



eSure™ Power Extend Converter

Installation and User Manual

Specification Number: 1C48581000B

Model Number: C48/58-1000B

Note: P/N 565050 includes Vertiv™ eSure™ Power Extend Converter Spec. No. 1C48581000B and associated components.

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Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures.

Visit <https://www.vertiv.com/en-us/support/> for additional assistance.

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Admonishments Used in this Document



DANGER! Warns of a hazard the reader **will** be exposed to that will **likely** result in death or serious injury if not avoided. (ANSI, OSHA)



WARNING! Warns of a potential hazard the reader **may** be exposed to that **could** result in death or serious injury if not avoided. This admonition is not used for situations that pose a risk only to equipment, software, data, or service. (ANSI)



CAUTION! Warns of a potential hazard the reader **may** be exposed to that **could** result in minor or moderate injury if not avoided. (ANSI, OSHA) This admonition is not used for situations that pose a risk only to equipment, data, or service, even if such use appears to be permitted in some of the applicable standards. (OSHA)



ALERT! Alerts the reader to an action that **must be avoided** in order to protect equipment, software, data, or service. (ISO)



ALERT! Alerts the reader to an action that **must be performed** in order to prevent equipment damage, software corruption, data loss, or service interruption. (ISO)



FIRE SAFETY! Informs the reader of fire safety information, reminders, precautions, or policies, or of the locations of fire-fighting and fire-safety equipment. (ISO)



SAFETY! Informs the reader of general safety information, reminders, precautions, or policies not related to a particular source of hazard or to fire safety. (ISO, ANSI, OSHA)

Important Safety Instructions

Safety Admonishments Definitions

Definitions of the safety admonishments used in this document are listed under “Admonishments Used in this Document” on page v.

General Safety



DANGER! YOU MUST FOLLOW APPROVED SAFETY PROCEDURES.

Performing the following procedures may expose you to hazards. These procedures should be performed by qualified technicians familiar with the hazards associated with this type of equipment. These hazards may include shock, energy, and/or burns. To avoid these hazards:

- a) The tasks should be performed in the order indicated.
- b) Remove watches, rings, and other metal objects.
- c) Prior to contacting any uninsulated surface or termination, use a voltmeter to verify that no voltage or the expected voltage is present. Check for voltage with both AC and DC voltmeters prior to making contact.
- d) Wear eye protection.
- e) Use certified and well maintained insulated tools. Use double insulated tools appropriately rated for the work to be performed.

Voltages

AC Input Voltages



DANGER! The system the power extend converter is installed in operates from AC input voltage capable of producing fatal electrical shock.

DC Input Voltages



DANGER! The power extend converter operates from DC input voltage. Although the DC voltage is not hazardously high, the input power can deliver large amounts of current.

DC Output and Battery Voltages



DANGER! The system the power extend converter is installed in produces DC power and may have a battery source connected to it. Although the DC voltage is not hazardously high, the rectifiers and/or battery can deliver large amounts of current.

Personal Protective Equipment (PPE)



DANGER! ARC FLASH AND SHOCK HAZARD.

Appropriate PPE and tools required when working on this equipment. An appropriate flash protection boundary analysis should be done to determine the “hazard/risk” category, and to select proper PPE.



Only authorized and properly trained personnel should be allowed to install, inspect, operate, or maintain the equipment.

Do not work on LIVE parts. If required to work or operate live parts, obtain appropriate Energized Work Permits as required by the local authority, per NFPA 70E “Standard for Electrical Safety in the Workplace”.

Hazardous Voltage



DANGER! HAZARD OF ELECTRICAL SHOCK.

More than one disconnect may be required to de-energize the system before servicing.

Handling Equipment Containing Static Sensitive Components



ALERT! Installation or removal of equipment containing static sensitive components requires careful handling. Before handling any equipment containing static sensitive components, read and follow the instructions contained on the Static Warning Page.

Static Warning



This equipment contains static sensitive components. The warnings listed below must be observed to prevent damage to these components. Disregarding any of these warnings may result in personal injury or damage to the equipment.

1. Strictly adhere to the procedures provided in this document.
2. Before touching any equipment containing static sensitive components, discharge all static electricity from yourself by wearing a wrist strap grounded through a one megohm resistor. Some wrist straps have a built-in one megohm resistor; no external resistor is necessary. Read and follow wrist strap manufacturer's instructions outlining use of a specific wrist strap.
3. Do not touch traces or components on equipment containing static sensitive components. Handle equipment containing static sensitive components only by the edges that do not have connector pads.
4. After removing equipment containing static sensitive components, place the equipment only on static dissipative surfaces such as conductive foam or ESD bag. Do not use ordinary Styrofoam or ordinary plastic.
5. Store and ship equipment containing static sensitive components only in static shielding containers.
6. If necessary to repair equipment containing static sensitive components, wear an appropriately grounded wrist strap, work on a conductive surface, use a grounded soldering iron, and use grounded test equipment.

1 Introduction

1.1 Overview

The Vertiv™ eSure™ Power Extend Converter (Model C48/58-1000B, Spec. No. 1C48581000B) is a compact DC/DC converter unit which offers efficient power conversion. It operates from a nominal -48 VDC source to provide regulated -58 VDC to the load for continuous operation to end of battery discharge.

The C48/58-1000B simply plugs into a load position on the system's distribution panel which accepts a bullet device. The bullet terminals provide connections for DC input and the regulated DC output. The supplied return lead is installed from the device to the panel's return bar.

The power extend converter provides several functions.

1. Boosts the input voltage to provide a regulated -58.0 VDC to the load.
2. Provides overload protection with a resettable electronic over-current switch.
3. Contains a mechanical switch to enable and disable the output. This switch also resets the electronic over-current protection switch.
4. Internal fuse for fail-safe output circuit overload protection. This fuse will blow only in the event of a failure of the device coupled with an external fault.
5. By-pass mode. The device will feed the input voltage directly to the output in the following cases:
 - a) Failure of the boost converter circuitry.
 - b) Input voltage exceeds output voltage set point.

1.2 What is in the Box

Kit P/N 565050 includes the items listed in **Table 1**.

Table 1: Items in Kit P/N 565050

Part Number	Description	Qty
1C48581000B	Power Extend Converter	1
565990	Return Wire Faston Tab	1
564330	Return Wire (6-inch long)	1
565752 (See Note 1)	Return Wire Jumper Extension (4-inch long)	1
566207 (See Note 1)	Return Wire Jumper Extension (8-inch long)	1
UM565050	These Instructions	1

Note 1: The return wire jumper extension may or may not be required for each mounting bracket kit. Refer to the instructions furnished with the mounting bracket kits.

1.3 Support Mounting Bracket Kits

Support mounting bracket kits have been designed to easily install the C48/58-1000B Power Extend Converter into the power systems listed in **Table 2**. A support mounting bracket kit must be used for grounding and mechanical support. The various support mounting bracket kits available are listed in **Table 3**. Each kit comes with specific installation instructions.

Refer to **Figure 1** for an illustration of the C48/58-1000B.

1.4 Application

Applications of this product include, but are not limited to the following:

- This product could be used in applications in which the DC power is delivered over long distances to the end load.
- The power extend converter, with its output voltage regulated at a higher level than its input, allows the end load to be sustained for a longer period of time during a battery discharge condition.

Table 2: Associated Power Systems

Spec. No.	Description
581125000	+24 VDC Vortex Power System (with -48 VDC converter option installed)
581126000	NetSure™ 700 +24 VDC Power System (with -48 VDC converter option installed)
581127000	NetSure™ 710 +24 VDC Power System (with -48 VDC converter option installed)
582125000	-48 VDC Vortex Power System
582126000	NetSure™ 701 -48 VDC Power System
582127000	NetSure™ 7100 -48 VDC Power System (formerly NetSure 721)
582127000100, 582127000101, 582127000102, 582127000103, 582127000203	NetSure™ 7100 -48 VDC Power System, Pre-Configured Models
582136800	NetSure™ 502 -48 VDC Power System
582137000	NetSure™ 512 -48 VDC Power System (List 27)
582137100	NetSure™ 5100 -48 VDC Power System
545277 and 520276	-48 VDC Stand-Alone Distribution Panel, 20-position
548066	-48 VDC Stand-Alone Distribution Panel, 19-inch wide
548067	-48 VDC Stand-Alone Distribution Panel, 23-inch wide

Table 3: Power System Mounting Bracket Kits (cont'd on next page)

Mounting Bracket Kit P/N	Description
565391	<p>For use with a List AA (24-position bullet) distribution panel installed in a Spec. No. 582127000 power system.</p> <p>For use with a List DA, DB, DC, DD (21-position bullet dual voltage) distribution panel installed in a Spec. No. 581127000 or 582127000 power system.</p> <p>(Kit Instructions, see IM565391.)</p>
565459	<p>For use with a List AL (26-position bullet) distribution panel installed in a Spec. No. 582127000, 582127000100, 582127000101, 582127000102, 582127000103, 582127000203 power system.</p> <p>For use with a List DE, DF, DG, DH, DJ, DK (26-position bullet dual voltage) distribution panel installed in a Spec. No. 581127000 or 582127000 power system.</p> <p>(Kit Instructions, see IM565391.)</p>
565601	<p>For use with a List AA, AM, AN (24-position bullet) distribution panel installed in a Spec. No. 582126000 or 582125000 power system.</p> <p>For use with a List JA, JB, JC (20-position bullet dual voltage) or List JD (22-position bullet dual voltage) distribution panel installed in a Spec. No. 581126000, 581125000, 582126000, 582125000 power system.</p> <p>(Kit Instructions, see IM565391.)</p>
565649	<p>For use with a Spec. No. 582136800, 23-inch wide power system as follows:</p> <ul style="list-style-type: none"> a) 1-row version. 1-row distribution cabinet front door must be removed to install kit. If door is required, see kit P/N 10010670. b) 2-row version, row-1 only. <p>(Kit Instructions, see IM565649.)</p>
565926	<p>For use with a Spec. No. 582136800, 19-inch wide power system as follows:</p> <ul style="list-style-type: none"> a) 1-row version. 1-row distribution cabinet front door must be removed to install kit. If door is required, see kit P/N 60018725. b) 2-row version, row-1 only. <p>(Kit Instructions, see IM565649.)</p>
10010670	<p>For use with a P/N 548067 stand-alone distribution panel. Includes mounting bracket and door kits. Also used with a Spec. No. 582136800, 23-inch wide, 1-row cabinet when a front door is required.</p> <p>(Kit Instructions, see IM565649.)</p>
60018725	<p>For use with a P/N 548066 stand-alone distribution panel. Includes mounting bracket and door kits. Also used with a Spec. No. 582136800, 19-inch wide, 1-row cabinet when a front door is required.</p> <p>(Kit Instructions, see IM565649.)</p>

Table 3: Power System Mounting Bracket Kits (cont'd from previous page)

Mounting Bracket Kit P/N	Description
565460	For use with a Spec. No. 582137000 List 27 power system. (Kit Instructions, see IM565460.)
565939	For use with a Spec. No. 582137100 List 20 power system. (Kit Instructions, see IM565939.)
60011929	For use with a Spec. No. 582137100 List 21 power system. (Kit Instructions, see IM565939.)
565997	For use with a Spec. No. 582137100 List 25 power system. (Kit Instructions, see IM565939.)
60011928	For use with a Spec. No. 582137100 List 26 power system. (Kit Instructions, see IM565939.)
60011930	For use with a Spec. No. 582137100 List 27 power system. (Kit Instructions, see IM565939.)
60017372	For use with a P/N 545277 and 520276 stand-alone distribution panel. Includes mounting bracket and door kits. (Kit Instructions, see IM60017372.)
60019000	For use with a Spec. No. 582137100 List 102, 104, and 106 power system. (Kit Instructions, see IM60019000.)

Table 4: Additional Material for Systems to be Equipped with Power Extend Converter

P/N	Description
565788	21-position return bus bar for use with Spec. No. 582137100 List 20 installed prior to January, 2020.
565789	26-position return bus bar for use with Spec. No. 582137100 List 25 installed prior to January, 2020.
60016097	2-position load bus bar adapter for use with two power extend converters in parallel.
545346	3-position load bus bar adapter for use with three power extend converters in parallel.
566026	Toggle breaker guard kit (included with each Power Extend Converter bracket kit)

2 Specifications

2.1 DC Output Ratings

1. Nameplate Rating: -58 VDC / 17.2 A, 1000 W maximum.
2. Output Voltage: Nominal -58 VDC, positive ground. Output voltage is non-adjustable.
3. Output Current:
 - a) Boost Mode: 17.2 amps maximum.
 - b) Bypass Mode: 24.0 amps maximum.



NOTE! *The power extend converter will operate in bypass mode due to 1) a failure of the boost conversion circuitry, (2) input voltage exceeds 58.0 VDC, or 3) output current exceeds the boost mode rating.*

4. Output Power: See **Table 5**.



NOTE! *These values are for a single unit and may be reduced in the end use application. Refer to the specific mounting bracket kit instructions (see **Table 3**) for spacing and power restrictions. Use the calculator tool that can be obtained at <https://www.vertiv.com/en-us/products-catalog/critical-power/dc-power-systems/esure-power-extend-converter-c4858-1000/#/downloads> to determine the necessity, quantity and spacing requirement of the Power Extend Converter based on the RRU type (or peak load), use application (host power system), trunk and jumper cable size and length, minimum source voltage and minimum RRU operating voltage.*

5. Regulation:
 - a) Output Voltage Tolerance: ± 0.35 VDC (at nominal input voltage [52V to 56.5V] and 0% to 100% load).
 - b) Dynamic Response: Step changes in load, from 50% to 25% or 50% to 75% at 2 A / microsecond does not cause the voltage measured at the power extend converter output to overshoot or undershoot more than 5% of the regulated output level. The output voltage returns and stays within the $\pm 1\%$ regulation band within 4 milliseconds. (Telcordia GR-947-CORE.)

- c) Overshoot/Undershoot: 1.0% maximum output voltage overshoot at turn-on (high voltage shutdown does not activate). No voltage undershoots at turn-off.
- d) Output Voltage Accuracy: ± 0.15 V (at -58 VDC and 50% load and nominal input voltage [52V to 56.5V]).

Table 5: Output Power Ratings

Input Voltage	Ambient Temperature											
	40 °C				55 °C				65 °C			
	Air Flow LFM		Watts		Air Flow LFM		Watts		Air Flow LFM		Watts	
42VDC	0	120	0	800	0	850	0	1000	0	600	0	800
	60	1000	120	1000	60	1000	120	1000	60	650	120	850
	1000	1000	1000	1000	1000	1000	1000	1000	1000	750	1000	1000
54VDC	0	120	0	1000	0	1000	0	1000	0	1000	0	1000
	60	1000	120	1000	60	1000	120	1000	60	1000	120	1000
	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
58VDC	0	120	0	1000	0	1000	0	1000	0	1000	0	1000
	60	1000	120	1000	60	1000	120	1000	60	1000	120	1000
	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

6. Filtering:

- a) Peak to Peak Noise: 250 mV up to 100 MHz.
- b) Psophometric Noise: Less than 2 mv at nominal input (54 V) and load (5% to 100%) conditions (16.66 Hz to 6000 Hz).
- c) Wideband Noise:
 - <20 mV between 25 Hz to 20 kHz according to ETS EN 300 132-2.
 - <250 mV peak to peak, 0 to 100 MHz.
 - <50 mV rms in any 3 kHz band 10 KHz to 20 MHz for all line, load and environmental conditions according to GR-947-Core section 3.24.
- d) Narrow Band Noise: -21 dBm (20 mV) at 25 Hz to 200 Hz, -40 dBm (2.24 mV) at 500 Hz to 3000 Hz and linear in between; -35 dBm (4 mV) at 3 kHz to 20 kHz according to ETSI EN 300 132-2 V2_1_2 2003-09 4.9.1
- e) Voice Frequency Output Noise (System Noise): Output noise less than 26 dBrc at nominal input (54 V) and load (5% to 100%) conditions (16.66 Hz to 6000 Hz).

2.2 DC Input Ratings

1. Nameplate Rating: -42 VDC / 23.8 A; -54 VDC / 19.0 A; -58 VDC / 17.8 A.
2. Input Voltage:
 - a) -42.0 VDC to -58.0 VDC with 100% maximum output.
 - b) If input voltage exceeds output voltage setpoint, input will pass through the power extend converter.
3. Maximum Input Current: 24.35 A at 42 Vin.
4. Inrush Current: The peak value of the input inrush current shall not exceed 2.0 times the peak value of the maximum steady-state input current at 25 °C and shall not trigger the power extend converter's internal input fault protection device(s). No damage to connection points when inserted into a live bus.
5. Typical Input Data: See **Table 6**.

Table 6: Typical Input Data

	Vin (VDC)	% load	Iin (ADC)	Vo (VDC)	Io (ADC)	Eff	Wloss (W)	BTU/hour
42	42.04	0	0.04	58.27	0.00	na	1.68	5.74
	42.03	25.16%	6.22	58.11	4.33	0.9625	9.81	33.47
	42.08	49.96%	12.22	57.96	8.62	0.9716	14.60	49.83
	42.02	75.13%	18.33	57.79	13.00	0.9754	18.96	64.68
	42.02	100.09%	24.42	57.62	17.37	0.9754	25.27	86.22
48	48.1	0.00%	0.07	58.29	0.00	0.00	3.37	11.49
	48.19	20.24%	4.34	58.16	3.48	0.9677	6.75	23.02
	48.15	30.55%	6.52	58.08	5.26	0.9731	8.44	28.79
	47.99	50.01%	10.65	57.95	8.63	0.9785	10.99	37.48
	48	70.84%	15.05	57.83	12.25	0.9806	13.98	47.71
	47.96	80.81%	17.18	57.76	13.99	0.9807	15.89	54.22
	48.01	99.89%	21.21	57.64	17.33	0.9810	19.39	66.16
54.5	54.44	0.00%	0.08	58.27	0.00	0.00	4.36	14.86
	54.59	20.35%	3.82	58.13	3.50	0.9756	5.08	17.33
	54.47	30.43%	5.70	58.07	5.24	0.9801	6.19	21.13
	54.51	50.03%	9.32	57.97	8.63	0.9847	7.78	26.55
	54.54	70.70%	13.15	57.81	12.23	0.9858	10.18	34.75
	54.5	80.78%	15.04	57.74	13.99	0.9855	11.90	40.60
	54.5	99.89%	18.60	57.64	17.33	0.9854	14.80	50.50
58	58.87	0	0.03	58.27	0	0	1.7661	6.03
	57.74	20.35%	3.61	58.13	3.50	0.9761	4.99	17.01
	57.7	30.43%	5.37	58.07	5.24	0.9820	5.56	18.98
	57.77	50.03%	8.79	57.97	8.63	0.9852	7.52	25.65
	57.81	70.70%	12.40	57.81	12.23	0.9863	9.83	33.53
	57.83	80.76%	14.16	57.73	13.99	0.9863	11.23	38.32
	57.82	99.91%	17.50	57.65	17.33	0.9874	12.78	43.59

2.3 Environmental Ratings

1. Operation Temperature Range: -40 °C to +65 °C (-40 °F to +149 °F).
See “7. Ventilation Requirements” below.
2. Storage Ambient Temperature Range: -40 °C to +70 °C (-40 °F to +158 °F).
3. Temperature Coefficient: 0.02% of output regulation per degree Celsius at full performance temperature range.
4. Relative Humidity: Capable of operating in an ambient relative humidity range of 0% to 93%, non-condensing.
5. Altitude:
 - a) 2000 m (6000 ft) at full power (power limited for heights above 2000 m).
 - b) The maximum operating ambient temperature is to be derated by 2 °C per 1000 feet above 6,000 feet.
 - c) Operating: -200 feet (-61 meters) to 10,000 feet (3048 meters) (per Telcordia GR-63).
6. Seismic: Designed to meet GR-63-CORE Zone 4.
7. Ventilation Requirements: When used in Vertiv plants in environments of 40 °C or less, the power extend converter does not require forced cooling in order to provide the power levels found in the Indoor mounting kit manuals. From 40 °C to 65 °C environments, the power extend converter relies on the forced cooling provided by the cabinet in which it is installed to provide the power levels found in the Outdoor cabinet power system mounting kit manuals. See **Table 2** for applications of the Power Extend Converter. Use the calculator tool that can be obtained at <https://www.vertiv.com/en-us/products-catalog/critical-power/dc-power-systems/esure-power-extend-converter-c4858-1000/#/downloads> to determine the necessity, quantity and spacing requirement of the Power Extend Converter based on the RRU type (or peak load), use application (host power system), trunk and jumper cable size and length, minimum source voltage and minimum RRU operating voltage.

2.4 Compliance Information

1. UL: UL 62368-1; 2nd Ed. 2014-12-01 (Audio/Video, Information and Communication Technology Equipment Part 1: Safety Requirements); CAN/CSA C22.2 No.

62368-1-14; 2nd Ed. (Audio/Video, Information and Communication Technology Equipment Part 1: Safety Requirements)

UL recognized per UL / cUL Category QQJQ2 (UL) and QQJQ8 (cUL) as a power supply.

2. FCC: The power extend converter operating in an approved distribution panel conforms to the requirements of FCC rules Part 15, Subpart B, Class B for radiated and conducted emissions limits. Telcordia GR-1089-CORE class B. CISPR22, Class B conducted and radiated.
3. NEBS Compliance (Pending): Compliance verified by a Nationally Recognized Testing Laboratory (NRTL) per GR-1089-CORE, GR-63-CORE to NEBS Level 3, compliance to GR-3108 Class 2.

2.5 Standard Features

1. The power extend converter plugs into a standard bullet breaker panel. The power extend converter combines the functionality of a boost converter, overcurrent protection device, and disconnect switch in a package that is in the form factor of a bullet DC breaker so that it can be used in DC power plants that utilize the bullet style breaker.
2. Input Protection:
 - a) Fusing: A non-user replaceable fuse is located in the negative input lead of the power extend converter.
 - b) Low Input Voltage Protection: The power extend converter shuts down at low input voltage. The low voltage disable point is -40.5 ± 0.5 VDC. The power extend converter will start at -43.5 ± 0.5 VDC.
 - c) High Input Voltage Protection: The power extend converter withstands voltages to -65.0 VDC without damage or hazard.
3. Output Protection:
 - a) High Voltage Shutdown (HVSD): If the output voltage exceeds 59.5 ± 0.5 VDC, at the power extend converter output, the power extend converter shuts down. Manual restart is required by turning the power extend converter off and then back on.

- b) Overcurrent Protection: The power extend converter shuts down (opens the output) if output current exceeds 24 A. The power extend converter goes into overcurrent protection. Manual restart is required by turning the power extend converter off and then back on after the overcurrent condition has been corrected.
 - c) Over Temperature Protection: The power extend converter shuts down if the internal temperature of the power extend converter exceeds an acceptable level. Boost conversion operation will automatically resume after the over-temperature condition is corrected.
4. Hot Swappable: The power extend converter is designed to be plug-and-play. The power extend converter can be inserted or removed from a live DC power system with no damage as long as the power extend converter is inserted with the enable/disable switch in the disabled position. Plugging the power extend converter into the system will not affect the system voltage.
 5. Load Sharing: Power extend converters are capable of being operated in parallel and share the load such that the maximum difference in output current between any two converters is less than 2.5 A. For loads exceeding 1000 watts, the rate of change of current to the load must be less than 2 amps per millisecond at startup to prevent actuation of the over-current protection feature. Once the output voltage of the converters has reached steady state (58 VDC), the Dynamic Response specification will be met for units operating in parallel. Refer to the specific mounting bracket kit instructions (see **Table 3**) for spacing and power restrictions. See **Table 3** for paralleling power extend converter instructions.
 6. External Alarm Contact: A power extend converter fail alarm contact is extended to the distribution device alarm termination strip on the distribution panel.
 7. Local Controls: A switch is provided on the front of the power extend converter to enable/disable operation.
 8. Local Test Points: Test points are provided on the front of the power extend converter to allow measurement of output voltage.
 9. Local Status and Alarm Indicator: An LED indicator is provided on the front of the power extend converter to provide visual operating status or failure condition of the power extend converter. Refer to **Table 8** for LED indicator operation.

2.6 Mechanical Specifications

1. Weight: 0.45 kg (1.0 lb).
2. Dimensions (H x W x D) (body): 4.35" (110.49 mm) x 0.73" (18.54 mm) x 4.64" (117.87 mm).

3 Installation

3.1 General Requirements

- This product is intended only for installation in a restricted access location on or above a non-combustible surface.
- This product must be located in a controlled environment with access to Crafts persons only.
- This product is intended for installation in network telecommunication facilities (CO, vault, hut, or other environmentally controlled electronic equipment enclosure).
- This product is intended for connection to the common bonding network in a network telecommunication facility (CO, vault, hut, or other environmentally controlled electronic equipment enclosure).
- The DC return connection to this system can remain isolated from system frame and chassis (DC-I).
- This system is suitable for installation as part of the Common Bonding Network (CBN).

3.2 Installing the Power Extend Converter



NOTE! *The power extend converter can be inserted or removed with power applied (hot swappable) as long as the power extend converter is inserted/removed with the enable/disable switch in the disabled position. See **Figure 7** on page 26.*



WARNING! The power extend converter and front mounting bracket becomes very hot during power extend converter operation at heavy load. Wear heat resistant gloves or allow the power extend converter to cool down before removing.

Refer to the instructions furnished with the mounting bracket kits for complete installation instructions. The following is a typical installation procedure.

Typical Installation Procedure



DANGER! Adhere to the “Important Safety Instructions” starting on page vi and those listed in the power system manual.



ALERT! Only install the power extend converter into a -48 VDC distribution position. Non-repairable damage will occur if the power extend converter is plugged into a +24 VDC distribution position.



NOTE! *Mounting bracket kit P/N 565391 with distribution panel 582127000 List AA is used in the following procedure. Other kits and distribution panels similar. For complete installation instructions, refer to the instructions furnished with the mounting bracket kits.*

- [] 1. Performing this procedure may activate external alarms. Initial installation of the converter with the switch in the off position will actuate the CB/Fuse Alarm. Do one of the following. If possible, disable these alarms. If these alarms cannot be easily disabled, notify the appropriate personnel to disregard any future alarms associated with this system while the procedure is being performed.
- [] 2. Gain access to the distribution panel into which the power extend converter is to be installed.
- [] 3. Install the power extend converter mounting bracket kit per the installation instructions furnished with the kit. If two or three power extend converters are to be connected in parallel, a two-position (60016097) or three-position (545346) lug adapter busbar plate should be installed first, as shown in the separate kit installation instructions.
- [] 4. If the power extend converter is to be installed for a newly connected load, connect the load and load return cables to the distribution panel for the position to be occupied by the power extend converter. At the same time, connect the power extend converter return wire faston tab (P/N 565990) provided with the power extend converter to the distribution panel return busbar (use the same location and hardware used for the return lead to the load). See **Figure 2**. Torque as indicated in **Figure 2**.

- [] 5. If the power extend converter is to replace an existing circuit breaker, remove the circuit breaker and verify the load and return cables for the position are wired and labeled correctly. It may be advantageous to loosen and temporarily move the load side cables for easier access to the hardware on the return landing position studs. Connect the power extend converter return wire faston tab (P/N 565990) provided with the power extend converter to the distribution panel return busbar (use the same location and hardware used for the return lead to the load). See **Figure 2**. Torque as indicated in **Figure 2**.

- [] 6. For return wire selection and installation routing, refer to the instructions furnished with each mounting bracket kit. Mounting bracket kit P/N 565391 with distribution panel 582127000 List AA is used in **Figure 3** and **Figure 4**. Refer to **Table 3** for other available kit P/Ns. General instructions are as follows:
 - a) **If required**, connect 4-inch long return wire extension P/N 565752 or 8-inch long return wire extension P/N 566207 provided with the power extend converter to the return wire faston tab P/N 565990 previously installed on the distribution panel return bar.

 - b) Connect the return wire P/N 564330 provided with the power extend converter to either the return wire extension installed in a) above or to the return wire faston tab P/N 565990 previously installed on the distribution panel return bar.

- [] 7. If the load side cables were disconnected in an above step, reinstall and tighten those cables in the appropriate positions.

- [] 8. Route the return wire (P/N 564330) down and behind the power extend converter's front mounting bracket, then connect it to the power extend converter. See **Figure 4**. Orient the white square on the return wire faston receptacle's locking tab as shown in **Figure 4**.

Figure 2: Connecting Power Extend Converter Load and Load Return Cables to the Distribution Panel with the **Power Extend Converter Return Wire Faston Tab (P/N 565990)**

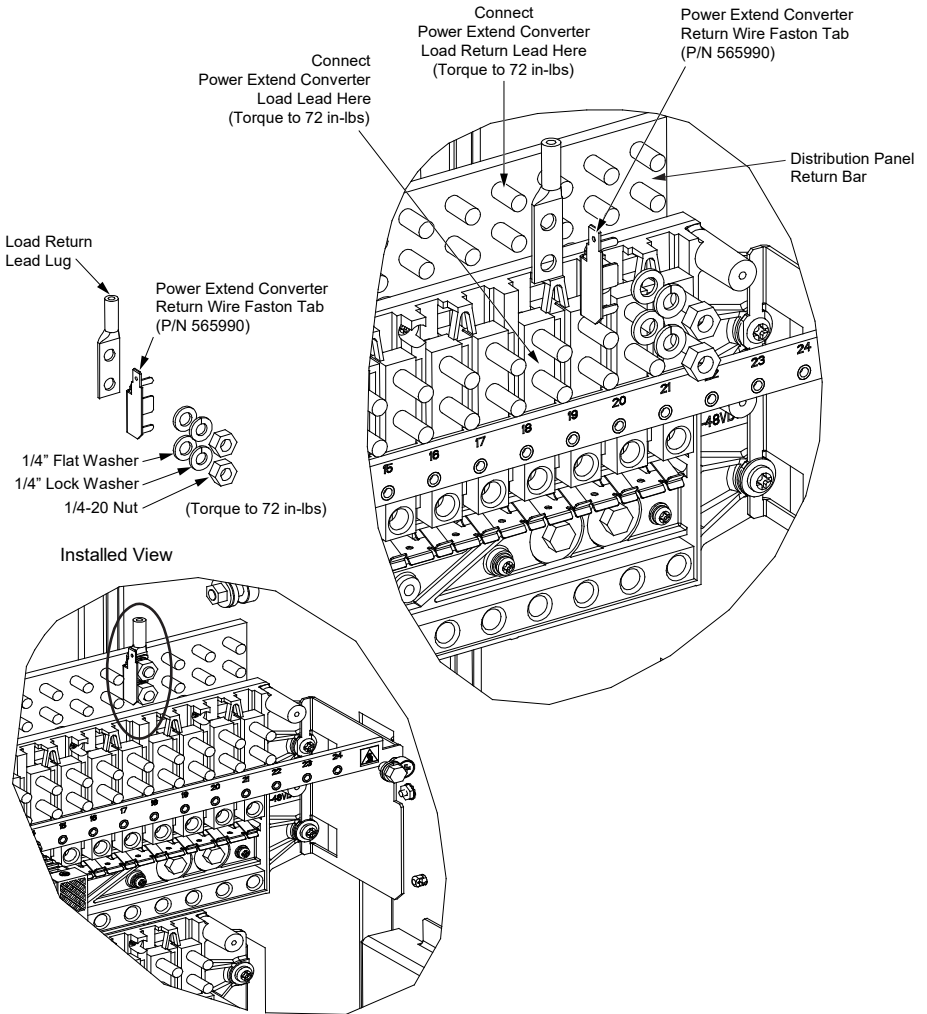


Figure 3: Connecting Power Extend Converter Return Wire (P/N 564330) and Return Wire Extension (P/N 565752) to the Power Extend Converter Return Wire Faston Tab (P/N 565990)

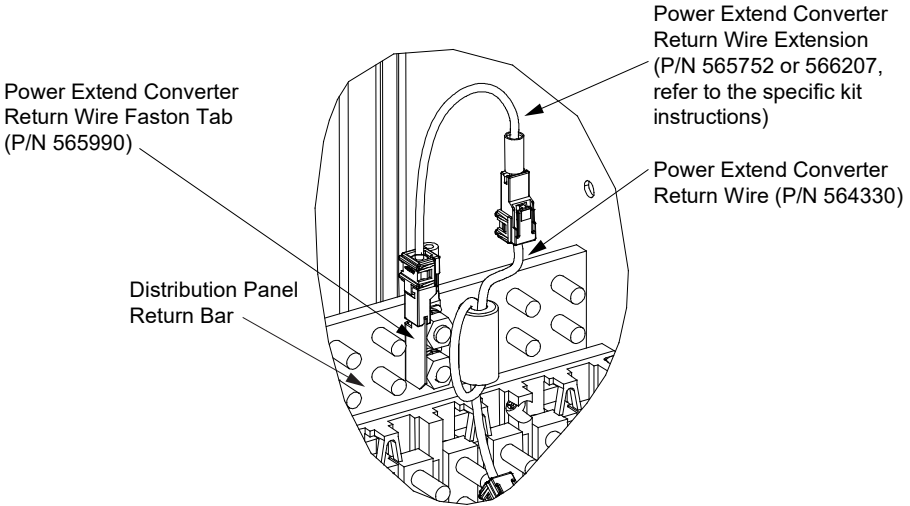
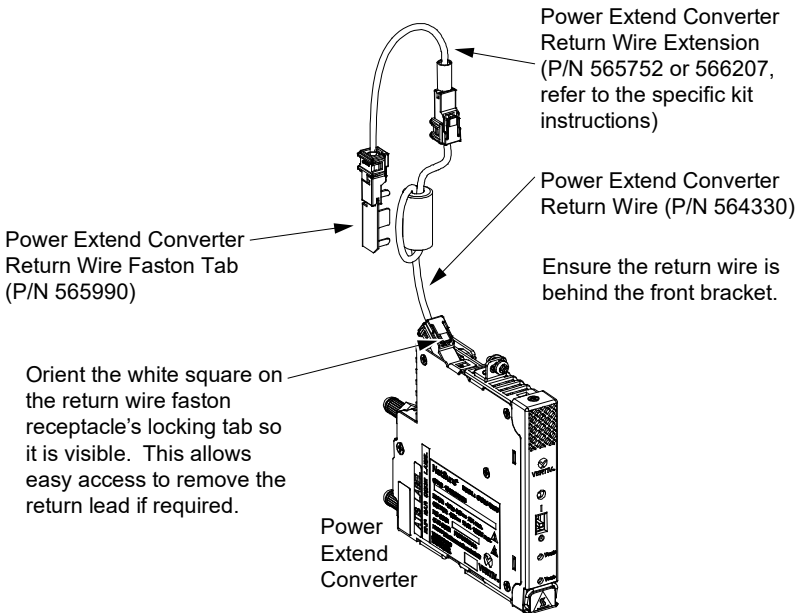
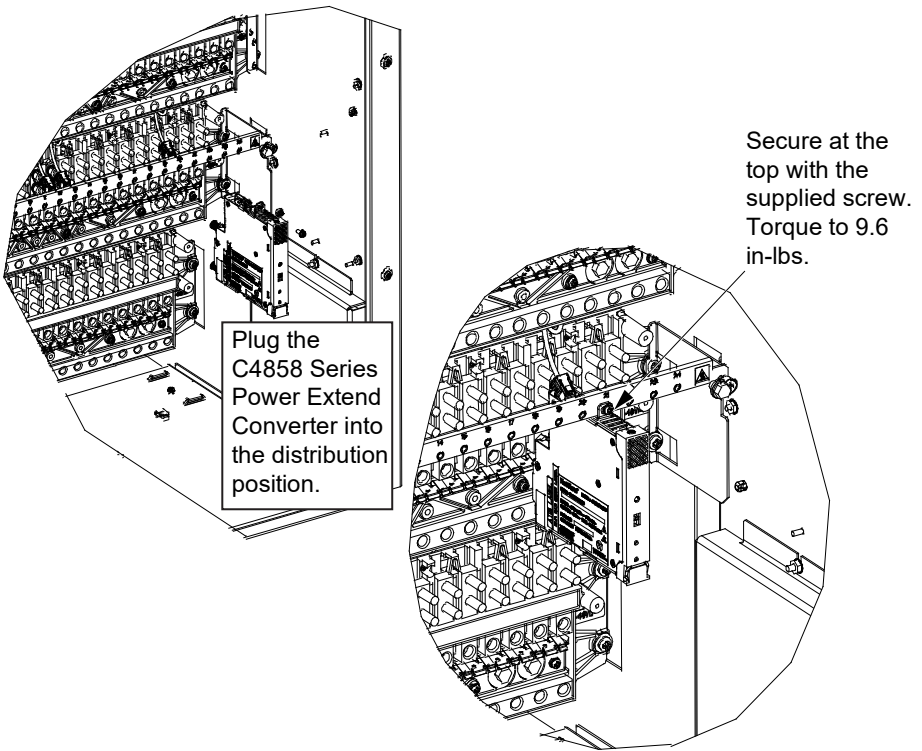


Figure 4: Connecting Power Extend Converter Return Wire (P/N 564330) to the Power Extend Converter



- [] 9. **Ensure the enable/disable switch on the power extend converter is in the disable (down) position. See Figure 7 on page 26.**
- [] 10. Plug the power extend converter into the distribution panel. See **Figure 5**.
- [] 11. Secure the power extend converter to the front mounting bracket with the screw provided with the power extend converter. Torque as indicated in **Figure 5**.

Figure 5: Installing Power Extend Converter



- [] 12. Place the enable/disable switch on the power extend converter to the enable position. See **Figure 7** on page 26. If two or three power extend converters are connected in parallel to a load that exceeds 1000 watts peak, they should be switched on simultaneously.
- [] 13. Observe the status of the power extend converter front panel local indicator. If operating normally, this indicator should be illuminated green. See **Figure 7** on page 26.
- [] 14. Enable the external alarms or notify appropriate personnel that this procedure is finished.
- [] 15. Ensure that there are no local or remote alarms active on the power system.

4 Making Electrical Connections

4.1 Important Safety Instructions



DANGER! Adhere to the “Important Safety Instructions” starting on page vi and those listed in the power system manual.

4.2 Wiring Considerations

All wiring and branch circuit protection should follow the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC), and applicable local codes. For operation in countries where the NEC is not recognized, follow applicable codes.

Refer to **Table 7** for recommended wire sizes.

Table 7: Recommended Wire Sizes

Modules in Parallel	Recommended Wire Size ¹			
	Ambient Temperature			
	30 °C	40 °C	46 °C	65 °C
1	10 AWG	10 AWG	10 AWG	10 AWG
2	6 AWG	6 AWG	6 AWG	4 AWG
3	4 AWG	4 AWG	2 AWG	2 AWG

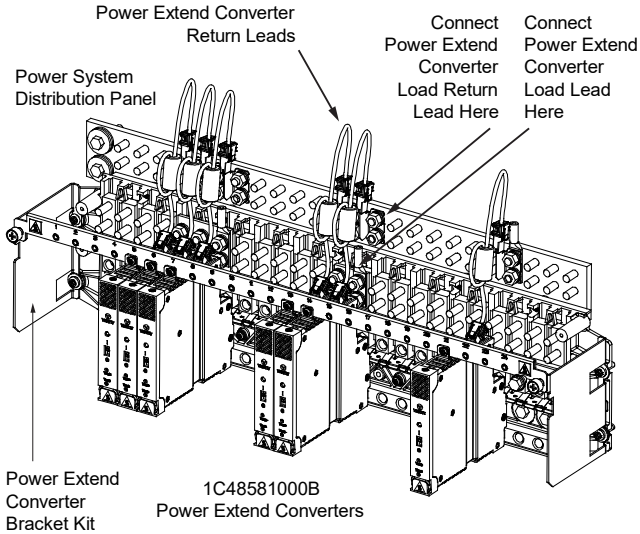
¹ Wire sizes based on recommendations of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC). Table 310.15 (B) (16) for copper wire at 90 °C conductor temperature.

4.3 Electrical Connections

Procedure

1. Output leads from the power extend converter are connected to the system's return bar and to the respective load position for the distribution position the device is installed in. Refer to the instructions furnished with the power system for wiring to a load position. See **Figure 6** for a typical wiring illustration.

Figure 6: Typical Wiring Illustration



5 Initially Starting and Checking Power Extend Converter Operation

5.1 Initially Starting the Power Extend Converter

Procedure

1. Place the enable/disable switch on the power extend converter to the enable position. See **Figure 7**. If two or three power extend converters are connected in parallel to a load that exceeds 1000 watts peak, they should be switched on simultaneously.

5.2 Checking Power Extend Converter Status

Procedure

1. Observe the status of the power extend converter front panel local indicator. If operating normally, this indicator should be illuminated green. See **Figure 7**.

6 Operation

6.1 Local Indicator, Test Points, and Switch

Location and Identification

Refer to **Figure 7**.

Indicator

There is one (1) indicator located on the power extend converter's front panel. Refer to **Table 8** for the function of this indicator. Refer also to **Table 8** for the alarm contact state for each indicator function.

Test Points

There are two (2) test points located on the power extend converter's front panel (Vout- and Vout+) for measurement of output voltage.

Switch

There is one (1) switch located on the power extend converter's front panel. To place the power extend converter into operation, place the switch in the "enable" position. To remove the power extend converter from operation, place the switch in the "disable" position.

6.2 Power Extend Converter High Voltage Shutdown and Lockout Restart and Power Extend Converter Overcurrent Shutdown and Lockout Restart

If the power extend converter experiences a high voltage or overcurrent condition on the output, the power extend converter shuts down and locks out. The power extend converter must be manually restarted. Refer to the following procedure to restart the power extend converter.

Procedure

1. Turn the power extend converter off and then back on by placing the front panel enable/disable switch to the disable position and then to the enable position.

Figure 7: Local Indicator, Test Points, and Switch Location and Identification

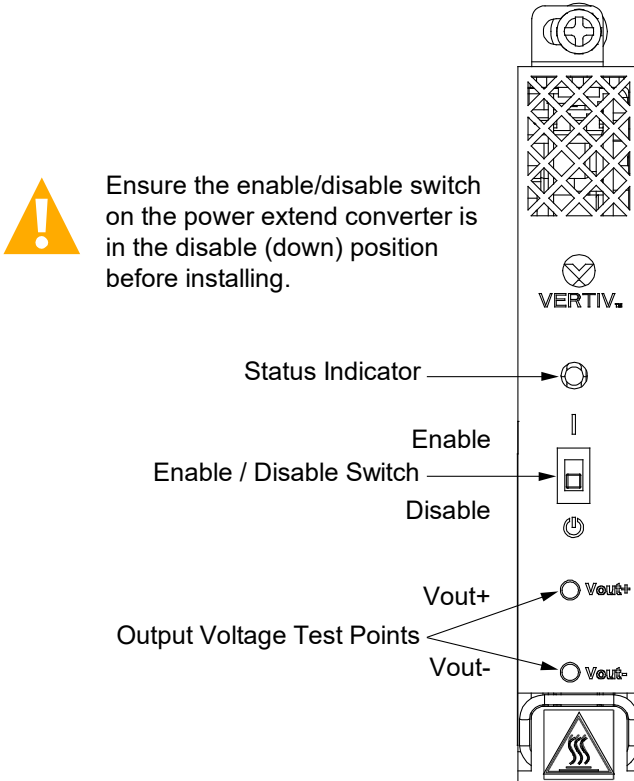


Table 8: Front Panel Indicator Function and Alarm Contact State

Condition	LED Color	Alarm Contact State
Power extend converter is within correct input voltage range and operating properly.	Green	Open Circuit
Low output voltage.	Red	Closed to Source Input Bullet Terminal
Power Extend Converter fail.		
Overcurrent Protection Mode.		
Enable/Disable switch set to off.		
Output protected (HVSD).		
Latched off due to overcurrent.		
No power to input.	Off	Closed to Source Input Bullet Terminal
Blown fuse.		

7 Troubleshooting and Repair

7.1 Important Safety Instructions



DANGER! Adhere to the “Important Safety Instructions” starting on page vi and those listed in the power system manual.

7.2 Contact Information

Refer to Section 4154 (provided with your customer documentation) for support contact information.

7.3 Troubleshooting

7.3.1 Power Extend Converter Fault Symptoms and Troubleshooting

The fault indicators that can be displayed by the power extend converter are as follows.

- Status Indicator (Red)
- Status Indicator (Off)

Refer to **Table 9** for a list of possible causes and corrective actions.

Table 9: Power Extend Converter Troubleshooting

Symptom	Possible Cause(s)	Suggested Action(s)
Status Indicator Red	Low output voltage.	Replace the power extend converter.
	Converter fail.	Replace the power extend converter.
	Operating in Bypass Mode.	Lower output load to bring converter out of Bypass mode.
	Enable/Disable switch set to off.	Set switch to enable position.
	Output protected (HVSD).	Check for converter failure causing it to go into HVSD, replace converter.
	Latched off due to overcurrent.	Lower the load on the output or correct overload condition.
Status Indicator Off	No power to input.	Check rectifier system for proper operation to supply input voltage to the power extend converter.
	Blown fuse.	Replace the power extend converter.

7.4 Repair

When a trouble symptom is localized to a faulty power extend converter, the power extend converter is to be replaced in its entirety. No attempt should be made to troubleshoot or repair individual components inside the power extend converter.

7.5 Power Extend Converter Replacement

7.5.1 General

The power extend converter can be inserted or removed with power applied (hot swappable) as long as the power extend converter is inserted/removed with the enable/disable switch in the disabled position.

7.5.2 Important Safety Instructions



DANGER! Adhere to the “Important Safety Instructions” starting on page vi and those listed in the power system manual.



WARNING! The power extend converter and front mounting bracket becomes very hot during power extend converter operation at heavy loads. Wear heat resistant gloves or allow the power extend converter to cool down before removing.

Procedure

1. Performing this procedure may activate external alarms. Do one of the following. If possible, disable these alarms. If these alarms cannot be easily disabled, notify the appropriate personnel to disregard any alarms associated with this system while this procedure is performed.
2. Place the power extend converter front panel switch to the disable position.
3. Carefully remove any brackets or panels to access the power extend converter.
4. Loosen the screw retaining the converter to the mounting bracket.
5. Pull the power extend converter out from the distribution position.
6. Carefully disconnect the return wire from the top of the power extend converter.
7. Ensure the enable/disable switch on the replacement power extend converter is in the disabled position.
8. Carefully reconnect the return wire to the top of the replacement power extend converter.
9. Plug the replacement power extend converter into the distribution position that the defective power extend converter was removed from.
10. Tighten the screw to retain the converter to the mounting bracket
11. Carefully replace any brackets or panels that were previously removed.
12. Place the replacement power extend converter front panel enable/disable switch to the enable position.
13. Observe the status of the replacement power extend converter front panel local indicator. If operating normally, this indicator should be illuminated green.
14. Enable the external alarms or notify appropriate personnel that this procedure is finished.
15. Ensure that there are no local or remote alarms active on the system.

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