AMETEK®
PROGRAMMABLE POWER

Sorensen

Asterion DC Half Rack Series
Operation Manual

www.programmablepower.com

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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, Power Ten, 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 $5 billion. The company has over 14,000 colleagues working at more than 120 manufacturing facilities and more than 80 sales and service centers in the United States and around the world.

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Date and Revision

09-Apr-26, Rev B

Part Number

M330519-01

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Product Family: Asterion DC Half Rack Series

Warranty Period: Five Years

Warranty Terms

AMETEK Programmable Power, Inc. (“AMETEK”), provides this written warranty covering the Product stated above, and if the Buyer discovers and notifies AMETEK in writing of any defect in material or workmanship within the applicable warranty period stated above, then AMETEK may, at its option: repair or replace the Product; or issue a credit note for the defective Product; or provide the Buyer with replacement parts for the Product.

The Buyer will, at its expense, return the defective Product or parts thereof to AMETEK in accordance with the return procedure specified below. AMETEK will, at its expense, deliver the repaired or replaced Product or parts to the Buyer. Any warranty of AMETEK will not apply if the Buyer is in default under the Purchase Order Agreement or where the Product or any part thereof:

- is damaged by misuse, accident, negligence, or failure to maintain the same as specified or required by AMETEK;
- is damaged by modifications, alterations, or attachments thereto which are not authorized by AMETEK;
- is installed or operated contrary to the instructions of AMETEK;
- is opened, modified, or disassembled in any way without AMETEK’s consent; or
- is used in combination with items, articles or materials not authorized by AMETEK.

The Buyer may not assert any claim that the Products are not in conformity with any warranty until the Buyer has made all payments to AMETEK provided for in the Purchase Order Agreement.

Product Return Procedure

1. Request a Return Material Authorization (RMA) number from the repair facility (**must be done in the country in which it was purchased**):
   - **In the USA,** contact the AMETEK Repair 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 our website, www.powerandtest.com, by clicking Support and going to the Service Centers tab.
2. 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 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 AC mains input when servicing this equipment.

WARNING!

This equipment contains ESD sensitive input/output connection ports. When installing equipment, follow ESD safety procedures. Electrostatic discharges might cause damage to the equipment.

Only qualified personnel, who understand and deal with attendant hazards in power supplies, can perform installation and servicing.

Ensure that the AC mains input ground is connected properly to the chassis safety ground connection. Similarly, other power ground lines, including those to application and maintenance equipment, must be grounded properly for both personnel and equipment safety. Always ensure that facility AC mains input is de-energized prior to connecting or disconnecting any cable.

In normal operation from the front panel, the operator does not have access to hazardous voltages within the chassis. However, depending on the application configuration, **HIGH VOLTAGES HAZARDOUS TO HUMAN SAFETY** might be normally generated on the output terminals. The user must ensure that the output power lines are labeled properly as to the safety hazards and that any possibility for inadvertent contact with hazardous voltages is eliminated.

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 during open cover checks to avoid personal injury by any sudden component failure.

Neither AMETEK Programmable Power Inc., San Diego, California, USA, or any of the subsidiary sales organizations, can 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

GENERAL WARNING/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 inside the instrument marks the central safety grounding point for the instrument.

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 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 Asterion DC Half Rack Series of power supplies, which have been designed and certified to meet the Low Voltage, Electromagnetic Compatibility, and 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 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 (see Safety Instructions page)

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OVERVIEW

1.1 General Description

The Sorensen Asterion line of DC power supplies by AMETEK Programmable Power combines intelligence and flexibility to create an advanced platform of DC solutions. Asterion DC Half Rack source is 1700 W output high power density in 1U Half Rack size. The Asterion Half Rack DC series offers both Fixed and Auto ranging models. The Fixed range supplies are economical, rectangular wave output power supplies with all the enhanced operation advantages standard with the Asterion platform. The Auto ranging supplies feature expanded current and voltage range at the full output power level, enabling the ability to satisfy a wider testing need without requiring the purchase of additional models.

This easy-to-configure design features sophisticated technology for delivering high performance, programmable DC power. Its sleek design pack maximum power density into a low-profile form factor; with an intuitive touch screen interface placing that power at your fingertips. Centralized control and unparalleled modularity make Asterion the most adaptable platform on the market. Its groundbreaking capabilities set the standard for affordable, precision power supplies.

Figure 1-1: Asterion DC Half Rack Series Power Supply, 1U Models

The Asterion DC Half Rack Series is Digital Signal Processor (DSP) controlled and can be operated from the intuitive, easy-to-use front panel touchscreen or the Ethernet LXI, USB, and RS232 standard control interfaces, as well as through the optional GPIB control interface or EtherCAT control interface. Supply is provided with external user I/O connector for Remote Inhibit, Remote ON/OFF, Status and Trigger functions. In addition to the I/O signals power source also provides with Auxiliary 5 V and 15 V outputs that could be used as control power. Source also provides control interface connectors for the parallel, series and multi-chassis communication operations of the power supplies. Maximum of four similar units can be paralleled, two similar units for series operation and thirty-two units for multi-chassis communication.

The touchscreen function group icons include a Dashboard, Output Programming Parameters, Measurements, Ramp, Configuration, Control Interfaces, and System Settings. Function selection and parameter entry can be achieved either by direct selection from the touchscreen or by using the encoder selector button. The control resolution is adjusted by a dynamic rate change algorithm that combines the benefits of precise control over small parameter changes with quick sweeps through the entire range.

The power supply can also be operated using DC Virtual Panels. Virtual Panels allow remote control of the Asterion DC power supply as well as programming communication and monitoring of the instrument. You can perform all operations via the remote Virtual Panels control, or you could be working directly with the unit's front panel.

This source also comes with the Optional Isolated Analog Programming Inputs and Monitor Outputs for output voltage and current. Analog programming inputs include signals for control of output voltage and current through analog voltage and resistance inputs. Additional signals include analog voltage signal input for output overvoltage programming. The monitor signal outputs are provided for output voltage and current.

The Asterion DC Half Rack Series is designed for testing today's complex electronics, including telecommunications and commercial electronics requiring low profile, light weight power supplies with high power density. Other applications include:

- ATE applications
- Military and aerospace electronics test
- DC power simulation
- Commercial manufacturing and process control
- Research and development
- Automotive component and battery testing

See *Figure 1-2* for decoding the Asterion DC Half Rack Series Model Number.

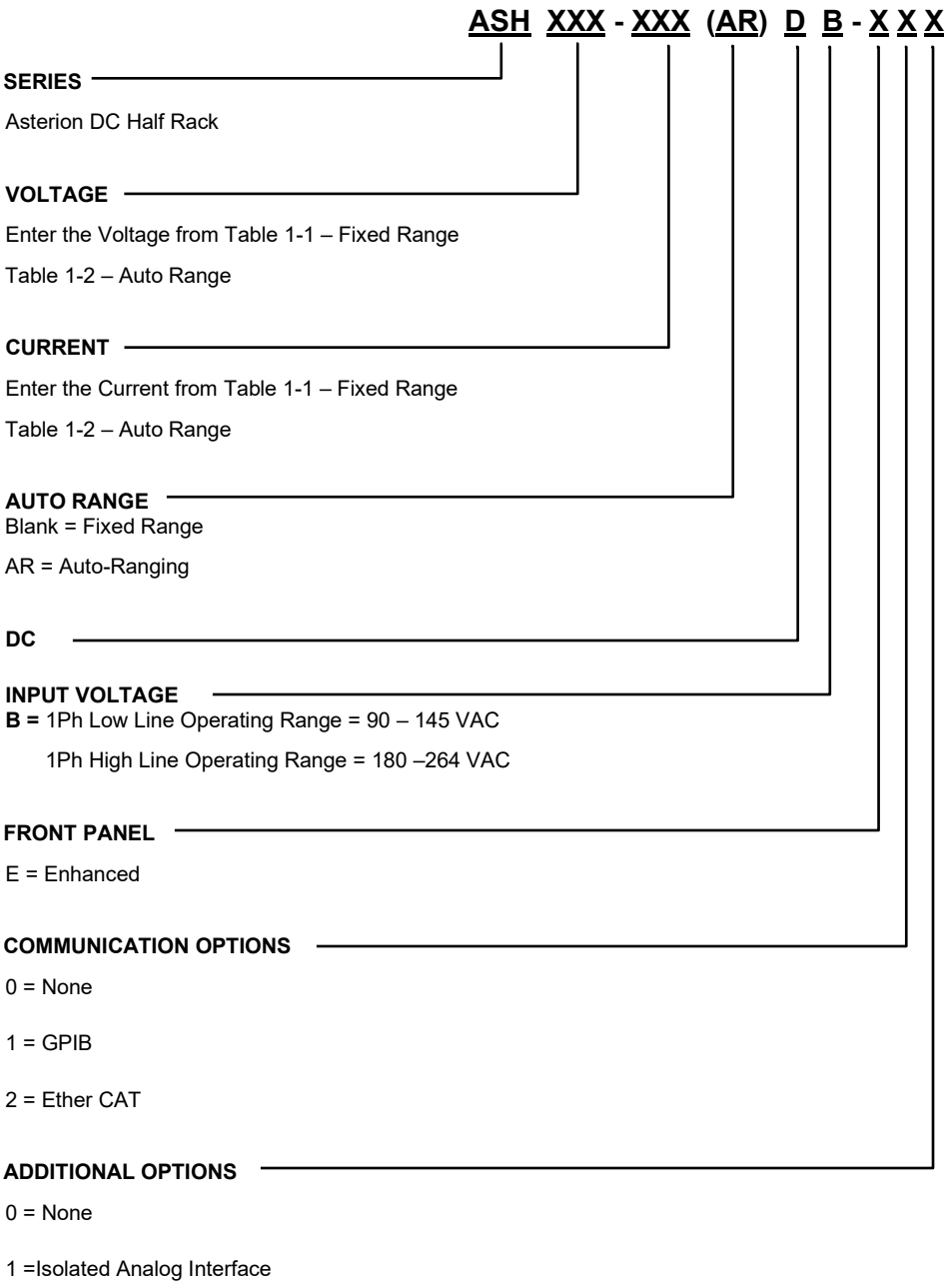


Figure 1-2: Asterion DC Half Rack Series Model Number Decoding

Fixed Range Models for the Asterion Half Rack Series	
Voltage Model to be entered in Part number	Current Rating in A
40	42
60	28
80	22
100	17
150	12
200	8.5
300	5.6
400	4.3
600	2.8

Table 1-1: Voltage Model for Fixed range Half Rack series

Auto Range Models for the Asterion Half Rack Series	
Voltage Model to be entered in Part number	Current Rating in A
60	42
200	17
400	6

Table 1-2: Voltage Model for Auto range Half Rack series

1.2 Specifications

The following sections provide electrical, environmental, and physical specifications for the Asterion DC Half Rack 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, and at fixed AC input line and load.

b. DC output into a resistive load.

c. Specifications values are valid from 5% 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.

1.2.1 Output Power

Model	Power
Asterion DC Half Rack Series	1700W

Table 1-3: Output Power for Half Rack Series

1.2.2 Output Voltage and Current Ratings

Voltage	Current
60 V	42 A
200 V	17 A
400 V	6 A

Table 1-4: Output ratings for Asterion DC Half Rack Series Auto Range Models

Voltage	Current
40 V	42 A
60 V	28 A
80 V	22 A
100 V	17 A
150 V	12 A
200 V	8.5 A
300 V	5.6 A
400 V	4.3 A
600 V	2.8 A

Table 1-5: Output ratings for Asterion DC Half Rack Series Fixed Range Models

Asterion DC Half Rack Series Auto Range Output Voltage and Current models are listed in Table 1-4 and the power is rated at 1700 W. The output current versus output voltage follows a constant-power curve to provide users a wider current and voltage operating range in a single power supply. The Auto Range Voltage Vs Current Characteristics of the different ratings are shown in the Figure 1-3.

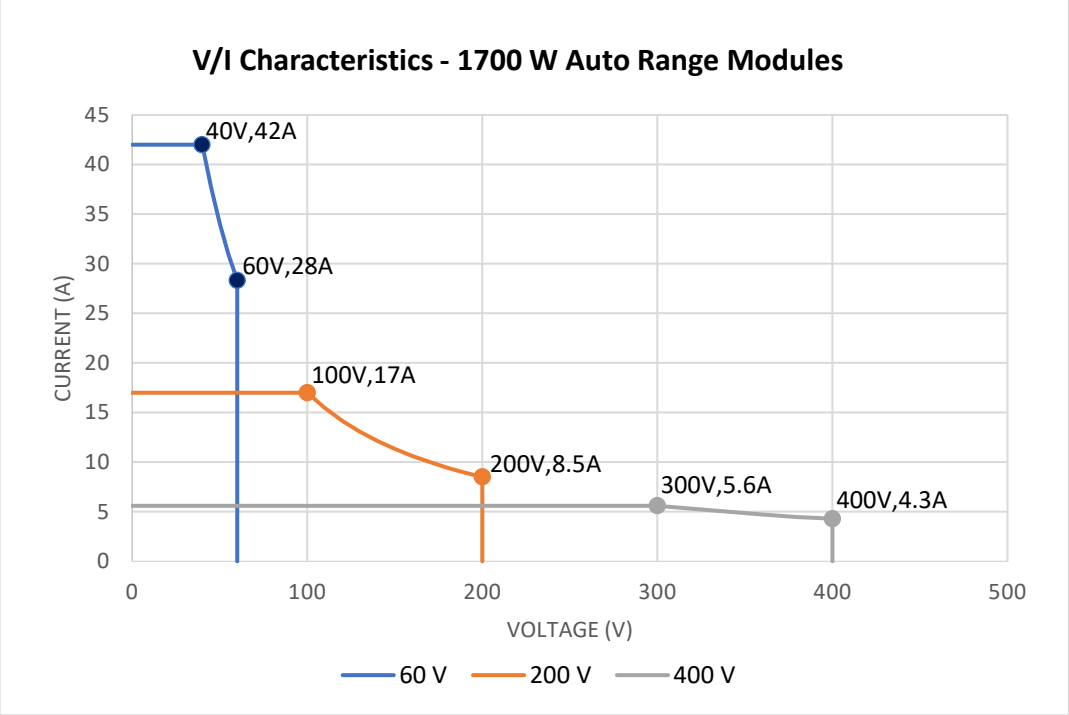


Figure 1-3 Auto Range Models Voltage Vs Current Characteristics

The voltage and current characteristics of the 1700 W, 200 V, 17 A is given in Figure 1-4. For any given voltage, the maximum supported current is described. There are three distinct regions, the red line shows the maximum supported current for a given model green line shows the maximum full-scale voltage for the model and the blue curved section shows the models power limit.

Determination of the available voltage or current under your conditions can be calculated readily. As an example, we will use the 1700 W, 200 V, 17 A output. This output can provide up to 17 A from 0 to 100 V and maximum of 8.5 A from 0 to 200 V. In the power limit portion of the curve if you need to determine how much current you can obtain at given voltage, you divide the models power limit by the desired output voltage. For example, at 100 V in this model you can obtain maximum current of 17 A (1700 W/ 100 V = 17 A).

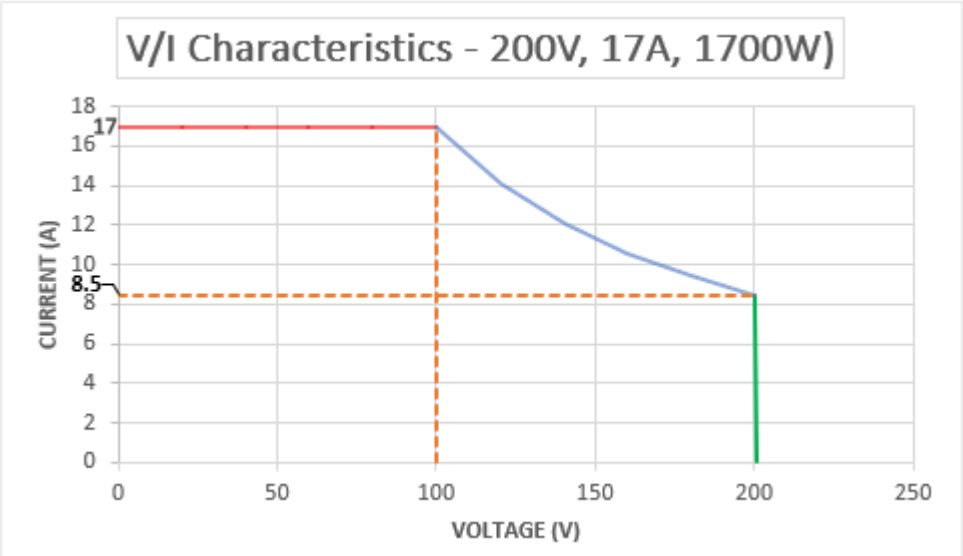


Figure 1-4: Auto Range Model 1700 W, 200 V, 17 A Voltage Vs Current Characteristics

1.2.3 Resolution Specifications

Resolution	Remote digital Interface	Front panel
Voltage Output programming resolution	0.012% of full scale	4 Digits
Current Output programming resolution	0.012% of full scale	4 Digits
Power Output programming resolution	0.012% of full scale	4 Digits
Overvoltage programming resolution	0.1% of full scale	4 Digits
Voltage Output Readback resolution	0.012% of full scale	5 Digits
Current Output Readback resolution	0.012% of full scale	5 Digits
Power Output Readback resolution	0.012% of full scale	5 Digits

1.2.4 Remote Sense

Sense terminals are provided at the output to sense voltage at point of load. Line drop in the wires would be compensated by remote sense feature.

Output Voltage Models	Allowed Line drop Voltage
40 V	2 V
60 V	3 V
80 V – 600 V	5 V
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.

CAUTION!
Due to Line Drop Compensation, if Remote Sense is disconnected from unit while the output is enabled, output voltage will rise a maximum of 10% of model's maximum rated voltage, before faulting.

1.2.5 DC Output Programming, Readback and Regulation Specifications [1][2]

Programming & Readback Accuracy (via Front Panel or Remote Digital Interface)	
Voltage Output programming accuracy	+/- 0.1% of rated output voltage
Current Output programming accuracy	+/- 0.2% of rated output current
Power Output programming accuracy	+/- 0.3% 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	+/- 0.2% of rated output current
Power Output Readback accuracy	+/- 0.3% of rated output power
Overvoltage Response time	20 ms
DC Regulation Characteristics- Constant Voltage Mode	
Maximum line regulation	+/- 0.01% of rated voltage
Maximum load regulation	+/- 0.02% of rated voltage
Temperature Drift	+/- 100 PPM / 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	+/- 0.15% of rated current
Temperature Drift	+/- 100 PPM / degree Celsius
Stability	+/- 0.05% of rated current
DC Regulation Characteristics- Constant Power Mode	
Maximum line regulation	+/- 0.1% of rated power
Temperature Drift	+/- 100 PPM / degree Celsius
Stability	+/- 0.05% of rated power

[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

1.2.6 Output Ripple, Noise and Transient Specifications

1.2.6.1 Auto Range Output Models

Rated Output Voltage (V)	Voltage Ripple & Noise RMS, mV(1)	Voltage Ripple & Noise PK-PK, mV(2)	Voltage & Current Rise Time (ms), Full load(3)	Voltage & Current Fall Time (ms), Full load(4)	Voltage Fall Time (ms), No load(5)	Transient response (ms)(6)
60	12	75	20	50	1500	1
200	20	100	75	150	3500	2
400	40	300	100	200	4600	2

1) RMS ripple/noise, over 20 Hz to 300 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.

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

3) Maximum time, from 0%-100% of programming change from zero to rated output voltage with rated resistive load.
4) Maximum time, from 100%-0% of programming change from rated output voltage to zero with rated resistive load.
5) Maximum time, from 100%-0% of programming change from rated output voltage to zero with No load

6) Typical time to recover within 0.5% of rated output voltage for load step of 10-90% of rated output current.

1.2.6.2 FIXED RANGE OUTPUT MODELS

Rated Output Voltage (V)	Voltage Ripple & Noise RMS, mV(1)	Voltage Ripple & Noise PK-PK, mV(2)	Voltage & Current Rise Time (ms), Full load(3)	Voltage & Current Fall Time (ms), Full load(4)	Voltage Fall Time (ms), No load(5)	Transient response (ms)(6)
40	7	60	20	50	1200	1
60	7	60	20	50	1500	1
80	12	75	25	60	2600	1
100	12	75	25	60	2600	2
150	20	75	50	120	2900	2
200	20	100	75	150	3500	2
300	40	300	100	200	4600	2
400	40	300	100	200	4600	2
600	80	350	150	200	4800	2

1) RMS ripple/noise, over 20 Hz to 300 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.

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

3) Maximum time, from 0%-100% of programming change from zero to rated output voltage with rated resistive load.
4) Maximum time, from 100%-0% of programming change from rated output voltage to zero with rated resistive load.
5) Maximum time, from 100%-0% of programming change from rated output voltage to zero with No load

[6] Typical time to recover within 0.5% of rated output voltage for load step of 10-90% of rated output current.

1.2.7 AC Input Specifications

Parameter	Description
Input Voltage Operating Nominal range	**Input Type: 1 Phase, 2 wire + Gnd** Nominal Rating Range for 1 phase, 2 wire+ Gnd Low Line range:100 –132 VAC [1], 1 Phase, Line-Neutral. Nominal Rating Range for 1 phase, 2 wire+ Gnd High Line range: 200–240 VAC, 1 Phase, Line-Neutral.
Input Voltage, Operating range	**1 phase, 2 wire + Gnd, Low line,** Operating Range 90-145 VAC Line-Neutral. **1 phase, 2 wire + Gnd, High line,** Operating Range 180-264 VAC Line-Neutral.
Input Current, Maximum RMS	**1 phase, 2 wire + Gnd, Low line:** 24 A at 90 VAC Line-Neutral. **1 phase, 2 wire + Gnd, High line:** 11.5 A at 180 VAC Line-Neutral.
Efficiency	**1 phase, 2 wire + Gnd, Low line:** 80%[2] **1 phase, 2 wire + Gnd, High line:** 85%[3]
Inrush Current, typical[4]	**1 phase, 2 wire + Gnd, Low line:** 16 A Peak @ 132 VAC L-N **1 phase, 2 wire + Gnd, High line:** 34 A Peak @ 264 VAC L-N
Input Frequency, Nominal Rating	50 Hz, 60 Hz [6]
Input Frequency Range	47 Hz- 63 Hz[6]
Power Factor[5]**, typical**	1-Ph: 0.98; active PFC
Hold-Up Time[5]**, typical**	≥10 ms
Isolation Voltage	1500 VAC Input to Ground, 3000 VAC Input to Hazardous Secondary, 3000 VAC Input to Isolated SELV barriers

[1] Ensure the inlet wiring is capable of handling current up to 24 A on using Low line input and 12 A for the high line input to load up to 1700 W.

[2] Typical value at full load 1700 W output and nominal AC input voltage of 110VAC L-N at 50/60 Hz input frequency.

[3] Typical value at full load 1700 W output and nominal AC input voltage of 220VAC L-N at 50/60 Hz input frequency.

[4] Not including EMI filter inrush less than 200us.

(5) Measured at full load at rated nominal AC input voltage of 110 VAC/ 220 VAC L-N for single phase input.

(6) Contact to factory for high frequency operation for more details.

1.2.8 Output Power derating characteristics with Temperature

Output power is derated with operating temperature irrespective of high line (180-264VAC) and low line (90-132VAC) input.

Derating Characteristics	40ºC	50ºC
Total Output Power	1700 W	1500 W

1.2.9 Operational Characteristics

Parameter	Characteristic
Output Modes of Operation	Constant Voltage (CV), Constant Current (CC) and Constant Power (CP) modes are supported. User-selectable fold back mode CV/CC/CP or CV or CC or CP.
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 & 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 9999 s maximum. Maximum slew to be limited to the transient 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 to the transient specifications of the output model.
Sequencing Function(1)	Sequencing function is supported through multioutput DC Virtual panels software. Sequencing function allows the user to set up the supply to automatically run a series of voltage, current and power mode operations. This is especially useful for setting up the supply to test to compliance standards or unburdening the test computer in automated testing applications. Through RS-232, IEEE-488 or Ethernet, an external computer can trigger the sequences. Up to 50 sequences may be stored, with each sequence containing up to 20 individual steps. With the ability to string sequences together and an extensive list of step functions such as ramping, looping, go to and subroutine calls, the user can define a nearly infinite variety of test sequences.
Fault Identification	On-board diagnostics identify when power supply has experienced a fault.
Programming Command Set	SCPI compliant command set and same could be used using all the communication interfaces (USB, RS232, Ethernet, IEEE-488).
Software Drivers	IVI-C and IVI-COM drivers provided for user programming.
GPIB interface, Option	Parallel interface complies with IEEE-488.1, IEEE-488.2, and the SCPI command specification

ECAT-3	EtherCAT (Ethernet for Control Automation Technology) is an Ethernet-based fieldbus system. The protocol is standardized in IEC 61158 and is suitable for both hard and soft real-time computing requirements in automation technology.
Parallel Operation	Similar rated units can be paralleled. Outputs to be hardwired to the load from the relevant paralleled output terminals. Up to four similar rating units can be paralleled.
Series Operation	Two similar rated units can be connected in series. Outputs to be hardwired to the load from the relevant output terminals that needs to be connected in series. The maximum voltage is restricted to 600 V on the series combination.
Multi-Chassis Communication (Optional)	Ethernet Connectors 8P-8C 2PORT R/A RJ45 Connector, safety isolation SELV-rated, referenced to chassis. This Connector to be used with Multi Chassis Interface Firmware Option. Up to thirty-two chassis can be connected.
Analog Programming, Option	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.
[1)] This feature is available through all the interfaces (USB, RS232, GPIB and Ethernet) and in the DC Virtual panels whereas not available in the front panel.	

1.2.10 Front Panel Controls/Indicators

Model Type	Controls/Indicators
Enhanced Front panel	Touch-Panel, TFT color LCD display with menu-based control. Display size: 1U models, 3.9” diagonal Rotary encoder for menu navigation and parameter adjustment and entry, with integrated selection switch. POWER switch: turns unit on/off. OUTPUT switch: turns output on/off. OUTPUT LED: integrated into the OUTPUT switch; indicates that the output of the unit has been turned on. CV LED: indicates that the unit is in constant- voltage mode and the output voltage is being regulated. CC LED: indicates that the unit is in constant- current mode and the output current is being regulated. CP LED: indicates that the unit is in constant- power mode and the output power is being regulated. REM LED: indicates that the unit is under control of the remote digital interface, FAULT LED: indicates that an internal fault has been detected and the output has been shut down.

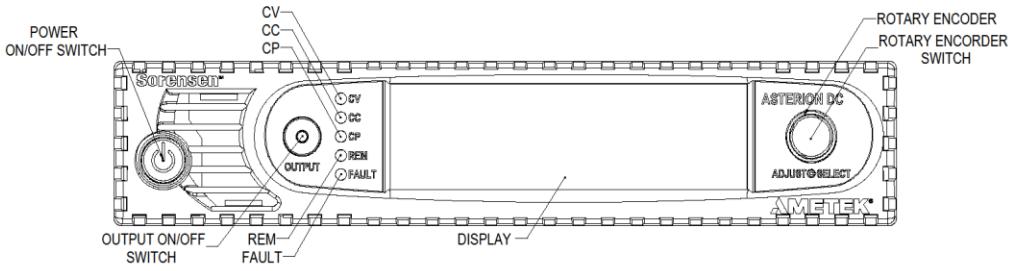


Figure 1-5: Front Panel Display, Controls, and indicators

1.2.11 Remote Isolated External User Control I/O Signal Interface Characteristics

DC Asterion Half Rack source provides 26-Pin Digital I/O interface connector for Trigger, Status output, Remote ON/OFF, Inhibit and optional analog interface functions. All the signals in this interface are isolated from the output negative. Refer to section 2.13 for connector type and pin details.

Function	Characteristics
Isolated Remote Output ON/OFF Control	There are two types of isolated control inputs to turn ON/OFF power supply. a) Remote-control input for output on/off with an applied AC/DC voltage source. A positive (+) 6-24 VDC or an AC input of 12- 24 VAC will enable (turn-on) the output of the supply. b) 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
Remote Inhibit Input	Switch/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.
Trigger In	TTL compatible Input signal, active-high pulse of 10 ms; provides external hardware trigger at falling edge of the pulse for voltage, current ramp, and sequencing functions. Signal connects to Open-anode of opto-isolator diode with internal 1kΩ series resistor internal to power supply. Voltage Rating: Maximum 24 V, Minimum -5V Low state: 0.3 V max, High State 2.7 V min
Trigger Out	Output signal, active-high; synchronization pulse of 10 ms when a change in the output occurs. Open collector transistor output, Collector is connected the DB 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. Voltage Rating: Maximum 30 V, Minimum 3V for Active High, Current Sink Current: 50mA
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 the DB 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector.

	Voltage Rating: Maximum 30 V, Minimum 3V for Active High, Current Sink Current: 50mA
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 the DB 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. Voltage Rating: Maximum 30 V, Minimum 3V for Active High, Sink Current: 50mA
FAULT Status	Output Signal, High state indicates fault state of the power supply. Open collector transistor output, Collector is connected the DB 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. Voltage Rating: Maximum 30 V, Minimum 3V for Active High, Current Sink Current: 50mA
Auxiliary power output	Two Auxiliary power output of 5V and 15V is available. Maximum current for the auxiliary power output: 1 A
Auxiliary Power Enable Inputs	Auxiliary power can be enabled from front panel or through digital enable inputs on the 26-pin connector. Voltage Rating: Maximum 24 V, Minimum -5V Low state: 0.3 V max, High State 2.7 V min
Optional Isolated Analog programming features	
Remote Analog Programming of Output Voltage and Output Current	Independent Signal inputs for output voltage and current programming using External Analog Reference. Analog reference source is user selectable and can be a voltage or resistance. Selected analog reference source can be used to program output voltage and output current. **Voltage as Reference Source:** 0 V to user selectable maximum range (5 V to 10 V) for 0 to full scale rated Output **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
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	Signal input for setting Overvoltage using External Analog Reference Voltage. Range: 0.25 V to user selectable maximum range (2 V to 10 V) for 5% to 110% of the full-scale Output Voltage. Programming accuracy and linearity: ±1% of full-scale output

1.2.12 Remote Control Digital Interface Characteristics

Interface	Characteristic
LAN	Ethernet LXI Compliant 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; 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.
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.
ECAT-3 (Optional)	EtherCAT (Ethernet for Control Automation Technology) is an Ethernet-based fieldbus system. The protocol is standardized in IEC 61158 and is suitable for both hard and soft real-time computing requirements in automation technology. Connector: 2 Numbers of 8P8C modular jack.
Firmware Upgrade	Firmware can be upgraded through the LAN interface.

1.2.13 Protection Function Characteristics

Function	Characteristics
Output Overvoltage Protection (OVP)	Programmable to 110% of full-scale output voltage; exceeding OVP threshold results in shutdown of output.
Output Current Limit Protection	User-selectable fold back mode CV/CC/CP or CV or CC or CP. In CV/CC/CP mode, output current or power is regulated to setpoint on reaching limit. In CV mode, on reaching current or power limits results in shutdown of output. In CC mode, on reaching voltage or power limits results in shutdown of output. In CP mode, on reaching voltage or current limits results in shutdown of output. In CV or CC or CP mode, 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
AC Input Transient Protection	Protection to withstand EN61326-1, Class-A surge levels

Overtemperature Protection (OTP)	Internal temperature monitors cause shutdown of output if temperature thresholds are exceeded

1.2.14 Output Isolation

Parameter	Specification
Output terminal Positive (+Ve) and Negative (-Ve)	600V_{RMS}, maximum, with respect to chassis ground.
Isolated Analog interface Signals and External User Control I/O interface to Output Negative terminal	600V_{RMS}, maximum; optional 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.

1.2.15 Environmental Specifications

Parameter	Specification
Operating Temperature	0°C to 40°C (32° F to 104° F) (1700 watts output) 0°C to 50°C (32° F to 122° F) (1500 watts output)
Storage Temperature	-40°C to 85°C (-40°F to 185° F)
Altitude	3000 m (10,000 ft), output current derating 2%/100 m or ambient temperature 1ºC/100 m above 2000 m
Operating Humidity	20-90 %, non-condensing
Relative Humidity	10-95 %, non-condensing
Vibration	MIL-PRF-28800F, Class 3; 5-500 Hz per Paragraph 4.5.5.3.1.
Shock	MIL-PRF-28800F, Class 3; 30G half-sine with 11ms duration per Paragraph 4.5.5.4.1.
Transportation Integrity	ISTA Test Procedure 1A

1.2.16 Mechanical Specifications

Parameter	Specification
Dimensions	H, 1.7” (43.5 mm); W (front panel), 8.43” (214 mm); D, 24.0” (610 mm); H, 1.7” (43.5 mm); W (chassis), 8.43” (214 mm); D, 23.0” (584 mm).
Unit Weight	14lbs, maximum
Shipping Weight	20lbs, maximum
Chassis Material	Steel with plastic front panel
Chassis Finish	Galvanized Zinc, G90
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	68 dBA, maximum; measured at 1 m with A-weighting;

1.2.17 Regulatory Agency Compliance

Parameter	Specification
EMC	CE marked for EMC Directive 2014/30/EU per EN 61326-1:2013 Class A for Emissions and Industrial Immunity levels as required.
Safety	NRTL certified for US and Canada to CAN/CSA-C22.2 No. 61010-1-12, UL 61010-1 Third Edition. CE marked for LVD Directive 2014/35/EU to EN 61010-1 Third Edition as required.
CE Mark LVD Categories	Installation Overvoltage Category II, Pollution Degree 2, Indoor use only.
RoHS	CE marked for RoHS Directive 2011/65/EU per EN IEC 63000:2018 as required.

1.2.18 Rear Panel Connectors

Connector	Description
AC Input	1-Phase AC input: connector terminals; Unit side connector: compression terminals, Phoenix P/N 1720479 Mating Connector, Phoenix P/N 1778078
Safety-Ground	M4 x 0.7 chassis stud
DC Output and Remote Sense	DC Output and remote sense terminal; Unit side connector: compression terminals, Phoenix P/N 1720835 Mating Connector, Phoenix P/N 1777875
Isolated External User Control I/O interface	User Control signal interface connector; Unit side connector: high-density, 26-contact, female D-Type, Norcomp P/N 180-026-213R531 Mating connector, Norcomp P/N 180-026-103L001
LAN Interface	Ethernet 10BASE-T and 100BASE-T; safety isolation SELV-rated, referenced to chassis; connector: 8P8C modular jack.
RS-232 Interface	Serial interface to RS-232C; safety isolation SELV-rated, referenced to chassis; connector: Subminiature-D, 9-contact receptacle.
USB Interface	Serial interface to USB 2.0; safety isolation SELV-rated, referenced to chassis; connector: Type-B.
Parallel Interface **(CAN-IN/CAN-OUT & PAR-IN/PAR-OUT)**	Two numbers of 8P – 8C R/A 2PORT RJ45 connectors; safety isolation SELV-rated, referenced to chassis. This interface is used for the parallel operation of the Asterion DC Half rack chassis.
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.
ECAT-3 (Optional)	2 Connectors of RJ45 8P-8C, safety isolation SELV-rated, referenced to chassis. EtherCAT (Ethernet for Control Automation Technology) is an Ethernet-based fieldbus system. The protocol is standardized in IEC 61158 and is suitable for both hard and soft real-time computing requirements in automation technology.

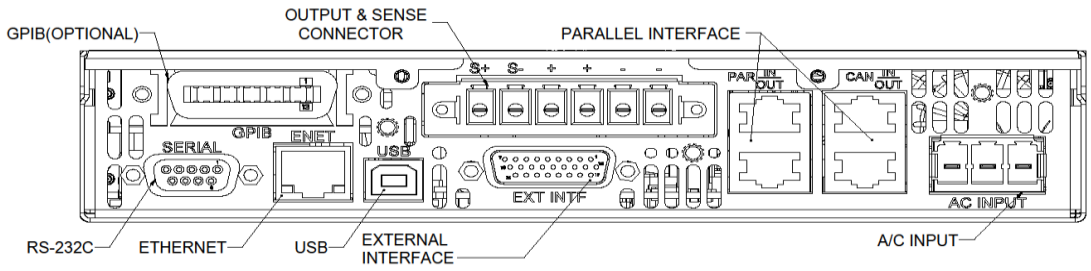


Figure 1-6: Rear Panel Connectors with GPIB Option

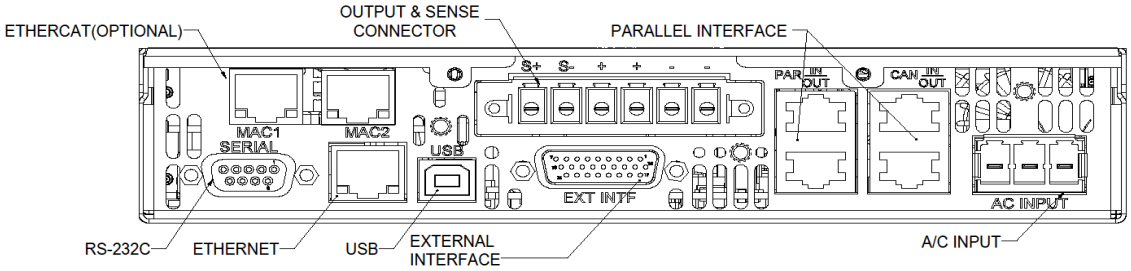


Figure 1-7: Rear Panel Connector with EtherCAT Option

1.2.19 Overall Dimensions Drawing

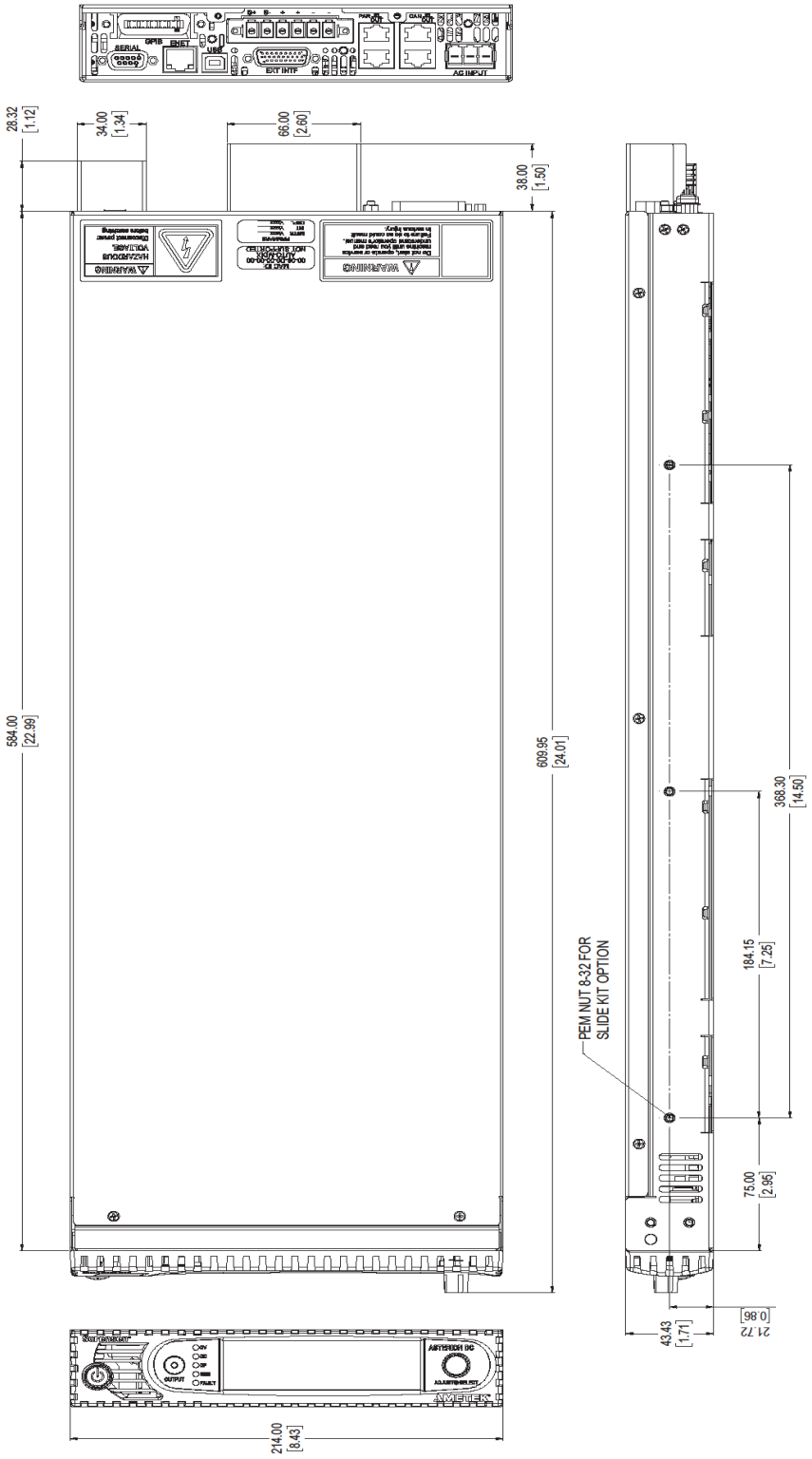


Figure 1-8 Dimensional Drawing

2
INSTALLATION

2.1 Inspection

Inspect the shipping carton for possible damage before unpacking the unit. Carefully unpack the equipment. Save all packing materials until inspection is complete. Verify that all items listed on the packing lists have been received. Visually inspect all exterior surfaces for dented or damaged exterior surfaces, and broken connectors, display, or controls. External damage might 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 AMETEK Customer Service Department at 858-458-0223 (local) or 1-800-733-5427 (toll free in North America).

2.2 Contents of Shipment

Depending on the model, configuration, and options selected for your Asterion DC Half Rack Series power supply, the ship kit may include additional parts and accessories.

Minimum items included in the ship kit:

1. DC Output Power and Remote Sense Mating Connector- Refer to Item 1 in Table 2-1.

2. AMETEK CD-ROM（P/N M550008-01) containing the Asterion DC Half Rack Series User Manual (P/N M330519-01), and the Asterion DC Series Programming Manual (P/N M330520-01). Refer to Item 2 in Table 2-1.

3. Bracket and Handles kit (P/N 5330241-01R), Refer to Item 3 in Table 2-1.

4. Input power mating connector- Refer to Item 4 in Table 2-1.

5. Protective cover for DC output, Refer to Item 5 in Table 2-1.

6. Protective cover for AC input, Refer to Item 6 in Table 2-1.

7. KEPS Steel Nut for installing AC Input and DC output protective covers, Refer to Item 7 in Table 2-1.

8. Ferrite core for AC input, Refer to Item 8 in Table 2-1.

9. Ferrite core for Output cable, Refer to Item 9 in Table 2-1.

Item No	Part number	Description	Qty	Manufacturer	Manufacturer Part number
1	893-006-06	TERM BLK,6P,41A,1KV, PLG,7.62MM	1[(1)]	Phoenix	1777875
2	M550008-01	MANUAL, SORENSEN, CD ROM	1	Ametek	M550008-01
3	5330241-01R	KIT,RKMT BRACKET & HANDLES-DYN	1	Ametek	5330241-01R
4	893-780-78	TERM BLK,3P,1KV, LATCH,7.62MM	1	Phoenix	1778078
5	5330811-01R	COVER, SFTY O/P, HALF RACK-ASTDC	1	Ametek	5330811-01R
6	9330669-01R	COVER, SFTY I/P, HALF RACK-ASTDC	1	Ametek	9330669-01R
7	MN-M04K-07	NUT M4X0.7 KEPS STEEL ZN PLATE	3	Any	M4 -0.7 KEPS Zinc Plated Steel
8	995-385-18	CORE, FERRITE, RND,38.5ODX18ID	1[(2)]	Fair-Rite Products Corp	444176451
9	995-259-28	CORE, FERRITE, ROUND,25.9X28.6MM	1[(3)]	Fair-Rite Products Corp	2631102002
[(1)] Terminal block is assembled with a label indicating the pin details.					
[(2)] Two turns of the AC Input cable excluding the earth cable need to be passed through the Ferrite core (444176451), before connecting to the unit (One turn means the cable must be passed once through the Ferrite core).					
[(3)] One turn for the Output cable; the cable must be passed once through the Ferrite core, near to the unit's output terminal. (One turn means the cable must be passed once through the Ferrite core).					

Table 2-1: Ship Kit Details

Note: If any of these parts are missing, contact AMETEK Customer Service Department at 858-458-0223 (local) or 1-800-733-5427 (toll free).

Optional accessories:

1. 5330809-01R: Rackmount Mounting kit for assembling two half rack units in the 19-inch Rack; the items mentioned in Table 2-2 will be shipped on ordering 5330809-01R kit.
2. 5330809-02R: Rackmount Mounting kit for assembling one half rack unit and one dummy unit in the 19-inch Rack, items mentioned in Table 2-3 will be shipped on ordering 5330809-02R kit.

2.3 Mechanical Installation

The Asterion DC Half Rack power source is designed for rackmount applications and rack mount accessories to mount two half rack sources or one half rack source and one dummy unit using slides, the mounting brackets are available as optional accessories from Ametek. Rack mounting is possible using optional rack mount kits 5330809-01R or 5330809-02R depending upon the need. Detailed rack mount procedure is provided in Section 0

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 50°C.

WARNING!

This unit is intended for installation in a protected environment. Exposure to conductive contaminants or corrosive compounds/gases that could be ingested into the chassis could result in internal damage. Install the power source in a temperature and humidity controlled indoor area.

CAUTION!

The power source 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" clearance from the rear air outlet is required.

CAUTION!

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

2.4 Brackets and Handles

The bracket and handles kit consist of the following items:

5330241-01R 1U

Part Number	Description	MFG	Item #	Qty
9330233-01R	BRKT, 1U, CHAS MTG EAR -DYN	CD ALEXANDER	1	2
MH-8125-BA	HANDLE,RND,1.25IN,AL,BLK,ANODZ	HANDLES UNLIMITED	2	2
110EG20-08	SCREW,8-32 X .500,PFH,100D,SS	ANY	3	4
FM1001	SCREW,M4,18-8,FLAT HD,SS,.7X6	ANY	4	4

Recommended kit installation instructions are as follows:

1. Install the brackets, item **#1**, to the front side panels with M4 screws, item **#4**, (two on each side).
2. Tightening torque is 11 in-lb.
3. Install the handles, item **#2**, to the brackets, item **#1**, with 8-32 screws, item **#3** (two one each side).
4. Tightening torque is 11 in-lb.

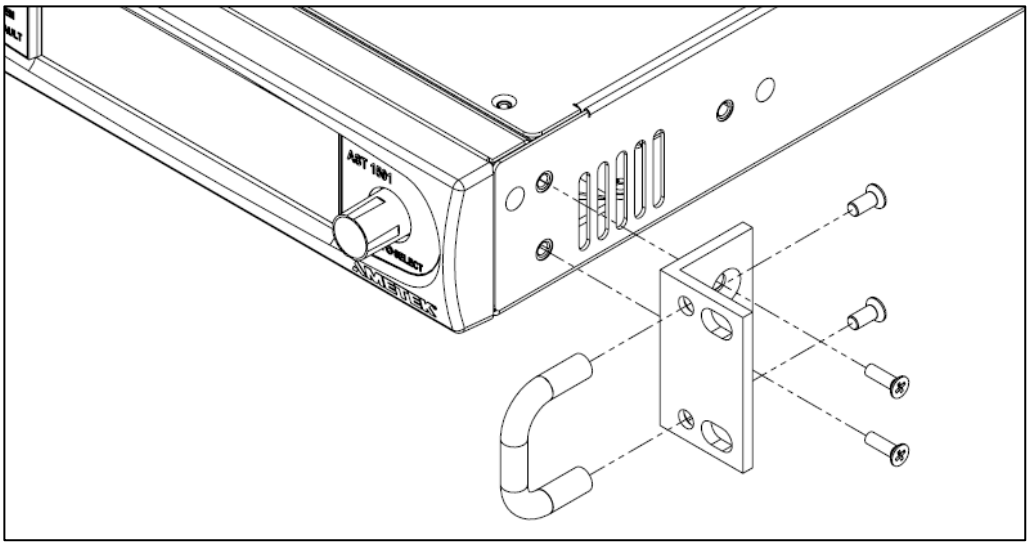


Figure 2-1: Brackets and Handles mounting, Half Rack DC Series Models

2.5 Rack Mounting

The Asterion DC Half Rack Series power source is designed in 1U height and 8.43 inches in width, this would help to reduce space during workbench practice. For mounting to a standard 19-inch equipment rack compliant to ANSI/EIA-310-D, the half rack unit must be attached with another half rack unit or to a dummy unit. Refer section 2.5.1 for Rack mounting installation with two half rack units and refer section 2.5.2 for Rack mounting installation of a single half rack unit with a dummy unit. 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.

2.5.1 Rack mounting Of Two Asterion Half Rack

The rack mounting kit, part number **5330809-01R** (Dual Unit) consists of the following items:

Part Number	Description	MFG	Item #	Qty
9330763-01R	BRKT, TOP RACKMNT, HLFRACK-ASTDC	AMETEK	1	2
9331024-01R	BRKT, RACK MNT, HALF RACK-ASTDC	AMETEK	2	2
9330233-01R	BRKT, 1U, CHAS MTG EAR -DYN	AMETEK	3	2
MH-8125-BA	HANDLE, RND,1.25IN, AL, BLK, ANODZ	AMETEK	4	2
FM1001	SCREW, M4,18-8, FLAT HD, SS,.7X6	ANY	5	4
110EG20-08	SCREW,8-32 X .500, PFH,100D, SS	ANY	6	4
110-400-03	SCREW,4-40 X .187, PFH100, LK, SS	ANY	7	8
110-M3F-05R	SCREW, M3 X 5, PFH, SS	ANY	8	12
105-510-24	RACK SLIDES, FRICTION,24 IN, SS	JONATHAN 510QD-24	21	2

9330325-01R	BRKT, RACKSLIDE -DYN	AMETEK	22	4
110-800-06	SCREW,8-32 X .375, PFH100, LK, SS	ANY	23	14
112EN04-01	NUT,8-32, W/CONE WASHER, KEP, CS	ANY	24	8
110GS04-08	SCREW,10-32 X .500, SEMS, PPH, CS	ANY	25	12
112GL04-01	NUT, 10-32, WASHER, KEPS, CS	ANY	26	12

Table 2-2: Rack mounting (dual units) Ship Kit Details

Note: Item #21 consists of three parts (item #21A, item #21B and item #21C) as shown in Figure 2-6.

Assembly Steps:

1. Install the rack mount bracket (item #2) to the underside of the chassis using (6X) M3 screws (item #8) as shown in Figure 2-2.

2. Flush another unit with centre bracket and then Screw the chassis and bracket using (6X) M3 screws (item #8) as shown in Figure 2-3.

3. Install the top rack mount bracket (item #1), on top side of both the units using (8X) M3 Screws (item #7) as shown in Figure 2-4.

4. Install the handles (item #4) to the rack brackets (item #3) using (4X) 8-32 flat head Screw (item #6) as shown in Figure 2-5.

5. Install the rack bracket using (4X) m4 flat head screw (item #5) as shown in Figure 2-6.

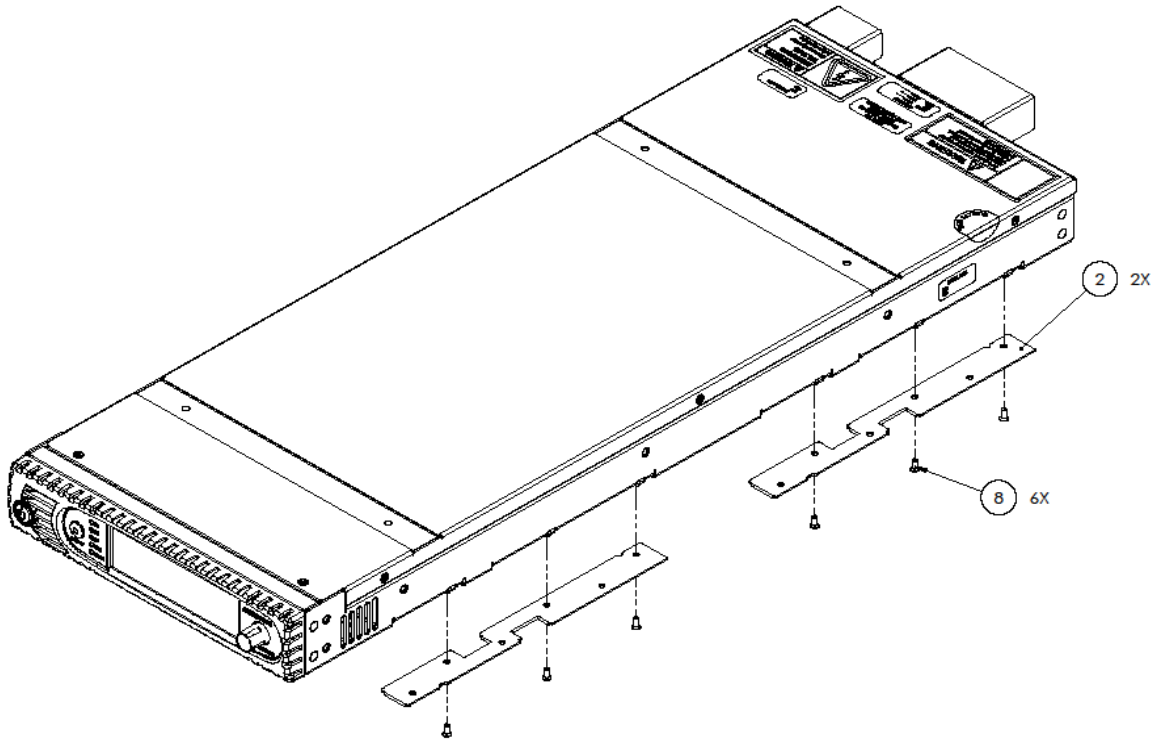


Figure 2-2: Rack mounting, Half Rack DC Series Model

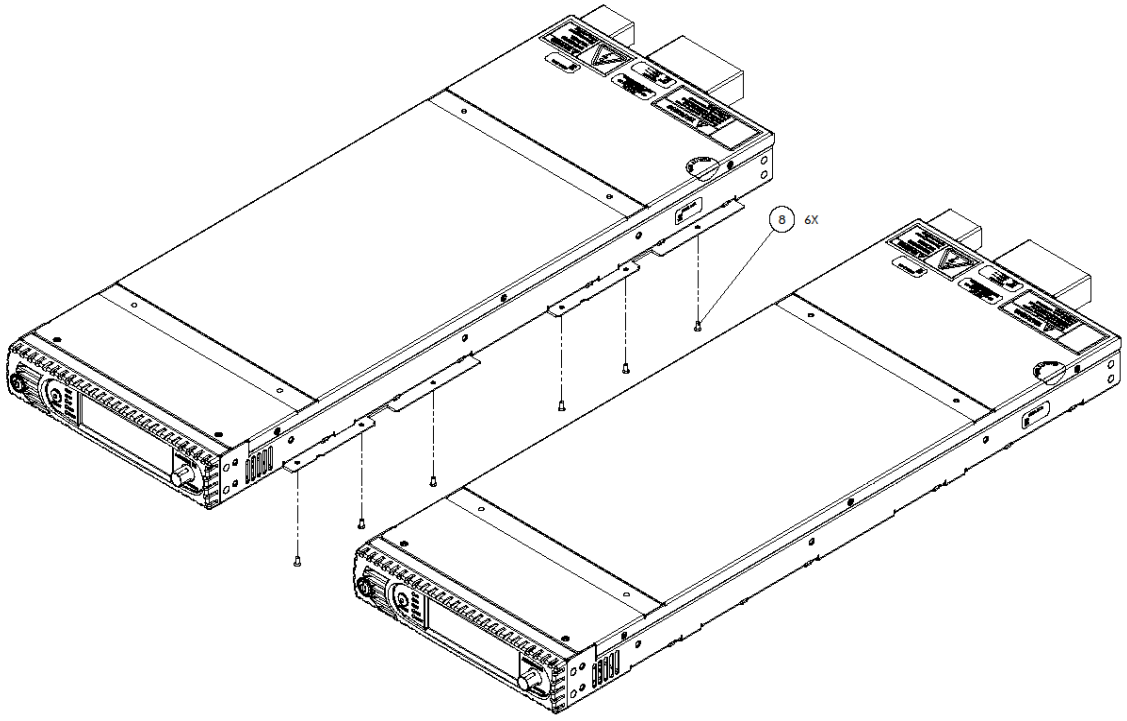


Figure 2-3: Rack mounting, Half Rack DC Series Model

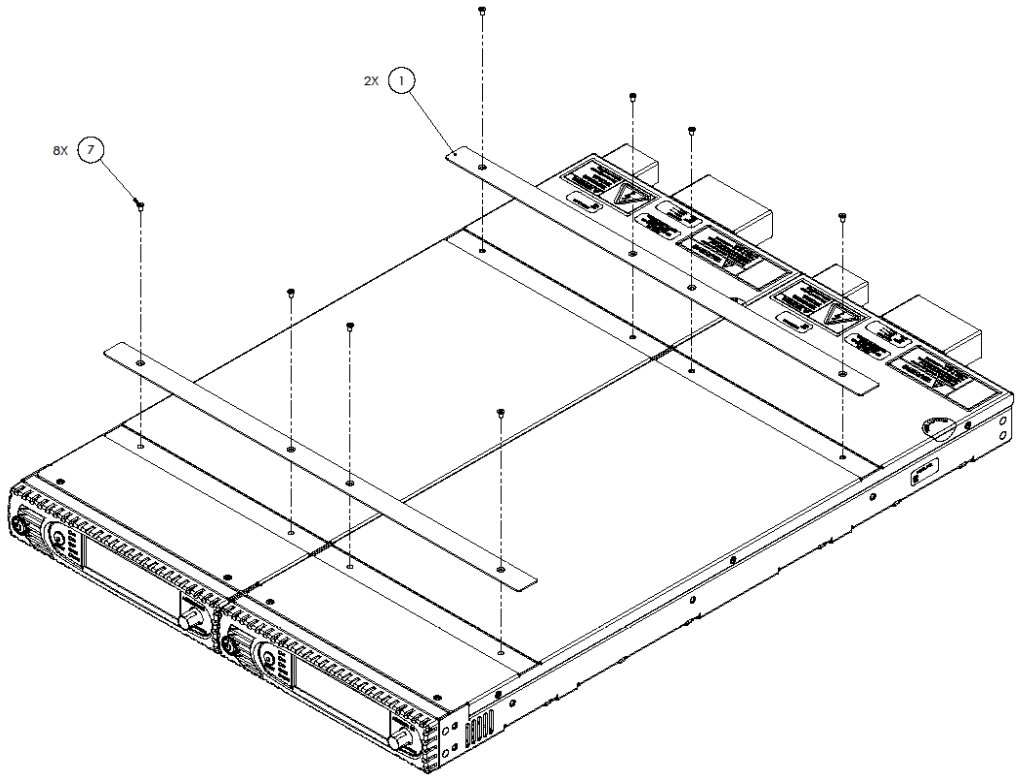


Figure 2-4: Rack mounting, Half Rack DC Series Model

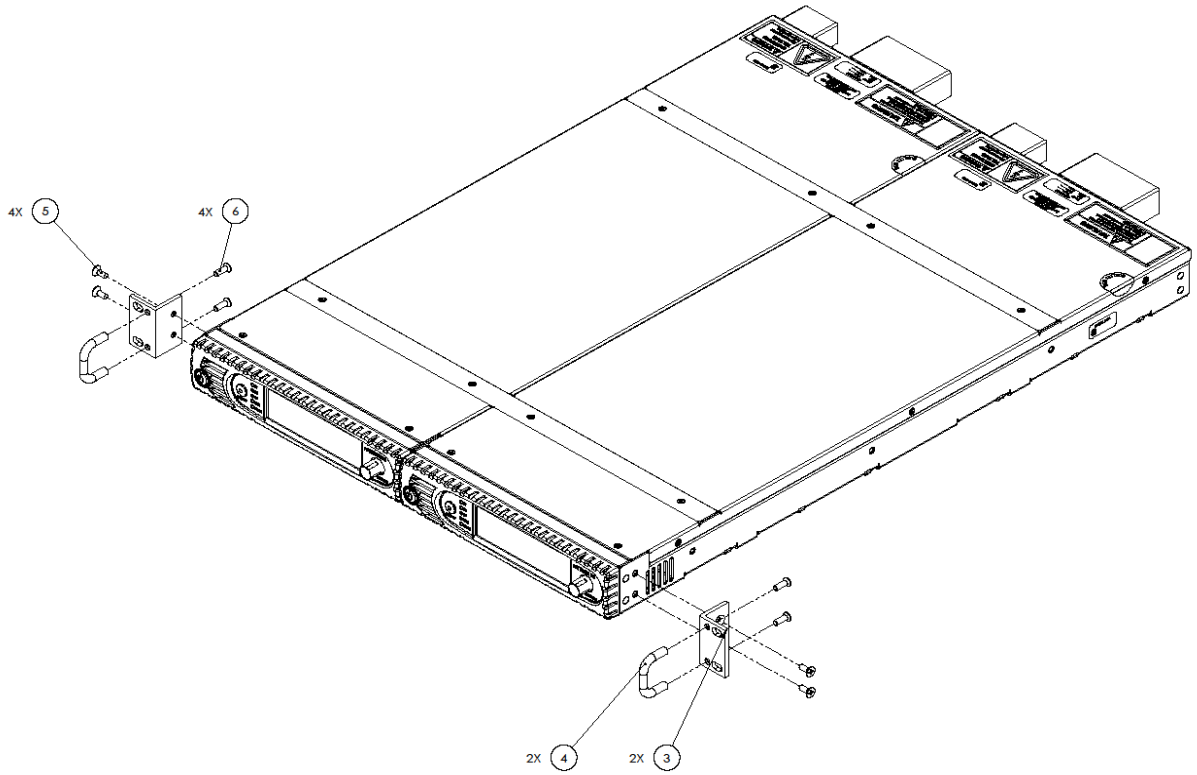


Figure 2-5: Rack mounting, Half Rack DC Series Model

Install the Rack Slides as follows:

6. Install the slide sections (item #21A) on both sides of the power supply chassis with screws (item #23) (three on each side).

7. Install the brackets (item #22) to the cabinet sections of the slides (item #21C) with screws (item #23) and nuts (item #24) (four on each side).

8. Adjust the location of the mounting brackets (item#2) as required for the rack cabinet vertical rails utilized.

9. Mount the cabinet sections of the slides (item #21C), (with brackets already installed) into the cabinet using appropriate hardware (e.g., the screws and nuts supplied, (item #25) and (item#26), 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.

10. Insert adjustable side sections (item #21B) into cabinet slide sections (item #21C). Insert power supply chassis with installed slide sections (item #21A) into the adjustable slide sections (item #21B).

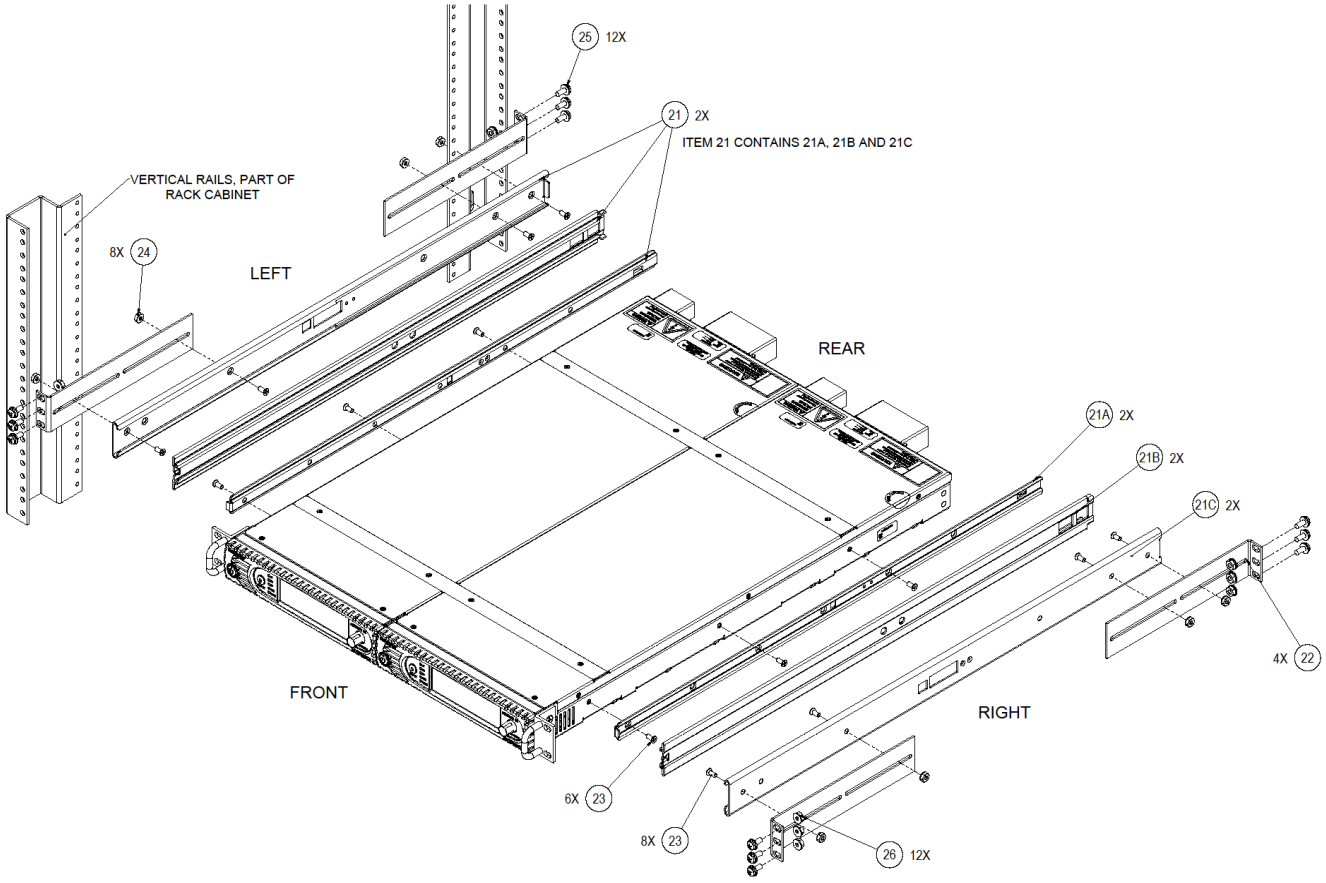


Figure 2-6: Rack mounting, Half rack DC Series Model

2.5.2 Rack mounting Of A Single Half Rack with a Dummy Unit

The rack mounting kit, part number **5330809-02R** (Single Unit) consists of the following items:

Part Number	Description	MFG	Item #	Qty
9330763-01R	BRKT, TOP RACKMNT, HLFRACK-ASTDC	AMETEK	1	2
9331024-01R	BRKT, RACK MNT, HALF RACK-ASTDC	AMETEK	2	2
9330233-01R	BRKT, 1U, CHAS MTG EAR -DYN	AMETEK	3	2
MH-8125-BA	HANDLE, RND,1.25IN, AL, BLK, ANODZ	AMETEK	4	2
FM1001	SCREW, M4,18-8, FLAT HD, SS,.7X6	ANY	5	4
110EG20-08	SCREW,8-32 X .500, PFH,100D, SS	ANY	6	4
9331034-01R	CHASSIS, DUMMY, HALF-RACK-ASTDC	AMETEK	7	1
110-400-03	SCREW,4-40 X .187, PFH100, LK, SS	ANY	8	8
110-M3F-05R	SCREW, M3 X 5, PFH, SS	ANY	9	12
9331021-01R	TOP COVER, HALF RACK -ASTDC	AMETEK	11	1
110-401-03	SCREW,4-40 X .187, PFH100, LK, SS	ANY	12	8
110CS04-01	SCREW,4-40 X .250, SEMS, PPH, CS	ANY	13	2
105-510-24	RACK SLIDES, FRICTION,24 IN, SS	JONATHAN 510QD-24	21	2
9330325-01R	BRKT, RACKSLIDE -DYN	AMETEK	22	4
110-800-06	SCREW,8-32 X .375, PFH100, LK, SS	ANY	23	14
112EN04-01	NUT,8-32, W/CONE WASHER, KEP, CS	ANY	24	8
110GS04-08	SCREW,10-32 X .500, SEMS, PPH, CS	ANY	25	12
112GL04-01	NUT, 10-32, ZINC PL	ANY	26	12

Table 2-3: Rack mounting (single unit) Ship Kit Details

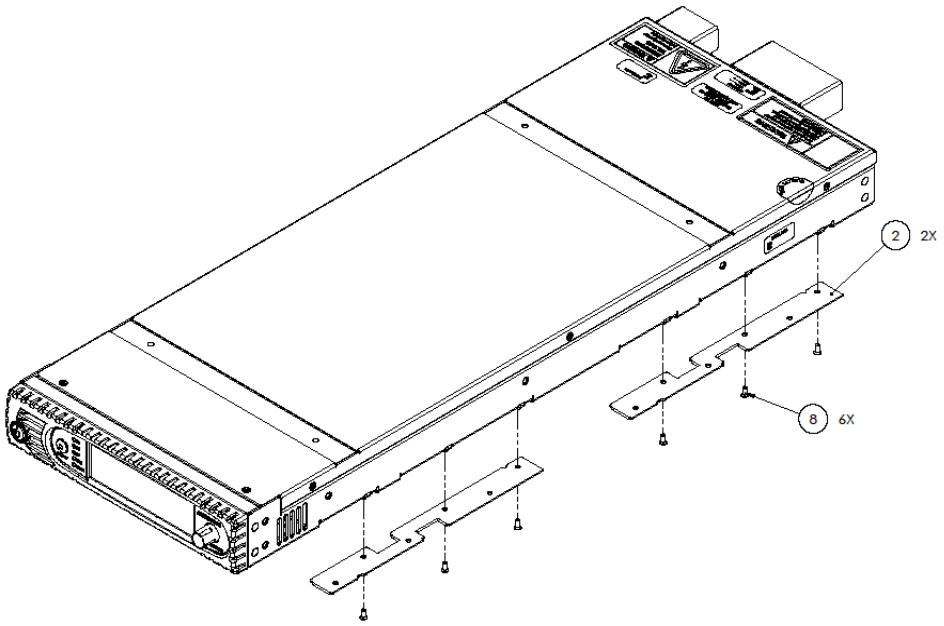


Figure 2-7: Rack mounting, Half Rack DC Series Model

Assembly Steps:

1. Install the rack mount bracket (item #2) to the underside of the chassis using (6X) M3 screws (item #9) as shown in Figure 2-7.

2. Assemble the chassis (item #7) and top cover (item #11) using screws (item #12 and #13) as shown in Figure 2-8.

3. Flush another unit with centre bracket and then Screw the chassis and bracket using (6X) M3 screws (item #9) as shown in Figure 2-9.

4. Install the top rack mount bracket (item #1) on top side of both the units using (8X) M3 Screws (item #8) as shown in Figure 2-10.

5. Install the handles (item #4) to the rack brackets (item #3) using (4X) 8-32 flat head Screw (item #6)as shown in Figure 2-11.

6. Install the rack brackets using (4X) m4 flat head screw (item #5) shown in Figure 2-11.

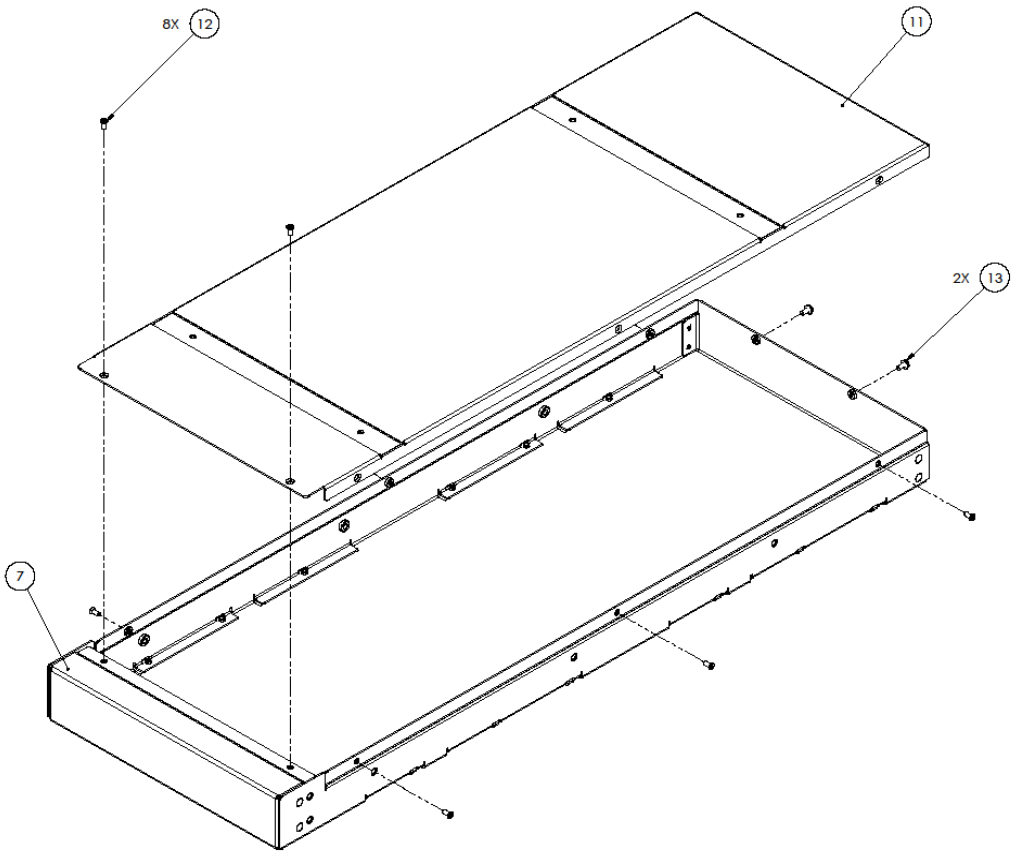


Figure 2-8: Rack mounting, Half Rack DC Series Model

Install the rackmount kit as follows:

7. Install the slide sections (item #21) on both sides of the power supply chassis with screws, item #25 (three on each side).

8. Install the brackets (item #22) to the cabinet sections of the slides (item #21C) with screws (item #23) and nuts (item #24) (four on each side).

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

10. Mount the cabinet sections of the slides (item #21C) (with brackets already installed) into the cabinet using appropriate hardware (e.g., the screws and nuts supplied (item #25 and item#26) 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.

11. Insert adjustable side sections (item #21B) into cabinet slide sections (item #21C). Insert power supply chassis with installed slide sections (item #21A) into the adjustable slide sections (item #21B).

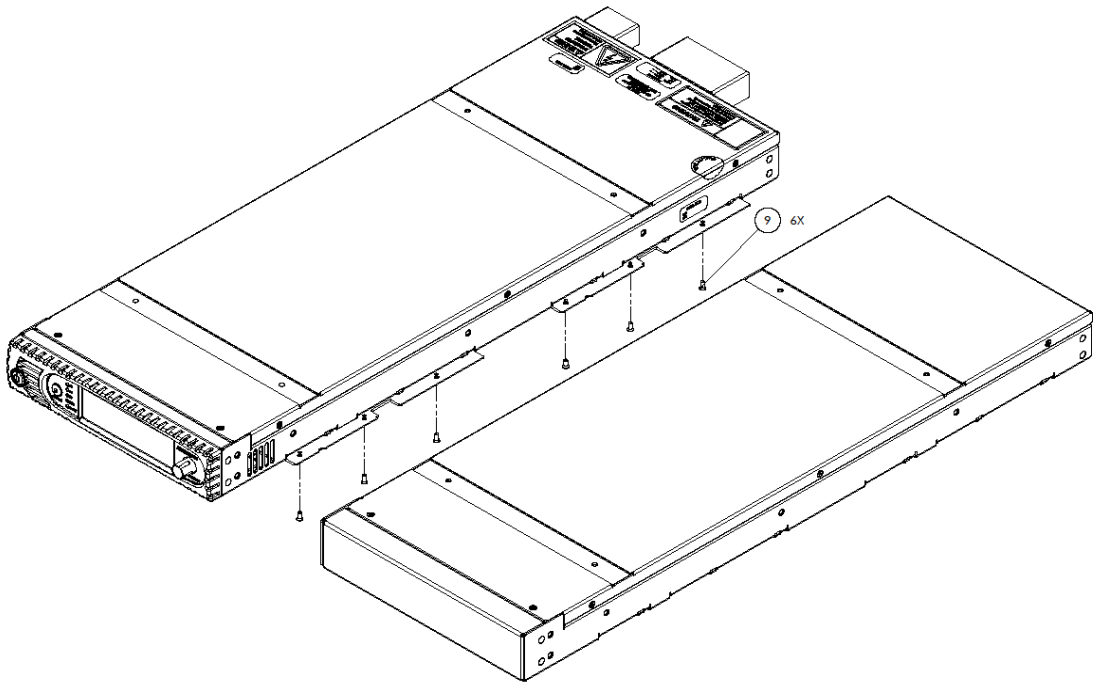


Figure 2-9: Rack mounting, Half Rack DC Series Model

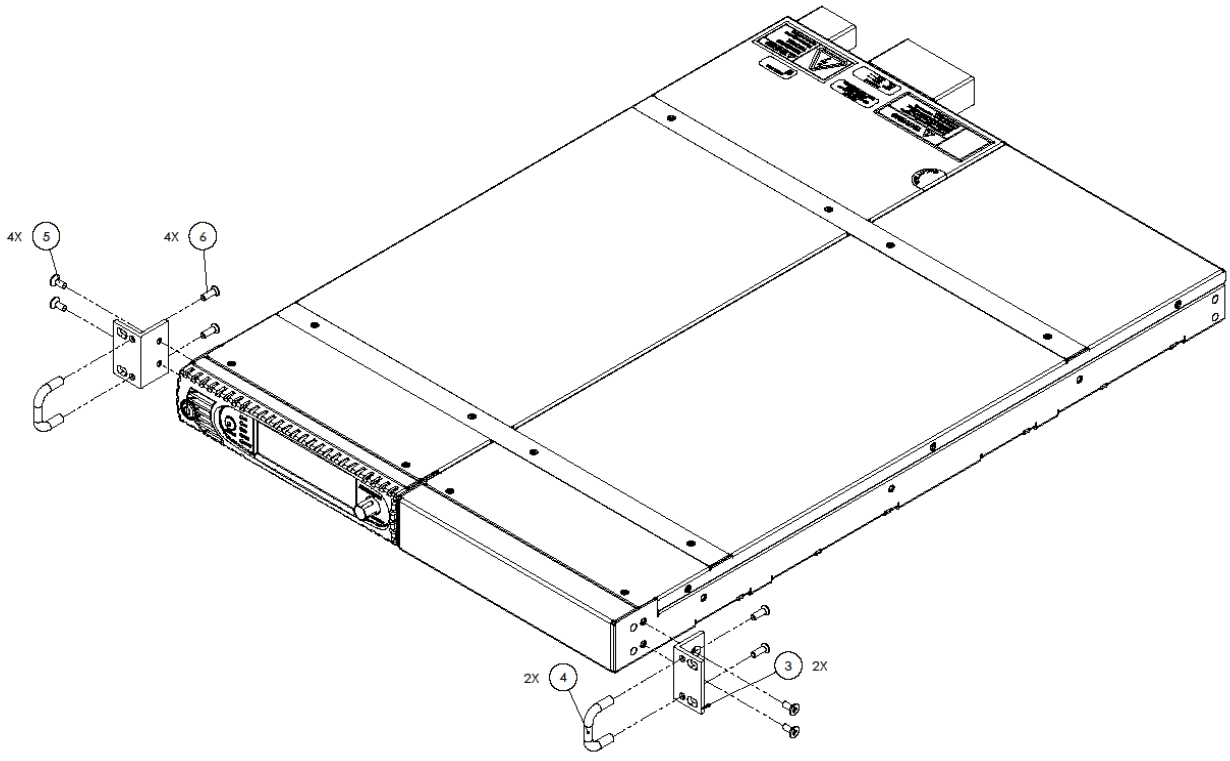


Figure 2-10: Rack mounting, Half Rack DC Series Model

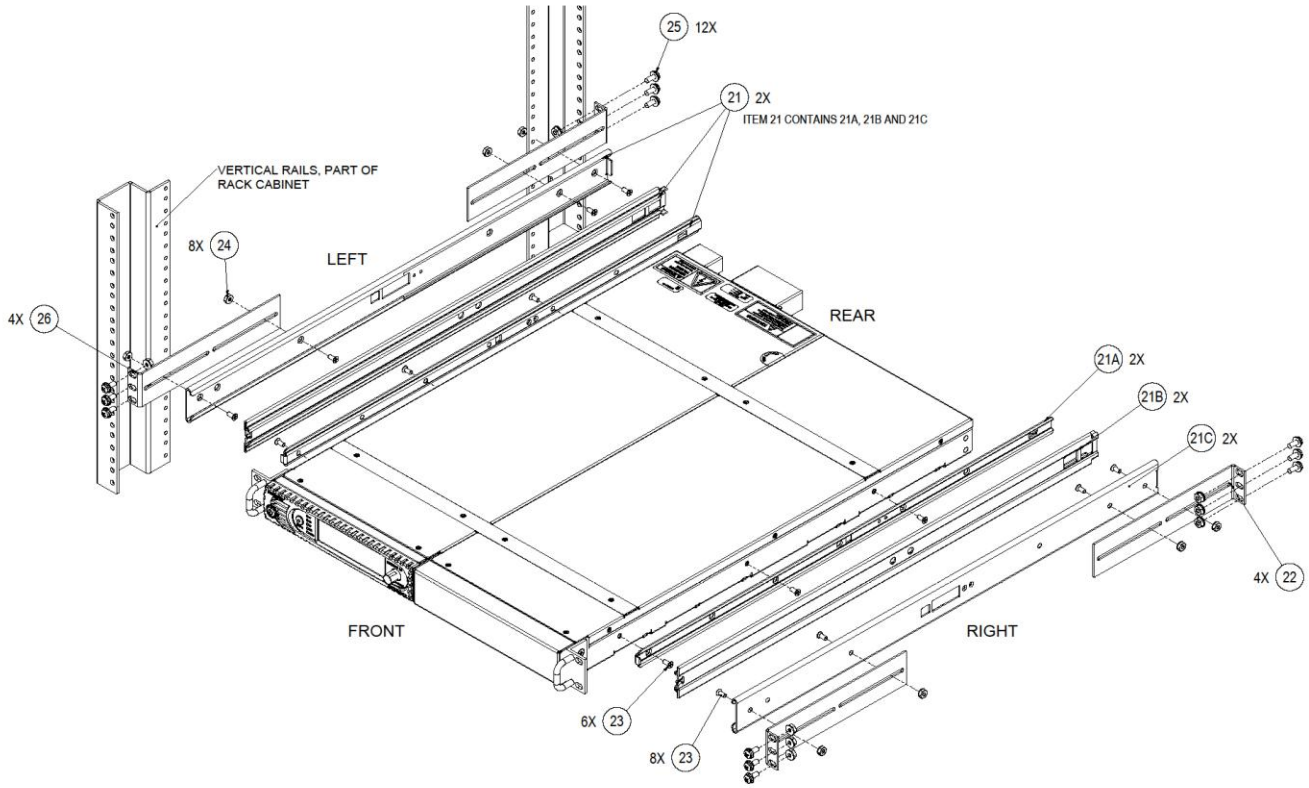


Figure 2-11: Rack mounting, Half Rack DC Series Model

2.6 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.

2.7 Outline drawings

Figure 2-12 shows the outlines and overall dimensions for installation of the Asterion DC Half Rack Series power source.

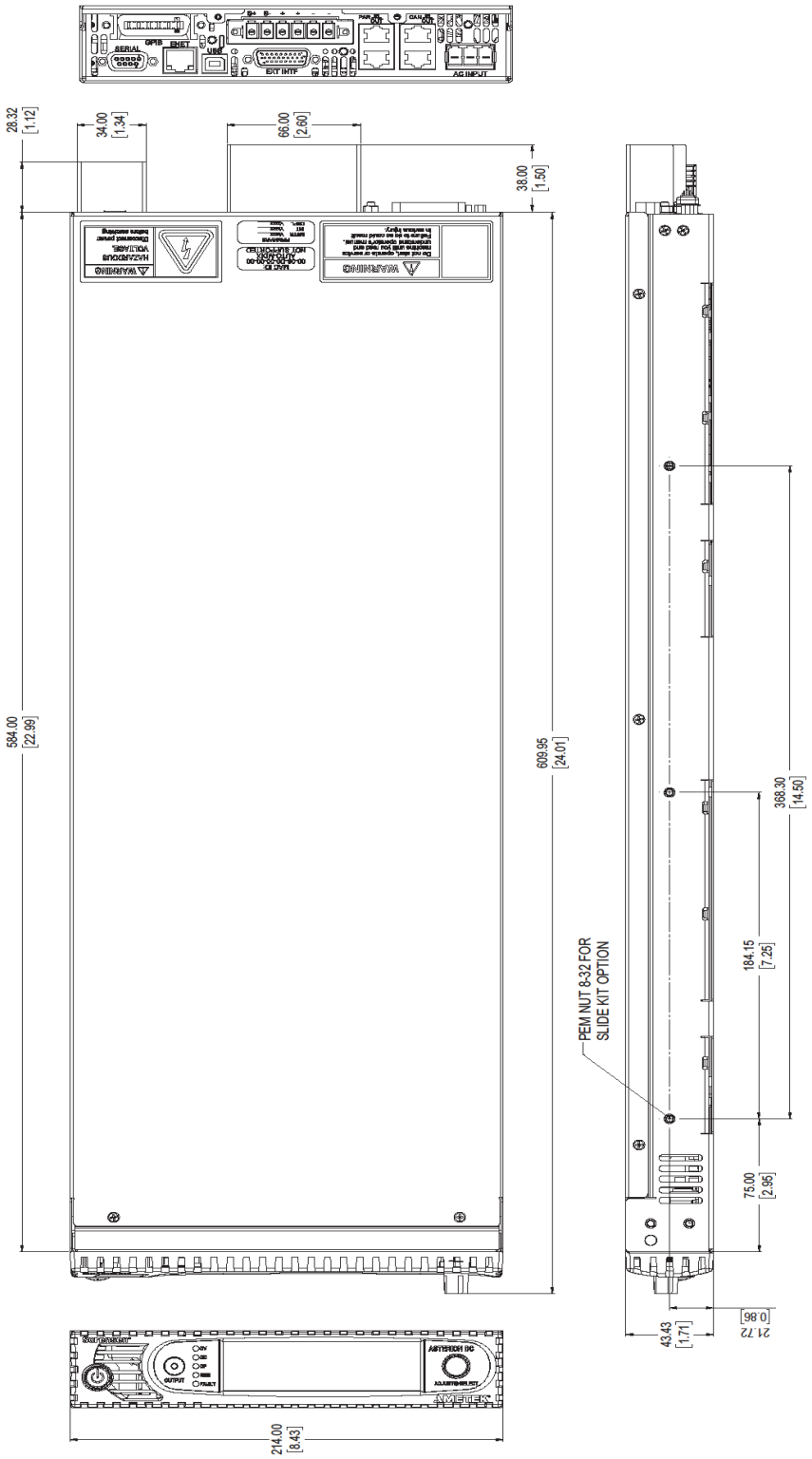


Figure 2-12: Installation Drawing

Figure 2-13 and Figure 2-14 shows the rear panel view of the power sources and the location of the connectors with GPIB and EtherCAT options respectively.

Figure 2-15 shows the installation of the rear panel protective covers for the AC input and DC Output terminals. The components comprising these covers are supplied in the ship kit.

CAUTION!

M4 0.7 KEPS nuts - Maximum tightening torque is 1.1Nm (10 lb-in.).

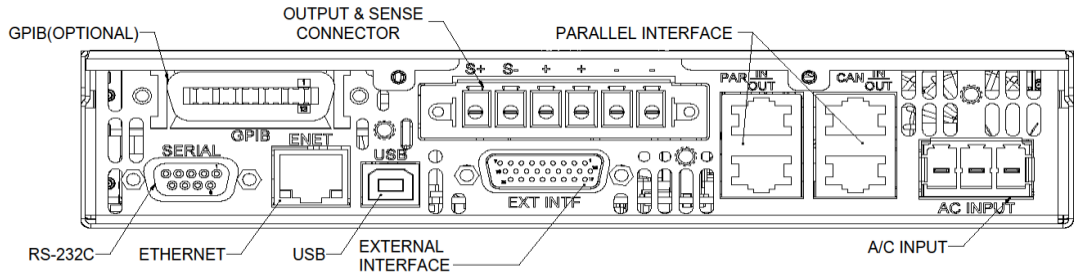


Figure 2-13: Rear Panel View with GPIB option

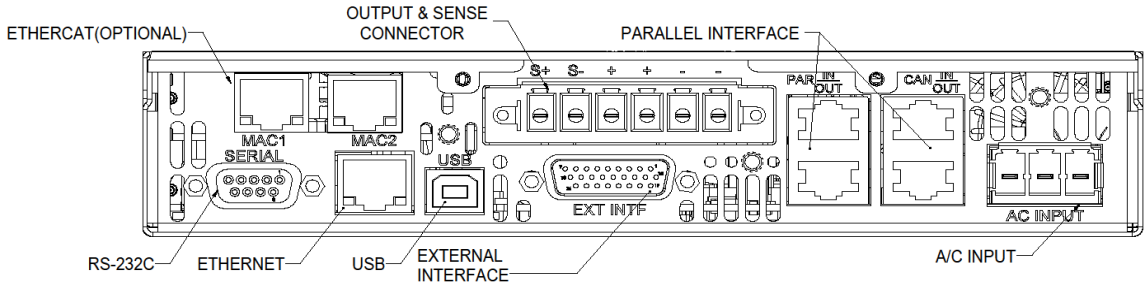


Figure 2-14: Rear Panel View with EtherCAT option

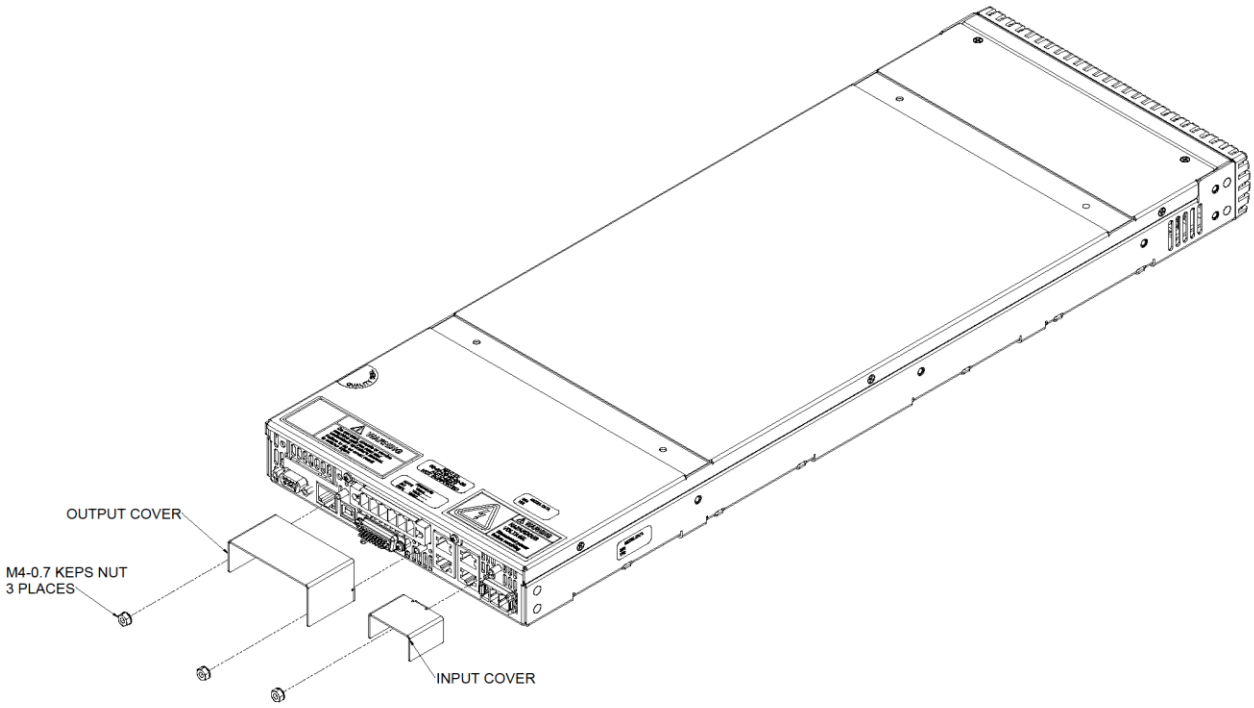


Figure 2-15: Rear Panel Protective covers installation

2.8 Rear Panel Input/ Output Connections

Figure 2-13 and Figure 2-14 shows the rear panel view of the power source and its available connectors. Table 2-4 provides details of the connectors located in the rear panel of the power source.

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 .

WARNING!

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

CAUTION!

Under no condition should the negative output terminal exceed 600V 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.

Connector	Function	Connection
AC Input Connector	AC input power; see section 2.9	AC mains 1-phase input
DC Output and Remote Sense Connector	DC output power and Remote voltage sensing; see section 2.10	Output load
Remote Isolated External User Control I/O connector	External User Control and Analog interface;	User I/O controller
RS-232C connector	RS-232C connector for remote digital control; see section 2.13.2.	External digital interface

USB Connector	USB type B connector for remote digital control; see section 2.13.3.	External digital interface
Ethernet connector	Ethernet connector for remote digital control; see section 2.13.4.	External digital interface
GPIB (IEEE-488) (Optional)	GPIB (IEEE-488) Option connector for remote digital control; see section 2.13.5	External digital interface
EtherCAT (Optional)	Modular connection for Optional EtherCAT for remote digital control; see section 2.13.6	External digital interface

Table 2-4: Rear Panel Connector

Voltage Model	AC Input Option Code	Nominal Input Voltage, Range VAC	Maximum Input Line Current, A (RMS)
40V- 600 V	B- 1 Phase Low Line Input	100V - 132V	24
	B- 1 Phase High Line Input	200V - 240V	11.5

Table 2-5: Maximum Input Line Current

2.9 AC input power connection

The Half rack Asterion DC Series power source is designed to operate from 1-phase input power, having 2 wires plus ground, with nominal AC input voltage (Refer Table 2-5), and 50/60 Hz input frequency. The AC input voltage range is automatically selected by the unit at power-up; no user setup is required. Power factor correction (PFC) provides high power factor, minimizing the required input apparent power and current harmonic distortion. Refer to the specifications of Section 1.2 for AC input current requirements, and derating of output power as a function of AC input voltage.

2.9.1 AC input overcurrent protection

The Asterion DC Half Rack Series power source 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 of internal components or wiring. A suitable overcurrent protection device must be provided externally, within the system installation, to protect the external wiring and interconnects.

2.9.2 AC Input Safety Disconnect Device

The Half Rack Asterion DC Series power source front panel POWER switch 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 switch or circuit breaker, and must be located close to the unit, within reach of the operator, and clearly labeled as the disconnection device.

2.9.3 AC Input Connector

The AC input connector is located on the rear panel, along with the safety-ground line. The input connection could be between Line and Neutral or vice-versa that have a voltage that does not exceed 264 VAC. Use wires with ratings equal to or greater than

the current rating listed in the Table 2-10. A ground wire must be connected from the rear panel safety-ground terminal to the utility power earth protection-ground. Figure 2-16 shows the rear panel view of the connector. Table 2-6 shows the functions and connector pinout, and Table 2-7 lists the connector type.

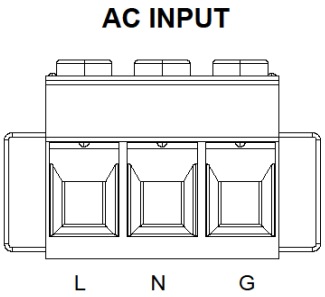


Figure 2-16: AC Input Connector

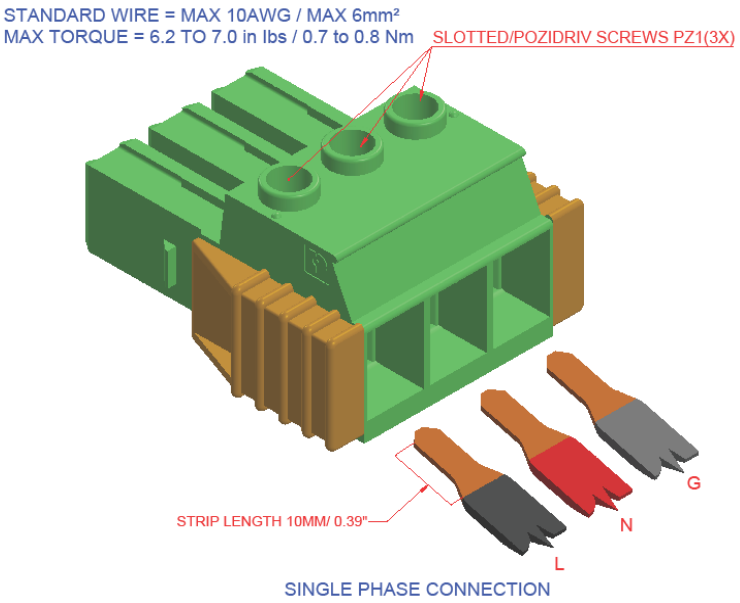


Figure 2-17: AC Input Connector wiring

The connector has compression terminals with female contacts. A ground connection must always be made to the utility earth protection ground using the AC Input connector pin. Figure 2-17 shows the AC input connector wiring 1-Phase connections.

Name	Type	Function
L	AC Input	Line input from utility AC mains.
N	Neutral	Neutral input from utility AC mains.
G	Safety Ground	Safety-Ground connection from utility earth protection-ground.

Table 2-6: AC Input Connector Pinout and Safety-Ground

Connector	Type
AC Input	Chassis connector header: Phoenix P/N 1720479; 3-position, compression terminals. Mating connector: Phoenix P/N 1778078; compression terminals; housing retained to header with screws. Wire stripping length: 10 mm (0.39”). Tightening torque: 0.7 Nm, min (6.1 lb-in) to 0.8 Nm, max (7 lb-in). Wire cross section: 0.2 mm^2, min (24 AWG) to 6 mm^2, max (10 AWG). Refer to Phoenix P/N 1778078 manufacturer datasheet for the complete specifications of the Mating Connector.
Safety-Ground	Use the GND pin (G) provided in the input AC connector Safety-Ground Connection.

Table 2-7: 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.

CAUTION!

For Input AC voltage, do not connect an AC voltage that is greater than 264 VAC, line-to-neutral, for 1-Phase. 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 to the utility power distribution earth protection-ground.

2.10 DC Output and Remote Sense power connections

The DC output and remote sense connector is located on the rear panel. Figure 2-18 shows the rear panel view of the connector. Figure 2-19 shows the output connection to load. Table 2-8 shows the functions and connector pinout, and Table 2-9 lists the connector type. Figure 2-20 shows the DC output and remote sense connection wiring details.

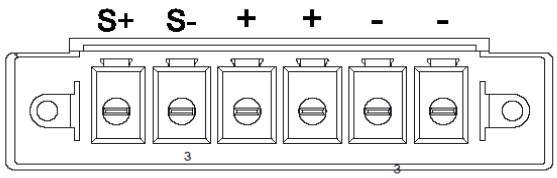


Figure 2-18: Output and Remote Sense Connector

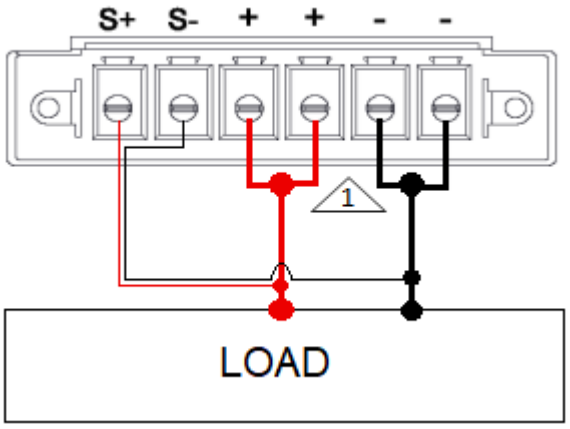


Figure 2-19: Output and Remote Sense Connector with Load

CAUTION!

1 The terminals of same polarity of the output connector are shorted internal to the power supply. Each terminal has the capacity to provide 25 A. For current greater than 25 A use individual wires from each terminal to the load and connect them together externally. Drawing current greater than 25 A from individual terminal would damage the power supply.

Name	Type	Function
S+	Remote Sense Positive DC Input	Positive DC input from the point where voltage needs to be regulated
S-	Remote Sense Negative DC Input	Negative DC input from the point where voltage needs to be regulated

+	Positive DC Power Output	Positive DC Power Output for connection to the Load
+	Positive DC Power Output	Positive DC Power Output for connection to the Load
-	Negative DC Power Output	Negative DC Power Output for connection to the Load
-	Negative DC Power Output	Negative DC Power Output for connection to the Load

Table 2-8: DC Output and Remote Sense Connector Pinout

Connector	Type
DC Output and Remote Sense	Chassis connector header: Phoenix P/N 172105; 6-position, compression terminals. Mating connector: Phoenix P/N 1777875; compression terminals; housing retained to header with screws. Wire stripping length: 10 mm (0.39”); Tightening torque: 0.7 Nm, min (6.1 lb-in) to 0.8 Nm, max (7 lb-in); Wire cross section: 0.2 mm^2, min (24 AWG) to 6 mm^2, max (10 AWG). Refer to Phoenix P/N 1777875 manufacturer datasheet for the complete specifications of the Mating Connector.

Table 2-9: DC Output and Remote Sense Connector Type

CAUTION!

The output DC connector provides two terminals each for positive and negative DC outputs rated at 25A. Loads requiring more than 25A to use two wires from individual output pins provided in the connector and connections to be made externally to the load. Looping of the wires in the output connector would cause over heating of the output terminals and would cause damage to the power supply.

CAUTION!

To prevent damage to the DC Output and Remote sense 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.

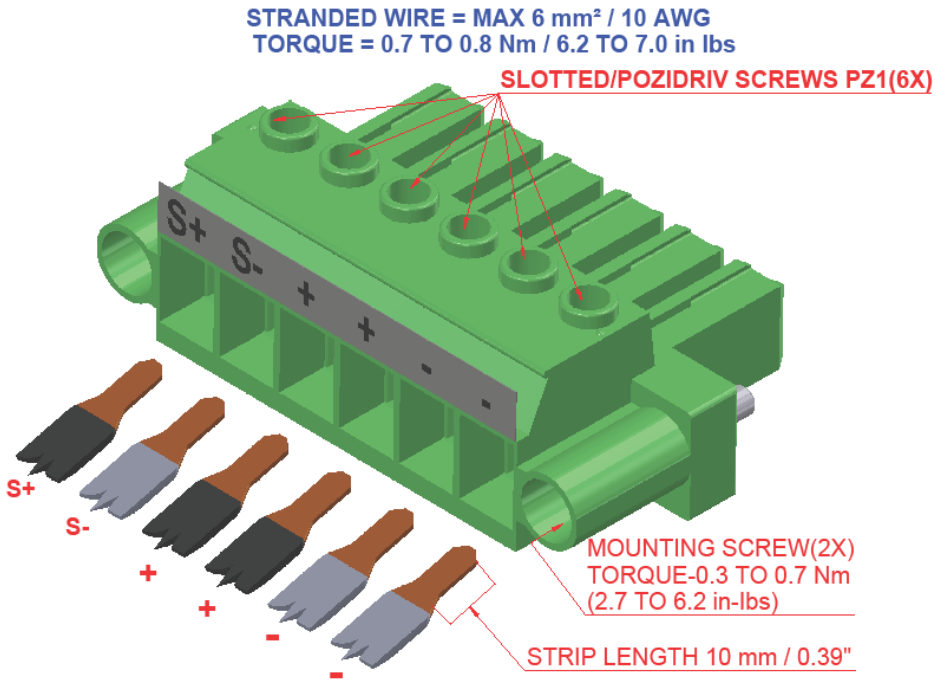


Figure 2-20: DC Output and Remotes Sense Connector wiring

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 and Remote sense both are at the rear panel output connector, while remote sense is at the load, through a cable connection from the rear panel remote sense Pin S+ and S-. Based on the user selection (local or remote) corresponding sense signal is used by the controller as the voltage feedback. Figure 2-18, shows the remote sense connector at the rear panel of the power supply.

Remote sensing is used to compensate for the voltage drop that occurs across the wires connecting the load to the output of the power source. 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 Figure 2-18. Connect the terminal Sense Positive (S+), to the point at the load that is connected to the Output Positive terminal, and the terminal Sense Negative (S-), 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 5% of the rated output voltage, then the unit would go to fault state. The fault can arise due to any of the following conditions.

1. If the remote sense is selected and the remote sense wiring is not done to the power supply.
2. If the remote sense is connected in the reverse polarity.
3. If the load cable drop exceeds 5% of the rated output voltage.

On the remote sense fault condition, the output voltage would get programmed to zero.

2.11 Wire Gauge Selection

Care must be taken to properly size all conductors for the input and output of the power source. This section provides guidance in the selection of wire size.

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

2.11.1 Wire Size

The tables below will assist in determining the appropriate wire size for both the input and output connections. Table 2-10 gives minimum recommended wire size; these recommendations are for 30°C 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 paralleled; refer to the National Electrical Code for guidelines.

Size	Temperature Rating of Copper Conductor		
AWG	60°C	75°C	90°C
	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	–	–	14
16	–	–	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 2-10: Minimum Wire Size

When determining the optimum cable specification for your power applications, the same engineering rules apply whether at the input or output of an electrical device. Therefore, this guide applies equally to the input cable and output cable for this power source 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 source 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 the power source 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. Therefore, short cables with derating of gauge size and insulation properties are recommended for power source 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 performance specifications of this power source. Also, consider how the wiring codes apply to bundles of wire within a cable arrangement.

In high performance applications requiring high inrush/ transient currents, additional consideration is required. The cable wire gauge must accommodate peak currents developed at peak voltages, which might be up to five times the RMS current values. An underrated wire gauge adds losses, which alter the inrush characteristics of the application and thus the expected performance.

Table 2-11 presents wire resistance and resulting cable voltage drop at maximum rated current, with the wire at 20°C. Copper wire has a temperature coefficient of $\alpha = 0.00393\Omega/°C$ at $t1 = 20°C$, so that at an elevated temperature, t2, the resistance would be $R2 = R1 (1 + \alpha (t2 - t1))$.

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

$$\text{Voltage Drop} = 2 \times \text{distance-in-feet} \times \text{cable-resistance-per-foot} \times \text{current}$$

Size, AWG	A(RMS), (90°C wire)	Ohms/100 Ft, (One Way)	Voltage Drop/100 Ft, (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 2-11: Wire Resistance and Voltage Drop, 20°C

2.12 Load Considerations

This section provides guidelines for incorporating protective diode networks at the output of the power supply to prevent damage while driving inductive loads or loads having stored energy that could be circulated back to the power supply.

2.12.1 Inductive and Stored-Energy Loads

To prevent damage to the power supply from inductive voltage kickback, connect an antiparallel diode (rated at greater than the supply's output voltage and current) across the output. Connect the cathode to the positive output and the anode to return. Where positive load transients, such as back EMF from a motor might occur, or stored energy is present such as a battery, a second blocking diode in series with the output is recommended to protect the power supply. Refer to Figure 2-21.

2.12.1.1 BLOCKING AND ANTI-PARALLEL DIODES

Ensure that the chosen components are suitably rated for the inductance and energy to be dissipated. The Peak Reverse Voltage ratings should be a minimum of 2 times the Power Supply maximum output voltage. The Continuous Forward Current ratings should be a minimum of 1.5 times the power supply maximum output current. A heatsink may be required to dissipate the power caused by flow of current.

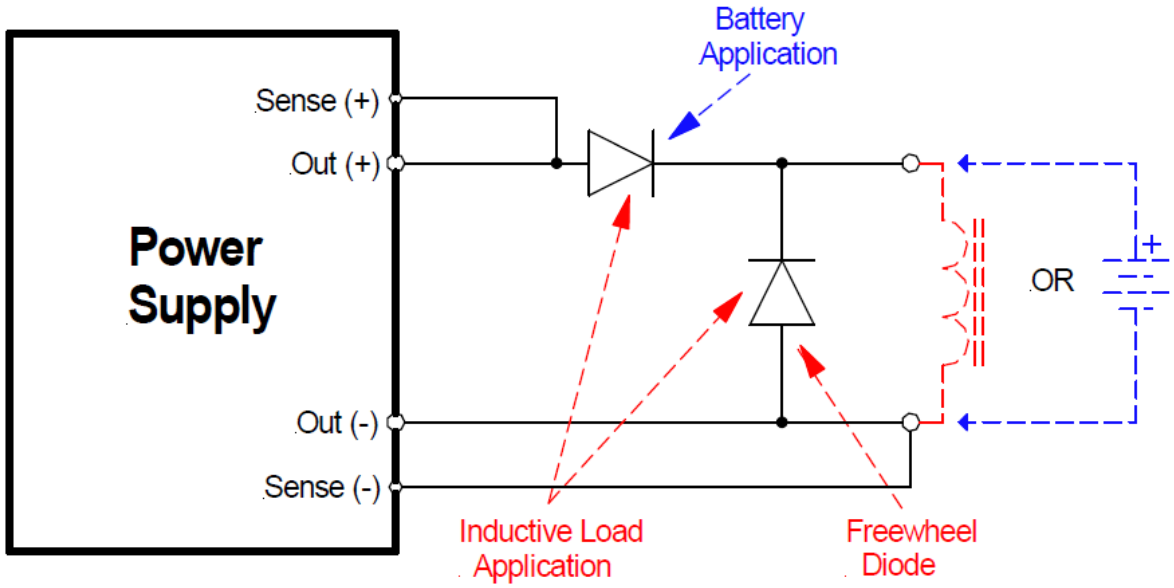


Figure 2-21: Diode Connections

2.13 Rear Panel User Interface Connectors

The rear panel contains the connectors for the remote isolated external user control I/O interface, digital communications interfaces (LAN, USB, RS-232C, optional GPIB IEEE-488 and optional EtherCAT).

2.13.1 Remote Isolated External User Control I/O Interface

The remote isolated external user control I/O interface connector is located on the rear panel. Figure 2-22 shows the rear panel view of the connector and Table 2-12 lists the connector type. Table 2-13 shows the functions and Table 2-14 shows the connector pinout.

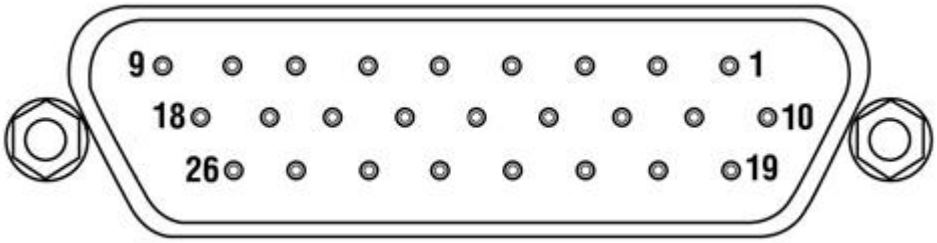


Figure 2-22: Remote Isolated External User Control I/O Interface connector

Connector	Type
Remote Analog programming and External User Interface	high-density, 26-contact, female D-Type, Norcomp P/N 181-026-113R531 Mating connector, Norcomp P/N 180-026-103L001

Table 2-12: Remote Analog Programming and External User Interface Connector Type

Function	Characteristics
Isolated Remote Output ON/OFF Control	There are two types of isolated control inputs to turn ON/OFF power supply. a) Remote-control input for output on/off with an applied AC/DC voltage source. A positive (+) 6-24 VDC or an AC input of 12- 24 VAC will enable (turn-on) the output of the supply. b) 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
Remote Inhibit Input	Switch/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.
TRIGGER IN	TTL compatible Input signal, active-high pulse of 10 ms; provides external hardware trigger at falling edge of the pulse for voltage ramp, current ramp, and sequencing functions. Signal connects to Open-anode of opto-isolator diode with internal 1kΩ series resistor internal to power supply. Voltage Rating: Maximum 24 V, Minimum -5V Low state: 0.3 V max, High State 2.7 V min
TRIGGER OUT	Output signal, active-high; synchronization pulse of 10 ms when a change in the output occurs. Open collector transistor output, Collector is connected the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector.

	Voltage Rating: Maximum 30 V, Minimum 3V for Active High, Current Sink Current: 50mA
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 the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. Voltage Rating: Maximum 30 V, Minimum 3V for Active High, Current Sink Current: 50mA
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 the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. Voltage Rating: Maximum 30 V, Minimum 3V for Active High, Sink Current: 50mA
FAULT Status	Output Signal, High state indicates fault state of the power supply. Open collector transistor output, Collector is connected the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. Voltage Rating: Maximum 30 V, Minimum 3V for Active High, Current Sink Current: 50mA
Auxiliary power output	Two Auxiliary power output of 5V and 15V is available. Maximum current for the auxiliary power output: 1 A
Auxiliary Power Enable Inputs	Auxiliary power can be enabled from front panel or through digital enable inputs on the 26-pin connector. Voltage Rating: Maximum 24 V, Minimum -5V Low state: 0.3 V max, High State 2.7 V min
Optional Isolated Analog programming features	
Remote Analog Programming of Output Voltage and Output Current	Independent Signal inputs for output voltage and current programming using External Analog Reference. Analog reference source is user selectable and can be a voltage or resistance. Selected analog reference source can be used to program output voltage and output current. **Voltage as Reference Source:** Full Scale Voltage could be set by the user from 5V to 10V. **Resistance as Reference Source** Full Scale Voltage could be set by the user from 5kΩ to 10kΩ. 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	Signal input for setting Overvoltage using External Analog Reference Voltage. Range: 0-10 VDC = 0-110% of full-scale output voltage. Do not exceed an input of 12 VDC. Programming accuracy and linearity: ±1% of full-scale output

Table 2-13: Remote Analog Programming and External User Interface Connector Characteristics

Pin	Signals	Type	Description
1 (1)	VPRG_VSOUR	ANALOG INPUT	Remote control input for voltage programming using a voltage source connected between pin 1 and signal return pin 6. **Signal return:** Pin 6 **Range:** Full scale Voltage could be set by the user from 5V to 10V. **Input impedance:** 20 kΩ, typical
2 (1)	VPRG_ISOUR	ANALOG INPUT	Remote control input for voltage programming using a resistance connected between pin 2 and signal return pin 6. Current Source of 1 mA is internally connected to pin 2 to enable resistance programming. **Signal return:** Pin 6 **Range:** Full scale Voltage could be set by the user from 5kΩ to 10kΩ. **Note:** Do not exceed resistance of maximum 10 kΩ
3 (1)	IPRG_VSOUR	ANALOG INPUT	Remote control input for current programming using a voltage source connected between pin 3 and signal return pin 6. **Signal return:** Pin 6 **Range:** Full scale Current could be set by the user from 5V to 10V. **Input impedance**: 20 kΩ, typical
4 (1)	IPRG_ISOUR	ANALOG INPUT	Remote control input for current programming using a resistance connected between pin 4 and signal return pin 6. Current Source of 1 mA is connected to pin 4 to enable resistance programming. **Signal return:** Pin 6 **Range:** Full scale Current could be set by the user from 5kΩ to 10kΩ. **Note:** Do not exceed resistance of maximum 10 kΩ
5 (1)	OVPRG_VSOUR	ANALOG INPUT	Remote control input for overvoltage programming using a voltage source connected between pin 5 and signal return pin 6. **Signal return:** Pin 6 **Range:** 5-10 VDC = 0-110% of full-scale output voltage. Do not exceed an input of 12 VDC.

6 (1)	RTN_PRG	PROGRAMMI NG RETURN	Return/GND. Internally, pins 6, 9, 25, and 26 are kept at the same DC potential. Circuit is electrically connected to the output power negative terminal.
7 (1)	VMON	ANALOG OUTPUT	Monitor signal for output voltage **Signal return:** Pin 9 **Range:** 0V to 10V corresponds to 0-100% full-scale output voltage. **Output impedance:** 100 Ω, typical **Minimum recommended Load:** 100 kΩ, typical **Maximum Load:** 20 kΩ
8 (1)	IMON	ANALOG OUTPUT	Monitor signal for output current **Signal return:** Pin 9 **Range:** 0V to 10V corresponds to 0-100% full-scale output current. **Output impedance:** 100 Ω, typical **Minimum recommended Load:** 100 kΩ, typical **Maximum Load:** 20 kΩ
9 (1)	RTN	MONITOR RETURN	Return/GND. Internally, pins 6, 9, 25, and 26 are kept at the same DC potential. Circuit is electrically connected to the output power negative terminal.
10	5V_AUX	POWER OUT	5V user power output, 1A max current. **Signal return:** Pin 11
11	RTN_AUX5V	POWER OUT RETURN	Return for Pin 10
12	15V_AUX	POWER OUT	15V user power output, 1A max current. **Signal return:** Pin 13
13	RTN_AUX15V	POWER OUT RETURN	Return for Pin 12
14	OUTPUT_ON/OFF _ACDC	DIGITAL IN	Isolated remote-control input for output on/off with an applied AC/DC voltage source. A positive (+) 6-24 VDC or an AC input of 12- 24 VAC will enable (turn-on) the output of the power supply. **Signal return:** Pin 15 (RTN_ACDC) **Input impedance:** 5 kΩ, typical
15	RTN_ACDC	DIGITAL GND	Dedicated Return for pins 14 (OUTPUT_ON/OFF_ACDC). This control return is optically isolated from the output power negative terminal of the power supply.

16	IPVOLT_ON/OFF	DIGITAL IN	Isolated 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. This control input is optically isolated from the output power negative terminal of the power supply. **Signal return:** Pin 26 **Input impedance**: 5 kΩ, typical
17	AUX_5V_EN	DIGITAL IN	Apply a high to enable output on pin 10 (5V_AUX). **Signal return:** Pin 26 **Voltage Rating:** Up to 24V capable, 0.3V max low, 2.7V min high.
18	TRIG_IN	DIGITAL IN	Input signal, active-high pulse of 10 ms; provides external hardware trigger at falling edge of the pulse for voltage, current ramp and sequencing functions. Signal connects to Open-anode of opto-isolator diode with 1kΩ series resistor internal to power supply. **Signal return:** Pin 26 **Voltage Rating:** Maximum 24 V, Minimum -5V **Low state** 0.3 V max, **High State** 2.7 V min.
19	AUX_15V_EN	DIGITAL IN	Apply a high to enable output on pin 12 (15V_AUX). **Signal return:** Pin 26 **Voltage Rating:** Up to 24V capable, 0.3V max low, 2.7V min high.
20	TRIG_OUT	DIGITAL OUT	Output signal, active-high; synchronization pulse of 10 ms when a change in the output occurs. Open collector transistor output, Collector is connected the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. **Signal return:** Pin 26 **Voltage Rating:** Maximum 30 V, Minimum 3V for Active High, Sink Current: 50mA
21	DIO_OUT1A	DIGITAL OUT	User digital output. Output signal high indicates Output is ON and signal low indicates Output is OFF. Open collector transistor output, Collector is connected the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. **Signal return:** Pin 26 **Voltage Rating:** Maximum 30 V, Minimum 3V for Active High, Sink Current: 50mA
22	DIO_OUT1B	DIGITAL OUT	User digital output. Output low for Constant Voltage (CV) and high for Constant Current (CC). Open collector transistor output, Collector is connected the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. **Signal return:** Pin 26 **Voltage Rating:** Maximum 30 V, Minimum 3V for Active High, Sink Current: 50mA

23	DIO_OUT1C	DIGITAL OUT	User digital output. High state indicates fault state of the power supply. Open collector transistor output, Collector is connected the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. **Signal return:** Pin 26 **Voltage Rating:** Maximum 30 V, Minimum 3V for Active High, Sink Current: 50mA
24	RMT_INHIBIT_CONTACT_CLOSURE	DIGITAL IN	Control input for Output ON/OFF. Switch/Relay contact closure or direct short-circuit from this terminal to signal return is required to enable/disable the output of the power supply. Remote circuit must sink up to 10 mA from 5 VDC to enable. **Signal return:** Pin 26
25	RTN	DIGITAL GND	Return/GND. Internally, pins 6, 9, 25, and 26 are kept at the same DC potential. Circuit is electrically connected to the output power negative terminal
26	RTN	DIGITAL GND	Return/GND. Internally, pins 6, 9, 25, and 26 are kept at the same DC potential. Circuit is electrically connected to the output power negative terminal
(1) The Remote Analog Programming pin 1 to pin 9 are optional. Pins are No Connection (NC) for the units without Analog Programming feature.			

Table 2-14: Remote Analog Programming and External User Interface Connector Pin out

CAUTION!
Return signal are shorted internal to the power supply. Applying a voltage potential between the unit's return signal would damage the power supply.

CAUTION!
Analog programming interface signals are isolated from negative output terminal; Isolation voltage is rated for ±600 VRMS, maximum; operation of Isolated Analog Interface signals should be at SELV safety voltage conditions to chassis ground.

2.13.2 RS-232C Serial Interface

Figure 2-23 shows the RS-232C connector type and Table 2-16 for pin descriptions. The power source 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. Refer to the DC-Asterion Series Programming Manual (P/N M330520-01) distributed on the CD, M550008-01 for establishing communication from the computer.

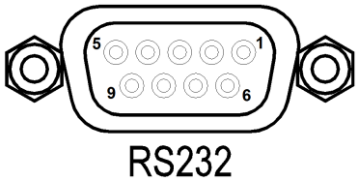


Figure 2-23: RS-232C Interface Connector

Connector	Type
RS-232C Interface	9-contact receptacle (female) Subminiature-D.

Table 2-15: 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 2-16: RS-232C Interface Connector Pinout

2.13.3 USB interface

USB remote control interface is made through a Series-B device connector located on the rear panel; refer to Figure 2-24 for view of connector, Table 2-17 for the connector type and Table 2-18 for pin descriptions. A standard USB cable between the Asterion Series power source and a computer should be used. For EMC considerations a ferrite core can be added to the cable Ametek P/N: 991-642-28, Manufacturer P/N: CS28B0642. Refer to the DC-Asterion Series Programming Manual (P/N M330520-01) distributed on the CD, M550008-01 for establishing communication from the computer.

CAUTION!

Connecting the power source to the computer controller through an USB hub is not recommended. The USB connection should be direct between the two devices.

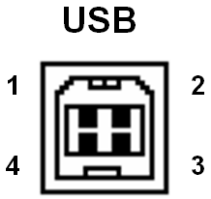


Figure 2-24: USB Interface Connector

Connector	Type
USB Interface	USB series-B type Connector

Table 2-17: USB Interface Connector Type

Pin #	Name	Description
1	N/C	No Connection
2	D-	Data -
3	D+	Data +
4	GND	Ground

Table 2-18: USB Interface Connector Pinout

2.13.4 LAN interface

A LAN connector (Ethernet 10BaseT/100BaseT) is located on the rear panel for remote control; refer to Figure 2-25 for view of connector, Table 2-19 for connector type and Table 2-20 for pin descriptions. A standard modular cable with an 8P8C modular plug should be used between the power source 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 source. For information on how to set up a network connection or a direct computer connection using the LAN interface, refer to the DC-Asterion Series Programming Manual (P/N M330520-01) distributed on the CD, M550008-01. For EMC considerations a ferrite core can be added to the cable Ametek P/N: 991-642-28, Manufacturer P/N: CS28B0642.

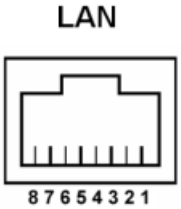


Figure 2-25: LAN Interface 8P8C Modular Connector

Connector	Type
LAN Interface	Standard RJ45 connector

Table 2-19: 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 2-20: LAN Interface 8P8C Modular Connector Pinout

2.13.5 GPIB interface (Optional)

A GPIB connector is located on the rear panel for remote control; refer to Figure 2-26 for rear view of connector, Table 2-21 for connector type and Table 2-22 for pin descriptions. Refer to the DC-Asterion Series Programming Manual (P/N M330520-01) distributed on the CD, M550008-01 for establishing communication.

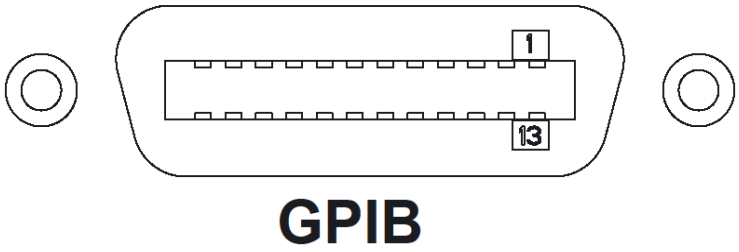


Figure 2-26: GPIB interface Connector

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

Table 2-21: 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

Pin #	GPIB Signal	Description
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 2-22: GPIB Interface Connector Pinout

2.13.6 EtherCAT interface (Optional)

EtherCAT interface is located on the rear panel for remote control; refer to Figure 2-27 for view of connector, Table 2-23 for connector type and Table 2-24 for pin descriptions. Refer to the DC-Asterion Series Programming Manual (P/N M330520-01) distributed on the CD, M550008-01 for establishing communication.

For connecting EtherCAT devices only Ethernet cables that meet at least the requirements of category 5 (CAT5) according to EN 50173 or ISO/IEC 11801 should be used. EtherCAT uses 4 wires for signal transfer as described in Table 2-24.

Figure 2-27: EtherCAT interface Connector

Connector	Type
EtherCAT Interface	2 X Standard RJ45 connector

Table 2-23: EtherCAT Interface Connector Type

Pin #	EtherCAT Signal	Core Coloring	Description
1	TD +	Yellow	Transmit Data +
2	TD -	Orange	Transmit Data -
3	RD +	White	Receiver Data +
6	RD -	Blue	Receiver Data 0

Table 2-24: EtherCAT Interface Connector Pinout

3
OPERATION

3.1 Introduction

The Asterion DC Half Rack Series is operated from the intuitive, easy-to-use front panel touch screen display. Provides Quick access to dashboard, output programming parameters, measurements, ramp, configuration, control interface and system settings from the touch screen interface. Functions and parameters can be directly selected from the touch screen or by using the encoder selector button. The following sections provides detailed information of the controls, indicators, and the front panel menu functionalities for the operation of the power supply.

3.2 Front Panel Controls and LED Indicators

Figure 3-1 shows a view of the front panel of the Asterion DC Half Rack series. Refer to Table 3-1 for functional descriptions of the front panel.

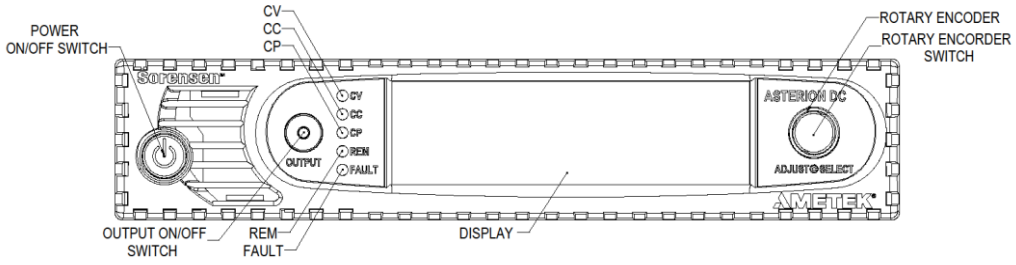


Figure 3-1: Front panel DC-Asterion Half Rack

Item	Reference	Functional Description
1	ON/OFF Switch	Two–position pushbutton switch turns the source on and off.  **WARNING!** OFF position does not remove AC input from internal circuits. Disconnect external AC input before servicing unit
2	OUTPUT ON/OFF Switch	Momentary switch that toggles output power ON/OFF.
3	Display	TFT color graphics display with backlight and pressure-actuated touch-screen. 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 selects functions and enters numerical values.
LED Mode Indicators		Indicates the mode that is active.
6	CV (Constant Voltage)	Indicates the CV regulation mode is turned on.
7	CC (Constant Current)	Indicates the CC regulation mode is turned on.
8	CP (Constant Power)	Indicates the CP regulation mode is turned on.
10	REM	Source is presently controlled by the remote digital interface. If the RS-232C, USB, GPIB, LAN or EtherCAT interface is used, the REM state can be enabled by the external controller using the SCPI command, SYST:REM. 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 or by clicking on the Go To Local button displayed on the front panel.
11	FAULT	Fault condition has occurred; output is shutdown, and output voltage is programmed to zero.

Table 3-1: Front Panels controls and indicators

3.3 Basic Front Panel Operation

The Asterion DC Half Rack Series power source provides extensive functionality and programmability, which could be exercised through the front panel, and the remote analog/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 Asterion DC Half Rack Series power supply is shipped from the factory configured for front panel voltage/current/overvoltage Protection 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 remote isolated external user control I/O interface connector (26 pin connector) is supplied with a mating connector which has the remote inhibit input control signals connected (Pin-24 shorted to Pin-25) to allow the output to be enabled.

WARNING!

The power-up factory default state is output enabled, and the output will be energized with the settings of voltage and current at zero. At initial power-on a screen is displayed with a warning that the output will be enabled after countdown of a 10-second timer; during this state, the output Voltage and Current are programmed to zero, the Overvoltage Protection (OVP) is set to maximum, and the Output State is OFF. After the 10-second timer has elapsed, the Output State is changed to ON. Refer to Figure 3-11 or the warning screen that is displayed on the course of boot up of the power supply.

3.3.1 Initial Setup

Before connecting the unit to the AC mains, ensure that the front panel ON/OFF power switch is in the **OFF** position. Check the remote isolated external user control I/O interface connector (26 pin connector) mating connector is fixed on the rear panel and verify that Pins 24 and 25 (Remote Inhibit Output On/Off) are shorted together. This is the default configuration installed from the factory. This jumper allows the output of the supply to be enabled from the front panel when the Output On/Off button is pressed.

3.3.2 Navigation and Selection

The front panel display of the Asterion DC Half Rack Series power source allows the user to select the various menus required to configure and operate the unit. Navigating through the various menus could be done using the touch-screen display or the rotary encoder. Tapping the display screen or clicking with the encoder on any menu or function that is highlighted (active) will enter that menu or execute that function.

The touchscreen utilizes resistive, pressure-actuated technology, and depends on pressure being applied to the top surface of the screen to detect the position of input. A fingertip, fingernail, or stylus pen could be used. To prevent scratching the surface layer, do not use a hard or sharp tip, such as ball-point pen or mechanical pencil.

CAUTION!

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

The present cursor position is always shown with a selection-box that has a highlighted border around a field, refer to Figure 3-2. 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. When outside one of the HOME screens, tapping the Home Icon will exit that screen and would return to the HOME screen. Refer to Figure 3-3 and Figure 3-2 respectively.

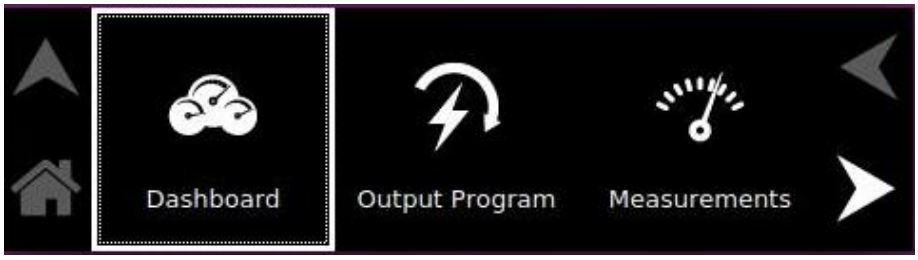


Figure 3-2: Home Screen with Dashboard Icon Highlighted

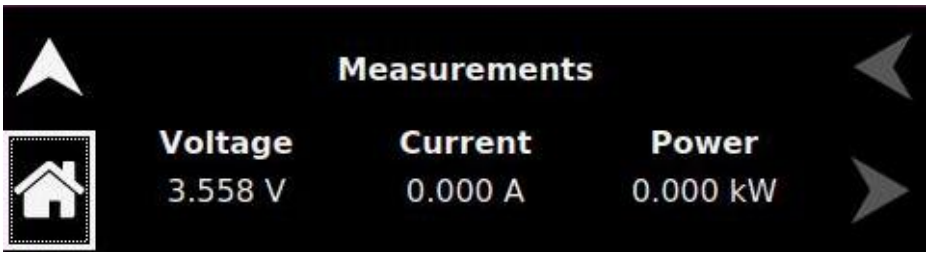


Figure 3-3 : Measurement Screen with Home Icon Highlighted

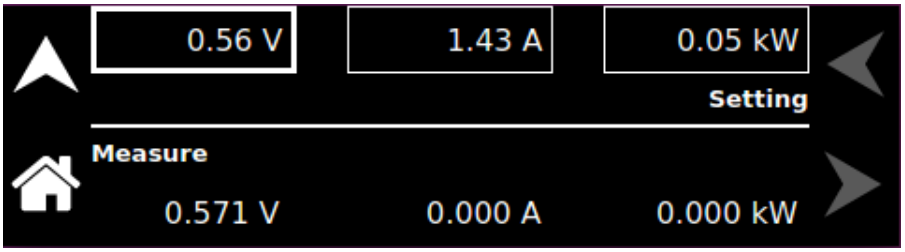


Figure 3-4: Dashboard Screen with Voltage Setting Field Active

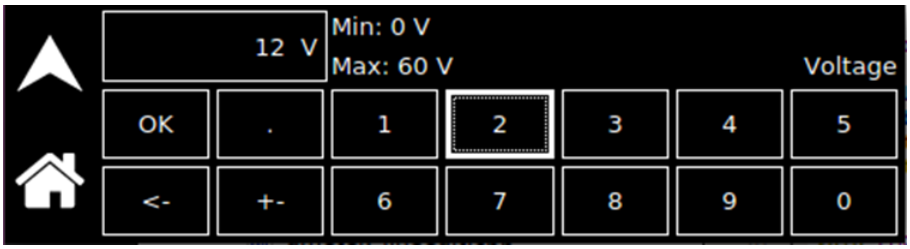


Figure 3-5: Touch-Screen Numeric Keypad

The Dashboard Menu is shown with voltage selection field highlighted active (Refer to Figure 3-4). Tapping the selection-field box, selects that parameter for adjustment, and the screen changes to the numeric keypad that allows value entry; Refer to Figure 3-5.

Another way of entering the value is by scrolling to the parameter selection-field and depressing with encoder switch, parameter selection- field active has its border highlighted

in bold when selected using the encoder switch; refer to Figure 3-6, voltage selection field is selected by encoder switch and the border is highlighted in Bold lines. Upon selection the user can continuously adjust the parameter value, up and down, as the encoder is rotated, and the encoder switch is depressed again this will set the value on the parameter field.

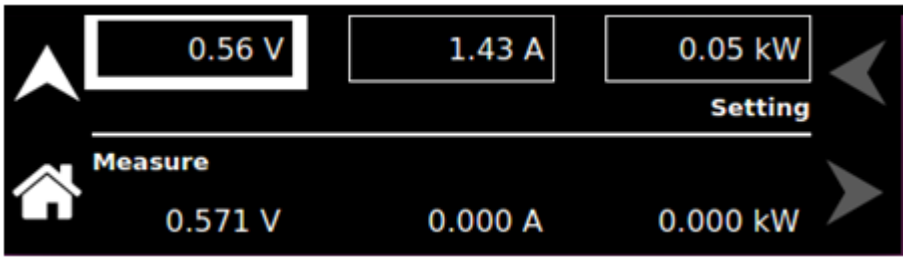


Figure 3-6: DASHBOARD Screen Voltage Selection-Field Active using Encoder switch

3.3.3 Touch-Screen Numeric Keypad

The touchscreen has a keypad that allows numeric value entry; refer to Figure 3-7. After scrolling through menus until a parameter selection-field box is highlighted (active), tapping the selection-field selects it. Afterwards, the keypad screen will be displayed and tapping numerical value keys, the decimal point key, or the polarity key selects 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. Tapping the OK key enters the value to have it take effect.

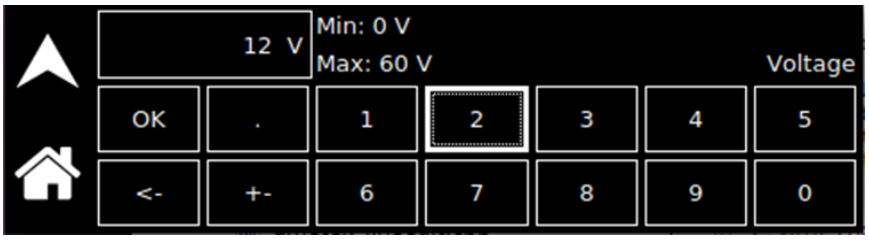


Figure 3-7: Touch-Screen Numeric Keypad

Functions that accept a numeric value require that the value is within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

3.3.4 Rotary Encoder

The rotary encoder provides a secondary way to navigate the display. It is used to select functions, change parameter values, and perform setup. It can be used to move 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 the clockwise and counter-clockwise rotation; refer to Figure 3-8. Turning the encoder knob allows sequential scrolling through each menu or function on a screen; the item that is active has its selection field-box highlighted bold; Refer Figure 3-6. To select or set a choice, depress the encoder knob to engage the encoder momentary switch.

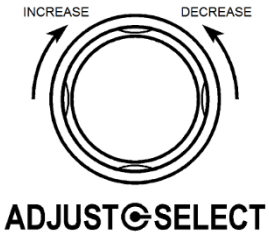


Figure 3-8: Rotary Encoder

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 current (active) selected 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 3-4.
ADJUST/SELECT	After scrolling to a function, the rotary encoder knob is depressed to select the function (clicking on an item). Clicking on a selection-button will change its state (on or off) and clicking on a function or menu will select it and change to a screen that allows further value entry. Parameter values, such as voltage, current and power, are adjusted by navigating to the parameter text box and depressing on the text box will select the parameter text box. The screen will be displayed with a parameter selection-field border highlighted bold (refer to Figure 3-6). If a parameter selection-field had been selected whose value could be adjusted by Rotary Encoder switch, the rotary encoder could then be used to continuously adjust the parameter value, up and down, as the encoder is rotated, and the encoder switch is depressed again this will set the parameter value. 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 has the capability for real-time adjustment of output parameters: the value of the parameters change as the rotary encoder is turned for immediate effect at the output. If the OUTPUT switch is on, the output parameter will change as the encoder is rotated. Refer to the DASHBOARD screen menu in Section 3.4.3 for a description of the parameters that have real-time adjustability.

The rotary encoder could also be used with the numeric keypad to enter values. After selecting a parameter using the touch-screen, the numeric keypad will be displayed; refer to Figure 3-7. The rotary encoder could be used to select any of the items of 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 button is clicked to execute the final value and have it take effect.

3.4 Front Panel Display Menu and Functionality

3.4.1 Power-Up Screens

At initial power-on, the display shows the Asterion DC Half Rack Splash screen, refer to Figure 3-9, followed by the Start-Up screen with the manufacturer name, model number, serial number, firmware revisions and last calibration date, refer to Figure 3-10, and finally the Dashboard screen, refer to Figure 3-15.

Figure 3-9: Splash Screen

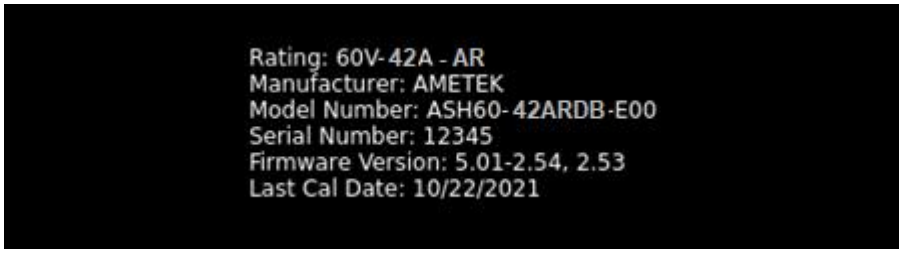


Figure 3-10: Power-On Screen Displaying Model & Version

If output is enabled in Power-ON Settings (PONS) screen, refer to Figure 3-43 and during the next power-cycle, a warning screen is shown, Refer to Figure 3-11, before the Dashboard Screen.

It warns the user that the output will be enabled at the end of 10 second countdown. The process can be aborted by pressing the ABORT button on the screen. Once aborted, the output remains off until the user enables it with the Output On/Off button.

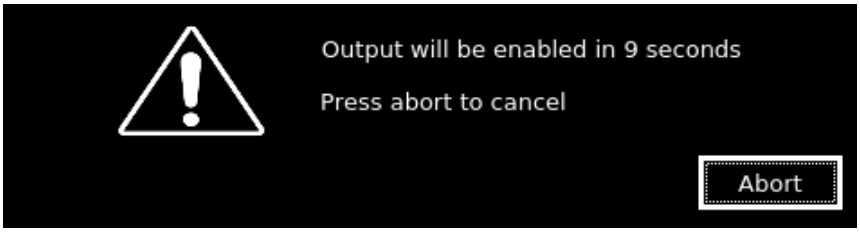


Figure 3-11: Output-Enabled Warning Screen

3.4.2 Home Screen Top-Level Menu

Selecting the Home icon or Up arrow will open the HOME screen. Each menu of a screen could be selected by tapping its associated selection-field box through the touch-screen, or by selecting it with the rotary encoder and depressing (clicking) the rotary encoder SELECT switch. Refer to Figure 3-12, Figure 3-13, Figure 3-14 and Table 3-2.

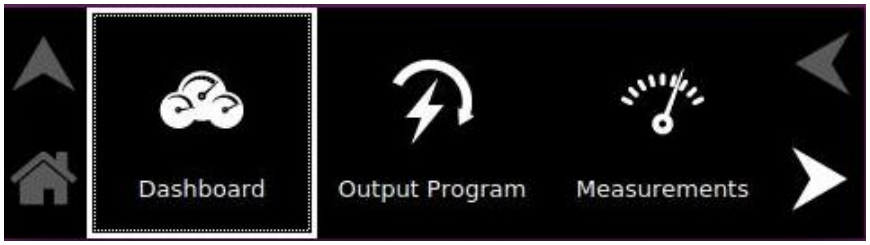


Figure 3-12: HOME Screen Menu 1

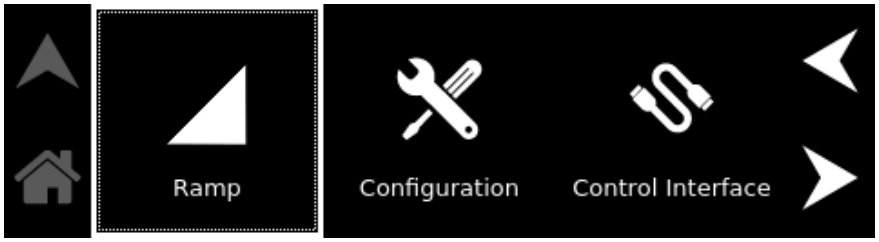


Figure 3-13: HOME Screen Menu 2

Figure 3-14: HOME Screen Menu 3

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 setting and measurement of output parameters: voltage, current and power.
OUTPUT PROGRAM	Provides setting of voltage, current, power, regulation mode, output state, and OVP (Over Voltage Protection).
MEASUREMENT	Provides Measurements of Output Voltage, Current and Power.
RAMP	Provides Voltage and Current Ramp functions.
CONFIGURATION	Provides setup of Power ON **S**tates (PONS), User V/I limit, Output Sense, Measurement Settings, Aux Output and Connections.
CONTROL INTERFACE	Provides setup of remote digital interfaces: RS232, GPIB, LAN, Analog, USB and EtherCAT.
SYSTEM SETTINGS	Provides display of System Status, Last Save, LCD, Hardware Limits, Firmware version, Default Screen timeout, Language, Parallel Chassis Reset and Factory Default.

Table 3-2: Home Screen Menu Content

3.4.2.1 NAVIGATING BETWEEN HOME SCREEN MENUS

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

- Tapping selected menu on Home Screen of the front panel touchscreen.

- Scrolling to menu with the encoder and depressing the encoder switch.

Tapping the Up-arrow button will return to the previously selected screen. Tapping the HOME button will return to the Home Screen.

3.4.3 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 shown in the DASHBOARD screen menu. The DASHBOARD screen is the default menu that is displayed after power-on, refer to Figure 3-15. The DASHBOARD screen displays settings and measurement.

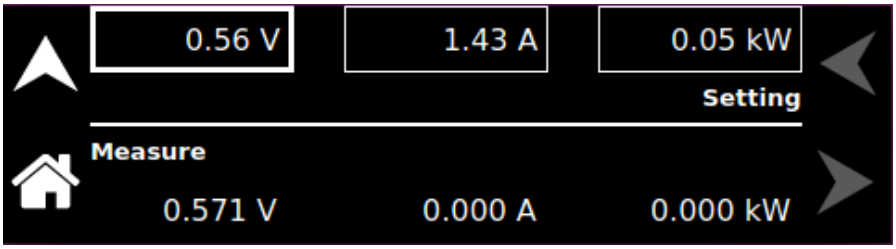


Figure 3-15: Dashboard Screen

The Voltage settings parameter field box would be disabled and grayed out (refer Figure 3-16) if the Voltage Reference Mode is selected as External. User is restricted to program the output voltage from the front panel screen or digital interface. It could be programed only through the analog programming interface.

The Current settings parameter field box would be disabled and grayed out (refer Figure 3-16) if the Current Reference Mode is selected as External. User is restricted to program the output current from the front panel screen or digital interface. It could be programed only through the analog programming interface.

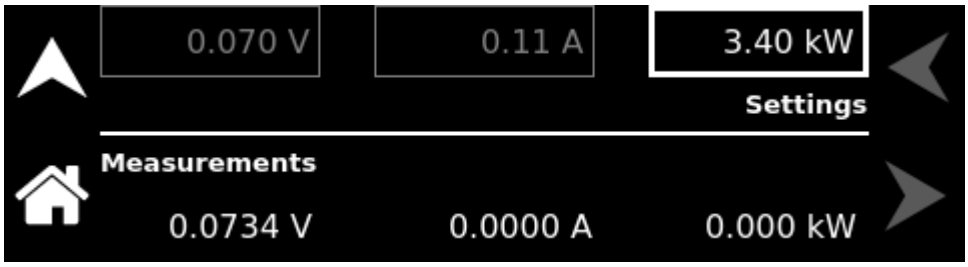


Figure 3-16: Output Voltage and Current as External Reference Mode

The following selections are available in the DASHBOARD screen top-level menu.

Entry	Description
Setting	
Voltage	Programs the output voltage of the power supply in volts. Real-time setting is possible using the rotary encoder and touch screen.

Current	Programs the output current in amps. Real-time setting is possible using the rotary encoder and touch screen.
Power	Programs the output power in kW. Real-time setting is possible using the rotary encoder and touch screen.

Measure

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.

3.4.3.1 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 bold (Voltage selection field) and with a value entry window (refer to Figure 3-17). 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.

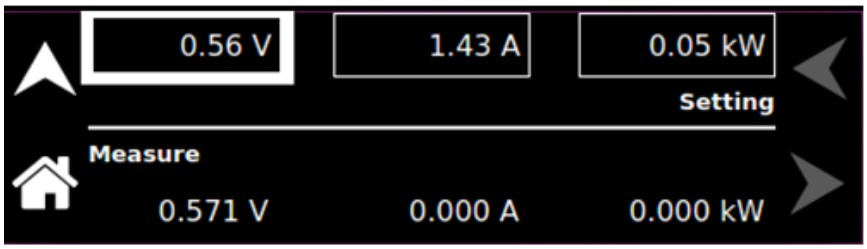


Figure 3-17: Real-Time, Immediate Output Parameter Adjustment

3.4.3.2 TOUCH-SCREEN NUMERIC KEYPAD

The touchscreen has a keypad that allows numeric value entry; refer to Figure 3-18. After scrolling through menus until a parameter selection-field box is highlighted (active), tapping the selection-field selects it. Afterwards, the keypad screen will be displayed. Tapping numerical value keys, the decimal point key, or the polarity key, selects 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. Tapping the OK key enters the value to have it take effect.

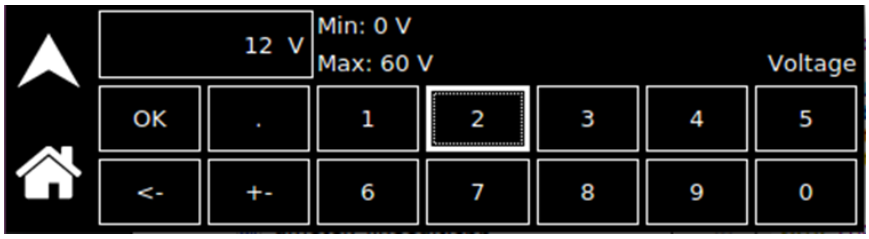


Figure 3-18: Touch-Screen Numeric Keypad

3.4.3.3 DEFAULT SCREEN

The Default screen provides measurements of the DC output voltage and current. Refer to Figure 3-19. When in the Dashboard screen, and idle for an interval equal to a set time delay, the display will automatically switch to the Default timeout screen. Tap anywhere on the screen to return to the Dashboard screen (Default Screen).

Figure 3-19: Default Screen

With the understanding of the dashboard screen features, user can perform basic functionality and verify the output voltage and output current in various modes of operation.

3.4.4 Output Program

The OUTPUT PROGRAM provides setting of output related items such as output Voltage, OVP, Power, Current, Regulation mode and Output state.

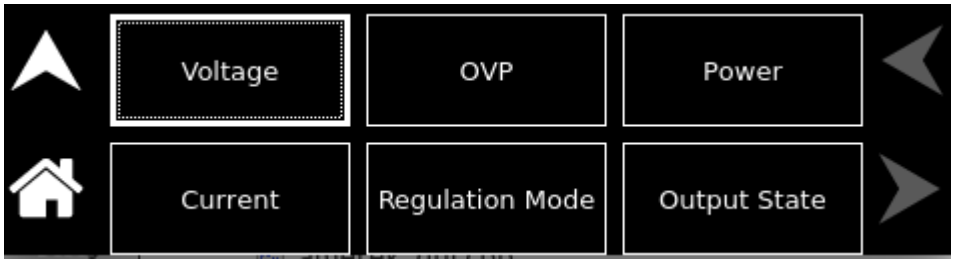


Figure 3-20: OUTPUT PROGRAM Screen Top-Level Menu

The top-level menu of the Output Program sub menu screen is shown in Figure 3-20. They could be reached in one of two ways:

1. Tapping on OUTPUT PROGRAM screen of the front panel touchscreen.

2. Scrolling to the OUTPUT PROGRAM screen with the encoder and depressing the encoder switch.

The Up-arrow button will return to the previously selected screen menu (in this case the OUTPUT PROGRAM screen). The HOME button will return to the HOME screen -1 (refer Figure 3-12).

The following sub menus are available in the Output Program screen. Functions that accept a numeric value require that the value be within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

Entry	Description
Voltage	Upon clicking on the voltage sub menu from the Output Program screen, this would proceed to the Voltage setting screen. Refer to Figure 3-21. This screen allows the user to program the output voltage in Volts. The default value would be same that of the programmed Power ON settings (PONS).

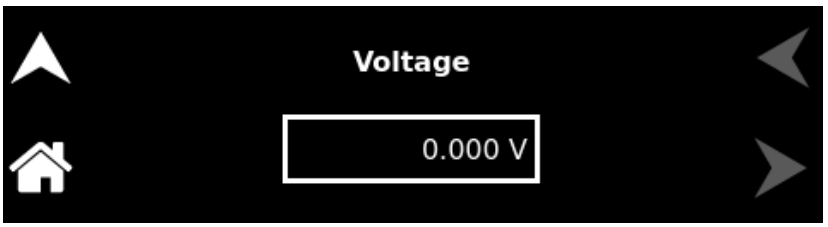


Figure 3-21: Voltage Screen

Current	Upon clicking on the Current sub menu from the Output Program screen, this would proceed to the Current setting screen. Refer to Figure 3-22. This screen allows the user to program the output current in Amps. The default value would be same that of the programmed Power ON settings.

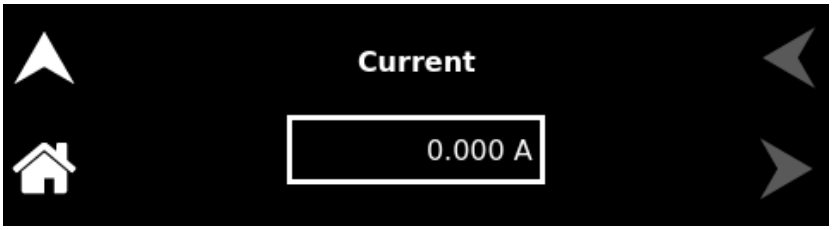


Figure 3-22: Current Screen

OVP	Upon clicking on the OVP sub menu from the Output Program screen, this would proceed to the OVP setting screen. Refer to Figure 3-23. This screen allows the user to program the Overvoltage Protection (OVP) threshold for the output voltage. Exceeding the OVP threshold will result in shutdown of the output and the output voltage programmed to zero. The default value would be the same that of the programmed Power ON settings.

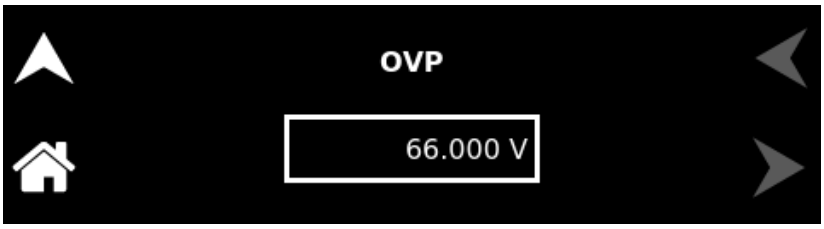


Figure 3-23: OVP Screen

Power

Upon clicking on the Power sub menu from the Output Program screen, this would proceed to the Power setting screen. Refer to Figure 3-24.

This screen allows the user to program the output power in kilo watts(kW). The default value would be the module power.

Figure 3-24: Power Screen

3.4.4.1 REGULATION MODE SCREEN

Upon clicking on the Regulation Mode sub menu from the Output Program screen, this would proceed to the Regulation mode screen. Refer to Figure 3-25.

Regulation Mode screen provides functionality to set regulation mode of the power supply. Up-arrow will return to previously selected screen and Home button will return to HOME Menu screen-1 (refer Figure 3-12).

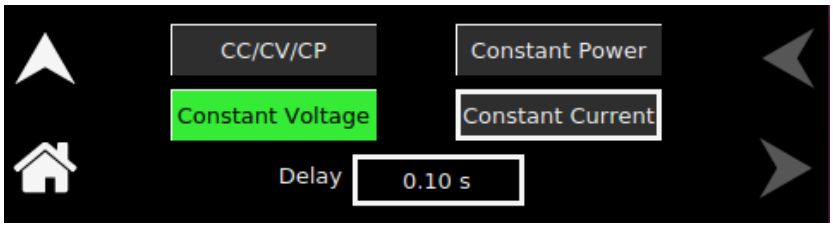


Figure 3-25: Regulation Mode Screen

Entry	Description
CC/CV/CP	Sets the Regulation Mode as CC/CV/CP mode. Supply switches between the CC (constant current), CV (constant voltage) and CP (constant power) modes based on the load conditions, without making the output to zero.

Constant Current	Sets the Regulation Mode as CC mode. Supply regulates the output current at the set value. If the regulation of output current is not met due to change in load, it programs the output to zero after a programmable delay time.
Constant Voltage	Sets the Regulation Mode as CV mode. Supply regulates the output voltage at the set value. If the regulation of the output voltage is not met due to change in load, it programs the output to zero after a programmable delay time.
Constant Power	Sets the Regulation Mode as CP mode. While in this mode, the supply will continually adjust the voltage and current levels to attempt to maintain a constant power to the load. To provide additional protection for the load, voltage and current limits may be set while in the Constant-Power mode. If the unit cannot regulate to the Constant Power setting due to load conditions, it will regulate either at the voltage or current limit depending on the load demand. (Note: Constant Power mode is intended primarily for loads with response times greater than approximately 10ms).
Delay	This parameter field box allows the user to set delay for CC and CV mode.

3.4.4.2 OUTPUT STATE SCREEN

Output state screen provides the functionality to turn the output either ON or OFF. Selecting Output state submenu in OUTPUT PROGRAM screen (refer Figure 3-20) would proceed to the output state screen as below (Refer to Figure 3-26).

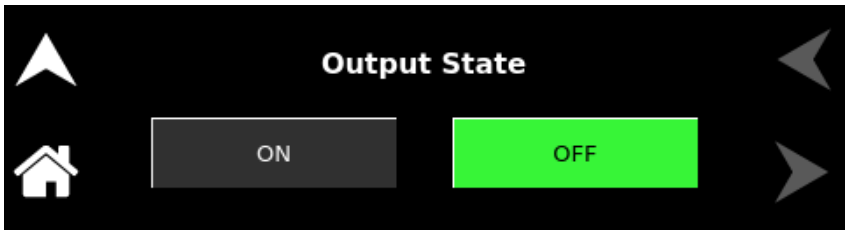


Figure 3-26: Output State Screen

Entry	Description
ON	Programs the output state ON.
OFF	Programs the output state OFF.

3.4.5 Measurements

The Measurements Menu will show the measurements of DC Output Voltage, Output Current and Output Power in the floating-point value, refer Figure 3-27. Up-arrow and Home button will return to HOME MENU screen 1.

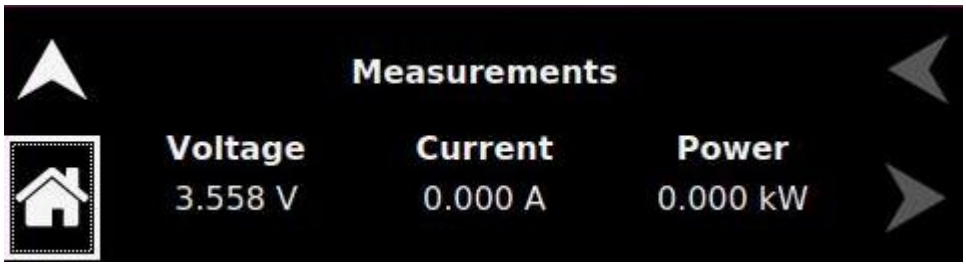


Figure 3-27: Measurements Screen Top Level Menu

3.4.6 Ramp

The Ramp Screen provides the functionality to create voltage and current ramp. The top-level menu of the Ramp screen is shown in refer to Figure 3-28. Up-Arrow and Home button will return to HOME MENU screen 2; Refer Figure 3-13.

Figure 3-28: Ramp Menu Screen

The following menus are available in the Ramp top-level menu:

- Voltage Ramp
- Current Ramp

3.4.6.1 Voltage Ramp

The front panel Voltage Ramp screen allows the user to configure and execute voltage ramp. The Voltage Ramp menu allows the selection of parameters such as Volt (initial volt), To Volt (end volt), Curr (Limit Current), Time and Trigger (Trig: SW or Trig: HW), refer to Figure 3-29.

Pressing Exit button would return to Ramp Menu screen; Refer Figure 3-28.

Figure 3-29: Voltage Ramp Screen

The Voltage Ramp menu has the following fields:

Entry	Description
Volt	Sets the start voltage for the ramp.
To Volt	Sets the end voltage for the ramp.
Curr	Sets the Current limit for the ramp.
Time	Sets the time in seconds to reach from start volt to end volt. Time can be programed from 0.10s to 9999s.
Trigger	Sets the trigger mode for the ramp. In **SW (Software)** trigger mode, the ramp is generated as soon as the **Trigger Ramp** button is pressed. In **HW (Hardware)** trigger mode, the ramp will be generated when an active high pulse of 10ms is applied to the trigger pins in the DB26 external interface connector; Refer Table 4-1 for PIN details. Pin-18 (TRIG1_IN) and Pin-26 (RTN) to trigger ramp.
Initialize	Initializes the set Ramp parameters**.** Refer to Figure 3-30. Press **OK** to return.

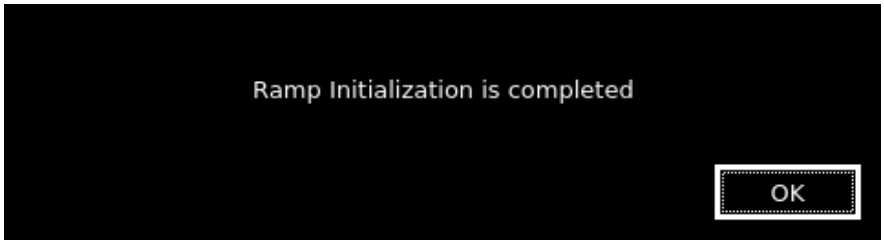


Figure 3-30: Ramp-Screen (Initialization)

Trigger Ramp	**Trigger Ramp** button will only be enabled after **Initialize** button is pressed, Refer to Figure 3-31:

Figure 3-31: Voltage Ramp-Screen (SW Trigger)

Waiting for Trig	This field is displayed after Initialize button is pressed in HW trigger Mode, refer to Figure 3-32:. This shows that the supply is waiting for an active high pulse of 10ms on the DB26 connector to generate the Voltage Ramp; Refer Table 4-1 for PIN details. Active high pulse on Pin-18 (TRIG1_IN) and Pin-26 (RTN) to trigger ramp.

Figure 3-32: Voltage Ramp-Screen (HW Trigger)

Abort — In **SW** trigger mode, when **Trigger Ramp** button is pressed, **Trigger Ramp** button changes to **Abort** button. In **HW** trigger mode, when external trigger is received, **Waiting for Trig** will change to **Abort** button**.** Pressing the **Abort** button aborts the ramp and returns to **Ramp** screen.

Exit — Exits the Voltage Ramp sub menu and return to Ramp Menu, refer to Figure 3-28.

Example 1: Creating a Voltage ramp using Software Trigger mode

- Set the **Volt** to 25V
- Set the **To Volt** to 50V
- Set the **Curr** to 20A
- Set the **Time** to 10s
- Select the Trigger mode as **SW** (software)
- Click on **Initialize**
- Click on **Trigger Ramp**
- Observe that **Trigger Ramp** button will change to **Abort** button
- 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.

Example 2: Creating a Voltage ramp using Hardware Trigger mode

- Set the **Volt** to 25V
- Set the **To Volt** to 50V
- Set the **Curr** to 20A
- Set the **Time** to 10s
- Select the Trigger mode as **HW** (Hardware)
- Click on **Initialize**
- Observe that **Trigger Ramp** button will change to **Waiting for Trig**.
- Give an external trigger i.e., an active high pulse of 10ms on the 26-pin connector pin-18 (TRIGGER_IN) and pin-26 (RTN) to generate the Voltage Ramp.
- Observe that **Waiting for Trig** will change to **Abort** button.
- 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.

3.4.6.2 CURRENT RAMP

The front panel Current Ramp screen allows the user to configure and execute current ramp. The Current Ramp menu allows the selection of parameters such as Curr (initial current), To Curr (end current), Volt (voltage limit), Time, and Trigger (Trig: SW or Trig:HW), refer to Figure 3-33.

Pressing Exit button would return to Ramp Menu screen; refer Figure 3-28.

Figure 3-33: Current Ramp Screen

The Current Ramp menu has the following fields:

Entry	Description
Curr	Sets the start current for the ramp.
To Curr	Sets the end current for the ramp.
Volt	Sets the volt limit for the ramp.
Time	Sets the time in seconds to reach from start current to end current.
Trigger	Sets the trigger mode for the ramp. In **SW (Software)** trigger mode, the ramp is generated as soon as the Trigger Ramp button is pressed. In **HW (Hardware)** trigger mode, the ramp will be generated when an active high pulse of 10ms is applied on the DB26 TRIG_IN pin and RTN pin; Refer Table 4-1 for PIN details. Pin-18 (TRIG1_IN) and Pin-26 (RTN) to trigger ramp.
Initialize	Initializes the set Ramp parameters**.** Refer to Figure 3-34**.** Press **OK** to return.

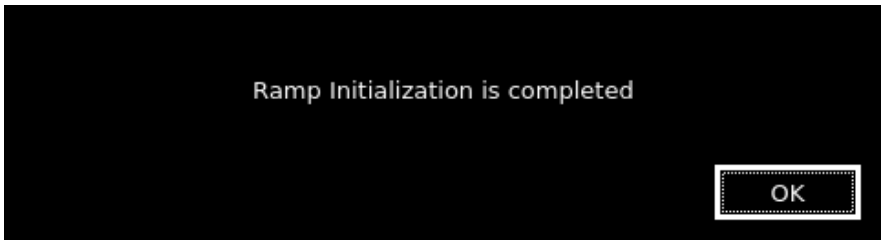


Figure 3-34: Ramp-Screen (Initialization)

Trigger Ramp	This will only be enabled after **Initialize** button is pressed, refer to Figure 3-35-:.

Figure 3-35-: Current Ramp-Screen (SW Trigger)

Waiting for Trig

This field is displayed after **Initialize** button is pressed in **HW** trigger Mode, refer to Figure 3-36:.

This shows that the supply is waiting for an active high pulse of 10ms on the DB26 connector to generate the Current Ramp. Refer Table 4-1 for PIN details.

Active high pulse on Pin-18 (TRIG1_IN) and Pin-26 (RTN) to trigger ramp

Figure 3-36: Current Ramp-Screen (HW Trigger)

Abort

In **SW** trigger mode, when **Trigger Ramp** button is pressed, **Trigger Ramp** button changes to **Abort** button. In **HW** trigger mode, when external trigger is received, **Waiting for Trig** will change to **Abort** button**.** Pressing the **Abort** button aborts the ramp and returns to **Ramp** screen.

Exit

Exits the Current Ramp screen and return to Ramp Menu Screen, refer to Figure 3-28.

Example 1: Creating a Current ramp using Software Trigger mode

- Set the **Curr** to 10A
- Set the **To Curr** to 30A
- Set the **Volt** to 25V
- Set the **Time** to 10s
- Connect an appropriate load to the supply
- Select the Trigger mode as **SW** (software)
- Click on **Initialize**
- Click on **Trigger Ramp**
- Observe that **Trigger Ramp** button will change to **Abort** button
- 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.

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
- Set the **Time** to 10s
- Connect an appropriate load to the supply
- Select the Trigger mode as **HW** (Hardware)
- Click on **Initialize**
- Observe that **Trigger Ramp** button will change to **Waiting for Trig**.
- Give an external trigger i.e. an active high pulse of 10ms on the 26-pin connector pin-18 (TRIGGER_IN) and pin-26 (RTN) to generate the Current Ramp.
- Observe that **Waiting for Trig** will change to **Abort** button.
- 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.

3.4.7 Configuration Screen

This section demonstrates the configuration of power on- settings (PONS), set-up of User V/I Limits, Output Sense, Measurement Settings, Aux Output and Connections.

The top-level menu of the Configuration screen is shown in Figure 3-37. Up-arrow and Home button will return to HOME MENU screen-2 (refer Figure 3-13).

Figure 3-37: Configuration Menu screen

The following menus are available in the Configuration Screen top-level menu:

- PONS
- User V/I Limits
- Output Sense
- Measurements
- Aux Output
- Connections

3.4.7.1 POWER ON SETTINGS (PONS)

The PONS Menu allows user to set the Power-ON values which is programmed during next power cycle of unit. The top-level menu of PONS is shown in Figure 3-38.

Up-arrow will return to previous screen refer Figure 3-37, and Home button will return to HOME MENU screen-2 refer Figure 3-13.

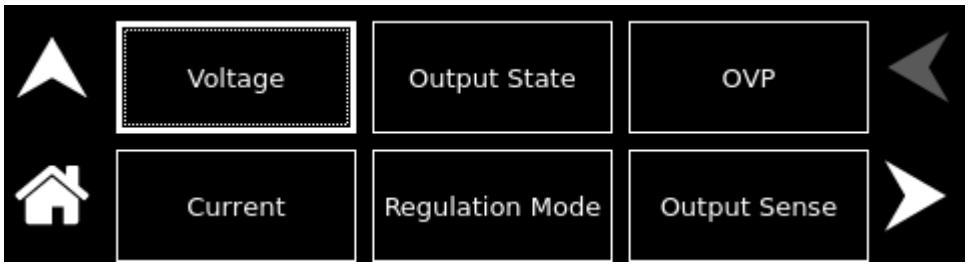


Figure 3-38: PONS Menu Screen–1

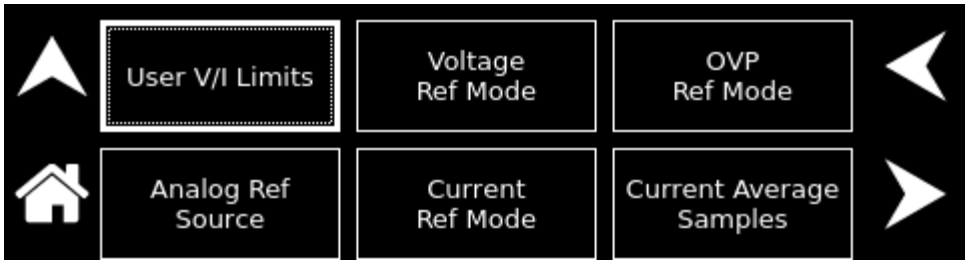


Figure 3-39: PONS Menu Screen–2

Figure 3-40: PONS Menu Screen-3

PONS menu contains following sub menu:

- Voltage
- Output State
- OVP
- Current
- Regulation Mode
- Output Sense
- User V/I Limits

- Voltage Ref Mode
- OVP Ref Mode
- Analog Ref Source
- Current Ref Mode
- Current Average Samples
- Voltage Average Samples
- Connections

3.4.7.1.1 PONS – Voltage Screen

The PONS Voltage screen sets the power-on default voltage. Settings set in the below screen will be applied during next power cycle of unit.

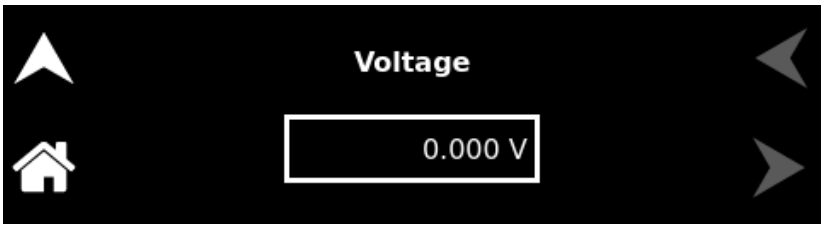


Figure 3-41: PONS – Voltage Screen

The voltage setting field accept a numeric value within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

Entry	Description
Voltage	Programs the power-ON output voltage in Volts. The default value is 0.

3.4.7.1.2 PONS – Current Screen

The PONS Current screen sets the power-on default current. Settings set in the below screen will be applied during next power cycle of unit.

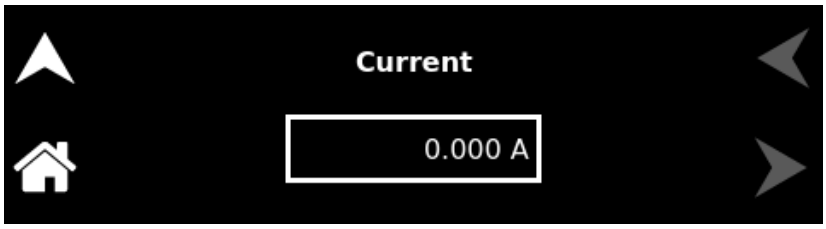


Figure 3-42: PONS – Current Screen

The current setting field accept a numeric value within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

Entry	Description
Current	Programs the power-ON output current in Amperes. The default value is 0.

3.4.7.1.3 PONS - Output State Screen

PONS Output state screen provides the functionality to turn the output either ON or OFF at power-on of unit during the next power cycle, refer to Figure 3-43. If output is set to ON, then during next power cycle, warning screen will be displayed with abort button to turn off output (refer Figure 3-11). If no action is taken by operator, then output will be turned ON.

Up-arrow will return to PONS menu screen; Refer Figure 3-38. Home button will return to HOME MENU screen 2; Refer Figure 3-13.

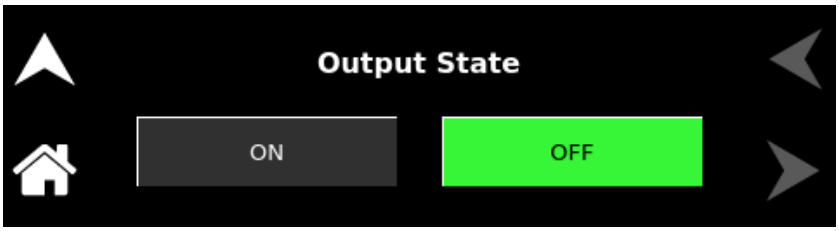


Figure 3-43: PONS - Output State Screen

Entry	Description
ON	Programs the Power ON output state to ON.
OFF	Programs the Power ON output state to OFF.

3.4.7.1.4 PONS - Regulation Mode Screen

PONS Regulation Mode screen provides functionality to set regulation mode at power-on of unit during the next power cycle, refer to Figure 3-44. Up-arrow will return to PONS menu screen; Refer Figure 3-38. Home button will return to HOME MENU screen 2; Refer Figure 3-13.

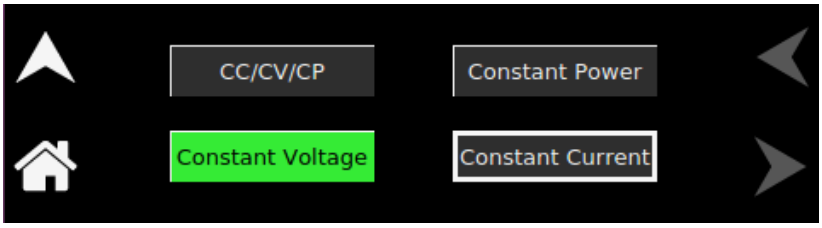


Figure 3-44: PONS - Regulation Mode Screen

Entry	Description
CC/CV/CP	Sets the Power ON regulation mode into CC/CV/CP, supply switches between the CC (constant current), CV (constant

voltage) and CP (constant power) modes based on the load conditions, without making the output to zero.

Constant Current	Sets the Power ON regulation mode into Constant Current Mode.
Constant Voltage	Sets the Power ON regulation mode into Constant Voltage Mode.
Constant Power	Sets the power ON regulation mode into Constant Power Mode.

3.4.7.1.5 PONS – OVP Screen

The PONS OVP screen sets the power-on default OVP. Settings set in below screen will be applied during next power cycle of unit, refer Figure 3-45.

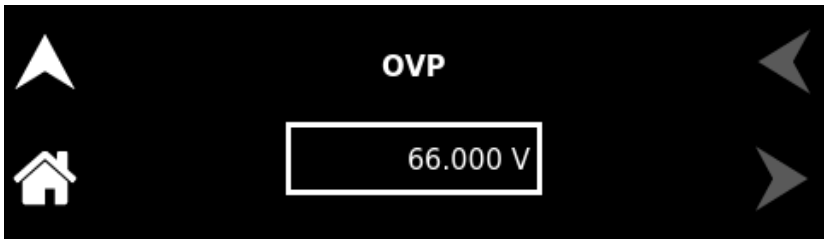


Figure 3-45: PONS – OVP Screen

The OVP setting field accept a numeric value within the allowed range, otherwise, an error will be generated, and the value will not be accepted.

Entry	Description
OVP	Programs the Power-ON Overvoltage Protection (OVP) threshold for the output voltage. Exceeding the OVP threshold will result in shutdown of the output and the output voltage programmed to zero.

3.4.7.1.6 PONS – Output Sense

The Output Sense screen allows user to set the power-on output voltage sense to either Remote or Local, refer to Figure 3-46.

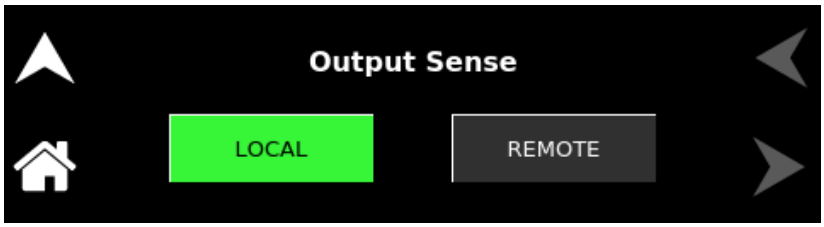


Figure 3-46: Output Sense Screen

Entry	Description
LOCAL	Sets supply to Local sense during the next power cycle of the unit.
REMOTE	Sets supply to Remote sense during the next power cycle of the unit.

3.4.7.1.7 PONS –User V/I Limits

The PONS User V/I Limit menu allows the user to set the soft-limits for output voltage, current and power at power-on of unit during the next power cycle. Default value is full scale, refer to Figure 3-47.

Up-arrow will return to PONS menu screen; Refer Figure 3-38. Home button will return to HOME MENU screen 2; Refer Figure 3-13.

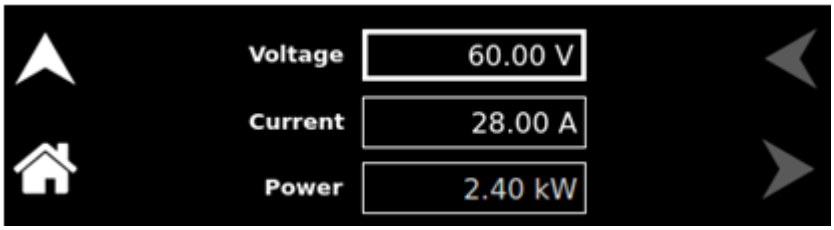


Figure 3-47: PONS – User V/I Limits Screen

The user limit prevents the supply from being inadvertently programmed above the user set limit, thus providing a method for protecting the load against damaging voltages, currents, and/or power levels. The User V/I Limits menu has the following fields:

Entry	Description
Voltage	Sets the power-on default value of voltage limit in Volts. The default is full-scale.
Current	Sets the power-on default value of current limit in Amps. The default is full-scale.
Power	Sets power-on default value of power limit in kilo watt (kW). The default is module power.

3.4.7.1.8 PONS – Analog Ref Source

Sets the power-on default value of the Analog Reference Mode Configurations during unit Power-ON, refer to Figure 3-48. Up-arrow will return to PONS menu screen; Refer Figure 3-38. Home button will return to HOME MENU screen 2; Refer Figure 3-13.

Figure 3-48: PONS - Analog Ref Source Screen

Entry	Description
Voltage	Sets analog reference source as Voltage during the next power cycle of the unit.
Resistive	Sets analog reference source as Resistive during the next power cycle of the unit.

NOTE:

- **If Analog Ref Source is selected as Voltage, the unit of FSC field box under Voltage Ref Mode and Current Ref Mode would be changed to Volts (V).**
- **If Analog Ref Source is selected as Resistive, the unit of FSC field box under Voltage Ref Mode and Current Ref Mode would be changed to k Ohms (kilo ohms).**

3.4.7.1.9 PONS – Voltage Ref Mode

Configures power-on Voltage Ref Mode either INTERNAL, EXTERNAL or INT + EXT (internal + external). The default Mode is INTERNAL.

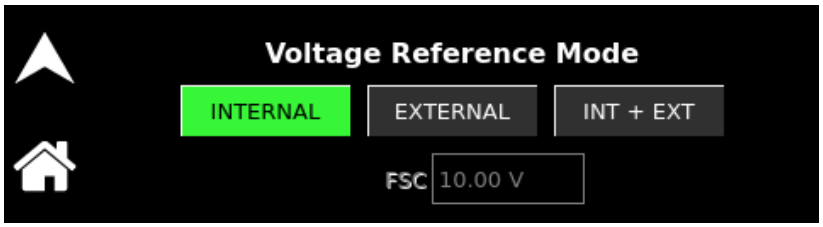


Figure 3-49: Voltage Reference Mode Screen

Entry	Description
INTERNAL	Configures power-on Voltage Ref Mode as internal. INTERNAL is the factory default Voltage Ref Mode.
EXTERNAL	Configures power-on Voltage Ref Mode as EXTERNAL.
INT + EXT	Configures power-on Voltage Ref Mode as INT+EXT.
FSC	To set the power-on FSC value of analog voltage program, default FSC is 10V for Voltage reference source and 10kΩ for Resistive reference source. FSC (Full scale) value can be programmed from 5V to 10V for voltage source as reference and 5kΩ to 10kΩ for resistive reference source.

3.4.7.1.10 PONS – Current Ref Mode

Configures power-on Current Ref Mode either INTERNAL, EXTERNAL or INT + EXT (internal + external). The default Mode is INTERNAL.

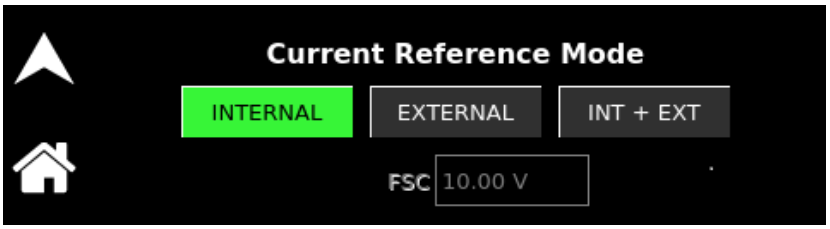


Figure 3-50: Current Reference Mode Screen

Entry	Description
INTERNAL	Configures power-on Current Ref Mode as INTERNAL. Internal is the factory default Current Ref Mode.
EXTERNAL	Configures power-on Current Ref Mode as EXTERNAL.
INT + EXT	Configures power-on Current Ref Mode as internal + external.
FSC	To set the power-on FSC value of analog current program, default FSC is 10V for Voltage reference source and 10kΩ for Resistive reference source. FSC (Full scale) value can be programmed from 5V to 10V for voltage source as reference and 5kΩ to 10kΩ for resistive reference source.

3.4.7.1.11 PONS – OVP Ref Mode

Configures power-on OVP Ref Mode either INTERNAL or EXTERNAL. The default mode is Internal.

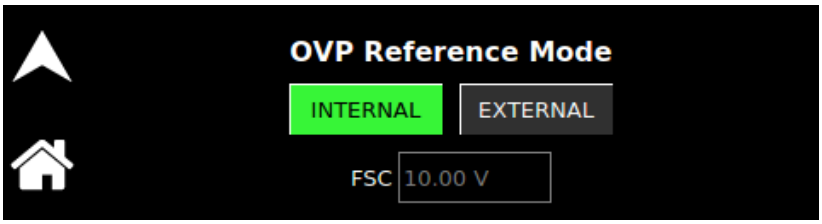


Figure 3-51: OVP Reference Mode Screen

Entry	Description
INTERNAL	Configures power-on OVP Ref Mode as INTERNAL. Internal is the factory default OVP Ref Mode.
EXTERNAL	Configures power-on OVP Ref Mode as EXTERNAL.

FSC: To set the power-on FSC value of analog OVP program, default FSC is 10V and the FSC (Full scale) value can be programmed from 5V to 10V.

3.4.7.1.12 PONS – Current Average Samples

Sets the number of current readings to average in the current readback during the power-on of the power supply. Allows to set a value between 1 to 9. The value of 1 (factory default) provides the fastest response time in the readings, but less rejection of noise.

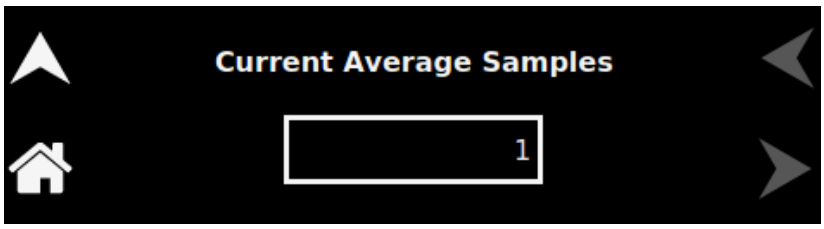


Figure 3-52: Current Average Samples

3.4.7.1.13 PONS – Voltage Average Samples

Sets the number of voltage readings to average in the voltage readback during power-on of the power supply. Allows to set a value between 1 to 9. The value of 1 (factory default) provides the fastest response time in the readings, but less rejection of noise.

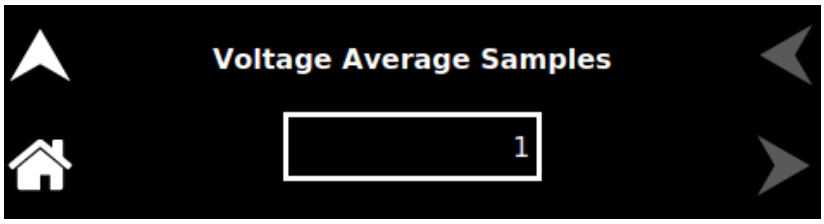


Figure 3-53: Voltage Average Samples

3.4.7.1.14 PONS – Connections

The PONS Connection screen provides the functionality to set between individual, parallel, series and multi-chassis communication operations during power-on of unit. The address configuration sub-menu will be disabled on single chassis operation, refer to Figure 3-54. This option will be enabled only when the mode is set as multi-chassis communication, refer to Figure 3-55.

Figure 3-54: Connections Sub-Menu Screen (Single Chassis)

Figure 3-55: Connections Sub-Menu Screen (Multi-Chassis)

The Mode Settings Screen allows the user to select between four operations, refer Figure 3-56. It has the following fields:

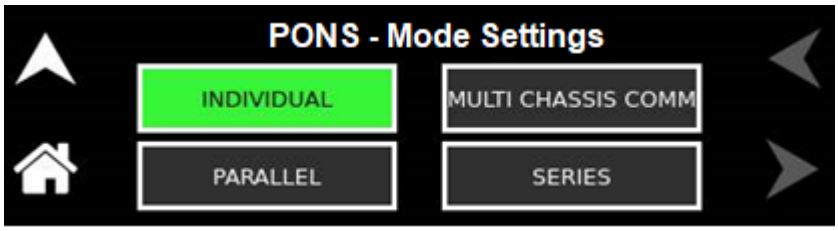


Figure 3-56: Mode Settings Screen

Entry	Description
Individual	Sets the power-on mode settings as individual during the next power cycle of the unit. Individual is the factory default Mode Settings.
Multi-Chassis Communication	Sets the power-on mode settings as multi-chassis communication during the next power cycle of the unit.
Parallel	Sets the power-on mode settings as parallel operation during the next power cycle of the unit.
Series	Sets the power-on mode settings as series operation during the next power cycle of the unit.

The Address Configuration Screen allows the user to assign the chassis address for the power supplies connected. There are two methods for address configuration: Auto and Manual. Refer to Figure 3-57 and Figure 3-58.

Figure 3-57: Address Configuration – Auto

Figure 3-58: Address Configuration – Manual

Entry	Description
Auto	Configures power-on Address Configuration as Auto during the next power cycle of the unit. Auto is the factory default address configuration.
Manual	Configures power-on Address Configuration as Manual during the next power cycle of the unit.
Chassis Addr	The field box is active only when Manual mode is selected. The chassis address field box allows the user to set induvial chassis address for the power supply.

3.4.7.2 USER V/I LIMITS

The User V/I Limits menu allows to set the soft limits for output voltage, current and power to which the unit could be programmed using the front panel or remote digital interface; default is full scale.

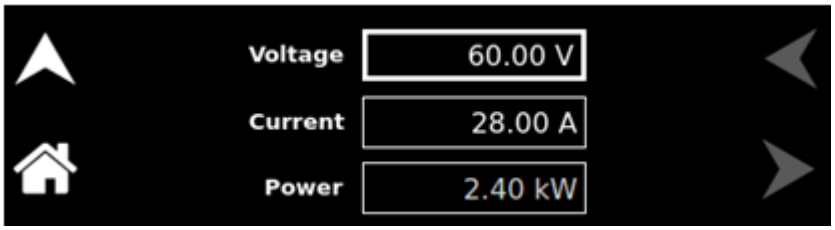


Figure 3-59: User V/I Limit Screen

The user limit prevents the supply from being inadvertently programmed above the user set limit, thus providing a method for protecting the load against damaging voltages, currents, and/or power levels. The User V/I Limits menu has the following fields:

Entry	Description
Voltage	Sets the upper limit on the programmed output voltage in Volts. The Default value is PONS User V/I Limit settings.
Current	Sets the upper limit on the programmed output current in Amperes. The Default value is PONS User V/I Limit settings.
Power	Sets the upper limit on the programmed output power in kilowatts (kW). The Default value is PONS User V/I Limit settings.

3.4.7.3 OUTPUT SENSE

The Output Sense screen allows user to set the output voltage sense to either Remote or Local, refer to Figure 3-60. The Default Output Sense setting is Local.

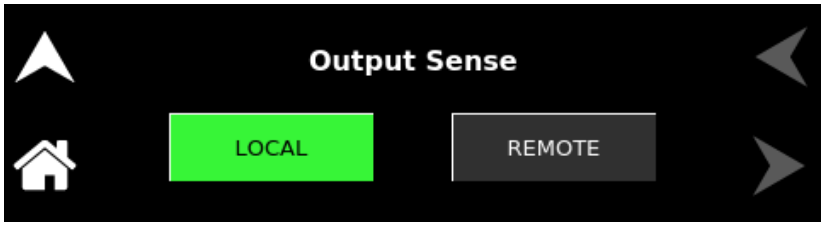


Figure 3-60: Output Sense Screen

Entry	Description
LOCAL	Sets the supply to Local sense.
REMOTE	Sets the supply to Remote sense.

3.4.7.4 MEASUREMENTS SETTING

The Measurement Settings screen sets the number of readings to average together to reduce noise in the readback. Refer to Figure 3-61.
Up-Arrow and Home button will return to HOME MENU screen 2; Refer Figure 3-13.

Figure 3-61: Measurement Settings Screen

The Measurement Settings screen has the following fields:

Entry	Description
Volt Avg Samples	Sets the number of voltage readings to average the voltage readback. Allows to set a value between 1 to 9. The Default value is PONS Measurements settings.
Curr Avg Samples	Sets the number of current readings to average the current readback. Allows to set a value between 1 to 9. The Default value is PONS Measurements settings.

3.4.7.5 AUX OUTPUT

The Auxiliary Output screen allows the user to set the 5 V and 15 V Auxiliary Output to either **ON** or **OFF** state, refer to Figure 3-62.

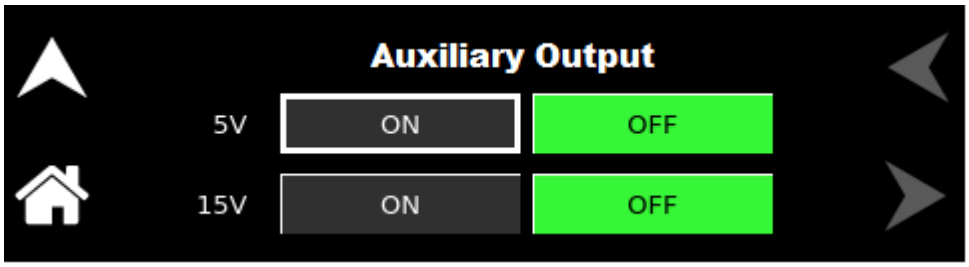


Figure 3-62. Auxiliary Settings Screen

The Auxiliary Settings menu has the following fields:

Entry	Description
5V	Sets the 5V Auxiliary Output to ON or OFF state. 5V will be available on the Remote Isolated External User Control I/O Interface connector between Pin 10 (source) and Pin 11 (return).
15V	Sets the 15V Auxiliary Output to ON or OFF state. 15V will be available on the Remote Isolated External User Control I/O Interface connector between Pin 12 (source) and Pin 13 (return).

3.4.7.6 CONNECTIONS

The Connection screen allows the user to select between individual, parallel, series and multi-chassis communication operations. The address configuration sub-menu will be disabled on single chassis operation, refer to Figure 3-63. This option will be enabled only when the mode is set as multi-chassis communication, refer to Figure 3-64. For connections between the chassis for parallel, series and multi-chassis communication operations refer to Section 5 and Section 6.

Figure 3-63: Connections Sub-Menu Screen (Single Chassis)

Figure 3-64: Connections Sub-Menu Screen (Multi-Chassis)

3.4.7.6.1 Mode Settings

Allows the user to select between the four operations. Refer to Figure 3-65.

Figure 3-65: Mode Settings Screen

The Mode Settings Screen has the following fields:

Entry	Description
Individual	Allows the user to operate the power supplies as individual units.
Multi-Chassis Communication	Allows the user to operate the power supply in multi-chassis communication i.e., the user can communicate to the all the units connected, through a single power supply.
Parallel	Allows the user to operate the power supply in parallel mode i.e., the output current obtained is the summation of the units connected.

Series	Allows the user to operate the power supply in series mode i.e., the output voltage obtained is the summation of the units connected.

3.4.7.6.2 Address Configuration

Allows the user to assign the chassis address for the power supplies connected. There are two methods for address configuration: Auto and Manual. Refer to Figure 3-66 and Figure 3-67.

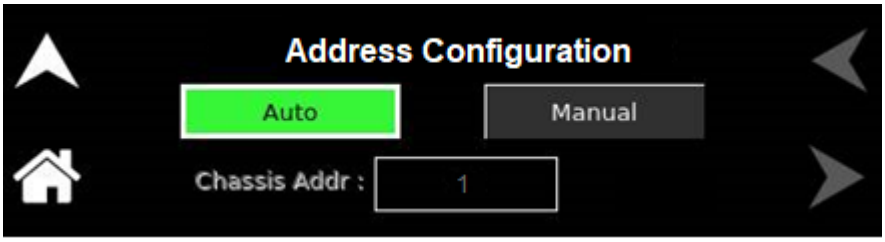


Figure 3-66: Address Configuration Screen – Auto

Figure 3-67: Address Configuration Screen - Manual

NOTE: The address configuration type selected on Chassis 1 will be set across all the other power supplies in connection and the address configuration type cannot be modified on any other chassis other than Chassis 1.

For example, there are 4 power supplies in multi-chassis communication setup. If Auto is selected on Chassis 1 then Chassis 2,3 and 4 will have its address configuration set as Auto and on Chassis 2,3 and 4 the buttons and the field box are disabled and grayed out, only the selected auto button is highlighted in green color while still being grayed out, refer to Figure 3-68. It is the same for Manual as well, except that only the buttons will be disabled and grayed out and the chassis addr field box would be still active for the user to assign chassis address, only the selected Manual button is highlighted in green color while still being grayed out, refer to Figure 3-69.

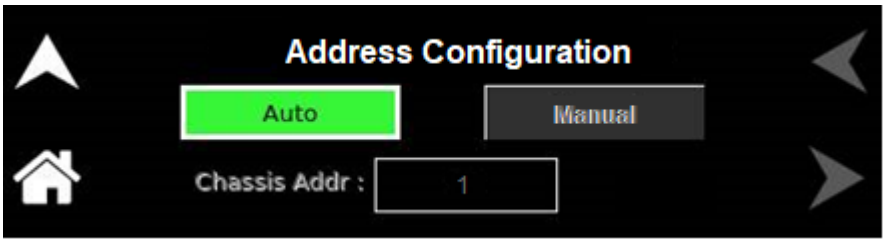


Figure 3-68: Address Configuration Screen - Auto

Figure 3-69: Address Configuration Screen - Manual

Entry	Description
Auto	Assigns chassis address of the power supplies in connection automatically in order starting from 1.
Manual	Assigning of individual chassis address of the power supplies in connection must be set by the user.
Chassis Addr	The field box is active only when Manual mode is selected. The chassis address field box allows the user to set induvial chassis address for the power supply.

3.4.7.6.3 Follower Chassis Screen

The screens displayed on the Follower unit when multiple power supplies are connected in either parallel or series operations are as follows: for parallel operation refer to Figure 3-70 and for series operation refer to Figure 3-71. The user can access all the functionalities of the Leader unit's front panel alone as the Follower units will display only the measurements of voltage and current of its own.

Figure 3-70: Source in Follower Mode Screen (Parallel)

Figure 3-71: Source in Follower Mode Screen (Series)

3.4.7.6.4 Multi-Chassis Communication Default Screen

The default time-out screen displayed on each individual unit's front panel when multiple power supplies are connected to work in multi-chassis communication is shown in Figure 3-72.

Figure 3-72: Multi-Chassis Default Timeout Screen

3.4.8 Control Interface Screen

The power supply is provided with digital communication interface such as RS232, USB, LAN, GPIB, Analog and EtherCAT.

The Control Interface screen provides the ability to configure the power source for remote control through the data communications interfaces. From control Interface screen, user can also configure Analog Programming feature to program the power supply parameters from external sources such as Voltage and Resistance. The top-level menu of the Control Interface screen is shown Figure 3-73.

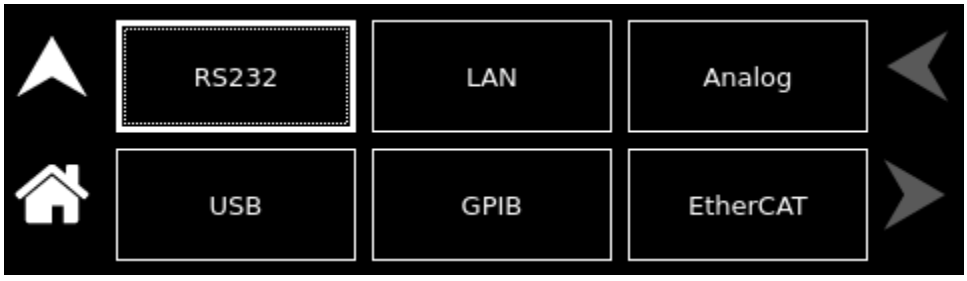


Figure 3-73: Control Interface Menu Screen

The following menus are available in the Control Interface Screen top-level menu: RS232, USB, LAN, GPIB, Analog and EtherCAT.

3.4.8.1 RS232

The following menus are available in the RS232 menu: RS232 Settings and Configure RS232.

Entry	Description
RS232 Settings	Lists the configured Baud Rate, Stop Bits, Bits and Parity for the RS232 digital interface, refer to Figure 3-74 and Figure 3-75.

Figure 3-74: RS232 Home Screen

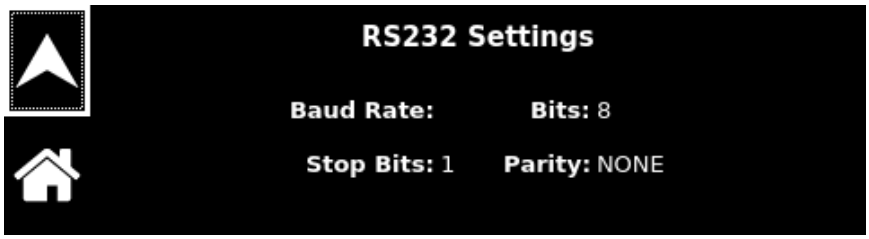


Figure 3-75: RS232 Setting Screen

RS232 Configure	Allows the user to configure the USB baud rate for the RS232 digital interface, refer to Figure 3-76.

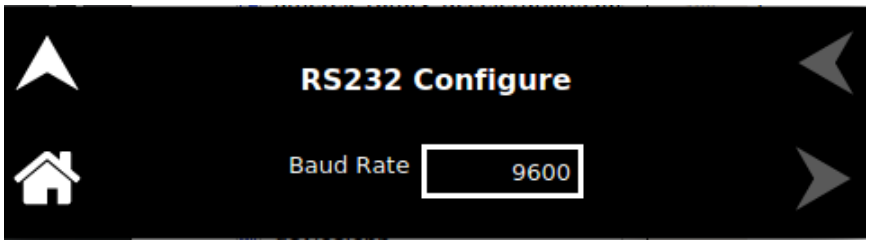


Figure 3-76: RS232 Configure Screen

3.4.8.2 USB

Lists the configured Baud Rate. Refer Figure 3-77.

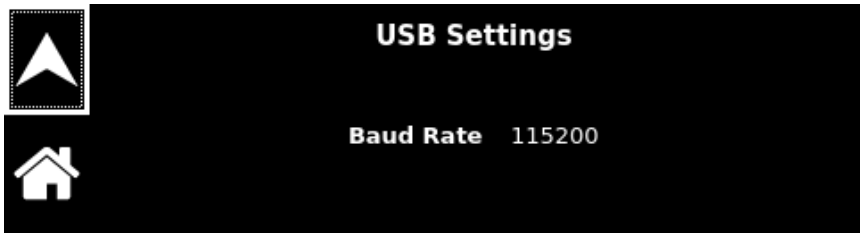


Figure 3-77: USB Screen

3.4.8.3 LAN

Configures the LAN communications interface. The following menus are available in the LAN menu screen, refer to Figure 3-78.

- LAN Settings
- Configure LAN

Figure 3-78: LAN Menu Screen

Entry	Description
LAN SETTINGS:	Lists the configuration settings of the LAN interface. Refer to Figure 3-79.

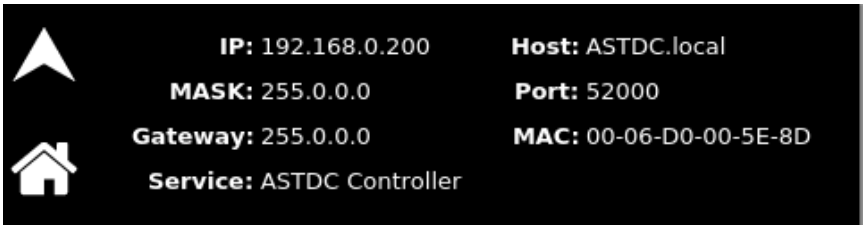


Figure 3-79: LAN Screen (Settings)

LAN CONFIGURE: Sets parameter values and controls operation of the LAN interface; refer to Figure 3-80 and Figure 3-81.

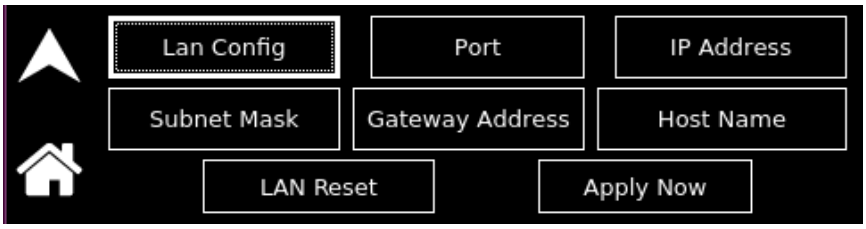


Figure 3-80: LAN Screen DHCP disabled (Configure)

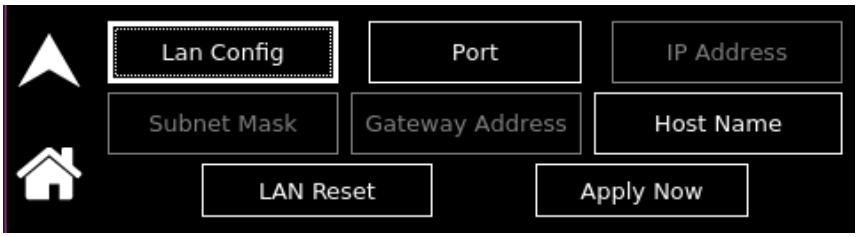


Figure 3-81:LAN Screen DHCP enabled (Configure)

LAN Config (DHCP): Selects whether DHCP is enabled or disabled. Refer to Figure 3-82. If DHCP is enabled (ON) user cannot set the IP Address, Subnet Mask and Gateway address. These fields will be inactive, refer Figure 3-81.

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.

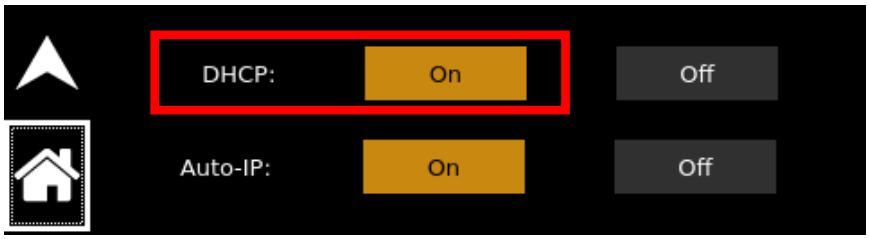


Figure 3-82: LAN Screen (DHCP)

Auto-IP: Enables or disable the Auto-IP configuration, when DHCP is ON. Refer to Figure 3-83.

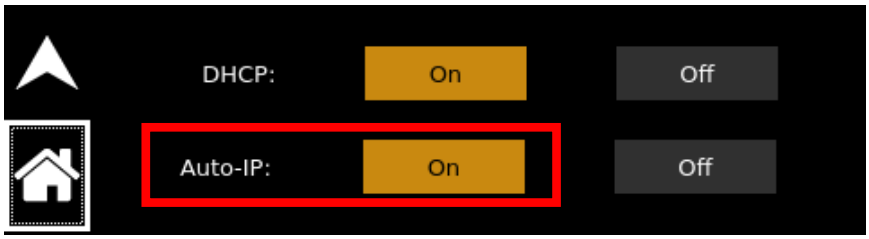


Figure 3-83: LAN Screen (Auto IP)

Host Name: Allows to set a unique alpha-numeric host name. Refer to Figure 3-84.

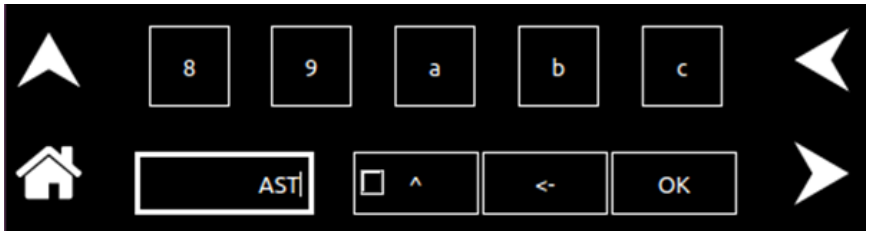


Figure 3-84: LAN Screen (Host Name)

Port: Sets the port number; the factory-default value is 52000. Refer to Figure 3-85.

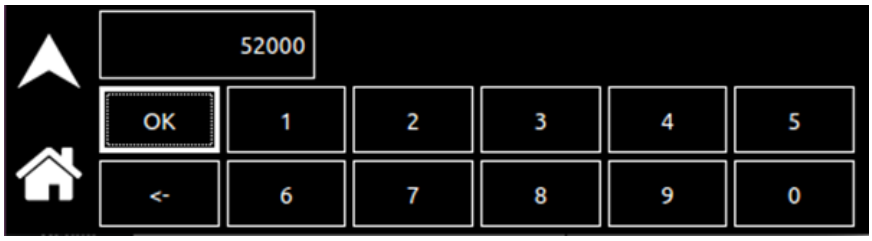


Figure 3-85: LAN Screen (Port)

IP Address: Sets the static IP address for the unit. Refer to Figure 3-86.

Figure 3-86: LAN Screen (IP Address)

Subnet Mask: Sets the subnet mask for use in static IP configuration. Refer to Figure 3-87.

Figure 3-87: LAN Screen (Subnet Mask)

Gateway Address: Sets the gateway address for use in static IP configuration. Refer to Figure 3-88.

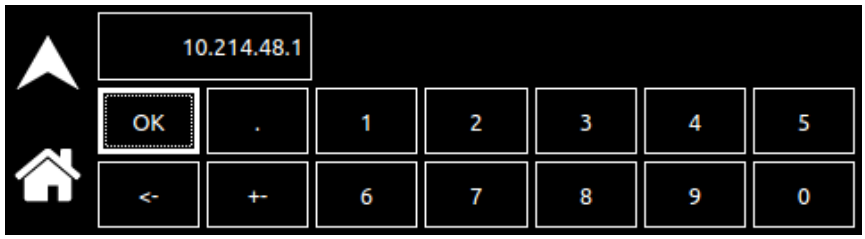


Figure 3-88: LAN Screen (Gateway Address)

NOTE: When DHCP is selected, the gateway address is assigned by the network DHCP server.

LAN RESET: When LAN RESET is pressed, a confirmation window will pop-up. After user confirmation, LAN settings will be set to factory default. Refer to Figure 3-89.

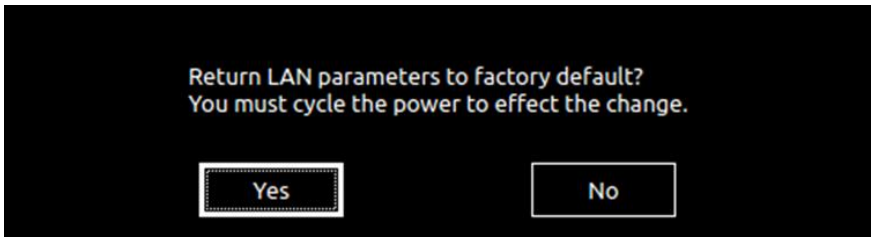


Figure 3-89: LAN Screen (Restore Default)

Apply Now: Applies the configured LAN settings to the supply. Refer to Figure 3-90.

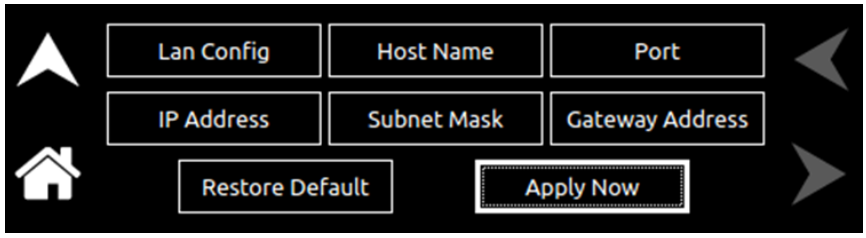


Figure 3-90: LAN Screen (Apply)

3.4.8.4 GPIB (OPTIONAL)

This screen allows the user 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. GPIB menu contains the following sub-menus:

- GPIB Settings

- Configure GPIB

Up-arrow will return to Control Interface menu screen; Refer Figure 3-73. Home button will return to HOME MENU screen 2; Refer Figure 3-13.

Figure 3-91: GPIB Menu Screen

Entry	Description

GPIB Settings: Lists the configured Address and Power ON SRQ for GPIB digital interface, refer Figure 3-92.

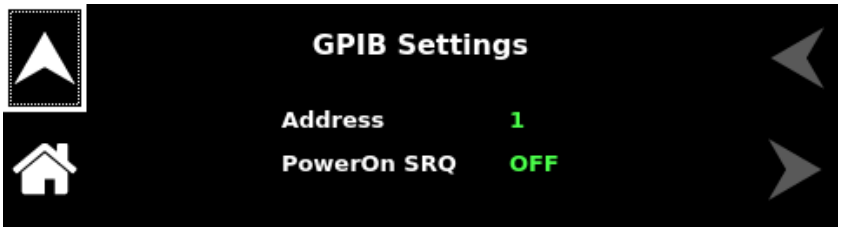


Figure 3-92: GPIB Settings Screen

Configure GPIB: Allows the user to configure the Address and Power ON SRQ for the GPIB digital interface, refer to Figure 3-93.

Figure 3-93: Configure GPIB Screen

Entry	Description

Address	Sets the IEEE -488 address. The address could be set from 1 through 30, the default address is 1.
ON	Sets the power On SRQ to ON.
OFF	Sets the power On SRQ to OFF.

3.4.8.5 ANALOG (OPTIONAL)

Sets the Remote Analog programming interface configurations. Analog menu contains below sub menus; refer to Figure 3-94.

- Analog mode Setting
- Configure Analog Mode

Up-arrow will return to Control Interface menu screen; Refer Figure 3-73. Home button will return to HOME MENU screen 2; Refer Figure 3-13.

Figure 3-94: Analog Screen

Entry	Description
Analog Mode Settings:	Lists the configuration settings of the Analog Programming interface. Refer Figure 3-95 and Figure 3-96.

Figure 3-95. Analog Mode Settings 1

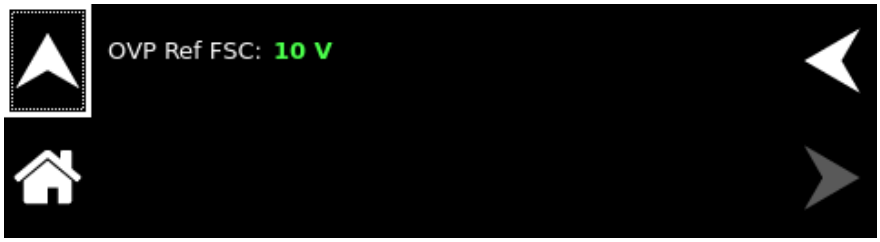


Figure 3-96. Analog Mode Settings Screen 2

Configure Analog mode:	Sets parameter values and controls operation of the Analog Programming interface; refer to Figure 3-97.

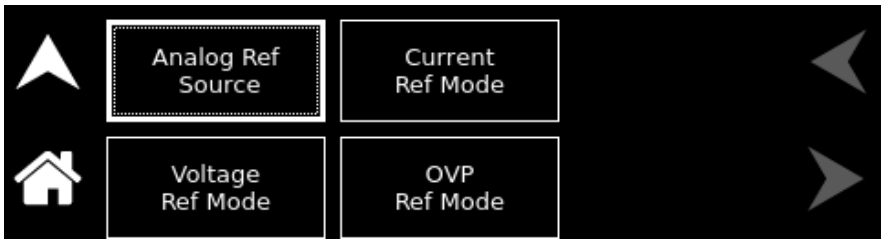


Figure 3-97. Configure Analog Mode Screen

The following menus are available in the Configure Analog mode sub-menu: Analog Reference Source, Voltage Reference Mode, Current Reference Mode and OVP Reference Mode.

Entry	Description

Analog Ref Source: Configures analog programming reference source as voltage or resistive source. The default reference source setting is PONS- Analog Ref Source settings. Refer to Figure 3-98.

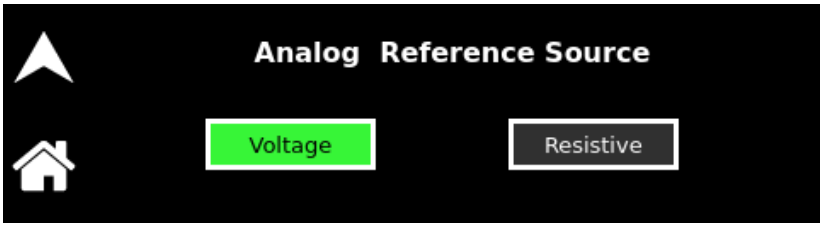


Figure 3-98. Analog Reference Source Screen

Voltage Ref Mode: Configures the Voltage Reference Mode, refer to Figure 3-99. When Voltage reference mode is selected as External, the Voltage setting field in Dashboard screen will be disabled and grayed out, it will display equivalent voltage setting from external program source. The default Voltage reference mode setting is PONS - Voltage Ref mode settings.

NOTE: When Analog Ref. Source is selected as Resistive, FSC (Full Scale) unit will change to k Ohms (kilo Ohms). If it is Voltage source FSC unit will change to V (Volts).

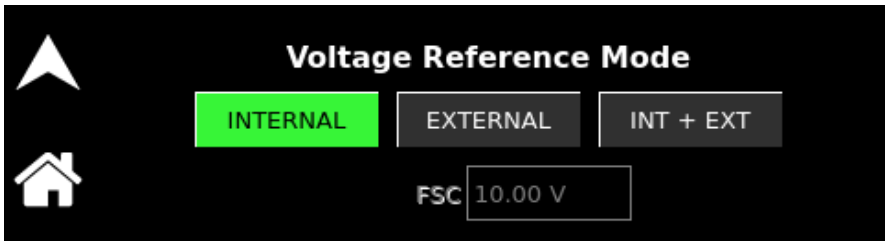


Figure 3-99. Voltage Reference Mode Screen

Current Ref Mode: Configures the Current Reference Mode, refer to Figure 3-100. When Current reference mode is selected as External, the Current setting field in Dashboard screen will be disabled and grayed out, it will display equivalent current setting from external program source. The default Current reference mode setting is PONS - Current Ref mode settings.

NOTE: When Analog Ref. Source is selected as Resistive, FSC (Full Scale) unit will change to k Ohms (kilo Ohms). If it is Voltage source FSC unit will change to V (Volts).

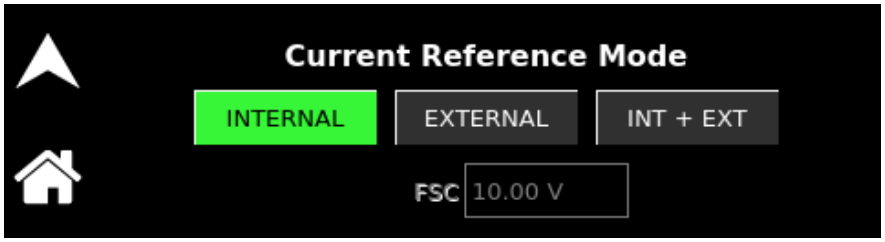


Figure 3-100. Current Reference Mode Screen

OVP Ref Mode: Configures the OVP Reference Mode, refer to Figure 3-101. The default OVP reference mode setting is PONS - OVP Ref mode settings
NOTE: Resistive source is not applicable to external OVP programming.

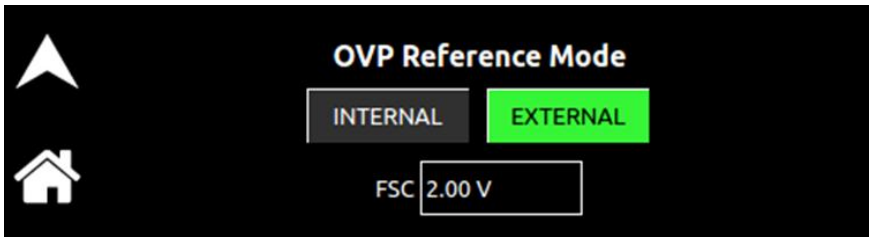


Figure 3-101. OVP Reference Mode Screen

3.4.8.6 ETHERCAT (OPTIONAL)

This screen allows the user to enable/disable the EtherCAT interface for remote control of the power supply. Refer to Figure 3-102.

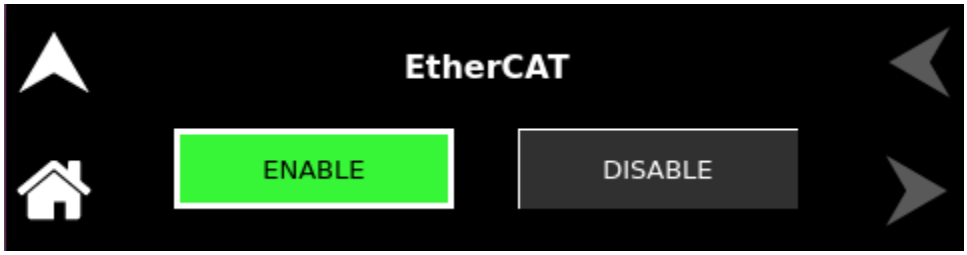


Figure 3-102: EtherCAT Enable/Disable Screen

Entry	Description
Enable:	Enables the EtherCAT communications interface.
Disable:	Disables the EtherCAT communications interface.

3.4.9 System Settings Screen

The System Settings screen provides information on System Status, Hardware Limits, Last Save, Firmware Version, LCD, Default Screen, Language, Factory Default and Parallel Chassis Reset.

The top-level menu of the System Settings menu is shown in Figure 3-103.

Figure 3-103: System Settings Menu Screen 1

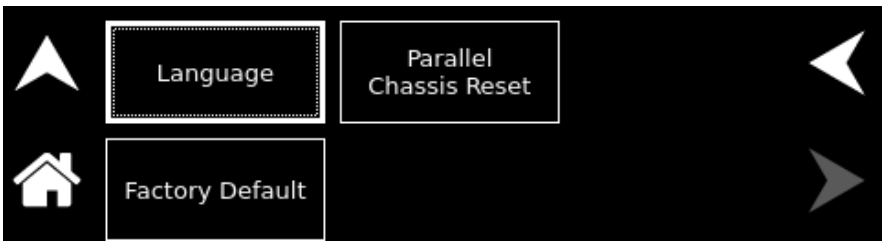


Figure 3-104: System Settings Menu Screen 2

Entry	Description
System Status	Displays the present status of the power supply, status of Regulation Mode, Input Phase, Input Line, Output State, Output Voltage sense and No. of Chassis. Refer to Figure 3-105.

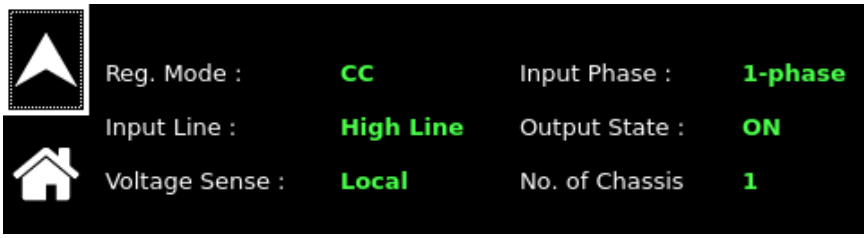


Figure 3-105: System Status Screen

Hardware Limits Displays the hardware parameter limit values. Refer to Figure 3-106:.

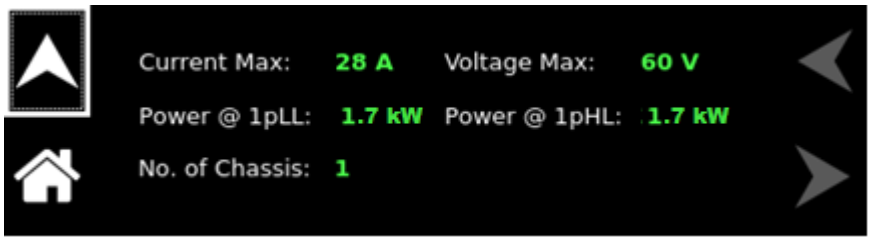


Figure 3-106: Hardware Limits Screen

Last Save This feature saves all the system setting parameters to the point before the power-off of the power supply when Last Save is enabled and during the next power-on of the power supply, all the system setting set before the power off will be set to the unit.

Enabling Last Save **(ON button)** will disable the Power-On Settings sub-menus. When the Last Save is disabled **(OFF button)** and the power supply is restarted, the values set in the Power-On Settings menu are set to the unit. All the parameters are set back to their default value when Last Save is enabled again. Refer Figure 3-107.

Figure 3-107: Last Save Screen

Firmware Version Displays information about the configuration of the power source. It has information such as manufacturer, model number, serial number, firmware versions and Last Calibration Date. This information helps identify the unit**.** Refer to Figure 3-108.

Firmware Version screen displays following three types of firmware versions refer Figure 3-108. In the screen 5.01 represents firmware version of System Controller, 2.54 represents firmware version of Interface (AIB) controller and 5.01 represents firmware version of Front Panel.

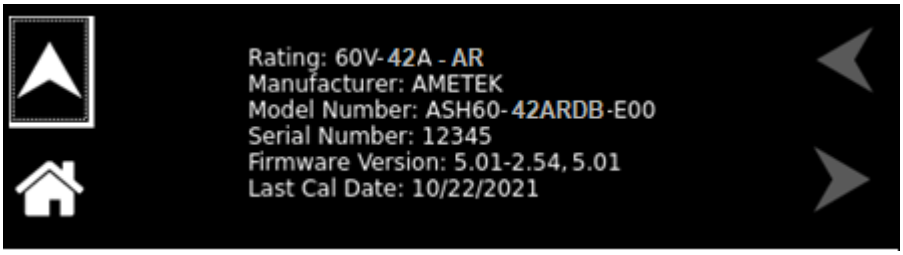


Figure 3-108: Firmware Version Screen

LCD Brightness Sets the brightness of the LCD backlight, as a percentage of the maximum that is available; the default setting is 70%. Tapping on the Right or Left arrow buttons or selecting them with the encoder and clicking the encoder switch, will increment/decrement the brightness by 10%, respectively. Refer to Figure 3-109 and Figure 3-110.

LCD Calibration User can calibrate the touchscreen with this utility for better accuracy of the Touch. Refer to Figure 3-109 and Figure 3-111. Follow the on screen guide to complete the calibration.

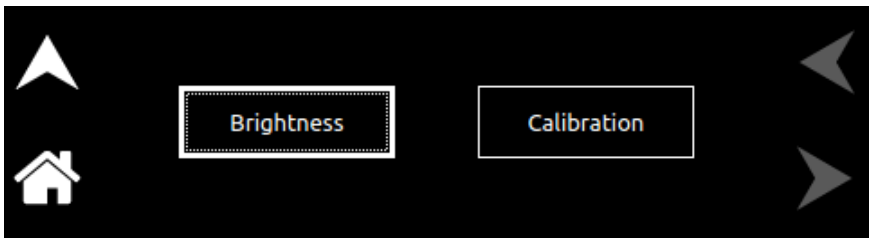


Figure 3-109: LCD Settings

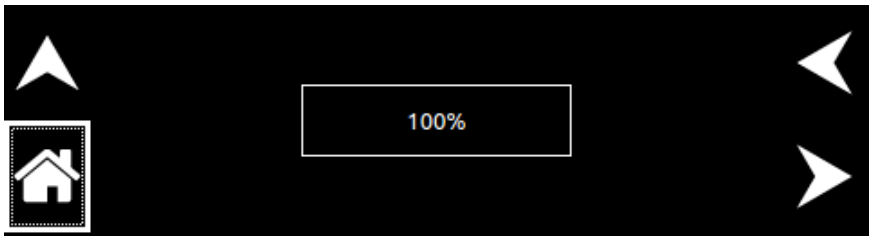


Figure 3-110: LCD Settings - Brightness

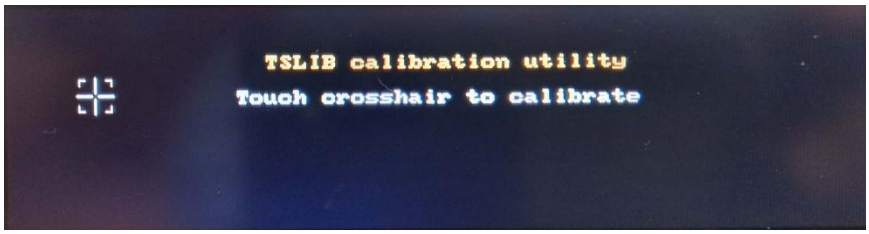


Figure 3-111: LCD Settings - Calibration

Default Screen Selects whether the Default screen (showing measured voltage and current) is enabled or disabled, refer to Figure 3-112. 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.

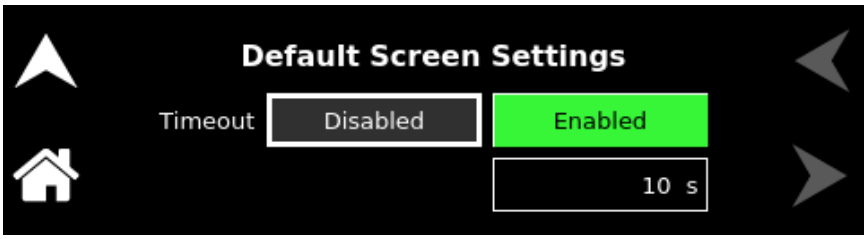


Figure 3-112: Default Screen Enabled

Language

Selects the language of the display menus: German, English, Spanish, French, Japanese, Chinese, Russian, or Korean. Refer to Figure 3-113.

Figure 3-113. Language

Factory Default

Sets the Power supply settings and values to its default. This also resets the Remote Analog Programming settings to its default status. A confirmation window will pop-up when Factory Default is pressed. The power supply will reset to its default after user confirmation. Refer to Figure 3-114.

NOTE: This will not reset LAN configuration

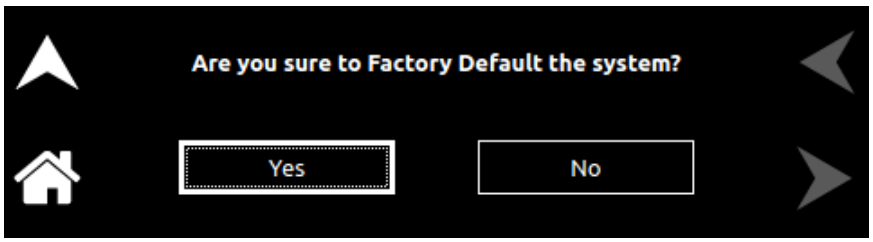


Figure 3-114: Factory Default

Parallel Chassis Reset

Resets the Parallel Chassis connection. Refer to Figure 3-115.

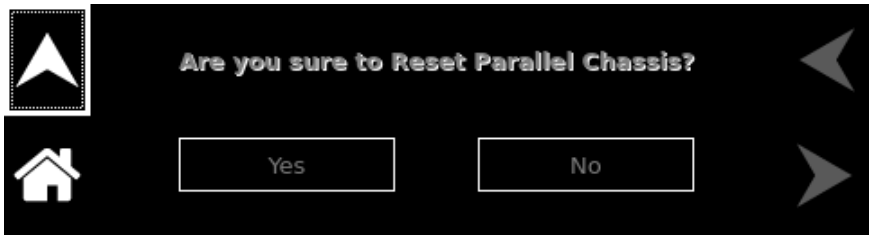


Figure 3-115. Parallel Chassis Reset

3.4.10 Warning/Fault Screen

The following Warning/Fault screen may appear during supply fault condition, refer to Figure 3-116. Pressing on View Faults will display all the Fault/Warning description with an option to clear the Fault. User should press Clear Fault button from the clear fault screen (refer Figure 3-117) to continue the operations of the power supply and clear the fault.

These warnings indicate description of Faults which has occurred in a power module, refer Table 3-3. These conditions might clear themselves, however, if they continue to occur after pressing the clear Fault; refer Figure 3-117. Contact the factory for service assistance.

Figure 3-116: Fault Screen

Figure 3-117: Clear Fault Screen

Mentioned below are the power supply's fault conditions:

Fault	Description	Action
OVP FAULT	Output voltage exceeded Over Voltage trip limit.	Check sufficient margin between set voltage and Over Voltage Protection limit.
OTP FAULT	Power supply internal hardware temperature exceeded limit	Check and make sure there are no Air blockage in the front and rear of the power supply. Make sure Ambient temperature and the Operating Power limit with input line condition is as per the Specifications. If fault persists, Contact factory.
EXTERNAL SHUTDOWN	External Shutdown activated from DB 26 External User Interface Connector	Make sure Pin 24 and Pin 25 are connected for disabling External Shutdown.

FOLDBACK FAULT	Trip activated due to foldback operation setting	Power supply is not regulating as per the regulation mode settings. Check the regulation mode settings as required for the load type. Check the programming parameters of output voltage, current to meet the load requirement and the regulation mode setting selected.
FAN FAULT	Fault from cooling Fan	This condition is caused by Fan's not running properly. Reset the fault or try restarting the power supply and if fault persists, Contact factory.
LINE DROP FAULT	Input voltage to the power supply is not in operating range	Check if input voltage to the supply is within specified range in datasheet.
DC FAULT	Internal DC module hardware fault	Try restarting the power supply if fault persists Contact factory.
PFC FAULT	Internal PFC module hardware fault	Try restarting the power supply if fault persists Contact factory.
OCP FAULT	Output current exceeds Over Current trip limit	Check sufficient margin between set current and Over Current trip limit.
AUX SUPPLY FAULT	Auxiliary Supply to internal hardware fault	Try restarting the power supply if fault persists Contact factory.
LINE STATE CHANGE	Input voltage changed from Low range to High range or vice versa	Make sure input voltage is stable at one voltage range. If there is change over in input voltage range power supply's output power limits will be reset based on the limits specified in datasheet.
REMOTE SNS ERROR	Remote voltage sensing is out of range from power supply capacity or cable connected to Output and Remote Sense connector fault	Check if the Remote Sense cable connected to Output and Remote Sense Connector at rear side power supply, Cables are intact, and polarity is correct. Check the output cable voltage drop and make sure voltage drop across cable is not exceeding limit specified in datasheet.

Table 3-3: Fault Conditions

3.4.11 Local/Remote Screen

This screen is displayed when the power supply operations are only controlled by digital communication interfaces. Pressing Go To Local from Local/Remote screen returns the supply to Local Mode and Home Screen menu is displayed. Refer to Figure 3-118.

Figure 3-118: Local/Remote Screen

3.4.12 Local Lockout Mode

Using the interface available on the unit (RS232, USB, LAN, GPIB and EtherCAT), sending the command **SYST:LOCAL:LOCK** will change the unit front panel touch control and output on/off button into Local Lockout Mode, refer Figure 3-119.

During this mode, the front panel would display the measurements of voltage and current along with the unlock button. If user decides to program the unit from the front panel touch control, the following command must be issued to the unit: **SYST:LOCAL:UNLOCK "6867"** or by pressing the unlock button displayed in the local lockout screen would pop-up a window, refer Figure 3-120.

Figure 3-119: Local Lockout Screen

Figure 3-120: Local Lockout – Unlock Screen

3.5 Output Verification

3.5.1 Constant-Voltage Mode Operation

In Constant-Voltage Mode (CV) operation, the output voltage is regulated at the programmed value while the output current varies with the load requirements. The voltage could be programmed either through the front panel or by the remote analog voltage programming input. To verify operation in Constant-Voltage mode, follow these steps:

1. Ensure that there is no load connected to the output.
2. Ensure that the remote sense is connected to the output terminals.
3. Connect a digital voltmeter (DVM) across the rear panel positive and negative output terminals, observing the correct polarity. Make sure the DVM is in the

DC voltage mode and the range is adequate to handle the full-scale voltage of the power supply.

4. Apply power to the AC mains input and turn on the power supply.
5. If the Power ON Settings (PONS) had previously been configured to be OFF and the power supply boots up to display the Dashboard Screen, enable the output by pressing the “Output On/Off”.
6. Use the Dashboard Screen to program the Voltage and Current.
7. Program the Current to 10% of rated output by entering the value in the Current text box on the Dashboard Screen. Program the current above zero to enable the supply of output current while in the constant-voltage mode.
8. On the Dashboard screen, rotate the rotary knob to select the “Voltage” text box. Press the rotary knob to highlight the voltage value. Rotate the rotary knob clockwise and observe both the voltage display in the “Measurement” section on the Dashboard screen and output of the DVM begin to accelerate up. The output voltage should increase from 0 V to the maximum rated voltage of the supply. The voltage display in the “Measurement” section on the Dashboard screen and DVM readings should track within the accuracies of the meter and the Dashboard.
9. Verify the Constant Voltage (CV) LED is on.
10. Program the Voltage and Current back to zero.
11. Turn the power supply off.

If Constant-Voltage mode operation did not function as indicated above, verify the setup, and check again. If the function continues to fail, contact the factory for assistance.

3.5.2 Constant-Current Mode Operation

Constant-Current Mode (CC) operation, the output current is regulated at the selected value while the output voltage varies with the load requirements. The current could be programmed either through the front panel or by the remote analog current programming input. To verify operation in Constant-Current mode, follow these steps:

1. If the output had been previously energized, allow 5 minutes for the output capacitors to discharge. Connect a high current DC ammeter across the rear panel positive and negative output terminals, observing the correct polarity. Select wire leads of sufficient current carrying capacity and an ammeter range compatible with the units maximum rated output current.

   Note: Verify that the supply could source rated output current, without measuring the current with an ammeter, but by only using the front

panel, this could be performed by shorting the output terminals together.

2. Apply power to the AC mains input and turn on the power supply.
3. If the Power ON Settings (PONS) had previously been configured to be OFF and the power supply boots up to display the Dashboard Screen, enable the output by pressing the “Output On/Off”.
4. Use the Dashboard Screen to program the Voltage, Current and Power.
5. Program the Voltage to 10% of rated output by entering the in the Voltage text box on the Dashboard Screen. This programs the Voltage above zero to enable the supply of output voltage while in the constant-current mode.
6. On the Dashboard screen, rotate the rotary knob to select the “Current” text box. Press the rotary knob to highlight the current value. Rotate the rotary knob clockwise and observe both the current display in the “Measurement” section on the Dashboard screen and output of the DC ammeter begin to accelerate up. The output current should increase from 0 A to the maximum rated current of the supply. The current display in the “Measurement” section on the Dashboard screen and DC ammeter readings should track within the accuracies of the meter and the Dashboard.
7. Verify the Constant Current Mode (CC) LED is on.
8. Program the Voltage and Current back to zero.
9. Turn the power supply off.
10. Allow 5 minutes for the output capacitors to discharge and disconnect the ammeter or short from the output terminals.

If Constant-Current mode operation did not function as indicated above, verify the setup, and check again. If the function continues to fail, contact the factory for assistance.

3.5.3 Overvoltage Protection

The Overvoltage Protection (OVP) function allows the supply to shut down the output if it were to exceed a preset voltage. This may be used to protect sensitive circuits or loads from damage caused by an excessive voltage on the output of the supply. The Overvoltage Protection (OVP) could be programmed through either through the front panel or by the remote analog OVP programming input. To verify OVP operation, follow these steps:

1. Make sure there is nothing connected across the output terminals.
2. Apply power to the AC mains input and turn on the power supply.

3. If the Power ON Settings (PONS) had previously been configured to be OFF and the power supply boots up to display the Dashboard Screen, enable the output by pressing the “Output On/Off”.
4. Use the Output Program Screen to program the Voltage, Current and Power.
5. Program the Current to 10% of rated output (program the current above zero to enable the supply of output current while in the constant-voltage mode).
6. The factory default setting is approximately 110% of the maximum rated output of the supply. On the Output Program screen, rotate the rotary knob to set the “OVP”. Press the rotary knob to highlight the OVP value. Rotate the rotary knob anti-clockwise until the OVP is programmed to about 80-90% of the maximum rated output voltage.
7. On the Dashboard screen, rotate the rotary knob to select the “Voltage” text box. Press the rotary knob to highlight the voltage value. Rotate the rotary knob clockwise and observe the voltage display in the “Measurement” section on the Dashboard screen begin to accelerate up. When the output voltage exceeds the OVP trip point, the warning/fault screen will be displayed saying that the output tripped due to an OVP fault. Refer Figure 3-117.
8. The Output State will be programmed to **OFF**, and the Voltage, Current, and OVP settings will retain their previous settings.
9. Press “Clear Faults” on Warning/Faults screen and the fault screen will clear. The Dashboard screen will be displayed, and the output will remain disabled.
10. Using the Dashboard screen, program the OVP setting as appropriate for the application. If OVP is not used, then “OVP” programming may be set at maximum, approximately 110% of the rated output voltage of the supply.

If OVP mode did not function as indicated above, verify the setup, and perform the check again. If the function continues to fail, contact the factory for assistance.

3.5.4 Constant-Power Mode Operation

The Constant-Power Mode (CP) allows the supply to regulate the output to a constant power setting as different to the more common constant voltage or constant current modes of operation. (**Note:** Constant Power mode is intended primarily for loads with response times greater than approximately 10ms). While in this mode, the supply will continually adjust the voltage and current levels to attempt to maintain a constant power to the load. To provide additional protection for the load, voltage, and current limits may be set while in the Constant-Power mode. If the unit cannot regulate to the Constant Power setting due to load conditions, it will regulate either at the voltage or current limit depending on the load demand. Refer to Figure 3-121.

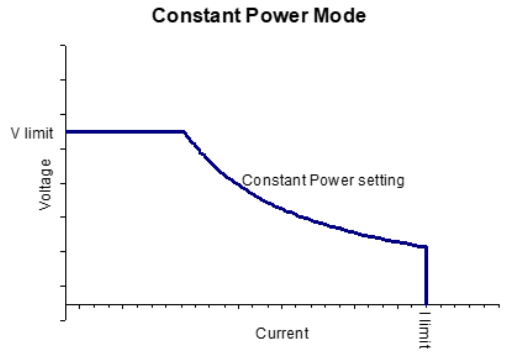


Figure 3-121: Constant-Power Example

4
REMOTE ISOLATED EXTERNAL USER CONTROL I/O INTERFACE

4.1 Introduction

The Asterion DC Half Rack Series Power supply is provided with Isolated External User Control I/O Interface connector on the rear panel. This allows the unit to be configured for different operating configurations. This chapter contains setup and operating configuration of Output ON/OFF, Regulation Mode status, Fault status, Remote inhibit (E-stop) and Trigger Functions. The power supply is also provided with optional isolated Analog programing interface. This feature is provided if the unit is ordered with the Analog Programming feature, else the pins related to this feature would not applicable.

Output of the Asterion DC half Rack Series power can be programmed by providing the respective remote analog source on the Isolated External User Control I/O Interface Connector provided on the rear panel. Remote analog programming inputs of Voltage, Over Voltage Protection and Current, monitor outputs of Voltage and Current are isolated from power supply's power output. Refer to Figure 4-1 for the connector pin-out diagram and Table 4-1Table for connector pin-out details.

The setup and operating requirements of each configuration are provided in Sections 4.3.1 and 4.3.2.

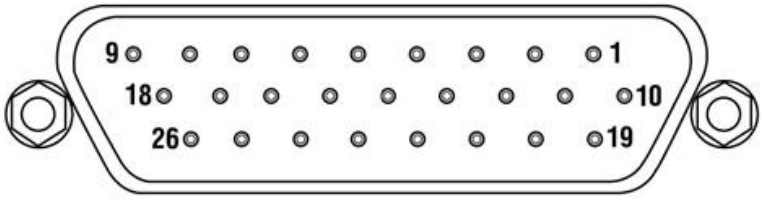


Figure 4-1: External User Interface Connector

Pin	Signals	Type	Description
1 (1)	VPRG_VSOUR	ANALOG INPUT	Remote control input for voltage programming using a voltage source connected between pin 1 and signal return pin 6. **Signal return:** Pin 6 **Range:** Full scale Voltage could be set by the user from 5V to 10V. **Input impedance:** 20 kΩ, typical
2 (1)	VPRG_ISOUR	ANALOG INPUT	Remote control input for voltage programming using a resistance connected between pin 2 and signal return pin 6. Current Source of 1 mA is internally connected to pin 2 to enable resistance programming. **Signal return:** Pin 6 **Range:** Full scale Voltage could be set by the user from 5kΩ to 10kΩ. **Note:** Do not exceed resistance of maximum 10 kΩ
3 (1)	IPRG_VSOUR	ANALOG INPUT	Remote control input for current programming using a voltage source connected between pin 3 and signal return pin 6. **Signal return:** Pin 6 **Range:** Full scale Current could be set by the user from 5V to 10V. **Input impedance**: 20 kΩ, typical
4 (1)	IPRG_ISOUR	ANALOG INPUT	Remote control input for current programming using a resistance connected between pin 4 and signal return pin 6. Current Source of 1 mA is connected to pin 4 to enable resistance programming. **Signal return:** Pin 6 **Range:** Full scale Current could be set by the user from 5kΩ to 10kΩ. **Note:** Do not exceed resistance of maximum 10 kΩ
5 (1)	OVPRG_VSOUR	ANALOG INPUT	Remote control input for overvoltage programming using a voltage source connected between pin 5 and signal return pin 6. **Signal return:** Pin 6 **Range:** 5-10 VDC = 0-110% of full-scale output voltage. Do not exceed an input of 12 VDC.
6 (1)	RTN_PRG	PROGRAMMING RETURN	Return/GND. Internally, pins 6, 9, 25, and 26 are kept at the same DC potential. Circuit is electrically connected to the output power negative terminal.

7 (1)	VMON	ANALOG OUTPUT	Monitor signal for output voltage **Signal return:** Pin 9 **Range:** 0V to 10V corresponds to 0-100% full-scale output voltage. **Output impedance:** 100 Ω, typical **Minimum recommended Load:** 100 kΩ, typical **Maximum Load:** 20 kΩ
8 (1)	IMON	ANALOG OUTPUT	Monitor signal for output current **Signal return:** Pin 9 **Range:** 0V to 10V corresponds to 0-100% full-scale output current. **Output impedance:** 100 Ω, typical **Minimum recommended Load:** 100 kΩ, typical **Maximum Load:** 20 kΩ
9 (1)	RTN	MONITOR RETURN	Return/GND. Internally, pins 6, 9, 25, and 26 are kept at the same DC potential. Circuit is electrically connected to the output power negative terminal.
10	5V_AUX	POWER OUT	5V user power output, 1A max current. **Signal return:** Pin 11
11	RTN_AUX5V	POWER OUT RETURN	Return for Pin 10
12	15V_AUX	POWER OUT	15V user power output, 1A max current. **Signal return:** Pin 13
13	RTN_AUX15V	POWER OUT RETURN	Return for Pin 12
14	OUTPUT_ON/OFF _ACDC	DIGITAL IN	Isolated remote-control input for output on/off with an applied AC/DC voltage source. A positive (+) 6-24 VDC or an AC input of 12- 24 VAC will enable (turn-on) the output of the power supply. **Signal return:** Pin 15 (RTN_ACDC) **Input impedance:** 5 kΩ, typical
15	RTN_ACDC	DIGITAL GND	Dedicated Return for pins 14 (OUTPUT_ON/OFF_ACDC). This control return is optically isolated from the output power negative terminal of the power supply.
16	IPVOLT_ON/OFF	DIGITAL IN	Isolated 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. This control input is optically isolated from the output power negative terminal of the power supply. **Signal return:** Pin 26 **Input impedance**: 5 kΩ, typical

17	AUX_5V_EN	DIGITAL IN	Apply a high to enable output on pin 10 (5V_AUX). **Signal return:** Pin 26 **Voltage Rating:** Up to 24V capable, 0.3V max low, 2.7V min high.
18	TRIG_IN	DIGITAL IN	Input signal, active-high pulse of 10 ms; provides external hardware trigger at falling edge of the pulse for voltage, current ramp and sequencing functions. Signal connects to Open-anode of opto-isolator diode with 1kΩ series resistor internal to power supply. **Signal return:** Pin 26 **Voltage Rating:** Maximum 24 V, Minimum -5V **Low state** 0.3 V max, **High State** 2.7 V min.
19	AUX_15V_EN	DIGITAL IN	Apply a high to enable output on pin 12 (15V_AUX). **Signal return:** Pin 26 **Voltage Rating:** Up to 24V capable, 0.3V max low, 2.7V min high.
20	TRIG_OUT	DIGITAL OUT	Output signal, active-high; synchronization pulse of 10 ms when a change in the output occurs. Open collector transistor output, Collector is connected the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. **Signal return:** Pin 26 **Voltage Rating:** Maximum 30 V, Minimum 3V for Active High, Sink Current: 50mA
21	DIO_OUT1A	DIGITAL OUT	User digital output. Output signal high indicates Output is ON and signal low indicates Output is OFF. Open collector transistor output, Collector is connected the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. **Signal return:** Pin 26 **Voltage Rating:** Maximum 30 V, Minimum 3V for Active High, Sink Current: 50mA
22	DIO_OUT1B	DIGITAL OUT	User digital output. Output low for Constant Voltage (CV) and high for Constant Current (CC). Open collector transistor output, Collector is connected the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. **Signal return:** Pin 26 **Voltage Rating:** Maximum 30 V, Minimum 3V for Active High, Sink Current: 50mA
23	DIO_OUT1C	DIGITAL OUT	User digital output. High state indicates fault state of the power supply. Open collector transistor output, Collector is connected the 26-pin connector. Emitter point of transistor is connected to common return pin of the interface connector. **Signal return:** Pin 26 **Voltage Rating:** Maximum 30 V, Minimum 3V for Active High, Sink Current: 50mA

24	RMT_INHIBIT_CONTACT_CLOSURE	DIGITAL IN	Control input for Output ON/OFF. Switch/Relay contact closure or direct short-circuit from this terminal to signal return is required to enable/disable the output of the power supply. Remote circuit must sink up to 10 mA from 5 VDC to enable. **Signal return:** Pin 26
25	RTN	DIGITAL GND	Return/GND. Internally, pins 6, 9, 25, and 26 are kept at the same DC potential. Circuit is electrically connected to the output power negative terminal
26	RTN	DIGITAL GND	Return/GND. Internally, pins 6, 9, 25, and 26 are kept at the same DC potential. Circuit is electrically connected to the output power negative terminal
(1) The Remote Analog Programming pin 1 to pin 9 are optional. Pins are No Connection (NC) for the units without Analog Programming feature.			

Table 4-1: Isolated External User Control I/O Interface connector pin out details

CAUTION!

The signal returns (Pin 6, 9, 25 and 26) are shorted internally to the power supply. Applying a voltage potential between them would damage the power supply.

CAUTION!

Remote Isolated External User Control I/O Interface signals are isolated from negative output terminal; Isolation voltage is rated for ±600 VRMS, maximum; operation of Isolated Analog Interface signals should be at SELV safety voltage conditions to chassis ground.

4.2 External User Control Interface Connector

4.2.1 Remote Inhibit (Switch/Relay Contact Closure)

The External User Interface Connector (26 pin connector) is provided with remote inhibit inputs; refer Table 4-1 for pin out details. A contact closure or direct shot between Remote Inhibit terminal (pin 24) and Return (pin 25) will allow the power supply's output to Turn On/Off; refer Figure 4-2 for connection requirements.

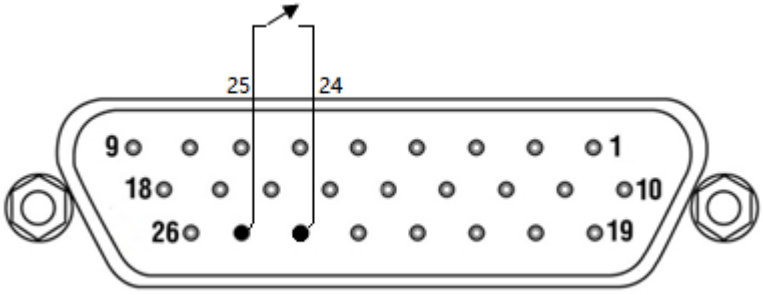


Figure 4-2: Output On/Off Control by Contact Closure

4.2.2 Remote Output ON/OFF Control by External Source

The power supply is provided with two isolated control inputs to turn ON/OFF power supply:

a) Remote-control input for output on/off with an applied AC/DC voltage source.

b) Remote-control input for output on/off with a logic signal.

4.2.2.1 REMOTE-CONTROL INPUT FOR OUTPUT ON/OFF WITH AN APPLIED AC/DC VOLTAGE SOURCE

The Output of the power supply can be turned on/off through both AC and DC voltage sources. Applying DC voltage (6-24VDC) between pin 14 and pin 15, will enable the output of the power supply or applying AC voltage (12-24VAC) between Pins 14 and 15, will enable the output of the power supply. This interface is opto-isolated from circuit common. See Figure 4-3 and Figure 4-4 for connection requirements.

To enable this feature, user must send the following SCPI command: `sour:analog:remote:outp 1`. If this feature is enabled, the user cannot turn the output on/off through SCPI commands or through front panel.

To enable the output on/off through SCPI commands or through the front panel, the user must send the following SCPI command: `sour:analog:remote:outp 0`.

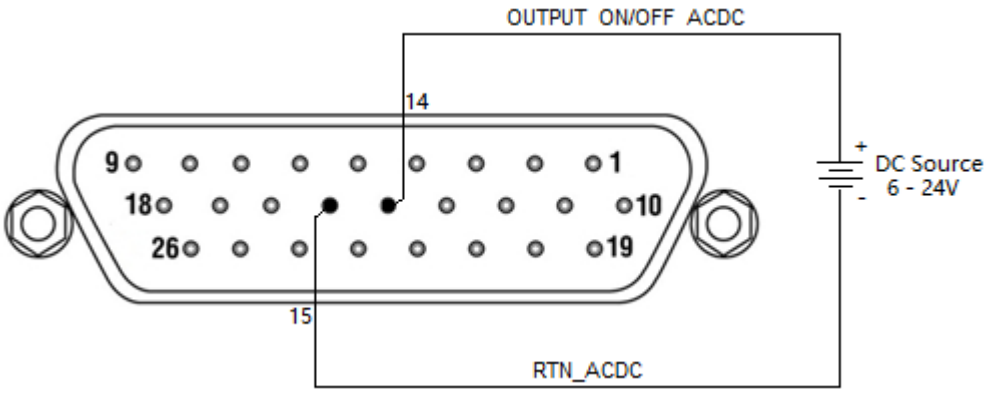


Figure 4-3: Remote Output On/Off Using DC Source

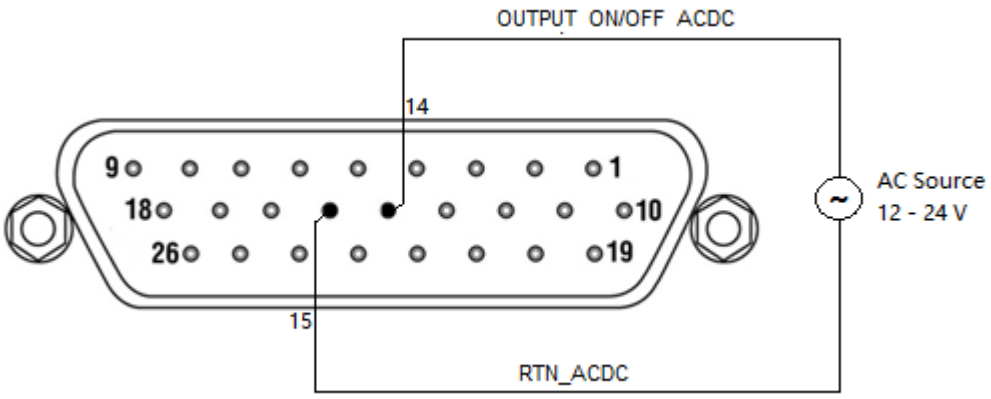


Figure 4-4: Remote Output On/Off Using AC Source

4.2.2.2 REMOTE-CONTROL INPUT FOR OUTPUT ON/OFF WITH A LOGIC SIGNAL

The Output of the power supply can also be turned on/off through logic signals: a logic-high, 2.7-24 VDC TTL/CMOS signals on pin 16 (IPVOLT_ON/OFF) and pin 26 (RTN) will enable the output of the supply, and a logic-low signal disables the output. This control input is optically isolated from the output power negative terminal of the power supply. See Figure 4-5 for connection requirements.

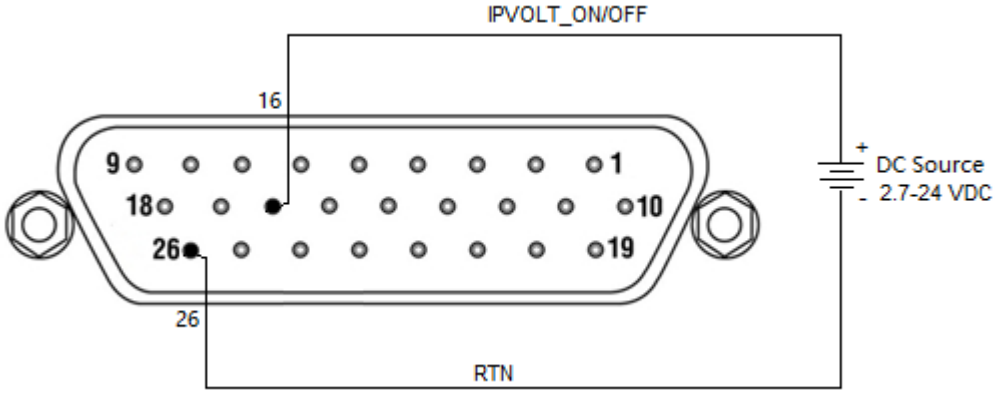


Figure 4-5: Remote Output On/Off Using DC Source

To enable this feature, user must send the following SCPI command: `sour:analog:remote:outp 1`. If this feature is enabled, the user cannot turn the output on/off through SCPI commands or through front panel.

To enable the output on/off through SCPI commands or through the front panel, the user must send the following SCPI command: `sour:analog:remote:outp 0`.

4.2.3 Trigger Functions

The Trigger IN provides functionality of external hardware triggering for sequencing and ramping of voltage and current. Applying input signal of TTL active-high (2.7V to 24V) at between TRIG_IN (pin 18) and RTN (pin 26) terminal. This will trigger the

configured function (Sequence or Ramp) at the falling edge of the pulse in the power supply.

Trigger OUT provides functionality to identify the change in the output. Output signal active-high of synchronization pulse for 10 ms would be generated at TRIG_OUT terminal, when a change occurs in the output.

The Trigger IN and Trigger OUT functions are explained with respect to Ramp function.

Asterion DC Half Rack Series power supply provides the following Ramp functions:

- Voltage Ramp
- Current Ramp

4.2.3.1 VOLTAGE RAMP

Voltage Ramp could be generated by applying active high signal between TRIGGER IN and Return pins on the 26-pin connector (refer Figure 4-1 and Table 4-1 for pinout details) with a programmable Dwell, Start and End Voltage set points. Dwell time could be set to 1 ms minimum and 9999 s maximum. Parameters can be programed through front panel display (refer section 3.4.6.1) or using SCPI commands, refer to Programming manual of Asterion DC (P/N M330520-01).

Apply TTL active-high voltage signal on pin 18 (Trig_IN) and pin 26 (Return) on the External User Interface connector. This will trigger the voltage ramp; refer Figure 4-6.

4.2.3.2 CURRENT RAMP

Current Ramp could be generated by applying active high signal between TRIGGER IN and Return pins on the 26-pin connector (refer Figure 4-1 and Table 4-1 for pinout details) with a programmable dwell Time, Start and End Current set points. dwell Time could be set to 1 ms minimum and 9999 s maximum. Parameters can be programed through front panel display (refer section 3.4.6.1) or using SCPI commands, refer to Programming manual of Asterion DC (P/N M330520-01).

Apply TTL active-high voltage signal on pin 18 (Trig_IN) and pin 26 (Return) on the External User Interface connector. This will trigger the current ramp; refer Figure 4-6.

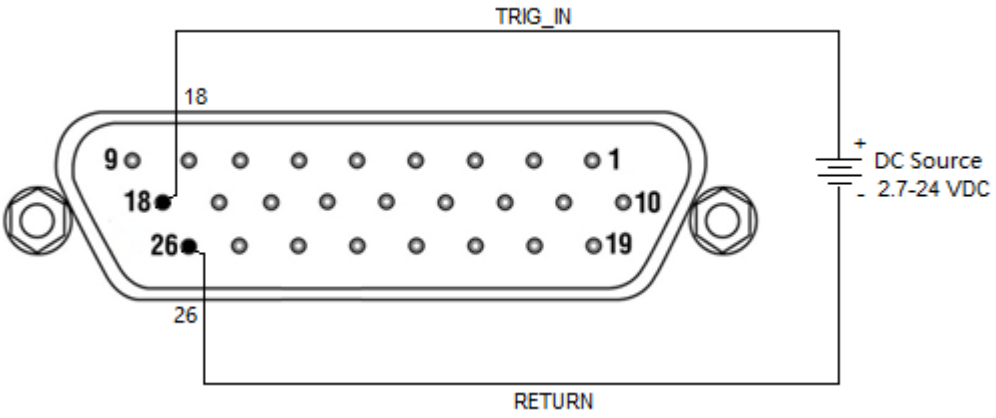


Figure 4-6: Trigger Input

4.2.4 Auxiliary Power Output

The power supply has the option of two auxiliary power outputs 5V DC and 15V DC. These auxiliary power outputs can be controlled through the power supply's front panel, SCPI command or by giving appropriate signals on the digital input enable pins provided with the External User Interface connector on the rear panel.

4.2.4.1 AUXILIARY POWER ENABLE

Applying an active-high signal on pin 17(AUX_5V_EN) and return pin 26(RTN) would enable the auxiliary power output 5V, refer Figure 4-7.

Applying an active-high signal on pin 19(AUX_15V_EN) and return pin 26(RTN) would enable the auxiliary power output 15V, refer Figure 4-8.

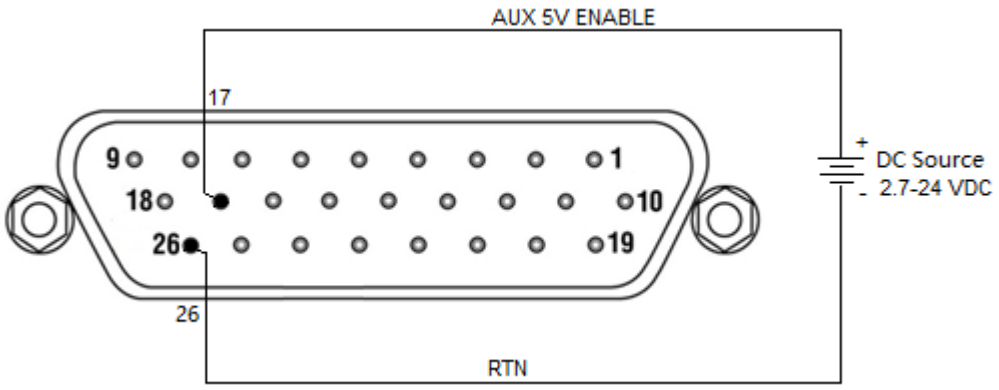


Figure 4-7: Auxiliary 5V Enable

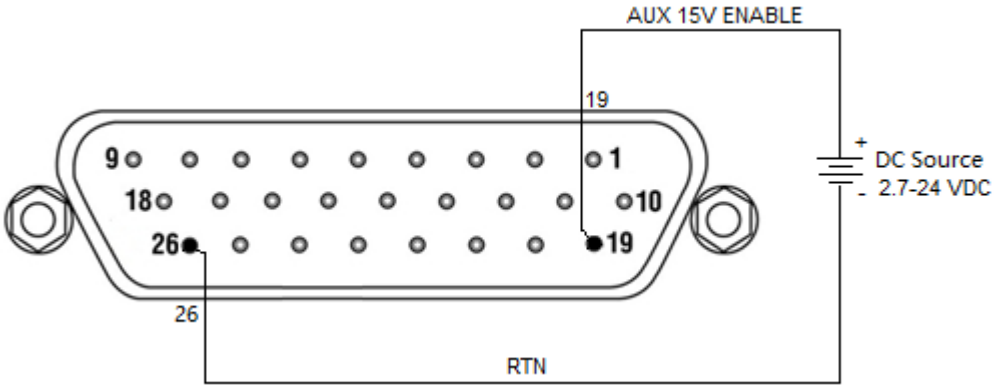


Figure 4-8: Auxiliary 15V Enable

4.2.4.2 AUXILIARY POWER OUTPUT 5V

Auxiliary power output of 5V DC can be enabled from front panel, SCPI command or through external user interface by enabling inputs on pin 17(AUX_5V_EN) and return pin 26 (RTN) in the 26-pin connector, refer Figure 4-10.

1. To enable the 5V DC output on pin 10 (5V_AUX) through the front panel:
    - Select the Configuration menu.
    - Go to Aux Output sub-menu and select 5V ON button.
    - The selected button will be highlighted in green color, refer to Figure 4-9.

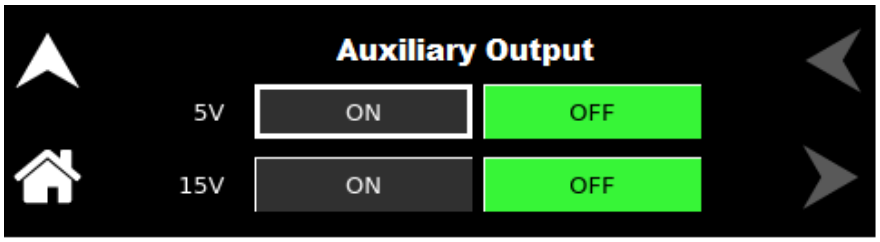


Figure 4-9: Auxiliary Output Screen

2. To enable the 5V output from remote digital input:
   Apply a high between pin 17 (AUX_5V_EN) and pin 26 (RTN) this permits output of 5V DC across pin 10 (5V_AUX) and Pin is 11 (RTN_AUX5).

   A High state voltage between 2.7V to 24V will enable the auxiliary power output of 5V across pin 10 and pin 11.
   A Low State voltage between -5V to 0.3V will disable the power output of 5V across pin 10 and pin 11.

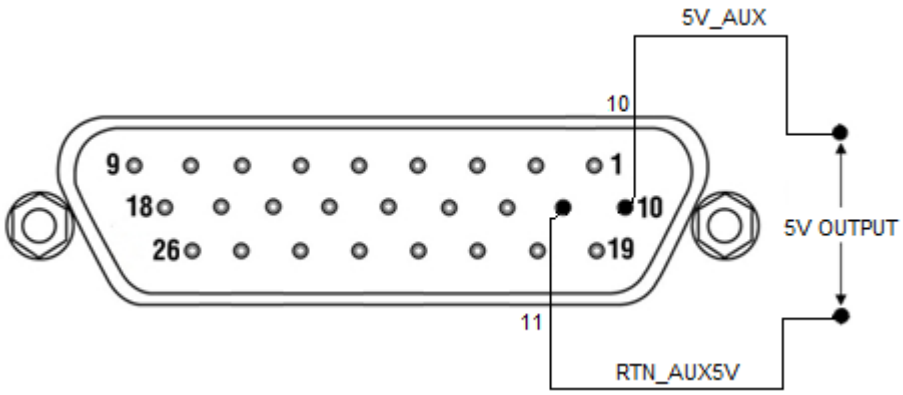


Figure 4-10: Auxiliary 5V Output

4.2.4.3 AUXILIARY POWER OUTPUT 15V

Auxiliary power output of 15V DC can be enabled from front panel, SCPI command or through external user interface by enabling inputs on pins 19(AUX_15V_EN) and return pin 26 (RTN) in the 26-pin connector, refer Figure 4-11.

1. To enable the 5V DC output on pin 10 (15V_AUX) through the front panel:
    - Select the Configuration menu.
    - Go to Aux Output sub-menu and select 15V ON button.

- The selected button will be highlighted in green color, refer to Figure 4-9.

2. To enable the 15V output from remote Digital Input:

   Apply a high between pin 19 (AUX_15V_EN) and pin 26 (RTN) this permits output of 15V DC across pin 13 (15V_AUX) and Pin is 11 (RTN_AUX15).

   A High state voltage between 2.7V to 24V will enable the power output of 15V across pin 12 and pin 13.
   A Low State voltage between -5V to 0.3V will disable the power output of 15V across pin 12 and pin 13.

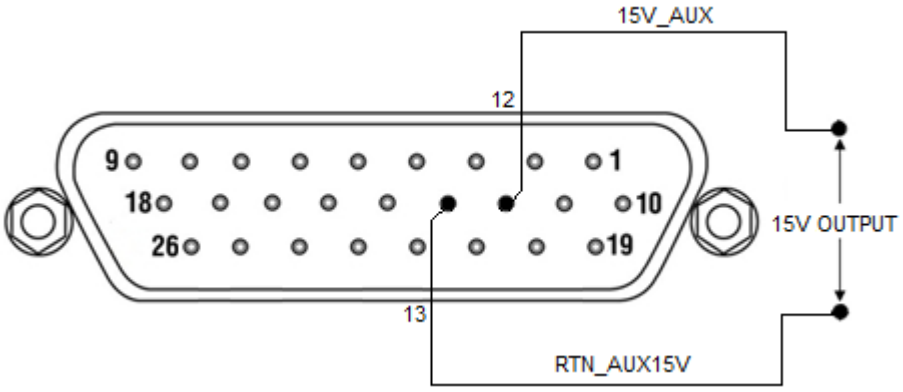


Figure 4-11: Auxiliary 15V Output

4.2.5 Fault Status

The External User Interface connector (26-pin connector) is provided with Fault status signal pin out; refer Table 4-1 for pin out details. An output signal with High state (3 to 30V) indicates that the power supply is in fault condition and Low state indicates unit is in no fault condition. Fault status output signal could be monitored between pin 23 (DIO_OUT1C) and pin 26 (RTN); refer Figure 4-12 for connection requirements.

Open collector transistor output, Collector is connected to the DIO_OUT1C pin of 26-pin connector and the Emitter point of transistor is connected to common return pin of the 26-pin connector.

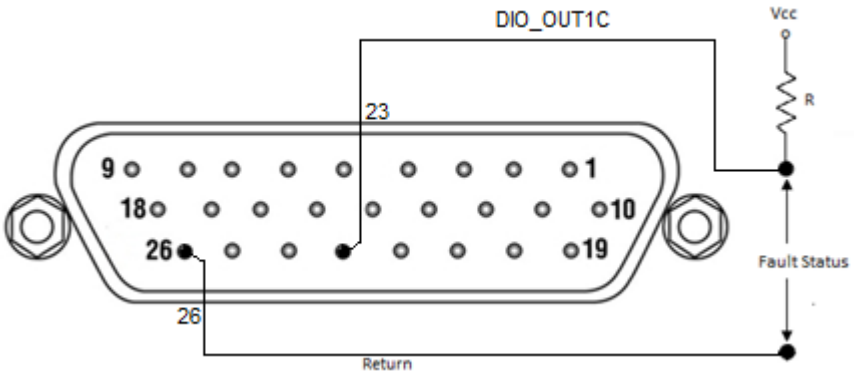


Figure 4-12: Fault Status

4.2.6 Regulation Mode Status

The External User Interface connector (26-pin connector) is provided with regulation mode status signal pin out; refer Table 4-1 for pin out details. An output signal with low state (less than 3V) indicates that the unit is in Constant Voltage (CV) mode and high state (minimum 3V to maximum 30V) indicates that the unit is in Constant Current (CC) mode. Mode can be monitored between pin 22 (DIO_OUT1B) and pin 26 (RTN); refer Figure 4-13 for connection requirements.

Open collector transistor output, Collector is connected to the DIO_OUT1B pin of 26-pin connector and the Emitter point of transistor is connected to common return pin of the 26-pin connector.

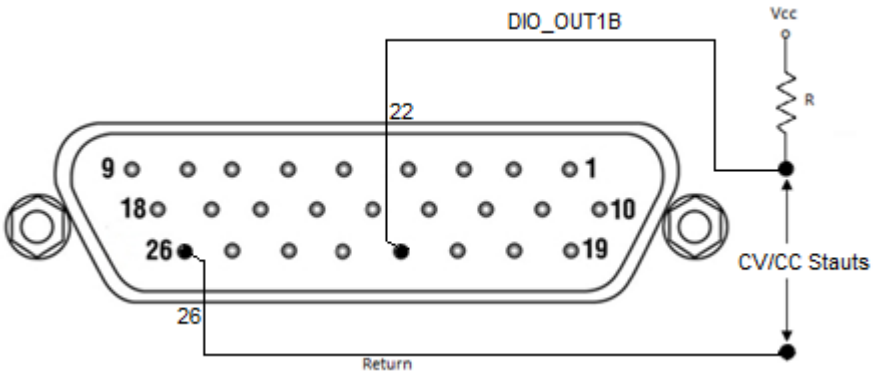


Figure 4-13: Regulation mode status

4.2.7 Output ON/OFF Status

Remote Isolated External User Control I/O Interface (26 pin connector) is provided with Output ON/OFF status signal pin out; refer Table 4-1 for pin out details. An output signal with High state (3 to 30V) indicates that the Output of power supply is enabled, and Low state indicates that the output of power supply is disabled. Output status signal can be monitored on DIO_OUT1A pin 21; refer Figure 4-14 for connection requirements.

Open collector transistor output, Collector is connected to the DIO_OUT1A pin of 26-pin connector and the Emitter point of transistor is connected to common return pin of the 26-pin connector.

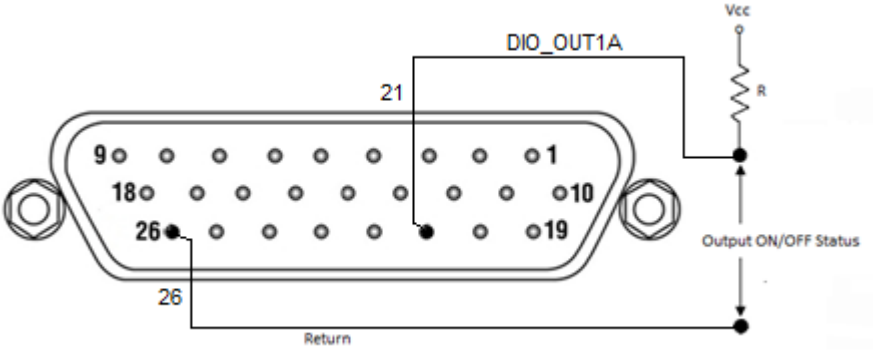


Figure 4-14: Output ON/OFF Status

4.3 Remote Analog Isolated Interface Control

The Remote Analog Isolated Interface control uses the Remote Isolated External User Control I/O Interface connector as the standard interface. This option fully isolates remote control signals, and these are isolated from common ground. Control ground is isolated from output power (output negative terminal), which protects against potential damage from systems with high electrical noise or large ground loop currents. Refer to Figure 4-1 and Table 4-1 for pinout details.

The Asterion DC Half Rack Series power supply also has the capability of providing summing of remote analog input with the set values on the front panel (or programmed values via the digital interface) for voltage and current. This capability provides a means to modulate a set value with the signal on the voltage, current analog input. If the user only desires to control the unit with the analog input, all the front panel values (V/I) or digital settings should be disabled.

4.3.1 Remote Current Programming

Remote current programming can be summed with Full Scale value on the front panel or digital setting. 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.

4.3.1.1 REMOTE CURRENT PROGRAMMING BY RESISTANCE

Remote Current Programming by Resistance programs the output current of the supply by external resistive reference source.

To configure the power supply to program output current by external reference source using front panel screen, refer to Section 4.3.1.1.1 or refer programming manual (P/N M330520-01) to program through SCPI Commands.

4.3.1.1.1 Power supply configurations to program output current by resistance

1. Set the Current Reference Mode as EXTERNAL from the front panel current ref mode screen refer Figure 4-15, this allows the power supply's output current to be programed form external source.

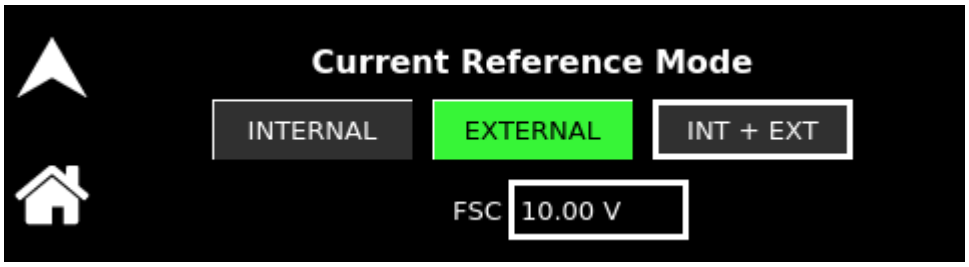


Figure 4-15: Current Reference Mode

2. Set the Analog Reference Source as Resistive from the front panel (refer to Figure 4-16). With the settings made, power supply's output current could be programed using only by external resistance.

Figure 4-16: Configure Analog Ref Source as Resistive

3. Set the Full-Scale value from the front panel. (Refer Figure 4-15).
4. Connect a resistance across the Pin 4 (IPRG_ISOUR) and Pin 6 (PRG_RTN) across the 26-pin connector (refer Figure 4-17). This will program the output current of the power supply.

The resistance-programming default coefficient for output current is (100% rated output current) / 10 kΩ, with input at Pin 4 (IPRG_ISOUR) and return to Pin 6 (PRG_RTN). An internal current source, factory-set at 1 mA; Pin 4 is utilized to drive the resistance. This produces a transfer function for output current, as follows:

Iout = R * ((100% rated output current) / 10 kΩ), with R in kilo ohms.

Full Scale current programming resistance can be modified from default 5kOhms to any other value, from 5 kΩ to 10 kΩ. Then the transfer function for output current, as follows:

Iout = R * ((100% rated output current) / FSC kΩ), with R in kilo ohms, where FSC kΩ is Full Scale current programming resistance

If multiple switches or relays are used to select resistors to program different current levels, make-before-break contacts are recommended.

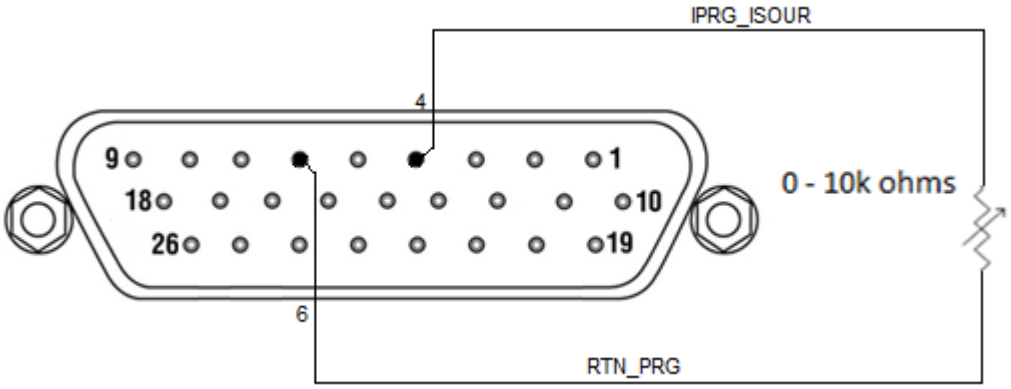


Figure 4-17: Remote Current Programming Using Resistance

Example: Program the output current to 80% of rated output current value using 8 kΩ resistance.

- Navigate to Current Reference Mode menu,
- Set reference mode to External; refer Figure 4-15.
- Navigate to Analog Reference Source menu,
- Set reference source as Resistive; refer Figure 4-16.
- Navigate to Current Ref Mode menu,
- Set Full scale value for Current into 10 kΩ (100% of FSC); refer Figure 4-15.
- Connect an 8 kΩ (80% of FSC) resistance across 26 pin connector between IPRG_ISOUR and PRG_RTN terminal; refer Figure 4-17.
- Verify the output current from the measurement screen.

4.3.1.2 REMOTE CURRENT PROGRAMMING BY VOLTAGE SOURCE

Programs the output current of the supply by external voltage reference source. Refer Section 4.3.1.2.1 to configure the power supply to program output current by external reference source using front panel screen or refer programming manual P\N: (P/N M330520-01) to program through SCPI Commands.

4.3.1.2.1 Power supply configurations to program output current by voltage source

1. Set the Current Reference Mode as EXTERNAL from the front panel current ref mode screen; refer Figure 4-15, this allows the supply output current to be programed from external source.
2. Set the Analog Reference Source as voltage from the front Panel (refer to Figure 4-18). With the settings made, power supply output current could be programed using only by external voltage source.

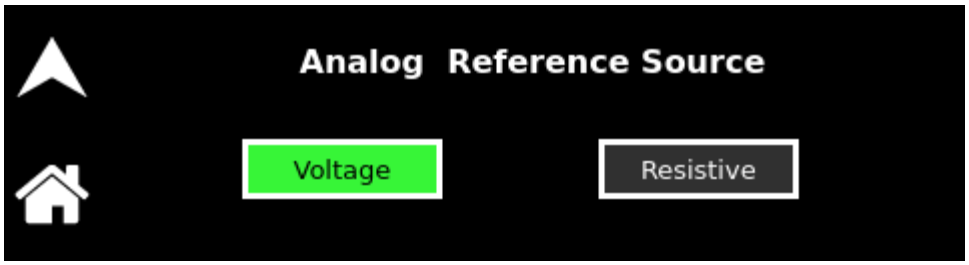


Figure 4-18: Configure Analog Ref Source as Voltage

3. Set the Full-Scale value from the front panel Screen (Refer Figure 4-15).
4. Connect a DC voltage source cross the pin 3 (IPRG_VSOUR) and pin 6 (PRG_RTN) across the 26-pin connecter (refer Figure 4-19). This will program output current of the power supply.

The Full-Scale voltage value can be modified to any voltage between 5V to 10V. Default FSC voltage value is 10V, where 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:

Iout = Vdc * (100% rated output current) / 10 VDC), with Vdc in volts, or

Iout = Vdc * (100% rated output current) / FSC VDC), with Vdc in volts.

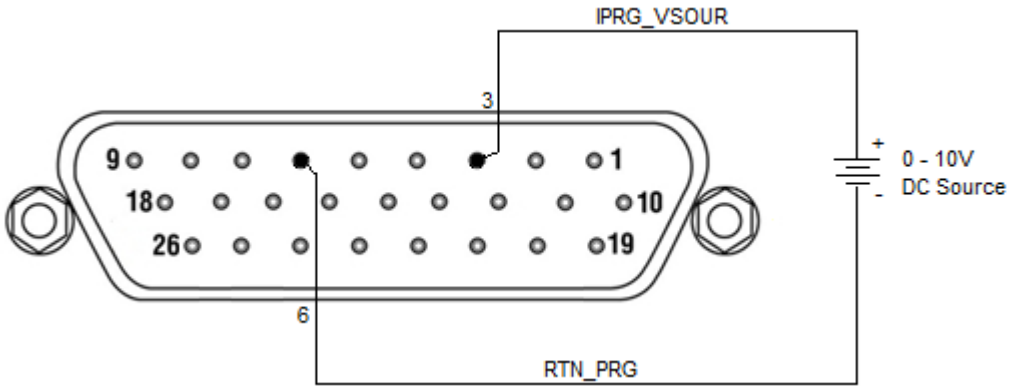


Figure 4-19: Remote Current Programming Using Voltage Source

Example: Program the output current to 85% of rated output current using voltage source.

- Navigate to Current Reference Mode menu,
- Set reference mode to External; refer Figure 4-15
- Navigate to Analog Reference Source menu,
- Set reference source as Voltage; refer Figure 4-18.
- Navigate to Current Ref Mode menu,
- Set Full scale value for Voltage into 10V (100% of FSC); refer Figure 4-15.
- Connect an DC voltage source across the 26-pin connector between IPRG_VSOUR and PRG_RTN terminal and apply 8.5V (85% of FSC); refer Figure 4-19.
- Verify the output current from the measurement screen.

4.3.2 Remote Voltage Programming

Remote voltage programming is summed with Full Scale value on the front panel or digital setting. 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.

4.3.2.1 REMOTE VOLTAGE PROGRAMMING BY RESISTANCE

Programs the output voltage of the supply by external resistive reference source. Refer Section 4.3.2.1.1 to configure the power supply to program output voltage by external reference source using front panel screen or refer programming manual P\N: (P/N M330520-01) to program through SCPI Commands.

4.3.2.1.1 Power supply configurations to program output voltage by resistance

1. Set the Voltage Reference Mode as EXTERNAL from the front panel voltage ref mode screen; refer Figure 4-20, this allows the supply output voltage to be programed from external source.

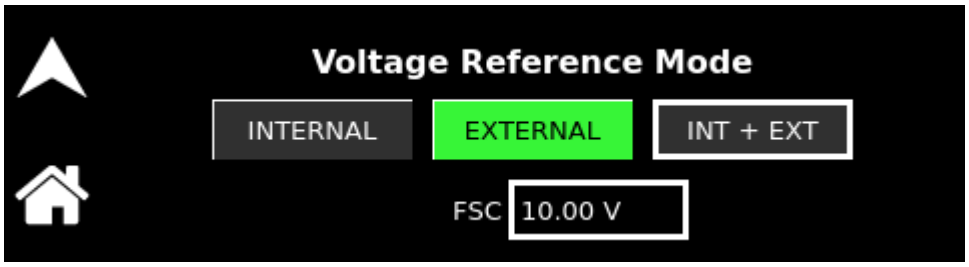


Figure 4-20: Voltage Reference Mode

2. Set the Analog Reference Source as resistive from the front Panel (refer to Figure 4-21Figure 4-16). With the settings made, power supply output voltage could be programed using only by external resistance.

Figure 4-21: Analog Ref Source as Resistive

3. Set the Full-Scale value from the front panel screen (Refer Figure 4-20).
4. Connect a resistance across the pin 2 (VPRG_ISOUR) and pin 6 (PRG_RTN) across the 26-pin connecter (refer Figure 4-22). This will program output voltage of the power supply.

The resistance-programming default coefficient for output voltage is (100% rated output voltage) / 10kΩ, with input at Pin 2 (VPRG_ISOUR) and return to Pin 6 (PRG_RTN). An internal current source, factory-set at 1 mA. This produces a transfer function for output voltage, as follows:

Vout = R * (100% rated output voltage) / 10kΩ), with R in kilo ohms.

Full Scale voltage programming resistance can be modified from default 5kOhms to any other value, from 5kΩ to 10kΩ.

Then the transfer function for output voltage, as follows:

Vout = R * (100% rated output voltage) / FSC kΩ), with R in kilo ohms.

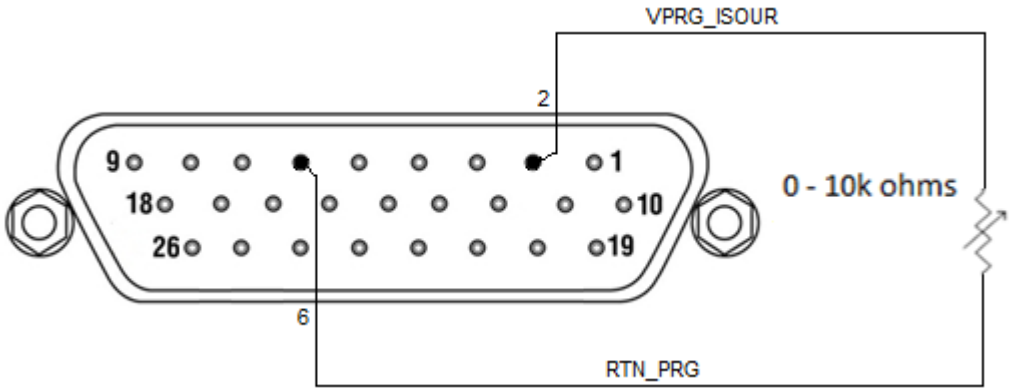


Figure 4-22: Remote Voltage Programming Using Resistance

Example: Program the output current to 80% of rated output current value using 8 kΩ resistance.

- Navigate to Voltage Reference Mode menu,
- Set reference mode as External; refer Figure 4-20.
- Navigate to Analog Reference Source menu,
- Set reference source as Resistive; refer Figure 4-21.
- Navigate to Voltage Ref Mode menu,
- Set Full scale value for Current into 10 kΩ (100% of FSC); refer Figure 4-20.
- Connect an 8 kΩ (80% of FSC) resistance across 26 pin connector between VPRG_ISOUR and PRG_RTN terminal; refer Figure 4-22.
- Verify the output voltage from the measurement screen.

4.3.2.2 REMOTE VOLTAGE PROGRAMMING BY VOLTAGE SOURCE

Programs the output voltage of the supply by external voltage reference source. Refer Section 4.3.2.2.1 to configure the power supply to program output voltage by external reference source using front panel screen or refer programming manual P\N: (P/N M330520-01).

4.3.2.2.1 Power supply configurations to program output voltage by voltage source

1. Set the Voltage Reference Mode as External from the front panel Voltage ref mode screen; refer Figure 4-20, this allows the supply output voltage to be programed from external source.
2. Set the Analog Reference Source as voltage from the front Panel (refer to Figure 4-23Figure 4-16). With the settings made, power supply output voltage could be programed using only by external voltage source.

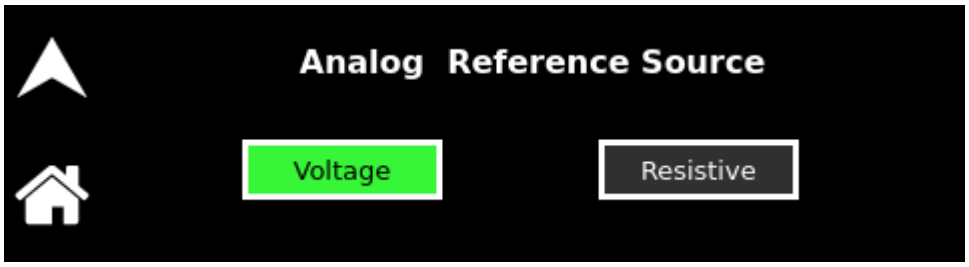


Figure 4-23: Analog Ref Source as Voltage

3. Set the Full Scale value from the front panel screen (Refer Figure 4-20).
4. Connect a DC voltage source cross the pin 1 (VPRG_VSOUR) and pin 6 (PRG_RTN) across the 26-pin connecter (refer Figure 4-24). This will program output voltage for the supply.

The DC voltage source is connected between Pin 1 (VPRG_VSOUR) and the return Pin 6 (PRG_RTN) and Analog Reference source is selected as Voltage from the front Panel, refer to Figure 4-24.

The Full-Scale voltage value can be modified to any voltage between 5V to 10V. 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. This produces transfer functions for output voltage, as follows:

Vout = Vdc * (100% rated output voltage) / 10 VDC), with Vdc in volts, or

Vout = Vdc * (100% rated output voltage) / FSC VDC), with Vdc in volts.

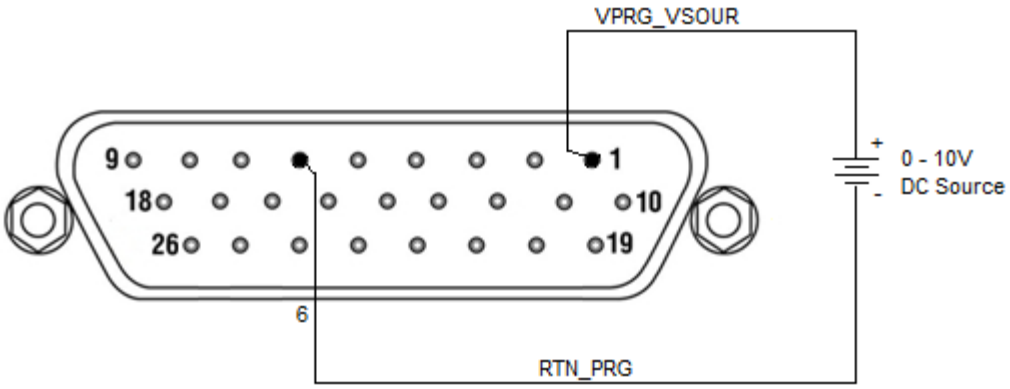


Figure 4-24: Remote Voltage Programming Using 0-10 VDC Source

Example: Program Full Scale Value of Voltage to 8V and program output voltage into 60% of rated output voltage using voltage source:

- Navigate to Voltage Reference Mode menu,
- Set reference mode as External; refer Figure 4-20.
- Navigate to Analog Reference Source menu,

- Set reference source as Voltage; refer Figure 4-23.
- Navigate to Voltage Ref Mode menu,
- Set Full Scale Value for Voltage into 8V (100% of FSC); refer Figure 4-20
- Connect a DC voltage source across 26-pin connector between VPRG_VSOUR and PRG_RTN terminal and apply 4.8V; refer Figure 4-24.
- Verify the output Voltage from the measurement screen.

4.3.3 Remote Overvoltage Programming

Programs the overvoltage protection of the supply by external voltage reference source. Refer Section 4.3.3.1 to configure the power supply to set overvoltage trip level through external reference source using front panel screen or refer programming manual P\N: (P/N M330520-01).

4.3.3.1 POWER SUPPLY CONFIGURATIONS TO PROGRAM OVERVOLTAGE

1. Set the OVP Reference Mode as External from the front panel OVP ref mode screen; refer Figure 4-25, this allows the supply OVP to be programed from external source.

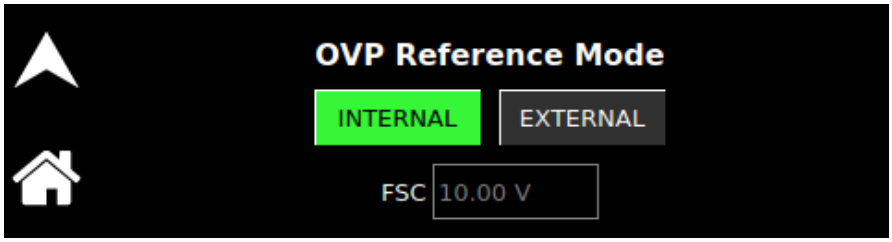


Figure 4-25: OVP Reference Mode Screen

2. Set the Full-Scale value from the front panel screen (Refer Figure 4-25).
3. Connect a DC voltage source across the pin 5 (OVPRG_VSOUR) and pin 6 (PRG_RTN) in the 26-pin connecter (refer Figure 4-26). This will program overvoltage for the supply.

The Full-Scale voltage value can be modified to any voltage between 5V to 10V from front panel screen. Default FSC voltage value is 10V, where 10V corresponds to 110% of output voltage.

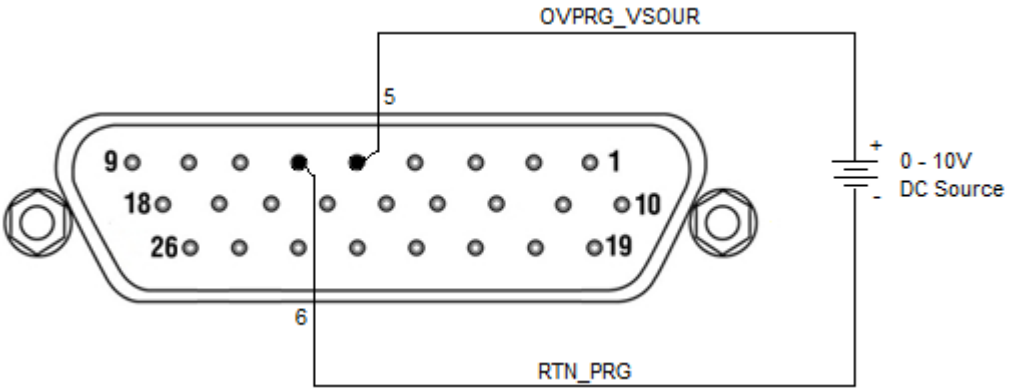


Figure 4-26: Remote Overvoltage Programming Using 0-10 VDC Source

Example: Program Full Scale Value of overvoltage protection (OVP) to 8V and Program overvoltage into 60% of rated OVP using voltage source:

- Navigate to OVP Reference Mode menu,
- Set reference mode to External; refer Figure 4-25.
- Set Full Scale Value for OVP into 8V (100% of FSC); refer Figure 4-25.
- Connect a DC voltage source across 26-pin connector between OVPRG_VSOUR and PRG_RTN terminal and apply 4.8V; refer Figure 4-26.
- Program voltage (less than the OVP value) and current values, enable the output.
- Program the output voltage over the set OVP value and verify if the output is tripped due to an OVP fault.

4.3.4 Voltage Monitor (VMON)

Voltage Monitor provides functionality to monitor the scaled down output voltage of the power supply; refer Figure 4-1 and Table 4-1 for pin out details. Scaled down Output voltage could be monitored at VMON terminal of 26-pin connector. Measurement of output voltage from 0 to 100% of full scale rated output corresponds to 0 to 10V.

Default Full Scale Voltage Monitor Output is 10V. Same can be changed from 5V to 10 V by issuing following SCPI command. For example, to set to 5V as full scale for voltage monitoring send below command:

SOUR:VOLT:MON:FSC 5

4.3.5 Current Monitor (IMON)

Current Monitor provides functionality to monitor the scaled down output current of the power supply; refer Figure 4-1 and Table 4-1 for pin out details. Scaled down Output current could be monitored at IMON terminal of analog programming connector. Measurement of output current 0 to 100% of full-scale rated output corresponds to 0 to 10V.

Default Full Scale Current Monitor Output is 10V. Same can be changed from 5V to 10 V by issuing following SCPI command. For example, to set to 5V as full scale for current monitoring send below command:

SOUR:CURR:MON:FSC 5

5
PARALLEL AND SERIES OPEATIONS

5.1 Introduction

Parallel and Series operations are used for applications requiring more current or voltage than it is available from a single power supply. To meet the requirements for greater output voltage or current, up to four supplies could be connected in parallel, or up to two supplies could be connected in series.

5.2 Parallel Operation

Parallel operation is used to obtain a higher output current; the rated current is sum of parallel supplies, using up to four power supplies. Parallel operation can be enabled through Front Panel (refer Section 5.2.1) or SCPI command. For enabling this feature through SCPI command refer to Asterion DC Series Programming Manual (P/N M330520-01).

5.2.1 Power supply configuration to perform parallel chassis operation through Front Panel:

Select connection settings as Parallel from the front panel Mode Settings screen, refer to Figure 5-1. This allows the power supplies to perform in parallel chassis operation.

Steps to Navigate to Mode Settings Screen

- Select Configuration form the top level menu.
- Go to Connection menu and select Mode Settings sub-menu.
- Select Mode settings as Parallel.
- Selected button will be highlighted in green color.

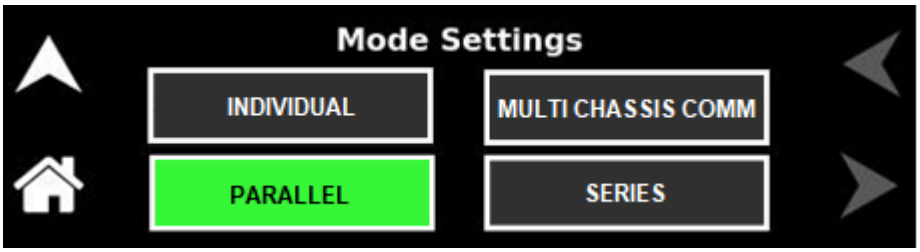


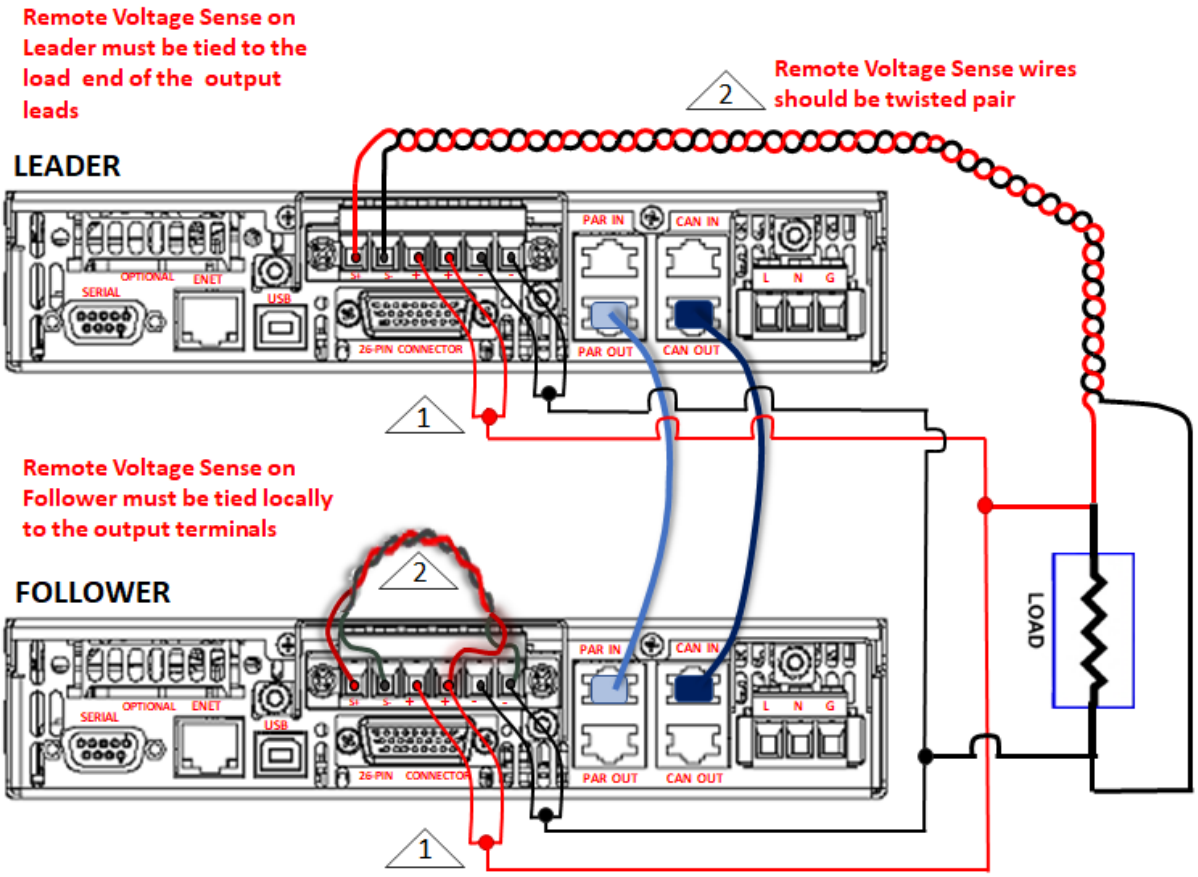
Figure 5-1: Mode Settings Screen

5.2.2 Parallel Chassis Connection Setup

There are two separate modular connectors on the rear panel of each power supply, marked “PAR OUT”, “PAR IN” and “CAN OUT”, “CAN IN" that are used for this operation.

1. Programming, readback, and control is performed through the unit set as “Leader”.
2. Beginning with the power supply that is to function as the Leader, use an interface cable (890-524-01) to connect the PAR OUT connector on the designated Leader power supply to the PAR IN connector on the Follower 1 power supply. Repeat connection between CAN OUT on the designated Leader power supply to CAN IN on the Follower 1 power supply using an 890-524-01 cable.
3. On the Follower 1 power supply, use another interface cable to connect the PAR OUT connector to the PAR IN connector on Follower 2 and the CAN OUT connector to the CAN IN connector of the Follower 2 power supply. Continue these interconnections up to a maximum of 4 power supplies.
4. Connect the Positive output terminals of all the power supplies and the load.
5. Connect the Negative output terminals of all the power supplies and the load.
6. Confirm that there are no shorts between the Positive and Negative output terminals.
7. Confirm the ESTOP for each power supply is connected (26 – pin connector with pin 24 and pin 25 shorted), this is used to turn the output on/off the power supply.
8. Referring to Figure 5-3, connect twisted-pair sense cables as follows; ensure that all twisted-pair cables are as short as possible.
9. For remote sense at the load, the Leader unit shall have a twisted-pair cable from its own sense terminals to the load terminals and all Follower units shall have twisted-pair cables from their sense terminals to their own output terminals.

Refer to Figure 5-3 and



10. Figure 5-4 for “Leader/Follower” wiring configuration setup.

Once the connections are made, the user can program the outputs of the power supplies through the Leader unit itself. This setup allows the user to obtain a summation of the current for power supplies of same configuration. For example, if the user requires an output current of 40A and four power supplies are connected then the output current would be 10A from each power supply irrespective of the regulation mode set. The equal sharing of current from each power supply is because of the PAR IN and PAR OUT connections. The inputs from the user are communicated only to the Leader unit and response is obtained from both the Leader and Follower units as well, this is because of the CAN IN and CAN OUT connections. The user can access all the functionalities of the Leader unit’s front panel alone as the Follower units will display only the measurements of voltage and current of its own, refer to Figure 5-2.

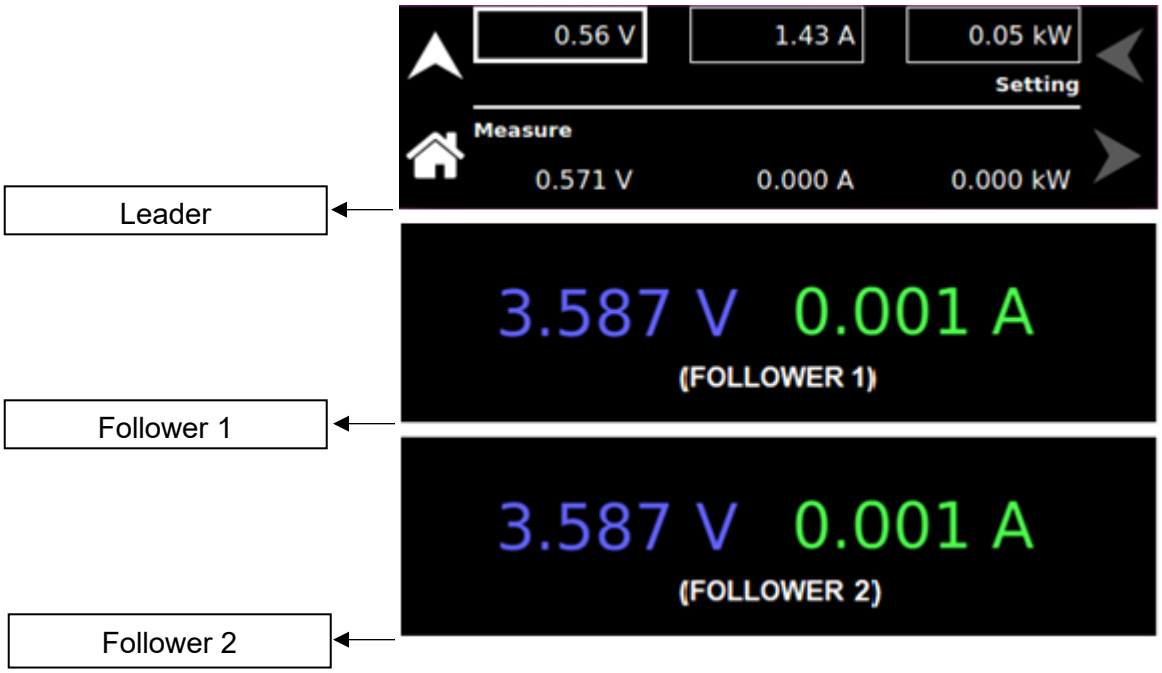


Figure 5-2: Parallel Operation Chassis Screens

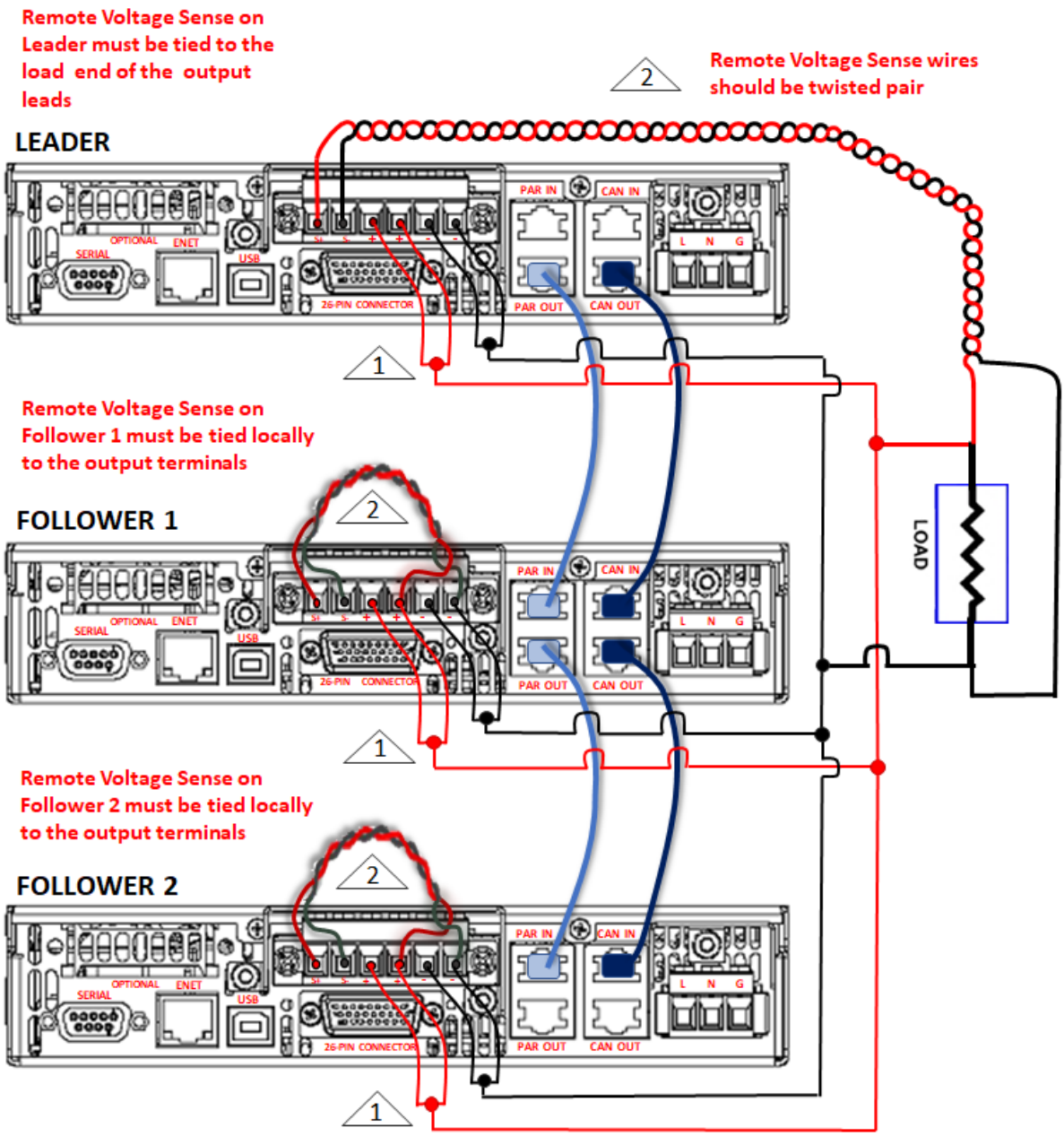


Figure 5-3. Parallel Connection - 3 Chassis

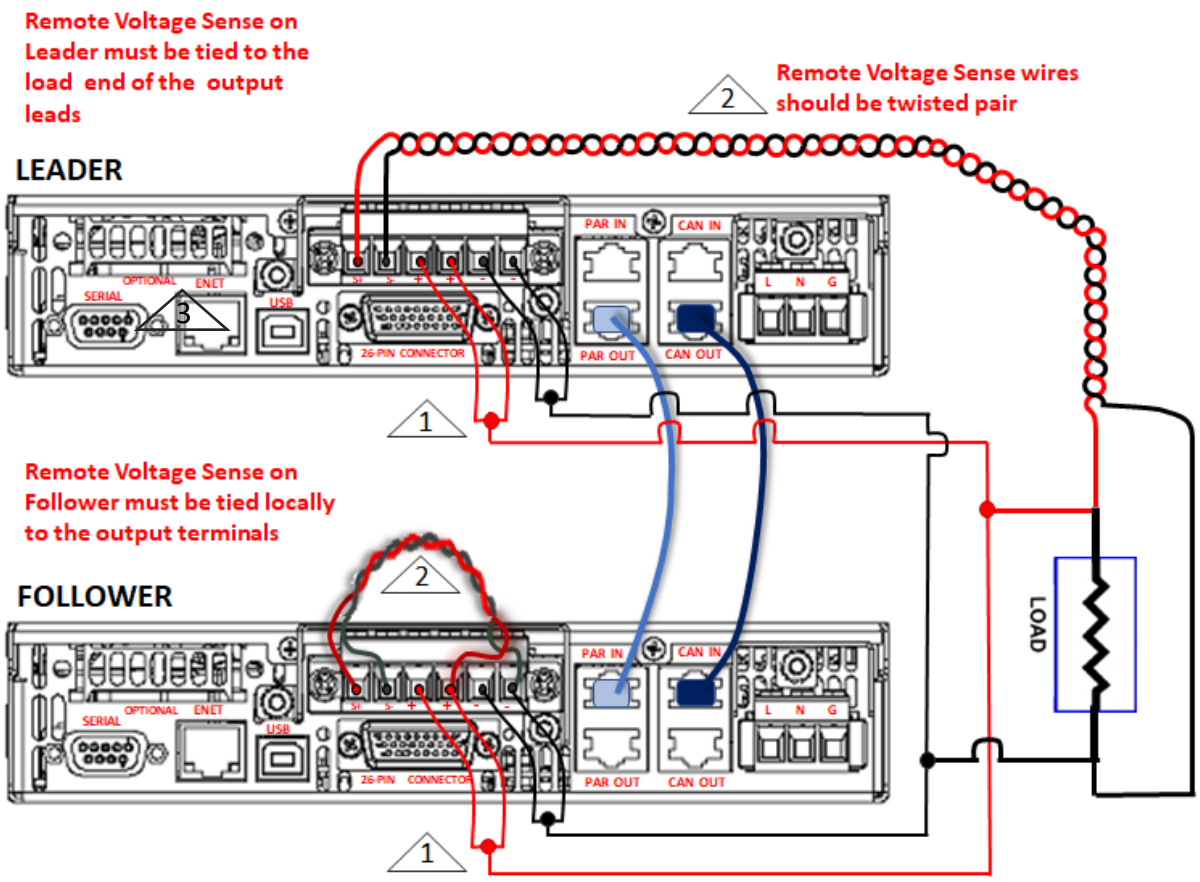


Figure 5-4: Parallel Connection - 2 Chassis

CAUTION!

1 The terminals of same polarity of the output connector are shorted internal to the power supply. Each terminal has the capacity to provide 25 A. For current greater than 25 A use individual wires from each terminal to the load and connect them together externally. Drawing current greater than 25 A from individual terminal would damage the power supply.

2 The remote sense wires must be twisted pair to avoid coupling of external noise.

5.3 Series Operation

Series operation is used to obtain a higher aggregate output voltage of the rated voltage sum in the series supplies, using up to two power supplies. Series operation can be enabled through Front Panel (refer Section 5.3.1) or SCPI command. For enabling this feature through SCPI command refer to Asterion DC Series Programming Manual (P/N M330520-01).

5.3.1 Power supply configuration to perform Series chassis operation through Front Panel

Select connection settings as Series from the front panel Mode Settings screen, refer to Figure 5-5. This allows the power supplies to perform in series chassis operation.

Steps to Navigate to Mode Settings Screen

- Select Configuration menu
- Go to Connection menu and select Mode Settings sub-menu.
- Select Mode settings as Series.
- Selected button will be highlighted in green colour.

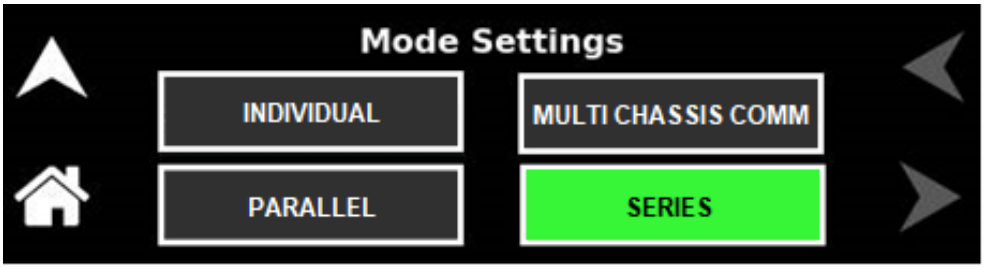


Figure 5-5: Mode Settings Screen

5.3.2 Series Chassis Connection Setup

There are two separate modular connectors on the rear panel of each power supply, marked “PAR OUT” and “PAR IN and ‘CAN OUT” and “CAN IN" that are used for this operation.

1. Programming, readback, and control is performed through the unit set as “Leader”.
2. Beginning with the power supply that is to function as the Leader, use an interface cable (890-524-01) to connect the PAR OUT connector on the designated Leader power supply to the PAR IN connector on the Follower power supply. Repeat connection between Leader CAN OUT and Follower CAN IN also using an 890-524-01 cable.
3. Connect the Positive output terminal of the Leader power supply to the positive terminal of the load.

4. Connect the Negative output terminal of the Leader power supply to the Positive output terminal secondary unit (Follower).
5. Connect the Negative output terminal of the secondary unit (Follower) to the negative terminal of the load.
6. Confirm that there are no shorts between the Positive and Negative output terminals.
7. Confirm the ESTOP for each power supply is connected (26 – pin connector with pin 24 and pin 25 shorted), this is used to turn the output on/off the power supply.
8. Referring to Figure 5-8, connect twisted-pair sense cables as follows; ensure that all twisted-pair cables are as short as possible.
9. For remote sense at the load, the Leader unit shall have a twisted-pair cable from its own sense terminals to the load terminals and all Follower units shall have twisted-pair cables from their sense terminals to their own output terminals.
10. Refer to Figure 5-8 for “Leader/Follower” wiring configuration setup.

Once the connections are made as mentioned below, the user can program the outputs of the power supplies through the Leader unit itself. This setup allows the user to obtain a summation of the voltage for power supplies of same configuration. For example, if the user requires an output voltage of 20V and the power supplies are in series connection then the output voltage would be 10V from each power supply irrespective of the regulation mode set. The equal sharing of voltages from each power supply is because of the PAR IN and PAR OUT connections. The inputs from the user are communicated only to the Leader unit and response is obtained from both the Leader and Follower unit as well, this is because of the CAN IN and CAN OUT connections. The user can access all the functionalities of the Leader unit’s front panel alone as the Follower units will display the measurements of voltage and current of its own, refer to Figure 5-6.

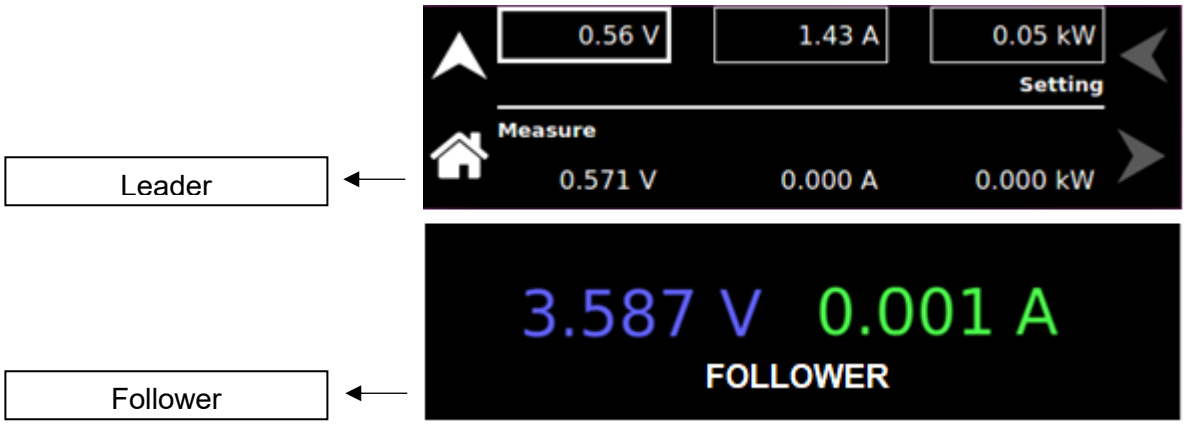


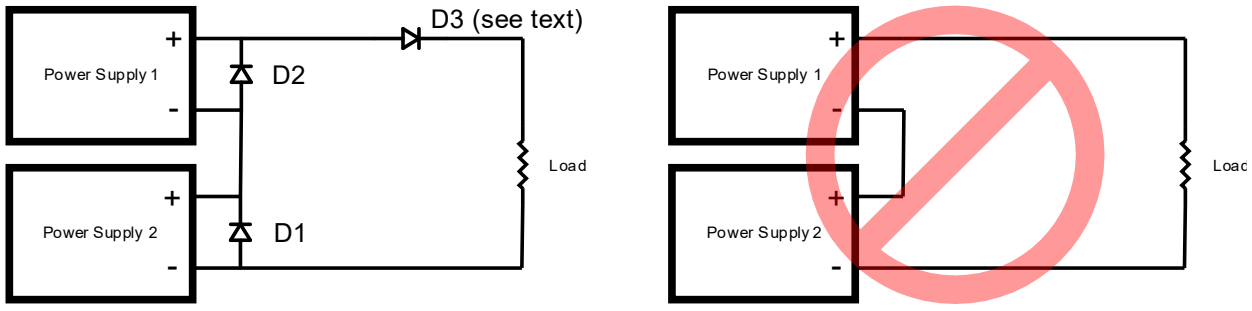
Figure 5-6: Series Operation Follower Screen

a) The maximum allowable current for a series string of power supplies is the rated output current of a single supply of the string.

b) An anti-parallel diode (power diode capable of the maximum current of the series group, connected across the output, but reverse biased) is recommended to protect against sinking current into a supply should one supply be ON while another other is OFF, as shown in Figure 5-7 and Figure 5-8.

c) Diode D3 shown in the figure is optional, if the load has stored energy such as a battery, capacitance, fuel cells, rotating motor. Refer to Section 2.12.

CAUTION!
Under no condition should the negative (–) output terminal of any power supply exceed 600 V to chassis (earth) ground. This is limited by the isolation and creepage/clearance distances internal to the power supply construction. If a higher output voltage range is required, contact the factory for availability.



Diodes used to prevent damage to power supply output. The damage can occur when one of the supplies is turned off resulting in a reverse bias on the output stage.

Figure 5-7: Series Connection with Anti-Parallel Diodes

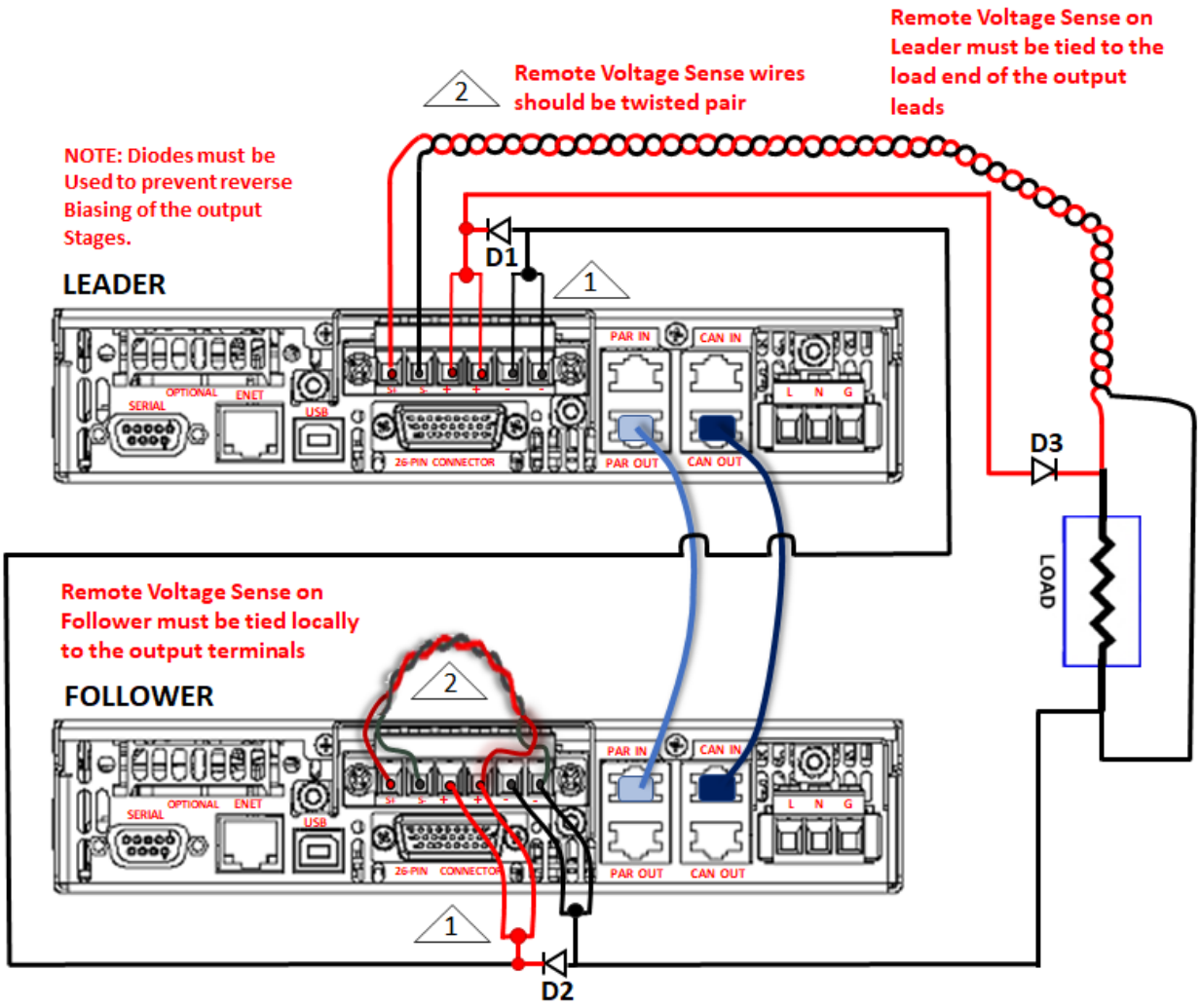


Figure 5-8: Series Connection

CAUTION!

1 The terminals of same polarity of the output connector are shorted internal to the power supply. Each terminal has the capacity to provide 25 A. For current greater than 25 A use individual wires from each terminal to the load and connect them together externally. Drawing current greater than 25 A from individual terminal would damage the power supply.

2 The remote sense wires must be twisted pair to avoid coupling of external noise.

6
MULTI-CHASSIS COMMUNICATION

6.1 Introduction

Multi-Chassis Communication allows the user to communicate with multiple power supplies that are connected in daisy chain as shown in Figure 6-8. Through this feature, a single LAN cable interface is sufficient to communicate to the other power supplies without having to connect LAN to each power supply. Up to thirty-two power supplies can be connected for this operation.

NOTE: The LAN cable interface must be connected the 1st chassis alone.

6.2 Multi-Chassis Communication Operation

Multi-Chassis Communication can be enabled through two methods: Front Panel or SCPI command. Multi-Chassis communication can be enabled through Front Panel (refer Section 6.2.1) or SCPI command. For enabling this feature through SCPI command refer to Asterion DC Series Programming Manual (P/N M330520-01).

6.2.1 Power supply configuration to perform Multi-Chassis communication through Front Panel

1. Select connection settings as Multi Chassis Comm from the front panel Mode Settings screen, refer to Figure 6-1. This allows the power supplies to perform in multi-chassis communication.

Steps to Navigate to Mode Settings Screen

- Select Configuration form the top-level menu.
- Go to Connection menu and select Mode Settings sub-menu.
- Select Mode settings as Multi Chassis Comm.
- Selected button will be highlighted in green color.

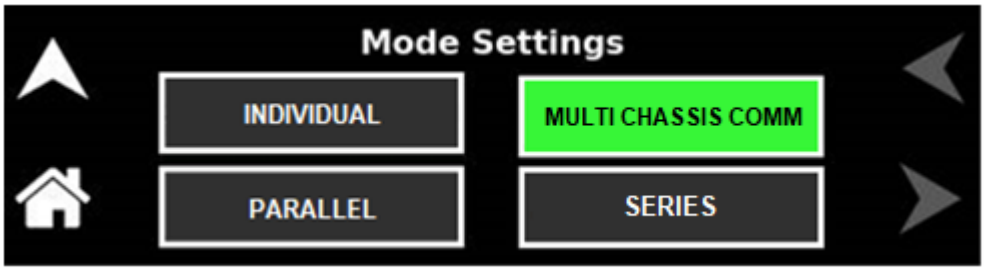


Figure 6-1: Mode Settings Screen

2. Select one of the two configuration modes of chassis addressing: Auto or Manual, refer to Figure 6-2 and Figure 6-3. This allows the user to either automatically assign the chassis address or manually set the chassis address of the power supplies.

NOTE: The address configuration type selected on Chassis 1 will be set across all the other power supplies in connection and the address configuration type cannot be modified on any other chassis other than Chassis 1.

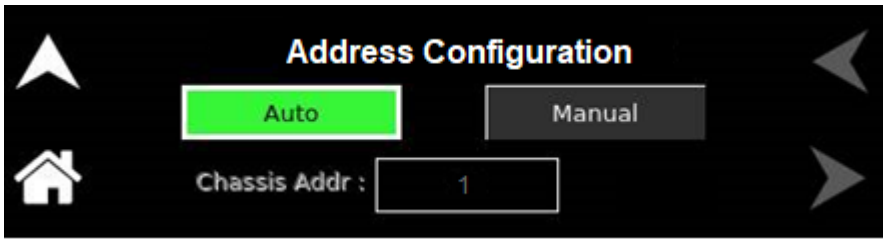


Figure 6-2: Address Configuration Screen - Auto

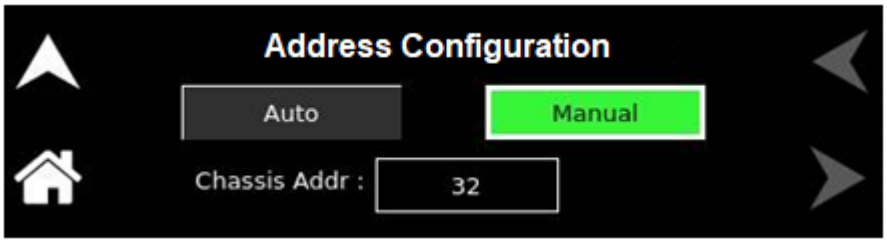


Figure 6-3: Address Configuration Screen – Manual

6.2.2 Chassis Address Configuration

Chassis address to the power supplies connected for multi-chassis communication must be assigned. Only if the chassis address is assigned, the user can communicate to any of the power supplies through a single unit itself (LAN interface cable connected). For example, if the user requires an output voltage of 10V from any of the chassis then the user must send sour<chassis_addr>:volt 10, where <chassis_addr> represent the chassis address of the power supply to which the output is required. Chassis Addressing of power supplies can be done either by Auto or Manual operation.

6.2.2.1 AUTO ENUMERATION

The power supplies in connection for multi-chassis communication gets assigned with the chassis addresses automatically. The chassis address assignation starts from 1 and address 1 is assigned to the unit to which the LAN cable interface (Chassis 1) and only the CAN OUT cable is connected. Refer to Figure 6-2 for Enumeration Configuration and refer to Figure 6-8 for wiring configuration.

6.2.2.2 MANUAL ENUMERATION

The power supplies in connection for multi-chassis communication gets the chassis address assigned manually by the user. The address for each power supply must be set individually through the front panel or can be set through SCPI command, refer Asterion DC Series Programming Manual (P/N M330520-01). The “chassis addr” field box is only active when manual is selected and the address to be set must be entered in this field box, refer to Figure 6-3.

For example, there are 4 power supplies in multi-chassis communication setup. If Auto is selected on Chassis 1 then Chassis 2,3 and 4 will have its address configuration set as Auto and on Chassis 2,3 and 4 the buttons and the field box are disabled and grayed out, only the selected auto button is highlighted in green color while still being grayed out, refer to Figure 6-4. It’s the same for Manual as well, except that only the buttons will be disabled and grayed out and the chassis addr field box would be still active for the user to assign chassis address, only the selected Manual button is highlighted in green color while still being grayed out, refer to Figure 6-5.

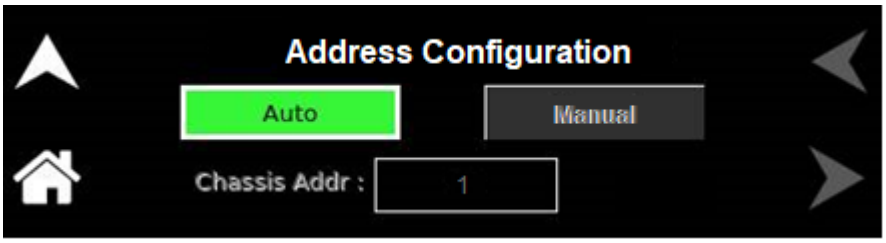


Figure 6-4: Address Configuration screen – Auto

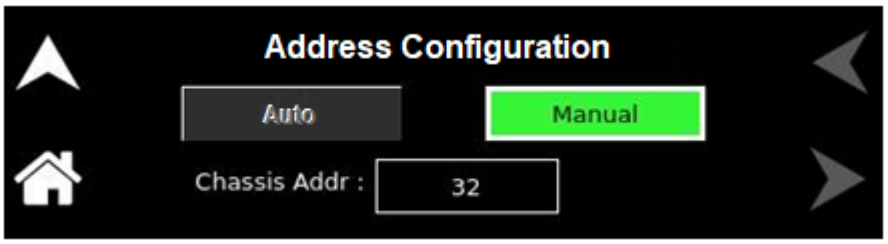


Figure 6-5: Address Configuration screen – Manual

6.2.3 Multi-Chassis Connection Setup

There are two separate modular connectors on the rear panel of each power supply, marked CAN OUT” and “CAN IN" that are used for this operation.

1. Beginning with the power supply that is used to communicate and to perform programming, readback, and control with the rest of the power supplies, use an interface cable (890-524-01) to connect the CAN OUT connector of the designated (Chassis 1) power supply to the CAN IN connector of the second power supply.

   NOTE: Connect the LAN interface to the power supply to which only the CAN OUT connector is connected, refer Figure 6-8Figure 6-8.

2. On the second connected power supply, use another interface cable to connect the CAN OUT to the CAN IN of the third power supply. Continue these interconnections up to a maximum of 32 power supplies. Repeat connection between power supply’s CAN OUT and following power supply’s CAN IN.
3. Connect the Positive output terminals of each power supply and the load.
4. Connect the Negative output terminals of each power supply and the load.
5. Confirm that there are no shorts between the Positive and Negative output terminals.
6. Confirm the ESTOP for each power supply is connected (26 – pin connector with pin 24 and pin 25 shorted), this is used to turn the output on/off the output relay of the power supply.

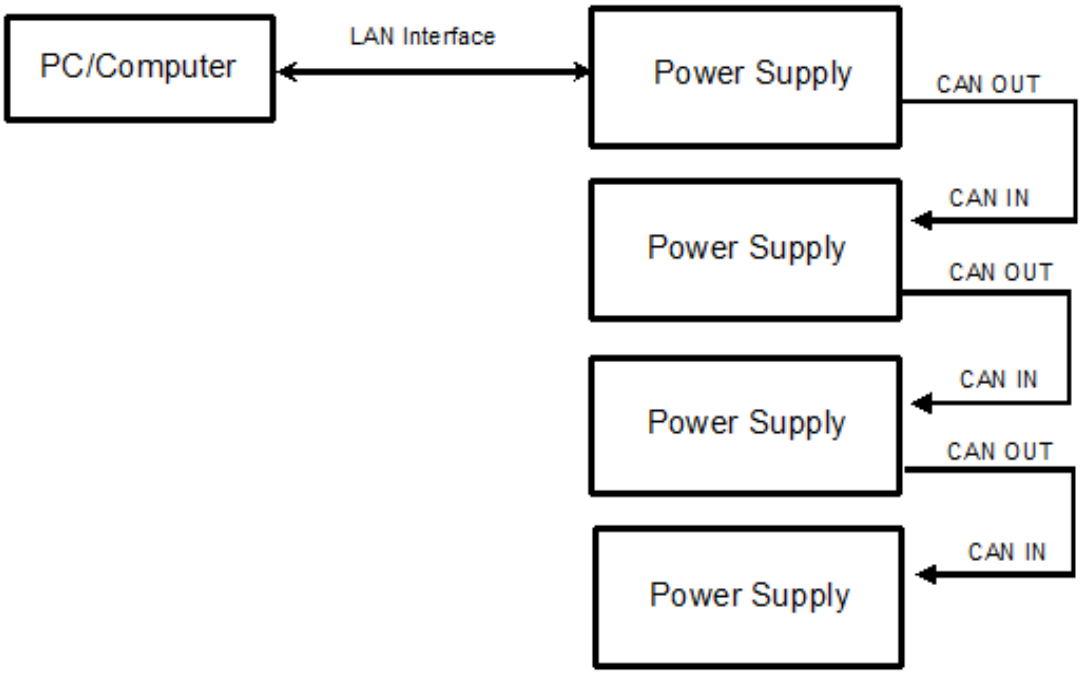


Figure 6-6: Multi-Chassis Communication Block Diagram

Once the connections are made, the user can program each of the power supplies through Chassis 1. This setup allows the user to communicate to the power supplies in connection from a single unit itself, because of the CAN IN and CAN OUT connections.

The front panel of each power supply in connection are individually accessible of all functionalities by the user. Refer to Figure 6-7, for the front panel screens of the power supplies in connection.

Figure 6-7: Multi-Chassis Communication Screens

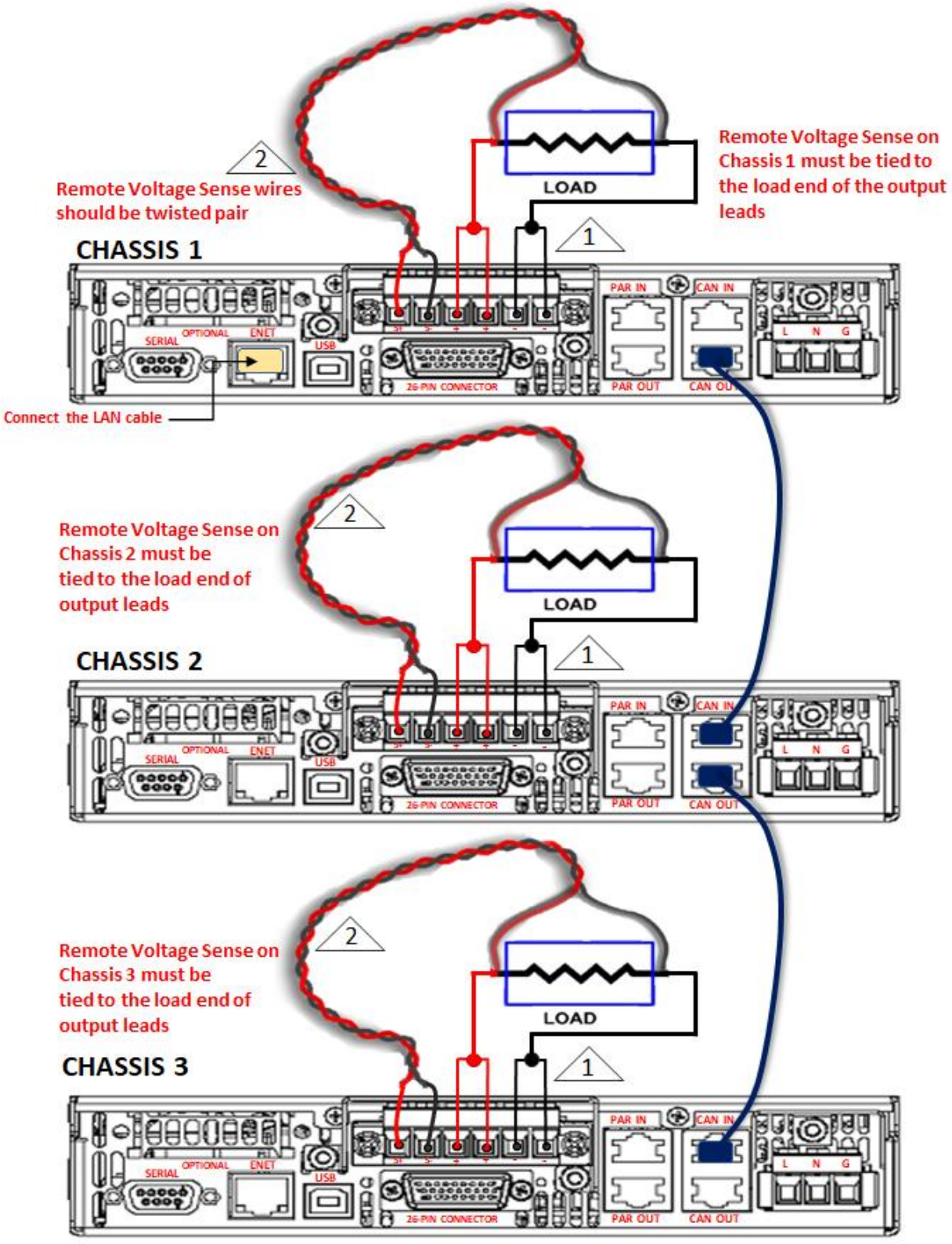


Figure 6-8: Multi-Power Supply Connection

CAUTION!

1 The terminals of same polarity of the output connector are shorted internal to the power supply. Each terminal has the capacity to provide 25 A. For current greater than 25 A use individual wires from each terminal to the load and connect them together externally. Drawing current greater than 25 A from individual terminal would damage the power supply.

2 The remote sense wires must be twisted pair to avoid coupling of external noise.

7
CALIBRATION AND VERIFICATION

7.1 Introduction

This section provides calibration and verification procedures for the Asterion DC Half Rack Series power supplies.

7.1.1 Calibration and Verification Cycle

Annual calibration and verification are recommended. Calibrate only as needed.

7.1.2 Digital programming and readback calibration

Refer to the Asterion DC programming manual for calibration of display readback and remote digital programming.

7.1.3 Analog control interface calibration (Standard and Isolated analog interface)

Refer to the Asterion DC programming manual for calibration of remote analog programming.

8
MAINTENANCE

8.1 Introduction

This chapter contains preventive maintenance information for the Asterion DC Half Rack Series power supplies.

WARNING!

All maintenance that requires removal of the cover of the unit should only be done 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 connecting of wiring to the chassis must be accomplished at least 5 *minutes* after AC input power has been removed with an external disconnect switch. Do not touch any circuits and/or terminals that are energized.

8.2 Preventive Maintenance

WARNING!

The OFF position of the front panel power switch does not remove AC input from internal circuits or input terminal blocks. Disconnect external AC input before servicing unit.

CAUTION!

For safe and continued operation of the Asterion DC Half Rack Series, 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 could result in internal damage. Keep the rear and sides of the unit free of obstructions to ensure proper ventilation.

No routine maintenance on the Asterion DC Half Rack Series is required, aside from periodic cleaning of the unit and inspection, as required by the environmental operating conditions:

- Once a unit is removed from service, vacuum all air vents, including the front panel grill.

- 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.

- Check external connections for integrity of insulation, loose contacts, and proper torque.

- If there is any evidence of short-circuits or arcing, overheating, or corrosion, contact the factory for recommended service.