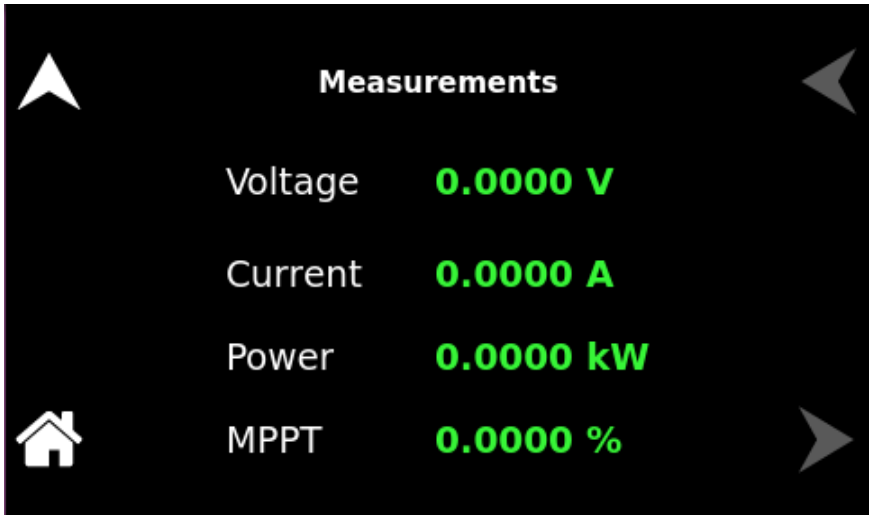


Figure 13-39. Measurement Screen

13.2.4 CONFIGURATION SCREEN

The ‘PVSIM Mode Selection’ menu in the ‘Configuration’ Screen allows the user to configure the settings below:

a) Oper. Type

- Steady State
- Profile

b) Oper. Mode

- Standard
- Array

c) Curve Type

- SNL
- EN50530
- User

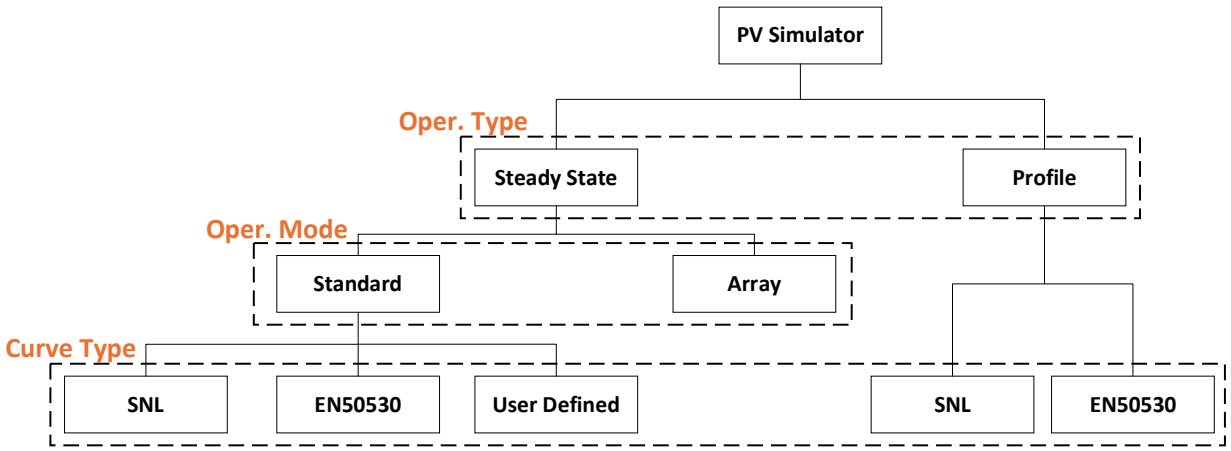


Figure 13-40. PVSIM mode Selection Setting

The front panel will not support all the modes in PV Simulator, to operate all the modes Virtual panels can be used. Refer to Figure 13-40 for the available PV Simulator modes and the Table 13-15 for the front panel support. The configuration screen will change based on the user's selection.

OPER. TYPE	OPER. MODE	CURVE TYPE	FRONT PANEL SUPPORT
Steady State	Standard	SNL	Yes
Steady State	Standard	EN50530	Yes
Steady State	Standard	Userdefined	Partial
Steady State	Standard	NA	Only view in the dashboard
Profile	NA	SNL	Only view in the dashboard
Profile	NA	EN50530	Only view in the dashboard

Table 13-15. PVSIM mode Selection Setting – Front Panel Support

13.2.4.1 PVSIM MODE SELECTION

The 'PVSIM Mode Selection' menu is used to configure different operating types, operating modes and curve types of PV simulator operation. Depending on the selection made in these settings, the 'Dashboard', 'Output program' and 'Configuration Screen' will change. Refer the Figure 13-41 to Figure 13-43.

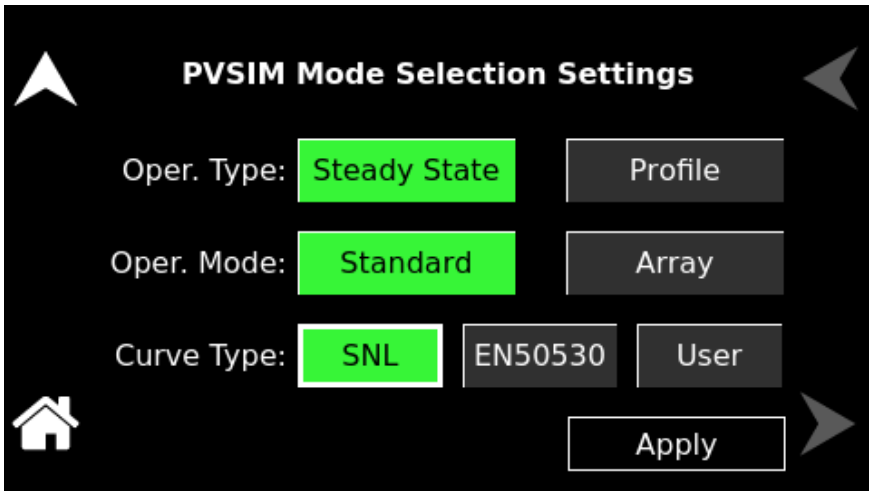


Figure 13-41. PVSIM Mode Selection Settings (Oper. Type -Steady State, Oper. Mode- Standard and Curve type – SNL)

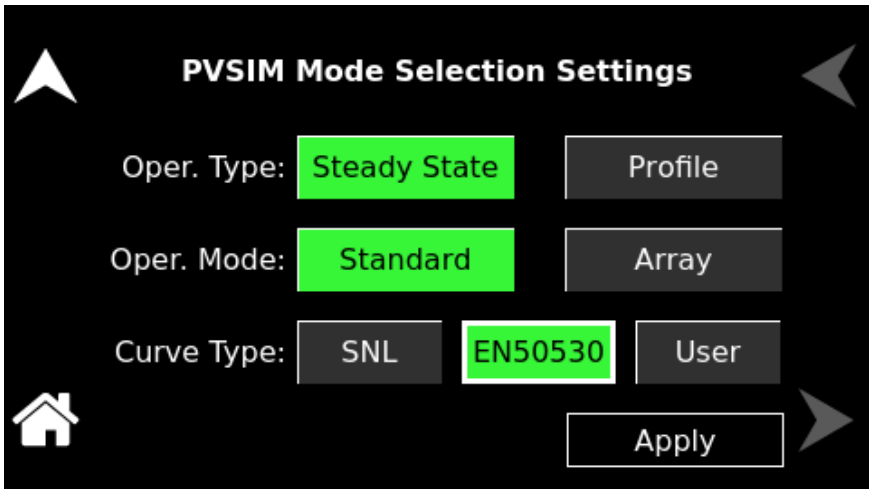


Figure 13-42. PVSIM Mode Selection Settings (Oper. Type -Steady State, Oper. Mode- Standard and Curve type – EN50530)

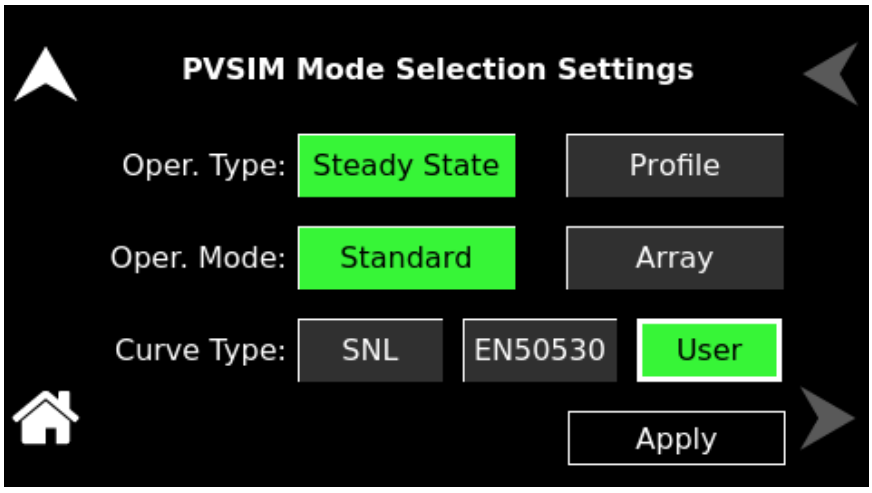


Figure 13-43. PVSIM Mode Selection Settings (Oper. Type -Steady State, Oper. Mode- Standard and Curve type – User)

The ‘Oper. Type - Profile’ and ‘Oper. Mode - Array’ cannot be configured through the front panel of the Mi-Beam. If these settings are selected through the front panel, the screen will display as ‘This feature is not supported in Front Panel’. Refer to Figure 13-44.



Figure 13-44. PVSIM Mode Selection Settings (Oper. Type -Profile or Oper. Mode - Array)

The ‘Oper. Type - Profile’ and Oper. Mode - Array’ can only be configured through the Virtual panel. If these settings are selected through the Virtual panel, the selected settings will be displayed on the Mi-beam front panel screen. Refer to Figure 13-45 to Figure 13-50.

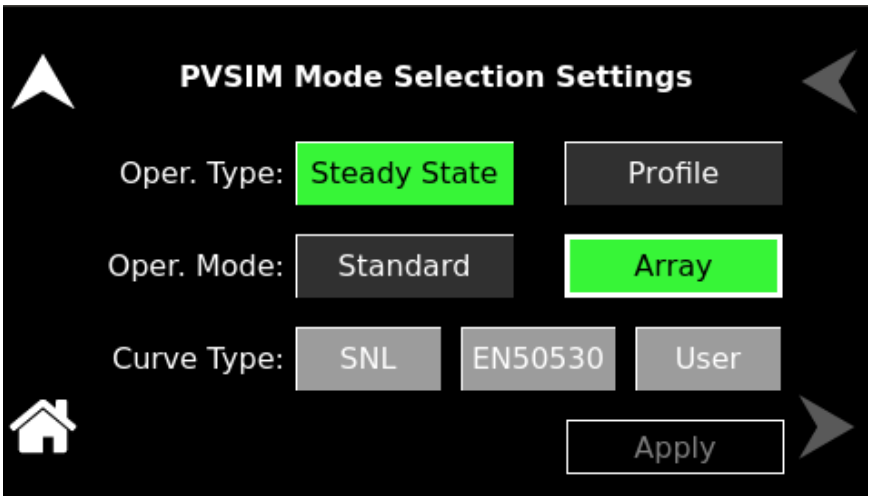


Figure 13-45. PVSIM Mode Selection Settings (Oper. Type -Steady State and Oper. Mode - Array)

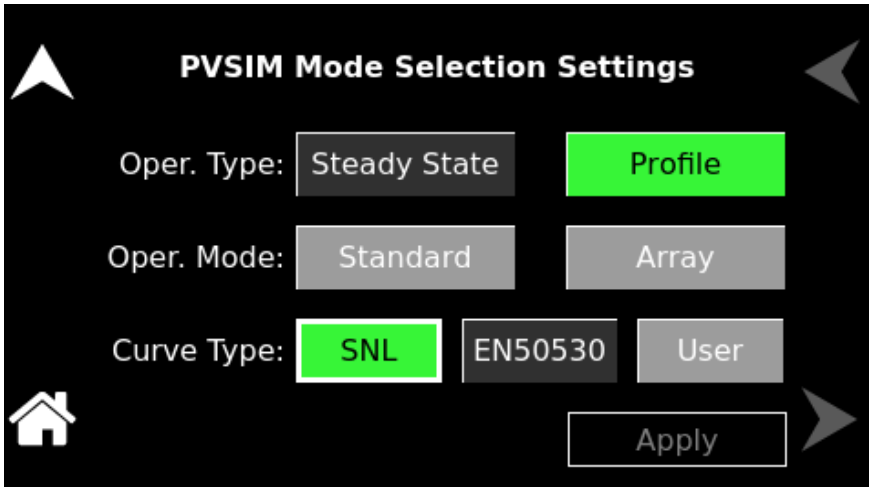


Figure 13-46. PVSIM Mode Selection Settings (Oper. Type -Profile and Curve Type - SNL)

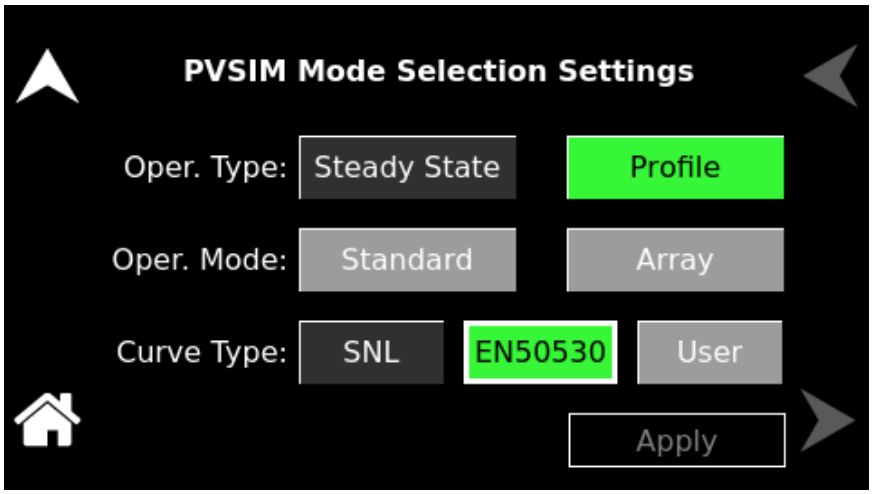


Figure 13-47. PVSIM Mode Selection Settings (Oper. Type -Profile and Curve Type – EN50530)

ENTRY[1]	DESCRIPTION
Oper. Type	Sets the operating type of the PV Simulator. **a) Steady State:** User can change the parameters of a PV Curve when required in real time. **b) Profile:** User can set the irradiance and temperature values of the PV curve (only SNL and EN50530 curves) using an irradiance and temperature profile, which will change with respect to time.
Oper. Mode	Sets the operating Mode of the PV Simulator for Steady State Operating Type ('Oper. Mode' is not applicable when the 'Oper. Type' is selected to 'Profile')

ENTRY(1)	DESCRIPTION
	a) Standard: Used to simulate a single PV cell, various types of PV curves supported are; • SNL(Standard No Load) Curve • EN50530 Curve • User Defined curve. **b) Array:** Simulates multiple PV cells connected in an array.
Curve Type	Sets the Curve type of the PV simulator: **a) SNL:** Standard No Load **b) EN50530:** Standard for measuring the efficiency of MPPT in grid-connected photovoltaic inverters. **c) User:** User can create customized PV curve by entering V (Voltage) vs I (Current) points.
(1) E*xplanation provided for individual settings, for possible combinations that can be done in PVSIM mode. Refer to Figure 13-40.*	

Table 13-16. PVSIM Mode Selection Settings

13.2.4.2 OPER. TYPE - STEADY STATE AND OPER. MODE - STANDARD

13.2.4.2.1 CURVE TYPE – SNL OR USER

When ‘PVSIM Mode Selection’ is configured as below:

a) Oper. Type - Steady State

b) Oper. Mode - Standard

c) Curve type - SNL or User

The Configuration Screen provides the settings of ‘PVSIM Mode Selections’, ‘Curve Selection’, ‘Protection’, ‘Output Sense’, ‘PONS’, ‘Measurement Average Samples’ and ‘Parallel Operation Mode’(enabled only in parallel operation).

For the top-level menu of the ‘Configuration screen’, refer to Figure 13-48 and for the instructions on how to navigate, refer to Section 9.4.2.2.

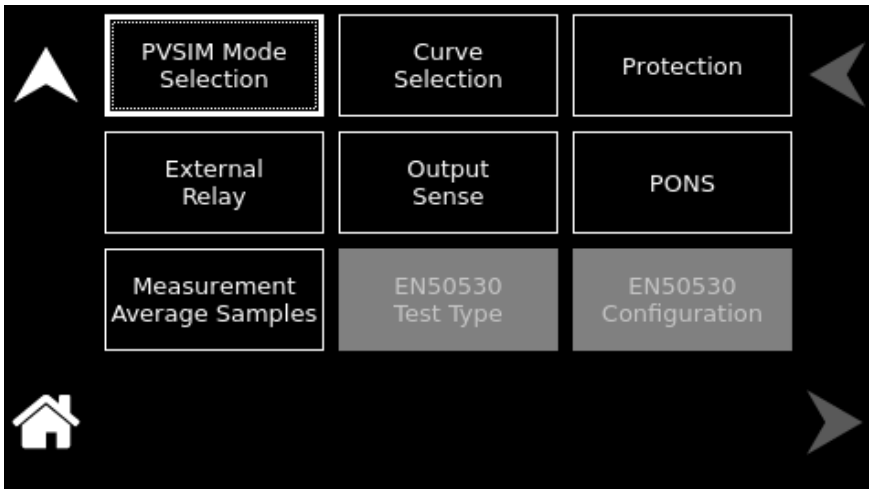


Figure 13-48. Configuration Screen (Curve Type – SNL or User)

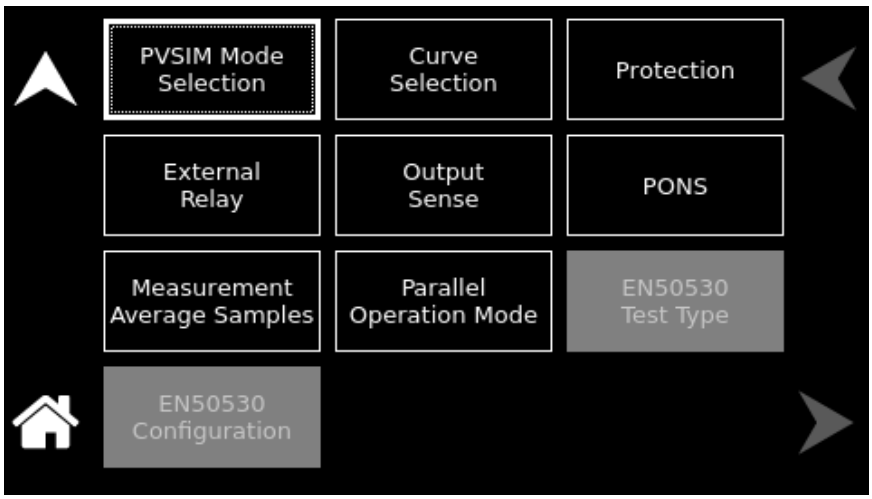


Figure 13-49. Configuration Screen (Curve Type – SNL or User) – Parallel Operation

13.2.4.2.1.1 CURVE SELECTION

a) SNL CURVE

The curve selection function is set to ‘Curve type - SNL’, enabling users to simulate various PV module characteristics by adjusting key parameters such as open circuit voltage, short circuit current, maximum power voltage, and maximum power current.

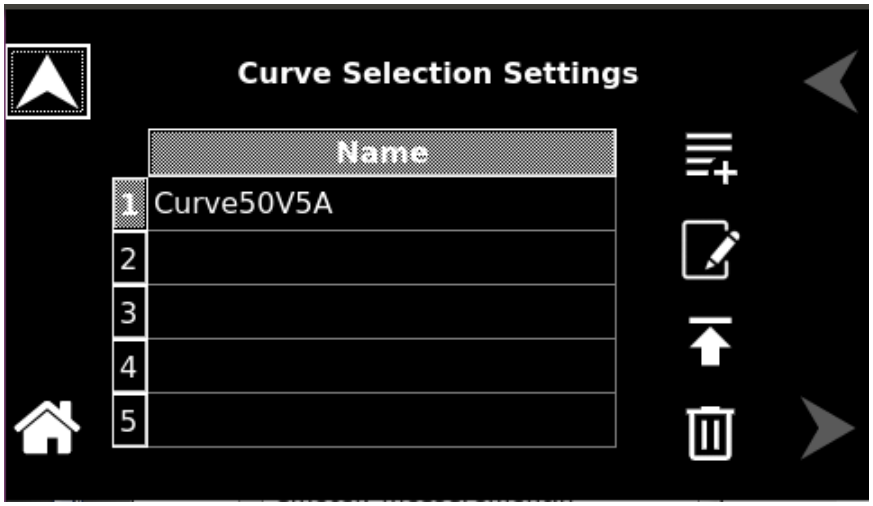


Figure 13-50. Curve Selection Settings - Upload button enabled (Curve Type - SNL)

- Adding a Curve in 'Curve Selection Settings'
    - Open the Curve Selection Settings and select the 'Add Curve' option on the right side of the screen. Refer to Figure 13-50.

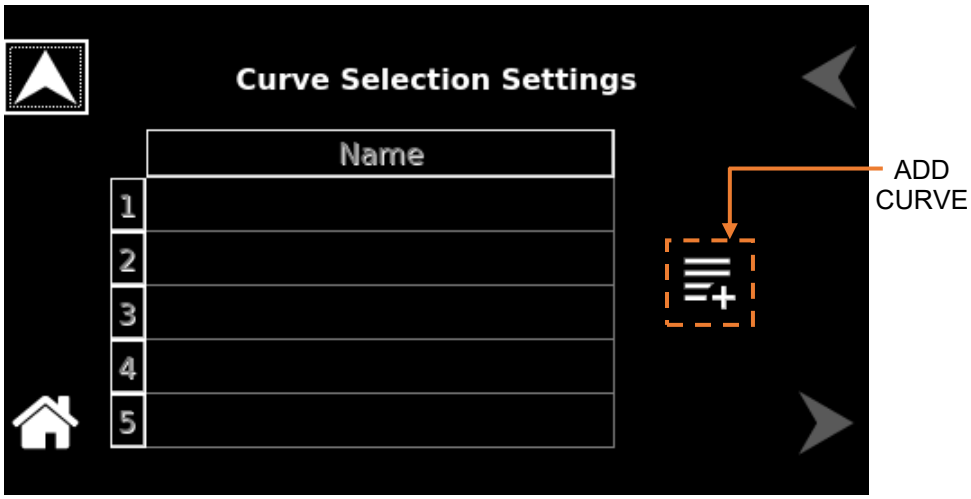


Figure 13-51. Curve Selection

- An alphanumeric keypad will open, allowing the user to enter a curve name and click 'OK' to confirm the entered name. Refer to Figure 13-52.

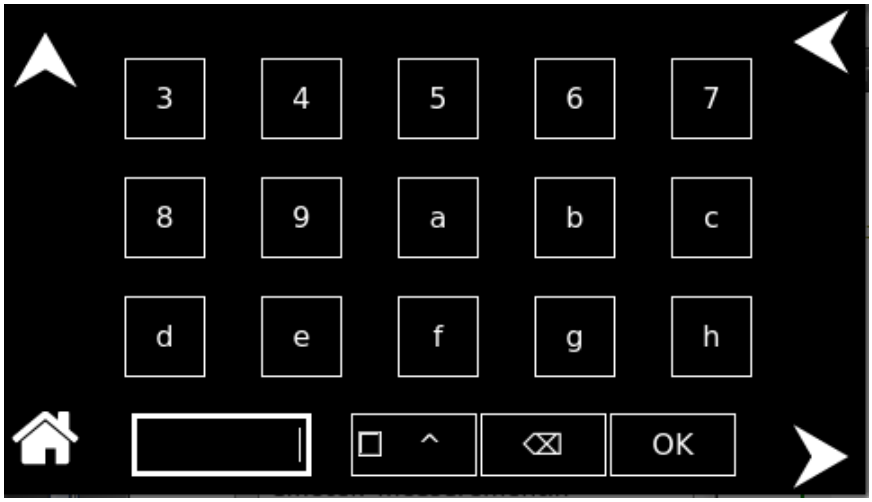
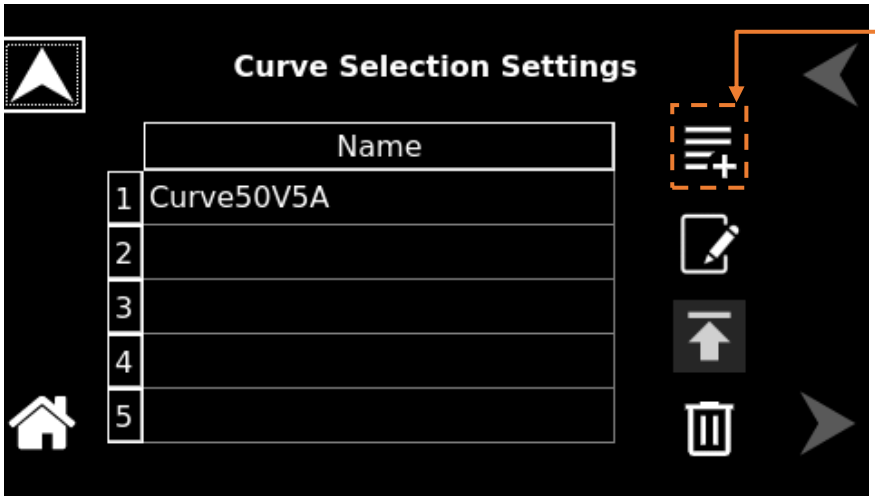


Figure 13-52. Alpha - numeric keypad

- Edit the values of the Curve in 'Curve Selection Settings'
    - The created curve will have default values. If the user want to change the default values, click on the 'Edit' option.
    - The created curve name will be displayed at the top of the screen when the 'Edit' option is clicked. Refer to Figure 13-53.
    - The functions available in 'Screen 1' are 'Open Circuit Voltage (Voc) , Short Circuit Current (Isc), Current at Maximum Power (Imp) and Fill Factor'. Refer to Figure 13-53.
    - 'Vmp' and 'Imp' will only be available when the 'Fill Factor' checkbox is unchecked. The fill factor value will be automatically calculated by analyzing the entered values of 'Vmp' and 'Imp'. Refer to Figure 13-53.



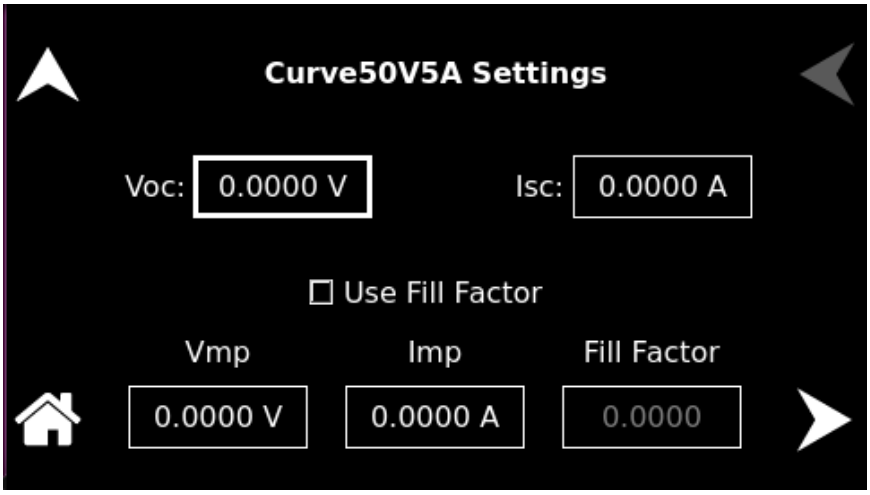


Figure 13-53. Curve Settings

- If the user has the fill factor value, select the 'Use Fill Factor' checkbox option to enable and to enter the 'Fill Factor' value. The 'Vmp' and 'Imp' values will be automatically calculated. Refer to Figure 13-54.

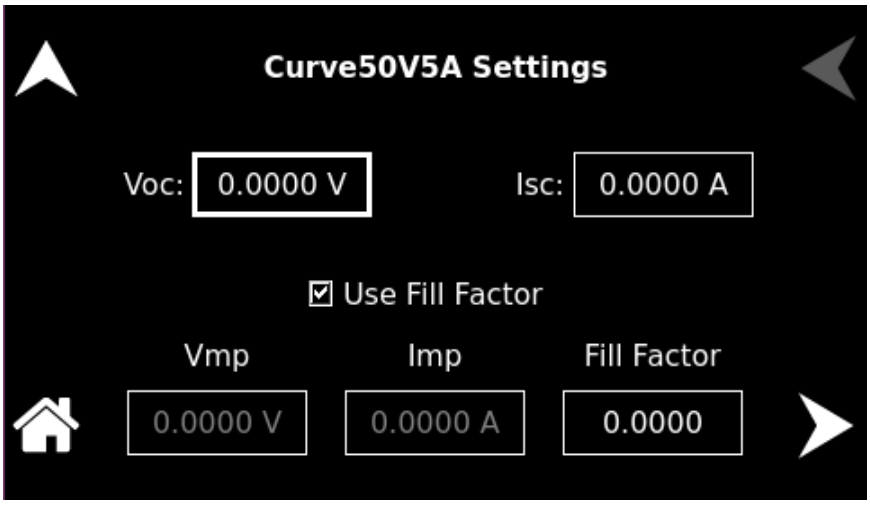


Figure 13-54. Curve Setting - Fill factor enabled

- Use the navigation arrows to change the screen to 'Screen 2' and enter the values of 'Temperature Coefficients' and 'Irradiance Correction'. Refer to Figure 13-55.

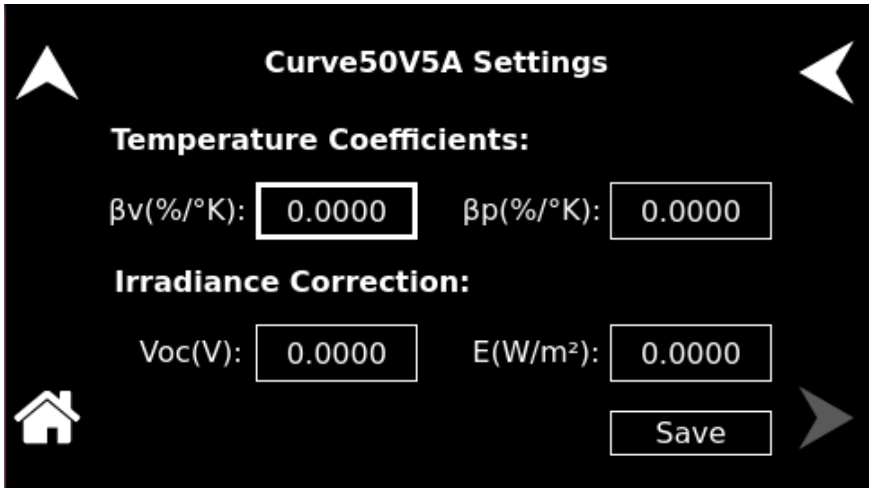


Figure 13-55. Curve Setting - Screen 2

ENTRY	DESCRIPTION
Voc	Maximum voltage from a solar panel without a load
Isc	Maximum current from a solar panel when short-circuited.
Vmp	Voltage when the panel operates at peak performance.
Imp	Current at the panel's maximum power point.
Fill Factor	Ratio of maximum power to the product of Voc and Isc.
βv (%/°K)	The temperature coefficient for voltage shows how voltage changes with temperature.
βp (%/°K)	The temperature coefficient for power shows how power changes with temperature.
Voc (V)	Open circuit voltage for irradiance correction.
E (W/m²)	Power of sunlight per square meter.

Table 13-17. Screen 1 and 2 – Profile Settings

- Once curve is configured, click on the ‘Save’ option to save the settings.

NOTE: When multiple setting screens are present, the ‘Save’ option will only be available on the last screen. Ensure to click the ‘Save’ option to save the settings.

- Load the Curve in ‘Curve Selection Settings’
  - Load the defined Curve by clicking the ‘Upload’ option. Refer to Figure 13-56.

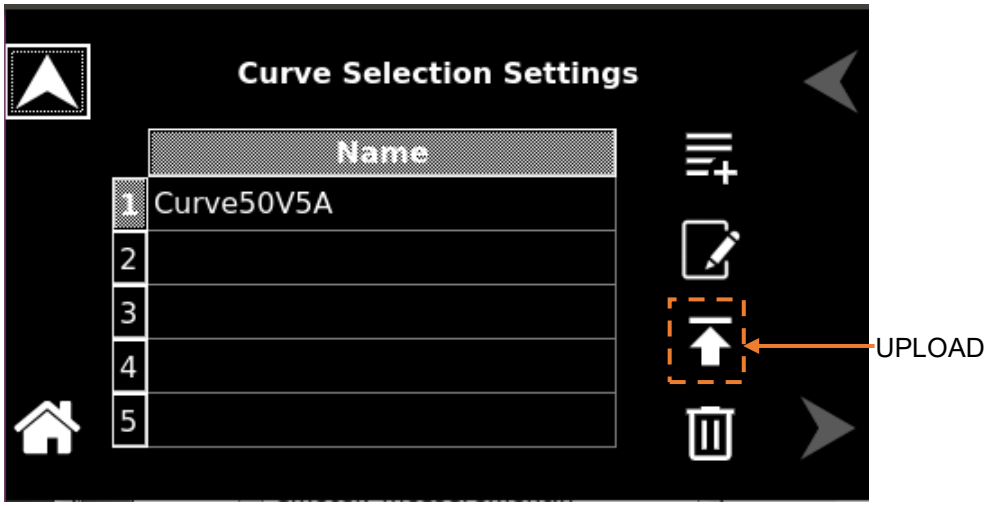


Figure 13-56. Curve Selection Settings - Upload button enabled

- The 'Upload button' will be disabled when the curve is loaded to the unit. Refer to Figure 13-57.

- Delete the Curve in 'Curve Selection Settings'
  - Click on 'Delete' to remove the existing or loaded curve. Refer to Figure 13-57.

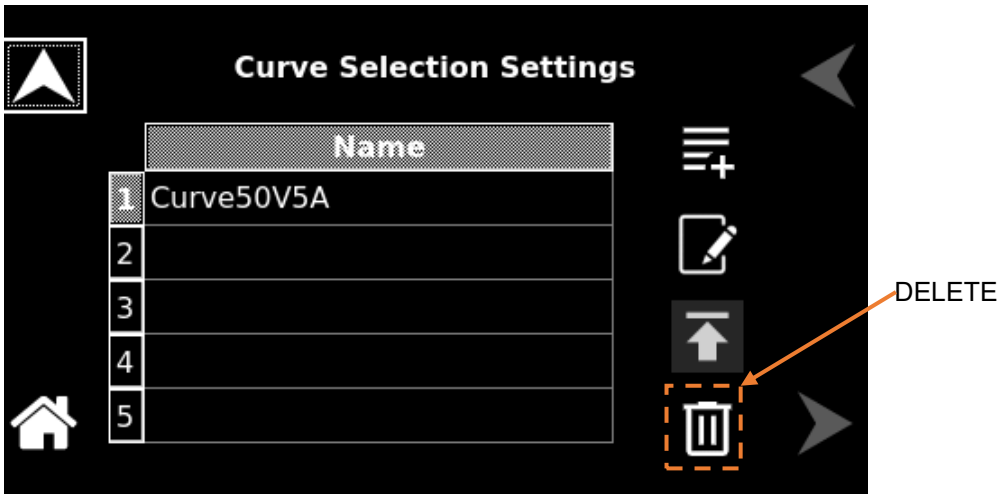


Figure 13-57. Curve Setting - Upload Disabled and Delete Option

b) USERDEFINED CURVE

The user-defined curve, IV curve of the PV simulator, can be directly configured by uploading 1024 points of current (I) and corresponding voltage (V) from a file. This configuration is only possible through virtual panels. Once configured, these user-defined curves can be selected and uploaded from the front panel.

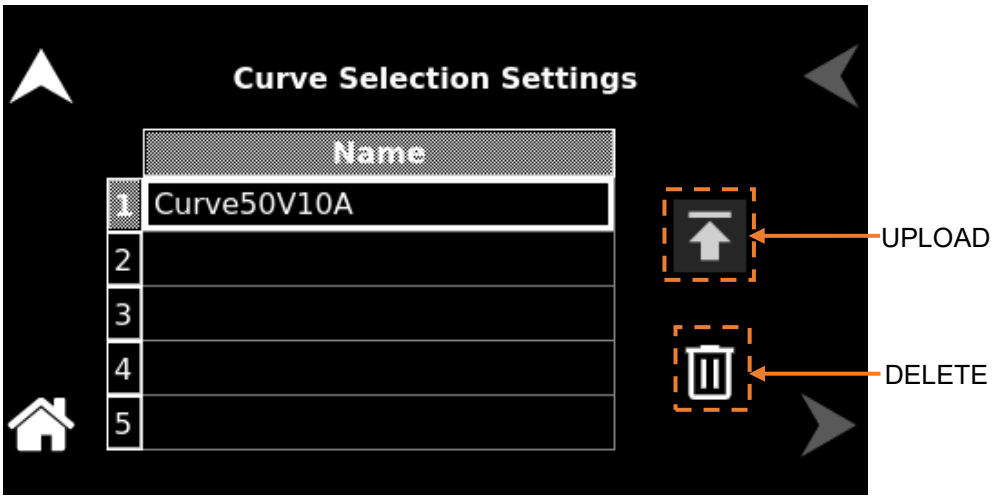


Figure 13-58. Curve Selection Settings - Upload button disabled (Curve Type - User)

- Load the Curve in ‘Curve Selection Settings’
  - The user can load a curve defined in the virtual panel by selecting the 'Upload' button. Refer to the Figure 13-58.
- Delete the Curve in ‘Curve Selection Settings’
  - Click on ‘Delete’ to remove the existing or loaded curve if it is not needed. Refer to Figure 13-58.

13.2.4.2.1.2 PROTECTION

In protection settings, users can define Output Overvoltage Protection (OVP) and Positive Overcurrent Protection (Pos. OCP) to help safeguard their devices from electrical anomalies. Refer to Figure 13-59.

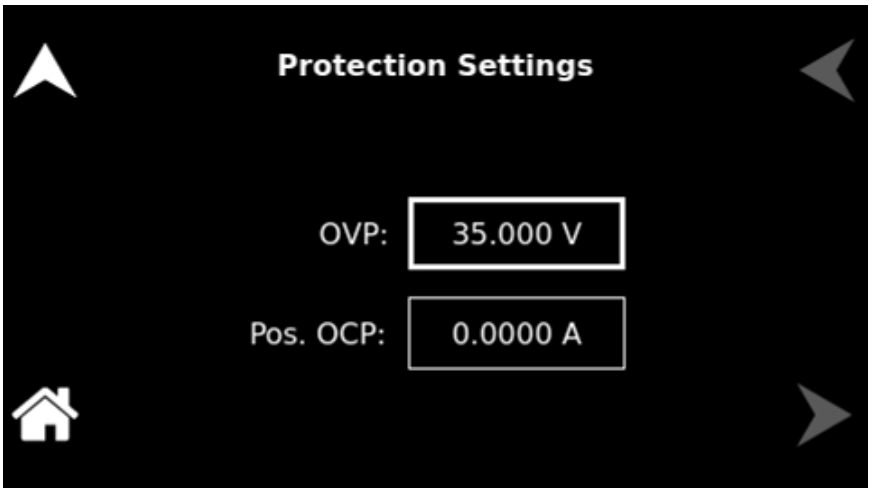


Figure 13-59. Protection Settings

13.2.4.2.1.3 EXTERNAL RELAY

The External relay Settings allows the user to set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits.

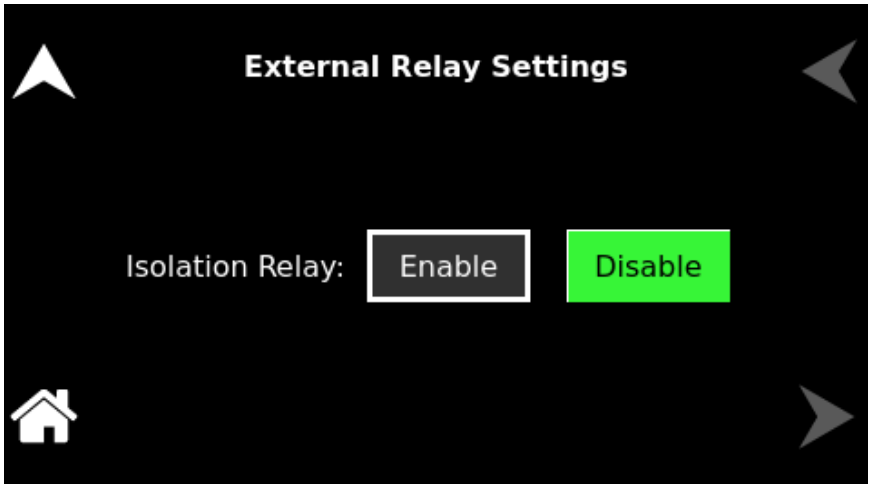


Figure 13-60. External Relay Settings

13.2.4.2.1.4 OUTPUT SENSE

The Output Sense menu allows user to set the output voltage sense of the unit to either local or remote. When Remote is selected as output sense, voltage sense cables must be connected to rear panel of power the supply at RVS connector. Refer to Figure 13-61.

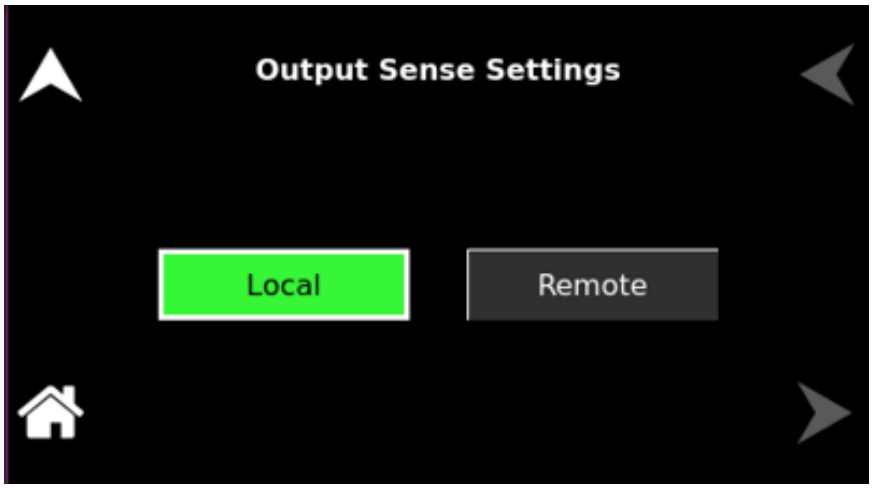


Figure 13-61. Output Sense Settings

13.2.4.2.1.5 PONS

The PONS Menu enables users to configure the Power-ON values and set up the power supply based on the chosen mode settings. Refer to Figure 13-62.

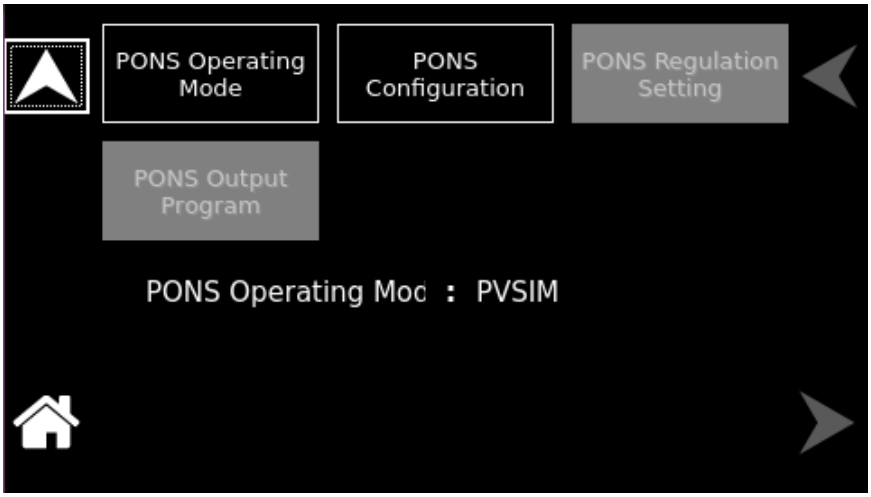


Figure 13-62. PONS – Main Screen

a) PONS OPERATING MODE

The 'PONS Operating Mode Settings' will not change automatically when the user changes the mode in the 'Operating Mode' settings on the Home screen. Users must separately select the ‘PVSIM’ mode in the 'PONS Operating Mode Settings', which will update both the 'PONS Operating Mode Settings' screen and the 'PONS Configuration' screen. Refer to Figure 13-63 and Figure 13-64.

The same applies to other modes such as Bi-DIR, SOUR, ELOAD, BATSIM and BATTEST. Refer to the Sections 10.2.5.7.1, 11.2.5.7.1, 12.2.5.7.1, 14.2.4.7.1 and 15.2.4.7.

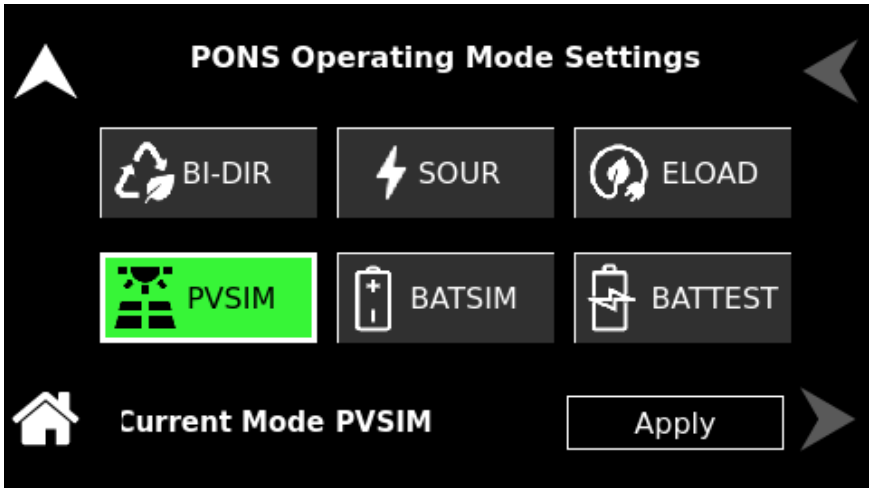


Figure 13-63. PONS Operating Mode Settings

b) PONS CONFIGURATION

In the PONS Configuration settings, the menu enables users to select ‘PONS Protection’, ‘PONS External Relay’, ‘PONS Output Sense’, ‘PONS Measurement Average Samples’, ‘PONS Remote Inhibit’, ‘PONS Remote Output’, ‘PONS AC Input Line’, ‘PONS Multi Chassis Operation’, and ‘PONS Parallel Operation Mode (enabled only in parallel operation)’. Refer to Figure 13-64 and Figure 13-65.

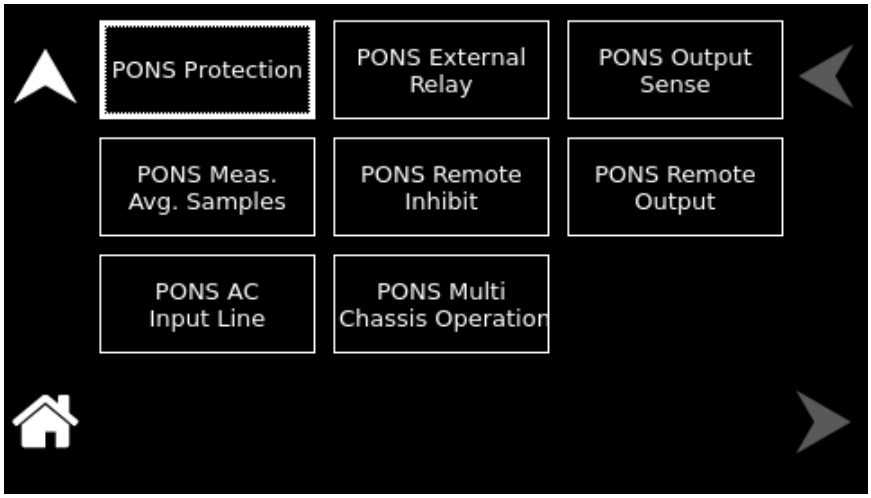


Figure 13-64. PONS Configuration mode

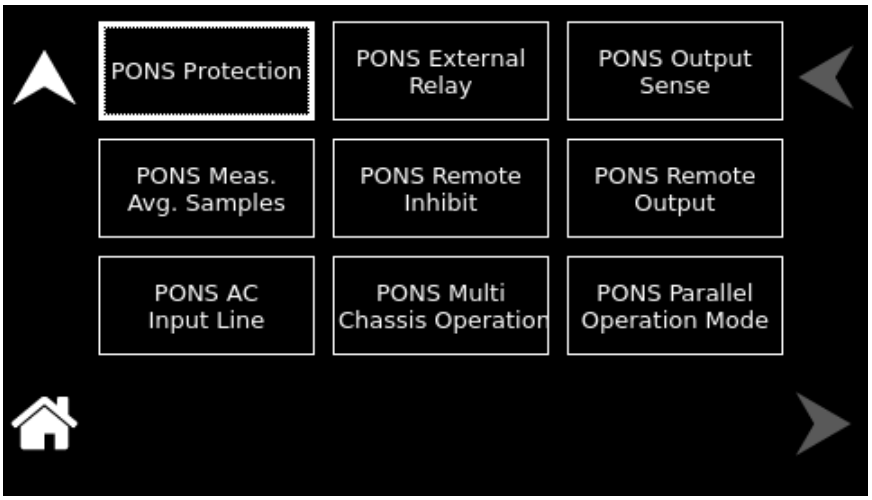


Figure 13-65. PONS Configuration mode – Parallel Operation

The PONS Configuration Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Protection	User can define OVP and Pos. OCP to help safeguard their devices from electrical anomalies. Refer to Figure 13-66.

ENTRY	DESCRIPTION

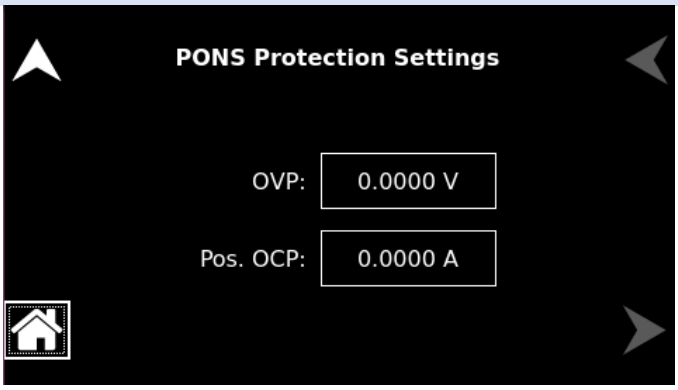


Figure 13-66. PONS Protection Settings

PONS External Relay

Users can set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 13-67.

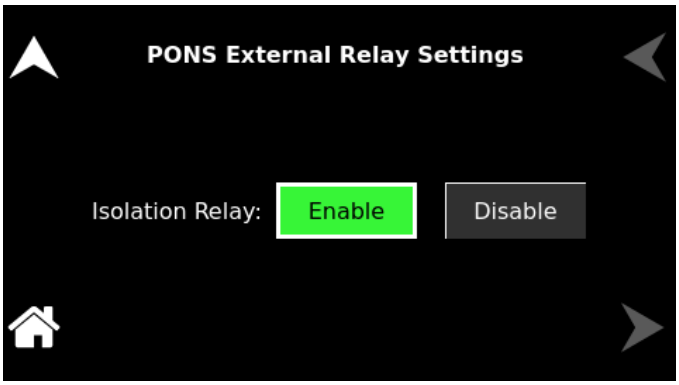


Figure 13-67. PONS External Relay Settings

PONS Output Sense

User can program the PONS output to ‘Local’ or ‘Remote’. Refer to Figure 13-68.

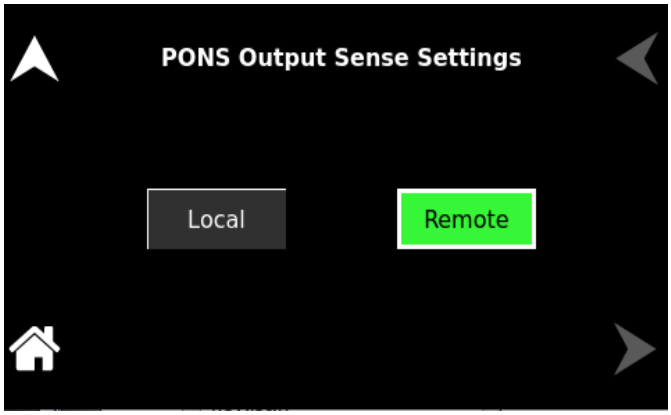


Figure 13-68. PONS Output Sense Settings

ENTRY	DESCRIPTION
PONS Measurement Average Samples	User can specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 13-69.

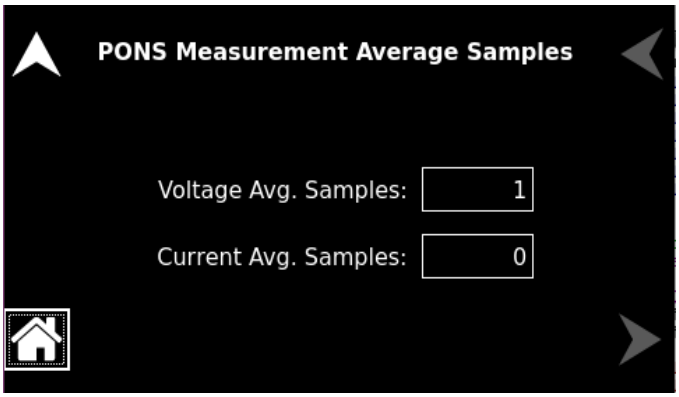


Figure 13-69. PONS Measurement Average Samples

PONS Remote Inhibit

User can control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 13-70.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

Remote inhibit can be configured in three modes;

- **Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output.
- **Live:** after reclosing the contact, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

b) Remote Inhibit Input – Active Source

An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply.

Remote inhibit can be configured in three modes;

- **Latch:** after removing the active voltage source, user needs to clear the fault and turn ON the output.
- **Live:** after removing the active voltage source, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

ENTRY	DESCRIPTION

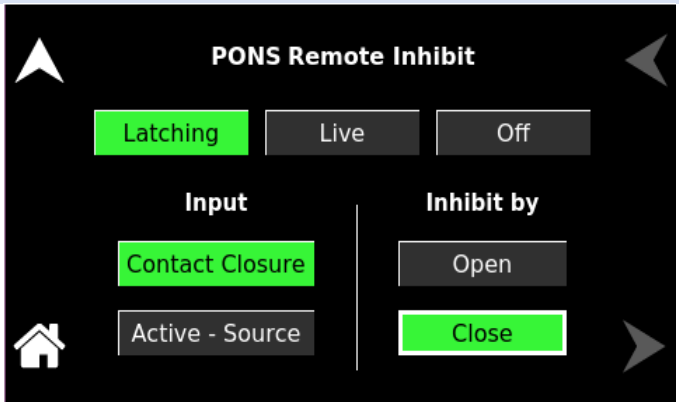


Figure 13-70. PONS remote Inhibit

PONS Remote Output

User can program the PONS Remote output to ON or OFF state. Refer to Figure 13-71.

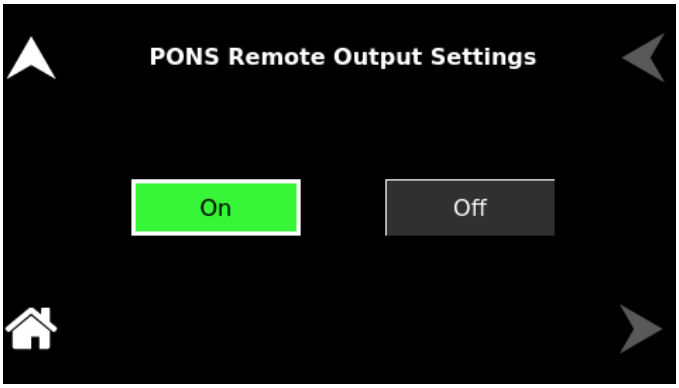


Figure 13-71. PONS Remote Output settings

PONS AC Input Line

User can select either the High Line or Low Line option based on the required input voltage range. Refer to Figure 13-72.

a) **High Line:** The nominal High Line Input range is 380 to 480 VAC.

b) **Low Line:** The nominal Low line input range is 200 to 240 VAC.

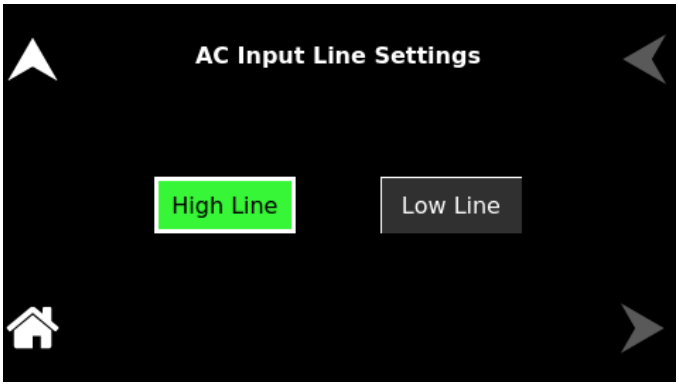


Figure 13-72. AC Input Line Settings

ENTRY	DESCRIPTION
PONS Multi Chassis Operation	Users can select the operation setting to Parallel. Refer to Figure 13-73. **a) Parallel:** Configure to perform parallel operation mode. Refer to Chapter 5. **NOTE:** If the unit is operating in standalone mode and the user selects the Parallel option, the selection remains enabled on the display; the setting does not affect unit operation. **NOTE:** Series and Series Split Phase operations are not applicable for PVSIM mode. If the user select series or series split phase, option remains enabled in the display; the setting does not affect unit operation.

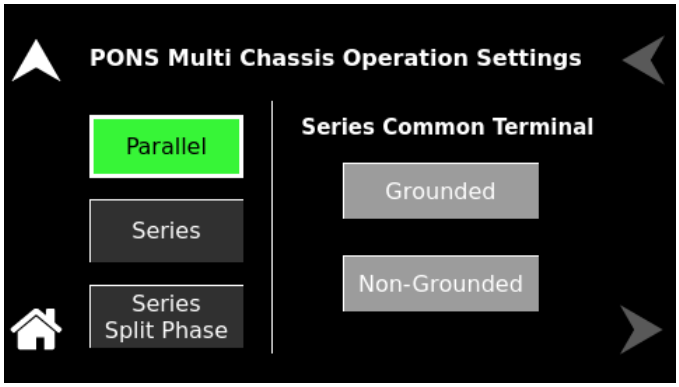


Figure 13-73. PONS Parallel Multi Chassis Operation Settings

PONS Parallel Operation Mode	User can select the parallel operation mode settings to Max Power or Max Current. Refer to Figure 13-72. **NOTE:** Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel. **a) Max Power:** Configure to deliver maximum power by limiting the overall current. **b) Max Current:** Configure to deliver maximum current by limiting the overall power.

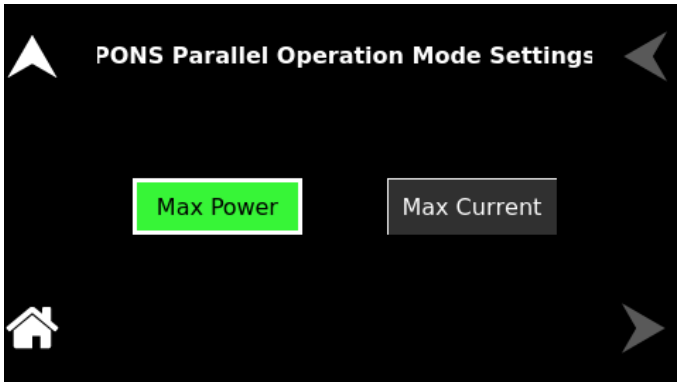


Figure 13-74. PONS Parallel Operation Mode Settings

Table 13-18. PONS Configuration mode

13.2.4.2.1.6 MEASUREMENT AVERAGE SAMPLES

The Measurement Average Samples Settings Menu allows the user to specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 13-75.

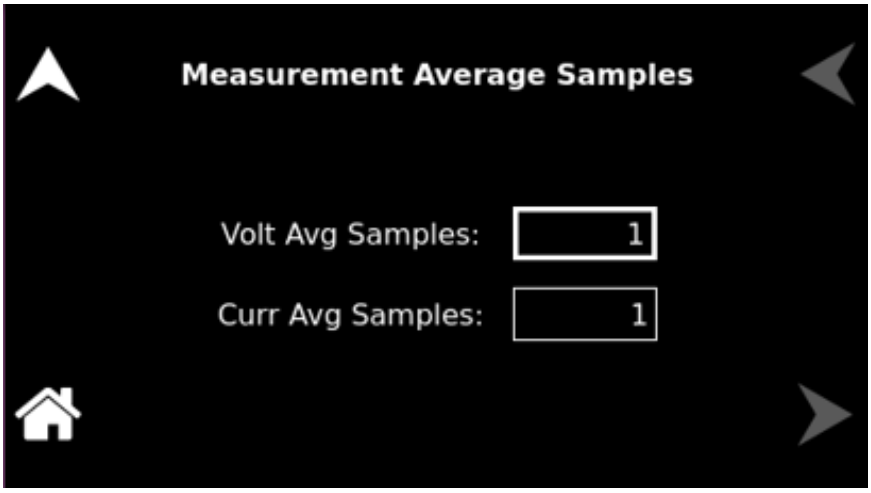


Figure 13-75. Measurement Average Samples

The Measurement Average Samples Settings menu has the following fields:

ENTRY	DESCRIPTION
Volt Avg Samples	Sets the number of voltage readings to average together to reduce noise in the voltage readback. Allows to set a value between 1 to 8.
Curr Avg Samples	Sets the number of current readings to average together to reduce noise in the current readback. Allows to set a value between 1 to 8. The value of 1 (factory default) provides the fastest response time in the readings, but less rejection of noise.

Table 13-19. Measurement Average Samples

13.2.4.2.1.7 PARALLEL OPERATION MODE

The Parallel Operation Mode setting is enabled only when the Mi-BEAM power supply is in parallel operation. This menu allows the user to achieve either maximum power or maximum current during parallel operation. When ‘Max Current’ is selected, the system delivers maximum current by limiting the overall power, whereas when ‘Max Power’ is selected, the system delivers maximum power by limiting the overall current. Refer to Figure 13-76.

NOTE: Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel.

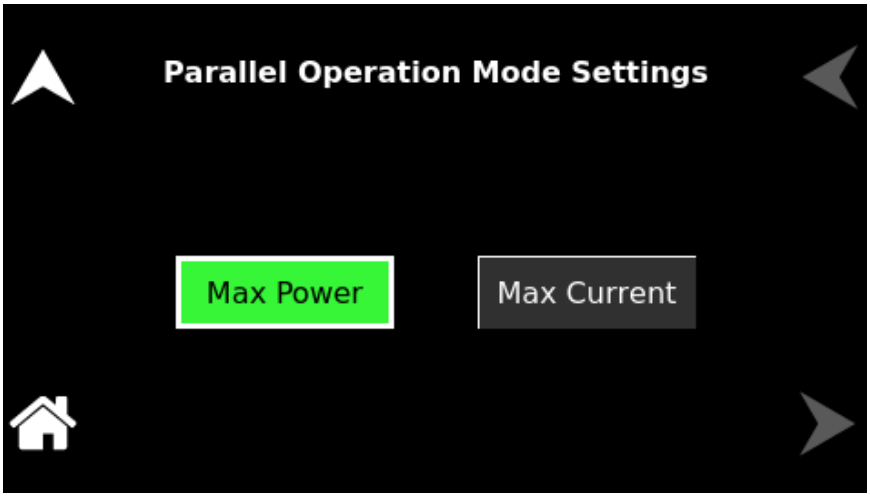


Figure 13-76. Parallel Operation Mode Settings

13.2.4.2.2 CURVE TYPE – EN50530

When 'PVSIM Mode Selection' is configured as below:

a) Oper. Type - Steady State

b) Oper. Mode - Standard

c) Curve type – EN50530

The 'Configuration Screen' provides the settings of PVSIM Mode Selections, EN50530 Test Type, EN50530 Configuration, Protection, Output Sense, PONS, Measurement Average Samples and Parallel Operation Mode (enabled only in parallel operation).

For the top-level menu of the Configuration screen, refer to Figure 13-77 and for the instructions on how to navigate, refer to Section 9.4.2.2.

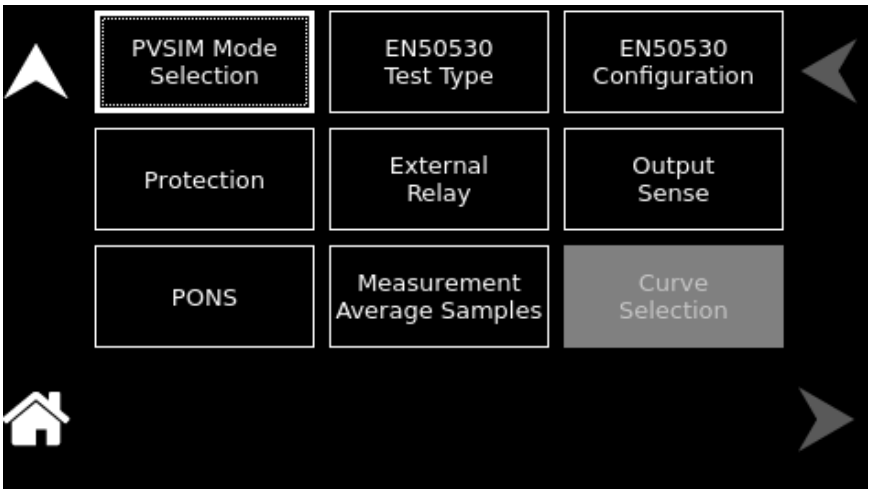


Figure 13-77. Configuration Screen (Curve Type – EN50530)

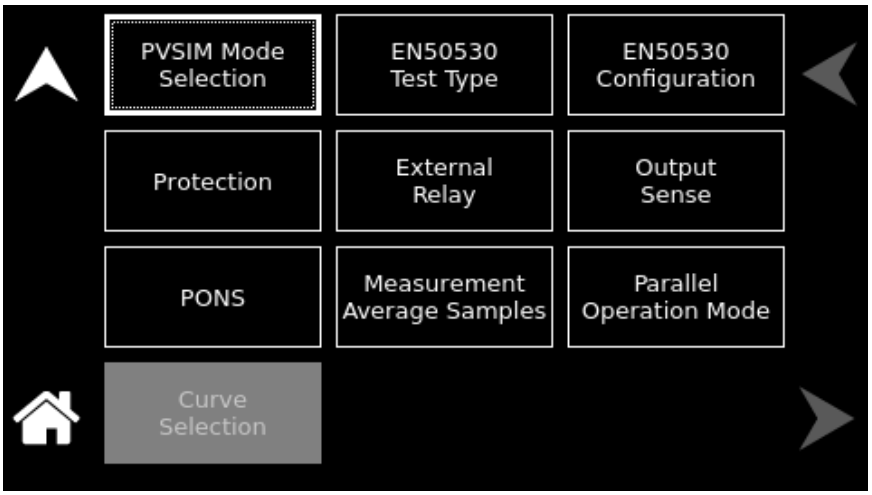


Figure 13-78. Configuration Screen (Curve Type – EN50530) – Parallel Operation

13.2.4.2.2.1 EN50530 TEST TYPE

The 'EN50530 Test Type' setting in the Configuration Screen enables users to select 'Static' or 'Dynamic' test types for EN50530 curve. Refer to the Figure 13-79.

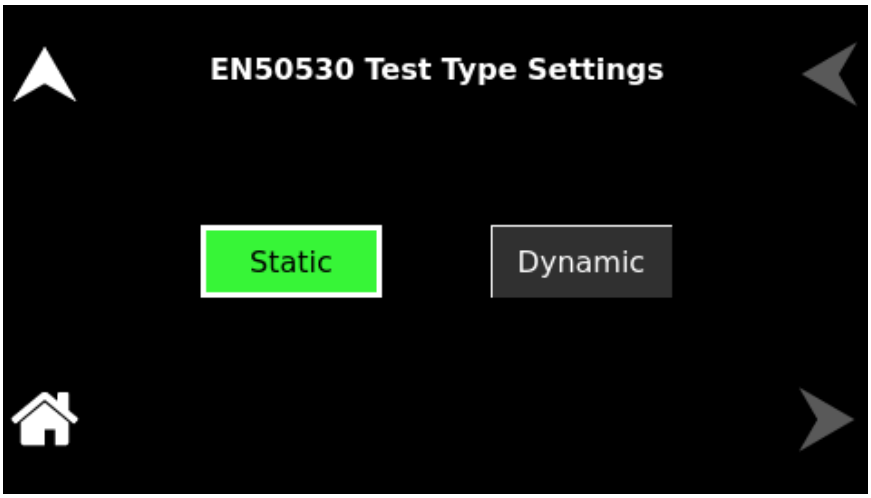


Figure 13-79. Configuration Screen

13.2.4.2.2.2 EN50530 CONFIGURATION

The 'Tech. Type' setting on the EN50530 'Configuration Screen' enables users to select between Rated Power, Rated Voltage, and cSi and Thin Film technology types and its Edit Coefficients. Refer to Figure 13-80 and Figure 13-81.

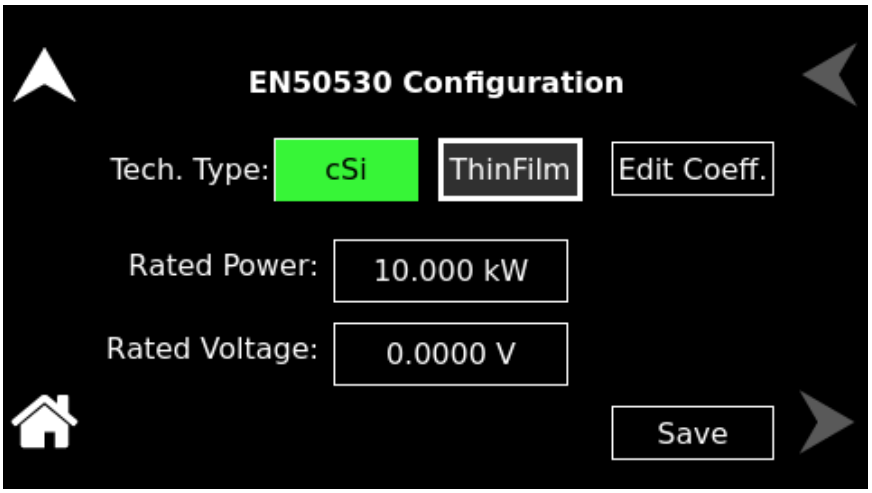


Figure 13-80. EN50530 Configuration (Tech. Type – cSi)

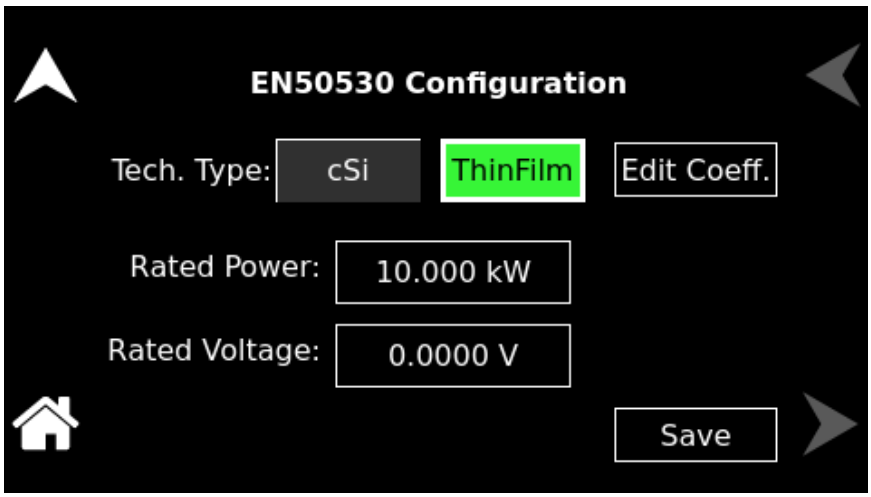
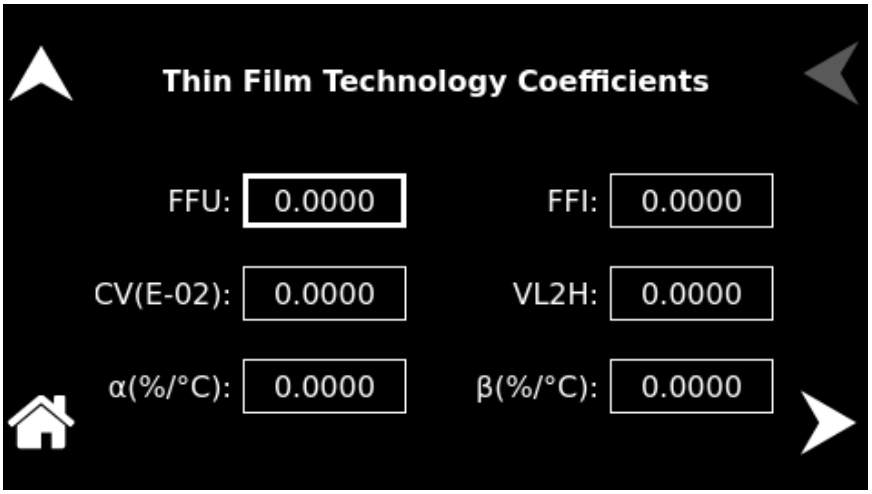


Figure 13-81. EN50530 Configuration (Tech. Type – Thin Filim)



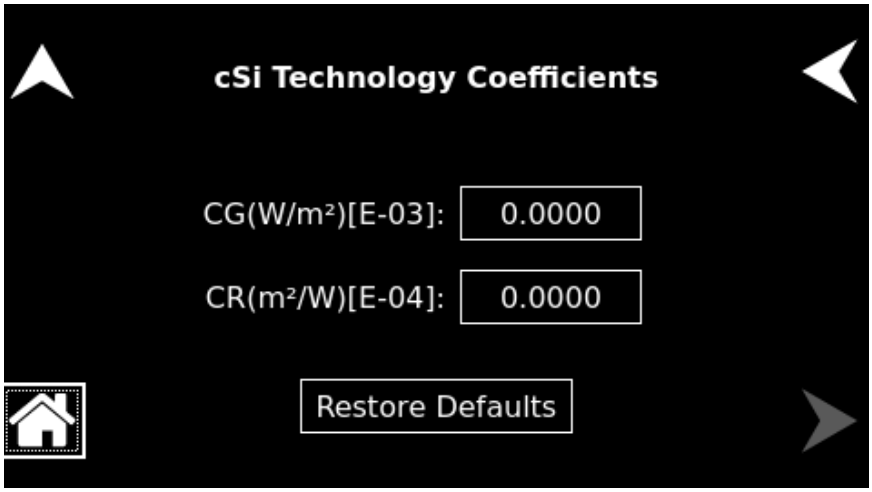


Figure 13-82. cSi and Thin Filim Technology Coefficients

ENTRY	DESCRIPTION
Tech. Type	This technology type defines the overall operational behavior of the system: **a) Thin Film:** User can set the technology type to Thin Film. Refer to Figure 13-81. **b) cSi:** User can set the technology type to cSi. Refer to Figure 13-80.
Edit Coeff.	These settings specify the operational conditions used in the simulation, ensuring consistency and comparability across different tests: **a) FFU:** User can set the Fill Factor Unit. Refer to Figure 13-82. **b) CV(E-02):** User can set the Coefficient of Variation. Refer to Figure 13-82. **c) α (%/°C):** User can set the Temperature Coefficient of Power. Refer to Figure 13-82. **d) FFI:** User can set the Fill Factor Index. Refer to Figure 13-82. **e) VL2H:** User can set the Voltage Level to Height. Refer to Figure 13-82. **f) β (%/°C):** User can set the Temperature Coefficient of Voltage. Refer to Figure 13-82. **g) CG(W/m^2)[E-03]:** User can set the Global irradiance. Refer to Figure 13-82. **h) CR(m2/W)[E-04]:** User can set the Conversion Ratio. Refer to Figure 13-82. **i) Restore Default:** User can click on 'Restore Default' to reset all settings to their original factory values. Refer to Figure 13-82.
Rated Power	User can set the rated power value for the curve. Refer to Figure 13-80 and Figure 13-81.

ENTRY	DESCRIPTION
Rated Voltage	User can set the rated voltage value for the curve. Refer to Figure 13-80 and Figure 13-81.

Table 13-20. EN50530 Configuration

13.2.4.2.2.3 PROTECTION

In protection settings, users can define Output Overvoltage Protection (OVP) and Positive Overcurrent Protection (Pos. OCP) to help safeguard their devices from electrical anomalies. Refer to Figure 13-83.

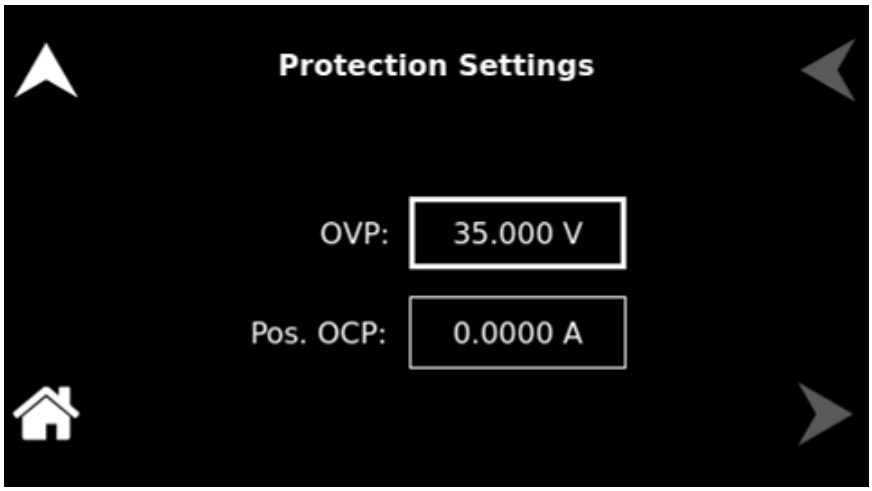


Figure 13-83. Protection Settings

13.2.4.2.2.4 EXTERNAL RELAY

The External relay Settings allows the user to set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits.

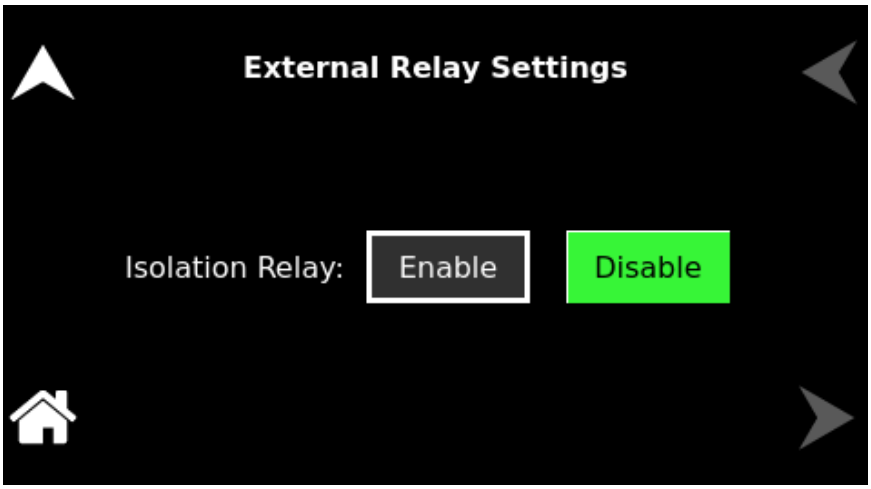


Figure 13-84. External Relay Settings

13.2.4.2.2.5 OUTPUT SENSE

The Output Sense menu allows user to set the output voltage sense of the unit to either local or remote. When Remote is selected as output sense, voltage sense cables must be connected to rear panel of power the supply at RVS connector. Refer to Figure 13-85.

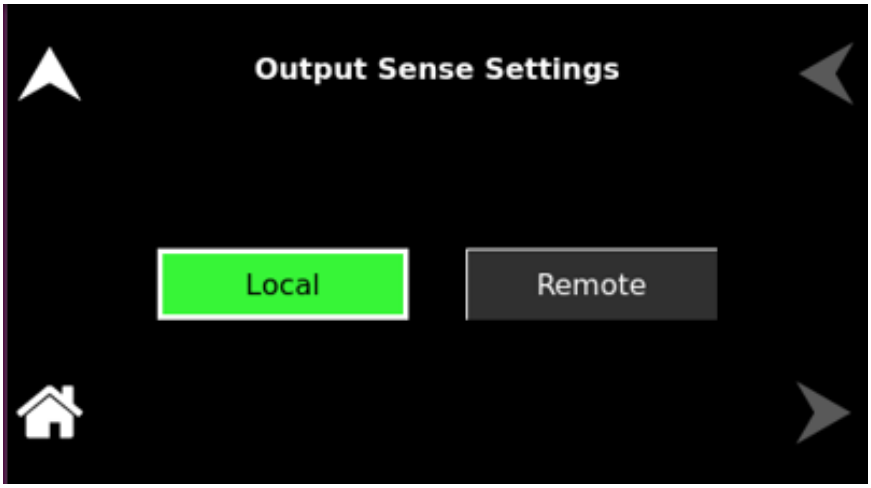


Figure 13-85. Output Sense Settings

13.2.4.2.2.6 PONS

The PONS Menu enables users to configure the Power-ON values and set up the power supply based on the chosen mode settings. Refer to Figure 13-86.

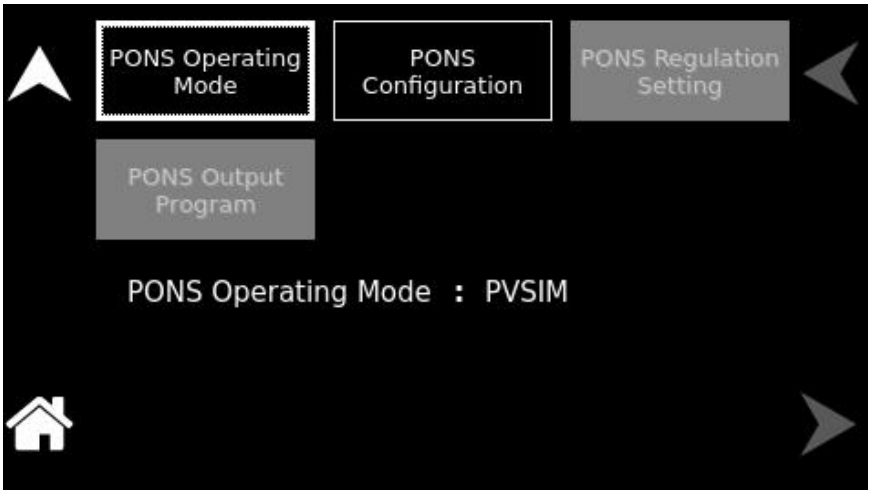


Figure 13-86. PONS – Main Screen

a) PONS OPERATING MODE

The 'PONS Operating Mode Settings' will not change automatically when the user changes the mode in the 'Operating Mode' settings on the Home screen. Users must separately select the 'PVSIM' mode in the 'PONS Operating Mode Settings', which will update both the 'PONS Operating Mode Settings' screen and the 'PONS Configuration' screen. Refer to Figure 13-87 and Figure 13-88.

The same applies to other modes such as Bi-DIR, SOUR, ELOAD, BATSIM and BATTEST. Refer to the Sections 10.2.5.7.1, 11.2.5.7.1, 12.2.5.7.1, 14.2.4.7.1 and 15.2.4.7.

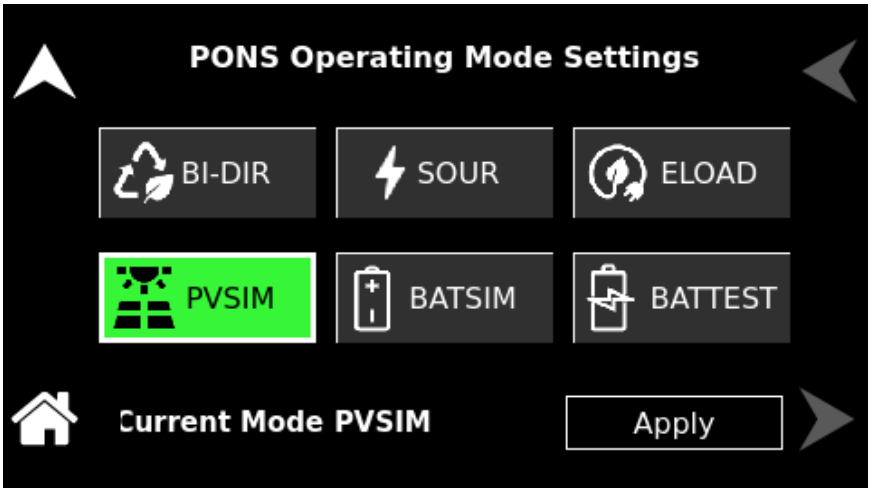


Figure 13-87. PONS Operating Mode Settings

b) PONS CONFIGURATION

In the PONS Configuration settings, the menu enables users to select 'PONS Protection', 'PONS External Relay', 'PONS Output Sense', 'PONS Measurement Average Samples', 'PONS Remote Inhibit', 'PONS Remote Output', 'PONS AC Input Line', 'PONS Multi Chassis Operation', and

'PONS Parallel Operation Mode (enabled only in parallel operation)'. Refer to Figure 13-88 and Figure 13-89.

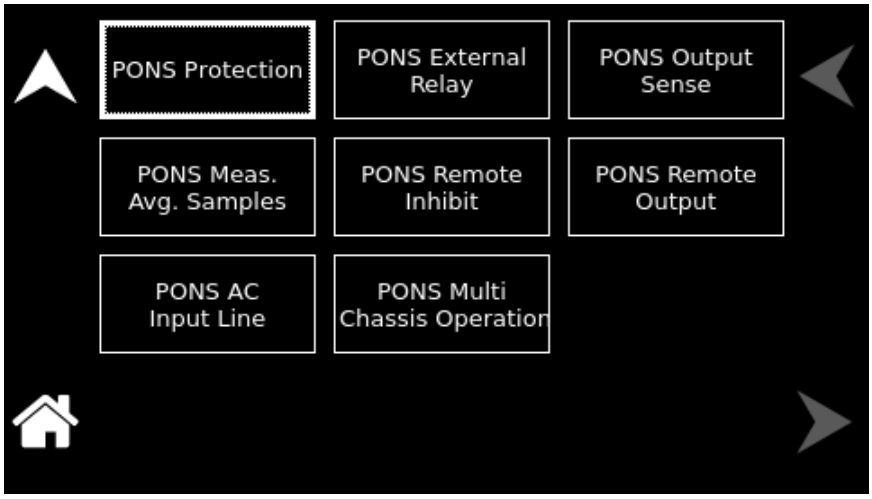


Figure 13-88. PONS Configuration mode

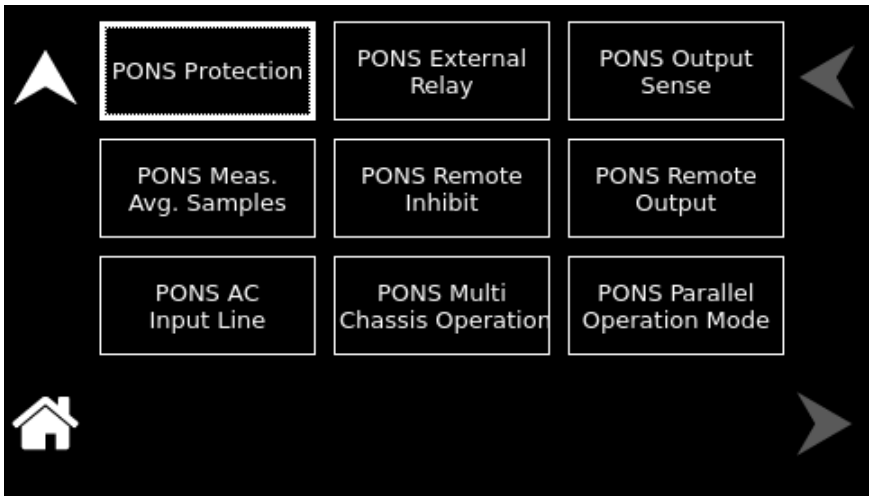


Figure 13-89. PONS Configuration mode – Parallel Operation

The PONS Configuration Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Protection	User can define OVP and Pos. OCP to help safeguard their devices from electrical anomalies. Refer to Figure 13-90.

ENTRY	DESCRIPTION

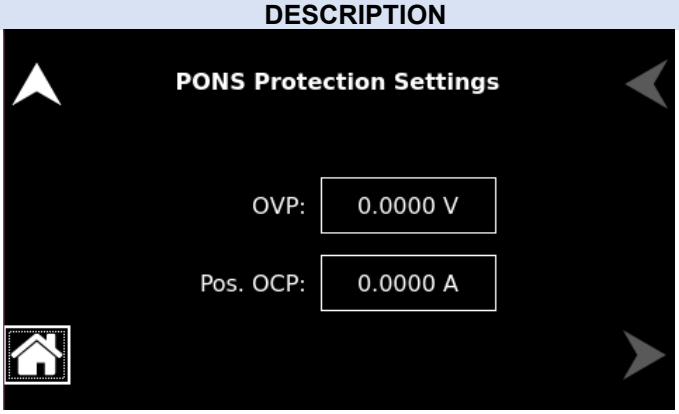


Figure 13-90. PONS Protection Settings

PONS External Relay

Users can set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 13-91.

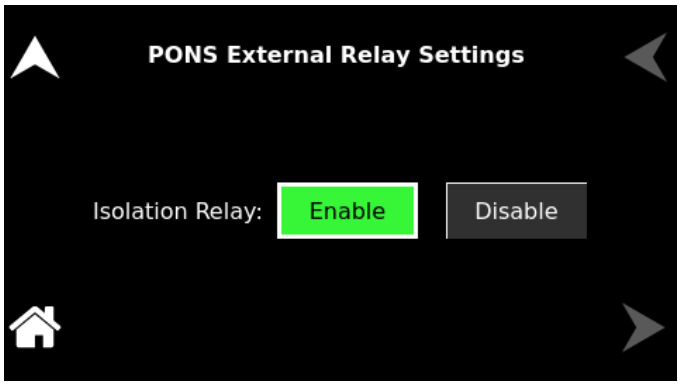


Figure 13-91. PONS External Relay Settings

PONS Output Sense

User can program the PONS output to ‘Local’ or ‘Remote’. Refer to Figure 13-92.

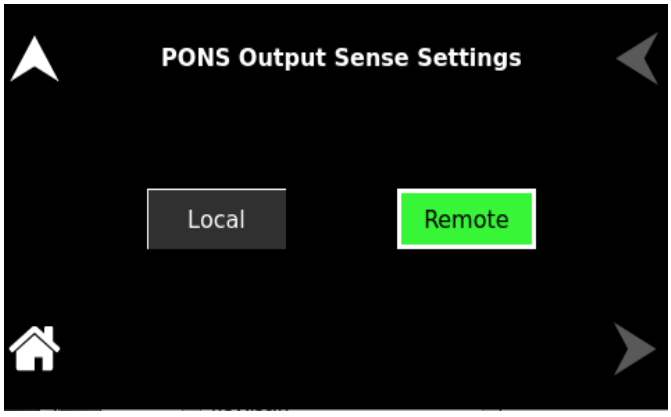


Figure 13-92. PONS Output Sense Settings

ENTRY	DESCRIPTION
PONS Measurement Average Samples	User can specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 13-93.

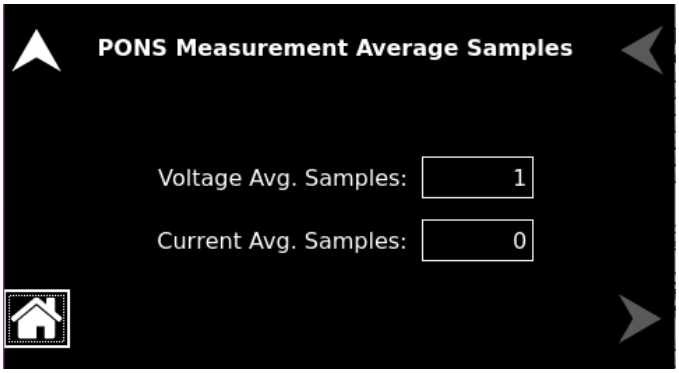


Figure 13-93. PONS Measurement Average Samples

PONS Remote Inhibit

User can control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 13-94.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

Remote inhibit can be configured in three modes;

- **Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output.
- **Live:** after reclosing the contact, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

b) Remote Inhibit Input – Active Source

An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply.

Remote inhibit can be configured in three modes;

- **Latch:** after removing the active voltage source, user needs to clear the fault and turn ON the output.
- **Live:** after removing the active voltage source, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

ENTRY	DESCRIPTION

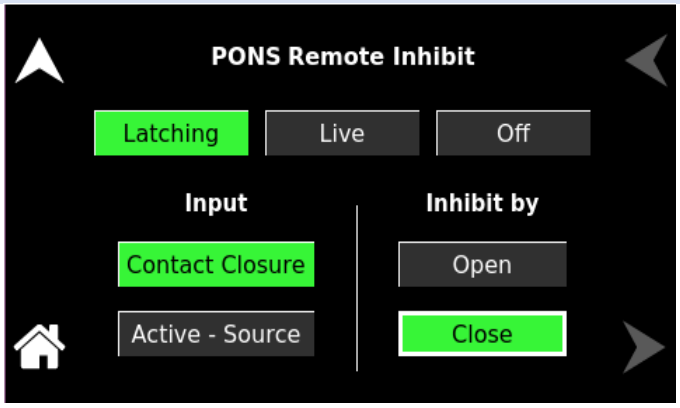


Figure 13-94. PONS remote Inhibit

PONS Remote Output

User can program the PONS Remote output to ON or OFF state. Refer to Figure 13-95.

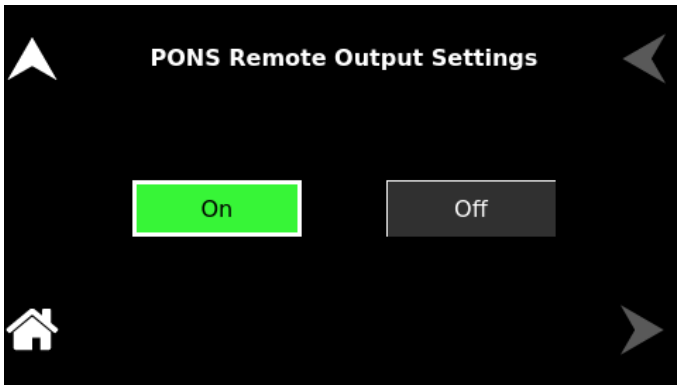


Figure 13-95. PONS Remote Output settings

PONS AC Input Line

User can select either the High Line or Low Line option based on the required input voltage range. Refer to Figure 13-96.

a) High Line: The nominal High Line Input range is 380 to 480 VAC.

b) Low Line: The nominal Low line input range is 200 to 240 VAC.

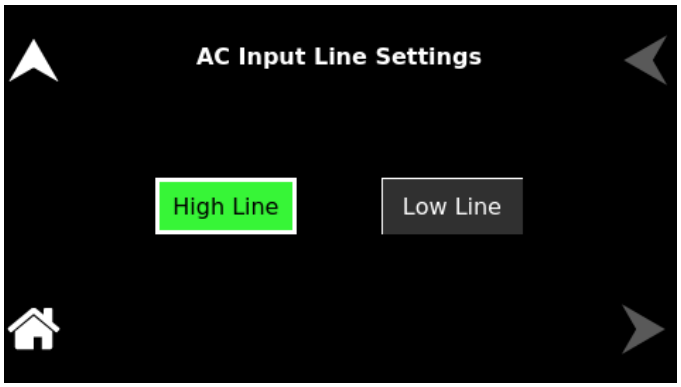


Figure 13-96. AC Input Line Settings

ENTRY	DESCRIPTION
PONS Multi Chassis Operation	Users can select the operation setting to Parallel. Refer to Figure 13-97. **a) Parallel:** Configure to perform parallel operation mode. Refer to Chapter 5. **NOTE:** If the unit is operating in standalone mode and the user selects the Parallel option, the selection remains enabled on the display; the setting does not affect unit operation. **NOTE:** Series and Series Split Phase operations are not applicable for PVSIM mode. If the user select series or series split phase, option remains enabled in the display; the setting does not affect unit operation.

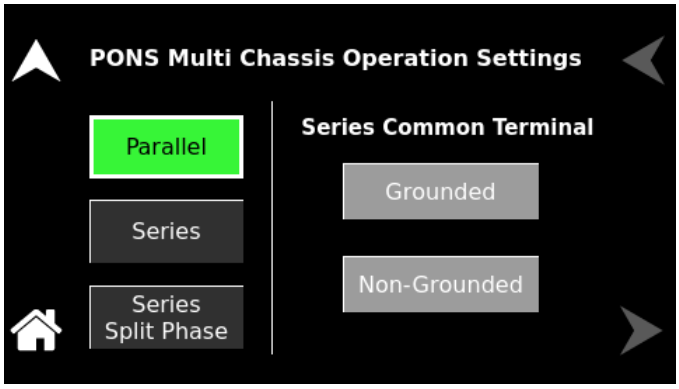


Figure 13-97. PONS Parallel Multi Chassis Operation Settings

PONS Parallel Operation Mode	User can select the parallel operation mode settings to Max Power or Max Current. Refer to Figure 13-98. **NOTE:** Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel. **a) Max Power:** Configure to deliver maximum power by limiting the overall current. **b) Max Current:** Configure to deliver maximum current by limiting the overall power.

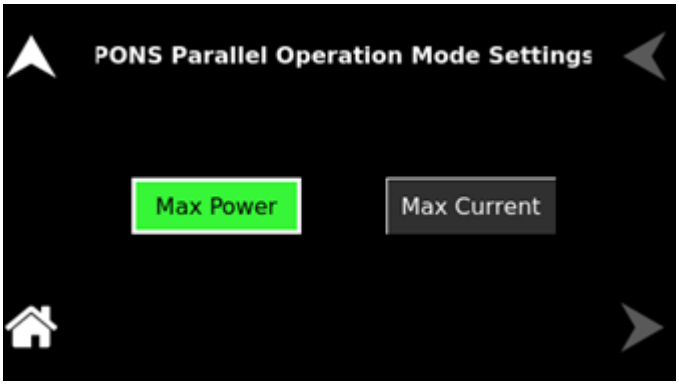


Figure 13-98. PONS Parallel Operation Mode Settings

Table 13-21. PONS Configuration mode

13.2.4.2.2.7 MEASUREMENT AVERAGE SAMPLES

The Measurement Average Samples Settings Menu allows the user to specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 13-99.

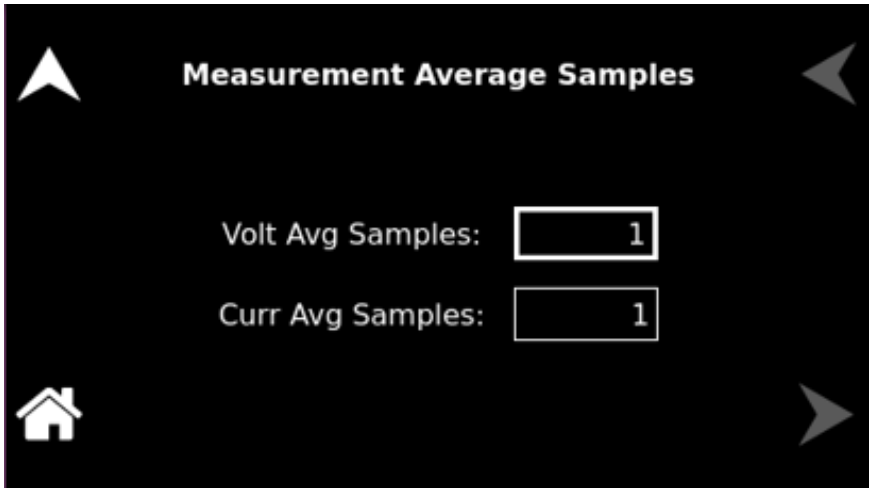


Figure 13-99. Measurement Average Samples

The Measurement Average Samples Settings menu has the following fields:

ENTRY	DESCRIPTION
Volt Avg Samples	Sets the number of voltage readings to average together to reduce noise in the voltage readback. Allows to set a value between 1 to 8.
Curr Avg Samples	Sets the number of current readings to average together to reduce noise in the current readback. Allows to set a value between 1 to 8. The value of 1 (factory default) provides the fastest response time in the readings, but less rejection of noise.

Table 13-22. Measurement Average Samples

13.2.4.2.2.8 PARALLEL OPERATION MODE

The Parallel Operation Mode setting is enabled only when the Mi-BEAM power supply is in parallel operation. This menu allows the user to achieve either maximum power or maximum current during parallel operation. When ‘Max Current’ is selected, the system delivers maximum current by limiting the overall power, whereas when ‘Max Power’ is selected, the system delivers maximum power by limiting the overall current. Refer to Figure 13-100.

NOTE: Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel.

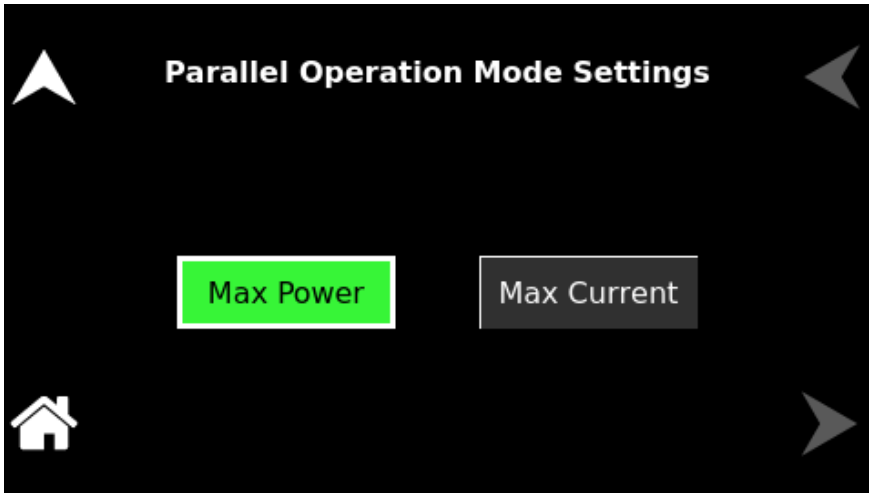


Figure 13-100. Parallel Operation Mode Settings

13.2.4.3 OPER. TYPE – STEADY STATE AND OPER. MODE– ARRAY

When 'PVSIM Mode Selection' is configured as below:

a) Oper. Type – Steady,
b) Oper. Mode - Array

The 'Configuration Screen' provides PVSIM Mode Selections, Protection, Output Sense, PONS, Measurement Average Samples and Parallel Operation Mode (enabled only in parallel operation).

NOTE: The 'Oper. Mode - Array' selected in PVSIM Mode Selection can only be done through the virtual panel. When it is selected, only generic configuration like Protection, Output Sense, PONS, Measurement Average Samples and 'Parallel Operation Mode' (enabled only in parallel operation) can be set through the front panel.

For the top-level menu of the Configuration screen, refer to Figure 13-101 and Figure 13-102 and for the instructions on how to navigate, refer to Section 9.4.2.2.

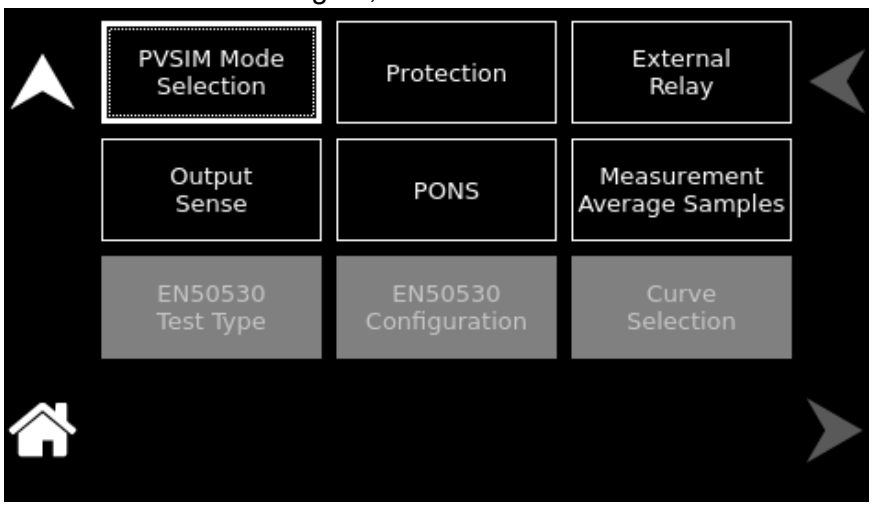


Figure 13-101. Configuration Screen (Oper. Type – Steady State and Oper. Mode – Array)

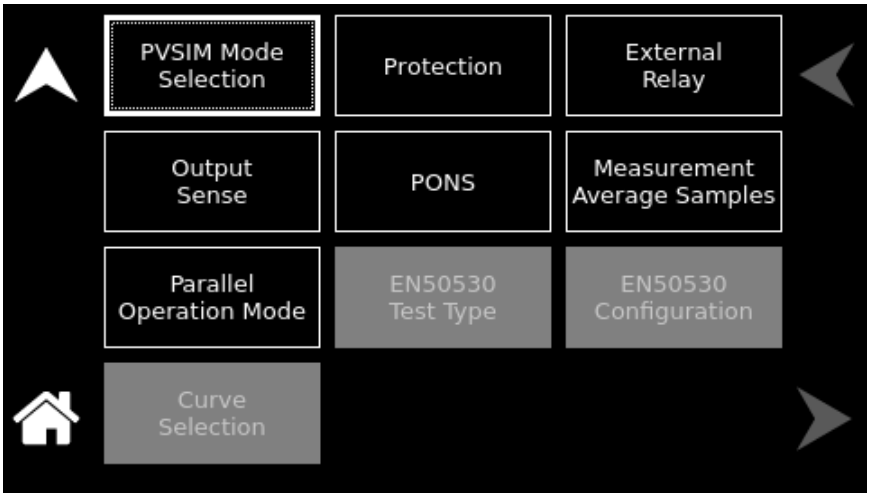


Figure 13-102. Configuration Screen (Oper. Type – Steady State and Oper. Mode – Array) – Parallel Operation

13.2.4.3.1.1 PROTECTION

In protection settings, users can define Output Overvoltage Protection (OVP) and Positive Overcurrent Protection (Pos. OCP) to help safeguard their devices from electrical anomalies. Refer to Figure 13-103.

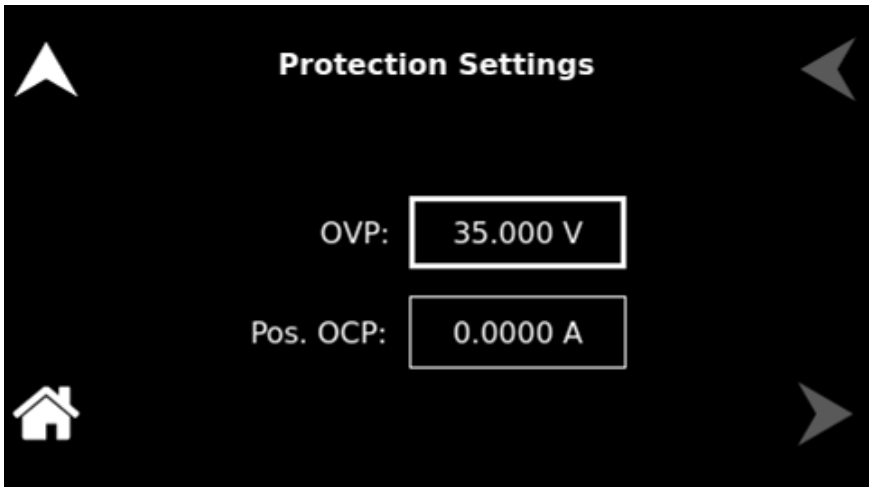


Figure 13-103. Protection Settings

13.2.4.3.1.2 EXTERNAL RELAY

The External relay Settings allows the user to set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits.

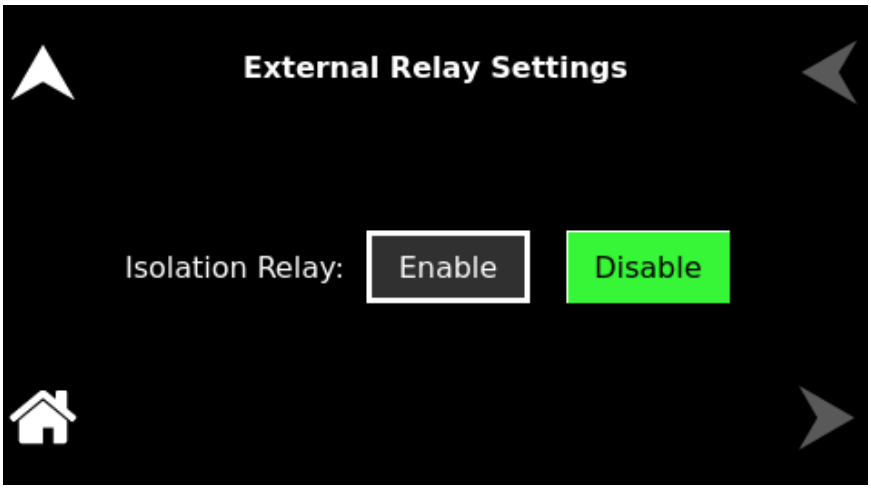


Figure 13-104. External Relay Settings

13.2.4.3.1.3 OUTPUT SENSE

The Output Sense menu allows user to set the output voltage sense of the unit to either local or remote. When Remote is selected as output sense, voltage sense cables must be connected to rear panel of power the supply at RVS connector. Refer to Figure 13-105.

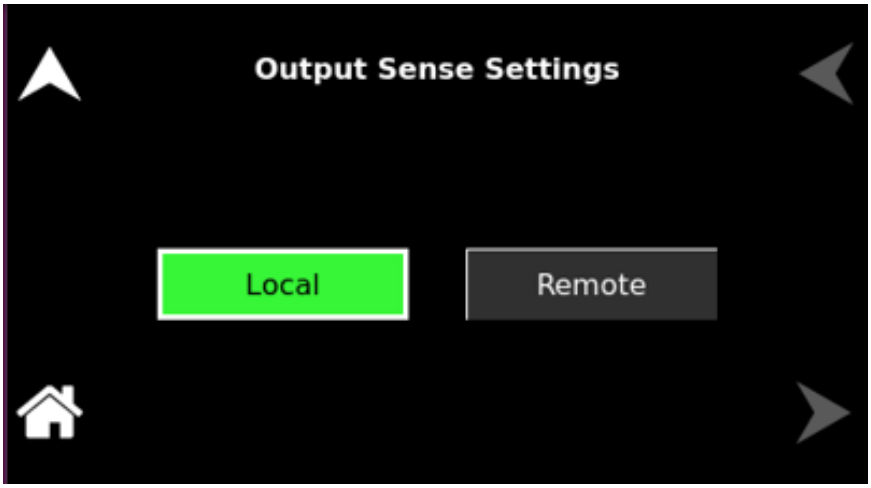


Figure 13-105. Output Sense Settings

13.2.4.3.1.4 PONS

The PONS Menu enables users to configure the Power-ON values and set up the power supply based on the chosen mode settings. Refer to Figure 13-106.

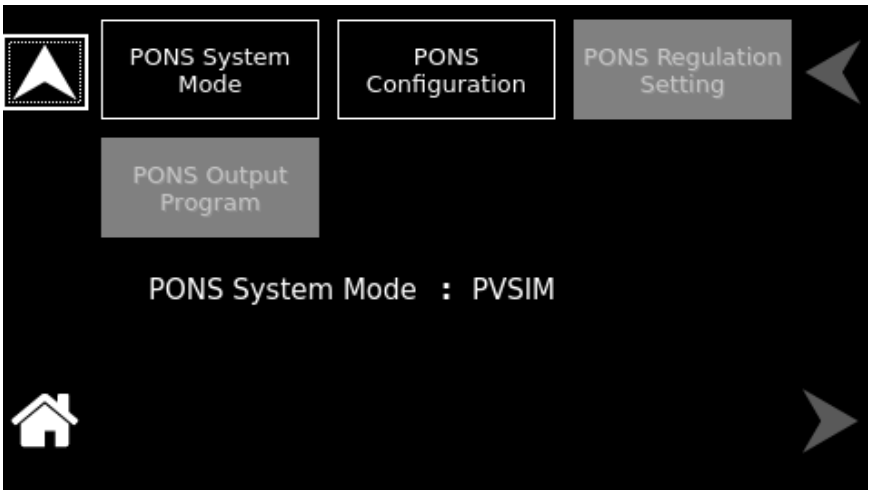


Figure 13-106. PONS – Main Screen

a) PONS OPERATING MODE

The 'PONS Operating Mode Settings' will not change automatically when the user changes the mode in the 'Operating Mode' settings on the Home screen. Users must separately select the ‘PVSIM’ mode in the 'PONS Operating Mode Settings', which will update both the 'PONS Operating Mode Settings' screen and the 'PONS Configuration' screen. Refer to Figure 13-107 and Figure 13-108.

The same applies to other modes such as Bi-DIR, SOUR, ELOAD, BATSIM and BATTEST. Refer to the Sections 10.2.5.7.1, 11.2.5.7.1, 12.2.5.7.1, 14.2.4.7.1 and 15.2.4.7.

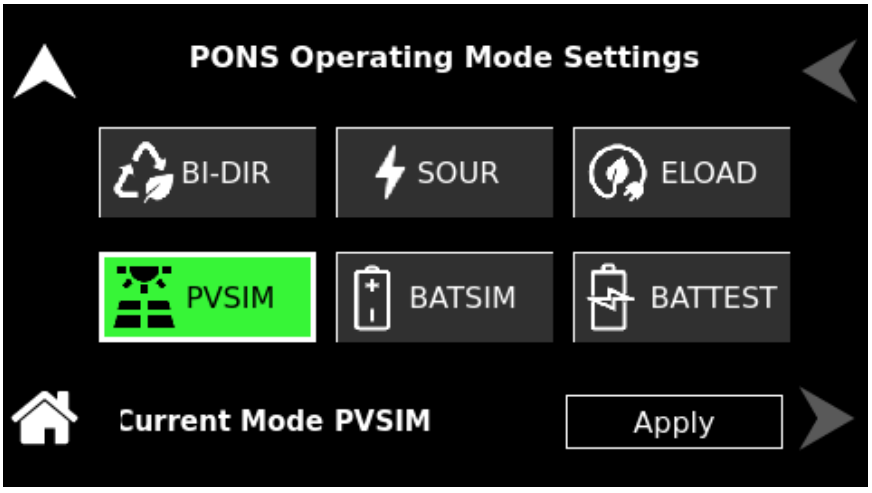


Figure 13-107. PONS Operating Mode Settings

b) PONS CONFIGURATION

In the PONS Configuration settings, the menu enables users to select ‘PONS Protection’, ‘PONS External Relay’, ‘PONS Output Sense’, ‘PONS Measurement Average Samples’, ‘PONS Remote Inhibit’, ‘PONS Remote Output’, ‘PONS AC Input Line’, ‘PONS Multi Chassis Operation’, and

'PONS Parallel Operation Mode (enabled only in parallel operation)'. Refer to Figure 13-108 and Figure 13-109.

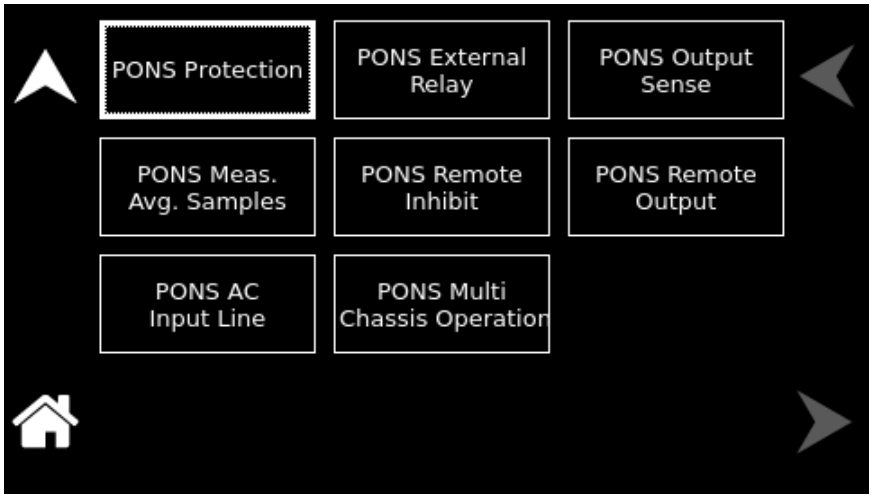


Figure 13-108. PONS Configuration mode

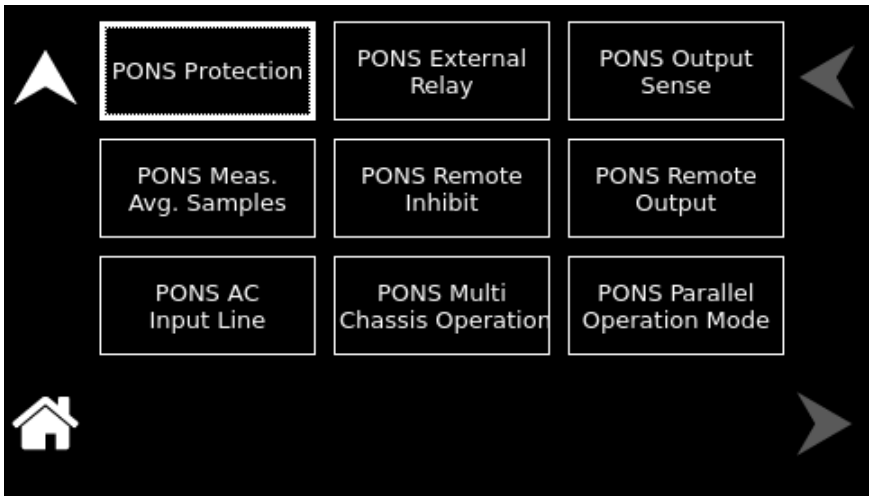


Figure 13-109. PONS Configuration mode – Parallel Operation

The PONS Configuration Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Protection	User can define OVP and Pos. OCP to help safeguard their devices from electrical anomalies. Refer to Figure 13-110.

ENTRY	DESCRIPTION

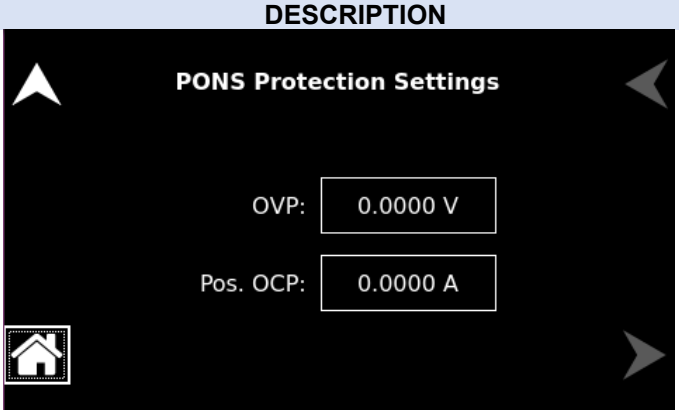


Figure 13-110. PONS Protection Settings

PONS External Relay

Users can set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 13-111.

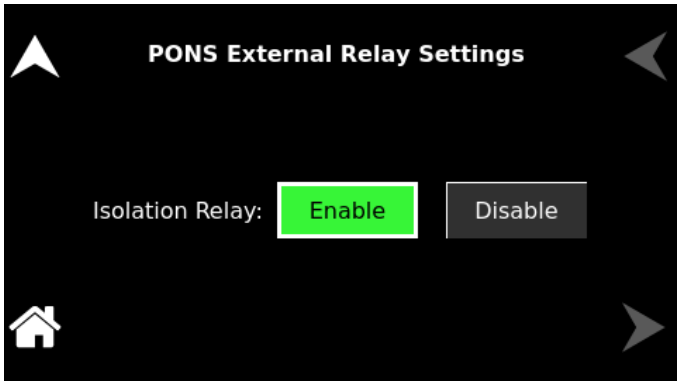


Figure 13-111. PONS External Relay Settings

PONS Output Sense

User can program the PONS output to ‘Local’ or ‘Remote’. Refer to Figure 13-112.

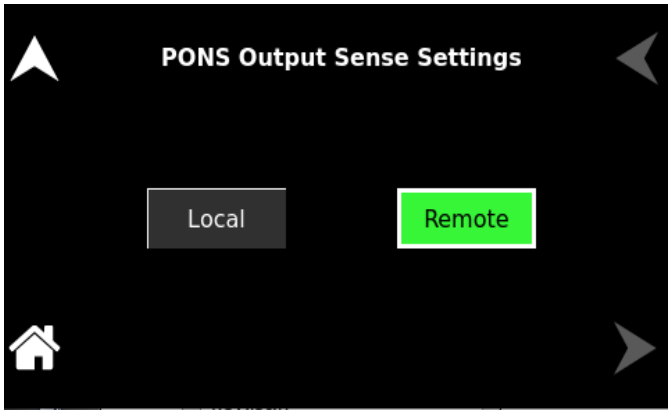


Figure 13-112. PONS Output Sense Settings

ENTRY	DESCRIPTION
PONS Measurement Average Samples	User can specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 13-113.

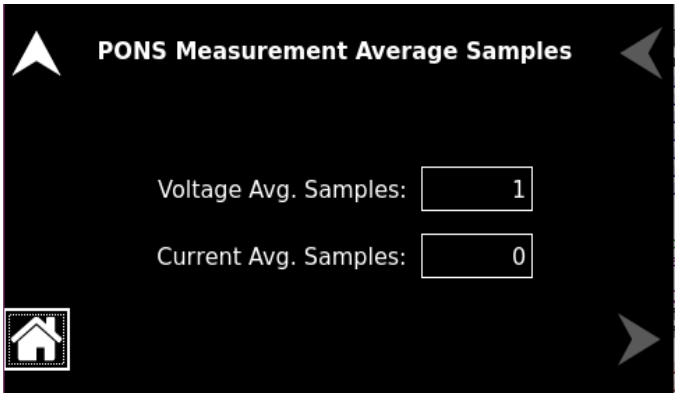


Figure 13-113. PONS Measurement Average Samples

PONS Remote Inhibit

User can control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 13-114.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

Remote inhibit can be configured in three modes;

- **Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output.
- **Live:** after reclosing the contact, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

b) Remote Inhibit Input – Active Source

An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply.

Remote inhibit can be configured in three modes;

- **Latch:** after removing the active voltage source, user needs to clear the fault and turn ON the output.
- **Live:** after removing the active voltage source, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

ENTRY	DESCRIPTION

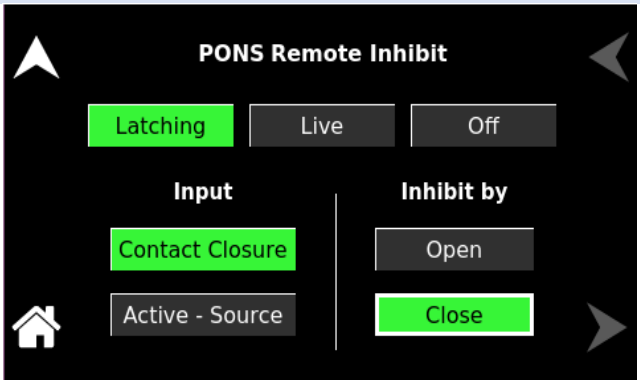


Figure 13-114. PONS Remote Inhibit

PONS Remote Output

User can program the PONS Remote output to ON or OFF state. Refer to Figure 13-115.

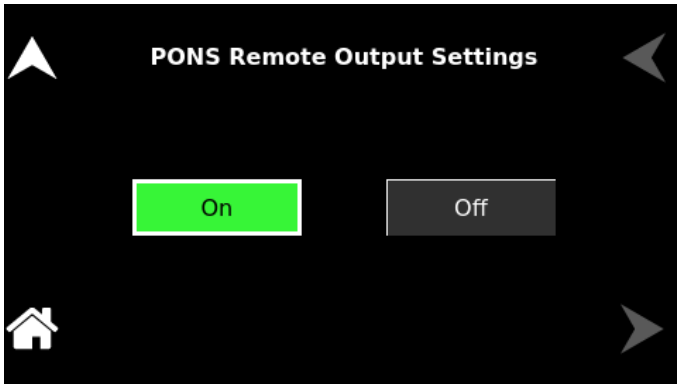


Figure 13-115. PONS Remote Output settings

PONS AC Input Line

User can select either the High Line or Low Line option based on the required input voltage range. Refer to Figure 13-116.

a) High Line: The nominal High Line Input range is 380 to 480 VAC.

b) Low Line: The nominal Low line input range is 200 to 240 VAC.

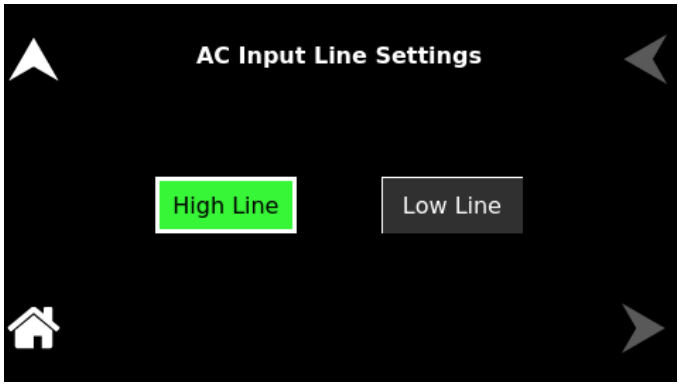


Figure 13-116. AC Input Line Settings

ENTRY	DESCRIPTION
PONS Multi Chassis Operation	Users can select the operation setting to Parallel. Refer to Figure 13-73. **a) Parallel:** Configure to perform parallel operation mode. Refer to Chapter 5. **NOTE:** If the unit is operating in standalone mode and the user selects the Parallel option, the selection remains enabled on the display; the setting does not affect unit operation. **NOTE:** Series and Series Split Phase operations are not applicable for PVSIM mode. If the user select series or series split phase, option remains enabled in the display; the setting does not affect unit operation.

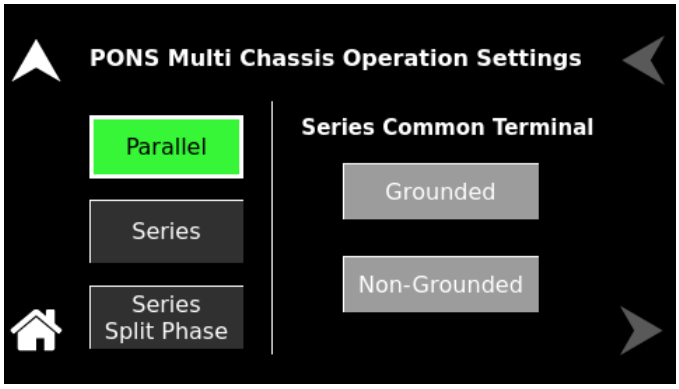


Figure 13-117. PONS Parallel Multi Chassis Operation Settings

PONS Parallel Operation Mode	User can select the parallel operation mode settings to Max Power or Max Current. Refer to Figure 13-112. **NOTE:** Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel. **a) Max Power:** Configure to deliver maximum power by limiting the overall current. **b) Max Current:** Configure to deliver maximum current by limiting the overall power.

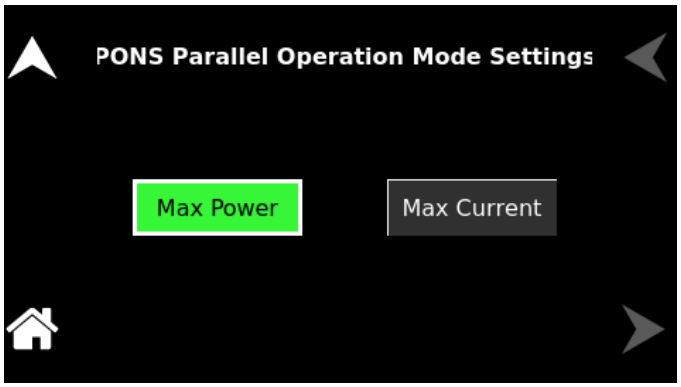


Figure 13-118. PONS Parallel Operation Mode Settings

ENTRY	DESCRIPTION

Table 13-23. PONS Configuration Mode

13.2.4.3.1.5 MEASUREMENT AVERAGE SAMPLES

The Measurement Average Samples Settings Menu allows the user to specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 13-119.

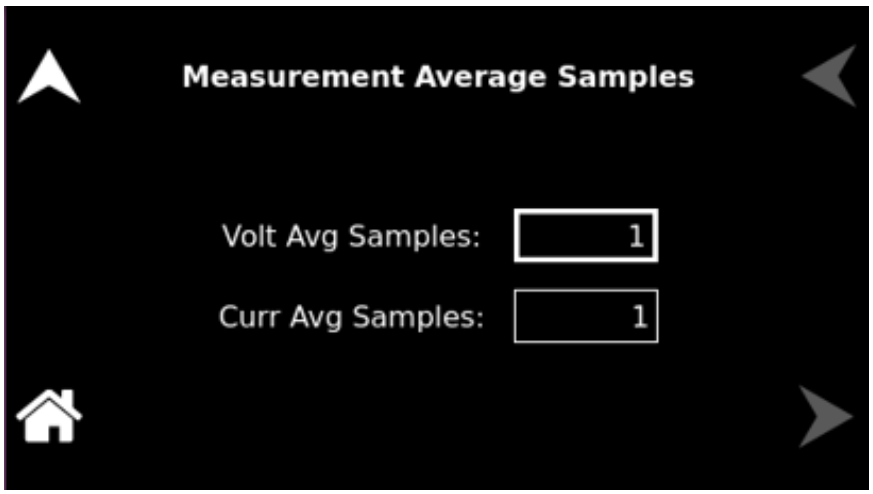


Figure 13-119. Measurement Average Samples

The Measurement Average Samples Settings menu has the following fields:

ENTRY	DESCRIPTION
Volt Avg Samples	Sets the number of voltage readings to average together to reduce noise in the voltage readback. Allows to set a value between 1 to 8.
Curr Avg Samples	Sets the number of current readings to average together to reduce noise in the current readback. Allows to set a value between 1 to 8. The value of 1 (factory default) provides the fastest response time in the readings, but less rejection of noise.

Table 13-24. Measurement Average Samples

13.2.4.3.1.6 PARALLEL OPERATION MODE

The Parallel Operation Mode setting is enabled only when the Mi-BEAM power supply is in parallel operation. This menu allows the user to achieve either maximum power or maximum current during parallel operation. When ‘Max Current’ is selected, the system delivers maximum current by limiting the overall power, whereas when ‘Max Power’ is selected, the system delivers maximum power by limiting the overall current. Refer to Figure 13-120.

NOTE: Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel.

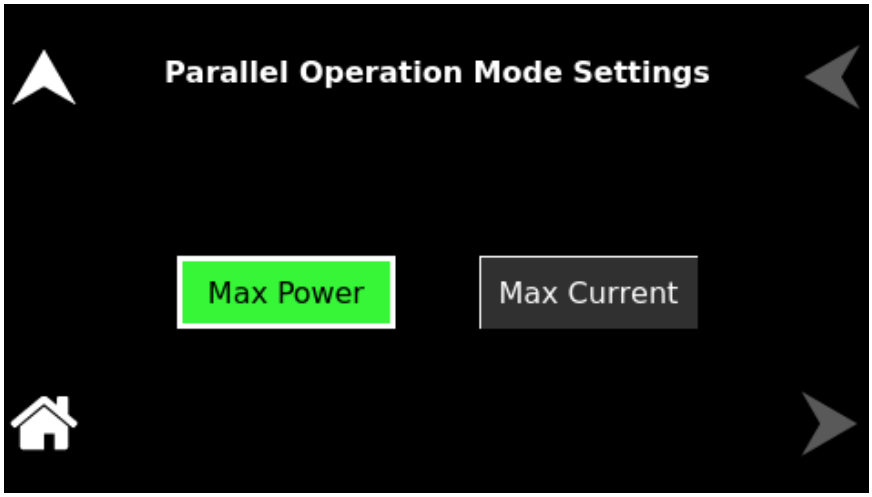


Figure 13-120. Parallel Operation Mode Settings

13.2.4.4 OPER. TYPE - PROFILE

13.2.4.4.1 CURVE TYPE – SNL OR EN50530

When 'PVSIM Mode Selection' is configured as below:

a) Oper. Type – Profile
b) Curve type – SNL or EN50530

The Configuration Screen provides the settings of PVSIM Mode Selections, Protection, Output Sense, PONS, Measurement Average Samples and Parallel Operation Mode (enabled only in parallel operation).

NOTE: The 'Oper. Mode - **Profile**' selected in PVSIM Mode Selection can only be done through the virtual panel. When it is selected, only generic configuration like Protection, Output Sense, PONS, Measurement Average Samples and Parallel Operation Mode (enabled only in parallel operation) can be set through the front panel.

For the top-level menu of the Configuration screen, refer to Figure 13-121 and Figure 13-122 and for the instructions on how to navigate, refer to Section 9.4.2.2.

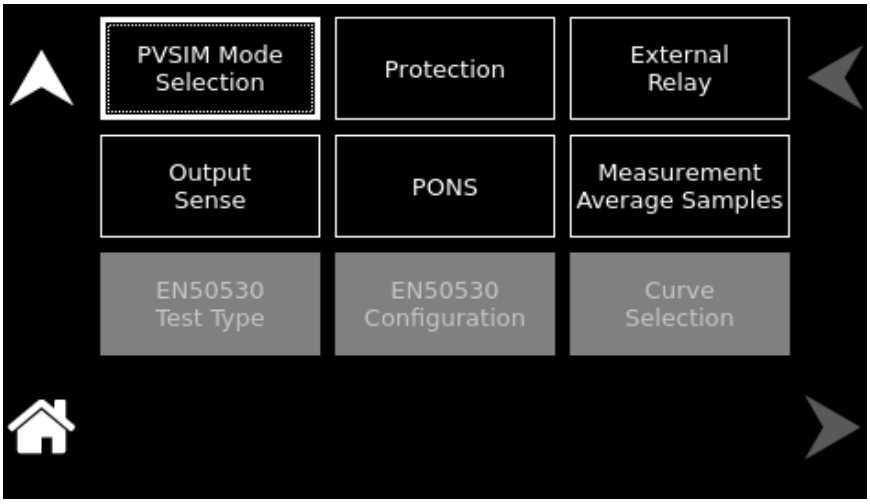


Figure 13-121. Configuration Screen (Oper. Type – Profile and Curve type – SNL or EN50530)

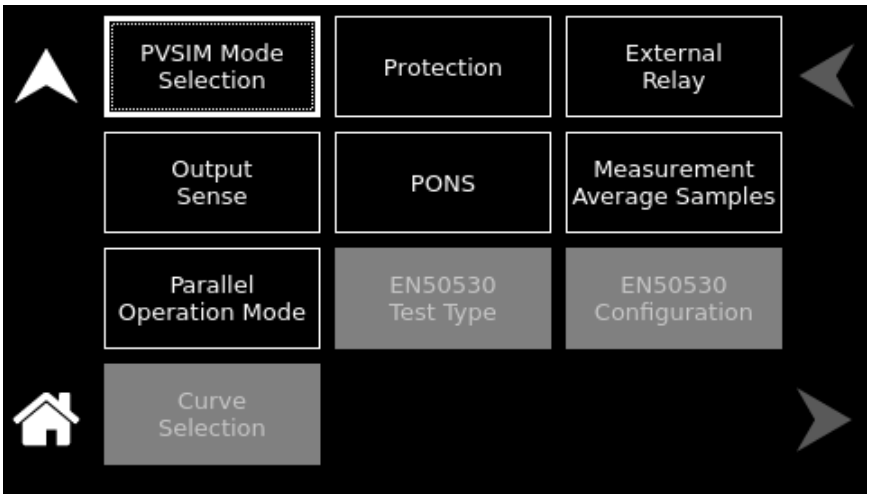


Figure 13-122. Configuration Screen (Oper. Type – Profile and Curve type – SNL or EN50530) – Parallel Operation

13.2.4.4.1.1 PROTECTION

In protection settings, users can define Output Overvoltage Protection (OVP) and Positive Overcurrent Protection (Pos. OCP) to help safeguard their devices from electrical anomalies. Refer to Figure 13-123.

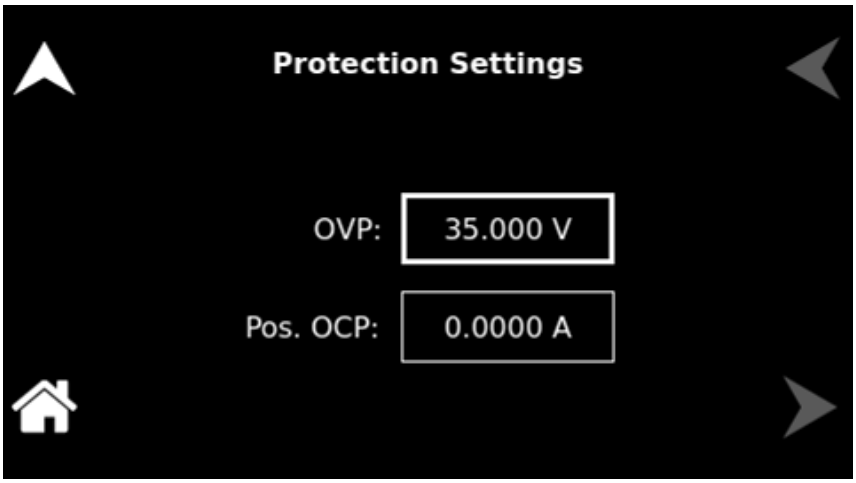


Figure 13-123. Protection Settings

13.2.4.4.1.2 EXTERNAL RELAY

The External relay Settings allows the user to set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 13-132.

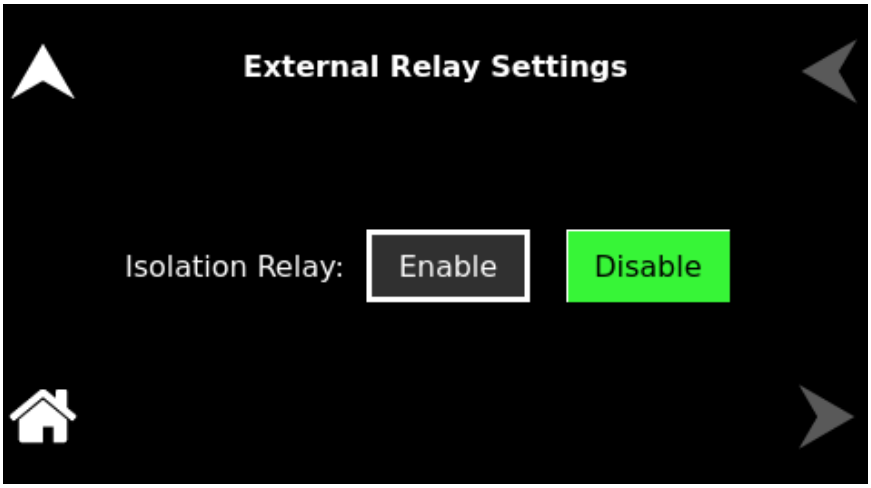


Figure 13-124. External Relay Settings

13.2.4.4.1.3 OUTPUT SENSE

The Output Sense menu allows user to set the output voltage sense of the unit to either local or remote. When Remote is selected as output sense, voltage sense cables must be connected to rear panel of power the supply at RVS connector. Refer to Figure 13-125.

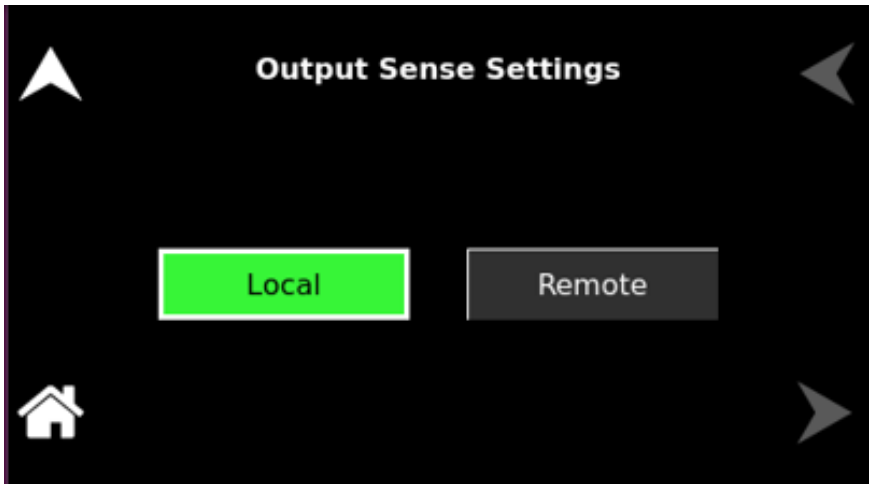


Figure 13-125. Output Sense Settings

13.2.4.4.1.4 PONS

The PONS Menu enables users to configure the Power-ON values and set up the power supply based on the chosen mode settings. Refer to Figure 13-126.

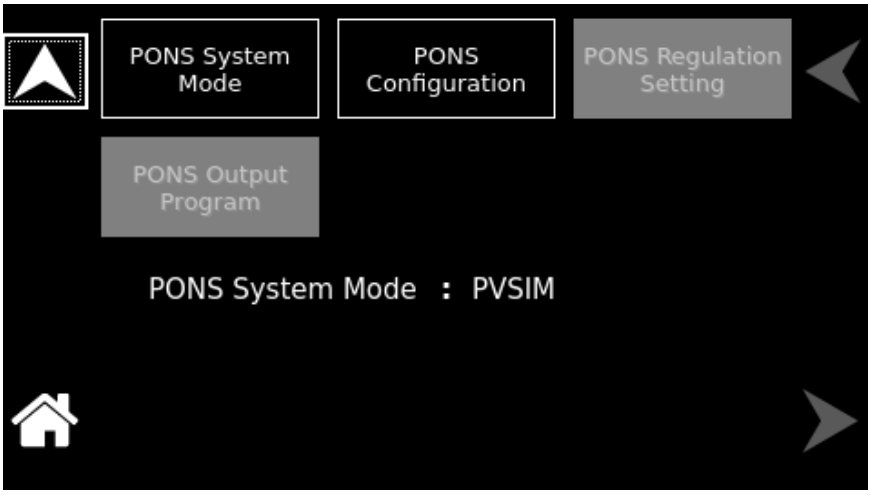


Figure 13-126. PONS – Main Screen

a) PONS OPERATING MODE

The 'PONS Operating Mode Settings' will not change automatically when the user changes the mode in the 'Operating Mode' settings on the Home screen. Users must separately select the ‘PVSIM’ mode in the 'PONS Operating Mode Settings', which will update both the 'PONS Operating Mode Settings' screen and the 'PONS Configuration' screen. Refer to Figure 13-127 and Figure 13-127.

The same applies to other modes such as Bi-DIR, SOUR, ELOAD, BATSIM and BATTEST. Refer to the Sections 10.2.5.7.1, 11.2.5.7.1, 12.2.5.7.1, 14.2.4.7.1 and 15.2.4.7.

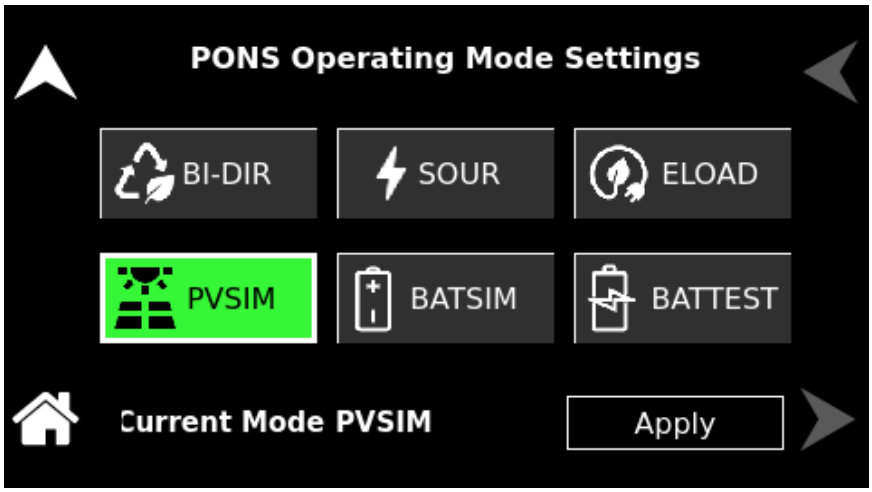


Figure 13-127. PONS Operating Mode Settings

b) PONS CONFIGURATION

In the PONS Configuration settings, the menu enables users to select ‘PONS Protection’, ‘PONS External Relay’, ‘PONS Output Sense’, ‘PONS Measurement Average Samples’, ‘PONS Remote Inhibit’, ‘PONS Remote Output’, ‘PONS AC Input Line’, ‘PONS Multi Chassis Operation’, and ‘PONS Parallel Operation Mode (enabled only in parallel operation)’. Refer to Figure 13-128 and Figure 13-129.

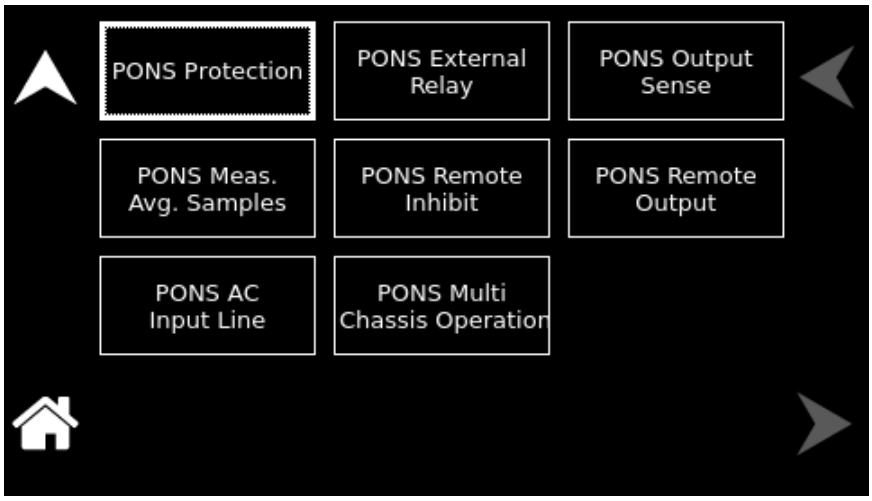


Figure 13-128. PONS Configuration mode

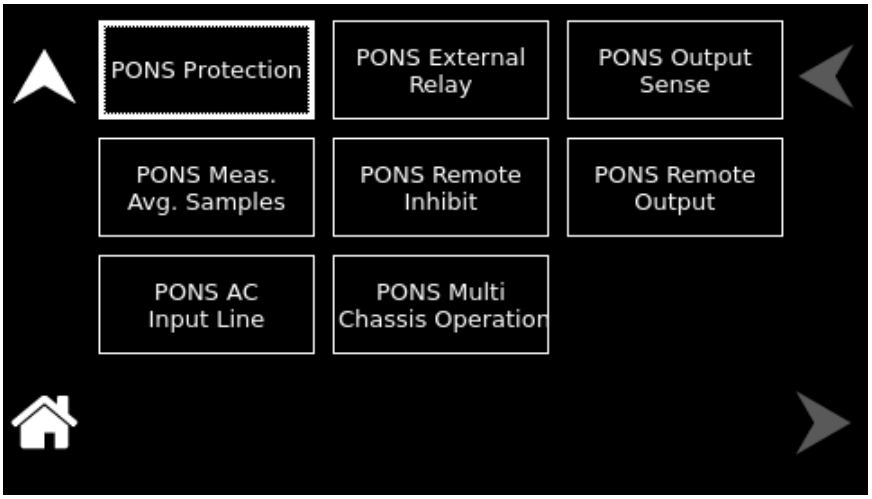


Figure 13-129. PONS Configuration mode – Parallel Operation

The PONS Configuration Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Protection	User can define OVP and Pos. OCP to help safeguard their devices from electrical anomalies. Refer to Figure 13-130.

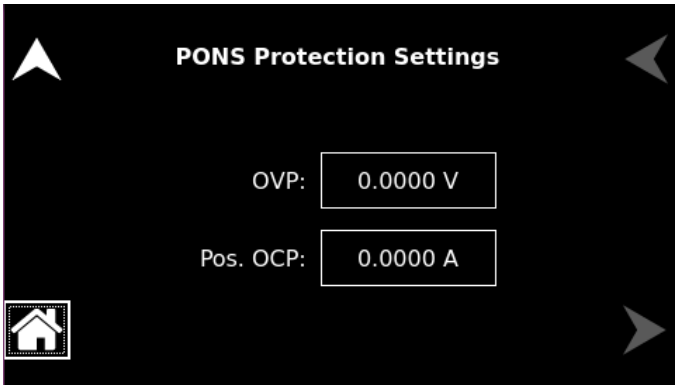


Figure 13-130. PONS Protection Settings

ENTRY	DESCRIPTION
PONS External Relay	Users can set the isolation relay to either 'Enable' or 'Disable'. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 13-131.

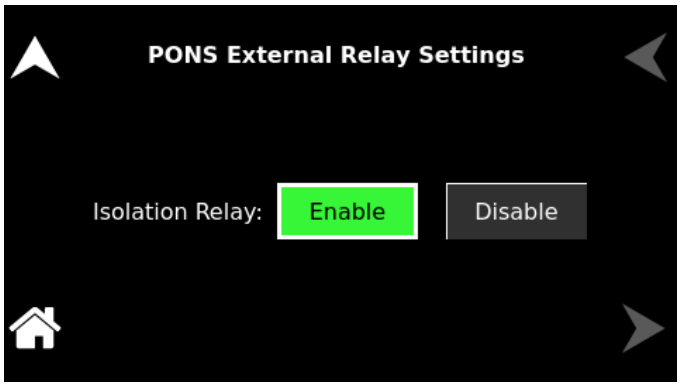


Figure 13-131. PONS External Relay Settings

PONS Output Sense

User can program the PONS output to 'Local' or 'Remote'. Refer to Figure 13-132.

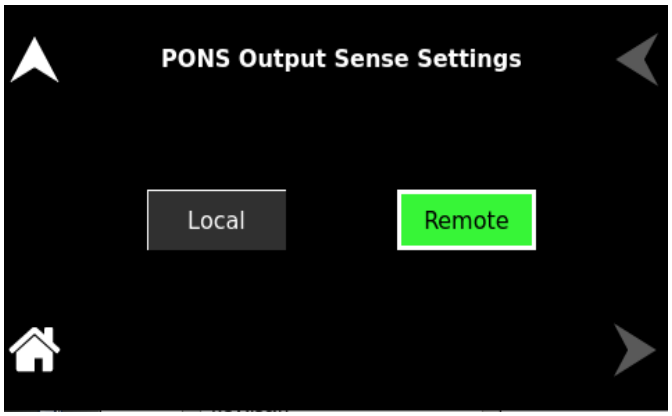


Figure 13-132. PONS Output Sense Settings

PONS Measurement Average Samples

User can specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 13-133.

ENTRY	DESCRIPTION

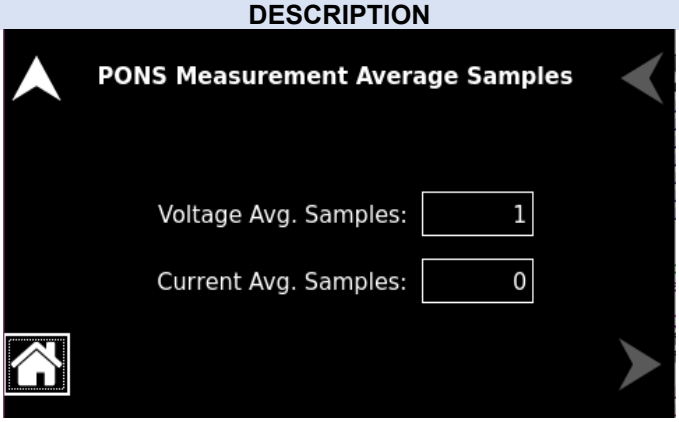


Figure 13-133. PONS Measurement Average Samples

PONS Remote Inhibit

User can control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 13-134.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

Remote inhibit can be configured in three modes;

- **Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output.
- **Live:** after reclosing the contact, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

b) Remote Inhibit Input – Active Source

An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply.

Remote inhibit can be configured in three modes;

- **Latch:** after removing the active voltage source, user needs to clear the fault and turn ON the output.
- **Live:** after removing the active voltage source, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

ENTRY	DESCRIPTION

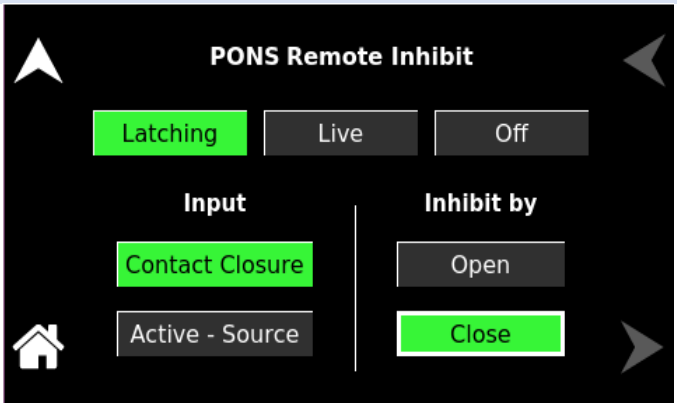


Figure 13-134. PONS remote Inhibit

PONS Remote Output

User can program the PONS Remote output to ON or OFF state. Refer to Figure 13-135.

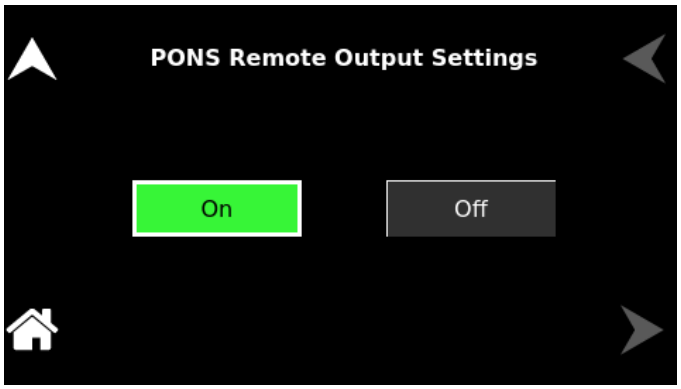


Figure 13-135. PONS Remote Output settings

PONS AC Input Line

User can select either the High Line or Low Line option based on the required input voltage range. Refer to Figure 13-136.

a) High Line: The nominal High Line Input range is 380 to 480 VAC.

b) Low Line: The nominal Low line input range is 200 to 240 VAC.

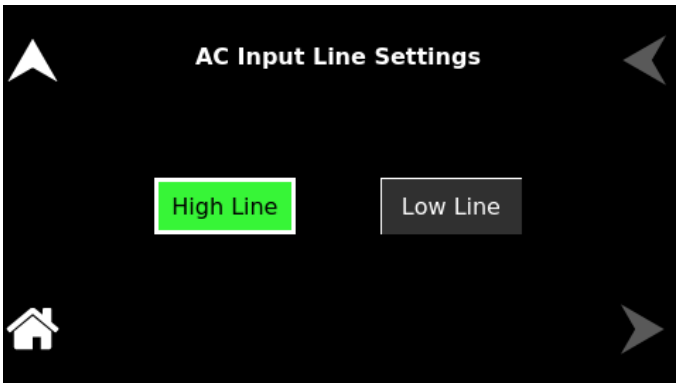


Figure 13-136. AC Input Line Settings

ENTRY	DESCRIPTION
PONS Multi Chassis Operation	Users can select the operation setting to Parallel. Refer to Figure 13-137. **a) Parallel:** Configure to perform parallel operation mode. Refer to Chapter 5. **NOTE:** If the unit is operating in standalone mode and the user selects the Parallel option, the selection remains enabled on the display; the setting does not affect unit operation. **NOTE:** Series and Series Split Phase operations are not applicable for PVSIM mode. If the user select series or series split phase, option remains enabled in the display; the setting does not affect unit operation.

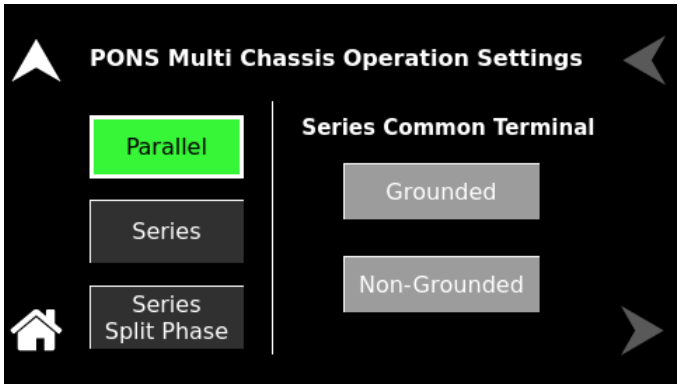


Figure 13-137. PONS Parallel Multi Chassis Operation Settings

PONS Parallel Operation Mode	User can select the parallel operation mode settings to Max Power or Max Current. Refer to Figure 13-138. **NOTE:** Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel. **a) Max Power:** Configure to deliver maximum power by limiting the overall current. **b) Max Current:** Configure to deliver maximum current by limiting the overall power.

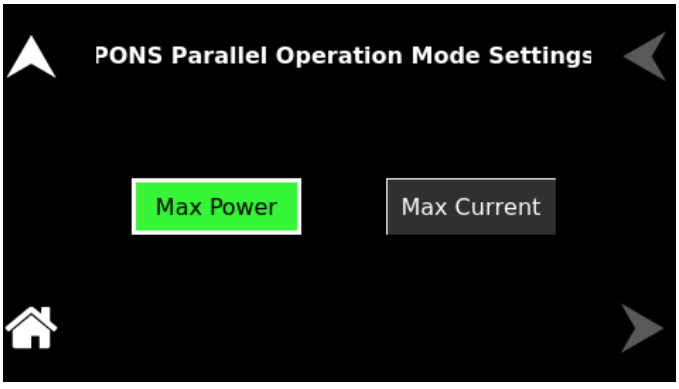


Figure 13-138. PONS Parallel Operation Mode Settings

Table 13-25. PONS Configuration mode

13.2.4.4.1.5 MEASUREMENT AVERAGE SAMPLES

The Measurement Average Samples Settings Menu allows the user to specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 13-139.

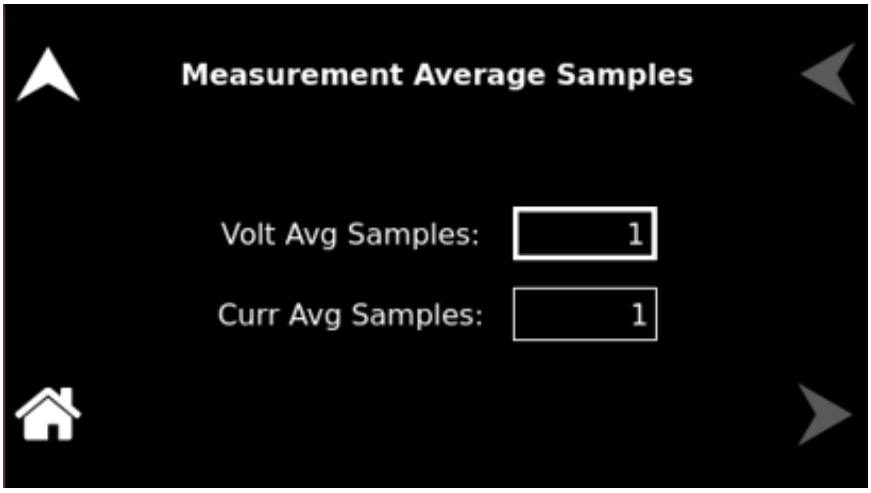


Figure 13-139. Measurement Average Samples

The Measurement Average Samples Settings menu has the following fields:

ENTRY	DESCRIPTION
Volt Avg Samples	Sets the number of voltage readings to average together to reduce noise in the voltage readback. Allows to set a value between 1 to 8.
Curr Avg Samples	Sets the number of current readings to average together to reduce noise in the current readback. Allows to set a value between 1 to 8. The value of 1 (factory default) provides the fastest response time in the readings, but less rejection of noise.

Table 13-26. Measurement Average Samples

13.2.4.4.1.6 PARALLEL OPERATION MODE

The Parallel Operation Mode setting is enabled only when the Mi-BEAM power supply is in parallel operation. This menu allows the user to achieve either maximum power or maximum current during parallel operation. When ‘Max Current’ is selected, the system delivers maximum current by limiting the overall power, whereas when ‘Max Power’ is selected, the system delivers maximum power by limiting the overall current. Refer to Figure 13-140.

NOTE: Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel.

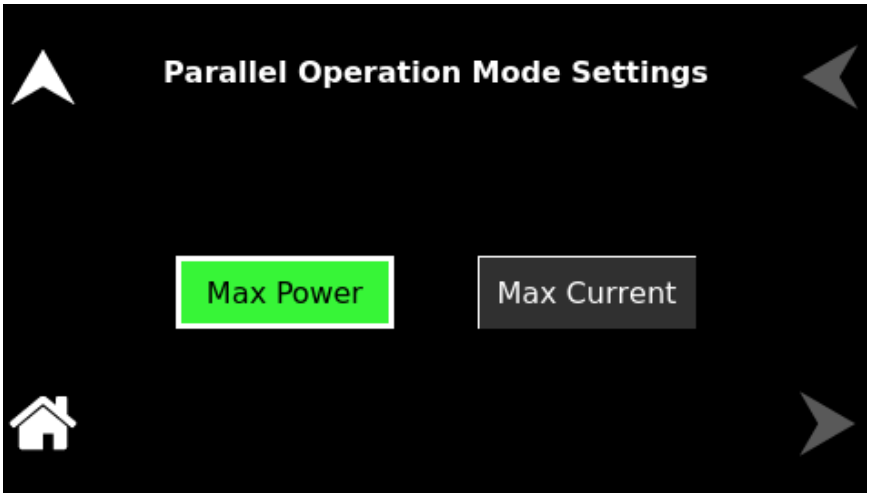


Figure 13-140. Parallel Operation Mode Settings

13.2.5 CONTROL INTERFACE SCREEN

The Control Interface screen provides 'LAN', 'RS232', 'USB', 'External CAN (Default)', 'GPIB' (available only when Mi-BEAM power supply is equipped with a GPIB interface)', and 'Remote inhibit'. For the top-level menu of the Control Interface Screen, refer to Figure 13-141 and for instructions on how to navigate to the Control Interface screen, refer to Section 9.4.2.2.

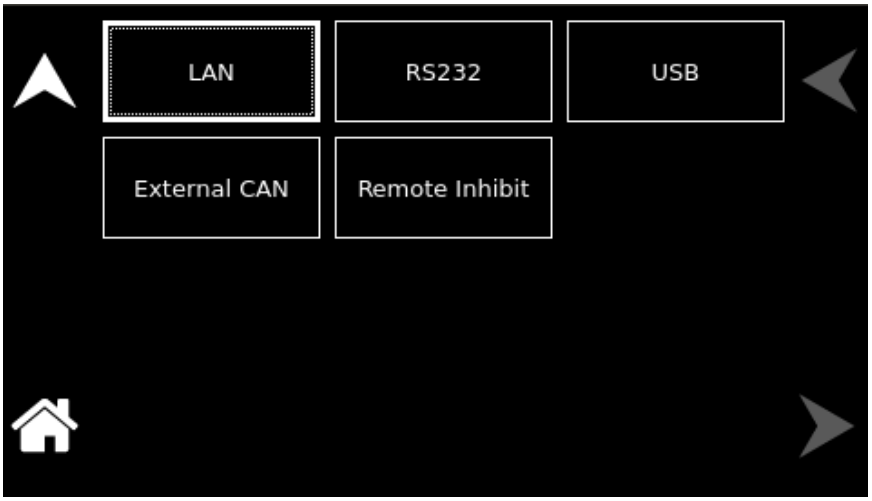


Figure 13-141. Control Interface Screen Top-Level Menu

When the Mi-BEAM power supply is equipped with a GPIB interface, the control interface screen menu changes. Refer to Figure 13-142.



Figure 13-142. Control Interface Screen Top-Level Menu- GPIB Option

The Control interface Settings menu has the following fields:

ENTRY	DESCRIPTION
LAN	Configures the LAN (LXI Ethernet) communications interface, refer to Figure 13-143. After settings are changed, the unit must be turned OFF/ON for them to take effect.

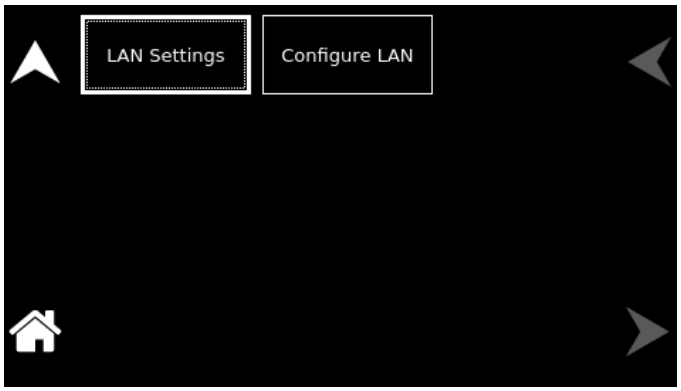


Figure 13-143. LAN Screen

a) LAN SETTINGS

Lists the configuration settings of the LAN interface, and the DNS-SD service name; a number, (n), would be appended to the service name, if necessary, to differentiate duplicate power supply names. Refer to Figure 13-144.

ENTRY	DESCRIPTION

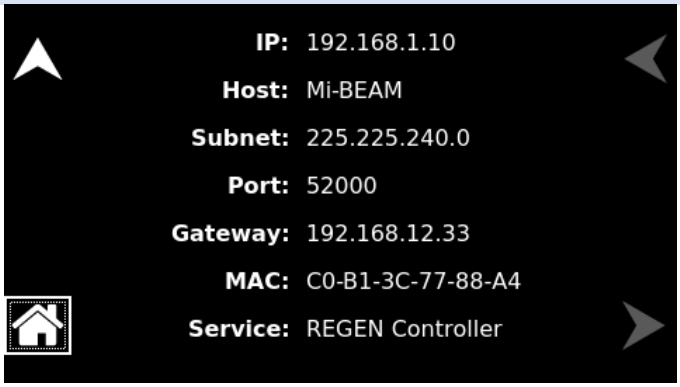


Figure 13-144. LAN Settings

b) LAN CONFIGURE

Sets parameter values and controls operation of the LAN interface, refer to Figure 13-145.

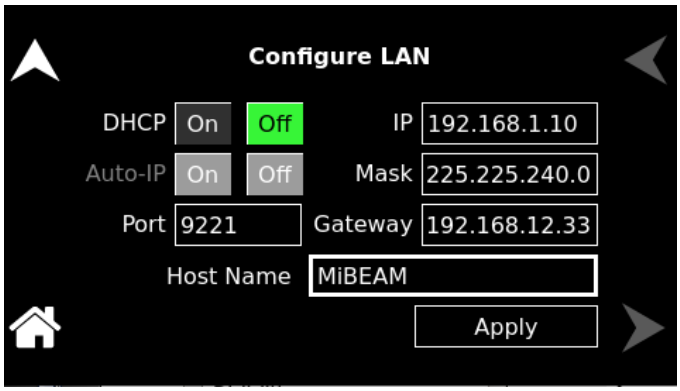


Figure 13-145. Configure LAN

- **DHCP**: Selects whether DHCP is enabled or disabled. Refer to Figure 13-146.

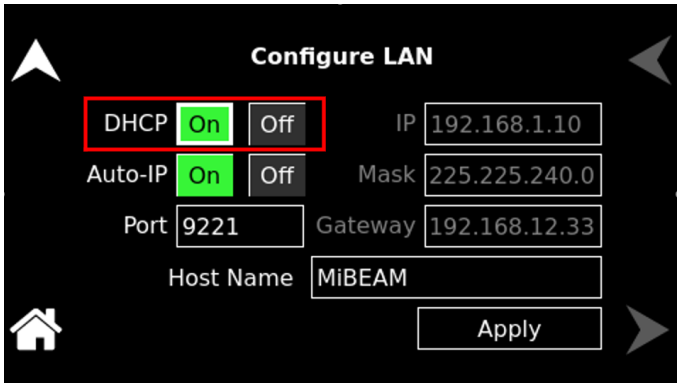


Figure 13-146. LAN Screen – DHCP

ENTRY	DESCRIPTION

NOTE: When DHCP is selected, the IP address is assigned by the network DHCP server. If DHCP server fails to assign an IP address and Auto-IP is enabled, the unit gets an IP address in the range of 169.254.X.X.

- **Auto-IP**: Enables or disable the Auto-IP configuration, when DHCP is ON. Refer to Figure 13-147.

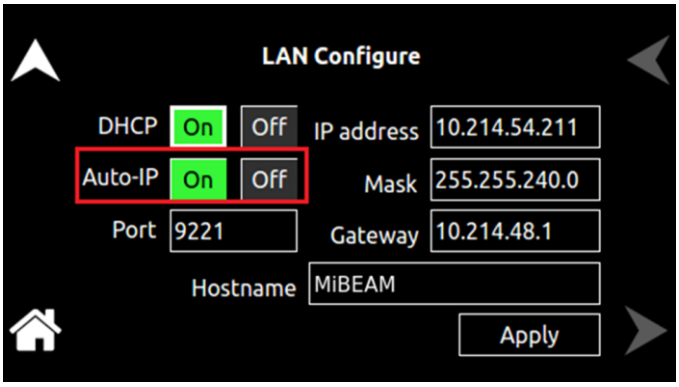


Figure 13-147. LAN Screen - Auto -IP

- **IP Address**: Sets the static IP address for the unit. When DHCP is turned off in the LAN CONFIG sub-menu, AUTO IP is selected, set the IP address to all zeros so that the IP address would be requested from the network; when DHCP is selected, the IP address is assigned by the network DHCP server. Refer to Figure 13-148.

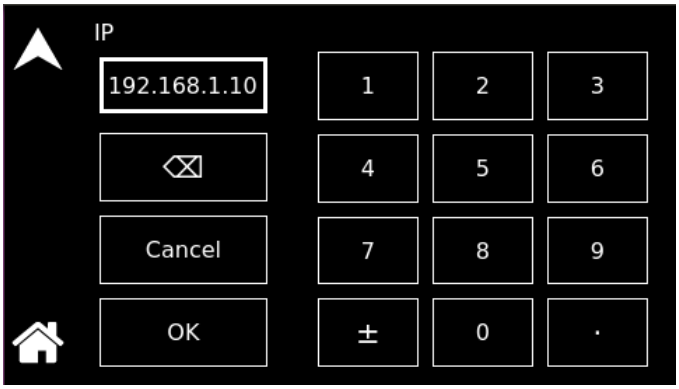


Figure 13-148. LAN Screen - IP Address

- **Subnet Mask**: Sets the subnet mask for use in static IP configuration. Refer to Figure 13-149.

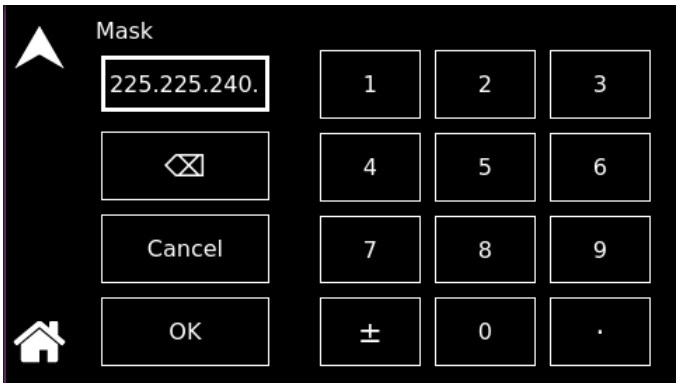


Figure 13-149. LAN Screen - Subnet Mask

- **Gateway Address**: Sets the gateway address when DHCP is turned off in the LAN CONFIG sub-menu and when AUTO IP is selected, set the gateway address to all zeros so that the gateway address would be requested from the network; when DHCP is selected, the gateway address is assigned by the network DHCP server. Refer to Figure 13-150.

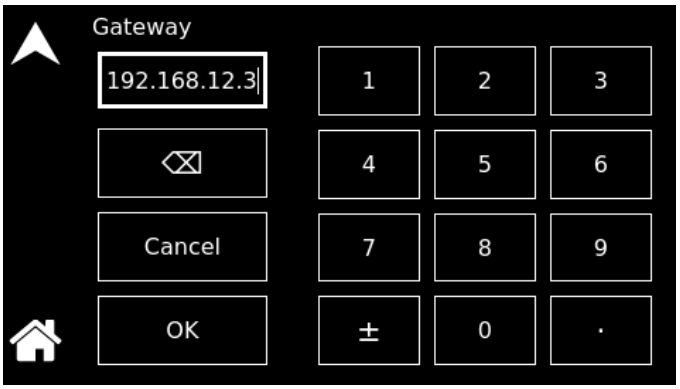


Figure 13-150. LAN Screen - Gateway Address

NOTE: When DHCP is selected, the gateway address is assigned by the network DHCP server.

- **Port**: sets the port number; the factory-default value is 9221. Refer to Figure 13-151.

ENTRY	DESCRIPTION



Figure 13-151. LAN Screen -Port

- **MAC Address:** Displays the MAC address; the MAC address is listed on a label on the chassis of the unit. Refer to Figure 13-152.



Figure 13-152. MAC Address

- **Host Name**: Allows setting a unique alpha-numeric host name. Refer to Figure 13-153.

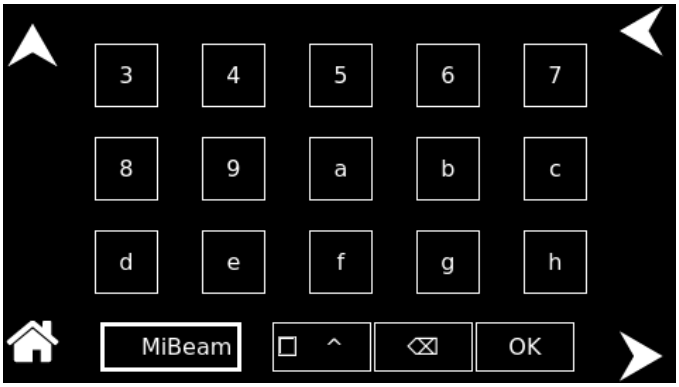


Figure 13-153. LAN Screen - Host Name

- **Apply**: Applies the LAN settings to the supply. Refer to Figure 13-154 and Figure 13-155.

ENTRY	DESCRIPTION

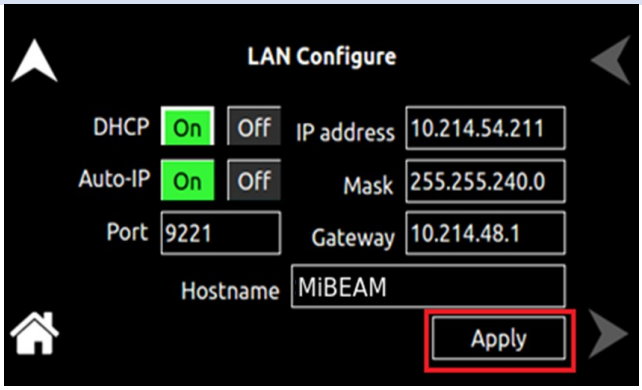


Figure 13-154. LAN Screen – Apply

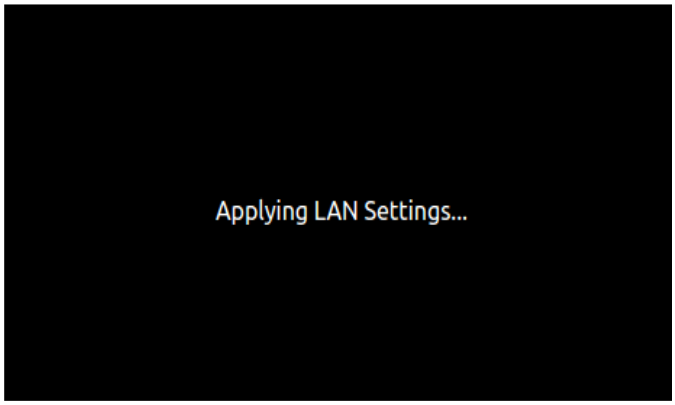


Figure 13-155. LAN Screen - Applying LAN Settings

RS232

Configures the RS-232C communications interface.RS232 has two sub-menus: RS232 Settings and RS232 Configure

a) RS232 Settings: Lists the configured Baud Rate, Stop Bits, Bits and Parity for the RS232 digital interface, refer to Figure 13-156.

- **Baud Rate**: sets baud rate to either 9600, 19200, 38400, 57600 or 115200 baud. The default setting is 115200 baud.
- **Stop Bits** sets the number of stop bits to either 1 or 2 bits. The default setting is 1 stop bit.
- **Data**: sets the number of data bits to either 7 or 8. The default setting is 8 bits.
- **Parity**: sets the parity to either Even, Odd, or no parity, None. The default setting is no parity, None.

ENTRY	DESCRIPTION



Figure 13-156. RS232 Screen -Settings

b) Configure RS232: Configures the RS-232 Baud Rate, refer to Figure 13-157 and Figure 13-158. This setting must match those set for the communications port of the user external controller.

- **Baud Rate**: sets baud rate to either 9600, 19200, 38400, 57600 or 115200 baud. The default setting is 115200 baud.

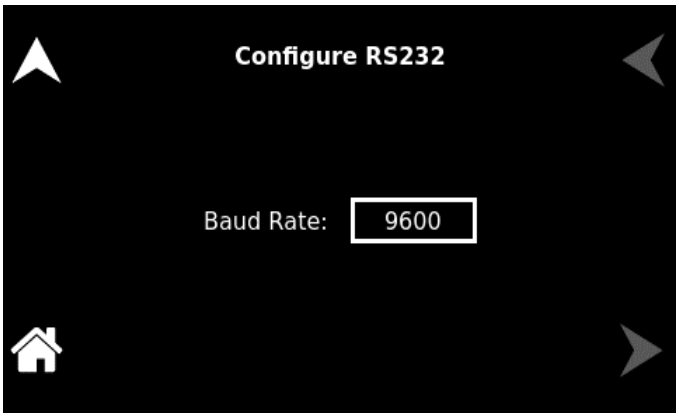


Figure 13-157. RS232 Screen -Configure

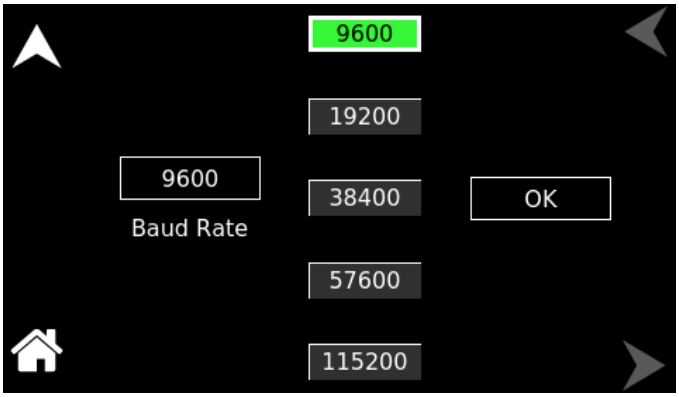


Figure 13-158. Baud Rate Selection

ENTRY	DESCRIPTION
USB	Displays the configured Baud Rate. Refer to Figure 13-159.

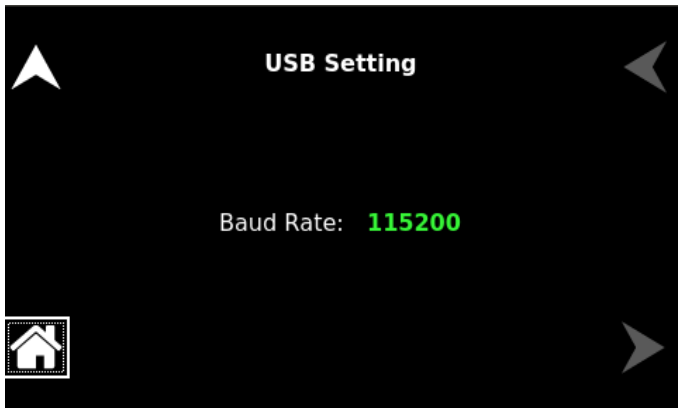


Figure 13-159. USB Setting

External CAN Configures the device Node Address, Baude Rate and Communication Protocol. Refer to Figure 13-160.

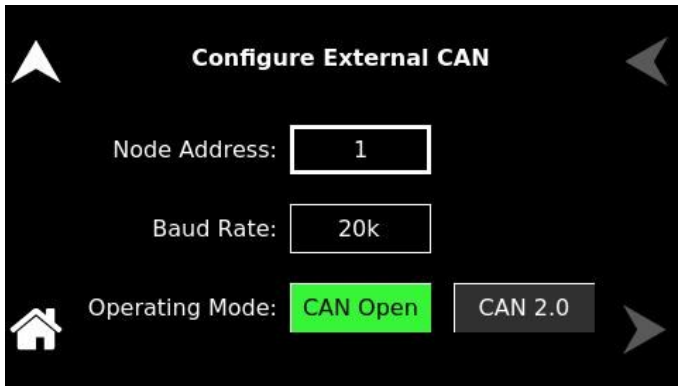


Figure 13-160. Configure External CAN

a) **Node Address:** Sets the CAN Node Address to the range of 1 to 127. Refer to Figure 13-161.

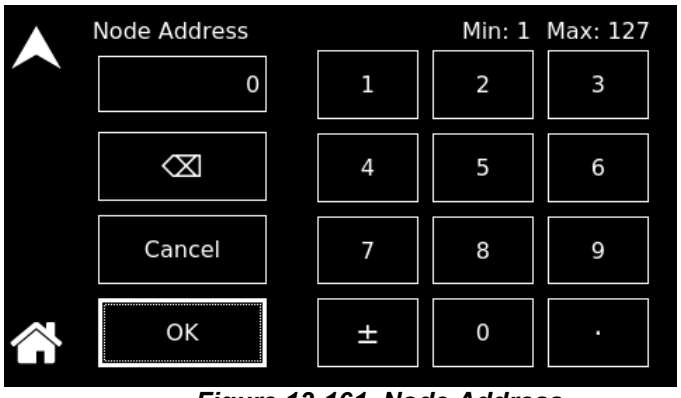


Figure 13-161. Node Address

ENTRY	DESCRIPTION

b) **Baud Rate:** Sets baud rate from 20kbps to 1mbps (20k, 40k, 50k, 80k, 100k, 125k, 150k, 200k, 250k, 400k, 500k, 1000 kbps). Refer to Figure 13-162.



Figure 13-162. Baud Rate

c) **Operating Mode:** Sets the communication protocol to CAN2.0 or CANopen. Refer to Figure 13-160.

- **CANopen**
  - Covers basic CANopen configuration, including NMT (Network Management) setup, TPDO (Transmit Process Data Object) mapping, and SDO (Service Data Object) structures.
  - Enables standardized communication and seamless integration into existing industrial CANopen networks.
- **CAN 2.0**
  - Describes the Hardware configuration and use of extended 29-bit identifiers.
  - Supports custom command or response mappings, allowing flexible and proprietary protocol integration.

ENTRY	DESCRIPTION
GPIB	Displays and Configures the GPIB Setting. Refer to Figure 13-163.

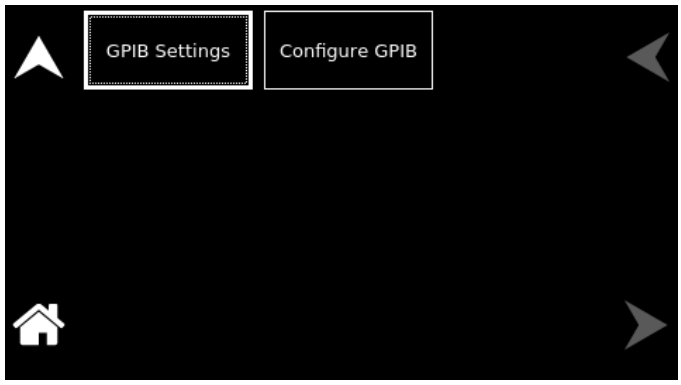


Figure 13-163. GPIB

a) GPIB Settings

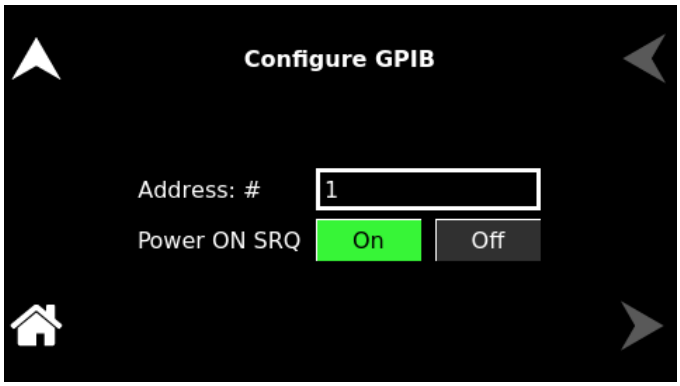
Displays the configured address and Power ON SRQ.



Figure 13-164. GPIB Settings

b) Configure GPIB

Configure the IEEE-488 address; the default is 1. The address can be set from 0 through 30 and allows to turn On/Off the Power ON Service Request. Power On SRQ set to On causes a GPIB service request to be sent to the computer, when the Power Supply is turned on. Factory Default



value for Power On SRQ is Off.

ENTRY	DESCRIPTION

Figure 13-165. Configure GPIB

Remote Inhibit

Sets the control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 13-166.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

Remote inhibit can be configured in three modes;

- **Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output.
- **Live:** after reclosing the contact, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

b) Remote Inhibit Input – Active Source

An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply.

Remote inhibit can be configured in three modes;

- **Latch:** after removing the active voltage source, user needs to clear the fault and turn ON the output.
- **Live:** after removing the active voltage source, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

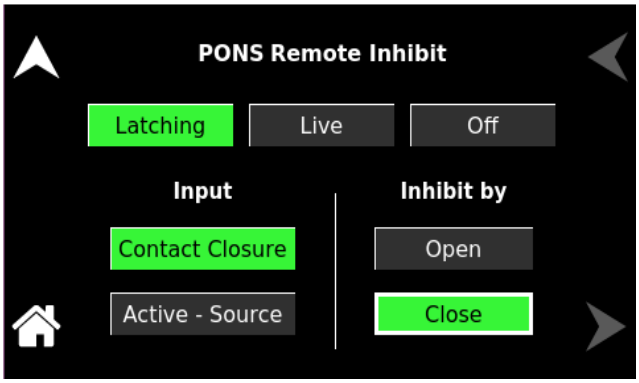


Figure 13-166. PONS remote Inhibit

Table 13-27. System Setting Screen

13.2.6 OPERATING MODE

The Operating Mode Settings screen offers comprehensive guidance on the system modes of the Mi-BEAM Series power supply. This model is engineered for versatile and reliable performance across various applications, ensuring precise and efficient power delivery through its advanced control features. Depending on user requirements, the Mi-BEAM Series supports multiple modes of operation. Refer to the Figure 13-167.

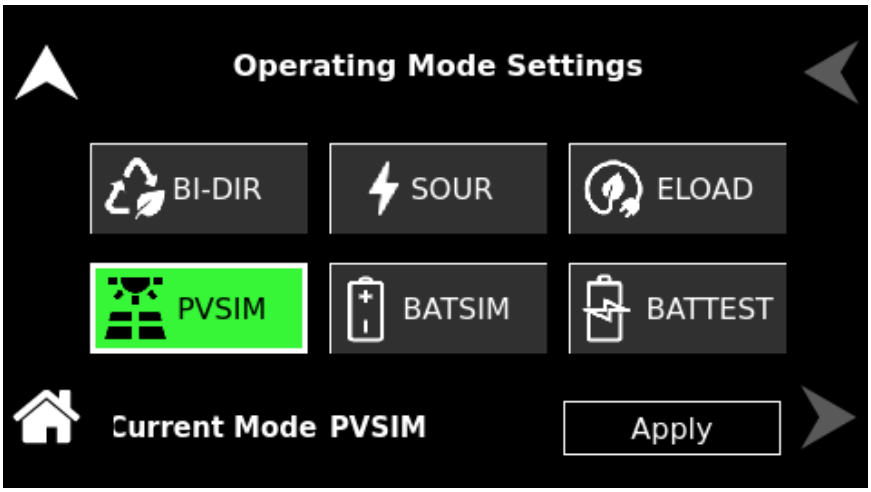


Figure 13-167. Operating Mode

13.2.7 SYSTEM SETTINGS SCREEN

The System Settings screen provides the settings of ‘Hardware Limits’, ‘System Details’ ‘Firmware Version’, ‘LCD’, ‘Default Screen’ and ‘Factory Default’. For the top-level menu of the System Settings Screen, refer to Figure 13-168 and for instructions on how to navigate, refer to Section 9.4.2.2.

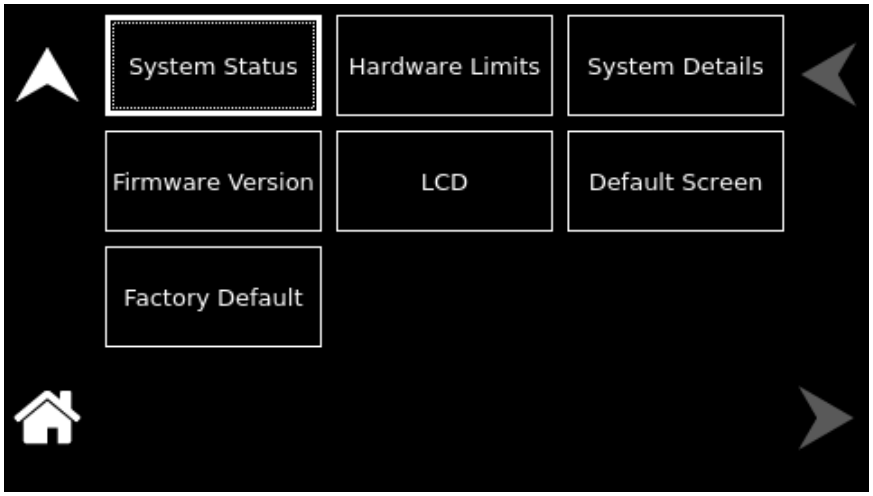


Figure 13-168. System Settings Screen

The System Settings menu has the following fields:

ENTRY	DESCRIPTION
System Status	Displays the present system status information of the power supply, including the Input Line, Output Sense, Isolation, Chassis Type and No. of chassis. Refer to Figure 13-169 and Figure 13-170. **NOTE:** The chassis type changes depending on the connection configuration; it is identified as Standalone (the power supply operates independently), and Multi-chassis Parallel (the power supply is connected in parallel).

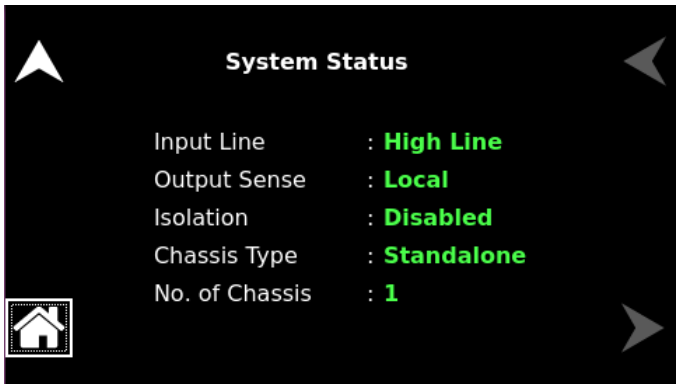


Figure 13-169. System Status – Standalone Unit

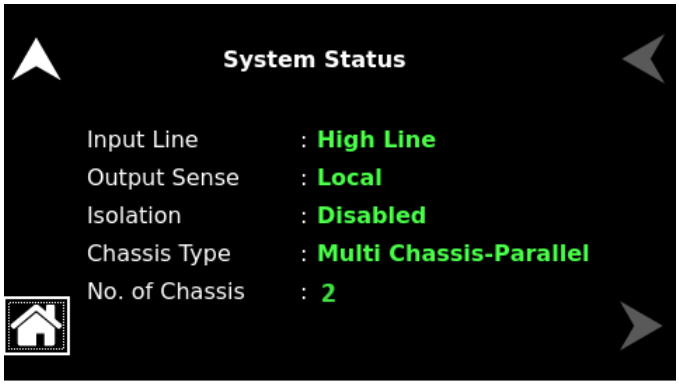


Figure 13-170. System Status – Parallel Operation

Hardware Limits Displays the hardware parameter limit values. Refer to Figure 13-171.



Figure 13-171. Hardware Limits

ENTRY	DESCRIPTION
System Details	Displays information about the user's device, including the Manufacturer, Model Number, Serial Number, Last Calibration Date, and Operating Mode. Refer to Figure 13-172.

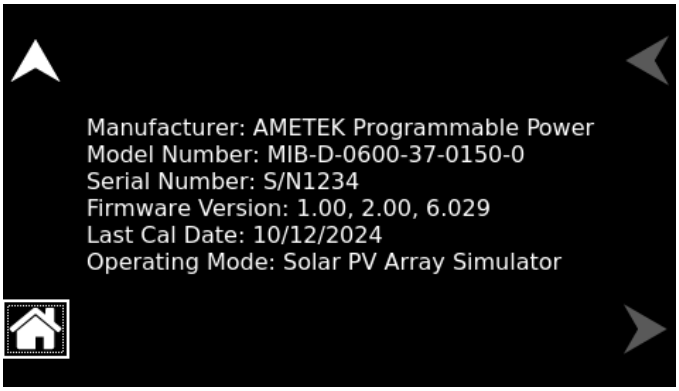


Figure 13-172. System Details

Firmware Version	Displays information about the configuration of the power supply, including the Communication Controller, System Interface, Front Panel, Fan Controller, Mod 1 Primary Controller, Mod 1 Secondary Controller, Mod 2 Primary Controller, Mod 2 Secondary Controller, Mod 3 Primary Controller, Mod 3 Secondary Controller. This information helps identify the unit. Refer to Figure 13-173.

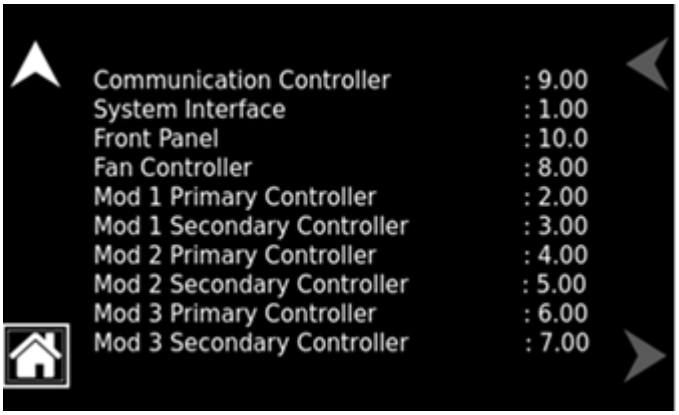


Figure 13-173. Firmware Version

LCD	Provides settings for the calibration of the display touchscreen. Refer to Figure 13-174.

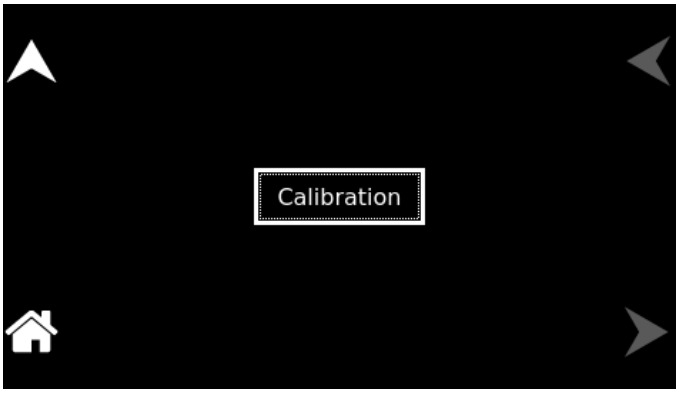


Figure 13-174. LCD

ENTRY	DESCRIPTION

Default Screen

Selects whether the Default screen (showing measured voltage, current and power) is enabled or disabled, refer to Figure 13-175 and Figure 13-176. It allows to set the time out if the default screen is enabled.

Timeout Interval: Selects the time, in seconds, for how long Dashboard screen must be inactive before the Default screen is displayed.

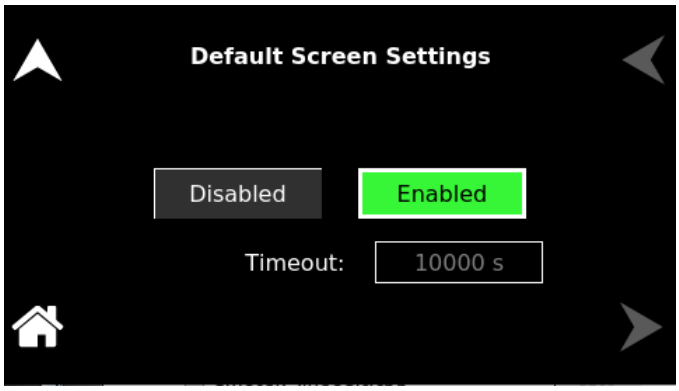


Figure 13-175. Default Screen Settings

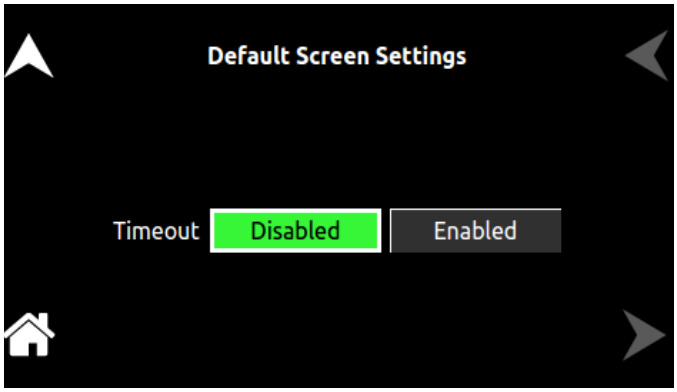


Figure 13-176. System Settings Screen - Default Screen Disabled

Factory Default

Set the device to its original factory settings, as it was when it left the manufacturer. Refer to Figure 13-177.

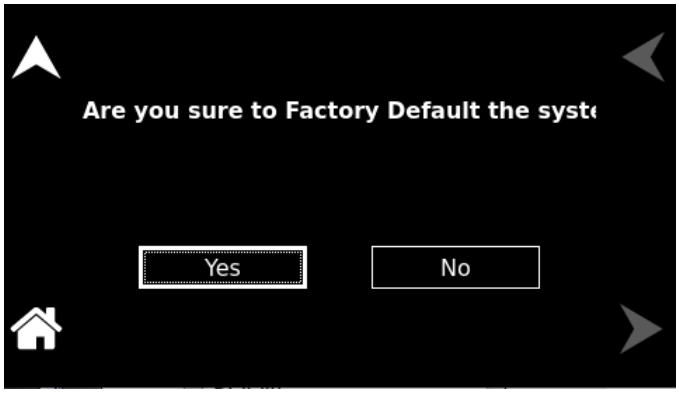


Figure 13-177. Factory Default

Table 13-28. System Setting Screen

13.2.8 SYSTEM FAULTS SCREEN

The System Faults screen provides descriptions of faults that have occurred in a power module. The fault screen appears if any supply fault conditions occur, refer to Figure 13-178. The user should press 'Clear' to clear the fault and continue operating the power supply, and press 'Reload' to refresh the system faults and check for errors. If no fault has occurred, the screen will display 'No Fault Occurred', refer to Figure 13-179.

NOTE: These conditions might resolve themselves; however, if they continue to occur after pressing 'Clear', refer to Chapter 17.

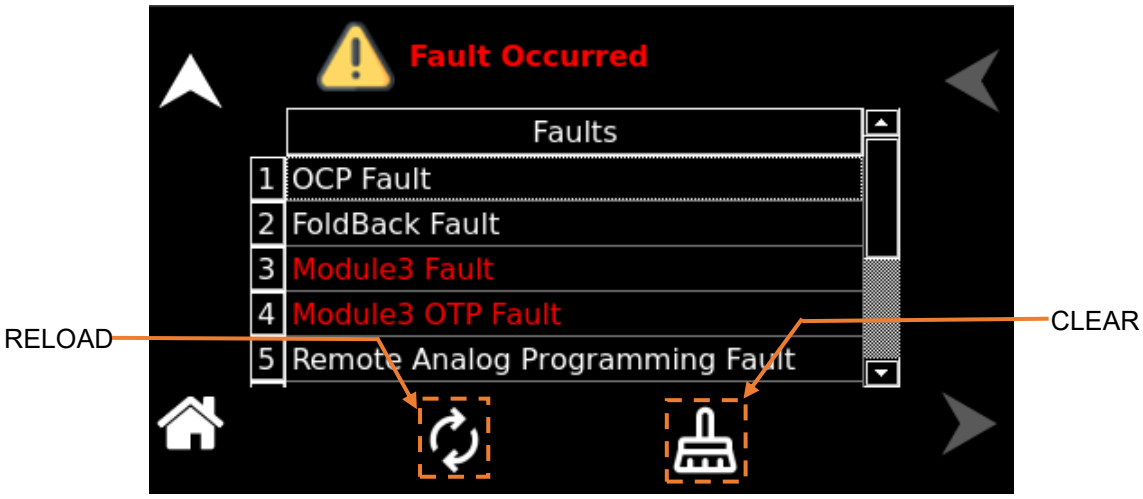


Figure 13-178. System Faults



Figure 13-179. No Fault Occurred Screen

If any fault occurs on the Follower screen, a fault signal is generated. Press 'Faults' to view the fault details on the Follower screen. Refer to Figure 13-180.

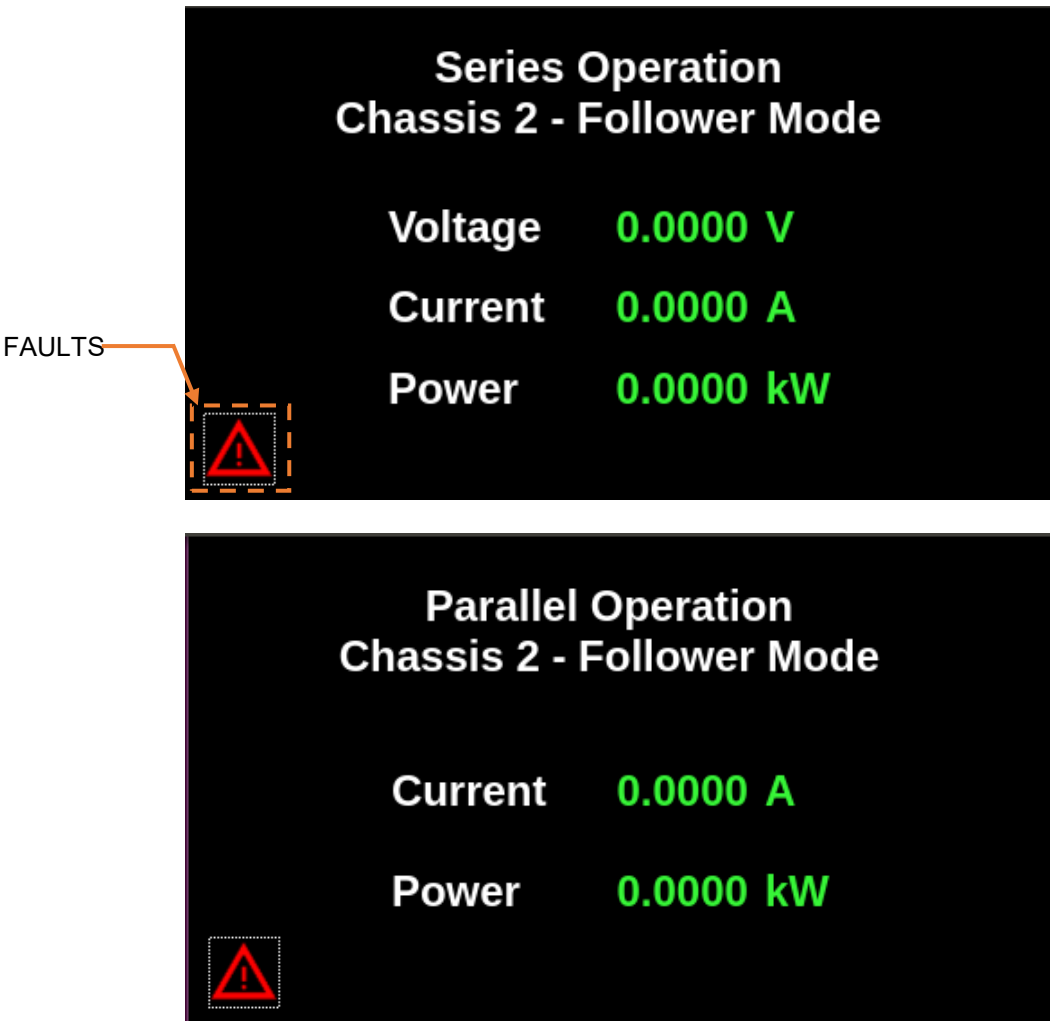


Figure 13-180. Follower Faults Screen

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14 BATTERY SIMULATOR MODE OPERATION

This chapter provides comprehensive information on the front panel display in Battery Simulator mode, designed to offer an intuitive interface for seamless setup, control, and monitoring of various battery simulation parameters.

14.1 Mi-BEAM CONNECTION TO UUT AND CONFIGURATION

14.1.1 CONFIGURING CURRENT TYPE UUT

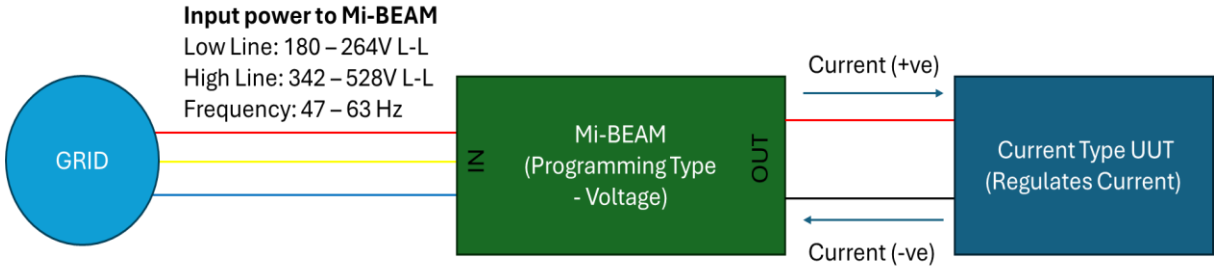


Figure 14-1. Current Type UUT

The Mi-BEAM Series power supply in BATSIM operates with a fixed Programming Type (Current) and the Regulation Setting is 'Constant Voltage Series Resistance (CV Ser. Res).

14.1.1.1 BATSIM PROFILE TYPE – BATTERY

When the settings selected in 'BATSIM Profile Type Settings - Battery' are applied in the Configuration Screen, the settings in top-level screens will appear with various options. Refer to Section 14.2.4.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 14-25.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 14-25.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 14-25.

- **BATSIM Profile Type:** Select the Test Type to 'Battery' in 'BATSIM Profile Type Settings'. Refer to Figure 14-13.

b) BATSIM Configuration: Create a configuration and define the characteristics of the battery to be simulated. Refer to Figure 14-16.

c) BATSIM Stop Conditions: Set the stop conditions of the battery simulation process. Refer to Figure 14-18 and Figure 14-19.

d) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 14-9.

e) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Figure 14-10.

h) End the Test: Once the test is complete, power down the system and safely disconnect the UUT from the Mi-BEAM.

14.1.1.2 BATSIM PROFILE TYPE – TABLE

When the settings selected in 'BATSIM Profile Type Settings - Table' are applied in the Configuration Screen, the settings in top-level screens will appear with various options. Refer to Section 14.2.4.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure the safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow from Mi-BEAM to UUT. Refer to Figure 14-25.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 14-25.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 14-25.

- **BATSIM Profile Type:** Select the Test Type to ‘Table’ in ‘BATSIM Profile Type Settings’. Refer to Figure 14-23.

b) BATSIM Configuration: Load a defined configuration which simulates the multiple battery characteristics. Refer to Figure 14-23.

c) BATSIM Stop Conditions: Set the stop conditions of the battery simulation process. Refer to Figure 14-14.

d) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 14-9.

e) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Figure 14-10.

h) End the Test: Once the test is complete, power down the system and safely disconnect the UUT from the Mi-BEAM.

14.2 FRONT PANEL OPERATION

This section provides detailed information on the front panel operation in Battery Simulator (BATSIM) mode. Each menu of a screen could be selected by tapping its associated selection-field box through the touchscreen, or by selecting it with the rotary encoder. Refer to Figure 14-2.

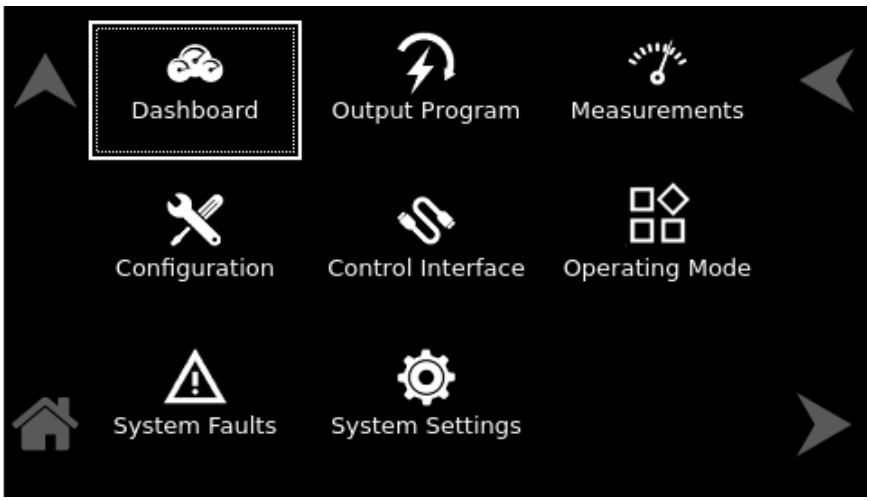


Figure 14-2. Home Screen Top-Level Menu

14.2.1 DASHBOARD SCREEN TOP-LEVEL MENU

The DASHBOARD screen top-level menu is used to change output parameters and simultaneously view output measurements. The most used output parameters are in the DASHBOARD screen menu. The DASHBOARD screen is the default menu that is displayed after power-on.

14.2.1.1 DASHBOARD SCREENS BASED ON BATSIM PROFILE TYPE

Dashboard screen will be updated based on the selection in ‘BATSIM Profile Type’ Settings. The ‘BATSIM Profile Type’ settings in the ‘Configuration’ allows the user to switch between the ‘Battery’ or ‘Table’ profile of the BATSIM operation. Refer to Section 14.2.4.

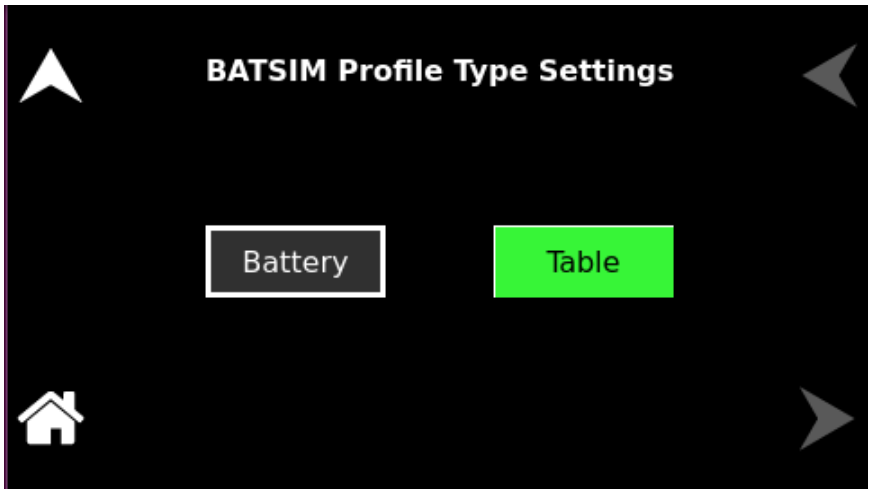


Figure 14-3. Configuration Screen

14.2.1.2 BATSIM PROFILE TYPE - BATTERY

When the setting selected is 'BATSIM Profile Type - **Battery'**, the dashboard screen will display options to set the ‘Battery Profile’, ‘Cut-Off Conditions’, and the options to ‘Start’, ‘Pause’, and ‘Stop’ the simulation. Refer to Figure 14-4 for dashboard screen and refer to Section 9.4.2.2 for navigating to Dashboard-Screen.

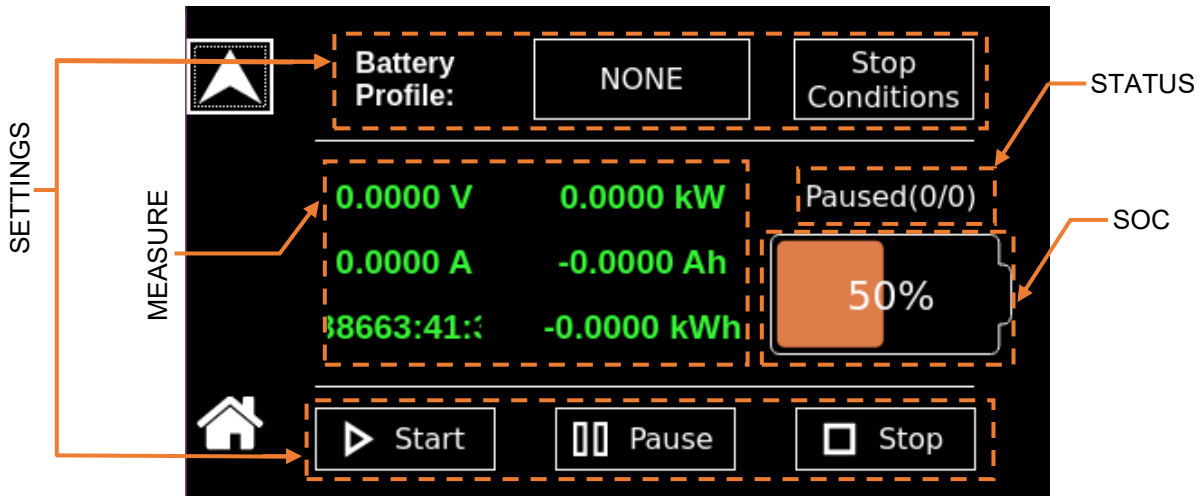


Figure 14-4. Dashboard Screen (BATSIM Profile Type – Battery)

SETTINGS	DESCRIPTION
Battery Profile(1)(2)	The selected battery profile will be displayed. Users can also select, edit, delete, and load the battery profiles. After loading the battery profile to the unit, resultant battery pack values can be viewed under this setting.
Stop Conditions	Stop conditions for the battery simulation can be configured from this menu. Refer to Figure 14-14. **a) SOC High:** On measured SOC reaching this high limit, battery simulation will be terminated. **b) SOC Low:** On measured SOC reaching this low limit, battery simulation will be terminated. **c) Cap High:** On measured Capacity reaching this high limit, battery simulation will be terminated. **d) Cap Low:** On measured Capacity reaching this low limit, battery simulation will be terminated.
Start	Starts the battery simulation.
Pause	Pauses the battery simulation.
Stop	Stops the battery simulation.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.
Energy	Displays the floating-point value of the energy in kWh.
Capacity	Displays the floating-point value of the battery capacity in Ah.
Time	Displays the time elapsed to complete the test in hh:mm:ss.
Status	Displays the status of the battery simulation.

SOC	Displays the State of Charge of the battery in percentage.

(1) The '' symbol before the battery profile name indicates that the profile is selected but not yet loaded. To load the profile, click the load button available in the 'BATSIM Configuration Setting'. To turn ON the output of the power supply, selected profile must be loaded.*
(2) The 'NONE' indicates that no profile is selected.

Table 14-1. Dashboard screen top-level menu – (BATSIM Profile Type – Battery)

The 'Status' in the Dashboard screen will update dynamically. Refer to the Table 14-2 below;

STATUS	DESCRIPTION
Idle	When the system is Idle (not performing any battery simulation).
Initializing	When the selected Battery Profile loading to the unit is in progress.
Initialized	When the selected Battery profile load is successful.
Running	When the battery simulation is in progress.
Running Clipped – Res	When the battery simulation is in progress and the inner resistance value of the battery pack exceeds Mi-BEAM 'Series Resistance' limit. Consequently, the battery pack's inner resistance will be clipped to Mi-BEAM Series Resistance limit.
Running Clipped – Volt	When the battery simulation is in progress and the Open Circuit Voltage value of the battery pack exceeds Mi-BEAM voltage limit. Consequently, the battery pack's Open Circuit Voltage will be clipped to Mi-BEAM Series Voltage limit.
Running Clipped – Res, Volt	When the battery simulation is in progress and both the Open Circuit Voltage and inner resistance values of the battery pack exceed Mi-BEAM voltage and 'Series Resistance' limits. Consequently, the battery pack's Open Circuit Voltage and inner resistance will be clipped to Mi-BEAM voltage and 'Series Resistance' limits.
Paused	When the simulation is paused by user.
Paused Clipped – Res	When the simulation is paused by user and the inner resistance value of the battery pack exceeds the Mi-BEAM 'Series Resistance' limit. Consequently, the battery pack's inner resistance will be clipped to the Mi-BEAM Series Resistance limit.
Paused Clipped – Volt	When the simulation is paused by user and the voltage value of the battery pack exceeds the Mi-BEAM 'Series voltage' limit. Consequently, the battery pack's inner voltage will be clipped to the Mi-BEAM 'Series voltage' limit.
Paused Clipped – Res, Volt	When the simulation is paused by user, the voltage and inner resistance value of the battery pack exceeds the Mi-BEAM 'Series voltage' and 'resistance' limit. Consequently, the battery pack's inner voltage and resistance will be clipped to the Mi-BEAM 'Series voltage' and 'resistance' limit.
Stopped	When the simulation is stopped.
Stopped Cap – H	When battery simulation is terminated on measured capacity reaches capacity high limit.
Stopped Cap – L	When battery simulation is terminated on measured capacity reaches capacity low limit.
Stopped SOC – H	When battery simulation is terminated on measured SOC reaches SOC high limit.
Stopped SOC – L	When battery simulation is terminated on measured SOC reaches SOC low limit.
Aborted	When battery simulation is aborted by the user and none of the stop conditions are met.
Tripped	When battery simulation is terminated due to fault.

Table 14-2. Status

14.2.1.3 BASTIM PROFILE TYPE - TABLE

When the settings selected is 'BATSIM Profile Type - **Profile**', the dashboard screen will display options to set the 'Table Profile', 'Cut-Off Conditions', and the options to 'Start, 'Pause', and 'Stop' the test. Refer to Figure 14-5.

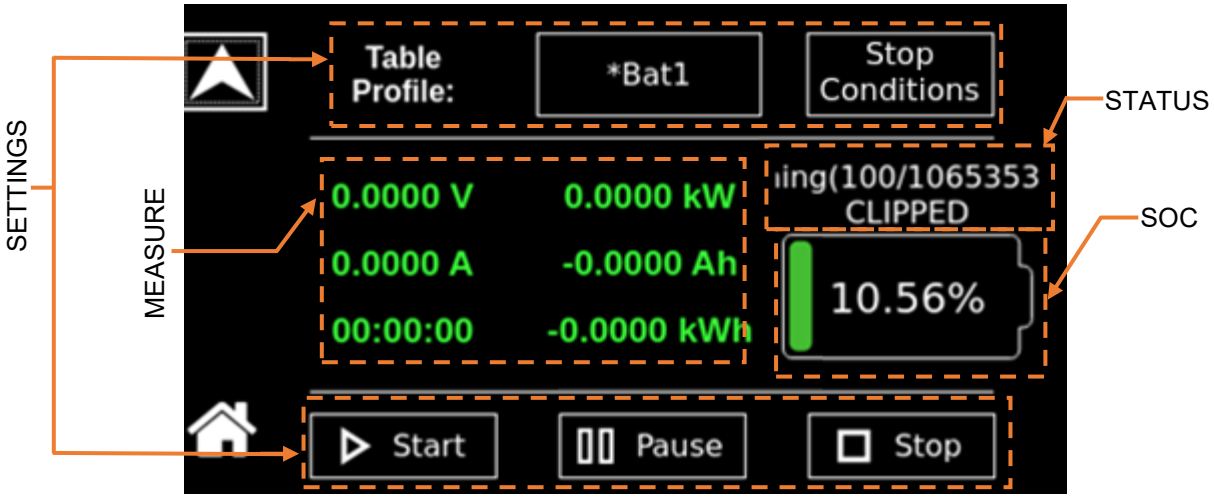


Figure 14-5. Dashboard Screen (BATSIM Profile Type – Battery)

SETTINGS	DESCRIPTION
Table Profile[1][2]	The selected table profile will be displayed. Users can load and delete the profiles. After loading the table profile to the unit, resultant battery pack values can be viewed under this setting.
Stop Conditions	Stop conditions for the battery simulation can be configured from this menu. Refer to Figure 14-14. **a) SOC High:** On measured SOC reaching this high limit, battery simulation will be terminated. **b) SOC Low:** On measured SOC reaching this low limit, battery simulation will be terminated. **c) Cap High:** On measured Capacity reaching this high limit, battery simulation will be terminated. **d) Cap Low:** On measured Capacity reaching this low limit, battery simulation will be terminated.
Start	Starts the battery simulation.
Pause	Pauses the battery simulation.
Stop	Stops the battery simulation.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.

SETTINGS	DESCRIPTION
Power	Displays the floating-point value of the DC output power in kW.
Energy	Displays the floating-point value of the energy in kWh.
Capacity	Displays the floating-point value of the battery capacity in Ah.
Time	Displays the time elapsed to complete the test in hh:mm:ss.
Status(3)	Displays the operational status of the battery simulation.
SOC	Displays the State of Charge of the battery in percentage.

(1) The '' symbol before the battery profile name indicates that the profile is selected but not yet loaded. To load the profile, click the load button available in the 'BATSIM Configuration Setting'. To turn ON the output of the power supply, selected profile must be loaded.*
(2) The 'NONE' indicates that no profile is selected.

Table 14-3. Dashboard screen top-level menu (BATSIM Profile Type – Table)

'Status' in the Dashboard screen will update dynamically. Refer to the Table 14-4 below;

STATUS	DESCRIPTION
Idle	When the system is Idle (not performing any battery simulation).
Initializing	When the selected Battery Profile loading to the unit is in progress.
Initialized	When the selected Battery profile load is successful.
Running (current index/total index)	When the battery simulation is in progress, the progress will be shown near the running status, indicating the current table index that is executing / total indices of the table.
Running (current index/total index) Clipped – Res	When the battery simulation is in progress and the inner resistance value of the battery pack exceeds Mi-BEAM 'Series Resistance' limit. Consequently, the battery pack's inner resistance will be clipped to Mi-BEAM 'Series Resistance' limit.
Running (current index/total index) Clipped – Volt	When the battery simulation is in progress and the Open Circuit Voltage value of the battery pack exceeds Mi-BEAM voltage limit. Consequently, the battery pack's Open Circuit Voltage will be clipped to Mi-BEAM 'Series Voltage' limit.
Running (current index/total index) Clipped – Res, Volt	When the battery simulation is in progress and both the Open Circuit Voltage and inner resistance values of the battery pack exceeds Mi-BEAM voltage and 'Series Resistance' limits. Consequently, the battery pack's Open Circuit Voltage and inner resistance will be clipped to Mi-BEAM voltage and 'Series Resistance' limits.
Paused (current index/total index)	When the simulation is paused by user, the progress will be shown near the running status, indicating the current table index that is executing / total indices of the table.
Paused (current index/total index) Clipped – Res	When the simulation is paused by user and the inner resistance value of the battery pack exceeds the Mi-BEAM Series Resistance limit. Consequently, the battery pack's inner resistance will be clipped to the Mi-BEAM 'Series Resistance' limit.
Paused (current index/total index) Clipped – Volt	When the simulation is paused by user and the voltage value of the battery pack exceeds the Mi-BEAM 'Series voltage' limit. Consequently, the battery pack's inner voltage will be clipped to the Mi-BEAM 'Series voltage' limit.
Paused (current index/total index) Clipped – Res, Volt	When the simulation is paused by user and the voltage and inner resistance value of the battery pack exceeds the Mi-BEAM 'Series voltage' and 'resistance' limit. Consequently, the battery pack's inner voltage and

STATUS	DESCRIPTION
	resistance will be clipped to the Mi-BEAM 'Series voltage' and 'resistance' limit.
Stopped	When the simulation is stopped.
Stopped Cap – H	When battery simulation is terminated on measured capacity reaches capacity high limit.
Stopped Cap – L	When battery simulation is terminated on measured capacity reaches capacity low limit.
Stopped SOC – H	When battery simulation is terminated on measured SOC reaches SOC high limit.
Stopped SOC – L	When battery simulation is terminated on measured SOC reaches SOC low limit.
Aborted	When battery simulation is aborted by the user and none of the stop conditions are met.
Tripped	When battery simulation is terminated due to fault.

Table 14-4. Status

14.2.1.4 REAL-TIME PARAMETER ADJUSTMENT

The DASHBOARD screen menu provides the capability for output parameter entry that has real-time, immediate effect on the output. This allows manual adjustment of the output parameters where tuning of a value is desired. Enabling this function requires clicking on a parameter selection-field box with the encoder switch to select the parameter and display its selection-field highlighted and with a value entry window, refer to Figure 14-6. The rotary encoder could then be used to continuously adjust the parameter value, up and down, as it is rotated. The value change has immediate effect at the output.

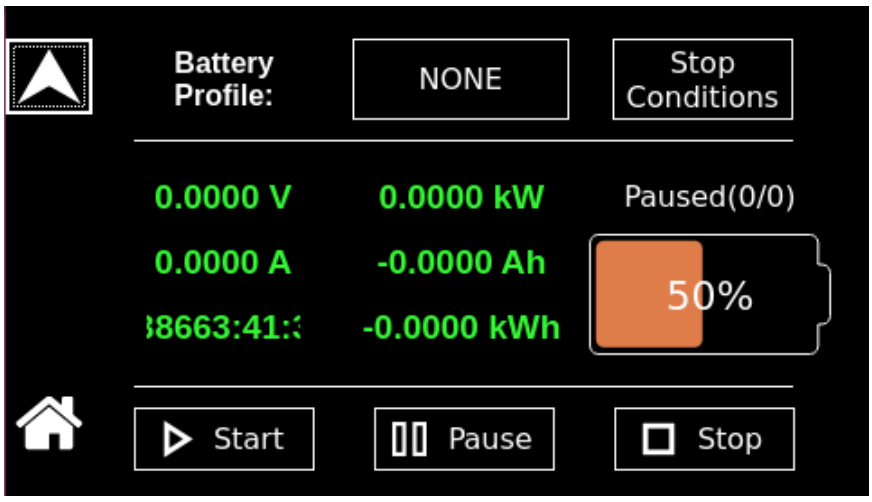


Figure 14-6. Real-Time, Immediate Output Parameter Adjustment

14.2.1.5 DEFAULT SCREEN

The Default screen provides measurement of the DC output ‘Voltage’, ‘Current’, ‘Power’ and ‘SOC’, refer to Figure 14-7. When the Dashboard screen is idle for an interval equal to a set time delay, refer to Figure 14-77 and Figure 14-75. The display will automatically switch to the Default screen. Tap anywhere on the screen to return to the Dashboard screen.

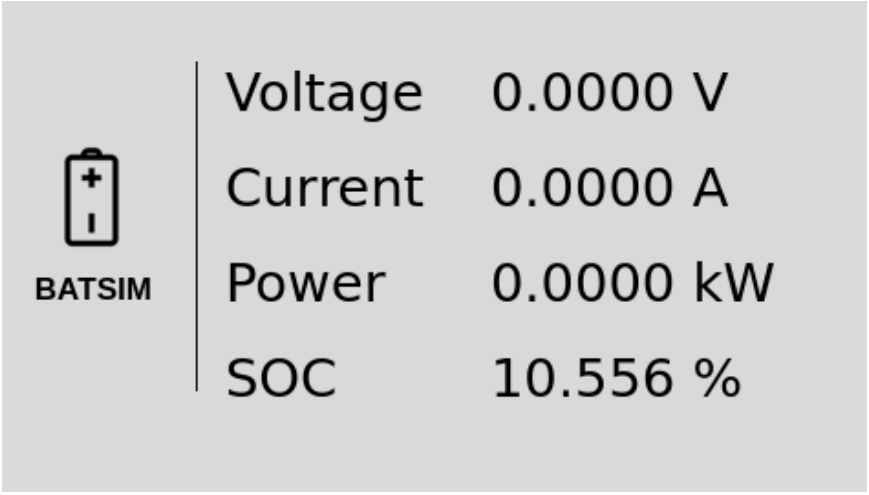


Figure 14-7. Default Screen

With the understanding of the dashboard screen features, user can perform basic functionality and verify the output voltage, current, power and SOC in various modes of operation.

14.2.2 OUTPUT PROGRAM SCREEN

The Output Program screen provides the settings of Output State. Refer to Section 9.4.2.2 for navigating to Output Program Screen Top-Level Menu.



Figure 14-8. Output Program Screen

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen includes the following functions:

ENTRY	DESCRIPTION
Output State	Users can program the output to ON or OFF state. Refer to Figure 14-9.

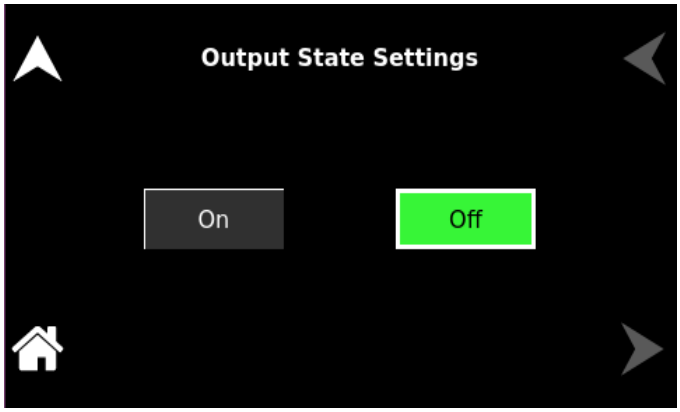


Figure 14-9. Output State Settings

Table 14-5. Output Program screen

14.2.3 MEASUREMENTS SCREEN

The Measurements screen displays the floating-point values for Output 'Voltage', Output 'Current', Output 'Power' and Output 'Capacity', Output 'Energy', Output 'SOC'. For the Measurement screen refer to Figure 14-10 and for instructions on how to navigate to the Measurements screen, refer to Section 9.4.2.2.

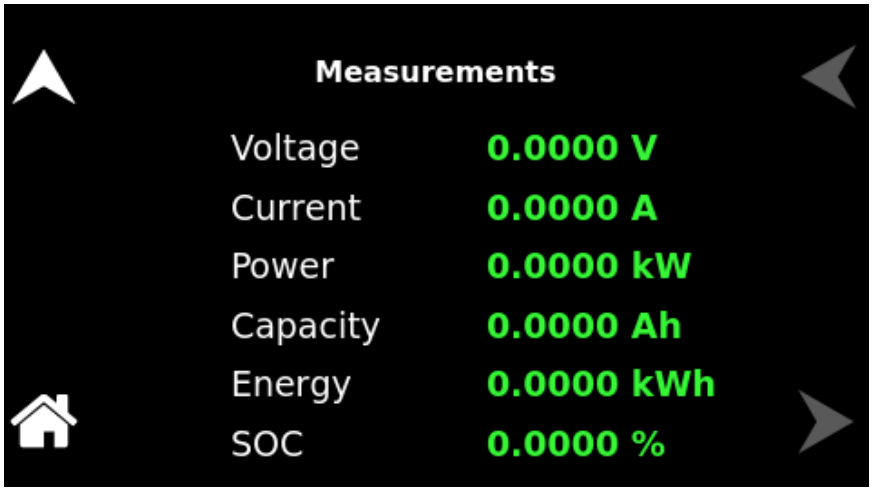


Figure 14-10. Measurement Screen

14.2.4 CONFIGURATION SCREEN

The ‘Configuration screen’ provides ‘BATSIM Profile Type’, ‘BATSIM Cut-Off Conditions’, ‘BATSIM Configuration’, Protection’, ‘Output Sense’, PONS’, ‘Measurement Average Samples’ and ‘Parallel Operation Mode’ (enabled only in parallel operation). For the top-level menu of the Configuration screen, refer to Figure 14-11 and Figure 14-12 and for instructions on how to navigate, refer to Section 9.4.2.2.

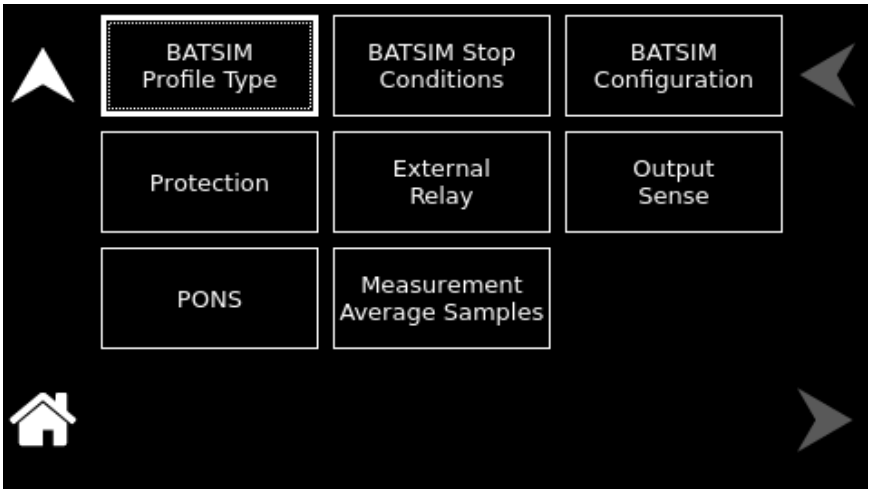


Figure 14-11. Configuration Screen Top-Level Menu

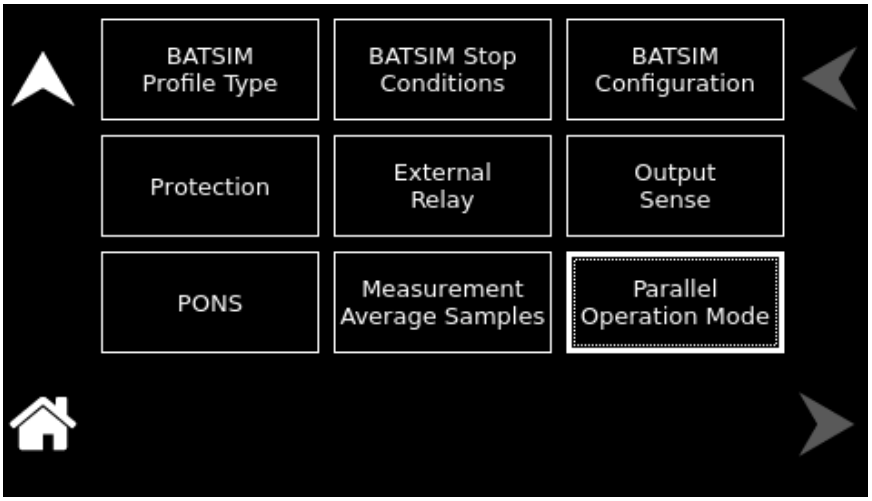


Figure 14-12. Configuration Screen Top-Level Menu – Parallel Operation

14.2.4.1 BATSIM PROFILE TYPE SETTINGS

The ‘BATSIM Profile Type’ setting in the ‘Configuration’ Screen enables users to switch between ‘Battery’ and ‘Table’ profile types. Refer to Figure 14-13.

For the top-level menu of the Configuration screen, refer to Figure 14-11 and for the instructions on how to navigate, refer to Section 9.4.2.2.

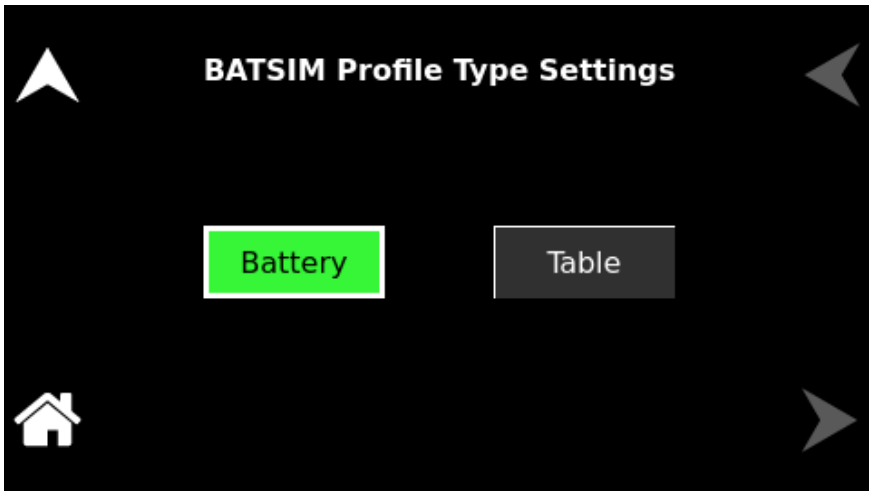


Figure 14-13. BATSIM Profile Type Setting

ENTRY	DESCRIPTION
Battery	Users can create and simulate battery models by configuring the battery parameters.
Table	Users can create and simulate battery models by configuring the SoC (State of Charge) vs OCV (Open Circuit Voltage) vs Inner Resistance points, with a maximum of 100 points.

Table 14-6. BATSIM Profile Type Settings

14.2.4.2 BATSIM CUT-OFF CONDITIONS SETTINGS

The 'BATSIM Cut-Off Conditions Settings' are used to configure various stop conditions for the battery simulation, such as 'SOC High', 'SOC Low', 'Cap High', and 'Cap Low'. Refer to Figure 14-14.

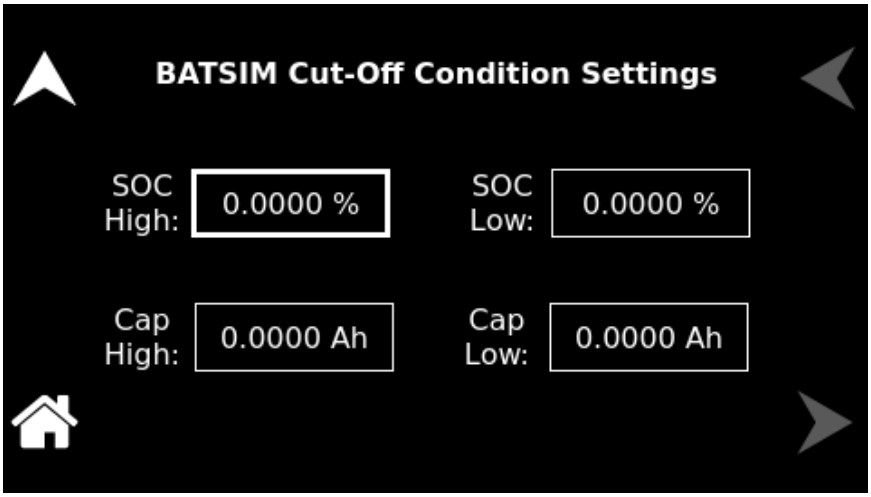


Figure 14-14. BATSIM Cut-Off Condition Settings

ENTRY (1)	DESCRIPTION
SOC High	On measured SOC reaching this high limit, battery simulation will be terminated.
SOC Low	On measured SOC reaching this low limit, battery simulation will be terminated.

ENTRY (1)	DESCRIPTION
Cap High	On measured Capacity reaching this high limit, battery simulation will be terminated.
Cap Low	On measured Capacity reaching this low limit, battery simulation will be terminated.
(1) The battery simulation will be terminated on reaching any configured stop condition.	

Table 14-7. BATSIM Cut-Off Condition Settings

14.2.4.3 BATSIM CONFIGURATION

a) BATTERY

The 'BATSIM Configuration' enables users to simulate various battery characteristics by adjusting key parameters like ‘Full Volt’, ‘Empty Volt’, ‘Parallel’, ‘Capacity’, ‘Inner Res.’, ‘Series’, ‘Charge Current’, ‘Discharge Current’ and ‘Initial SOC’.

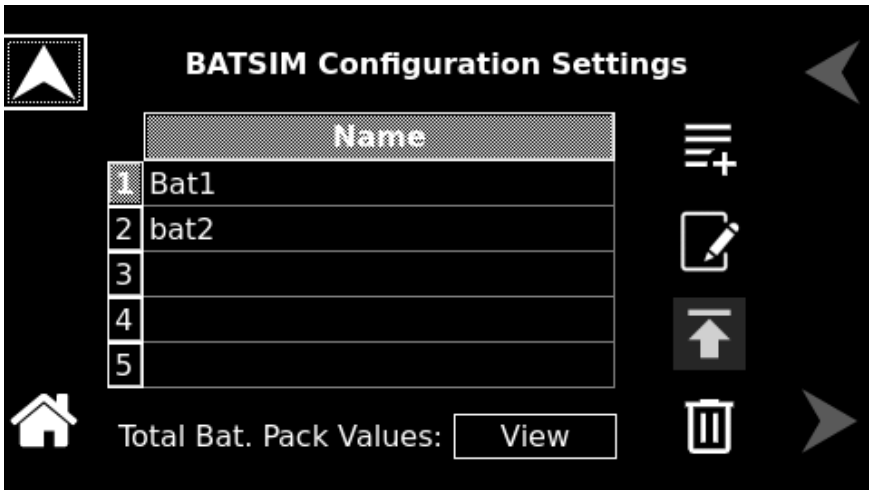


Figure 14-15. BATSIM Configuration Settings - Battery

- **Adding a configuration in ‘BATSIM Configuration Settings’**
    - Open the ‘BATSIM Configuration Settings’ and select the ‘Add Configuration’ option on the right side of the screen. Refer to Figure 14-16.

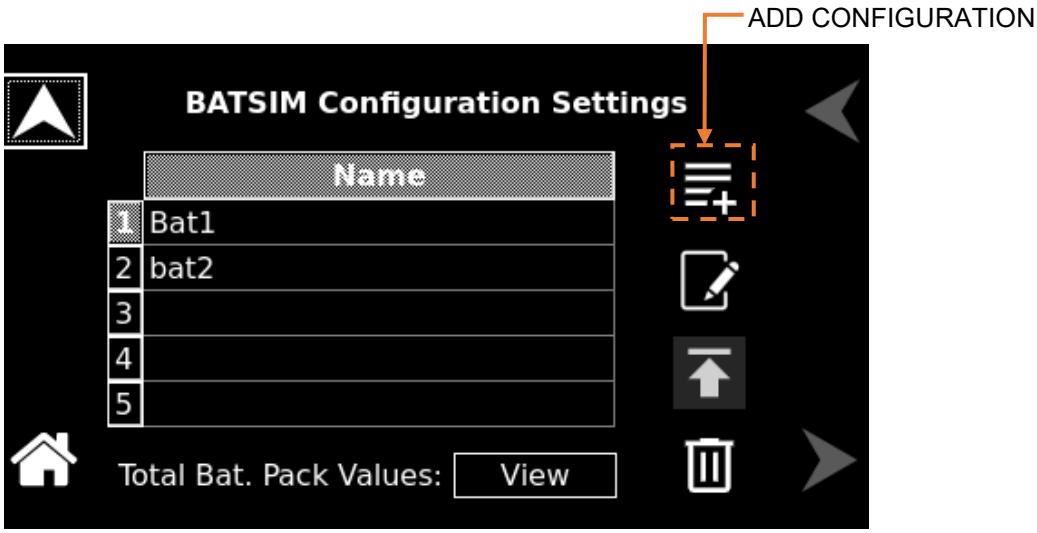


Figure 14-16. Profile Selection

- An alphanumeric keypad will open, allowing the user to enter a configuration name and click 'OK' to confirm the profile name. Refer to Figure 14-17.

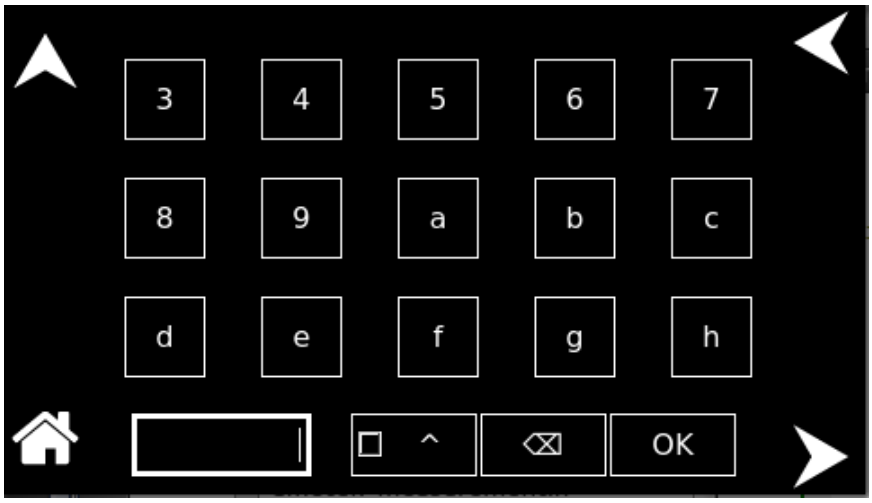


Figure 14-17. Alpha - numeric keypad

- **Edit the profile in 'BATSIM Configuration Settings'**

  - The created configuration will have default values. If the user wants to change the default values, click on the 'Edit' option.

  - The selected configuration name will be displayed at the top of the screen when the 'Edit' option is clicked. Refer to Figure 14-18.

  - The functions available in 'Screen 1' are 'Full Volt', 'Empty Volt', 'Parallel', 'Capacity', 'Inner Res. ' and 'Series '. Refer to Figure 14-18.

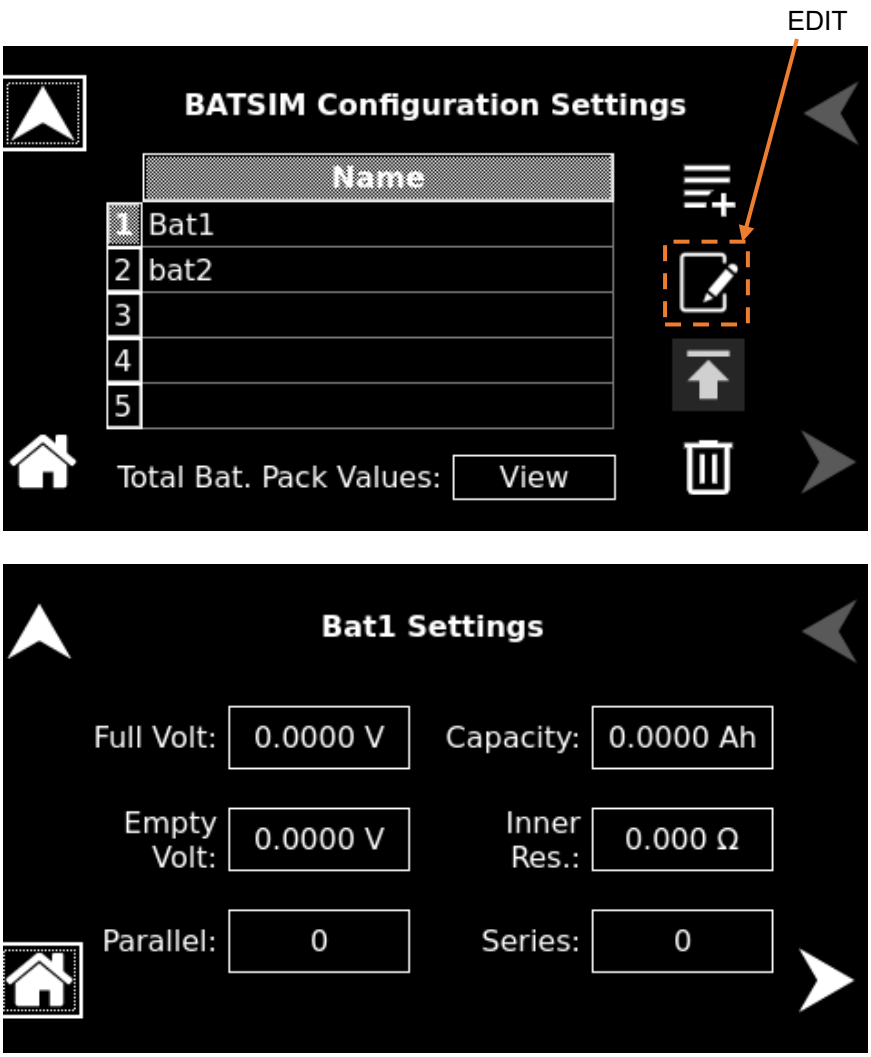


Figure 14-18. Cut- Off Conditions Settings

- Use the navigation arrows to change the screen to ‘Screen 2’ and enter the values of ‘Charge Current’, ‘Discharge Current’ and ‘Initial SOC’. Refer to Figure 14-19.

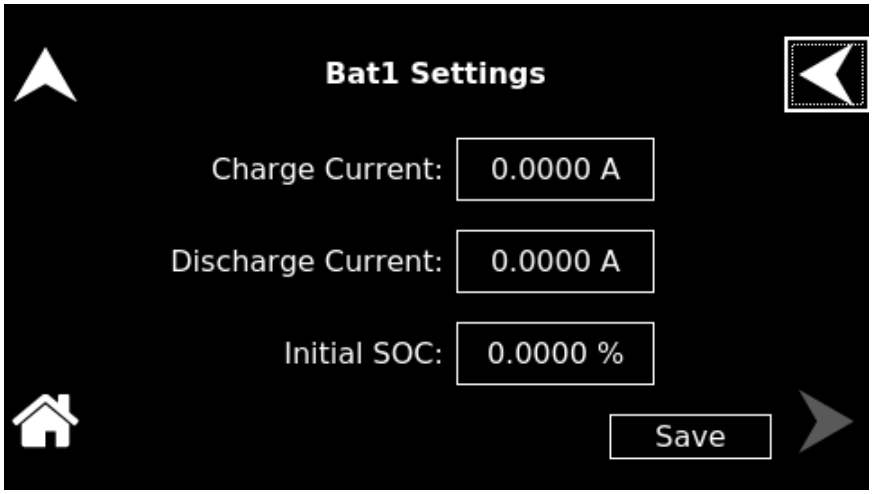


Figure 14-19. Cut- Off Conditions Settings

ENTRY	DESCRIPTION
Full Volt	Battery voltage at 100% SoC
Empty Volt	Battery voltage at 0% SoC
Capacity	Total Capacity of the battery, capacity when SoC is 100%
Inner Res	Battery inner resistance
Series(1)	Number of batteries connected in series
Parallel(2)	Number of batteries connected in parallel
Charge Current	Maximum charge current that the battery pack allows
Discharge Current	Maximum discharge current that the battery pack allows
Initial SoC	Battery SoC when the simulation starts
(1) Connecting battery cells end-to-end, increasing the overall voltage. *(2) Connecting battery cells side-by-side, increasing the overall capacity.*	

Table 14-8. Screen 1 and 2 – Profile Settings

- Once the profile is configured, click on the ‘Save’ option to save the settings.

NOTE: When multiple setting screens are present, the ‘Save’ option will only be available on the last screen. Ensure to click the 'Save' option to save the settings.

- **Load the Profile in ‘BATSIM Configuration Settings’**
  - Load the defined configuration by clicking the ‘Upload’ option. Refer to Figure 14-20.

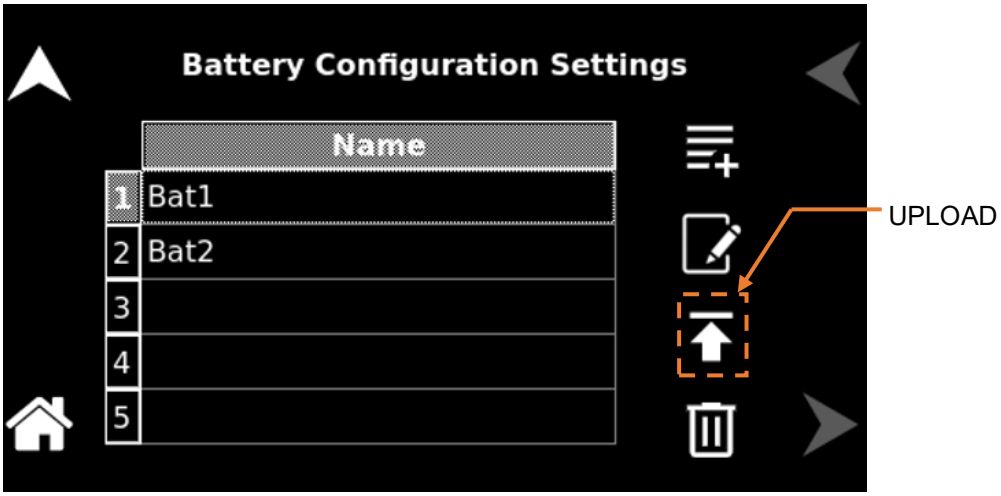


Figure 14-20. BATSIM Configuration Settings - Upload option

- The 'Upload button' will be disabled when the configuration is uploaded to the unit. Refer to Figure 14-22.
- The 'Total Bat. Pack Values' will show the total battery pack values of the loaded configuration. Refer to Figure 14-21.

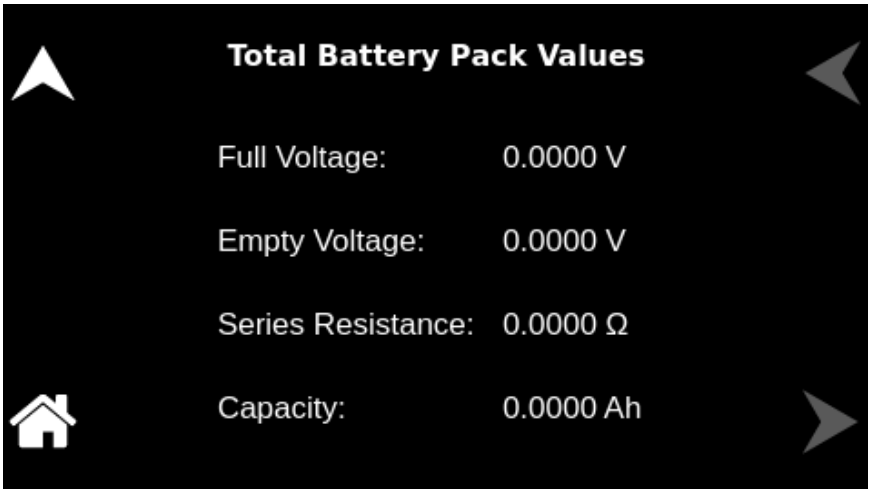


Figure 14-21. Total Battery Pack Values – Battery

- **Delete the Profile in 'BATSIM Configuration Settings'**
  - Click on 'Delete' to remove the selected BATSIM configuration. Refer to Figure 14-22.

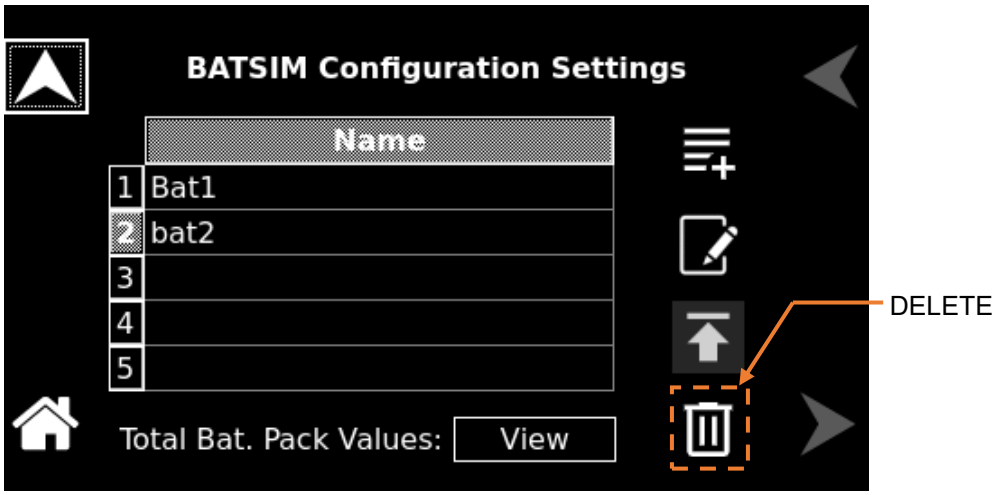


Figure 14-22. BATSIM Configuration Settings - Upload Disabled and Delete option

b) TABLE

When the Profile type is selected as ‘TABLE’ in the ‘BATSIM Configuration’ menu, the upload and delete option only be available. The user can create and edit configurations from the virtual panel.

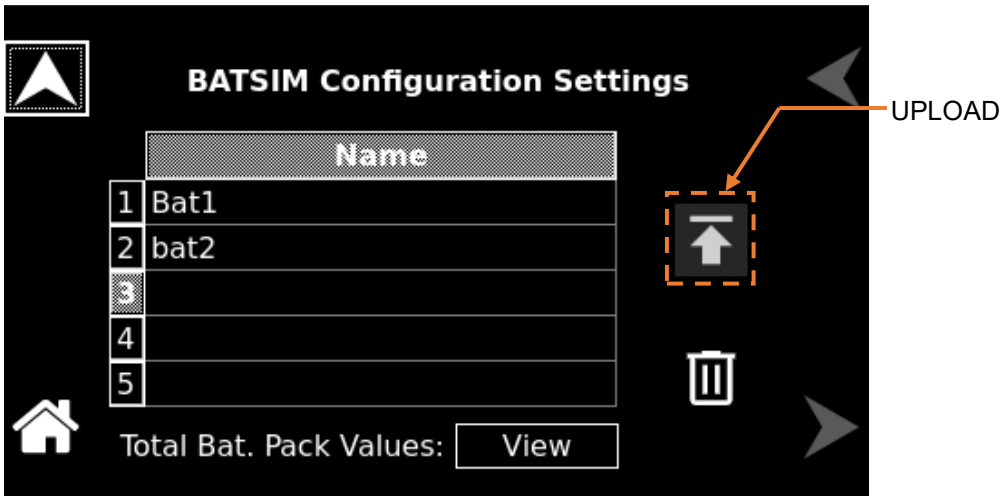


Figure 14-23. BATSIM Configuration Settings - Table

- **Load the profile in ‘BATSIM Configuration Settings’**
  - The user can load a configuration, defined in the virtual panel by selecting the 'Upload' button. Refer to the Figure 14-23.
  - The ‘Total Bat. Pack Values’ will show the total battery pack values of the loaded configuration. Refer to Figure 14-24.

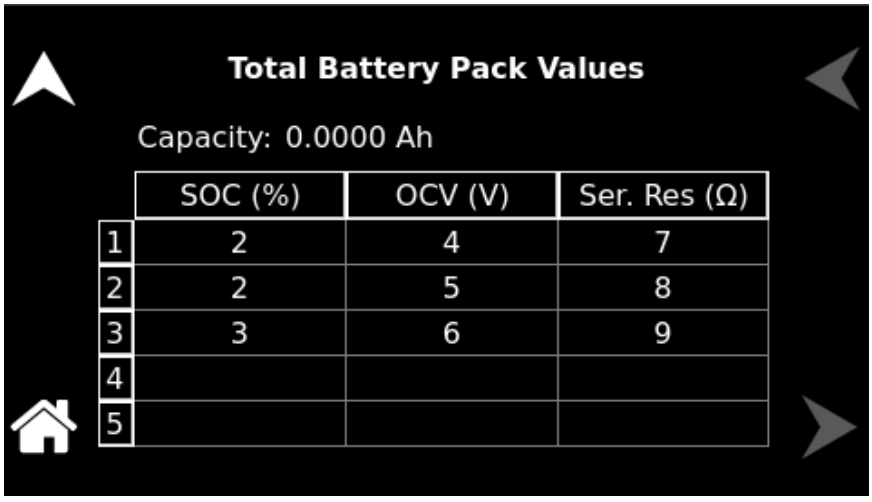


Figure 14-24. Total Battery Pack Values – Table

- **Delete the profile in 'BATSIM Configuration Settings'**
    - Click on 'Delete' to remove the selected BATSIM configuration. Refer to Figure 14-23.

14.2.4.4 PROTECTION

In protection settings, users can define Output Overvoltage Protection (OVP) and Positive Overcurrent Protection (Pos. OCP) and Negative Overcurrent Protection (Neg. OCP) to help safeguard their devices from electrical anomalies. Refer to Figure 14-25.

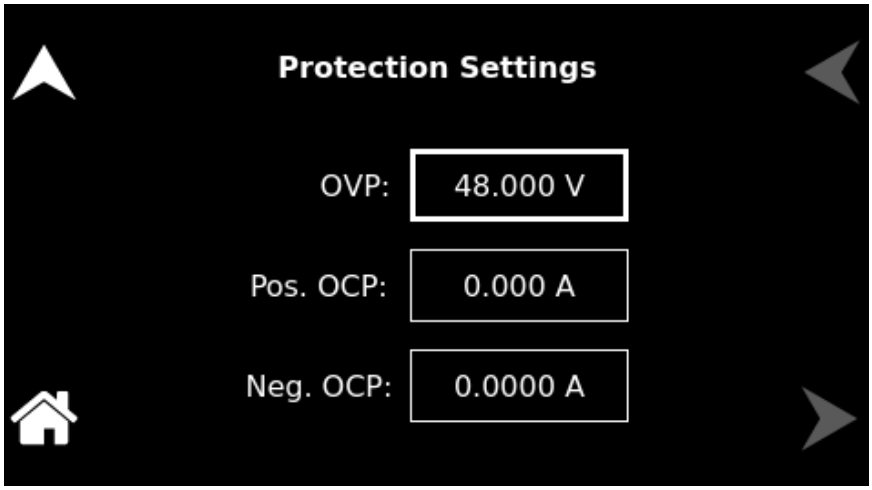


Figure 14-25. Protection Settings

14.2.4.5 EXTERNAL RELAY

The External relay Settings allows the user to set the isolation relay to either 'Enable' or 'Disable'. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 14-26.

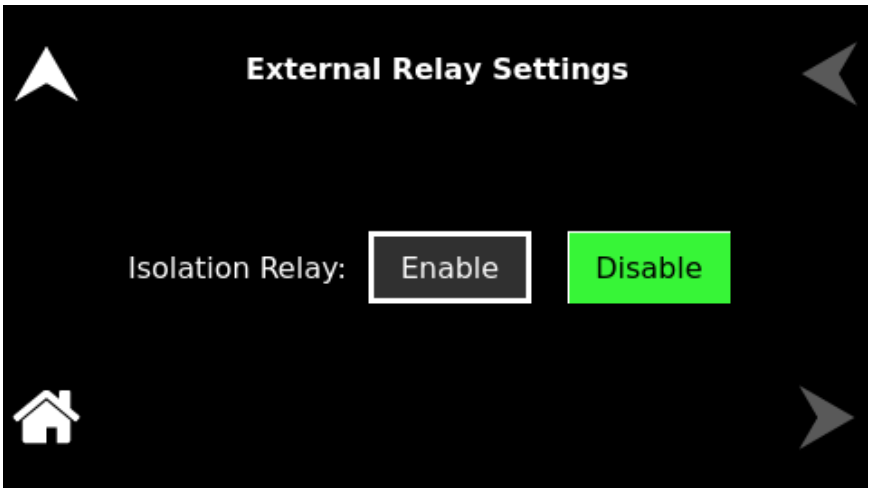


Figure 14-26. Isolation relay

14.2.4.6 OUTPUT SENSE

The Output Sense menu allows user to set the output voltage sense of the unit to either local or remote. When Remote is selected as output sense, voltage sense cables must be connected to rear panel of power the supply at RVS connector. Refer to Figure 14-27.

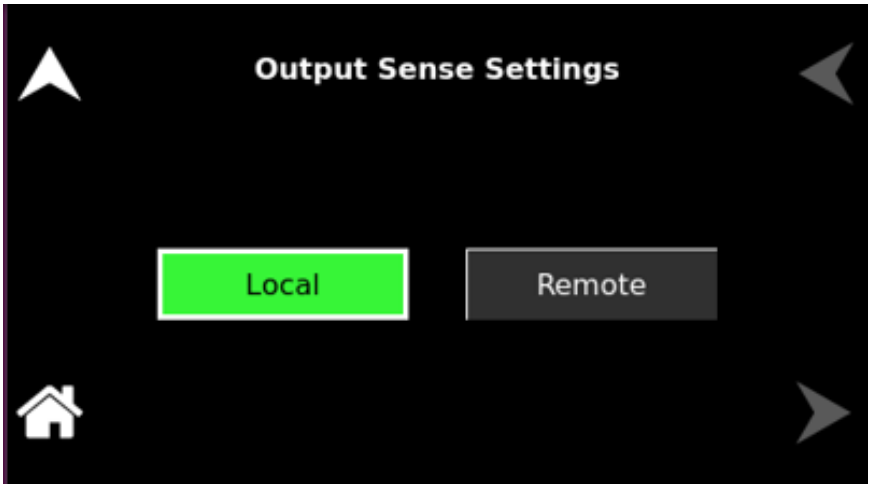


Figure 14-27. Output Sense Settings

14.2.4.7 PONS

The PONS Menu enables users to configure the Power-ON values and set up the power supply based on the chosen mode settings. Refer to Figure 14-28.

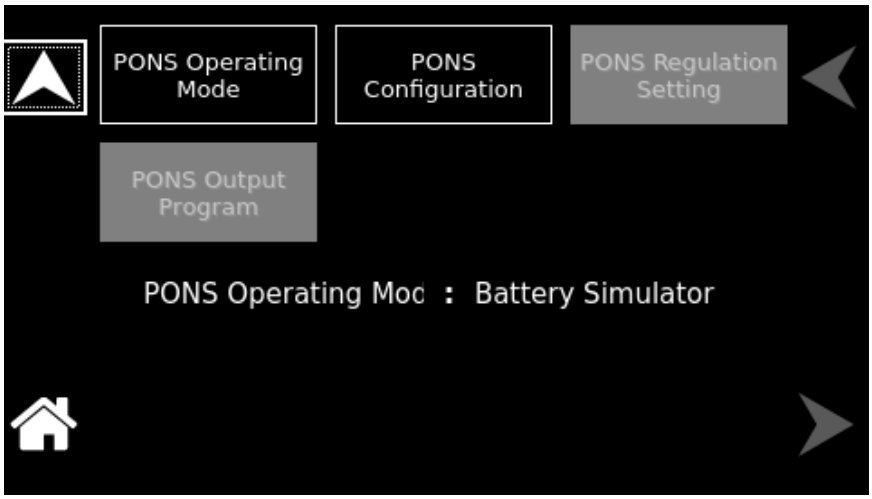


Figure 14-28. PONS – Main Screen

14.2.4.7.1 PONS OPERATING MODE

The 'PONS Operating Mode Settings' will not change automatically when the user changes the mode in the ' Operating Mode' settings on the Home screen. Users must separately select the 'BATTEST' mode in the 'PONS Operating Mode Settings', which will update the 'PONS Operating Mode Settings' screen and the 'PONS Configuration' screen. Refer to Figure 14-29 and Figure 14-30.

The same applies to other modes such as Bi-DIR, SOUR, ELOAD, PVSIM and BATTEST. Refer to the Sections 10.2.5.7.1, 11.2.5.7.1, 12.2.5.7.1, 13.2.4.2.1.5 and 15.2.4.7.1

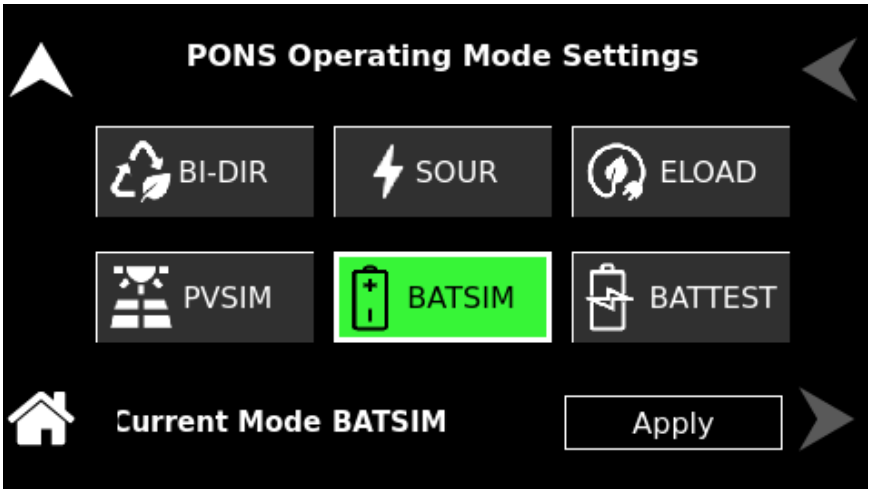


Figure 14-29. PONS Operating Mode Settings

14.2.4.7.2 PONS CONFIGURATION

In the PONS Configuration settings, the menu enables users to select 'PONS Protection', 'PONS External Relay', 'PONS Output Sense, 'PONS Measurement Average Samples', 'PONS Remote Inhibit', 'PONS Remote Output', 'PONS AC Input Line', 'PONS Multi Chassis Operation', and

'PONS Parallel Operation Mode (enabled only in parallel operation) '. Refer to Figure 14-30 and Figure 14-31.

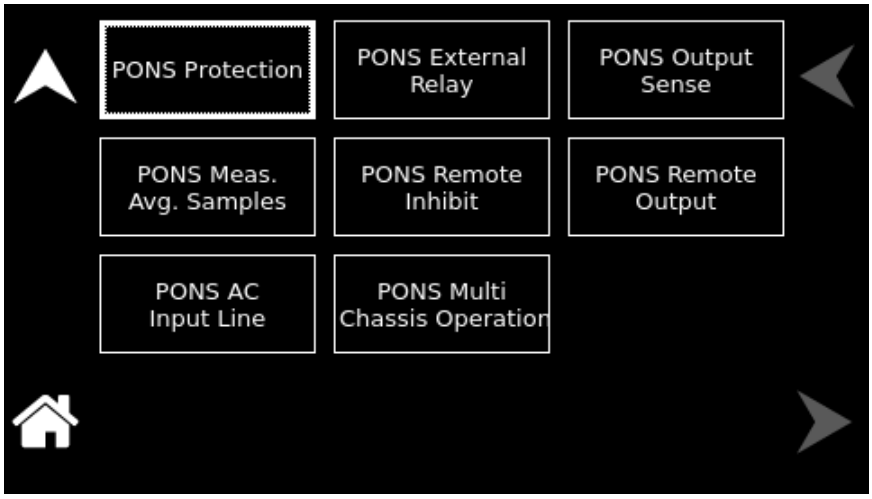


Figure 14-30. PONS Configuration mode

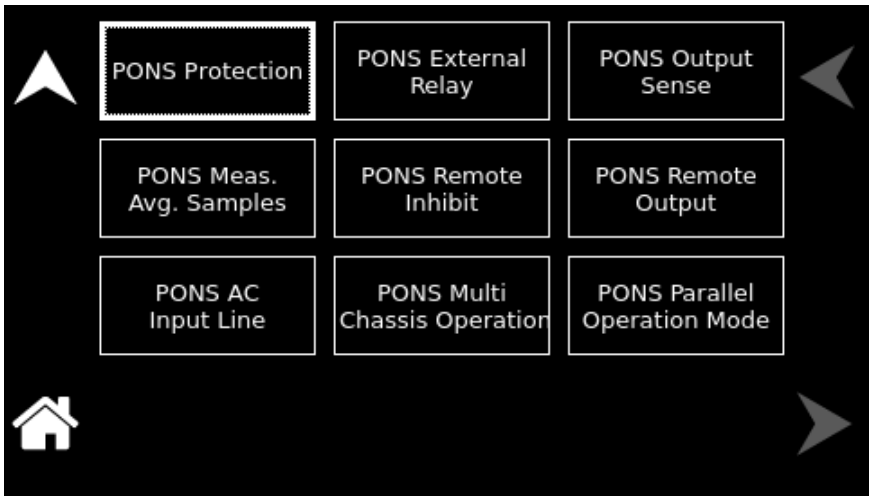


Figure 14-31. PONS Configuration mode – Parallel Operation

The PONS Configuration Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Protection	Users can define OVP, Pos. OCP and Neg. OCP to help safeguard their devices from electrical anomalies. Refer to Figure 14-32.

ENTRY	DESCRIPTION

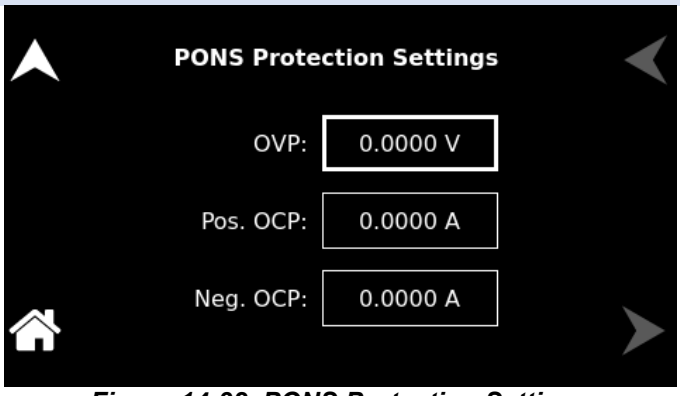


Figure 14-32. PONS Protection Settings

PONS External Relay

Users can set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 14-33.

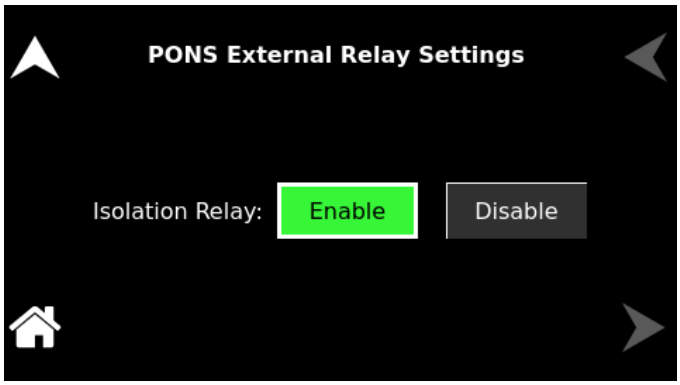


Figure 14-33. PONS External Relay Settings

PONS Output Sense

User can program the PONS output to ‘Local’ or ‘Remote’. Refer to Figure 14-34.

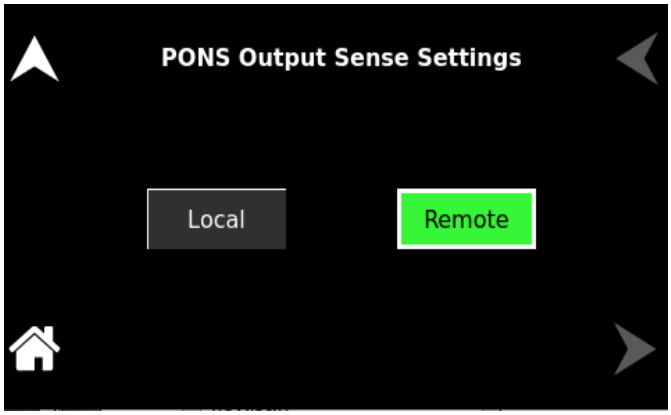


Figure 14-34. PONS Output Sense Settings

ENTRY	DESCRIPTION
PONS Measurement Average Samples	Users can specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 14-35.

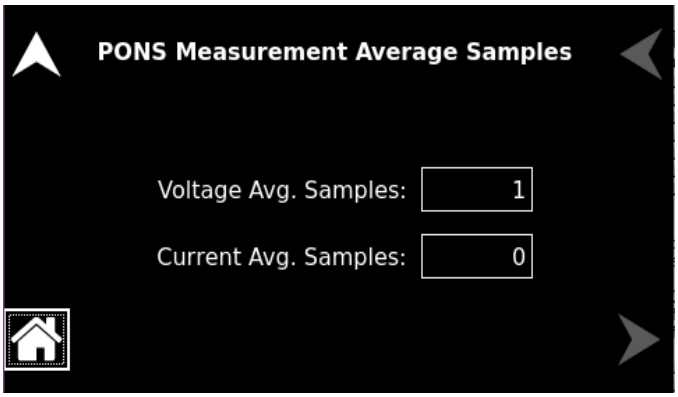


Figure 14-35. PONS Measurement Average Samples

PONS Remote Inhibit

User can control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 14-36.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

Remote inhibit can be configured in three modes;

- **Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output.
- **Live:** after reclosing the contact, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

b) Remote Inhibit Input – Active Source

An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply.

Remote inhibit can be configured in three modes;

- **Latch:** after removing the active voltage source, user needs to clear the fault and turn ON the output.
- **Live:** after removing the active voltage source, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

ENTRY	DESCRIPTION

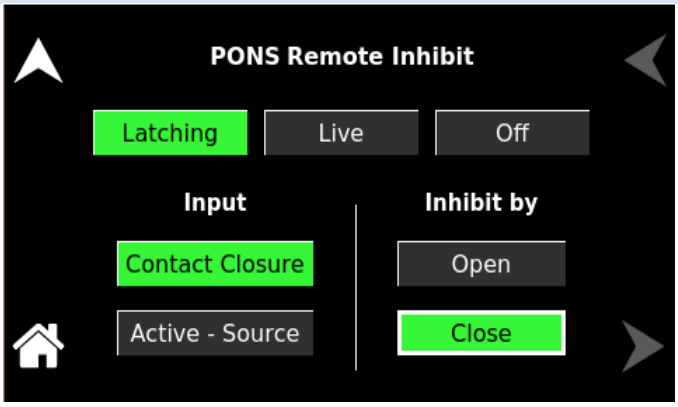


Figure 14-36. PONS remote Inhibit

PONS Remote Output

User can program the PONS Remote output to ON or OFF state. Refer to Figure 14-37.

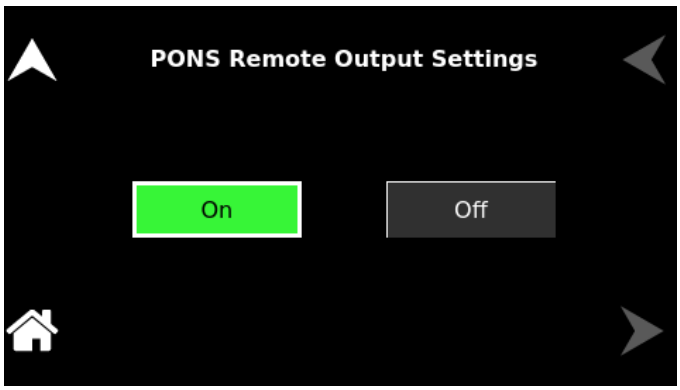


Figure 14-37. PONS Remote Output settings

PONS AC Input Line

User can select either the High Line or Low Line option based on the required input voltage range. Refer to Figure 14-38.

a) High Line: The nominal High Line Input range is 380 to 480 VAC.

b) Low Line: The nominal Low line input range is 200 to 240 VAC.

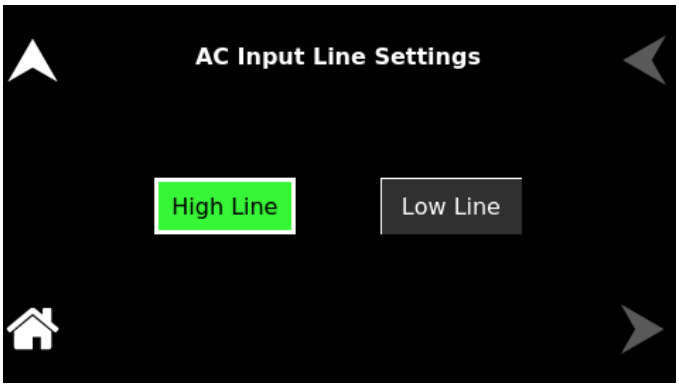


Figure 14-38. AC Input Line Settings

ENTRY	DESCRIPTION
PONS Multi Chassis Operation	Users can select the operation setting to Parallel. Refer to Figure 14-40. **a) Parallel:** Configure to perform parallel operation mode. Refer to Chapter 5. **NOTE:** If the unit is operating in standalone mode and the user selects the Parallel option, the selection remains enabled on the display; the setting does not affect unit operation. **NOTE:** Series and Series Split Phase operations are not applicable for BATSIM mode. If the user select series or series split phase, option remains enabled in the display; the setting does not affect unit operation.

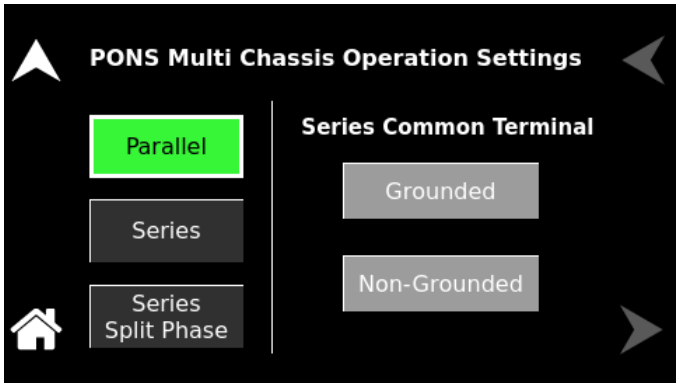


Figure 14-39. PONS Parallel Multi Chassis Operation Settings

PONS Parallel Operation Mode	User can select the parallel operation mode settings to Max Power or Max Current. Refer to Figure 14-40. **NOTE:** Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel. **a) Max Power:** Configure to deliver maximum power by limiting the overall current. **b) Max Current:** Configure to deliver maximum current by limiting the overall power.

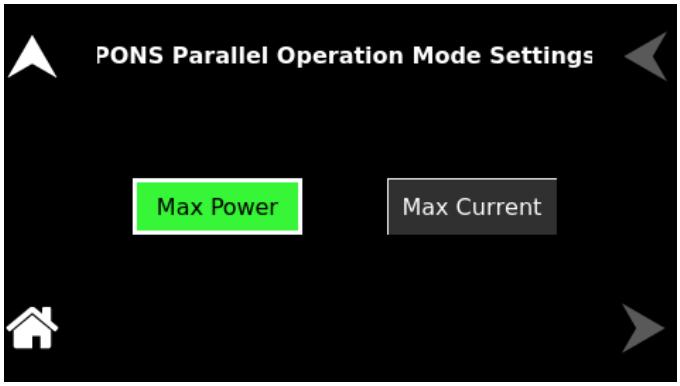


Figure 14-40. PONS Parallel Operation Mode Settings

Table 14-9. PONS Configuration mode

14.2.4.8 MEASUREMENT AVERAGE SAMPLES

The Measurement Average Samples Settings Menu allows the user to specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 14-41.

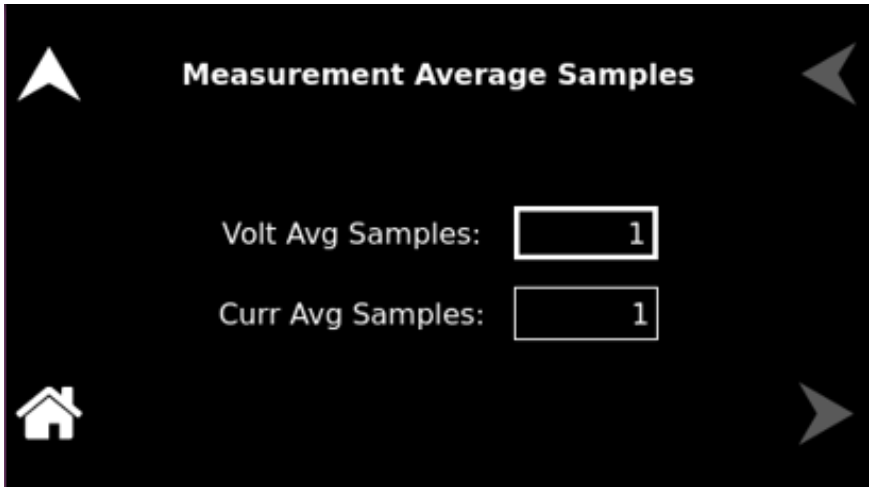


Figure 14-41. Measurement Average Samples

The Measurement Average Samples Settings menu has the following fields:

ENTRY	DESCRIPTION
Volt Avg Samples	Sets the number of voltage readings to average together to reduce noise in the voltage readback. Allows to set a value between 1 to 8.
Curr Avg Samples	Sets the number of current readings to average together to reduce noise in the current readback. Allows to set a value between 1 to 8. The value of 1 (factory default) provides the fastest response time in the readings, but less rejection of noise.

Table 14-10. Measurement Average Samples

14.2.4.9 PARALLEL OPERATION MODE

The Parallel Operation Mode setting is enabled only when the Mi-BEAM power supply is in parallel operation. This menu allows the user to achieve either maximum power or maximum current during parallel operation. When ‘Max Current’ is selected, the system delivers maximum current by limiting the overall power, whereas when ‘Max Power’ is selected, the system delivers maximum power by limiting the overall current. Refer to Figure 14-42.

NOTE: Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel.

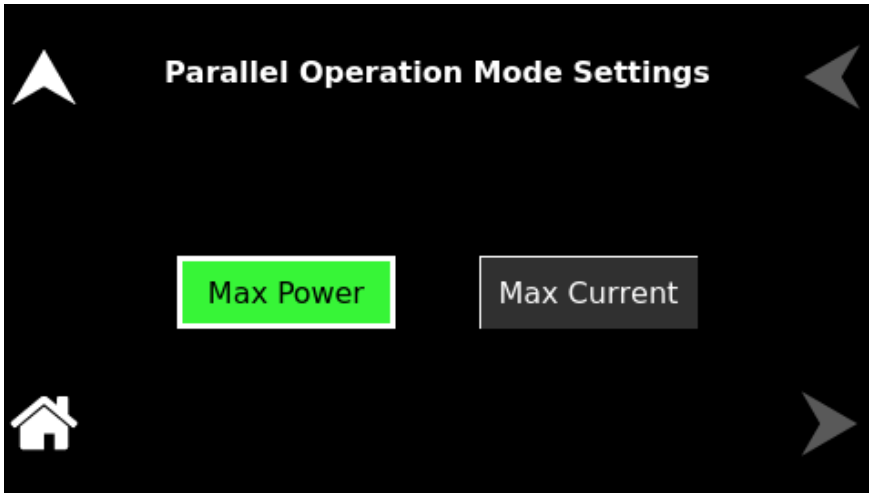


Figure 14-42. Parallel Operation Mode Settings

14.2.5 CONTROL INTERFACE SCREEN

The Control Interface screen provides 'LAN', 'RS232', 'USB', 'External CAN (Default)', 'GPIB'(available only when Mi-BEAM power supply is equipped with a GPIB interface) ', Remote inhibit. For the top-level menu of the Control Interface Screen, refer to Figure 14-43 and for instructions on how to navigate, refer to Section 9.4.2.2.

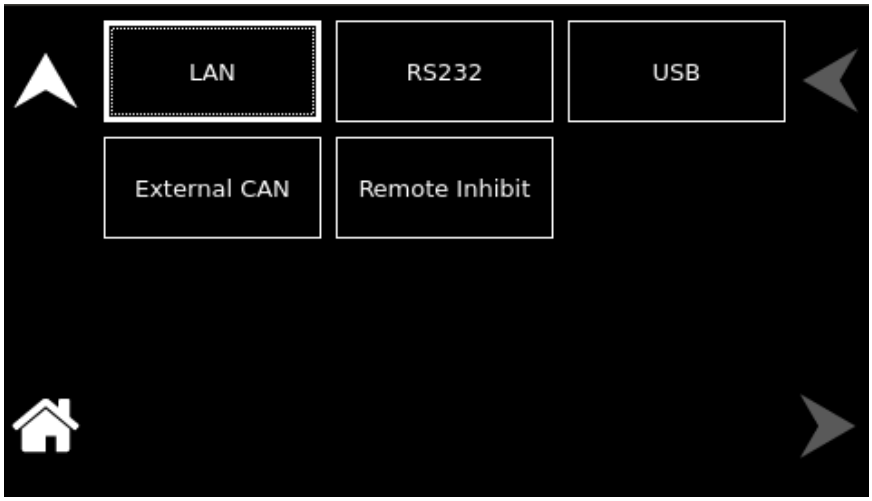


Figure 14-43. Control Interface Screen Top-Level Menu

When the Mi-BEAM power supply is equipped with a GPIB interface, the control interface screen menu changes. Refer to Figure 14-44.



Figure 14-44. Control Interface Screen Top-Level Menu – GPIB Option

The Control interface Settings menu has the following fields:

ENTRY	DESCRIPTION
LAN	Configures the LAN (LXI Ethernet) communications interface, refer to Figure 14-45. After settings are changed, the unit must be turned OFF/ON for them to take effect.

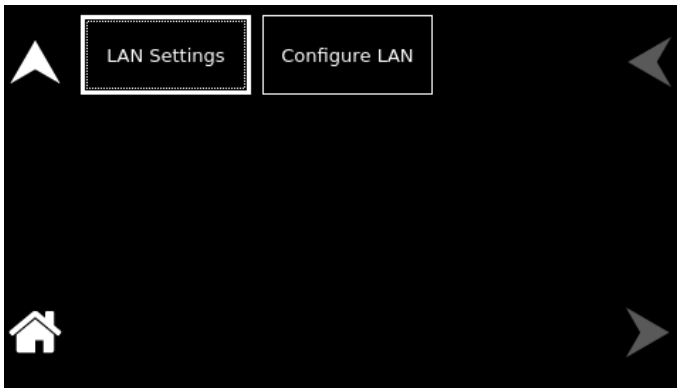


Figure 14-45. LAN Screen

a) LAN SETTINGS

Lists the configuration settings of the LAN interface, and the DNS-SD service name; a number, (n), would be appended to the service name, if necessary, to differentiate duplicate power supply names. Refer to Figure 14-46.

ENTRY	DESCRIPTION

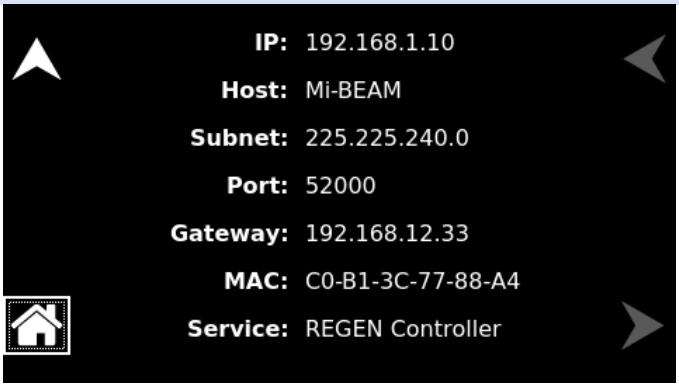


Figure 14-46. LAN Settings

b) LAN CONFIGURE

Sets parameter values and controls operation of the LAN interface. Refer to Figure 14-47.

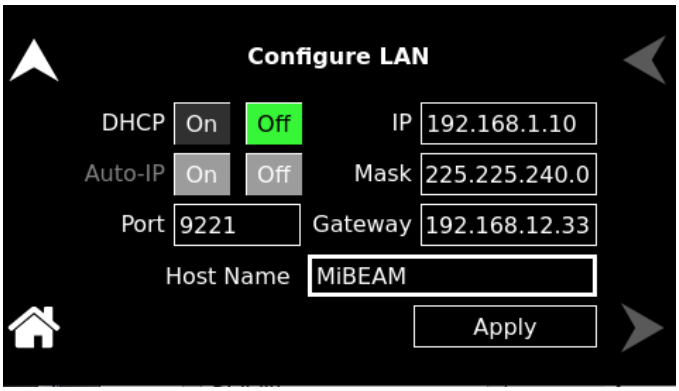


Figure 14-47. Configure LAN

- **DHCP**: Selects whether DHCP is enabled or disabled. Refer to Figure 14-48.

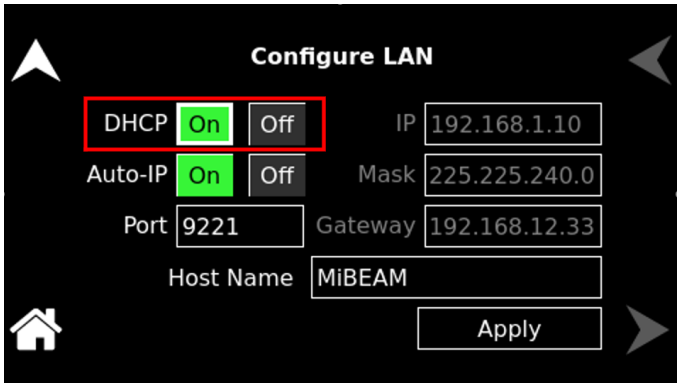


Figure 14-48. LAN Screen – DHCP

NOTE: When DHCP is selected, the IP address is assigned by the network DHCP server. If DHCP server fails to assign an IP address and Auto-IP is enabled, the unit gets an IP address in the range of 169.254.X.X.

ENTRY	DESCRIPTION

- **Auto-IP**: Enable or disable the Auto-IP configuration, when DHCP is ON. Refer to Figure 14-49.

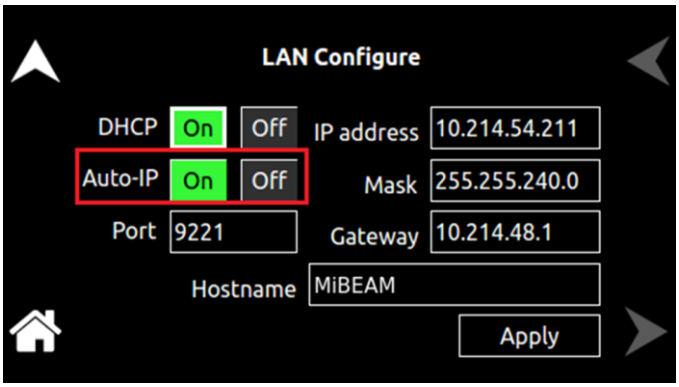


Figure 14-49. LAN Screen - Auto -IP

- **IP Address**: Sets the static IP address for the unit. When DHCP is turned off in the LAN CONFIG sub-menu, AUTO IP is selected, set the IP address to all zeros so that the IP address would be requested from the network; when DHCP is selected, the IP address is assigned by the network DHCP server. Refer to Figure 14-50.

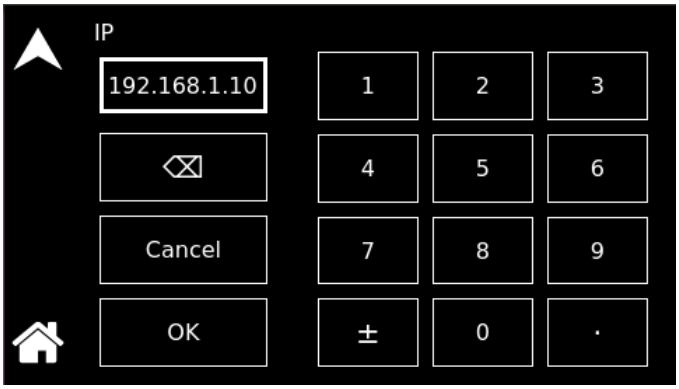


Figure 14-50. LAN Screen - IP Address

- **Subnet Mask**: Sets the subnet mask for use in static IP configuration. Refer to Figure 14-51.

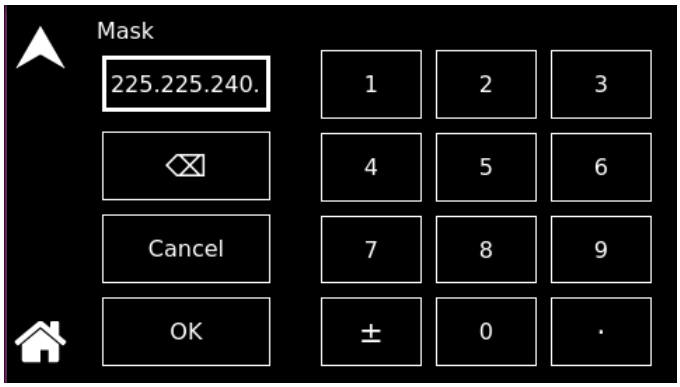


Figure 14-51. LAN Screen - Subnet Mask

- **Gateway Address**: Sets the gateway address when DHCP is turned off in the LAN CONFIG sub-menu and when AUTO IP is selected, set the gateway address to all zeros so that the gateway address would be requested from the network; when DHCP is selected, the gateway address is assigned by the network DHCP server. Refer to Figure 14-52.

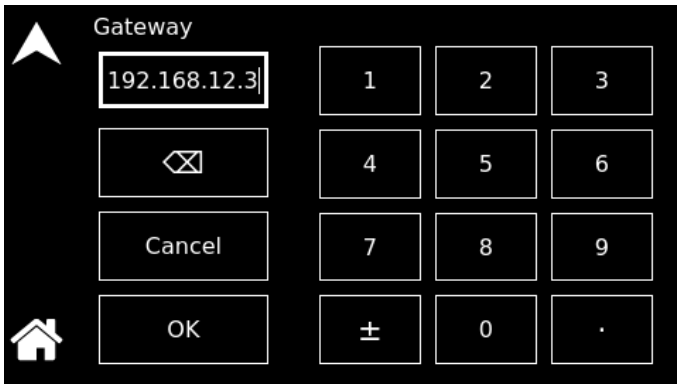


Figure 14-52. LAN Screen - Gateway Address

NOTE: When DHCP is selected, the gateway address is assigned by the network DHCP server.

- **Port**: sets the port number; the factory-default value is 9221. Refer to Figure 14-53.

ENTRY	DESCRIPTION



Figure 14-53. LAN Screen -Port

- **MAC Address:** Displays the MAC address; the MAC address is listed on a label on the chassis of the unit. Refer to Figure 14-54.



Figure 14-54. MAC Address

- **Host Name**: Allows setting a unique alpha-numeric host name. Refer to Figure 14-55.

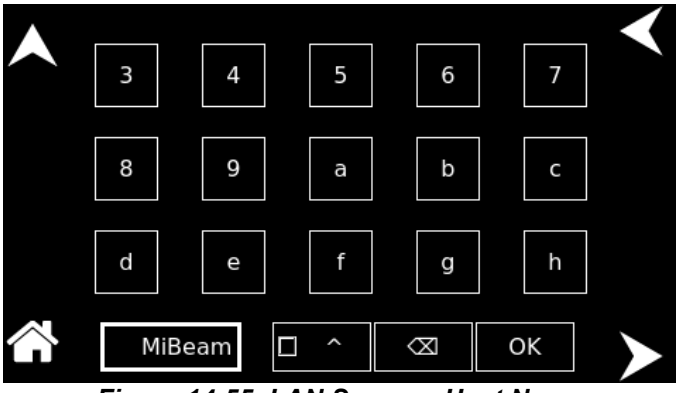


Figure 14-55. LAN Screen - Host Name

- **Apply**: Applies the LAN settings to the supply. Refer to Figure 14-56 and Figure 14-57.

ENTRY	DESCRIPTION

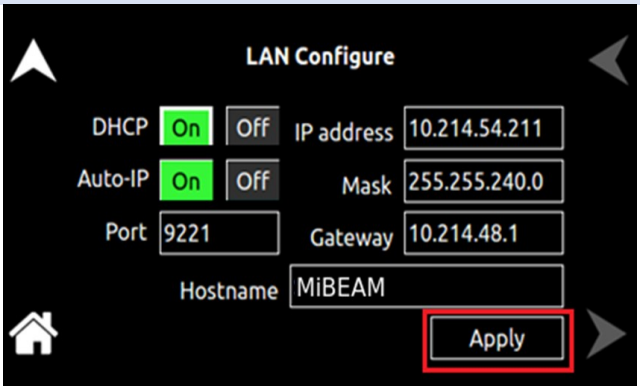


Figure 14-56. LAN Screen – Apply

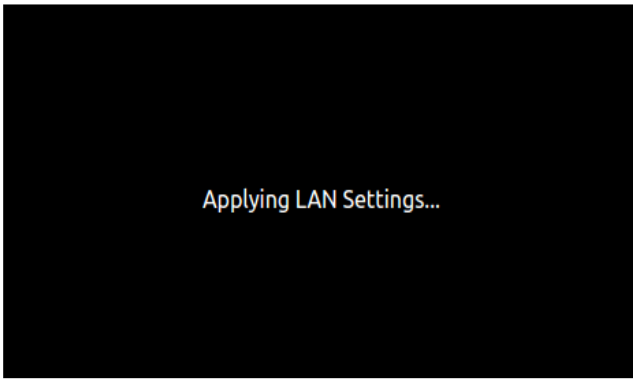


Figure 14-57. LAN Screen - Applying LAN Settings

RS232

Configures the RS-232C communications interface.RS232 has two sub-menus: RS232 Settings and RS232 Configure

a) RS232 Settings: Lists the configured Baud Rate, Stop Bits, Bits and Parity for the RS232 digital interface, refer to Figure 14-58.

- **Baud Rate**: sets baud rate to either 9600, 19200, 38400, 57600 or 115200 baud. The default setting is 115200 baud.
- **Stop Bits:** sets the number of stop bits to either 1 or 2 bits. The default setting is 1 stop bit.
- **Data:** sets the number of data bits to either 7 or 8. The default setting is 8 bits.
- **Parity:** sets the parity to either Even, Odd, or no parity, None. The default setting is no parity, None.

ENTRY	DESCRIPTION



Figure 14-58. RS232 Screen -Settings

b) Configure RS232: Configures the RS-232 Baud Rate, refer to Figure 14-59 and Figure 14-60. This setting must match those set for the communications port of the user external controller.

- **Baud Rate:** Sets baud rate to either 9600, 19200, 38400, 57600 or 115200 baud. The default setting is 115200 baud.

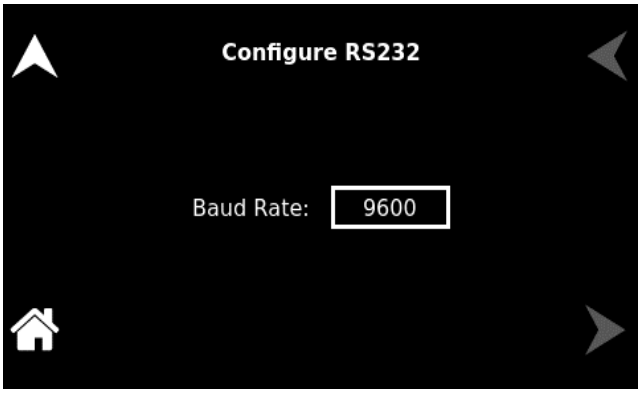


Figure 14-59. RS232 Screen -Configure

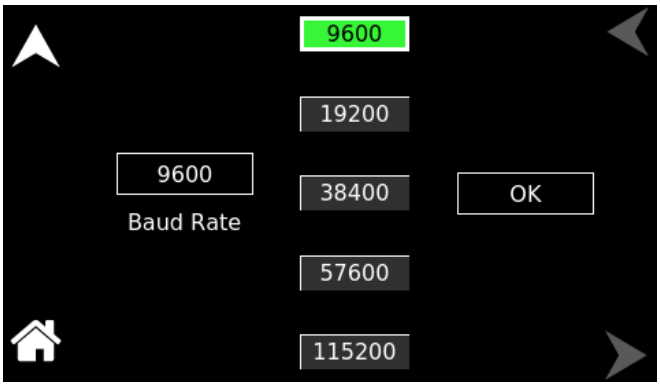


Figure 14-60. Baud Rate Selection

USB Displays the configured Baud Rate. Refer to Figure 14-61.

ENTRY	DESCRIPTION

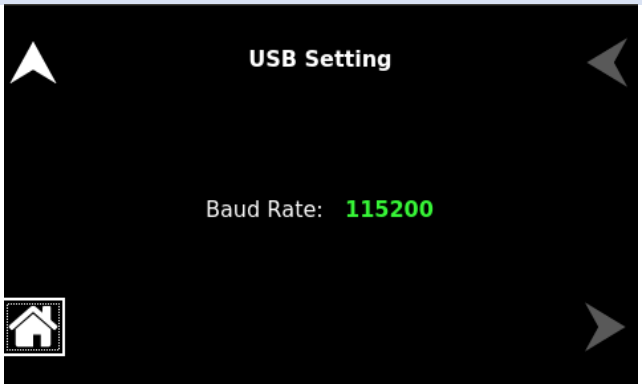


Figure 14-61. USB Setting

External CAN

Configures the device Node Address, Baude Rate and Communication Protocol. Refer to Figure 14-62.

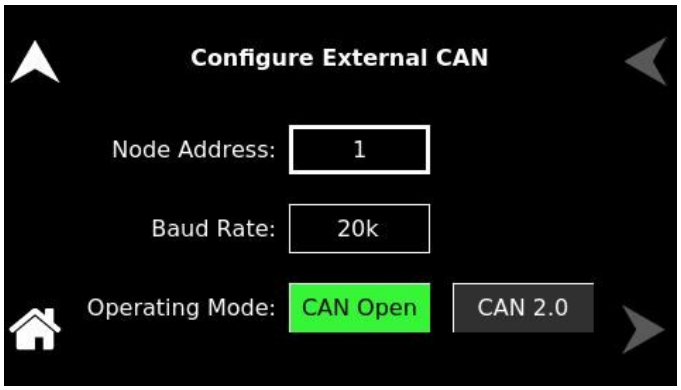


Figure 14-62. Configure External CAN

a) **Node Address:** Sets the CAN Node Address to the range of 1 to 127. Refer to Figure 14-63.



Figure 14-63. Node Address

b) **Baud Rate:** Sets baud rate from 20kbps to 1mbps (20k, 40k, 50k, 80k, 100k, 125k, 150k, 200k, 250k, 400k, 500k, 1000 kbps). Refer to Figure 14-64.

ENTRY	DESCRIPTION



Figure 14-64. Baud Rate

c) **Operating Mode:** Sets the communication protocol to CAN2.0 or CANopen. Refer to Figure 14-62.

- **CANopen**
  - Covers basic CANopen configuration, including NMT (Network Management) setup, TPDO (Transmit Process Data Object) mapping, and SDO (Service Data Object) structures.
  - Enables standardized communication and seamless integration into existing industrial CANopen networks.
- **CAN 2.0**
  - Describes the Hardware configuration and use of extended 29-bit identifiers.

Supports custom command or response mappings, allowing flexible and proprietary protocol integration.

GPIB Displays and Configures the GPIB Setting. Refer to Figure 14-65.

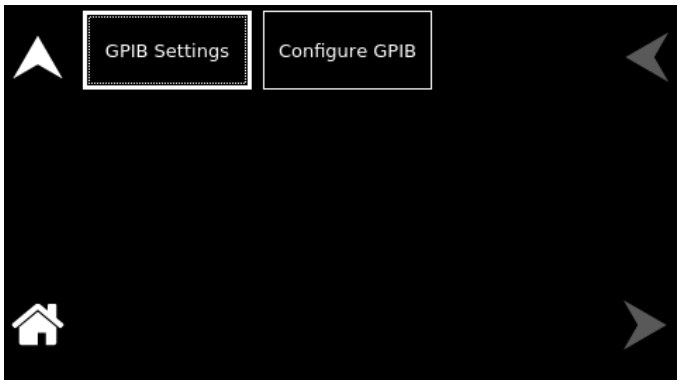


Figure 14-65. GPIB Setting

ENTRY	DESCRIPTION

a) GPIB Settings

Displays the configured address and Power ON SRQ.

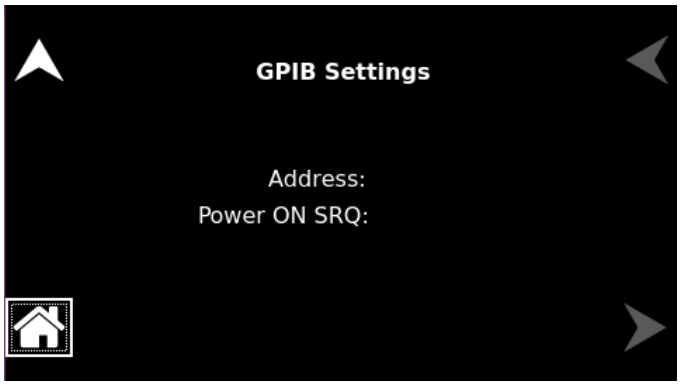


Figure 14-66. GPIB Settings

b) Configure GPIB

Configure the IEEE-488 address; the default is 1. The address can be set from 0 through 30.

Also allows to turn On/Off the Power ON Service Request. Power On SRQ set to On causes a GPIB service request to be sent to the computer, when the Power Supply is turned on. Factory Default value for Power On SRQ is Off.

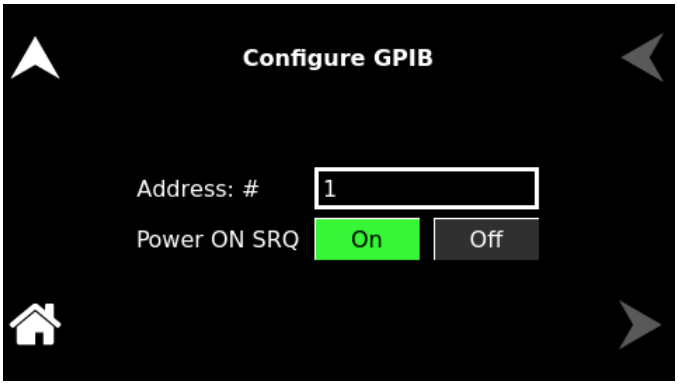


Figure 14-67. Configure GPIB

Remote Inhibit

Sets the control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 14-68.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

ENTRY	DESCRIPTION
	Remote inhibit can be configured in three modes; • **Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output. • **Live:** after reclosing the contact, user needs to turn ON the output. • **OFF:** inhibit function would be disabled. **b) Remote Inhibit Input – Active Source** An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply. Remote inhibit can be configured in three modes; • **Latch:** after removing the active voltage source, user needs to clear the fault and turn ON the output. • **Live:** after removing the active voltage source, user needs to turn ON the output. • **OFF:** inhibit function would be disabled.

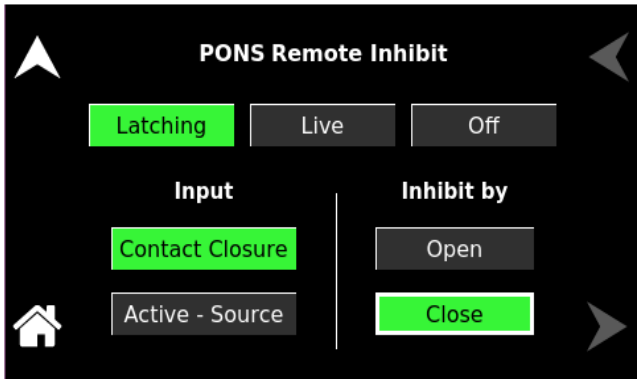


Figure 14-68. PONS remote Inhibit

Table 14-11. System Setting Screen

14.2.6 OPERATING MODE

The Operating Mode Settings screen offers comprehensive guidance on the system modes of the Mi-BEAM Series power supply. This model is engineered for versatile and reliable performance across various applications, ensuring precise and efficient power delivery through its advanced control features. Depending on user requirements, the Mi-BEAM Series supports multiple modes of operation. Refer to the Figure 14-69.

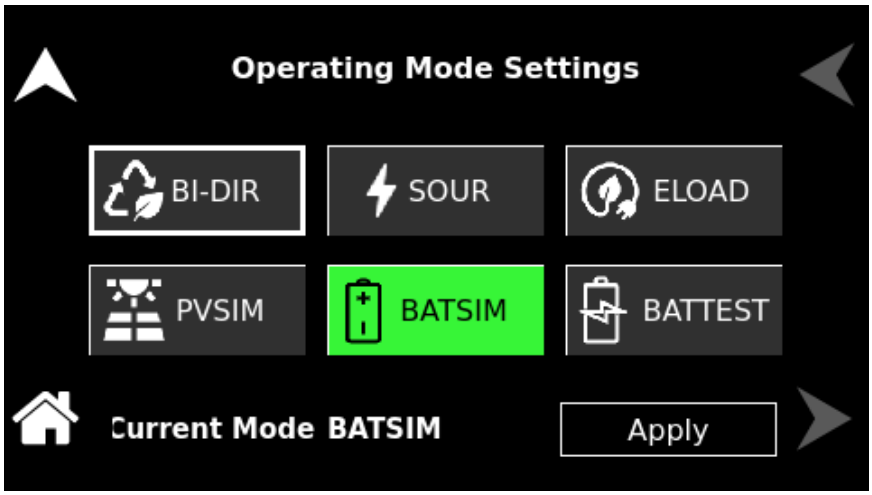


Figure 14-69. Operating Mode

14.2.7 SYSTEM SETTINGS SCREEN

The System Settings screen provides the settings of 'Hardware Limits', 'System Details' 'Firmware Version', 'LCD', 'Default Screen' and 'Factory Default'. For the top-level menu of the System Settings Screen, refer to Figure 14-70 and for instructions on how to navigate, refer to Section 9.4.2.2.

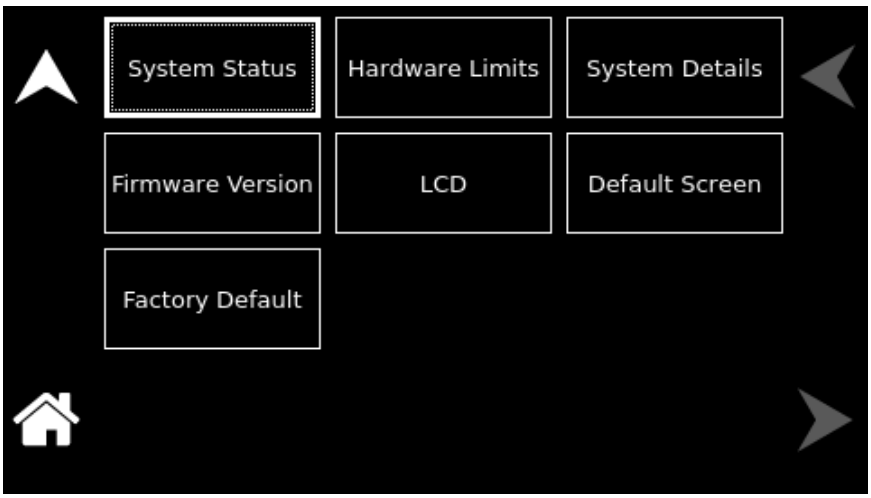


Figure 14-70. System Settings Screen

The System Settings menu has the following fields:

ENTRY	DESCRIPTION
System Status	Displays the present system status information of the power supply, including the Input Line, Output Sense, Isolation, Chassis Type and No. of chassis. Refer to Figure 14-71 and Figure 14-72. **NOTE:** The chassis type changes depending on the connection configuration; it is identified as Standalone (the power supply operates independently), and Multi-

ENTRY	DESCRIPTION

chassis Parallel (the power supply is connected in parallel).

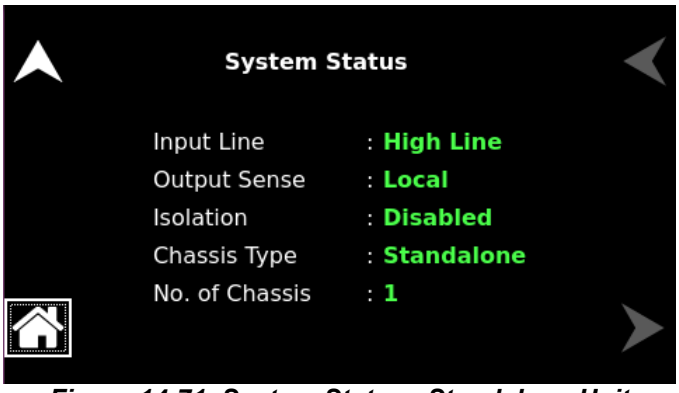


Figure 14-71. System Status– Standalone Unit

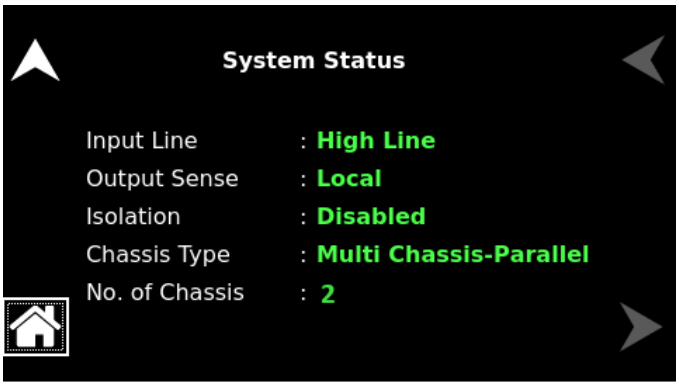


Figure 14-72. System Status – Parallel Operation

Hardware Limits Displays the hardware parameter limit values. Refer to Figure 14-73.

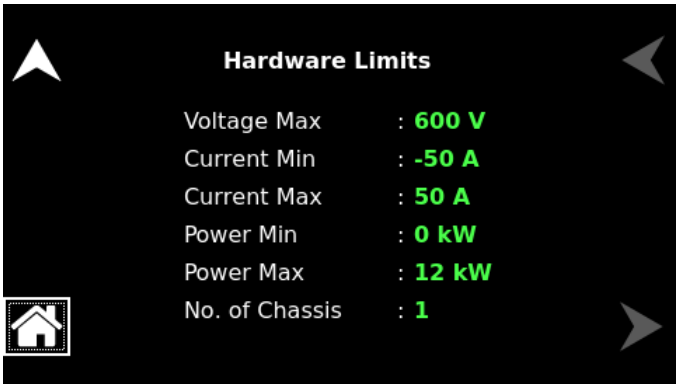


Figure 14-73. Hardware Limits

ENTRY	DESCRIPTION
System Details	Displays information about the user's device, including the Manufacturer, Model Number, Serial Number, Last Calibration Date, and Operating Mode. Refer to Figure 14-74.

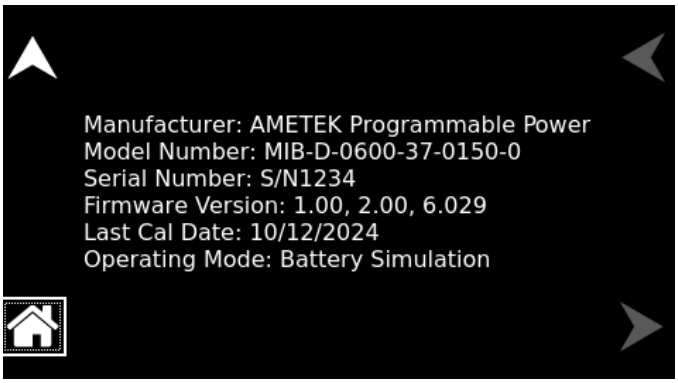


Figure 14-74. System Details

Firmware Version	Displays information about the configuration of the power supply, including the Communication Controller, System Interface, Front Panel, Fan Controller, Mod 1 Primary Controller, Mod 1 Secondary Controller, Mod 2 Primary Controller, Mod 2 Secondary Controller, Mod 3 Primary Controller, Mod 3 Secondary Controller. This information helps identify the unit. Refer to Figure 14-75.

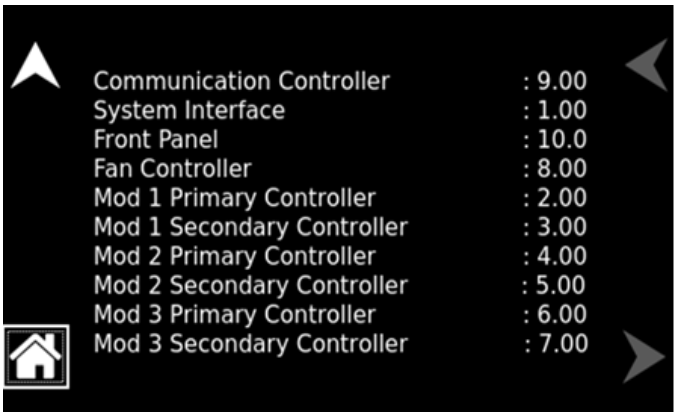


Figure 14-75. Firmware Version

LCD	Provides settings for the calibration of the display touchscreen. Refer to Figure 14-76.

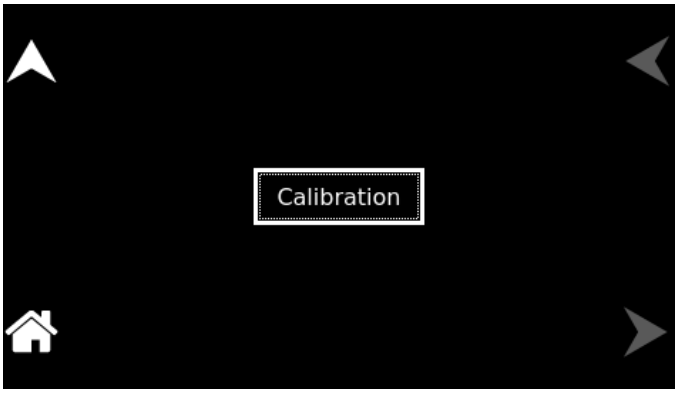


Figure 14-76. LCD

ENTRY	DESCRIPTION

Default Screen

Selects whether the Default screen (showing measured voltage, current and power) is enabled or disabled, refer to Figure 14-77 and Figure 14-78. It allows to set the time out if the default screen is enabled.

a) **Timeout Interval**: Selects the time, in seconds, for how long Dashboard screen must be inactive before the Default screen is displayed.

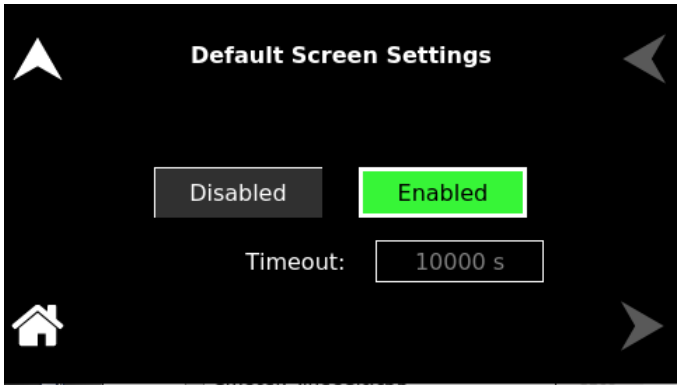


Figure 14-77. Default Screen Settings

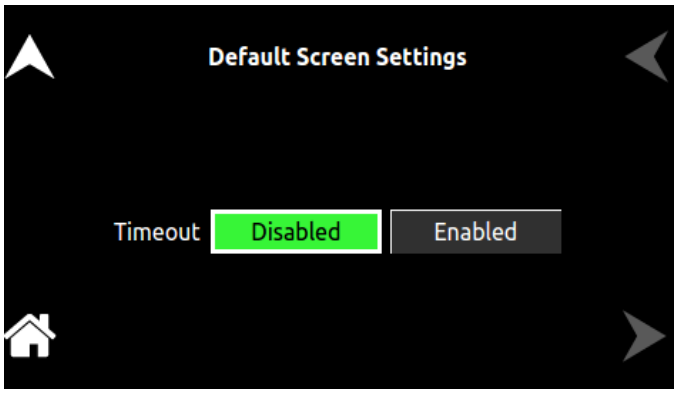


Figure 14-78. System Settings Screen - Default Screen Disabled

Factory Default

Set the device to its original factory settings, as it was when it left the manufacturer. Refer to Figure 14-79.

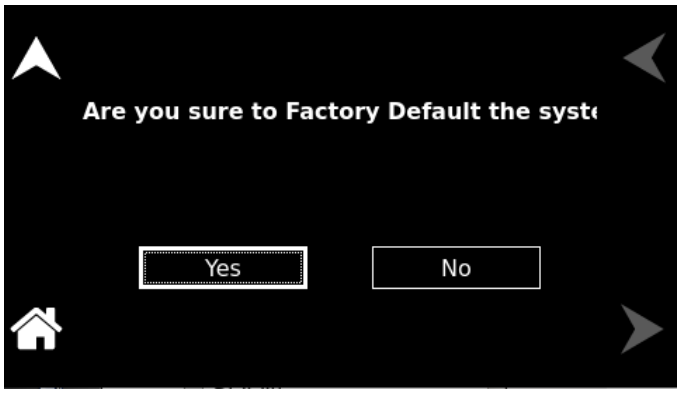


Figure 14-79. Factory Default

ENTRY	DESCRIPTION

Table 14-12. System Setting Screen

14.2.8 SYSTEM FAULTS SCREEN

The System Faults screen provides descriptions of faults that have occurred in a power module. The fault screen appears if any supply fault conditions occur, refer to Figure 14-80. The user should press ‘Clear’ to clear the fault and continue operating the power supply, and press ‘Reload’ to refresh the system faults and check for errors. If no fault has occurred, the screen will display ‘No Fault Occurred’, refer to Figure 14-81.

NOTE: These conditions might resolve themselves; however, if they continue to occur after pressing 'Clear', refer to Chapter 17.

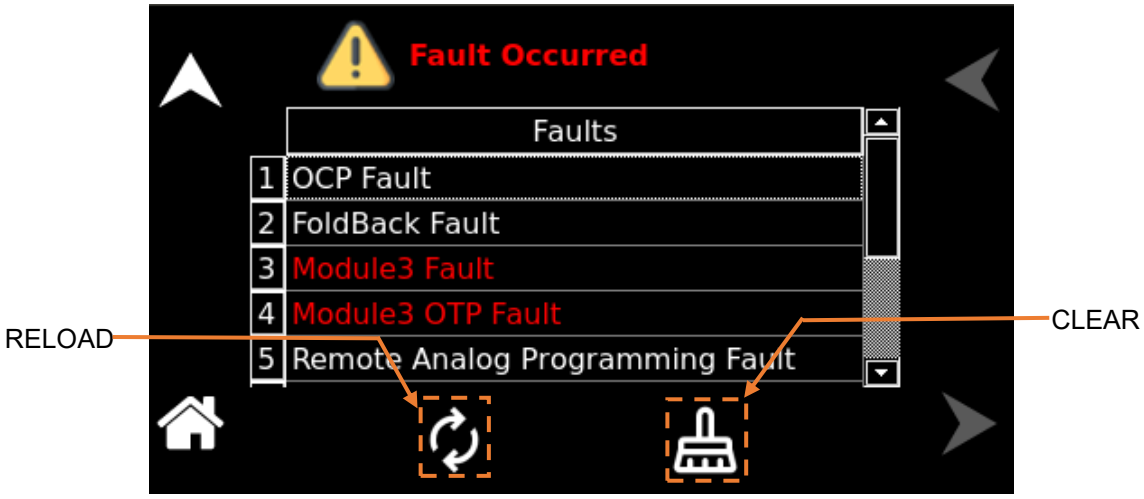


Figure 14-80. System Faults



Figure 14-81. No Fault Occurred Screen

If any fault occurs on the Follower screen, a fault signal is generated. Press ‘Faults’ to view the

fault details on the Follower screen. Refer to Figure 14-82.

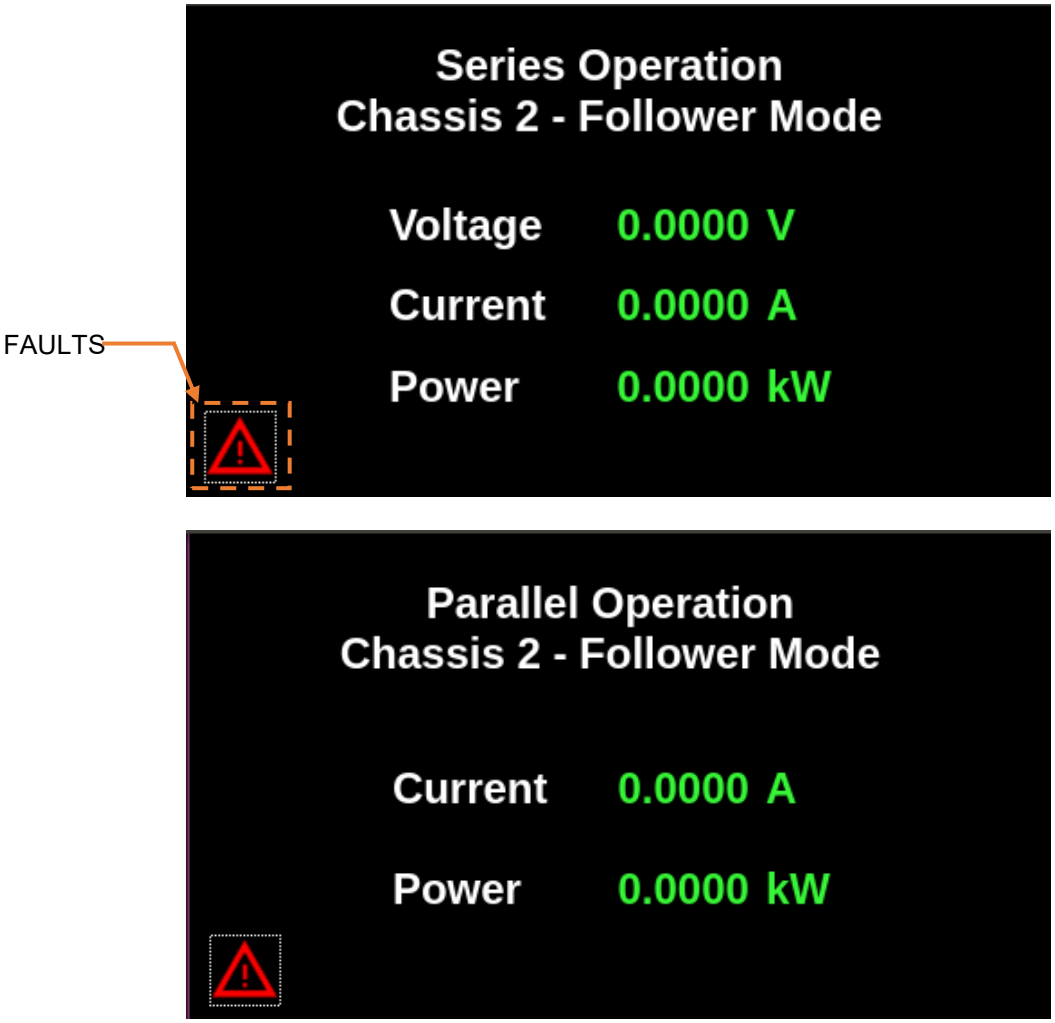


Figure 14-82. Follower Faults Screen

15 BATTERY TEST MODE OPERATION

This chapter provides comprehensive information on the front panel display in Battery Test mode. It is designed to offer an intuitive interface for seamless setup, control, and monitoring of various battery testing parameters.

15.1 Mi-BEAM CONNECTION TO UUT AND CONFIGURATION

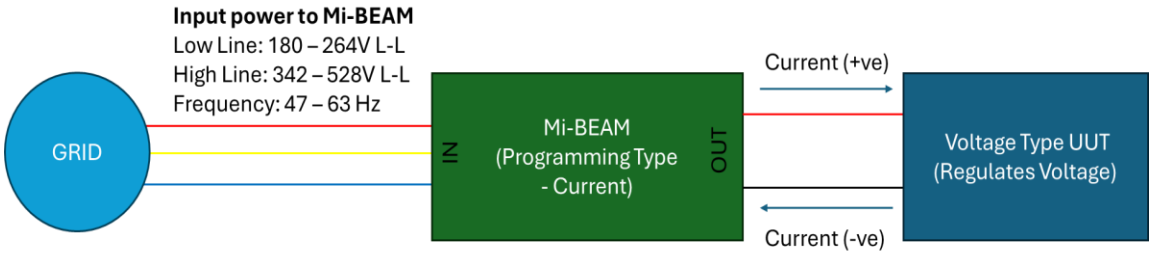


Figure 15-1. Voltage Type UUT

The Mi-BEAM Series power supply in BATSIM operates with a fixed Programming Type (Current) and the Regulation Setting is 'Constant Current / Constant Voltage(CC/CV)'.

a) Configuration: Before turning ON the Mi-BEAM output, various protection parameters and user soft limits need to be configured to ensure safety of the Mi-BEAM and UUT.

- **Positive Overcurrent Protection (Pos. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set higher than the expected current flow form Mi-BEAM to UUT. Refer to Figure 15-29.

- **Negative Overcurrent Protection (Neg. OCP):** Mi-BEAM output turns OFF when the measured current reaches this value (instantaneous current measured). This value must be set lower than the expected current flow from UUT to Mi-BEAM. Refer to Figure 15-29.

- **Overvoltage Protection (OVP):** Mi-BEAM output turns OFF when the measured voltage reaches this value (instantaneous voltage measured). This value must be set higher than the expected voltage from Mi-BEAM or UUT. Refer to Figure 15-29.

b) User Limit Configuration: Create a configuration and define the characteristics of the battery to be tested. Refer to Figure 15-24 and Figure 15-26.

c) Battery Operating Type: Configure the operating conditions of the battery. Refer to Figure 15-20.

d) Output State: Once all the parameters are configured as mentioned above output can be turned ON. Refer to Figure 15-31.

e) Connect the UUT to the Mi-BEAM: Ensure all connections are secure and correctly aligned with the UUT port type.

f) Start the Test: Initiate the output from the Mi-BEAM and monitor the performance to ensure the UUT operates within the desired parameters.

g) Monitoring and Adjustments: Monitor the output and make any necessary adjustments to the settings, using the built-in measurement screen to track the performance and ensure safety limits are not exceeded. Refer to Figure 15-13.

h) End the Test: Once the test is complete, safely disconnect the UUT from the Mi-BEAM.

15.2 FRONT PANEL OPERATION

This section provides detailed information on the front panel operation in Battery Test (BATTEST) mode. Each menu of a screen could be selected by tapping its associated selection-field box through the touchscreen, or by selecting it with the rotary encoder. Refer to Figure 15-2.

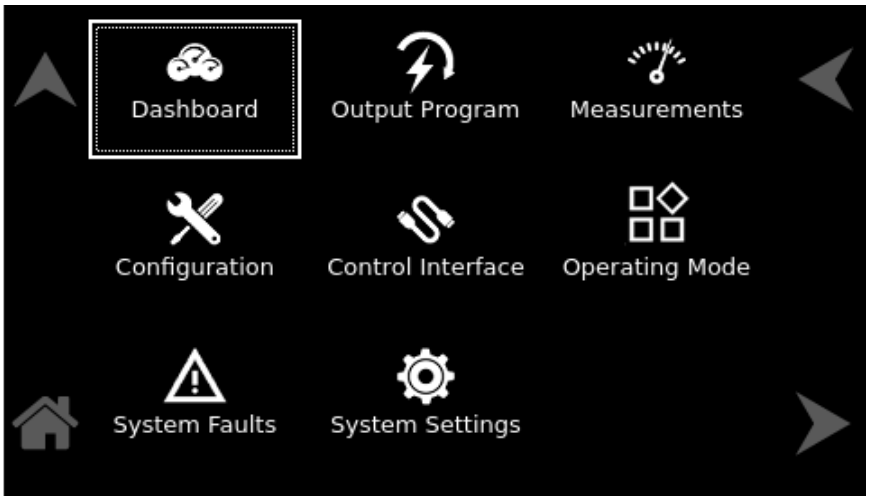


Figure 15-2. Home Screen Top-Level Menu

15.2.1 DASHBOARD SCREEN TOP-LEVEL MENU

The DASHBOARD screen top-level menu is used to change output parameters and simultaneously view output measurements. The most used output parameters are in the DASHBOARD screen menu. The DASHBOARD screen is the default menu that is displayed after power-on.

15.2.1.1 DASHBOARD SCREEN

The dashboard screen will display options to set the Oper. Type, Initial Cap, Voltage, and Current. Refer to Figure 15-3 for dashboard screen and refer to Section 9.4.2.2 for navigating to Dashboard-Screen.

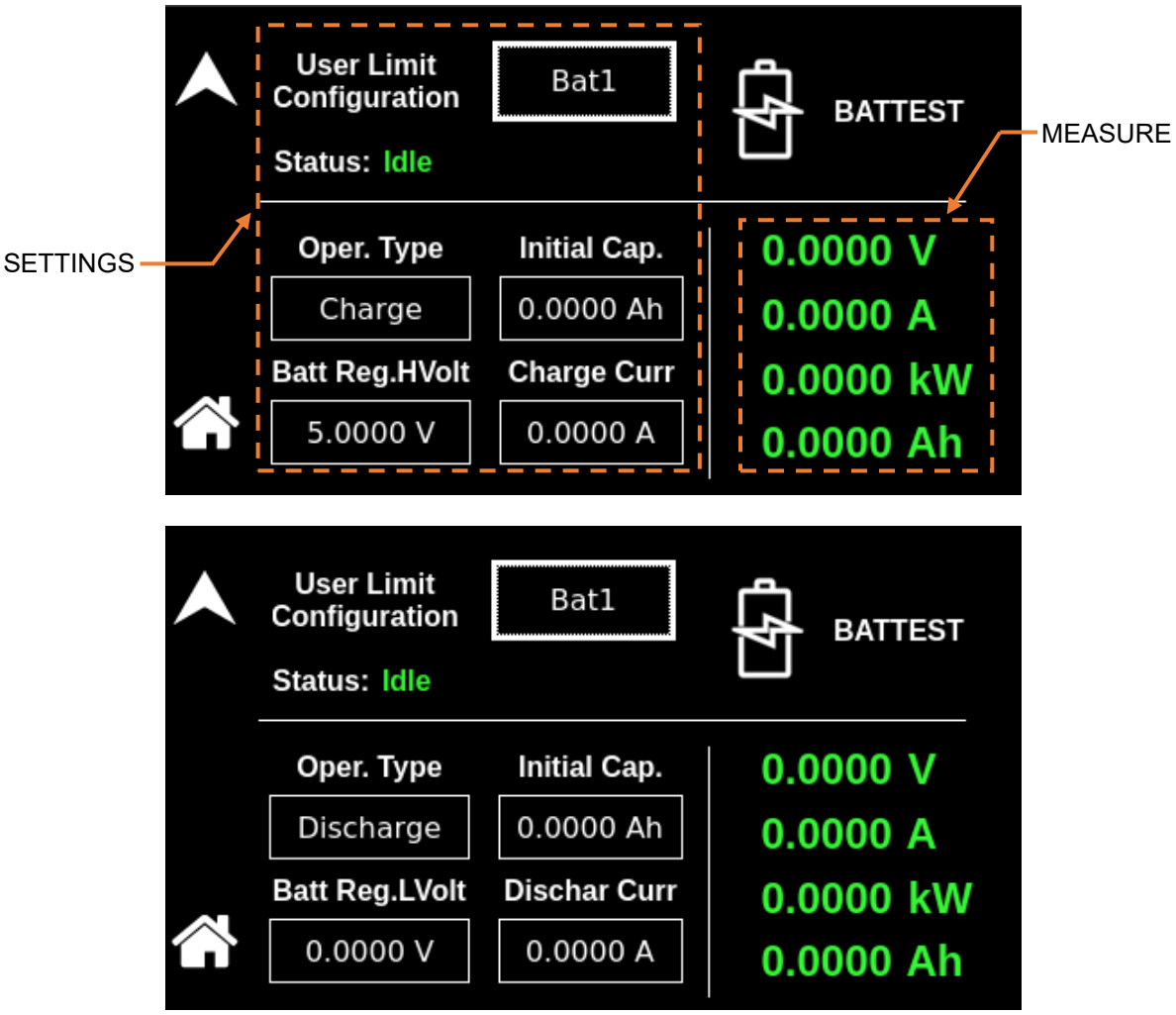


Figure 15-3. Dashboard Screen

The following selections are available in the DASHBOARD screen top-level menu:

SETTINGS	DESCRIPTION
User Limit Configuration	The selected user limit configuration will be displayed. Users can also select, edit, delete, and load the battery profiles for the battery to be tested.

SETTINGS	DESCRIPTION
Oper. Type	Battery operating type settings can be configured from this menu. Refer to Figure 15-20. **a) Charge:** Programs the supply to charge the battery. **b) Discharge:** Programs the supply to discharge the battery. **c) Charge Stop Cond.:** Programs the stop conditions of the supply while charging. **d) Discharge Stop Cond.:** Programs the stop conditions of the supply while discharging.
Initial Cap.	Programs the initial capacity of battery to be tested in ampere hour. Real-time setting is possible using the rotary encoder.
Batt Reg. HVolt	Programs the high output voltage of the supply in volts. Real-time setting is possible using the rotary encoder.
Batt Reg. LVolt	Programs the low output voltage of the supply in volts. Real-time setting is possible using the rotary encoder.
Charge Curr	Programs the output current of the supply in ampere. Real-time setting is possible using the rotary encoder.
MEASURE	**DESCRIPTION**
Voltage	Displays the floating-point value of the DC output voltage in volts.
Current	Displays the floating-point value of the DC output current in amps.
Power	Displays the floating-point value of the DC output power in kW.
Capacity	Displays the floating-point value of the battery capacity in Ah.
Status	Displays the status of the operation.
(1) The '' symbol before the user limit configuration indicates that the configuration is selected but not yet loaded. To load the profile, click the load button available in the 'BATTEST Configuration Setting'. To turn ON the output of the power supply, selected profile must be loaded.* *(2) The 'NONE' indicates that no configuration is selected.*	

Table 15-1. Dashboard screen top-level menu

'Status' in the Dashboard screen will automatically update based on the operation. Refer to the Table 15-2.

STATUS	DESCRIPTION
Idle	When the system is in Idle (not performing any task).
Initializing	When the selected User Limit Configuration loading to the unit is in progress.
Initialized	When the selected User Limit Configuration load is successful.
Running	When the battery test is in progress.
Stopped	When the battery test is stopped.
Stopped Term Curr	When the measured current reaches the termination current value or below it, charging is terminated.

STATUS	DESCRIPTION
Stopped Char Cap	When the battery reaches the charging capacity value or below it, charging is terminated.
Stopped Time	When the elapsed time reaches the set time value or below it, the battery test is terminated.
Stopped Char Volt	When the measured voltage reaches the charging voltage value or below it, charging is terminated.
Stopped Dischar Volt	When the measured voltage reaches the discharge voltage value or below it, discharging is terminated.
Stopped Dischar Cap	When the battery reaches the discharge capacity value or below it, discharging is terminated.
Aborted	When battery simulation is aborted by the user and none of the stop conditions are met.
Tripped	When battery simulation is terminated due to fault.

Table 15-2. Status

15.2.1.2 REAL-TIME PARAMETER ADJUSTMENT

The DASHBOARD screen menu provides the capability for output parameter entry that has real-time, immediate effect on the output. This allows manual adjustment of the output parameters where tuning of a value is desired. Enabling this function requires clicking on a parameter selection-field box with the encoder switch to select the parameter and display its selection-field highlighted and with a value entry window, refer to Figure 15-4. The rotary encoder could then be used to continuously adjust the parameter value, up and down, as it is rotated. The value change takes immediate effect at the output.



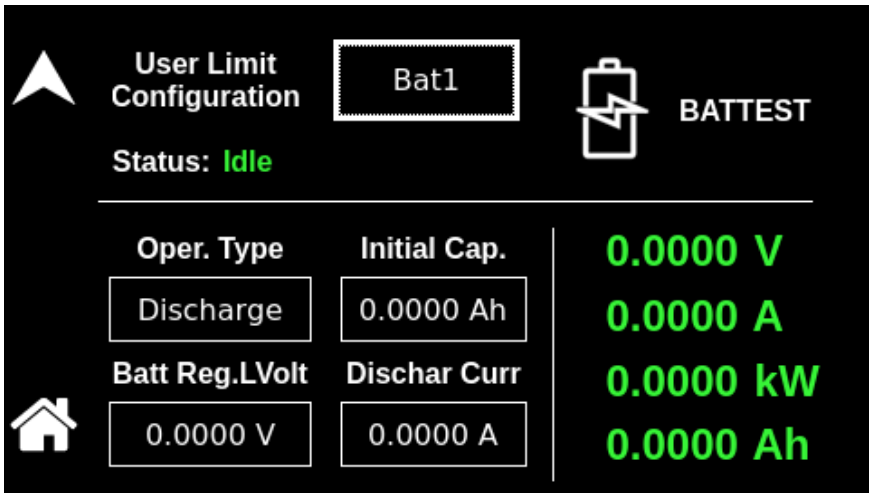


Figure 15-4. Real-Time, Immediate Output Parameter Adjustment

15.2.1.3 DEFAULT SCREEN

The Default screen provides measurement of the DC output 'Voltage', 'Current', 'Power' and calculated 'Capacity', refer to Figure 15-5. When the Dashboard screen is idle for an interval equal to a set time delay, refer to Figure 15-81 and Figure 15-82. The display will automatically switch to the Default screen. Tap anywhere on the screen to return to the Dashboard screen.

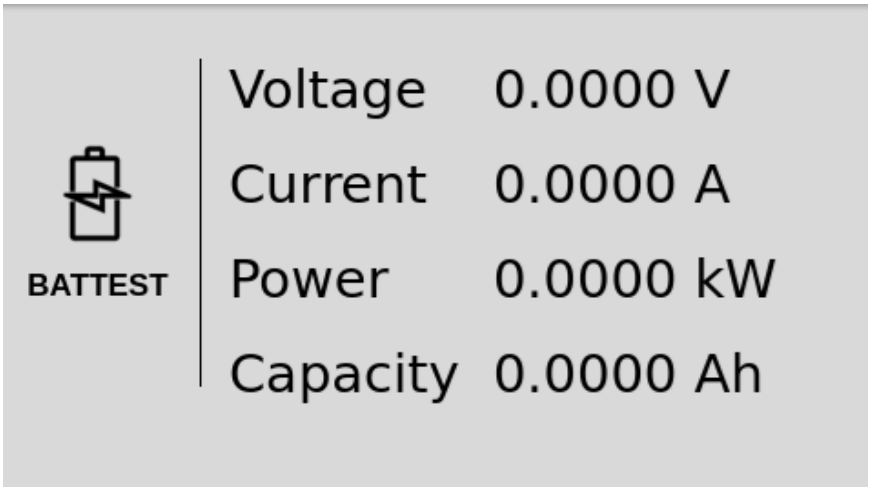


Figure 15-5. Default Screen

With the understanding of the dashboard screen features, user can perform basic functionality and verify the output voltage, current, power and capacity in various modes of operation.

15.2.2 OUTPUT PROGRAM SCREEN

The Output Program screen provides the settings of 'Initial Capacity', 'Charge Voltage', 'Charge Current', 'Discharge Voltage', 'Discharge Current' and 'Output State'. Refer to Section 9.4.2.2 for navigating to Output Program Screen Top-Level Menu.

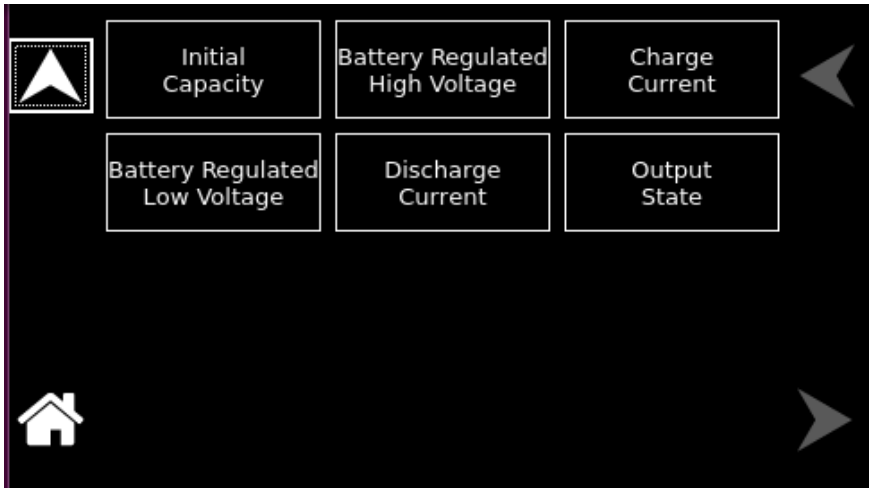


Figure 15-6. Output Program Screen

NOTE: Functions that accept a numeric value require the value to be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

The Output Program Screen includes the following functions:

ENTRY	DESCRIPTION
Initial Capacity	User can set the initial capacity of the battery to be tested. Refer to Figure 15-7.

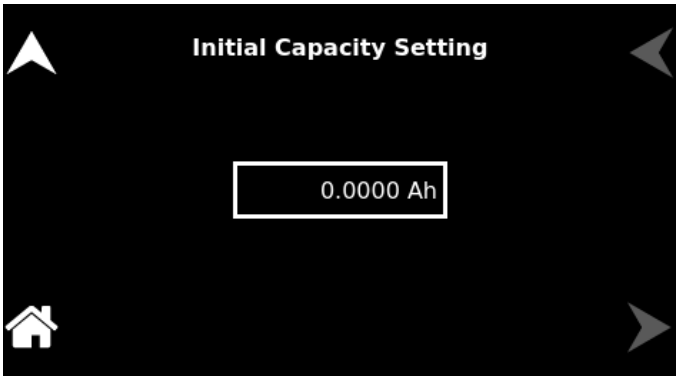


Figure 15-7. Initial Capacity Setting

Battery Regulated High Voltage	User can set the charge voltage value, which acts as the voltage high limit for the supply. The maximum voltage of the battery under test is expected to be entered. Refer to Figure 15-8.

ENTRY	DESCRIPTION

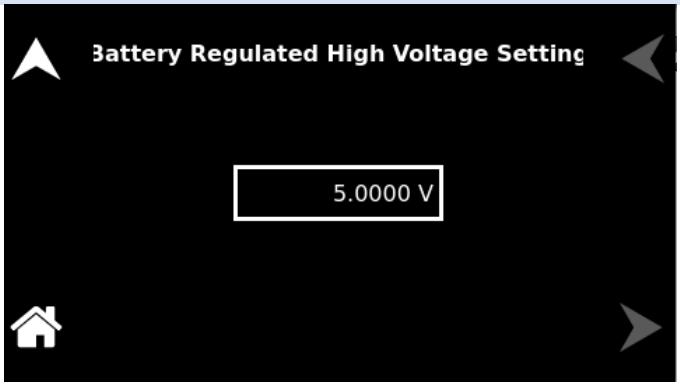


Figure 15-8. Charge Voltage Setting

Charge Current User can set the charge current value to the current at which the battery under test will be charged. Refer to Figure 15-9.

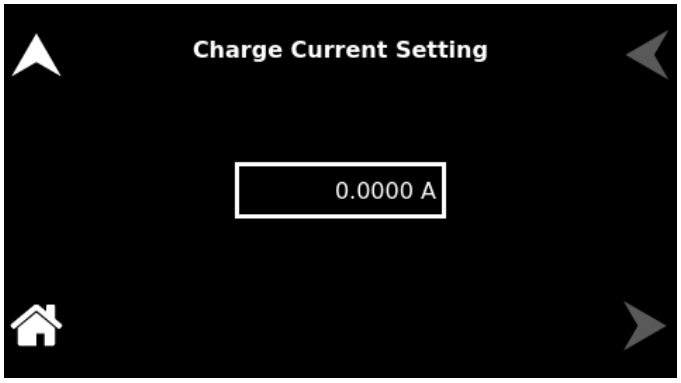


Figure 15-9. Charge Current Setting

Battery Regulated Low Voltage Users can set the discharge voltage value, which acts as the voltage low limit for the supply. The minimum voltage of the battery under test is expected to be entered. Refer to Figure 15-10.

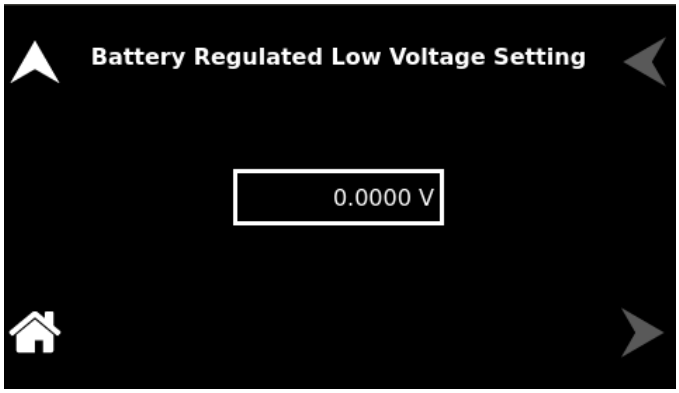


Figure 15-10. Discharge Voltage Setting

Discharge Current Users can set the discharge current value to the current at which the battery under test will be discharged. Refer to Figure 15-11.

ENTRY	DESCRIPTION

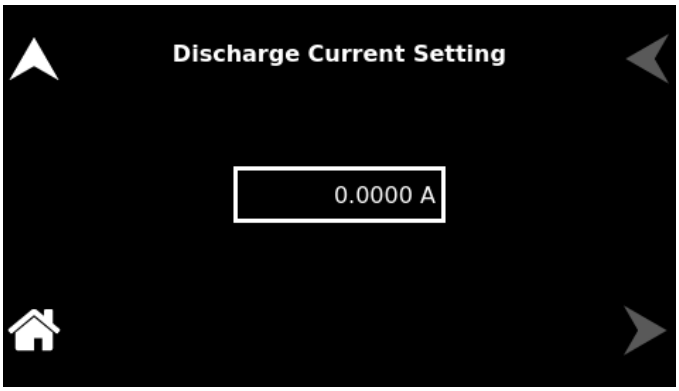


Figure 15-11. Discharge Current Setting

Output State Users can program the output to ON or OFF state. Refer to Figure 15-12.

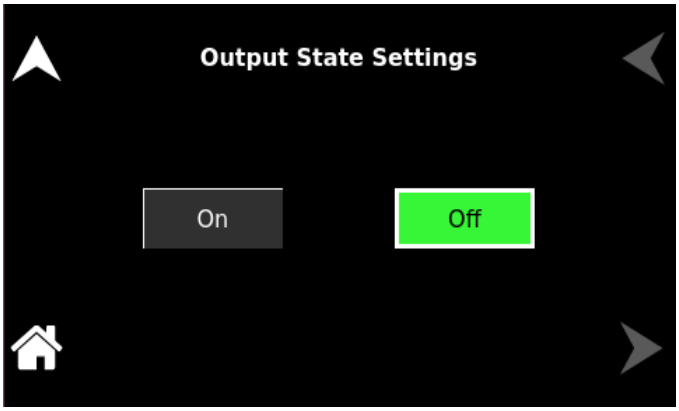


Figure 15-12. Output State Settings

Table 15-3. Output Program screen

15.2.3 MEASUREMENTS SCREEN

The Measurements screen displays the floating-point values for ‘Output Voltage’, ‘Output Current’, ‘Output Power’ and ‘Calculated Capacity’. For the Measurement screen refer to Figure 15-13 and for instructions on how to navigate to the Measurements screen, refer to Section 9.4.2.2.

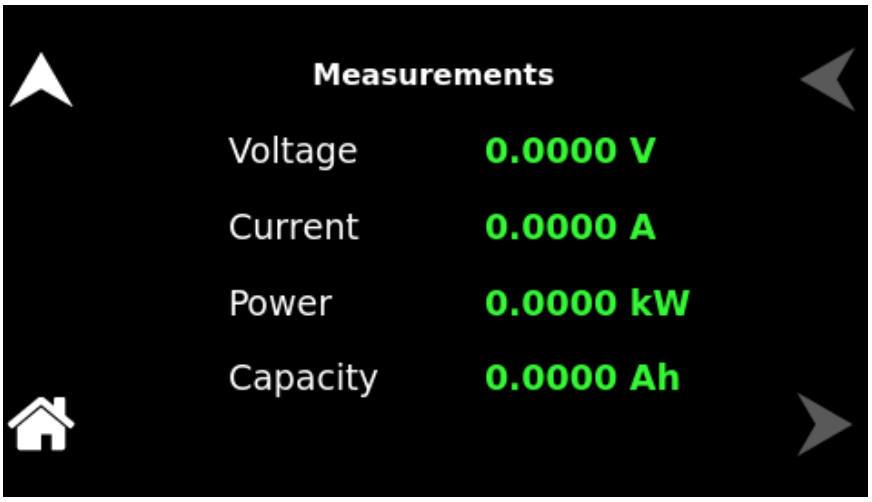


Figure 15-13. Measurement Screen

15.2.4 CONFIGURATION SCREEN

The Configuration Screen will change based on the selection made in 'Battery Mode', refer to section 15.2.4.1. If the mode is set to 'Steady State' in 'Battery Mode', the Configuration Screen provides the settings of 'Battery Mode', 'Battery Operating Type', 'User Limit Configuration', 'Protection', 'External Relay', 'Output Sense', 'PONS', 'Measurement Average Samples' and 'Parallel Operation Mode' (enabled only in parallel operation).

For the top-level menu of the 'Configuration screen', refer to Figure 15-14, Figure 15-15 and for instructions on how to navigate, refer to Section 9.4.2.2.

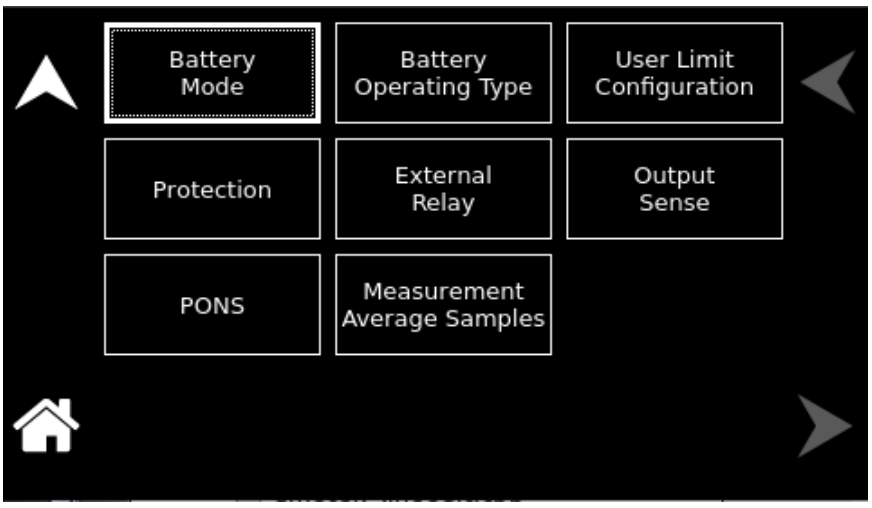


Figure 15-14. Configuration Screen Top-Level Menu – Steady State

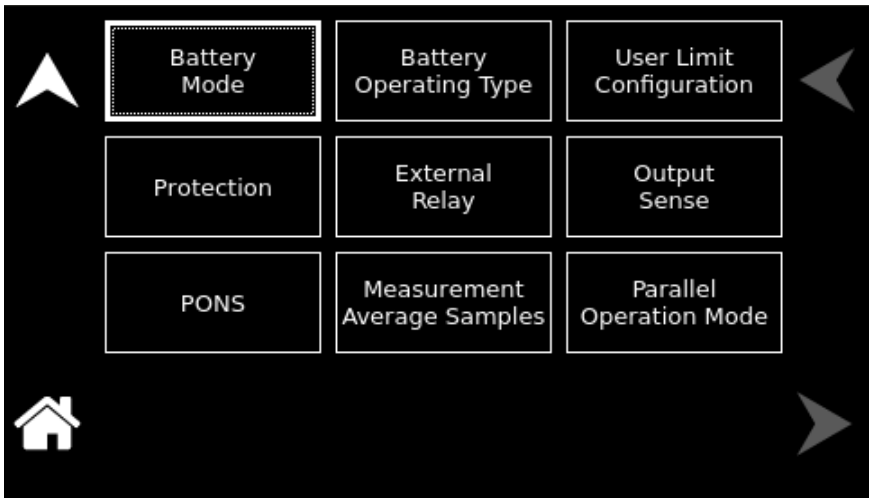


Figure 15-15. Configuration Screen Top-Level Menu (Steady State) – Parallel Operation

If the mode is set to 'Sequence' in 'Battery Mode' through the Virtual Panel, refer to section 15.2.4.1. The Configuration Screen provides the settings of 'Battery Mode', 'Protection', 'External Relay', 'Output Sense', 'PONS', 'Measurement Average Samples' and 'Parallel Operation Mode (enabled only in parallel operation)'. Refer to Figure 15-16.

NOTE: These settings can only be viewed on the front panel. If any selection is made through the front panel, the screen will display as 'This feature is not supported in Front Panel'.

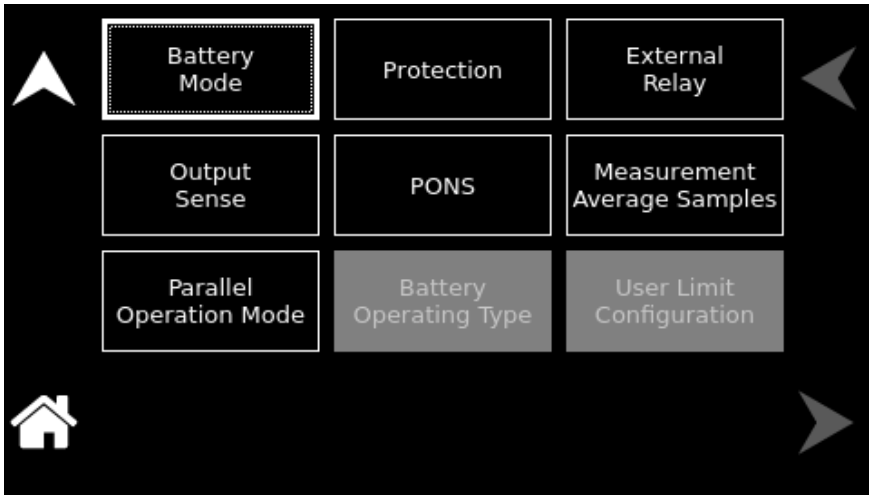


Figure 15-16. Configuration Screen Top-Level Menu - Sequence

15.2.4.1 BATTERY MODE

The 'Battery Mode' settings allows the user to set either to 'Steady State' or 'Sequence'.

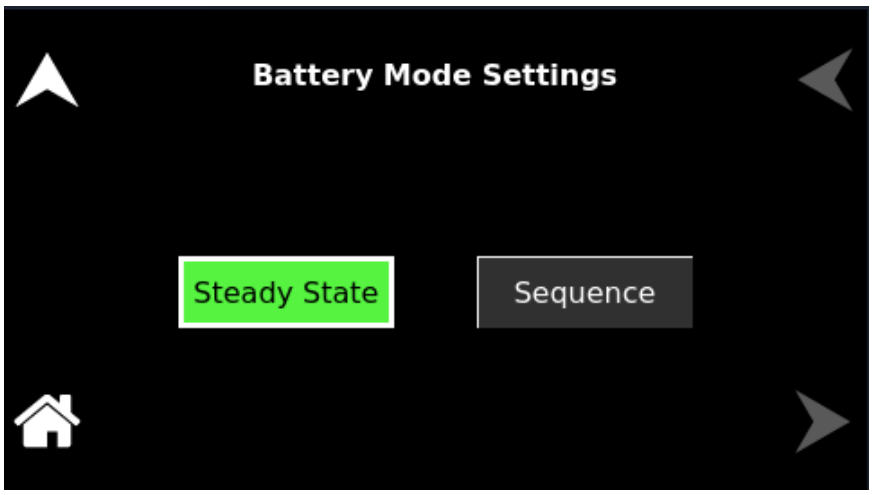


Figure 15-17. Battery Mode Settings

The front panel does not support 'Sequence' mode; to operate this mode Virtual panel is used. The configuration screen will change based on the user's selection. Refer to Table 15-4.

SETTINGS	FRONT PANEL SUPPORT
Steady State	Yes
Sequence	Only view in the dashboard

Table 15-4. Battey Mode Selection Setting – Front Panel Support

The 'Sequence' Mode cannot be configured through the front panel of the Mi-Beam. If the setting is selected through the front panel, the screen will display as 'This feature is supported only from Virtual Panel'. Refer to Figure 15-18.



Figure 15-18. Battery Mode Selection - Sequence

The ‘Sequence’ can only be configured through the Virtual panel. If the setting is selected through the Virtual panel, the selected settings will be displayed on the Mi-beam front panel screen. Refer to Figure 15-19.

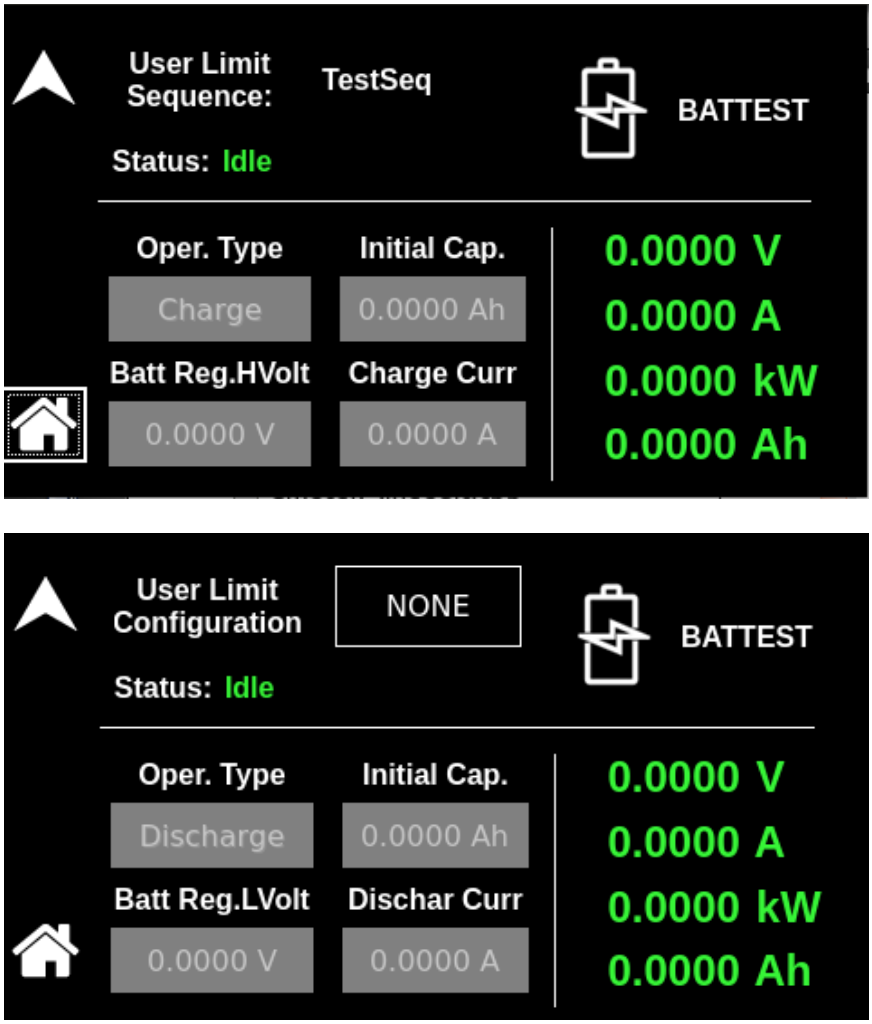


Figure 15-19. Sequence Mode – Dashboard Screen

15.2.4.2 BATTERY OPERATING TYPE

The ‘Battery Operating Type’ is used to configure various conditions for the battery testing, such as ‘Charge’, ‘Discharge’, ‘Charge Stop Condition’ and ‘Discharge Stop Condition’. Refer to Figure 15-20.

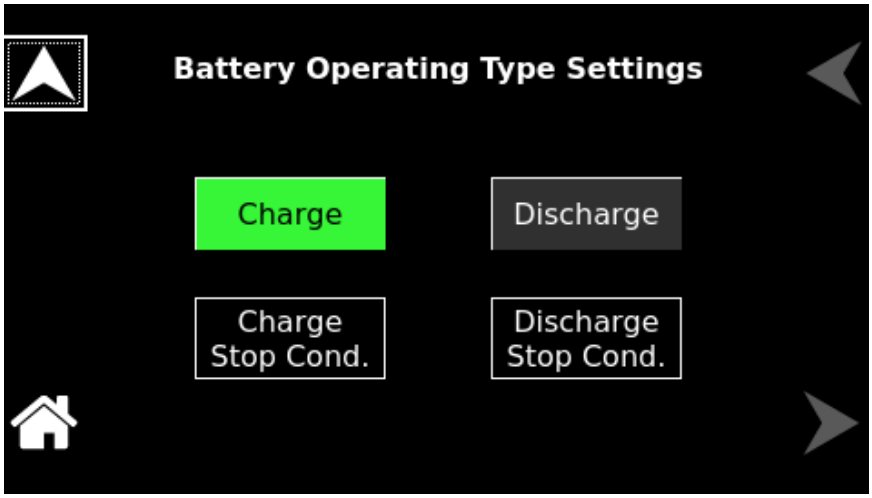


Figure 15-20. Battery Operating Type Settings

ENTRY	DESCRIPTION
Charge	User can set the supply to charge the battery.
Discharge	User can set the supply to discharge the battery.
Charge Stop Cond.	User can program the stop conditions of the supply while charging. **a) Battery charge Type:** User can set the battery charge type to 'CC' or 'CC/CV'. **b) Charge to Voltage (CC):** When 'Battery Charge Type' is set to 'CC', on measured voltage reaching the set 'Charge to Voltage (CC)' value, charging of the battery under test will be terminated. **c) Time:** On elapsed time reaches this value battery test will be terminated. **d) Term Current (CCCV):** When the 'Battery Charge Type' is set to 'CC/CV', on measured voltage reaching the set 'Batt Reg HVolt' (refer to Figure 15-19) value, the supply regulates the voltage, and the charge current reduces. When the measured current reaches the set 'Term Current (CCCV)' value charging of the battery under test will be terminated. **e) Charge to Cap:** On calculated capacity reaching this value, charging of the battery under test will be terminated.

ENTRY	DESCRIPTION

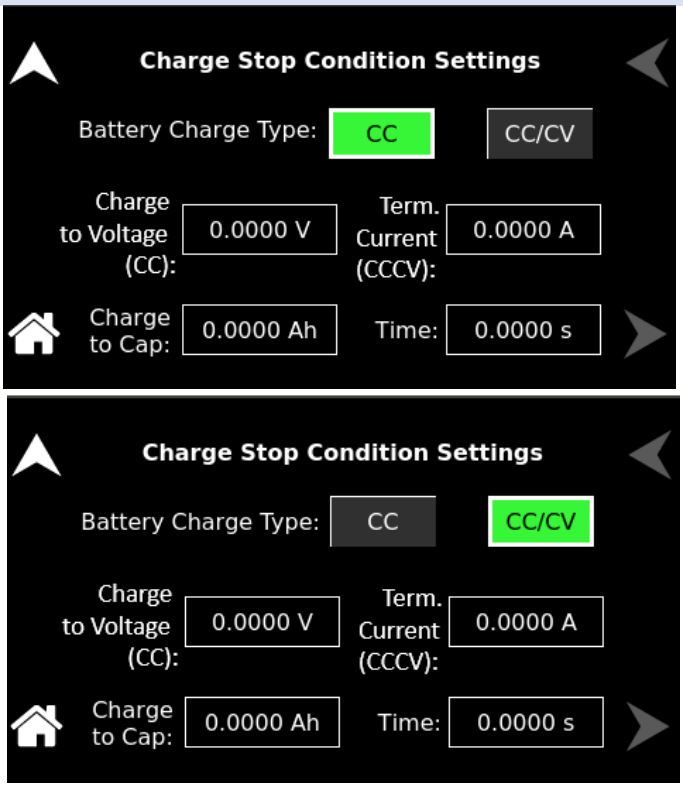


Figure 15-21. Charge Stop Condition Settings

Discharge Stop Cond.

User can program the stop conditions of the supply while discharging.

a) Battery charge Type: User can set the battery discharge type to ‘CC’ or ‘CC/CV’.

b) Discharge to Voltage (CC): When ‘Battery Discharge Type’ is set to ‘CC’, on measured voltage reaching the set ‘Discharge to Voltage (CC)’ value, discharging of the battery under test will be terminated.

c) Time: On elapsed time reaches this value battery test will be terminated.

d) Term Current (CCCV): When the ‘Battery Discharge Type’ is set to ‘CC/CV’, on measured voltage reaching the set ‘Batt Reg LVolt’ (refer to Figure 15-19) value, the supply regulates the voltage, and the discharge current reduces. When the measured current reaches the set ‘Term Current (CCCV)’ value, discharging of the battery under test will be terminated.

e) Discharge to Cap: On calculated capacity reaching this value, discharging of the battery will be terminated.

ENTRY	DESCRIPTION

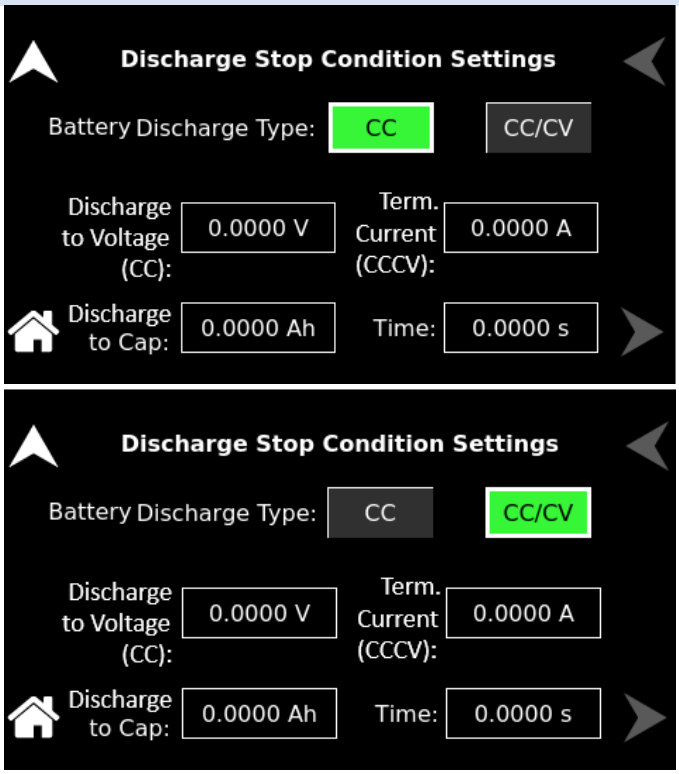


Figure 15-22. Discharge Stop Condition Settings

Table 15-5. BATSIM Cut-Off Condition Settings

15.2.4.3 USER LIMIT CONFIGURATION

The 'User Limit Configuration' enables users to create various battery configurations with parameters like ‘Volt Max’, ‘Volt Min’, ‘Cap Max’, ‘Charge Curr Lim’, ‘Discharge Curr Lim’. To perform any operation in battery test mode, user limit configuration must be selected. These user limit configuration parameters will act as limits for all the steady state parameters.

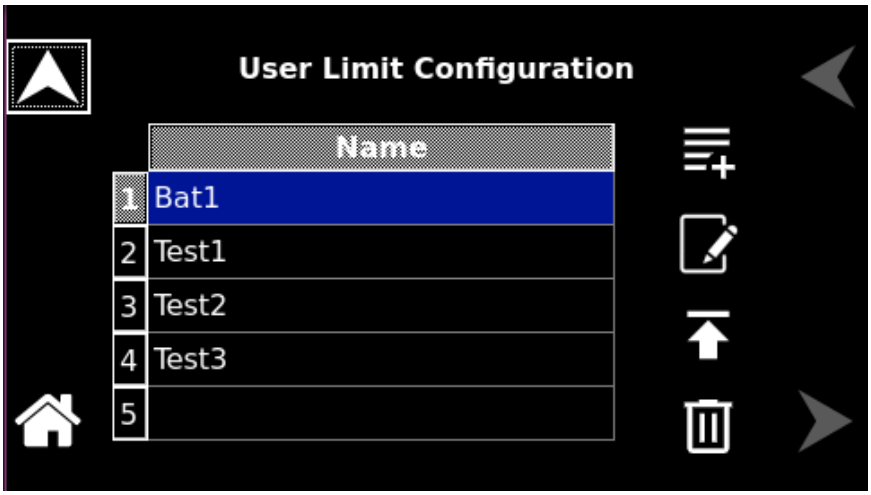


Figure 15-23. BATSIM Configuration Settings - Battery

- **Adding a configuration in 'User Limit Configuration Settings'**
  - Open the 'User Limit Configuration Settings' and select the 'Add Configuration' option on the right side of the screen. Refer to Figure 15-24.

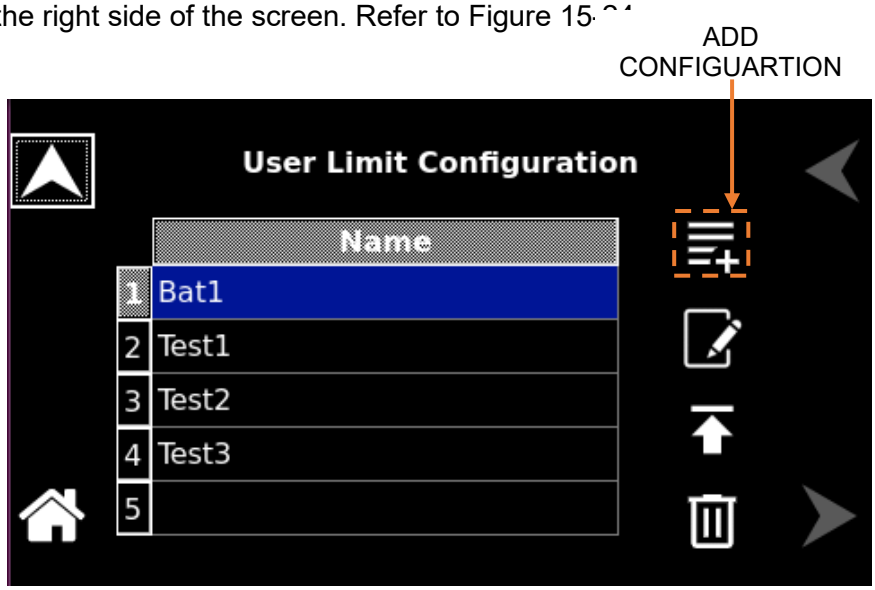


Figure 15-24. Profile Selection

  - An alphanumeric keypad will open, allowing the user to enter a configuration name and click 'OK' to confirm the profile name. Refer to Figure 15-25.

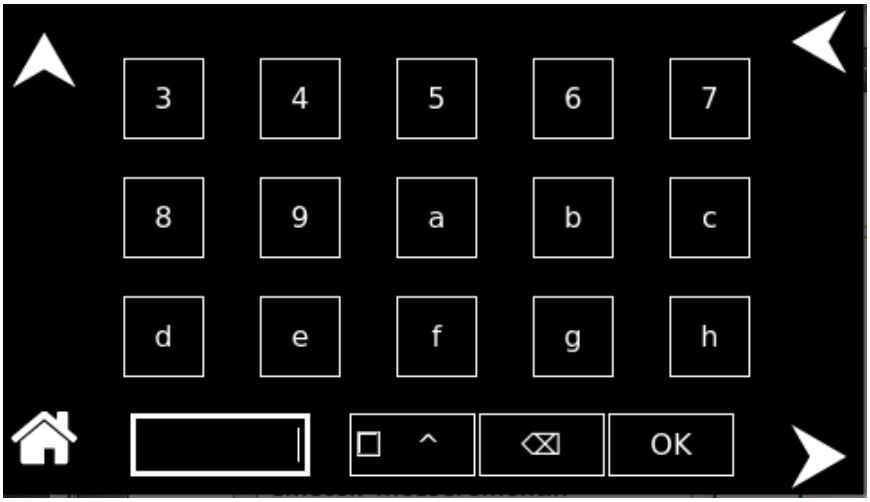
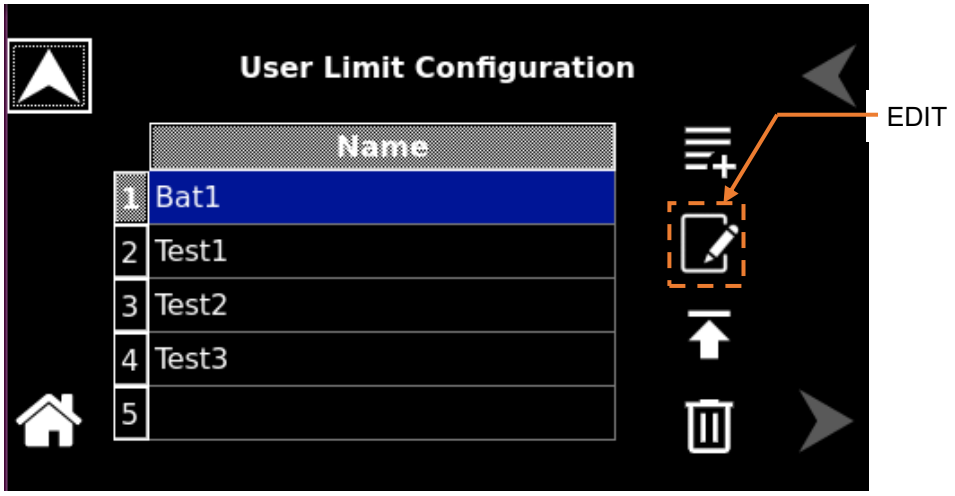


Figure 15-25. Alpha - numeric keypad

- **Edit the configuration in 'User Limit Configuration Settings'**
    - The created configuration will have default values. If the user wants to change the default values, click on the 'Edit' option.
    - The selected configuration name will be displayed at the top of the screen when the 'Edit' option is clicked. Refer to Figure 15-26.
    - The parameters available in screen are 'Volt Max', 'Volt Min', 'Cap Max', 'Charge Curr Lim', 'Discharge Curr Lim'. Refer to Figure 15-26.



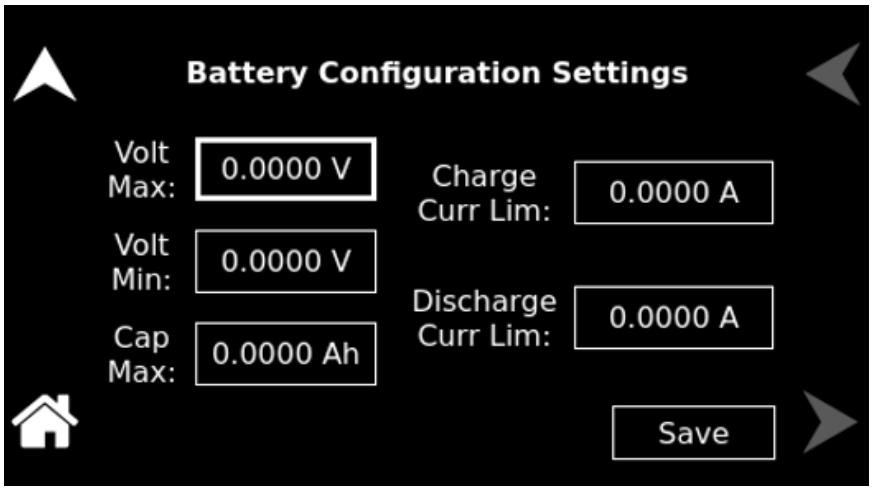


Figure 15-26. Cut- Off Conditions Settings

ENTRY	DESCRIPTION
Volt Max	Maximum voltage of the battery under test
Volt Min	Minimum voltage of the battery under test
Cap Max	Capacity of the battery under test
Charge Curr Lim	Maximum charge current of the battery under test
Discharge Curr Lim	Maximum discharge current of the battery under test

Table 15-6. Profile Settings Screen

- Once the configuration is completed, click on the 'Save' option to save the user limit configuration.

- **Load the Configuration in 'User Limit Configuration Settings'**

  - Load the selected User Limit Configuration by clicking the 'Upload' option. Refer to Figure 15-27.

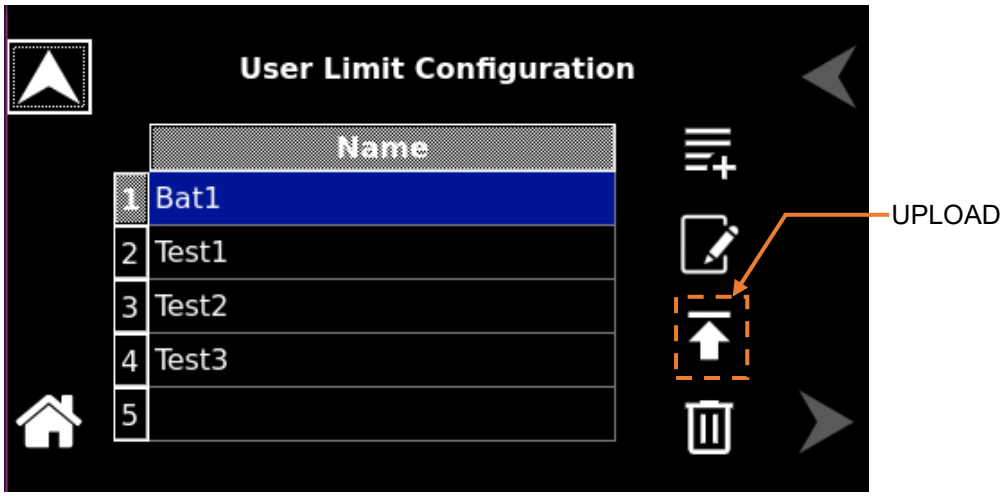


Figure 15-27. BATSIM Configuration Settings - Upload option

- The ‘Upload button’ will be disabled when the user limit configuration is uploaded to the unit. Refer to Figure 15-28.

- **Delete the configuration in ‘Battery Configuration Settings’**
  - Click on ‘Delete’ to remove the selected user limit configuration. Refer to Figure 15-28.

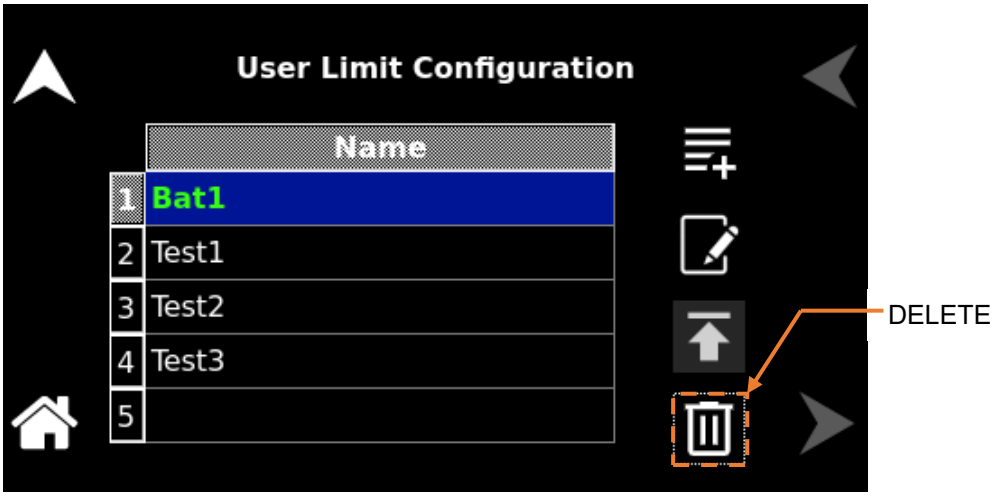


Figure 15-28. BATSIM Configuration Settings - Upload Disabled and Delete option

15.2.4.4 PROTECTION

In protection settings, users can define Output Overvoltage Protection (OVP) and Positive Overcurrent Protection (Pos. OCP) and Negative Overcurrent Protection (Neg. OCP) to help safeguard their devices from electrical anomalies. Refer to Figure 15-29.

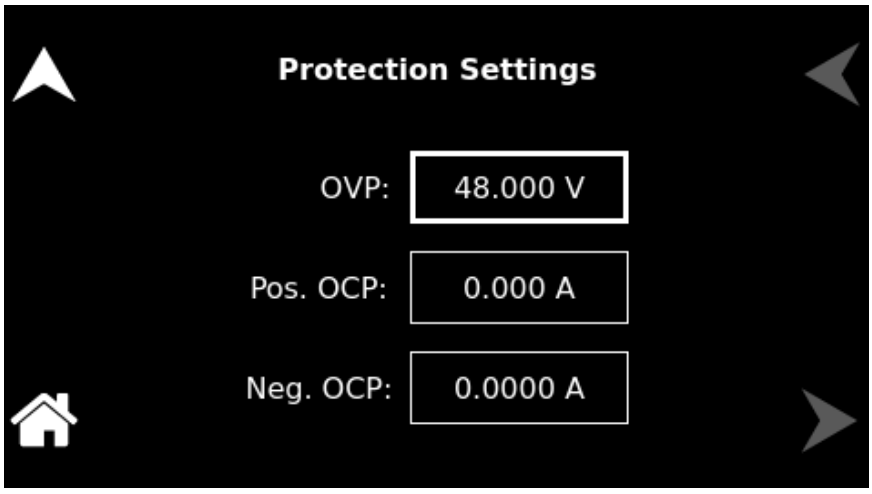


Figure 15-29. Protection Settings

15.2.4.5 EXTERNAL RELAY

The External relay Settings allows the user to set the isolation relay to either ‘Enable’ or ‘Disable’. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 15-30.

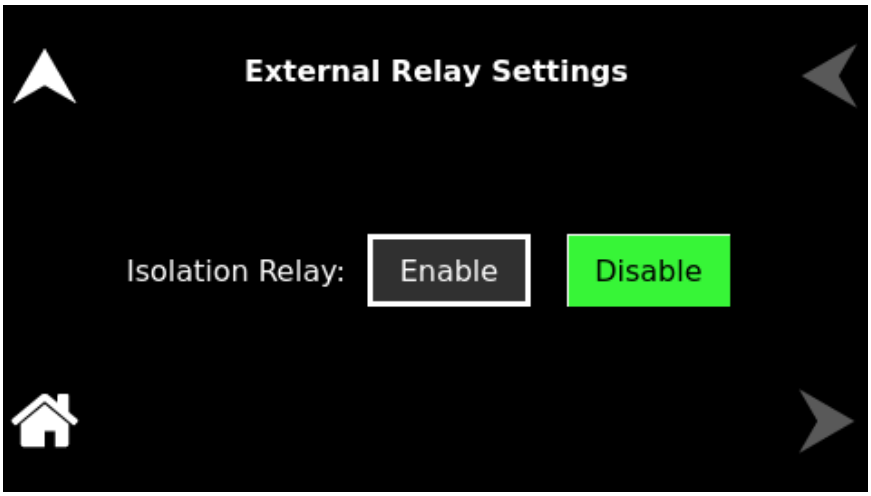


Figure 15-30. Isolation Relay

15.2.4.6 OUTPUT SENSE

The Output Sense menu allows user to set the output voltage sense of the unit to either local or remote. When Remote is selected as output sense, voltage sense cables must be connected to rear panel of power the supply at RVS connector. Refer to Figure 15-31.

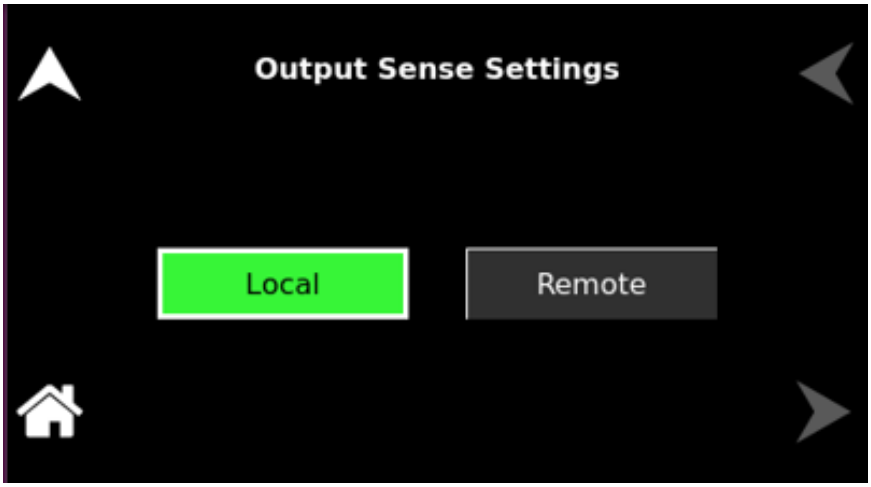


Figure 15-31. Output Sense Settings

15.2.4.7 PONS

The PONS Menu enables users to configure the Power-ON values and set up the power supply based on the chosen mode settings. Refer to Figure 15-32.

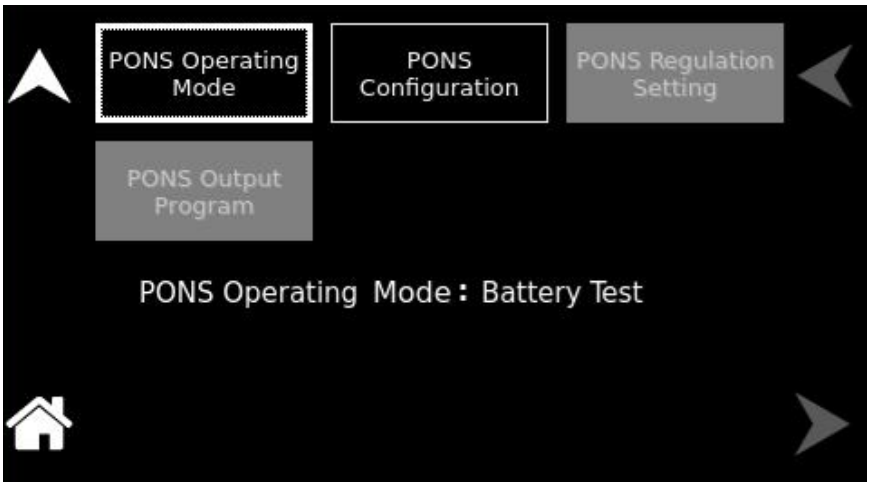


Figure 15-32. PONS – Main Screen

15.2.4.7.1 PONS OPERATING MODE

The 'PONS Operating Mode Settings' will not change automatically when the user changes the mode in the 'Operating Mode' settings on the Home screen. Users must separately select the 'BATTEST' mode in the 'PONS Operating Mode Settings', which will update the 'PONS Operating Mode Settings' screen and the 'PONS Configuration' screen. Refer to Figure 15-33 and Figure 15-34.

The same applies to other modes such as Bi-DIR, SOUR, ELOAD, PVSIM and BATSIM. Refer to the Sections 10.2.5.7.1, 11.2.5.7.1, 12.2.5.7.1, 13.2.4.2.1.5 and 14.2.4.7.1.

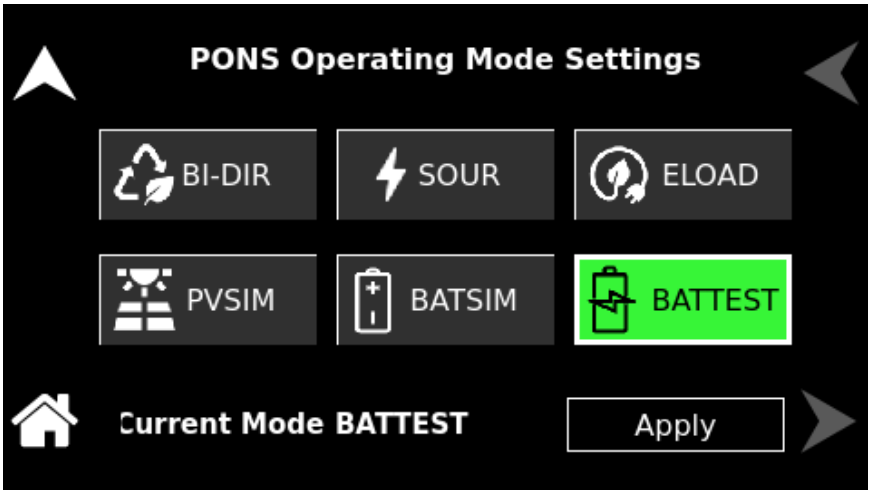


Figure 15-33. PONS Operating Mode Settings

15.2.4.7.2 PONS CONFIGURATION

In the ‘PONS Configuration’ settings, the menu enables users to select ‘PONS Protection’, ‘PONS External Relay’, ‘PONS Output Sense’, ‘PONS Measurement Average Samples’, ‘PONS Remote Inhibit’, ‘PONS Remote Output’, ‘PONS AC Input Line’, ‘PONS Multi Chassis Operation’, and ‘PONS Parallel Operation Mode (enabled only in parallel operation)’. Refer to Figure 15-34.

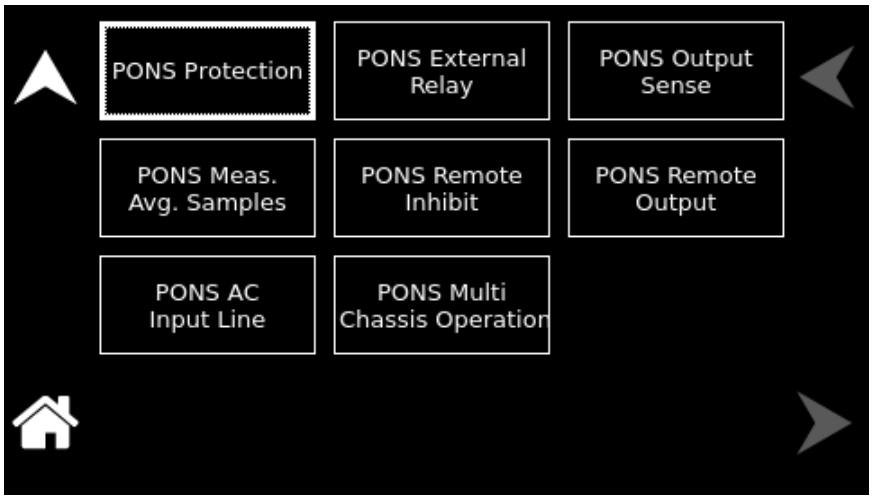


Figure 15-34. PONS Configuration mode

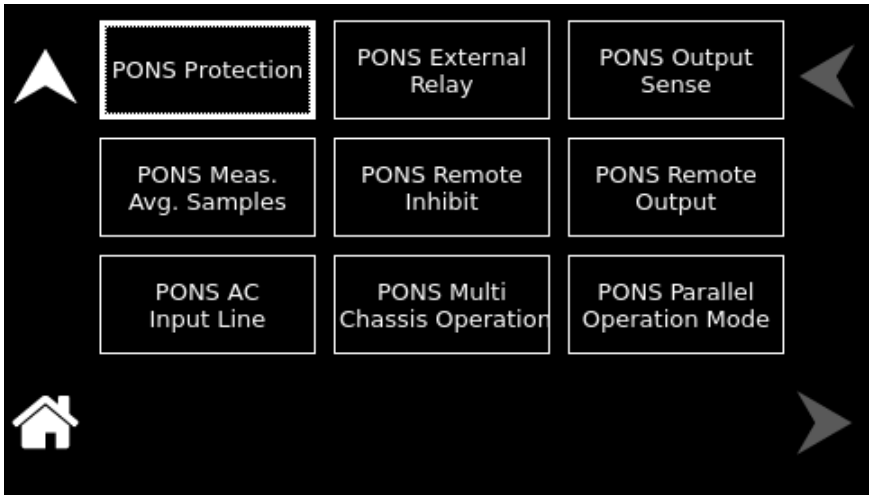


Figure 15-35. PONS Configuration mode – Parallel Operation

The PONS Configuration Settings menu has the following fields:

ENTRY	DESCRIPTION
PONS Protection	Users can define OVP, Pos. OCP and Neg. OCP to help safeguard their devices from electrical anomalies by shutting down the output if it exceeds the preset voltage. Refer to Figure 15-36.

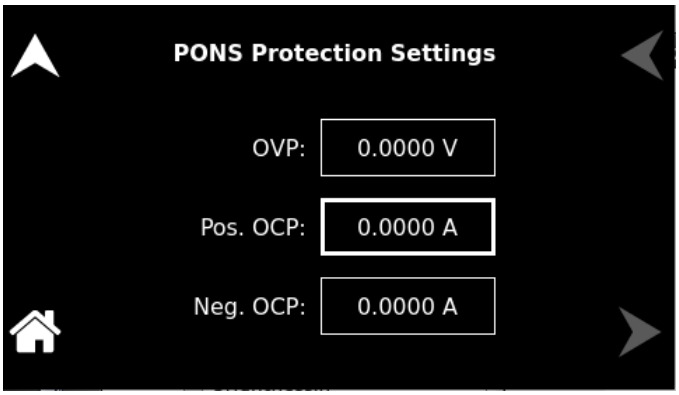


Figure 15-36. PONS Protection Settings

PONS External Relay	Users can set the isolation relay to either 'Enable' or 'Disable'. When Enable is selected, the relay activates to isolate control and power circuits. When Disable is selected, the relay remains inactive, allowing direct operation of the circuits. Refer to Figure 15-37.

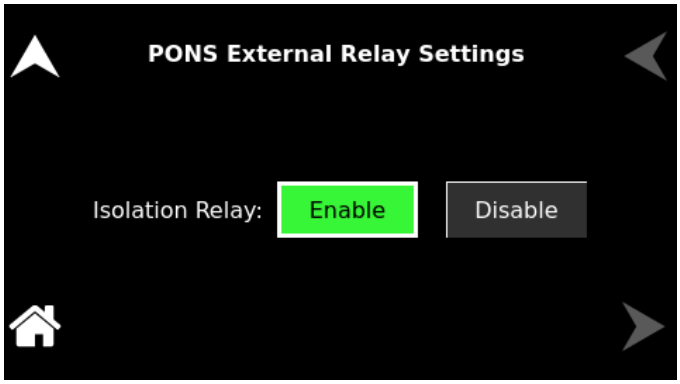


Figure 15-37. PONS External Relay Settings

PONS Output Sense	User can program the PONS output to 'Local' or 'Remote'. Refer to Figure 15-38.

ENTRY	DESCRIPTION

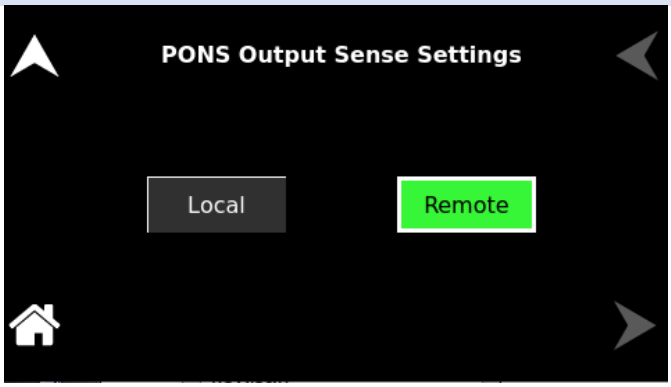


Figure 15-38. PONS Output Sense Settings

PONS Measurement Average Samples

Users can specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 15-39.

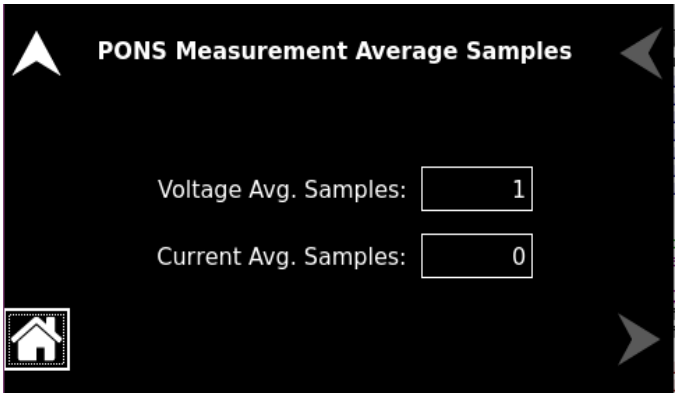


Figure 15-39. PONS Measurement Average Samples

PONS Remote Inhibit

User can control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 15-40.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

Remote inhibit can be configured in three modes;

- **Latch:** after reclosing the contact, user needs to clear the fault and turn ON the output.
- **Live:** after reclosing the contact, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

b) Remote Inhibit Input – Active Source

ENTRY	DESCRIPTION
	An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply. Remote inhibit can be configured in three modes; • **Latch:** after removing the active voltage source, user needs to clear the fault and turn ON the output. • **Live:** after removing the active voltage source, user needs to turn ON the output. • **OFF:** inhibit function would be disabled.

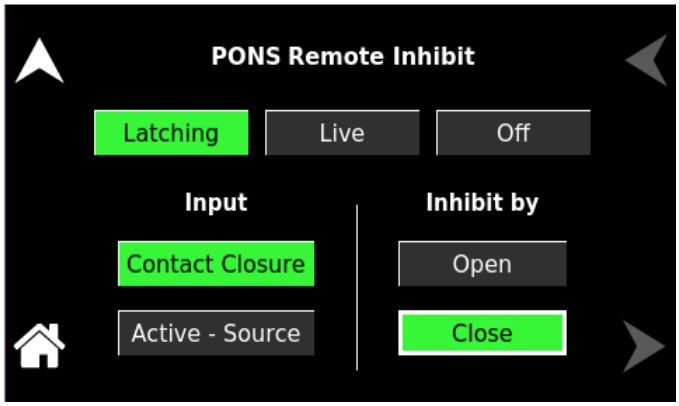


Figure 15-40. PONS remote Inhibit

PONS Remote Output

User can program the PONS Remote output to ON or OFF state. Refer to Figure 15-41.

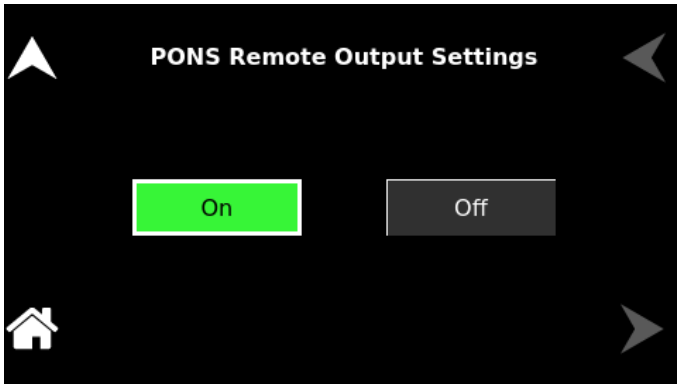


Figure 15-41. PONS Remote Output settings

PONS AC Input Line

User can select either the High Line or Low Line option based on the required input voltage range. Refer to Figure 15-42.

a) High Line: The nominal High Line Input range is 380 to 480 VAC.

ENTRY	DESCRIPTION

b) Low Line: The nominal Low line input range is 200 to 240 VAC.

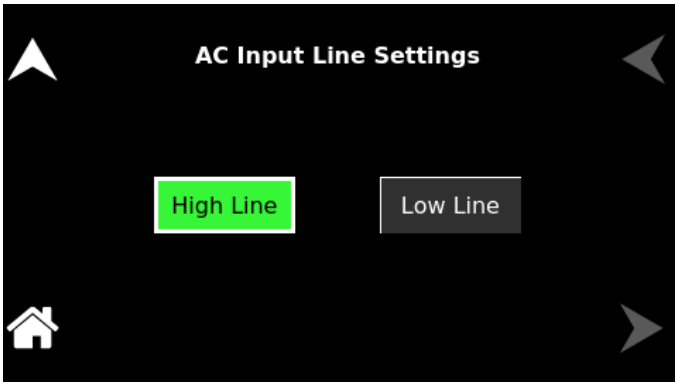


Figure 15-42. AC Input Line Settings

PONS Multi Chassis Operation

Users can select the operation setting to Parallel. Refer to Figure 15-44.

a) Parallel: Configure to perform parallel operation mode. Refer to Chapter 5.

NOTE: If the unit is operating in standalone mode and the user selects the Parallel option, the selection remains enabled on the display; the setting does not affect unit operation.

NOTE: Series and Series Split Phase operations are not applicable for BATTEST mode. If the user select series or series split phase, option remains enabled in the display; the setting does not affect unit operation.

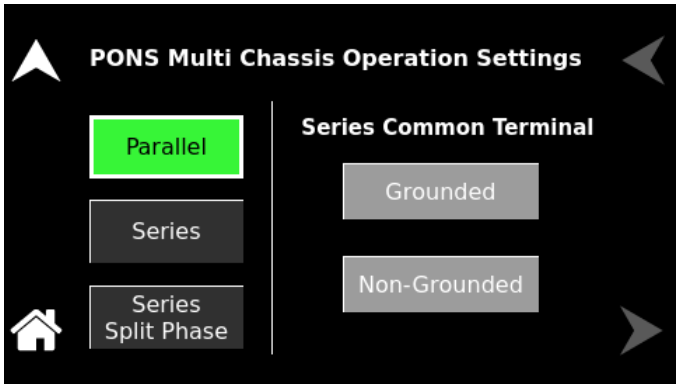


Figure 15-43. PONS Parallel Multi Chassis Operation Settings

PONS Parallel Operation Mode

User can select the parallel operation mode settings to Max Power or Max Current. Refer to Figure 15-44.

NOTE: Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel.

a) Max Power: Configure to deliver maximum power by limiting the overall current.

ENTRY	DESCRIPTION
	b) **Max Current:** Configure to deliver maximum current by limiting the overall power.

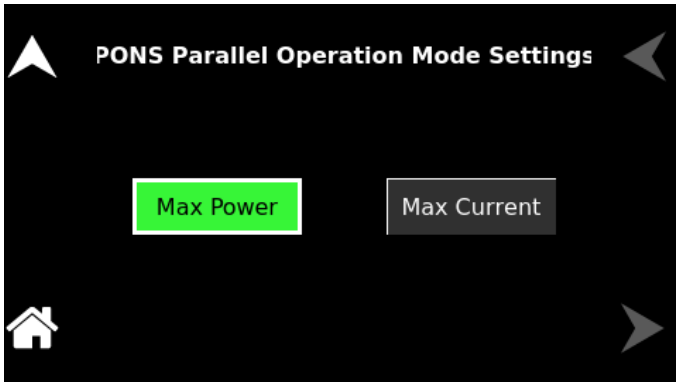


Figure 15-44. PONS Parallel Operation Mode Settings

Table 15-7. PONS Configuration mode

15.2.4.8 MEASUREMENT AVERAGE SAMPLES

The Measurement Average Samples Settings Menu allows the user to specify how many readings should be averaged together to minimize noise in the output. Refer to Figure 15-45.

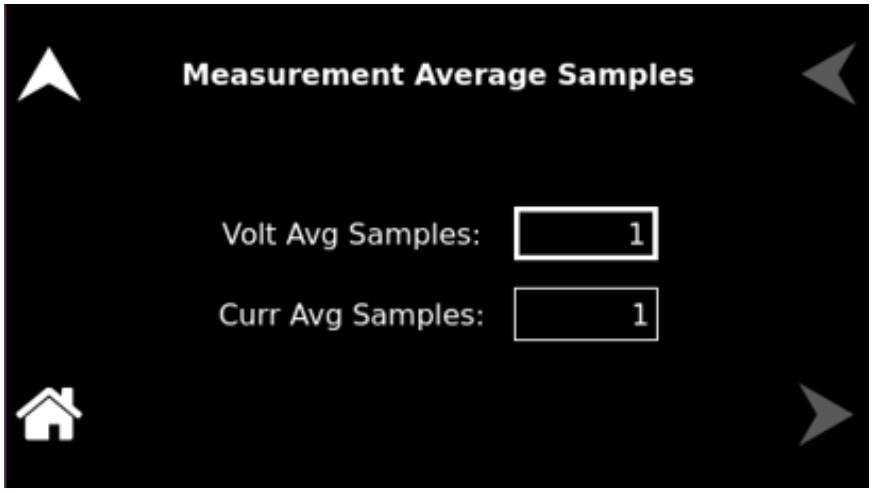


Figure 15-45. Measurement Average Samples

The Measurement Average Samples Settings menu has the following fields:

ENTRY	DESCRIPTION
Volt Avg Samples	Sets the number of voltage readings to average together to reduce noise in the voltage readback. Allows to set a value between 1 to 8.
Curr Avg Samples	Sets the number of current readings to average together to reduce noise in the current readback. Allows to set a value between 1 to 8. The value of 1 (factory default) provides the fastest response time in the readings, but less rejection of noise.

Table 15-8. Measurement Average Samples

15.2.4.9 PARALLEL OPERATION MODE

The Parallel Operation Mode setting is enabled only when the Mi-BEAM power supply is in parallel operation. This menu allows the user to achieve either maximum power or maximum current during parallel operation. When ‘Max Current’ is selected, the system delivers maximum current by limiting the overall power, whereas when ‘Max Power’ is selected, the system delivers maximum power by limiting the overall current. Refer to Figure 15-46.

NOTE: Selection is significant only when 1200 V, 1500 V or 2000 V units with different power ratings are connected in parallel.

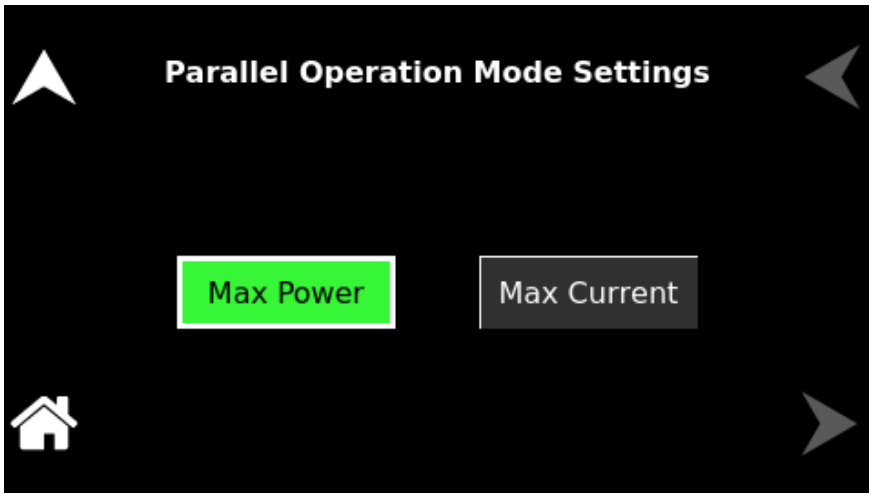


Figure 15-46. Parallel Operation Mode Settings

15.2.5 CONTROL INTERFACE SCREEN

The Control Interface screen provides ‘LAN’, ‘RS232’, ‘USB’, ‘External CAN’ (Default), ‘GPIB’ (available only when Mi-BEAM power supply is equipped with a GPIB interface) and ‘Remote inhibit’. For the top-level menu of the Control Interface Screen, refer to Figure 15-47 and for instructions on how to navigate to the Measurements screen, refer to Section 9.4.2.2.

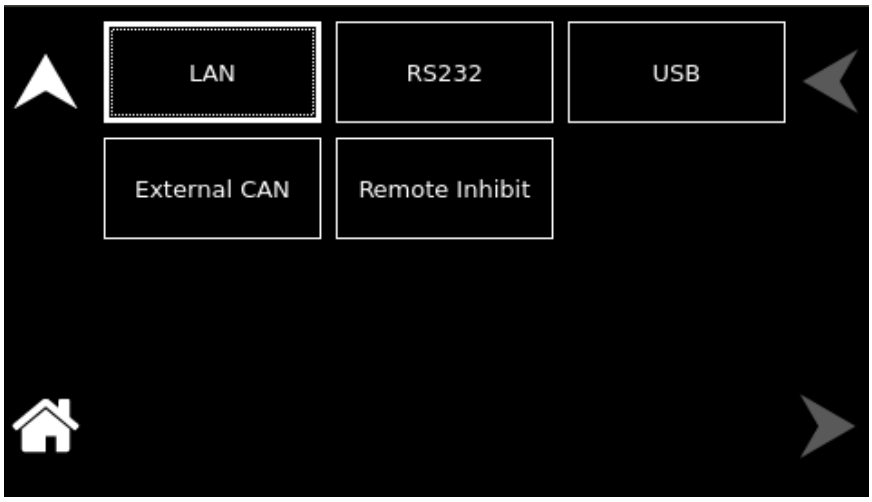


Figure 15-47. Control Interface Screen Top-Level Menu

When the Mi-BEAM power supply is equipped with a GPIB interface, the control interface screen menu changes. Refer to Figure 15-48.



Figure 15-48. Control Interface Screen Top-Level Menu – GPIB Option

The Control interface Settings menu has the following fields:

ENTRY	DESCRIPTION
LAN	Configures the LAN (LXI Ethernet) communications interface, refer to Figure 15-49. After settings are changed, the unit must be turned OFF/ON for them to take effect.

ENTRY	DESCRIPTION

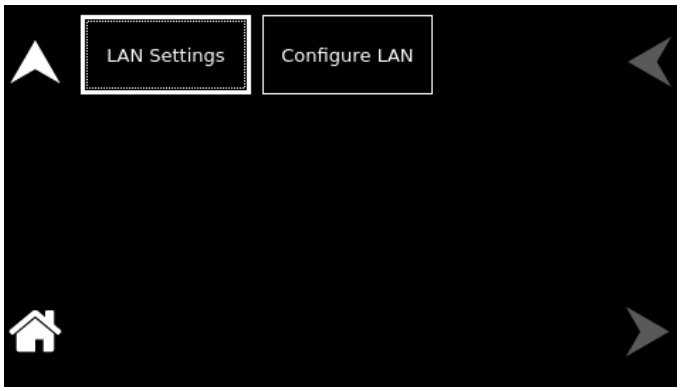


Figure 15-49. LAN Screen

a) LAN SETTINGS

Lists the configuration settings of the LAN interface, and the DNS-SD service name; a number, (n), would be appended to the service name, if necessary, to differentiate duplicate power supply names. Refer to Figure 15-50.

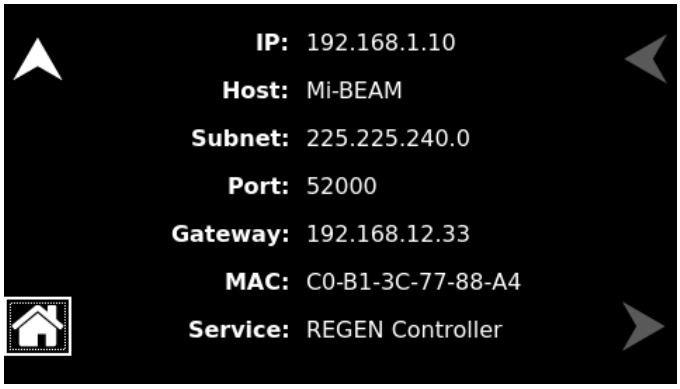


Figure 15-50. LAN Settings

b) LAN CONFIGURE

Sets parameter values and controls operation of the LAN interface. Refer to Figure 15-51.

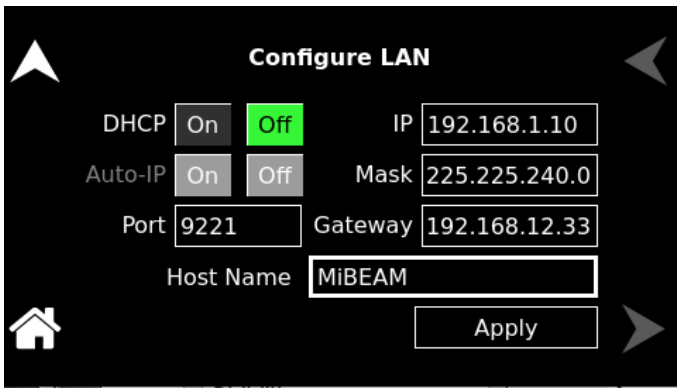


Figure 15-51. Configure LAN

ENTRY	DESCRIPTION

- **DHCP**: Selects whether DHCP is enabled or disabled. Refer to Figure 15-52.

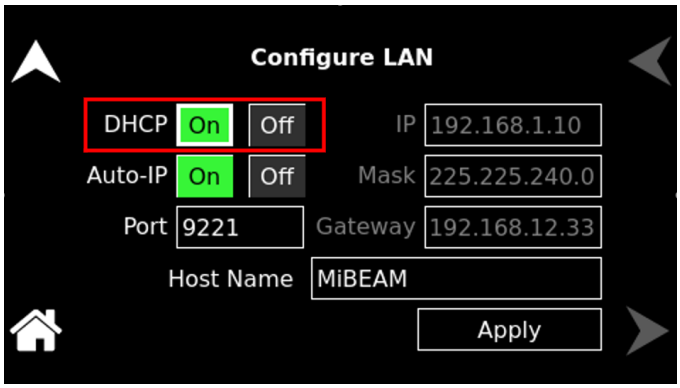


Figure 15-52. LAN Screen – DHCP

NOTE: When DHCP is selected, the IP address is assigned by the network DHCP server. If DHCP server fails to assign an IP address and Auto-IP is enabled, the unit gets an IP address in the range of 169.254.X.X.

- **Auto-IP**: Enable or disable the Auto-IP configuration, when DHCP is ON. Refer to Figure 15-53.

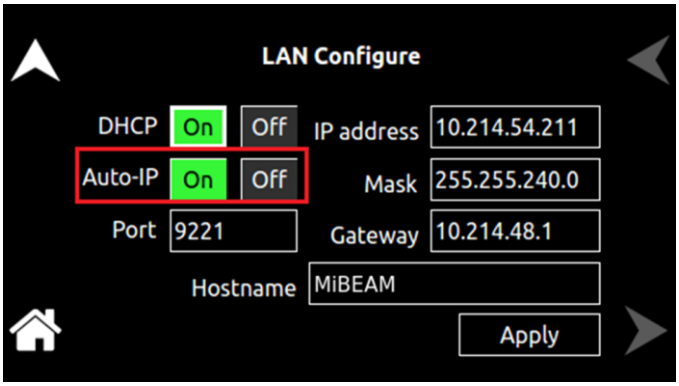


Figure 15-53. LAN Screen - Auto -IP

- **IP Address**: Sets the static IP address for the unit. When DHCP is turned off in the LAN CONFIG sub-menu, AUTO IP is selected, set the IP address to all zeros so that the IP address would be requested from the network; when DHCP is selected, the IP address is assigned by the network DHCP server. Refer to Figure 15-54.

ENTRY	DESCRIPTION

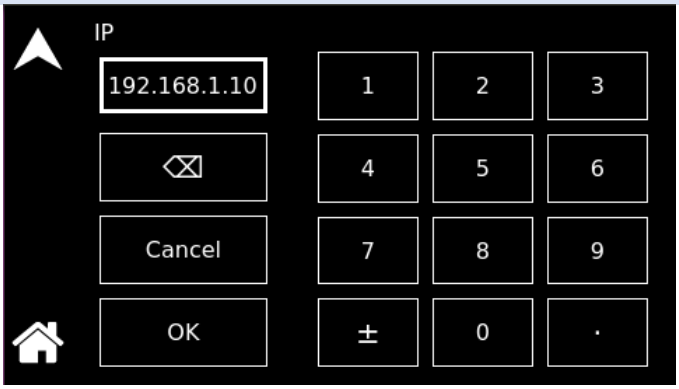


Figure 15-54. LAN Screen - IP Address

- **Subnet Mask**: Sets the subnet mask for use in static IP configuration. Refer to Figure 15-55.

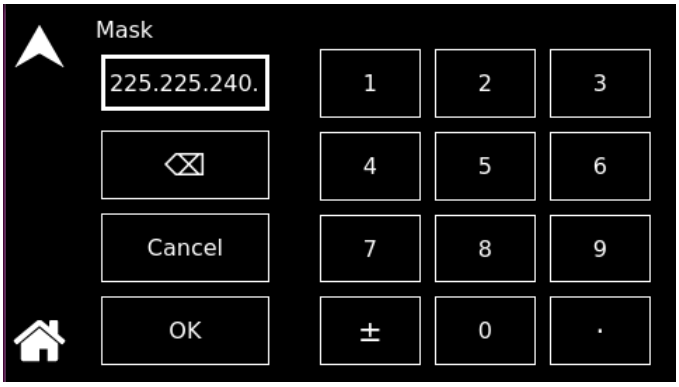


Figure 15-55. LAN Screen - Subnet Mask

- **Gateway Address**: Sets the gateway address when DHCP is turned off in the LAN CONFIG sub-menu and when AUTO IP is selected, set the gateway address to all zeros so that the gateway address would be requested from the network; when DHCP is selected, the gateway address is assigned by the network DHCP server. Refer to Figure 15-56.

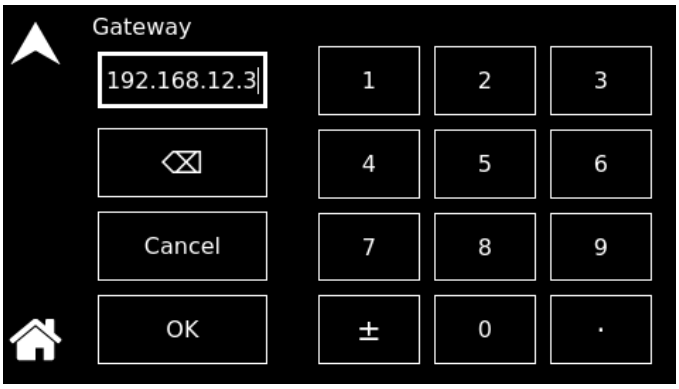


Figure 15-56. LAN Screen - Gateway Address

ENTRY	DESCRIPTION

NOTE: When DHCP is selected, the gateway address is assigned by the network DHCP server.

- **Port**: sets the port number; the factory-default value is 9221. Refer to Figure 15-57.



Figure 15-57. LAN Screen -Port

- **MAC Address:** Displays the MAC address; the MAC address is listed on a label on the chassis of the unit. Refer to Figure 15-58.



Figure 15-58. MAC Address

- **Host Name**: Allows setting a unique alpha-numeric host name. Refer to Figure 15-59.

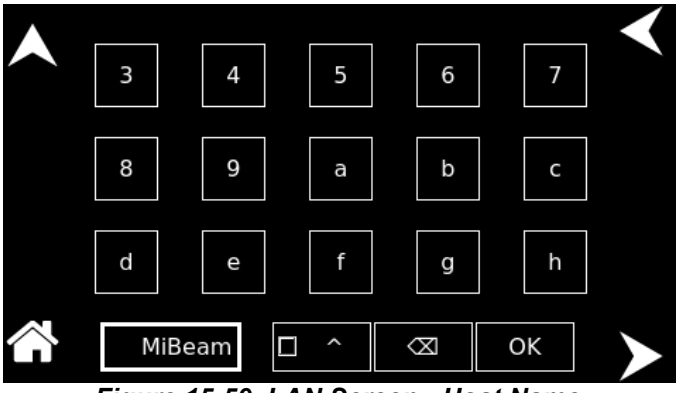


Figure 15-59. LAN Screen - Host Name

ENTRY	DESCRIPTION

- **Apply**: Applies the LAN settings to the supply. Refer to Figure 15-60 and Figure 15-61.

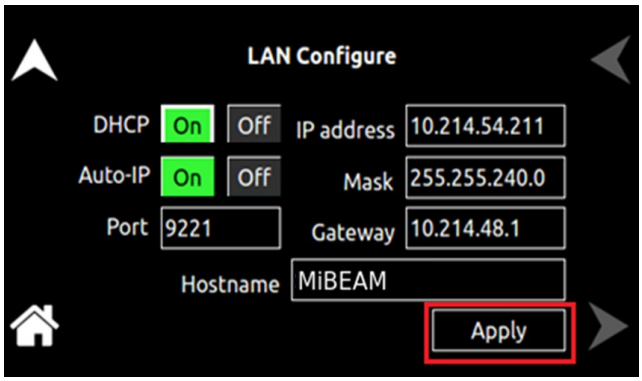


Figure 15-60. LAN Screen – Apply

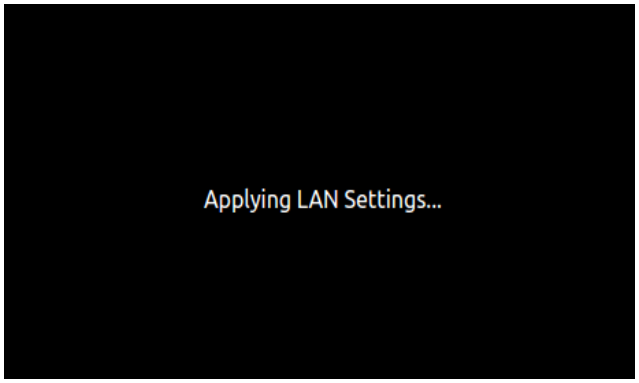


Figure 15-61. LAN Screen - Applying LAN Settings

RS232

Configures the RS-232C communications interface. RS232 has two sub-menus: RS232 Settings and RS232 Configure

a) RS232 Settings: Lists the configured Baud Rate, Stop Bits, Bits and Parity for the RS232 digital interface, refer to Figure 15-62.

- **Baud Rate:** sets baud rate to either 9600, 19200, 38400, 57600 or 115200 baud. The default setting is 115200 baud.
- **Stop Bits:** sets the number of stop bits to either 1 or 2 bits. The default setting is 1 stop bit.
- **Data:** sets the number of data bits to either 7 or 8. The default setting is 8 bits.
- **Parity:** sets the parity to either Even, Odd, or no parity, None. The default setting is no parity, None.

ENTRY	DESCRIPTION



Figure 15-62. RS232 Screen -Settings

b) Configure RS232: Configures the RS-232 Baud Rate, refer to Figure 15-63 and Figure 15-64. This setting must match those set for the communications port of the user external controller.

- **Baud Rate:** sets baud rate to either 9600, 19200, 38400, 57600 or 115200 baud. The default setting is 115200 baud.

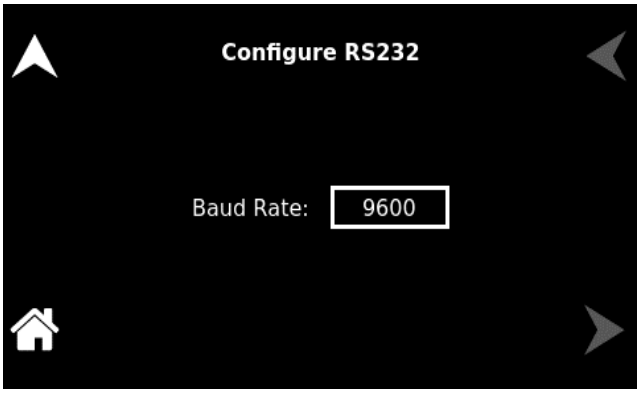


Figure 15-63. RS232 Screen -Configure

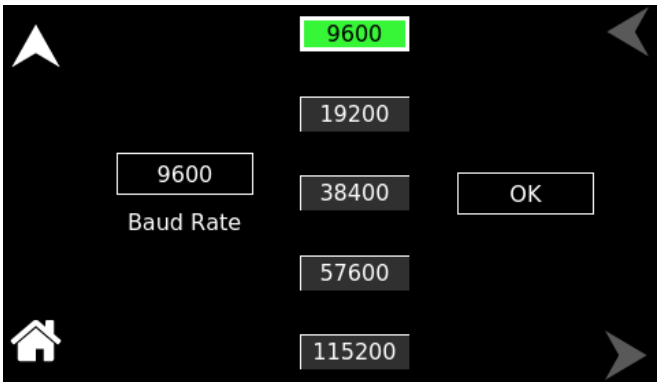


Figure 15-64. Baud Rate Selection

USB Displays the configured Baud Rate. Refer to Figure 15-65.

ENTRY	DESCRIPTION

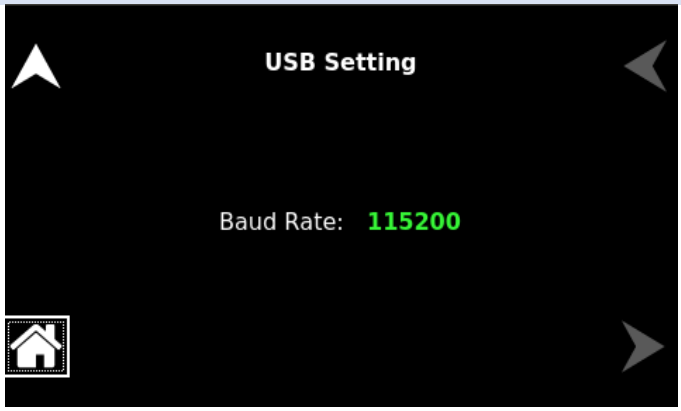


Figure 15-65. USB Setting

External CAN

Configures the device Node Address, Baude Rate and Communication Protocol. Refer to Figure 15-66.

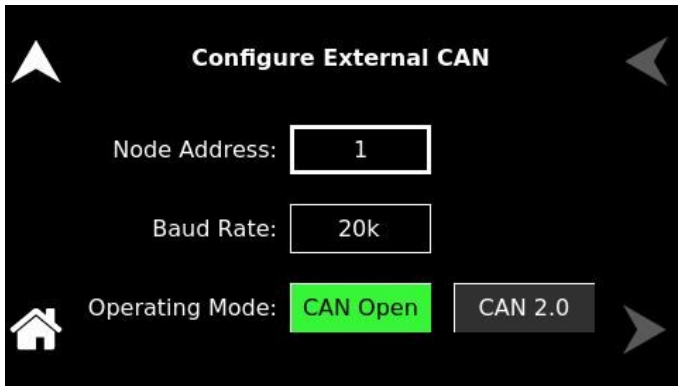


Figure 15-66. Configure External CAN

a) **Node Address:** Sets the CAN Node Address to the range of 1 to 127. Refer to Figure 15-67.



Figure 15-67. Node Address

ENTRY	DESCRIPTION

b) Baud Rate: Sets baud rate from 20kbps to 1mbps (20k, 40k, 50k, 80k, 100k, 125k, 150k, 200k, 250k, 400k, 500k, 1000 kbps). Refer to Figure 15-68.



Figure 15-68. Baud Rate

c) Operating Mode: Sets the communication protocol to CAN2.0 or CANopen. Refer to Figure 15-66.

- **CANopen**
  - Covers basic CANopen configuration, including NMT (Network Management) setup, TPDO (Transmit Process Data Object) mapping, and SDO (Service Data Object) structures.
  - Enables standardized communication and seamless integration into existing industrial CANopen networks.
- **CAN 2.0**
  - Describes the Hardware configuration and use of extended 29-bit identifiers.
  - Supports custom command or response mappings, allowing flexible and proprietary protocol integration.

ENTRY	DESCRIPTION
GPIB	Displays and Configures the GPIB Setting. Refer to Figure 15-69.

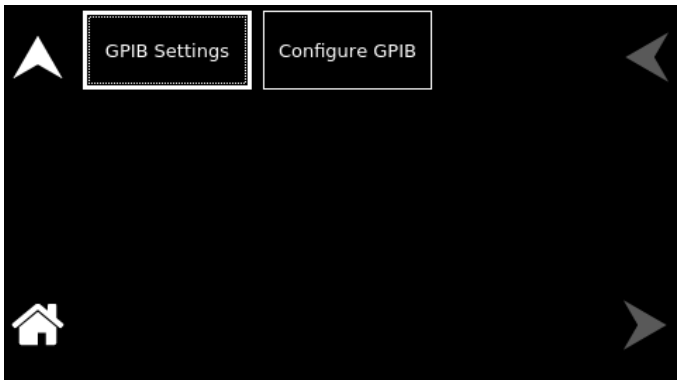


Figure 15-69. GPIB Setting

a) GPIB Settings

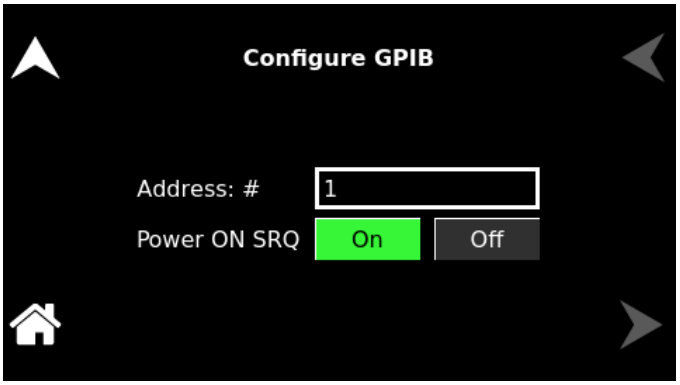
Displays the configured address and Power ON SRQ.



Figure 15-70. GPIB Settings

b) Configure GPIB

Configure the IEEE-488 address; the default is 1. The address can be set from 0 through 30 and allows to turn On/Off the Power ON Service Request. Power On SRQ set to On causes a GPIB service request to be sent to the computer, when the Power Supply is turned on. Factory Default value for Power On SRQ is Off.



ENTRY	DESCRIPTION

Figure 15-71. Configure GPIB

Remote Inhibit

Sets the control the power supply output remotely by either closing a contact or applying an active voltage source, depending on the configuration. This can be particularly useful for safety and operational control in various applications. Refer to Figure 15-72.

a) Remote Inhibit Input – Contact Closure

Switch or Relay contact closure or direct short from this terminal to signal return is required to Turn ON the output of power supply. Opening the contact would shut down the output.

Remote inhibit can be configured in three modes;

- **Latch**: after reclosing the contact, user needs to clear the fault and turn ON the output.
- **Live**: after reclosing the contact, user needs to turn ON the output.
- **OFF**: inhibit function would be disabled.

b) Remote Inhibit Input – Active Source

An active voltage source from this terminal to signal return is required to Turn OFF the output of power supply.

Remote inhibit can be configured in three modes;

- **Latch:** after removing the active voltage source, user needs to clear the fault and turn ON the output.
- **Live:** after removing the active voltage source, user needs to turn ON the output.
- **OFF:** inhibit function would be disabled.

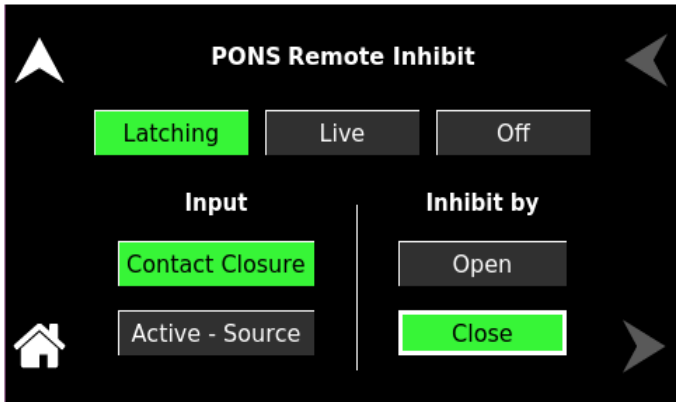


Figure 15-72. PONS remote Inhibit

Table 15-9. System Setting Screen

15.2.6 OPERATING MODE

The Operating Mode Settings screen offers comprehensive guidance on the system modes of the Mi-BEAM Series power supply. This model is engineered for versatile and reliable performance across various applications, ensuring precise and efficient power delivery through its advanced control features. Depending on user requirements, the Mi-BEAM Series supports multiple modes of operation. Refer to the Figure 15-73.

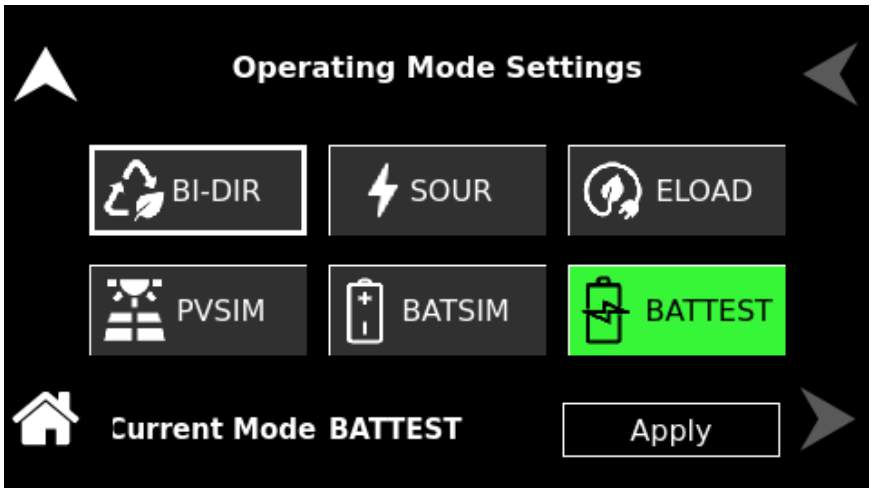


Figure 15-73. Operating Mode

15.2.7 SYSTEM SETTINGS SCREEN

The System Settings screen provides the settings of ‘Hardware Limits’, ‘System Details’, ‘Firmware Version’, ‘LCD’, ‘Default Screen’ and ‘Factory Default’. For the top-level menu of the System Settings Screen, refer to Figure 15-74 and for instructions on how to navigate, refer to Section 9.4.2.2.

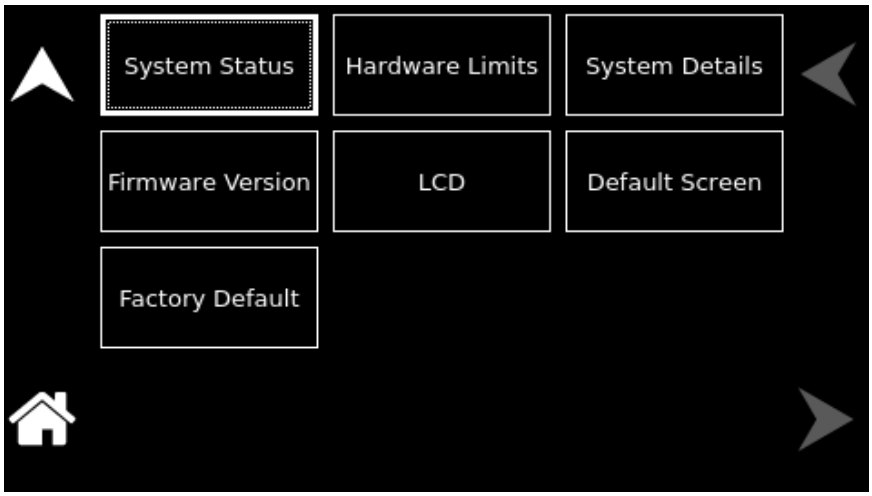


Figure 15-74. System Settings Screen

The System Settings menu has the following fields:

ENTRY	DESCRIPTION
System Status	Displays the present system status information of the power supply, including the Input Line, Output Sense, Isolation, Chassis Type and No. of chassis. Refer to Figure 15-75 and Figure 15-76. **NOTE:** The chassis type changes depending on the connection configuration; it is identified as Standalone (the power supply operates independently), and Multi-chassis Parallel (the power supply is connected in parallel).

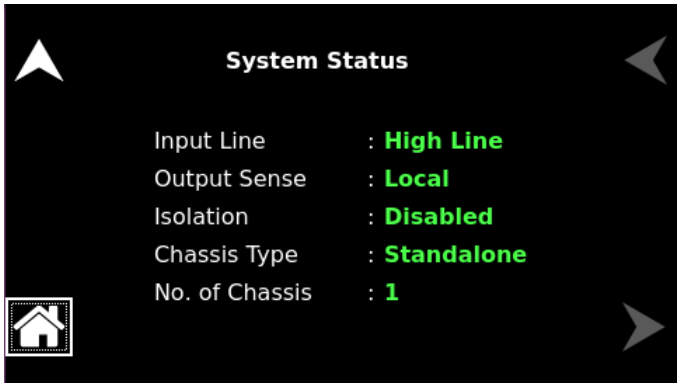


Figure 15-75. System Status– Standalone Unit

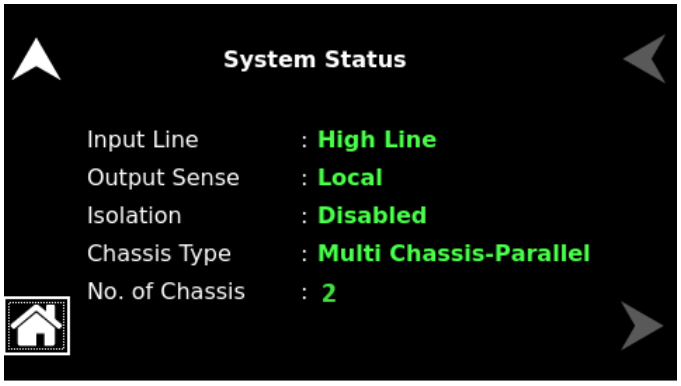


Figure 15-76. System Status – Parallel Operation

Hardware Limits Displays the hardware parameter limit values. Refer to Figure 15-77.

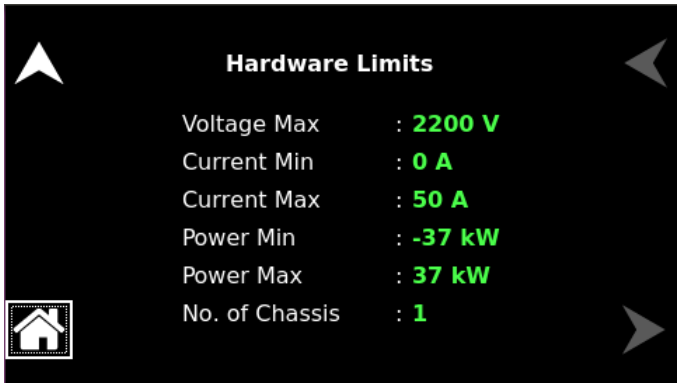


Figure 15-77. Hardware Limits

ENTRY	DESCRIPTION
System Details	Displays information about the user's device, including the Manufacturer, Model Number, Serial Number, Last Calibration Date, and Operating Mode. Refer to Figure 15-78.

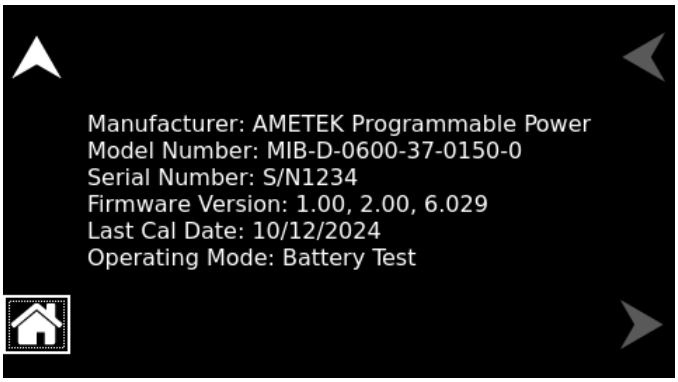


Figure 15-78. System Details

Firmware Version	Displays information about the configuration of the power supply, including the Communication Controller, System Interface, Front Panel, Fan Controller, Mod 1 Primary Controller, Mod 1 Secondary Controller, Mod 2 Primary Controller, Mod 2 Secondary Controller, Mod 3 Primary Controller, Mod 3 Secondary Controller. This information helps identify the unit. Refer to Figure 15-79.

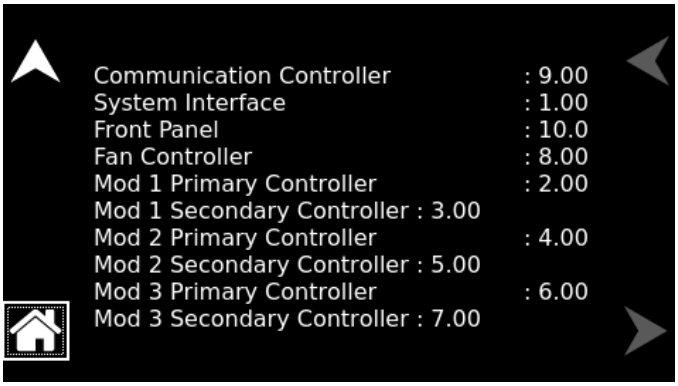


Figure 15-79. Firmware Version

LCD	Provides settings for the calibration of the display touchscreen. Refer to Figure 15-80.

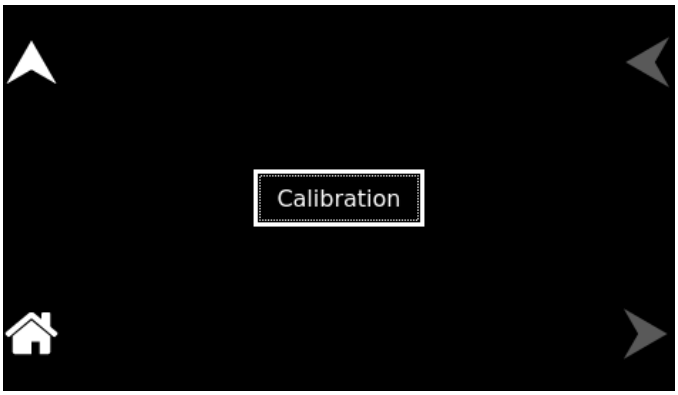


Figure 15-80. LCD

ENTRY	DESCRIPTION
Default Screen	Selects whether the Default screen (showing measured voltage, current and power) is enabled or disabled, refer to Figure 15-81 and Figure 15-82. It allows to set the time out if the default screen is enabled. **a) Timeout Interval**: Selects the time, in seconds, for how long Dashboard screen must be inactive before the Default screen is displayed.

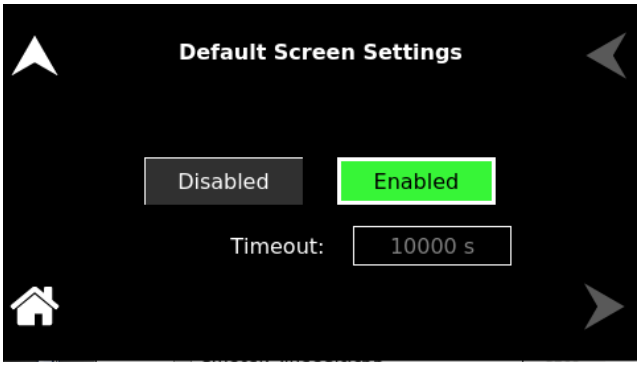


Figure 15-81. Default Screen Settings

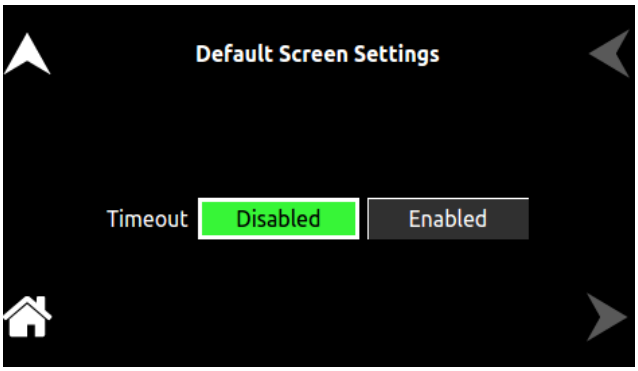


Figure 15-82. System Settings Screen - Default Screen Disabled

Factory Default	Set the device to its original factory settings, as it was when it left the manufacturer. Refer to Figure 15-83.

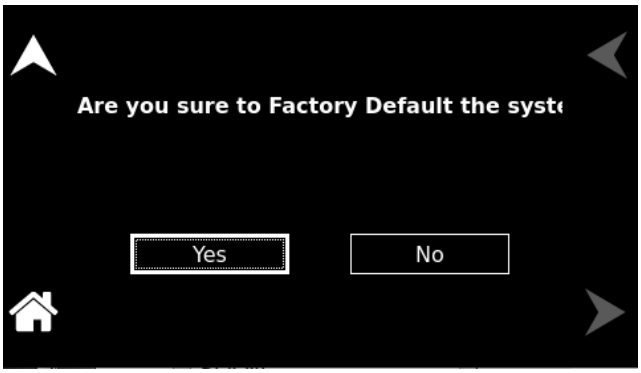


Figure 15-83. Factory Default

Table 15-10. System Setting Screen

15.2.8 SYSTEM FAULTS SCREEN

The System Faults screen provides descriptions of faults that have occurred in a power module. The fault screen appears if any supply fault conditions occur, refer to Figure 15-84. The user should press ‘Clear’ to clear the fault and continue operating the power supply, and press ‘Reload’ to refresh the system faults and check for errors. If no fault has occurred, the screen will display ‘No Fault Occurred’, refer to Figure 15-85.

NOTE: These conditions might resolve themselves; however, if they continue to occur after pressing 'Clear', refer to Chapter 17.

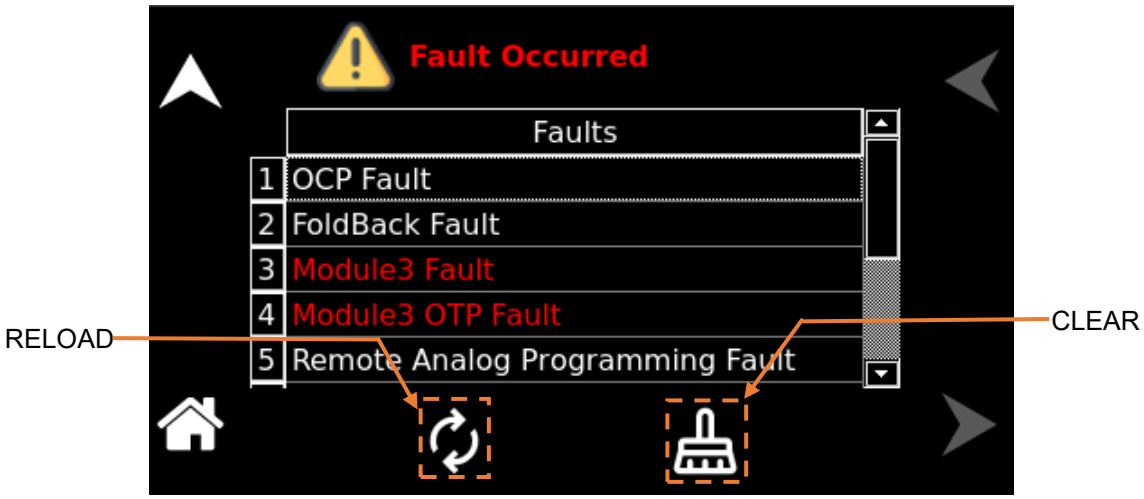


Figure 15-84. System Faults



Figure 15-85. No Fault Occurred Screen

If any fault occurs on the Follower screen, a fault signal is generated. Press ‘Faults’ to view the fault details on the Follower screen. Refer to Figure 15-86.

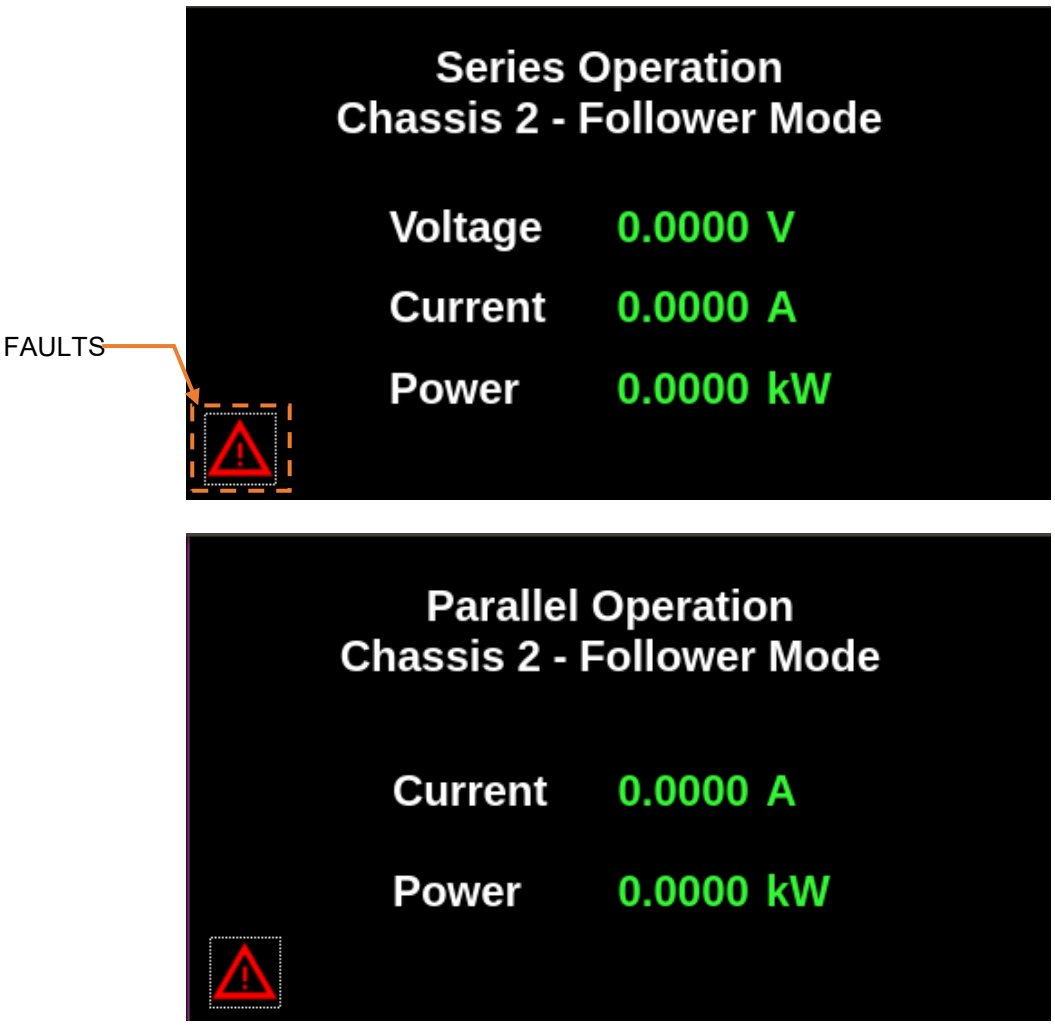


Figure 15-86. Follower Faults Screen

16 CALIBRATION

This chapter provides the procedures required to calibrate the Mi-Beam power supply. It is recommended that calibration should be performed at 12-month intervals, or following service if subassemblies are replaced. The procedures are performed using SCPI commands through the remote digital interface using either the Virtual Panels GUI program or another suitable communication program. For details related to operation through the remote digital interface, refer to the Mi-Beam Programming Manual M587352-01.

16.1 CALIBRATION PROCEDURES

16.1.1 PREPARATION FOR CALIBRATION



WARNING!

Hazardous voltages exist at the rear of the power supply; avoid contact with the AC input and AC/DC output terminals and be aware that filter capacitors store potentially dangerous energy for some time after power is removed.



TECHNICIAN SYMBOL

Only qualified personnel should perform maintenance or service tasks.

The calibration procedures require precision instrumentation to measure voltage and current; when substituting for the recommended test equipment, ensure that the accuracy is adequate so that excessive error is not incurred, compared to the specifications of the parameters that are to be calibrated. To set up the alignment procedures, perform the following initial steps:

a) Disconnect the Unit (Mi-BEAM) AC input power.

b) Disconnect all loads from the Unit's output terminals.

c) Connect the Unit sense lines to the output terminals.

d) Connect the DVM to the Unit output terminals.

e) Reconnect the AC input power.

f) Turn the unit ON and allow the unit to warm up for at least 30 minutes.

g) Set up the Ethernet communication by connecting the Ethernet cable to the rear panel of the Unit.

16.1.2 LOCAL SENSE VOLTAGE PROGRAMMING CALIBRATION

a) Perform the calibration in no load condition.

b) Configure the Unit to Voltage programming type and regulation into CV by sending the command:

```
OUTP:PROG:TYPE VOLT
OUTP:PROT:FOLD CV
```

c) Set the current and over voltage protection value to 100%, and sense to local by sending the SCPI commands:

```
OUTP:SENS 0
CAL:OUTP:CURR:PROT:POS:PER 100
CAL:OUTP:CURR:PROT:NEG:PER 100
CAL:OUTP:VOLT:PROT:PER 100
```

d) Enable the Output of the Unit:

```
OUTP:STAT 1
```

e) Set the calibration voltage value to 5% by sending the SCPI command:

```
CAL:OUTP:VOLT:PER 5
```

f) Measure the output voltage using a DMM. It should be approximately 5% of the rated output voltage. Set the 1st point of the calibration by sending the command:

```
CAL:OUTP:VOLT:FIVEPOINT 1 <data>
```

NOTE: where '<data>' is the measured output voltage from the DMM.

g) Set the calibration voltage value to 25% by sending the SCPI command:

```
CAL:OUTP:VOLT:PER 25
```

h) Measure the output voltage using a DMM. It should be approximately 25% of the rated output voltage. Set the 2nd point of the calibration by sending the command:

```
CAL:OUTP:VOLT:FIVEPOINT 2 <data>
```

NOTE: where '<data>' is the measured output voltage from the DMM.

i) Set the calibration voltage value to 50% by sending the SCPI command:

```
CAL:OUTP:VOLT:PER 50
```

j) Measure the output voltage using a DMM. It should be approximately 50% of the rated output voltage. Set the 3rd point of the calibration by sending the command:

```
CAL:OUTP:VOLT:FIVEPOINT 3 <data>
```

NOTE: where '<data>' is the measured output voltage from the DMM.

k) Set the calibration voltage value to 75% by sending the SCPI command:

```
CAL:OUTP:VOLT:PER 75
```

l) Measure the output voltage using a DMM. It should be approximately 75% of the rated output voltage. Set the 4th point of the calibration by sending the command:

```
CAL:OUTP:VOLT:FIVEPOINT 4 <data>
```

NOTE: where '<data>' is the measured output voltage from the DMM.

m) Set the calibration voltage value to 90% by sending the SCPI command:

```
CAL:OUTP:VOLT:PER 90
```

n) Measure the output voltage using a DMM. It should be approximately 100% of the rated output voltage. Set the 5th point of the calibration by sending the command:

```
CAL:OUTP:VOLT:FIVEPOINT 5 <data>
```

NOTE: where '<data>' is the measured output voltage from the DMM.

o) Set the calibration voltage value to zero and store the calibrated value by sending the following SCPI commands:

```
CAL:OUTP:VOLT:PER 0
CAL:OUTP:VOLT:FIVEPOINT?
OUTP:STAT 0
CAL:OUTP:VOLT:CALC
CAL:UNLOCK "6867"
CAL:STORE
CAL:LOCK
```

p) Program the DC bidirectional power supply output voltage to 0 V and disable the output.

16.1.3 REMOTE SENSE VOLTAGE PROGRAMMING CALIBRATION

a) Perform the calibration in no load condition.

b) Configure the Unit to Voltage programming type and regulation into CV by sending the commands:

```
OUTP:PROG:TYPE VOLT
OUTP:PROT:FOLD CV
```

c) Set the current and over voltage protection value to 100%, and sense to remote by sending the SCPI commands:

```
OUTP:SENS 1
CAL:OUTP:CURR:PROT:POS:PER100
CAL:OUTP:CURR:PROT:NEG:PER100
CAL:OUTP:VOLT:PROT:PER 100
```

d) Enable the Output of the Unit:

```
OUTP:STAT 1
```

e) Set the calibration voltage value to 5% by sending the SCPI command:

```
CAL:OUTP:VOLT:PER 5
```

f) Measure the output voltage using a DMM. It should be approximately 5% of the rated output voltage. Set the 1st point of the calibration by sending the command:

```
CAL:OUTP:VOLT:FIVEPOINT 1 <data>
```

NOTE: where '<data>' is the measured output voltage from the DMM.

g) Set the calibration voltage value to 25% by sending the SCPI command:

```
CAL:OUTP:VOLT:PER 25
```

h) Measure the output voltage using a DMM. It should be approximately 25% of the rated output voltage. Set the 2nd point of the calibration by sending the command:

```
CAL:OUTP:VOLT:FIVEPOINT 2 <data>
```

NOTE: where '<data>' is the measured output voltage from the DMM.

i) Set the calibration voltage value to 50% by sending the SCPI command:

```
CAL:OUTP:VOLT:PER 50
```

j) Measure the output voltage using a DMM. It should be approximately 50% of the rated output voltage. Set the 3rd point of the calibration by sending the command:

```
CAL:OUTP:VOLT:FIVEPOINT 3 <data>
```

NOTE: where '<data>' is the measured output voltage from the DMM.

k) Set the calibration voltage value to 75% by sending the SCPI command:

```
CAL:OUTP:VOLT:PER 75
```

l) Measure the output voltage using a DMM. It should be approximately 75% of the rated output voltage. Set the 4th point of the calibration by sending the command:

```
CAL:OUTP:VOLT:FIVEPOINT 4 <data>
```

NOTE: where '<data>' is the measured output voltage from the DMM.

m) Set the calibration voltage value to 90% by sending the SCPI command:

```
CAL:OUTP:VOLT:PER 90
```

n) Measure the output voltage using a DMM. It should be approximately 100% of the rated output voltage. Set the 5th point of the calibration by sending the command:

```
CAL:OUTP:VOLT:FIVEPOINT 5 <data>
```

NOTE: where '<data>' is the measured output voltage from the DMM.

o) Set the calibration voltage value to 0 and store the calibrated value by sending following SCPI commands:

```
CAL:OUTP:VOLT:PER 0
CAL:OUTP:VOLT:FIVEPOINT?
OUTP:STAT 0
CAL:OUTP:VOLT:CALC
CAL:UNLOCK "6867"
CAL:STORE
CAL:LOCK
```

p) Program the DC bidirectional power supply output voltage to 0 V and disable the output.

16.1.4 CURRENT PROGRAMMING CALIBRATION

a) Connect the DC bidirectional power supply as load to the output of the Unit and Current Shunt in series.

b) Connect the DMM to the sense terminals of the Current Shunt.

c) Configure the DC bidirectional power supply to voltage priority and set Positive current limit, Negative current limit, and voltage as follows:

- Set Current positive Limit= 101% FSC of the Unit
- Set Current negative Limit= - 101% FSC of the Unit
- Set Voltage = 30% of the Unit rated

d) Configure the Unit programming type into Current and regulation settings into CC/CV.

```
OUTP:PROG:TYPE CURR
OUTP:PROT:FOLD CCCV
```

e) Set the calibration over voltage value to 35% of the rated voltage, enable the output of the Unit by sending the SCPI commands:

```
CAL:OUTP:VOLT:PROT:PER 35
CAL:OUTP:CURR:PROT:POS:PER 100
CAL:OUTP:CURR:PROT:NEG:PER 100
OUTP:STAT 1
```

f) Set the output current to -90% for the 1st Point, by sending SCPI command:

```
CAL:OUTP:CURR:PER -90
```

g) Measure the output voltage of the shunt using the DMM and calculate output current, Set the 1st point of the calibration by sending the command:

```
CAL:OUTP:CURR:FIVEPOINT 1 <data>
```

NOTE: where '<data>' is the calculated output current from DMM value.

h) Set the output current to -40% for the 2nd Point, by sending SCPI command:

```
CAL:OUTP:CURR:PER -40
```

i) Measure the output voltage of the shunt using the DMM and calculate output current, Set the 2nd point of the calibration by sending the command:

```
CAL:OUTP:CURR:FIVEPOINT 2 <data>
```

NOTE: where '<data>' is the calculated output current from DMM value.

j) Set the resistance for the 3rd Point and current DAC value to 0%, by sending SCPI command:

```
CAL:OUTP:CURR:PER 0
```

k) Measure the output voltage of the shunt using the DMM and calculate output current, Set the 3rd point of the calibration by sending the command:

```
CAL:OUTP:CURR:FIVEPOINT 3 <data>
```

NOTE: where '<data>' is the calculated output current from DMM value.

l) Set the calibration current value to 40%, by sending SCPI command:

```
CAL:OUTP:CURR:PER 40
```

m) Measure the output voltage of the shunt using the DMM and calculate output current, Set the 4th point of the calibration by sending the command:

```
CAL:OUTP:CURR:FIVEPOINT 4 <data>
```

NOTE: where '<data>' is the calculated output current from DMM value.

n) Set the calibration current value to 90%, by sending SCPI command:

```
CAL:OUTP:CURR:PER 90
```

o) Measure the output voltage of the shunt using the DMM and calculate output current, Set the 5th point of the calibration by sending the command:

```
CAL:OUTP:CURR:FIVEPOINT 5 <data>
```

NOTE: where '<data>' is the calculated output current from DMM value.

p) Set the calibration current value to zero and store the calibrated value by sending the following SCPI commands:

```
CAL:OUTP:CURR:PER 0
CAL:OUTP:CURR:CALC
CAL:OUTP:CURR:FIVEPOINT?
OUTP:STAT 0
CAL:UNLOCK "6867"
CAL:STORE
CAL:LOCK
```

q) Program the DC bidirectional power supply output voltage to 0V and disable the output

17 ERROR MESSAGES AND SYSTEM FAULTS

This chapter provides information on error messages and system faults that occur during operation from either the front panel or the remote digital interface.

17.1 ERROR MESSAGES

Errors that occur during operation from either the front panel or the remote digital interface will result in error messages. Error messages are stored in memory allocated to the error message queue. The error messages in the queue can be read using the SCPI query command, `SYST: ERR?`. The error queue has a finite depth; if more error messages are generated than can be held in the queue, a queue overflow message will be put in the last queue location. To empty the queue, read out the error queue until the message 'No Error' is received.

The table below displays a list of possible error messages along with their possible cause and remedy. Refer to the Mi-Beam Programming Manual for more details. Refer to the AMETEK Programmable Power website, www.programmablepower.com, to download latest version.

NUMBER	MESSAGE STRING	CAUSE	ACTION TO BE TAKEN
000	No error	No errors in the queue	Normal operation
001	Self-test pending	Self-test in progress	Wait for the self-test to complete
008	Feature Not Supported	The command might be inconsistent with the current device settings.	Check the Programming Manual to ensure if the command is supported in current device setting.
-101	System too Busy	System is busy performing previously requested operation.	Wait for the operation to complete.
-102	Syntax error	SCPI command syntax incorrect, unrecognized command or data type	Correct command syntax, e.g. misspelled or unsupported commands.
-200	Execution error	The command could not be executed	Error occurred executing the command.
-203	Command protected	The command is locked out	Some commands are supported by the unit but are locked out for the protection of settings and are not user accessible until it is unlocked.
-221	Settings conflict	Requested setting conflicts with other settings in effect	Check settings: e.g., changing regulation setting, CC/CV is not allowed if the programming type is voltage.
-222	Parameter out of range	Parameter data outside of the allowable range	Check the Programming Manual for allowable parameter values.

NUMBER	MESSAGE STRING	CAUSE	ACTION TO BE TAKEN
-250	Directory full	No sufficient space to save new files.	Delete one or more files from the unit to make room.
-251	Directory not found	Unable to find the directory where the files are stored	Reboot the unit, contact factory if the issue persists.
-252	File name error	Incorrect filename	Check file (profile/list) name definition exceeds 29 characters.
-253	File not found	Unable to find the selected file name.	Ensure that the file is available in unit before selection.
-254	File read error	Error while reading the file (profile/list) data from the unit.	Retry, if the issue persists, delete and create a new file.
-255	Parameters count not matching as per configured size	Size declared and number of entered parameters are not matching.	Ensure that the declared size and parameter count matches.
-257	CRC value for file contents changed	Saved file (profile/list) data is corrupted.	Retry, if the issue persists, delete and create a new file.
-258	Battery configuration/ User limit Configuration not loaded	Battery configuration / User limit Configuration file (profile/list) is not loaded.	Ensure that the battery configuration/ User limit Configuration is loaded before turning ON the output.
-260	Name already exist	Creating the file (profile/list) with a name that already exists.	Ensure that the file (profile/list) name is not same as the previously saved file (profile/list).
-331	System error	Error occurred during performing the requested operation.	Ensure that the operation requested does not conflict the state system is in.
-350	Queue overflow	Message queue full	Read status using `SYST:ERR` query until 0; 'No Error' is received indicating queue empty.
-351	Data not saved	Trying to load a file (profile/list) which is not saved.	Ensure that the data is saved
-352	Model identification in progress, retry again	Cannot execute the command, module identification in progress.	Wait for the module identification to complete.
-353	File not selected	Cannot execute file (profile/list) operation command.	Ensure that the file (profile/list) is selected before sending any file (profile/list) related commands such as load or delete.
-354	Data not initialized or loaded	Selected file (profile/list) is not loaded before output ON.	After selecting the file ensure it is loaded before turning ON the output.

NUMBER	MESSAGE STRING	CAUSE	ACTION TO BE TAKEN
-357	Command not supported in selected operating mode	Command not supported in selected operating mode.	Ensure that the command sent is related to the selected operating mode.

Table 17-1. Error Messages

17.2 SYSTEM FAULTS

The table below displays a list of possible system faults along with their possible cause and remedy. Refer to the Mi-Beam Programming Manual for more details. Refer to the AMETEK Programmable Power website, www.programmablepower.com, to download latest version.

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
0x00000001	Overvoltage Protection Fault	Output voltage of Mi-BEAM has exceeded the programmed Over Voltage protection (OVP) limit. OVP is an instantaneous trip. Applying (or generating) an output voltage close to OVP limit may trigger this fault. Hence, always program the OVP trip limit well above the set voltage and applied output voltage. The OVP trip limit ensures that unit voltage will never exceed the programmed OVP limit, thus protecting the connected UUT from overvoltage failure.	**a)** Check sufficient margin between set voltage and OVP limit. **b)** Check if OVP is set from external Analog source and sufficient margin between set voltage and OVP limit.
0x00000002	Overcurrent Protection Fault	Output Current exceeded Over Current trip limit. OCP is an instantaneous trip. Hence, supplying (or drawing) an output current close to OCP limit may trigger this fault. Hence, always program the OCP trip limit well above the set current and load current. The OCP trip limit ensures that unit current will never exceed the programmed OCP limit, thus protecting the connected UUT from overcurrent failure.	**a)** Check sufficient margin between set voltage and OCP limit.
0x00000004	Foldback Fault	Output trip is activated due to foldback operation setting. Foldback operation corresponds to the regulation operation other than the main regulation operation. **Example**: Assume that user has selected CC mode as the regulation setting. Then, both CV and CP modes are foldback regulation operation. If the protection limit corresponding to Volt high or Volt low or Power high or Power low is hit during a Current control (CC) operation occurs, then a foldback fault is displayed. Similarly in CC/CV mode of operation, Power high or Power low is hit, then also a foldback fault is triggered. It is to be noted that in CC/CV mode if voltage high limit is hit, then present regulation operation is changed from current control to voltage control.	**a)** Check the foldback operation setting from `OUTP:PROT:FOLD?` Query and modify as required. **b)** This is applicable for CC or CV or CP regulation modes only in all the programming types.

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
0x00000008	External Shutdown	External Shutdown activated from External Analog Programming Connector (contact closure or Vsource)	**a)** Make sure Pins are connected for disabling External Shutdown. **b)** Remote Inhibit - potential free contact and active voltage source.
0x00000010	Module 1 Fault	Internal Module-1 Fault. Happens when module power stage parameter (like voltage current, power or temperature) exceeds the limit.	**a)** Restart the power supply and it may go away if it was caused due to a sudden supply input or an output load transient. **b)** To understand what fault occurred, query 'SYSTEM<CHASSNO>: MODULE1 :FAULT:STATUS?' (any type of electrical fault in the module).
0x00000020	Module 2 Fault	Internal Module-2 Fault. Happens when module power stage parameter (like voltage current, power or temperature) exceeds the limit.	**a)** Restart the power supply and it may go away if it was caused due to a sudden supply input or an output load transient. **b)** To understand what fault occurred, query 'SYSTEM<CHASSNO>: MODULE2:FAULT:STATUS?' (any type of electrical fault in the module).
0x00000040	Module 3 Fault	Internal Module-3 Fault. It can happen when module power stage parameter (like voltage current, power or temperature) exceeds the limit.	**a)** Restart the power supply and it may go away if it was caused due to a sudden supply input or an output load transient. **b)** To understand what fault occurred, query 'SYSTEM<CHASSNO>: MODULE3 :FAULT:STATUS?'

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
			(any type of electrical fault in the module).
0x00000080	Module 1 Over temperature fault	Internal Module 1 Over temperature fault. This refers to an increased temperature more than the specified limit in one of the power stages of module-1. The over-temperature fault would occur due to following reasons; **a)** Blockage of airflow in chassis air vents. **b)** Fan not running at sufficient speed. **c)** The chassis is operated at an elevated room temperature more than that specified level **d)** Due to hardware issue.	**a)** Restart the power supply. **b)** To understand what fault occurred, query '`SYSTEM<n>:MODULE1:TEMPERATURE:FAULT:STATUS?`' command to know detailed temperature fault status.
0x00000100	Module 2 Over temperature fault	Internal Module 2 Over temperature fault. This refers to an increased temperature more than the specified limit in one of the power stages of module-2. The over-temperature fault would occur due to following reasons; **a)** Blockage of airflow in chassis air vents. **b)** Fan not running at sufficient speed. **c)** The chassis is operated at an elevated room temperature more than that specified level **d)** Due to hardware issue.	**a)** Restart the power supply. **b)** To understand what fault occurred, query '`SYSTEM<n>:MODULE2:TEMPERATURE:FAULT:STATUS?`' command to know detailed temperature fault status.
0x00000200	Module 3 Over temperature fault	Internal Module 3 Over temperature fault. This refers to an increased temperature more than the specified limit in one of the power stages of module-3. The over-temperature fault would occur due to following reasons;	**a)** Restart the power supply **b)** To understand what fault occurred, query '`SYSTEM<n>:MODULE3`

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
		a) Blockage of airflow in chassis air vents. **b)** Fan not running at sufficient speed. **c)** The chassis is operated at an elevated room temperature more than that specified level. **d)** Due to hardware issue.	`:TEMPERATURE:FAULT:STATUS?` ' command to know detailed temperature fault status.
0x00000400	Remote Analog Programming Error	Remote programming Analog signal level is out of the specified range. Remote Analog Programming error can occur when the applied voltage/connected resistance in any of the analog programming pins of 26-Pin Digital I/O interface (e.g.: VPRG_VOLT, VPRG_CURR, IPRG_VOLT, IPRG_CURR, or OVPRG_VOLT) has exceeded the full-scale rated output voltage or is lower than minimum limit specified.	**a)** Check the Analog reference value, check the settings as per Reference mode set to Internal/External.
0x00000800	AC input Line Fault	AC input voltage to the power supply is not in specified operating range. This fault will be triggered if a unit configured as Low line and is supplied with input voltage corresponding to High line. The fault will also be triggered if the input supply voltage goes out of limit due to a voltage swell or sag during operation.	**a)** Check if input voltage to the supply is within specified range (allowed input voltage ranges are, **Low line:** 180-264V, **High line:** 342-528V). **b)** Restart the power supply.
0x00001000	Negative Polarity Fault	Negative voltage polarity is applied at the output of isolation relay. Since the unit can have only positive voltage applied at the output, the isolation relay will be operated only when there is positive voltage at its terminal. Applying a negative voltage at the load side of isolation relay terminal will trigger this fault.	**a)** Check if voltage at the load side of isolation relay terminal is not negative and is within the range specified in datasheet.
0x00002000	Fan1 Fault	Fault from cooling Fan-1. This condition is caused when Fan is not running at the required speed for cooling the unit.	**a)** Reset the fault or restart the power supply.

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
			b) Contact factory if the issue still persists.
0x00004000	Fan2 Fault	Fault from cooling Fan-2. This condition is caused when Fan is not running at the required speed for cooling the unit.	**a)** Reset the fault or restart the power supply. **b)** Contact factory if the issue still persists.
0x00008000	Fan3 Fault	Fault from cooling Fan-3. This condition is caused when Fan is not running at the required speed for cooling the unit.	**a)** Reset the fault or restart the power supply. **b)** Contact factory if the issue still persists.
0x00010000	Calibration Fault	Calibration data is not within the required range. Calibration data is corrupted or EEPROM is not working, or calibration data is invalid.	**a)** Restart the power supply. **b)** Contact factory if the issue still persists.
0x00020000	Remote Sense Fault	Remote voltage sense fault occurs if; **a)** The remote sense voltage is out of range from power supply voltage specification. **b)** There is a difference between the sensed voltage at the output terminal and the sensed voltage of the remote sense terminal.	**a)** Check if the cable connected to remote voltage sense connector at rear side of the power supply is intact and polarity is correct. **b)** Check the output cable line voltage drop and make sure line voltage drop across cable is not exceeding limit specified in datasheet.
0x00040000	Module Output Mismatch Fault	Module output currents or voltages are not equal. This fault is triggered when there is a mismatch in the current sharing between the modules or a mismatch in module voltages. The modules are expected to share the output current or voltage equally. However, during large output transients or during a hardware fault, the current or voltage sharing may not be equal	**a)** Check if the difference in modules output currents/voltages are less than 10%.

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
		resulting in module output mismatch fault. This fault protects the individual module from current or voltage overload.	
0x00080000	Over Power Protection Fault	Output power of the unit has exceeded the Overpower protection (OPP) limit. OPP is an instantaneous trip and is not a programmable feature. The OPP trip limit is kept higher than the model power limit. The OPP trip limit ensures that unit power will never exceed the unit's power rating, even during output transient conditions, thus protecting the unit and the connected UUT from overpower failure.	**a)** Check the unit is operated within the model power limit.
0x00100000	Output Voltage Synchronization Fault	Not able to synchronize Mi-BEAM output voltage with isolation relay output voltage. This fault is checked only when Isolation relay feature of the unit is enabled. The fault occurs when the unit is not able to produce an output voltage equal to the load side voltage of isolation relay when the unit output is turned ON. This would happen if the load side voltage is either negative or is set more than the model voltage limit.	**a)** Restart the power supply. **b)** Contact factory if the issue still persists.
0x00200000	Module Firmware Mismatch Fault	Firmware versions of the Module Controllers are not matching.	**a)** Check if all the primary module controller firmware versions are the same. **b)** Check if all the Secondary module controller firmware versions are same. **c)** Restart the power supply. **d)** Contact factory if the issue still persists.
0x00400000	Module Enumeration fault	Module present signal not matching with Number of modules	**a)** Try restarting the power supply. **b)** Contact factory if the issue still persists.

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
0x00800000	Startup Sequence Fault	Startup sequence of power modules is not completed within stipulated time.	**a)** Check if input voltage to the supply is within specified range in datasheet; Allowed input voltage range: **Low line:** 180-264 V, **High line:** 342-528 V. **b)** Restart the power supply. **c)** Contact factory if fault persists.
0x01000000	Parallel Cable Fault	This fault occurs if: **a)** Chassis Parallel cables PARALLEL IN/ PARALLEL OUT cables are disconnected. **b)** Enumeration does not complete within the specified time during bootup.	**a)** Reset the PARALLEL IN/ PARALLEL OUT cables as required and power cycle the units of parallel chassis configuration. **b)** Check if there is any damage in the parallel cable.
0x02000000	Paralleled System Incompatible	Voltage and Power Model limits are different in paralleled units. Parallel operation is allowed only for units with the same voltage rating, power rating and firmware versions only.	**a)** Check the Unit model details of all the paralleled system and make sure all units are of same Voltage model, Power model and all units are in same AC input line setting (Low/High).
0x04000000	Parallel System Fault	Fault occurred in any one of the parallel systems including leader	**a)** Get the chassis address of the parallel units having fault using SCPI command. **b)** Query command '`SYSTEM<LEADER CHASSIS ADDRESS>:FAULT:CHASSIS?`' will give you which Parallel chassis has detected fault.

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
			c) Query 'SYSTEM<Chassis Address>:FAULT:STATUS?' for individual unit faults **d)** Power cycle all the units of Parallel chassis configuration.
0x08000000	Parallel chassis current sharing fault	Any of the unit's current is out of 10% margin from the current reference value.	**a)** Power cycle all the units of Parallel chassis configuration. **b)** Check if there is damage in the parallel cable. **c)** Recalibrate the units(measurement calibration).
0x10000000	RESERVED	RESERVED	RESERVED
0x20000000	RESERVED	RESERVED	RESERVED
0x40000000	RESERVED	RESERVED	RESERVED
0x80000000	Hardware OVP Fault	Output voltage exceeded more than 2% of Voltage trip limit	**a)** Restart the power supply and set appropriate OVP limit and operate. **b)** Contact factory if the issue still persists.

Table 17-2. System Fault Messages

17.2.1 OUTPUT REGULATION FAULTS

The table below displays a list of possible Output Regulation Faults along with their possible cause and remedy. Refer to the Mi-Beam Programming Manual for more details. Refer to the AMETEK Programmable Power website, www.programmablepower.com, to download latest version.

NUMBER	DESCRIPTION	APPLICABLE REGULATION MODES	EXPLANATION	ACTION TO BE TAKEN
0x01	Voltage High Limit	CC, CC/CP, CP/CC, CR/CC	The operating voltage has reached the 'Voltage High Limit'	Clear the fault and make sure the output voltage does not reach the set 'VOLT_HIGH' limit.

NUMBER	DESCRIPTION	APPLICABLE REGULATION MODES	EXPLANATION	ACTION TO BE TAKEN
0x02	Voltage low Limit	CC, CC/CP, CP/CC, CR/CC	The operating voltage has reached the 'Voltage Low Limit'	Clear the fault and make sure the output voltage does not reach the set 'VOLT_LOW' limit.
0x04	Current pos Limit	CV, CV-Ser. Res, CV/CP	The operating voltage has reached the 'Positive Current Limit'	Clear the fault and make sure the output current does not reach the set 'POS_CURR' limit.
0x08	Current Neg Limit	CV, CV-Ser. Res, CV/CP	The operating voltage has reached the 'Negative Current Limit'	Clear the fault and make sure the output current does not reach the set 'NEG_CURR' limit.
0x10	Power pos Limit	CV, CV-Ser. Res, CV/CC, CC, CR/CC	The operating voltage has reached the 'Positive Power Limit'	Clear the fault and make sure the output current does not reach the set 'POS_POW' limit.
0x20	Power Neg Limit	CV, CV-Ser. Res, CV/CC, CC, CR/CC	The operating voltage has reached the 'Negative Power Limit'	Clear the fault and make sure the output current does not reach the set 'NEG_POW' limit.
0x40	RESERVED	RESERVED	RESERVED	RESERVED
0x80	RESERVED	RESERVED	RESERVED	RESERVED

Table 17-3. Output Regulation Faults

17.2.2 MODULE FAULTS

The table below displays a list of possible Module Faults along with their possible cause and remedy. Refer to the Mi-Beam Programming Manual for more details. Refer to the AMETEK Programmable Power website, www.programmablepower.com, to download latest version.

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
0x00000001	PFC fault	Fault in PFC side of the module. Along with this fault bit, any one of the bits corresponding to PFC side faults will also be high.	**a)** Check which fault is present along with PFC fault. Go to description of the corresponding fault bit and take the corresponding actions. **b)** Restart the unit and run the same test condition again.

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
0x00000002	DAB fault	Fault in isolated DC-DC converter side of the module. Along with this fault bit, any one of the bits corresponding to DAB faults will also be high.	**a)** Check which fault is present along with DAB fault. Go to description of the corresponding fault bit and take the corresponding actions. **b)** Restart the unit and run the same test condition again.
0x00000004	Buck fault	Fault in Buck converter side of the module. Along with this fault bit, any one of the bits corresponding to DAB faults will also be high.	**a)** Check which fault is present along with Buck fault. Go to description of the corresponding fault bit and take the corresponding actions. **b)** Restart the unit and run the same test condition again.
0x00000008	AC Line Instantaneous Over Voltage Fault	AC line V_{RY}, V_{YB}, V_{BR} instantaneous over voltage fault. **a) Low line (180-264V):** above 264V * 1.414 * 1.05 **b) High line (342-528V):** above 528V * 1.414 * 1.05	**a)** Check the selected voltage range in PONS (HIGH_LINE or LOW_LINE). **b)** Check if the voltage applied at the AC input terminals is within the specified range. **c)** Check if there is any possibility for AC voltage to increase during the operation. **d)** Restart the unit.
0x00000010	AC Line RMS Undervoltage Fault	AC line V_{RY}, V_{YB}, V_{BR} RMS under voltage fault, depends on the AC input configuration selected by user. depending on the range this fault will be detected. **a) Low line (180-264V):** below 180V. **b) High line (342-528V):** below 342V.	**a)** Check the selected voltage range in PONS (HIGH_LINE or LOW_LINE). **b)** Check if the voltage applied at the AC input terminals is within the specified range. **c)** Check if there is any possibility for AC voltage to decrease during the operation.

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
			d) Restart the unit.
0x00000020	AC Line Rms Overvoltage Fault	AC line V_{RY}, V_{YB}, V_{BR} RMS over voltage fault, depends on the AC input configuration selected by user. **a) Low line (180-264V):** above 264V. **b) High line (342-528V):** above 528V.	**a)** Check the selected voltage range in PONS (HIGH_LINE or LOW_LINE). **b)** Check if the voltage applied at the AC input terminals is within the specified range. **c)** Check if there is any possibility for AC voltage to decrease during the operation. **d)** Restart the unit.
0x00000040	AC Line Input Frequency Fault	This fault comes along with 'PFC Fault'. This fault bit is set high if the frequency of the input AC voltage is out of range (47 to 53 and 57 to 63)	**a)** Check if the frequency of the voltage applied at the AC input terminals is within the specified range. **b)** Check if there is any possibility for the frequency to deviate during the operation. **c)** Restart the unit.
0x00000080	Phase Missing Fault	This fault comes along with 'PFC Fault'. This fault bit is set high if any one phase or more of the AC input is not connected or Zero.	**a)** Check the connections of all three phases at the AC input terminals. **b)** Check if the voltages between each phase are as per expected. **c)** Restart the unit.
0x00000100	PFC Overcurrent Fault	IR, IY, IB over current fault.	**a)** Check if the operating conditions (at the output) are within the limit. **b)** Restart the unit.

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
0x00000200	PFC DC Bus Undervoltage Fault	This fault comes along with 'PFC Fault'. This fault bit is set high if the PFC DC bus voltage falls below the limit	**a)** Check if the operating conditions (at the output) are within the limit. **b)** Restart the unit.
0x00000400	PFC DC Bus Over Voltage Fault	This fault comes along with 'PFC Fault'. This fault bit is set high if the PFC DC bus voltage rises above the limit	**a)** Check if the operating conditions (at the output) are within the limit. **b)** Restart the unit.
0x00000800	DAB DC Bus Under Voltage Fault	This fault comes along with 'DAB Fault'. This fault bit is set high if the DAB DC bus voltage falls below the limit	**a)** Check if the operating conditions (at the output) are within the limit. **b)** Try restarting the unit.
0x00001000	DAB DC Bus Over Voltage Fault	This fault comes along with 'DAB Fault'. This fault bit is set high if the DAB DC bus voltage rises above the limit	**a)** Check if the operating conditions (at the output) are within the limit. **b)** Restart the unit.
0x00002000	DAB Over Current Fault	This fault comes along with 'DAB Fault'. This fault bit is set high if the DAB current (primary or secondary) is more than the limit	**a)** Check if the operating conditions (at the output) are within the limit. **b)** Restart the unit.
0x00004000	Buck Overcurrent Fault	Buck interleaved inductor- 1 to 4 overcurrent fault.	**a)** Check if the operating conditions (at the output) are within the limit. **b)** Restart the unit.
0x00008000	Buck DC Bus Over Voltage Fault	This fault comes along with 'Buck Fault'. This fault bit is set high if the output voltage of the corresponding module is more than the limit	**a)** Check if the operating conditions (at the output) are within the limit. **b)** Restart the unit.
0x00010000	Module Startup Sequence Fault	Fault generated, when pre-charge not happened within specified time.	**a)** Check if the input voltage applied is within the specified range.

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
			b) Restart the unit.
0x00020000	Module Auxiliary Fault	This fault comes if the required bias voltage at either the primary or secondary controller is not present	**a)** Check if the input voltage applied is within the specified range. **b)** Restart the unit.
0x00040000	AC Line Instantaneous Under Voltage Fault.	This fault comes along with 'PFC Fault'. This fault bit is set high if the instantaneous input AC voltage is less than the peak voltage corresponding to specified voltage ranges (High Line or Low Line). **a) Low line (180-264V):** below 180V. **b) High line (342-528V):** below 342V.	**a)** Check if there is any possibility for AC voltage to increase during the operation. **b)** Restart the unit.
0x00080000	Buck Current Sharing Mismatch Fault	This fault comes along with 'Buck Fault'. This fault bit is set high if there is mismatch in the currents flowing through buck legs.	**a)** Restart the unit.
0x00100000	RESERVED	RESERVED	RESERVED
0x00200000	RESERVED	RESERVED	RESERVED
0x00400000	RESERVED	RESERVED	RESERVED
0x00800000	RESERVED	RESERVED	RESERVED
0x01000000	Module Enumeration Fault	Any Module Not Responding. This bit will be set by system interface, module response will be always 'Zero'. **Example:** No of module present detected is 3 but only 2 modules responded back, then this bit will be set.	**a)** Restart the unit.
0x02000000	RESERVED	RESERVED	RESERVED
0x04000000	RESERVED	RESERVED	RESERVED
0x08000000	RESERVED	RESERVED	RESERVED
0x10000000	RESERVED	RESERVED	RESERVED

NUMBER	DESCRIPTION	EXPLANATION	ACTION TO BE TAKEN
0x20000000	RESERVED	RESERVED	RESERVED
0x40000000	RESERVED	RESERVED	RESERVED
0x80000000	RESERVED	RESERVED	RESERVED

Table 17-4. Module Faults

17.2.3 TEMPERATURE FAULTS DETAILS

The table below displays a list of possible Temperature Faults Details along with their possible cause and remedy. Refer to the Mi-Beam Programming Manual for more details. Refer to the AMETEK Programmable Power website, www.programmablepower.com, to download latest version.

NUMBER	DESCRIPTION	EXPLANATION	ACTIONS TO BE TAKEN
0x00000001	PFC side heatsink over temperature fault	PFC side heatsink over temperature fault	**a)** Make sure the ambient temperature and operating conditions are within the specified limits. **b)** Restart the unit.
0x00000002	DAB primary side heatsink over temperature fault	DAB primary side heatsink over temperature fault	**a)** Make sure the ambient temperature and operating conditions are within the specified limits. **b)** Restart the unit.
0x00000004	DAB transformer winding over temperature fault	DAB transformer winding over temperature fault	**a)** Make sure the ambient temperature and operating conditions are within the specified limits. **b)** Restart the unit.
0x00000008	DAB transformer core over temperature fault	DAB transformer core over temperature fault	**a)** Make sure the ambient temperature and operating conditions are within the specified limits. **b)** Restart the unit.

NUMBER	DESCRIPTION	EXPLANATION	ACTIONS TO BE TAKEN
0x00000010	DAB leakage inductor winding over temperature fault	DAB leakage inductor winding over temperature fault	**a)** Make sure the ambient temperature and operating conditions are within the specified limits. **b)** Restart the unit.
0x00000020	DAB leakage inductor core over temperature fault	DAB leakage inductor core over temperature fault	**a)** Make sure the ambient temperature and operating conditions are within the specified limits. **b)** Restart the unit.
0x00000040	RESERVED	RESERVED	RESERVED
0x00000080	RESERVED	RESERVED	RESERVED
0x00000100	DAB secondary side heatsink over temperature fault	DAB secondary side heatsink over temperature fault	**a)** Make sure the ambient temperature and operating conditions are within the specified limits. **b)** Restart the unit.
0x00000200	BUCK side heatsink over temperature fault	Buck side heatsink over temperature fault	**a)** Make sure the ambient temperature and operating conditions are within the specified limits. **b)** Restart the unit.
0x00000400	Buck inductor-1 winding over temperature fault	Buck inductor-1 winding over temperature fault	**a)** Make sure the ambient temperature and operating conditions are within the specified limits. **b)** Restart the unit.
0x00000800	Buck inductor-2 winding over temperature fault	Buck inductor-2 winding over temperature fault	**a)** Make sure the ambient temperature and operating conditions are within the specified limits. **b)** Restart the unit.

NUMBER	DESCRIPTION	EXPLANATION	ACTIONS TO BE TAKEN
0x00001000	Buck inductor-3 winding over temperature fault	Buck inductor-3 winding over temperature fault	**a)** Make sure the ambient temperature and operating conditions are within the specified limits. **b)** Try restarting the unit.
0x00002000	Buck inductor-4 winding over temperature fault	Buck inductor-4 winding over temperature fault	**a)** Make sure the ambient temperature and operating conditions are within the specified limits. **b)** Restart the unit.
0x00004000	RESERVED	RESERVED	RESERVED
0x00008000	RESERVED	RESERVED	RESERVED

Table 17-5. Temperature Faults

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18 MAINTENANCE

This chapter contains preventive maintenance information for the MI-BEAM Series power supplies.

18.1 PREVENTIVE MAINTENANCE



WARNING!

All maintenance requiring removal of the unit cover should only be performed by properly trained and qualified personnel. Hazardous voltages exist inside the unit. Disconnect the supply from the AC mains input before performing any maintenance. Service, fuse verification, and wiring connections to the chassis must be accomplished at least 5 minutes after AC input power has been removed using an external disconnect switch. Do not touch any circuits or terminals that are energized.



WARNING!

The OFF position of the front panel power switch does not remove AC input from the internal circuits or input terminal blocks. Ensure to disconnect the external AC input before servicing the unit.



WARNING!

Before handling the DC output connector, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live DC output can result in fatal electric shock and may cause death.



WARNING!

Before handling the remote sense connector, always verify that it is fully discharged using a properly rated multimeter or voltage tester, as direct contact with a live remote sense connector can result in fatal electric shock and may cause death.



CAUTION!

Always operate the unit in a temperature and humidity-controlled indoor area. Exposure to conductive contaminants or corrosive compounds/gases that could be ingested into the chassis may result in internal damage. Ensure the rear and sides of the unit are free of obstructions to maintain proper ventilation.

No routine maintenance on the Mi-Beam Series is required, aside from periodic cleaning of the unit and inspection, as required by the environmental operating conditions:

a) Once a unit is removed from service, vacuum all air vents, including the front panel grill.

b) Clean the exterior with a mild solution of detergent and water. Apply the solution onto a soft cloth, not directly to the surface of the unit. To prevent damage to materials, do not use aromatic hydrocarbons or chlorinated solvents for cleaning.

c) Check external connections for integrity of insulation, loose contacts, and proper torque.

d) If there is any evidence of short-circuits or arcing, overheating, or corrosion, contact the factory for recommended service.

18.2 FUSES

There are no user-replaceable components in the power supply. Internal fuses are listed in Table 18-1. Fuses are sized for fault isolation, and an open fuse might indicate that a circuit component has been damaged. Contact the factory for further assistance.



CAUTION!
Always replace fuses with identical type and rating. Using incorrect fuses may cause equipment failure or hazards.

ASSEMBLY	REFERENCE	RATING	MANUFACTURER	PART NO.
Bias PWA	F1, F2, F3	6.3A, 500V	LITTELFUSE	051406.3MXEP
AC Input PWA	F1, F2, F3	30A, 500V	LITTELFUSE	0505030.MXEP

Table 18-1. Fuse Ratings

ACRONYMS

This section provides a list of acronyms used throughout the manual, along with their full forms and descriptions. These acronyms are essential for understanding the terminology related to the Mi-Beam series.

ACRONYMS	FULL FORM	DESCRIPTION
A	Ampere	A unit of electric current in the International System of Units
V	Voltage	The electric potential difference between two points.
AC	Alternating Current	Electric current that periodically reverses direction.
CC	Constant Current	A power supply mode where the current remains constant regardless of voltage changes.
CP	Constant Power	A power supply mode where the power remains constant regardless of voltage or current changes.
CR	Constant Resistance	A mode where the resistance remains constant regardless of voltage or current changes
CV	Constant Voltage	A power supply mode where the voltage remains constant regardless of current changes.
DC	Direct Current	Electric current that flows in one direction.
ft	Foot	A unit of length in the British imperial and United States customary systems of measurement.
Hz	Hertz	The unit of frequency, equal to one cycle per second.
kΩ	Kilo Ohm	A unit of electrical resistance equal to one thousand ohms.
kW	Kilowatts	A unit of power equal to one thousand watts.
mA	Milliampere	A unit of electric current equal to one thousandth of an ampere.
mm	Millimeter	A unit of length in the metric system equal to one thousandth of a meter.
ms	Millisecond	A unit of time equal to one thousandth of a second.
PV	Photovoltaic	Related to the conversion of light into electricity using semiconducting materials.
ATE	Automatic Test Equipment	Computerized machinery that performs tests on electronic devices to ensure functionality and performance

ACRONYMS	FULL FORM	DESCRIPTION
BMS	Battery Management Systems	Systems that manage and monitor battery performance and safety.
CAN	Controller Area Network	A robust vehicle bus standard designed to allow microcontrollers and devices to communicate with each other without a host computer.
dBA	A-weighted Decibels	A unit of sound level adjusted to reflect the ear's sensitivity to different frequencies.
DSP	Digital Signal Processor	A specialized microprocessor designed for digital signal processing tasks.
EMF	Electromotive Force	The energy provided by a source, such as a battery or generator, to move electric charge through a circuit.
EVs	Electric Vehicles	Vehicles powered by electric motors using energy stored in batteries.
Gnd	Ground	A reference point in an electrical circuit from which voltages are measured.
GUI	Graphical User Interface	A user interface that includes graphical elements, such as windows, icons, and buttons.
kHz	Kilohertz	A unit of frequency equal to one thousand hertz.
LAN	Local Area Network	A network that connects devices within a limited area.
LCD	Liquid Crystal Display	A flat panel display technology commonly used in TVs, monitors, and smartphones.
LED	Light-emitting Diodes	Semiconductor devices that emit light when an electric current passes through them.
LVD	Low Voltage Directive	European directive ensuring electrical safety for low-voltage equipment.
LXI	LAN Extensions for Instrumentation	A standard for using Ethernet to control and communicate with instrumentation.
MHz	Megahertz	A unit of frequency equal to one million hertz.
OVP	Output Overvoltage Protection	A feature that protects electronic devices from voltage spikes.
RMS	Root Mean Square	A statistical measure of the magnitude of a varying quantity.
SoC	State of Charge	The level of charge in a battery relative to its capacity.
TFT	Thin Film Transistor	A type of transistor used in LCD screens for improved image quality.
USB	Universal Serial Bus	An industry standard for cables, connectors, and protocols for connection, communication, and power supply between computers and devices.

ACRONYMS	FULL FORM	DESCRIPTION
UUT	Unit Under Test	The device being tested in an automated test setup.
VAC	Volts Alternating Current	The voltage of an alternating current circuit.
VDC	Volts Direct Current	The voltage of a direct current circuit.
GPIB	General Purpose Interface Bus	An IEEE-488 standard interface for connecting and controlling instruments.
MPPT	Maximum Power Point Tracking	A technique used to maximize the power output of photovoltaic systems.
PONS	Power ON Settings	Configuration settings applied when the power supply is turned on.
RoHS	Restriction of Hazardous Substances	EU directive restricting hazardous materials in electrical equipment.
SCPI	Standard Commands for Programmable Instruments	A standard for controlling programmable test and measurement devices.
SELV	Safety Extra Low Voltage	Indicates circuits operating at safe voltage levels to prevent electric shock.
Pk-Pk	Peak-to-peak	The difference between the maximum and minimum values of a waveform.
PVSIM	Photovoltaic Simulator	A mode that simulates solar PV array characteristics for inverter testing.
BATSIM	Battery Simulation	A mode that simulates battery characteristics for testing chargers and BMS systems.
bi-DIR	Bi-directional	Capable of operating in both directions.
BATTEST	Battery Test	A mode for testing batteries under controlled charge/discharge profiles.
CANopen	Controller Area Network Open	A higher-level protocol for CAN networks used in industrial automation.
EN50530	European Standard for PV Inverter Testing	Defines procedures for testing inverter efficiency under dynamic conditions.
ISOSELV	Isolated Safety Extra Low Voltage	Indicates isolated circuits operating at safe voltage levels.
EtherCAT	Ethernet for Control Automation Technology	An Ethernet-based fieldbus system for real-time control in automation.

Table 19-1. Acronyms

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