



CPS800U Upstream System

Telephone Power for Video

48 Vdc Input, ± 190 Vdc Output Converter/Limiter System

Product Manual
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Notice:

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Table of Contents

1 Introduction.....	5
Overview.....	5
Customer Service Contacts.....	6
2 Product Description.....	7
Block Diagrams	7
Operation	8
Configurations	8
Specifications.....	9
3 Ordering.....	11
Ordering Guide	11
4 Safety.....	13
Safety Statements.....	13
Warning Statements and Safety Symbols.....	16
Precautions.....	17
5 Pre-Installation.....	19
CPS800U Installation	19
System Identification	19
6 Installing the Shelf Level Upstream Product	21
Unpacking Shelf Level Upstream Product	21
Install the CPS800U Shelf.....	22
Ground the Shelf.....	23
Connect the J100 and P700 Wiresets.....	24
Set Shelf ID and Attach Alarm Wiring.....	27
Attach Alarm Wiring	29
7 Inspect the Network.....	31
Check and Mark Wiring Compliance	31
8 Final Installation	33
Installing the Converters.....	33
Apply DC Power.....	35
Recognizing Normal States	37
QS982A LED Information Map	38
Confirm Operation of Alarm Wiring.....	39
9 Reference Information.....	41
Overview.....	41
QS982A Converter LED Information Map	41
QS982A LED Information Map (visual).....	42
Alarm Card Information	43
QS912C Converter Shelf	47
10 Product Warranty.....	53
Appendix A: Operating Temperature Measurement and Vertical Spacing ..	55
Overview.....	55
Revision History	57

1 Introduction

Overview

The CPS800U is part of the premier upstream dc/dc converter for line powering FTTN networks. The CPS800U contains 16 dc/dc converter/limiter cards in a dense 2 RU shelf. Each card contains a pair of independent -48 Vdc input to ± 190 Vdc output converters with each output safety limited to 100VA. In addition, each output terminal is safety Ground Fault protected. The cards are fully connectorized and insulator shielded, inrush current protected and completely hot swappable, making card addition to in-service shelves in the field an easy, one step process. The converter card shelf is front access for all field replaceable units. The alarm and communications connections are also on the front of the shelf. The shelf is equipped with pigtailed for all -48V input and RJ21 output connections.

The CPS800U meets the applicable requirements of these North American product standards: UL60950-21, UL60950-1, Telcordia GR-3108-CORE, GR-1089-CORE, GR-487-CORE, and GR-063-CORE.

Summary

The CPS800U Upstream System delivers power over telephone lines. The primary application is enabling the delivery of video bandwidth data rates to residences over twisted pairs by allowing placement of powered electronics at an acceptable distance from the residence.

48 Vdc Input, ± 190 Vdc Output Converter/Limiter System distributes battery backed up power from existing -48V battery backed up sites like Remote terminals to reliably power electronics near the home. It does this by converting the -48V to a UL60950-21 safety approved + and - 190V current limited and ground fault protected source. Each front access shelf provides 8 channels.

Customer Service Contacts

Customer Service, Technical Support, Product Repair and Return, and Warranty Service

For customers in the United States, Canada, Puerto Rico, and the US Virgin Islands, call 1-800-THE-1PWR (1-800-843-1797). This number is staffed from 7:00 am to 5:00 pm Central Time (zone 6), Monday through Friday, on normal business days. At other times this number is still available, but for emergencies only. Services provided through this contact include initiating the spare parts procurement process, ordering documents, product warranty administration, and providing other product and service information.

For other customers worldwide the 800 number may be accessed after first dialing the AT&T Direct country code for the country where the call is originating, or you may contact your local field support center or your sales representative to discuss your specific needs.

Customer Training

Lineage Power offers customer training on many Power Systems products. For information call 1-972-284-2163. This number is answered from 8:00 a.m. until 4:30 p.m., Central Time Zone (Zone 6), Monday through Friday.

Downloads and Software

To download the latest product information, product software and software upgrades, visit our web site at <http://www.lineagepower.com/>

2 Product Description

Block Diagrams

2-1 is a basic block diagram of single shelf CPS800U System.

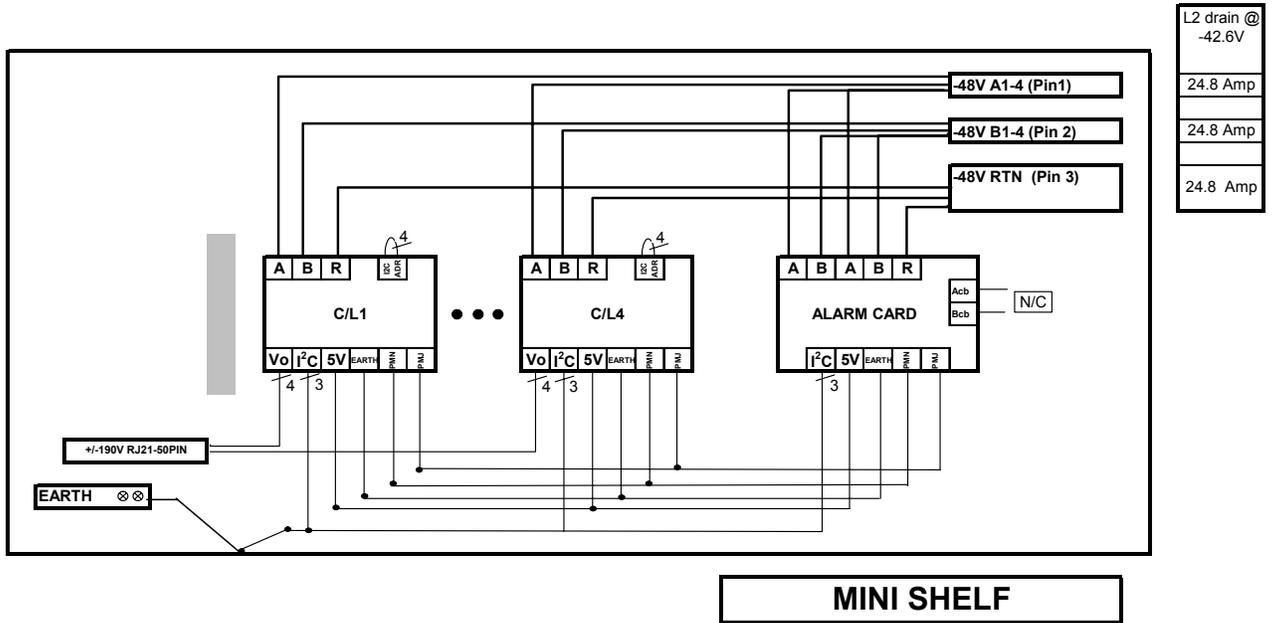


Figure 2-1: CPS800U Shelf

Operation

Power comes in as -48V and is distributed in an A and B redundant fashion to each of the converter cards and the alarm card. There are two +/-190V circuits on each converter card. The circuits both boost the voltage and limit the current as prescribed by UL60950-21 and GR-1089-CORE.

Warning: Ground faults or short circuits on the output do not permanently disconnect the output. The converter circuit tests the line every 4 seconds and will re-energize if the wiring fault is cleared.

A serial communication bus links each converter to an alarm card at the end of each shelf.

The alarm card provides major and minor form C contacts, manages the converters and can relay information to a Lineage Power QS941 controller using Galaxy Protocol over an RS485 bus. Up to 24 shelves can be controlled and monitored by one QS941 controller. The QS941 controller is WEB and SNMP capable.

Configurations

8 circuit, front access +/-190V shelves come in one configuration A single IP drop can be used to manage up to 24 shelves.

Specifications

Table 2-A: CPS800U Electrical Specifications

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Input Voltage					
Operating Continuous Non-operating, No Damage	V_I	-40 0	-52.8	-60 -40	Vdc
Transient (@ duration =)					
5 Seconds	V_{tr}			-65	Vdc
10 mS (rise and fall rate of 10V/mS)	V_{tr}			-75	
10 μ S	V_{tr}			-100	
1 μ S	V_{tr}			-200	
Input Current (either feed) per shelf					
$V_{IN} = 54.4V$	I_{IN}			20	Adc
$V_{IN} = 52.8V$	I_{IN}			20	Adc
$V_{IN} = 42.6V$	I_{IN}			25	Adc
$V_{IN} = 40.0V$	I_{IN}			27	Adc
Temperature					
Normal Operating Ambient Temperature at 150 lfm airflow	T_A	-40		50	$^{\circ}C$
Operating Ambient Temperature at higher (TBD) airflow	T_A	-40		75	$^{\circ}C$
Cold Start Temperature	T_A	-40			$^{\circ}C$
Storage Temperature	T_{stg}	-55		85	$^{\circ}C$
Power					
Input Power at -42.6 Vdc input (per C/L Card)	P_{in}			222	W
Power Dissipation (per C/L Card)	P_{diss}		21	30	W
Output Power (per C/L Card)	P_{out}			200	W
Isolation					
Input to Output Voltage				1500	Vdc

Table 2-A: CPS800U Electrical Specifications Continued

Parameter	Symbol	Min	Typ	Max	Unit
Output Voltage (line to line)	V_o	378	380	382	Vdc
Output Power (per circuit)	P_o	95.0	97.7	100	Watts
Output Current	I_{OUT}	251	257	263	mA

Table 2-B: CPS800U Physical Specifications

	Height in. (mm)	Width in. (mm)	Depth in. (mm)	Weight lb (kg)
Mini Shelf	3.5 (88.9)	5.86 (149)	12 (304)	TBD
Mini Shelf with 19 inch bracket set	3.5 (88.9)	17.4 (442)	12 (304)	TBD

Installation Category

CPS800U output circuits are suitable for connection to telephone lines that are equipped with primary lightning protectors consistent with UL 497. The host system must protect each pair to a level corresponding to a CommScope 3C*EW Gas tube primary protector. This protector has a voltage breakdown range of 265-465 Volts and an impulse spark over range of <265-700 Volts. The 5-Pin protector must be marked as a “special circuit” consistent with the marking protocol in the users network.

Network equipment and components along the powering circuit shall have suitable insulation resistance at 200 Vdc from each conductor to ground and a total insulation resistance suitable for 400 Vdc from line to line.

3 Ordering

Ordering Guide

This is a short list of items that can be purchased as part of a CPS800U system.

CPS800U - UPSTREAM +/- 190V

Items for new installation or growth of existing installations		
CODE	COMCODE	DESCRIPTION
QS912C	CC109134912	Converter Shelf with Alarm Module (provides pigtailed inputs and outputs)
QS982A	108996641	Converter Card (For first install on single shelf systems the sum of converters cards and converter slot fillers should be 16. For example: 14 Converter cards and 2 Converter slot fillers)
	CC109121992	Converter slot filler
	CC848814104	Extra rack ear with same setback as right rack ear
	CC848827535	Bracket that bridges two QS912 shelves together to fit in a 19 inch rack. To create a 19 inch system order one of these and two extra rack ears (CC848814104)
Spares: Items for repair or maintenance of existing installation		
CODE	COMCODE	DESCRIPTION
QS920A	CC109102118	Alarm Module (Spare) Note: Faceplate with LED identifiers will need to be transferred from the Alarm Card that comes included with each shelf

Note: For use in customer premise rather than outdoor cabinet environments a baffle must be placed above the topmost converter shelf for UL safety compliance.

4 Safety

Safety Statements

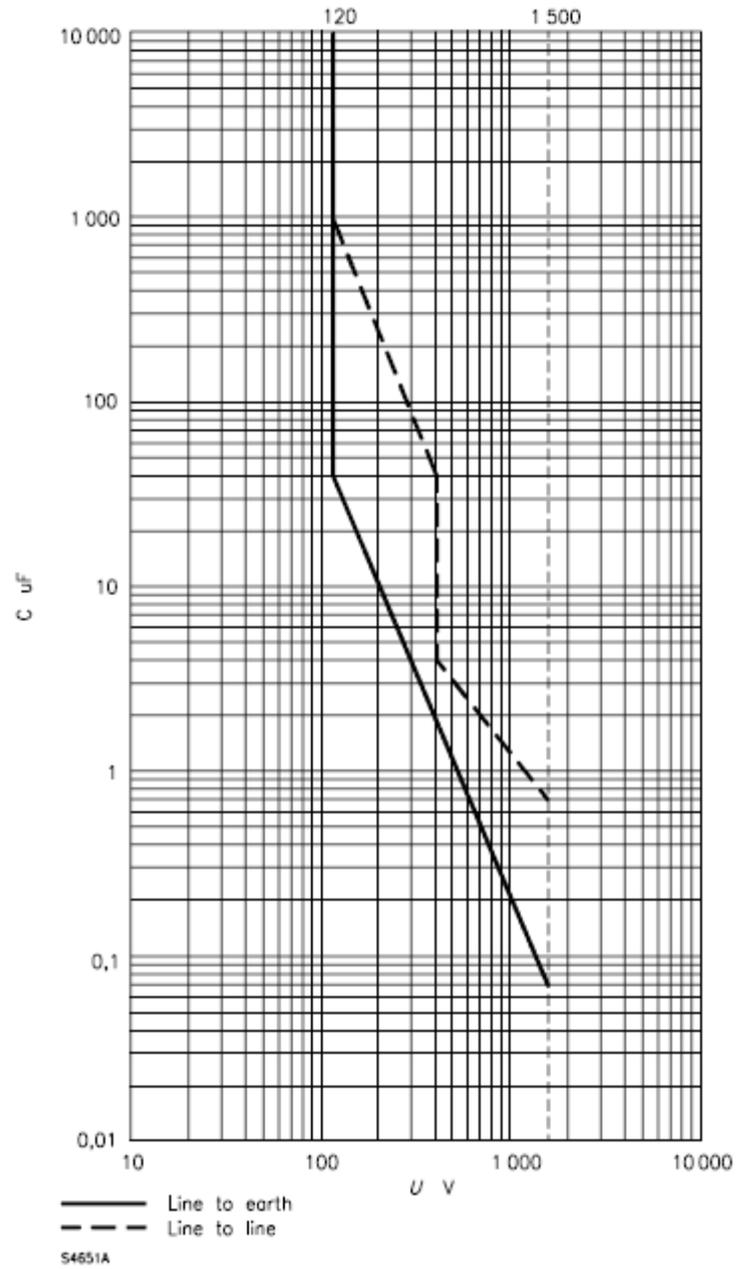
Please read and follow all safety instructions and warnings before installing, maintaining, or repairing the CPS800U System:

- The CPS800U platform is Underwriters Laboratories (UL) Listed per UL60950-21.
- CPS800U shelves have high, current limited, voltages on the output connectors with ground fault protection.
- For the product to be safe the chassis must be grounded by a permanent means.
- The return conductor of the -48V shall be earthed.
- Install only in restricted access areas (dedicated equipment rooms, equipment closets, or the like) in accordance with articles 110-16, 110-17, and 110-18 of the U.S. National Electric Code (NEC), ANSI/NFPA No. 70, and pursuant to applicable local codes.
- The telecommunication line cable, carrying the +/-190V, shall be minimum 26 AWG, and rated minimum 200V. Consideration shall be taken at the time of installation to verify cable rating.
- Primary protection must be provided on all the telecommunication line cable consistent with UL 497.
- Airflow must be provided at a rate of 175 lfm across the entire cross section of the shelf for operation in environments up to 65 C. Additional airflow must be provided for temperatures above 65 C.
- This equipment is to be used in controlled environments (an area where the humidity is maintained at levels that cannot cause condensation on the equipment, the contaminating dust is controlled, and the steady-state ambient temperature is within the range specified).

This equipment has been evaluated for continuous use in ambient temperature from -40°C to 65°C when used with the QS982A converters.

- This equipment must not be installed over combustible surfaces.
- For installations in the United States, Listed compression connectors are to be used to terminate Listed field-wired conductors where required. For all installations, the appropriate connector is to be applied only to the correct size conductor as specified by the connector manufacturer, using only the connector manufacturer's recommended tooling or tooling approved for that connector.
- If the proper connector for the country of installation is not provided, obtain appropriate connectors and follow manufacturer's and all local requirements for proper connections. All national and local rules and regulations should be followed when making field connections.

- The subject product is not provided with a dc mains disconnect. Provision for mains disconnect such as branch circuit breakers shall be provided by the end product installation.
- The main output voltage (+/-190V) meets UL60950-21RFT-V requirements. DO NOT CONNECT TO RFT-C CIRCUITS.
- Insulation on field-wired conductors should be rated no less than 90° Celsius. Wire conductor size should be sized per electrical codes for 75° Celsius wire, and based on the ampacity of the associated protection device. Wiring internal to enclosed equipment cabinets should be rated at 105° Celsius (minimum).
- Torque electrical connections to the values specified on labels or in the product documentation.
- Battery input cables must be dressed to avoid damage to the conductors (caused by routing around sharp edges or routing in areas where wires could get pinched) and undue stress on the connectors.
- Alarm contacts on the office alarm connector (J1) are not fused within the distribution panel; therefore, current limiting protection for these contacts must be provided by external circuits. Maximum ratings for alarm connections are 60Vdc and 0.5 amperes. Exceeding these maximum ratings could result in fire or damage to the unit.
- Fuse and/or circuit breaker loads must not exceed 80% of the fuse and/or circuit breaker current rating. Distribute loads across the panel.
- The short circuit current capability of the battery input to the panel must not exceed 10,000A.
- DC branch circuits to this equipment must be protected with either fuses or circuit breakers. Refer to the equipment ratings to assure rating of equipment will not exceed 80% of the value of the protector chosen.
- For applications in cabinets, huts, vaults, and central offices, the CPS800U mounting framework must be connected to the system integrated ground grid.
- Installing fuses or circuit breakers not specified for use in these modules may result in injury to service personnel or equipment damage. Use only replacement parts listed in this manual and on the equipment drawings.
- The telecom-type (e.g., GMT type) fuses can produce sparks during interruption or clearing of a fault on a high energy circuit. Use only fuses provided with safety caps for this type of circuit. Installing telecom-type fuses not equipped with safety caps may result in injury to service personnel.
- The designed capacitance between +/-190V RFT-V conductors is 2.2uF and the measured capacitance between +/-190V and earth is 4.4uF. DO NOT add capacitance to the system to reach values that exceed safety limits per the following figure:

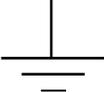


Key

U Voltage of the RFT CIRCUIT

Warning Statements and Safety Symbols

The symbols may sometimes be accompanied by some type of statement; e.g., “Hazardous voltage/energy inside. Risk of injury. This unit must be accessed only by qualified personnel.” Signal words as described below may also be used to indicate the level of hazard.

DANGER	Indicates the presence of a hazard that will cause death or severe personal injury if the hazard is not avoided.
WARNING	Indicates the presence of a hazard that can cause death or severe personal injury if the hazard is not avoided.
CAUTION	Indicates the presence of a hazard that will or can cause minor personal injury or property damage if the hazard is not avoided.
	This symbol identifies the need to refer to the equipment instructions for important information.
	These symbols (or equivalent) are used to identify the presence of hazardous ac mains voltage.
	This symbol is used to identify the presence of hazardous ac or dc voltages. It may also be used to warn of hazardous energy levels.
	One of these two symbols (or equivalent) may be used to identify the presence of rectifier and battery voltages. The symbol may sometimes be accompanied by some type of statement, for example: “Battery voltage present. Risk of injury due to high current. Avoid contacting conductors with uninsulated metal objects. Follow safety precautions.”
	One of these two symbols may be used to identify the presence of a hot surface. It may also be accompanied by a statement explaining the hazard. A symbol like this with a lightning bolt through the hand also means that the part is or could be at hazardous voltage levels.
	This symbol is used to identify the protective safety earth ground for the equipment.
	This symbol is used to identify other bonding points within the equipment.
	This symbol is used to identify the need for safety glasses and may sometimes be accompanied by some type of statement, for example: “Fuses can cause arcing and sparks. Risk of eye injury. Always wear safety glasses.”

Precautions

When working on or using this type of equipment, the following precautions should be noted:

- This unit must be installed, serviced, and operated only by skilled and qualified personnel who have the necessary knowledge and practical experience with electrical equipment and who understand the hazards that can arise when working on this type of equipment.
- The equipment could be powered by multiple dc inputs. Ensure that the appropriate circuit protection device for each dc input being serviced is disconnected before servicing the equipment. Do not disconnect permanent bonding provisions unless all dc inputs are disconnected.
- DC inputs may be connected in parallel to power the dc-dc converters. Disconnecting one dc input will not necessarily remove power from the bus. Make sure all battery power sources are also disconnected and/or follow safety procedures while working on any equipment that contains hazardous energy/voltage.
- Hazardous energy and voltages are present in the unit and on the interface cables that can shock or cause serious injury. Follow all safety warnings and practices when servicing this equipment. When equipped with QS982A modules, hazardous voltages (+/-190Vdc) will be present on the output connectors and associated interconnection cables.

In addition to proper job training and safety procedures, the following are some basic precautions that should always be used:

- Use only properly insulated tools.
- Remove all metallic objects (key chains, glasses, rings, watches, or other jewelry).
- Wear safety glasses. Fuses can produce sparks. High energy levels on buses and distribution components can produce severe arcing.
- Do not rely on simple volt meter tests to determine if the +/-190V output circuit is off line. Physically break the circuit by removing the associated QS982A converter before touching the +/-190V RFT-V circuit. Confirmation test each circuit for 5 seconds before touching. In some line fault modes, power is cycled on every 4 seconds. The presence of a fault may make it difficult to determine if the circuit is online. Always physically break the circuit.
- Lock out and tag circuit breakers/fuses when possible to prevent accidental turn on.
- Be aware of potential hazards before servicing equipment.
- Identify exposed hazardous electrical potentials on connectors, wiring, etc. (note the condition of these circuits, especially wiring).
- Use care when removing or replacing covers; avoid contacting circuits.

5 Pre-Installation

CPS800U Installation

Purpose

CPS800U Shelf Installation guide for generic installations. Additional requirements are needed for application specific installations. Refer to Appendix A for spacing requirements.

Audience

Field application personnel.

Precautions

Read Safety section prior to installation.

Observe ESD protection while installing circuit packs

Safety

- Always consider personal safety.
- Make sure the system is properly grounded per the National Electrical Code and local building codes.
- Remove all metal jewelry before beginning the installation.

Installation Tools

- A Complete Standard Insulated tool set
- Wire cutters and strippers
- Heat shrink gun
- Torque wrench (0-240 in-lb / 28 Nm)
- Digital meter, +/- 0.02%
- Screw Drivers (flat-blade and Phillips)
- ESD wrist strap

System Identification

Identify the product you have received. Make sure to select procedural steps to match the product you have.

6 Installing the Shelf Level Upstream Product

Unpacking Shelf Level Upstream Product

Make sure the framework has the space and the airflow to provide an acceptable operating environment for the CPS800U shelf. Then unpack the equipment.

Step	Action
1.	Before opening the packaging, carefully inspect the outside in the presence of shipping personnel for signs of damage.
2.	Carefully open the packaging to verify that the contents are complete and undamaged.
3.	If damaged, follow the shipping carrier's procedure for filing a damage claim.
4.	Save the shipping package until all parts are operating within specifications. If the equipment must be returned, it should be repacked in the original shipping crate.

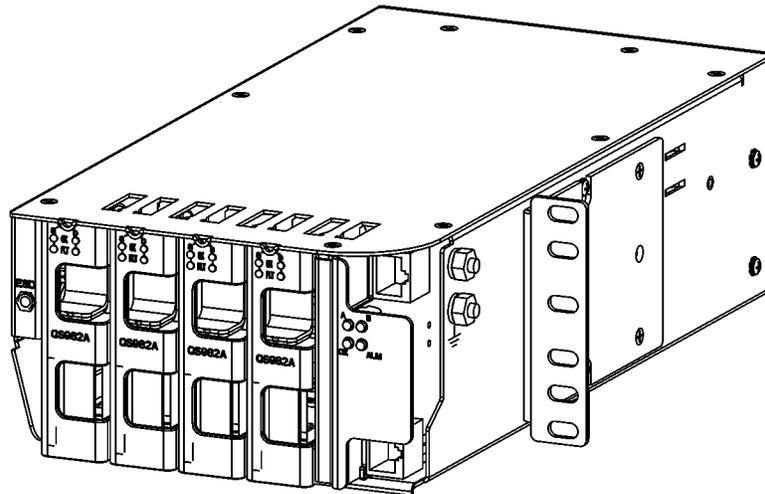
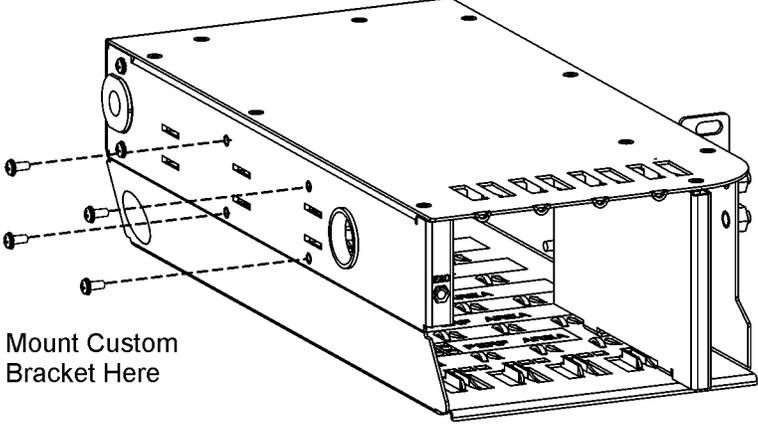
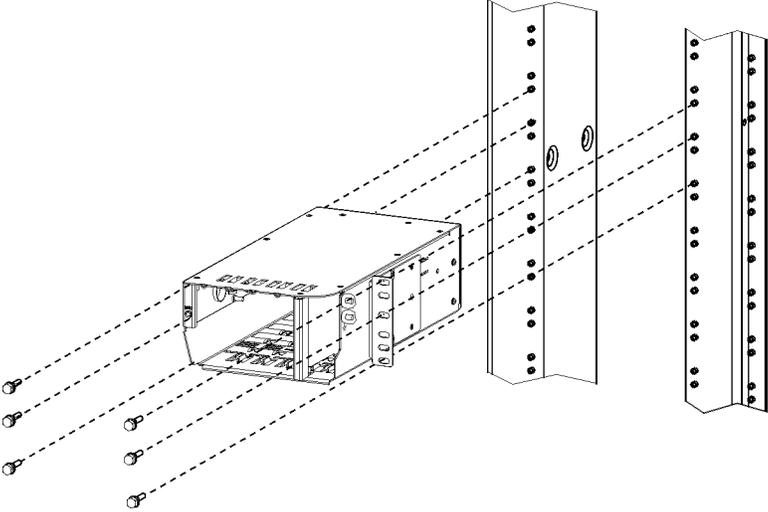


Figure 6-1: QS912C Converter Shelf
(Shown configured with 4 operational circuits and 0 slot fillers for airflow control)

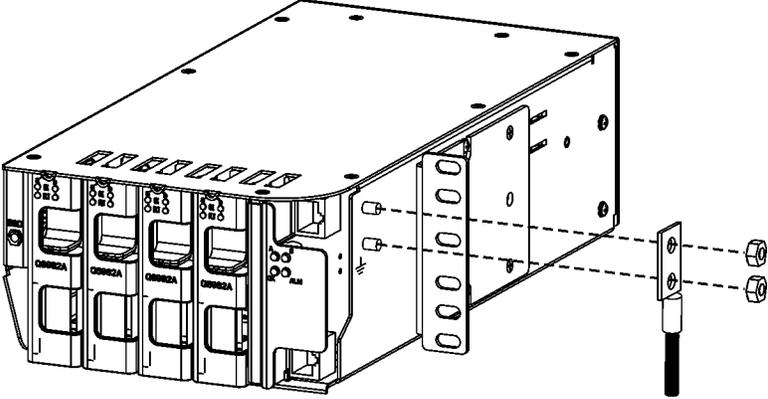
Install the CPS800U Shelf

Position the Shelf and mechanically attach it to the frame

Step	Action
1.	<p>Attach the left hand bracket of your choosing using 6-32 screws 3/8 inch maximum length.</p>  <p>Mount Custom Bracket Here</p> <p>Figure 6-2: Provide support for the left hand side of the shelf</p>
2.	<p>Locate the 2 mounting brackets, one on each side of the CPS800U shelf; align the holes in the shelf-mounting bracket with the holes in the mounting frame. Attach the brackets to the frame using two screws per frame as shown.</p>  <p>Figure 6-3: Mount the Shelf</p>
3.	Torque each of the fasteners to 4 Nm or 35 in-lbs.

Ground the Shelf

The next step is to ground the shelf to earth ground. This is an important safety step since each converter relies on this connection for proper ground fault detection.

Step	Action
1.	<p data-bbox="602 472 1243 499">Run and connect the framework ground lead as shown.</p>  <p data-bbox="800 976 1247 1003">Figure 6-4: Grounding BDFB Shelves</p>
2.	<p data-bbox="602 1047 1084 1075">Torque connections to 4 Nm or 35 in-lbs.</p>

Connect the J100 and P700 Wiresets

1. Make sure the DC connections to be installed are not powered by turning off circuit breakers assigned to equipment and checking with an Ohm meter.
2. Locate the input (P700) and output (J100) pigtails as shown below. Additional cutouts are available for field wiring in other directions.

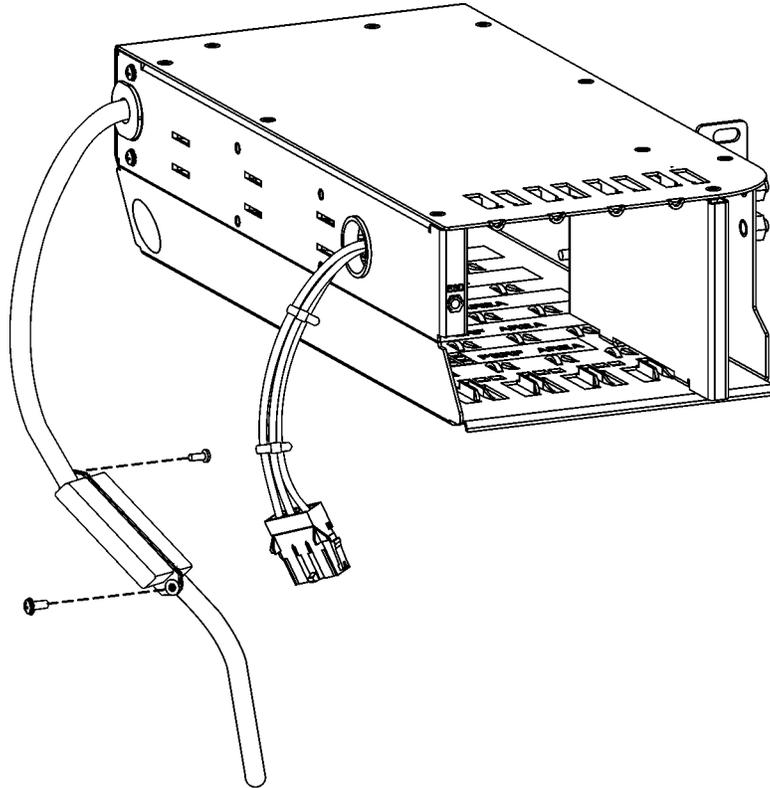


Figure 6-4: Locate the input (P700) and output (J100) pigtails

3. Attach the load wiring by plugging the J100 connector to its mate in the cabinet that runs to the 5-pin protector blocks. See reference section for load wiring pin construction details.

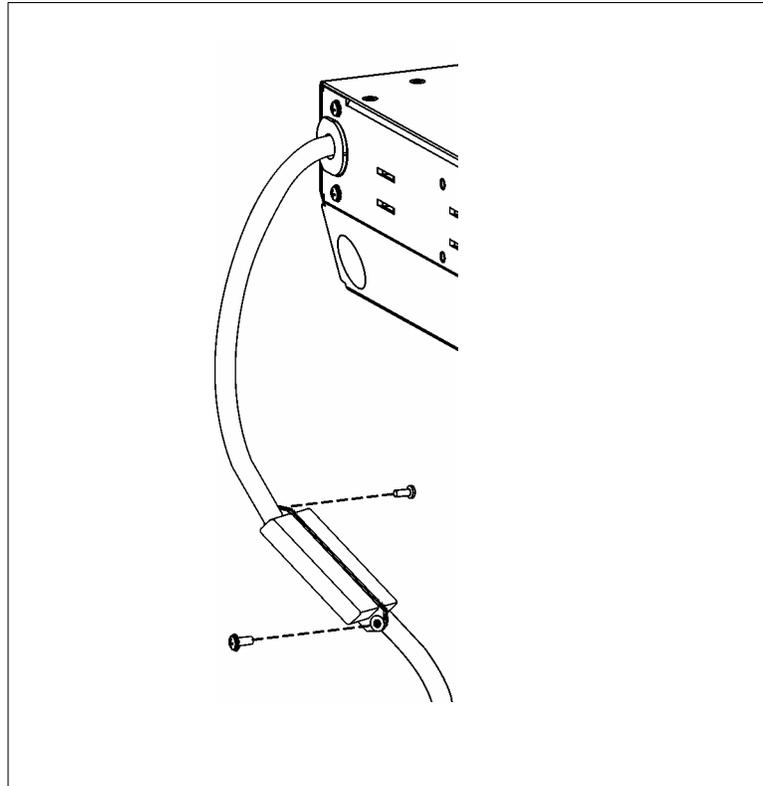


Figure 6-5: Mate the J100 Output Connector

4. Tighten both securing screws until both ends of the connector are fully seated.

5. Run one or two 30 Amp DC branch circuits from the DC power source to the DC input pigtail, P700. Plug the connectors together as shown:

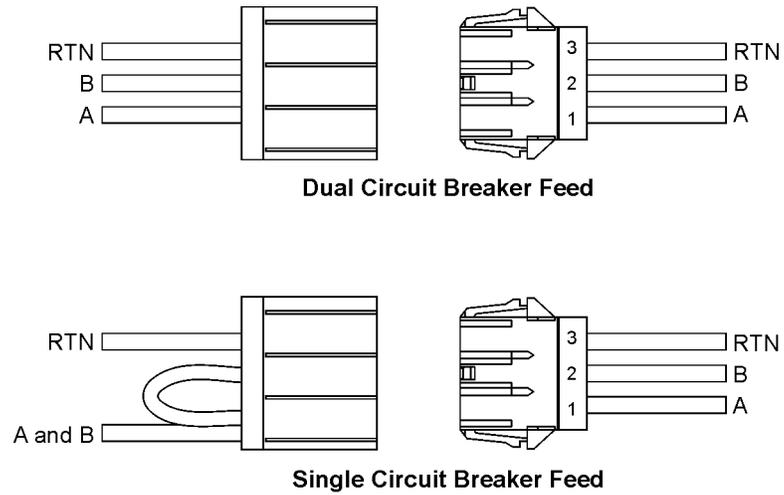


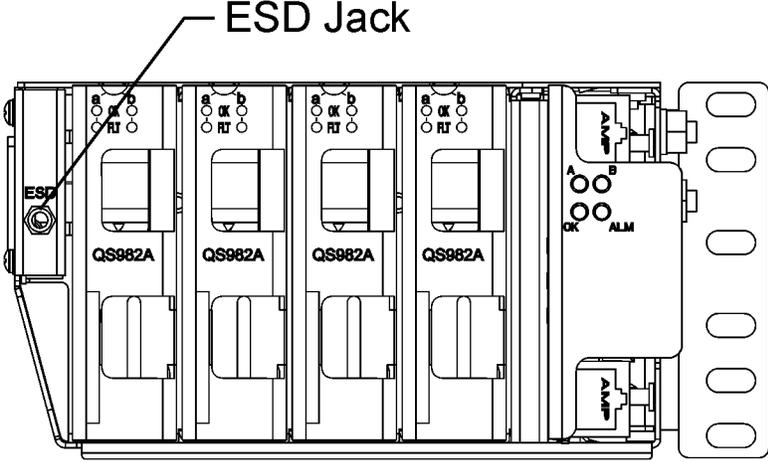
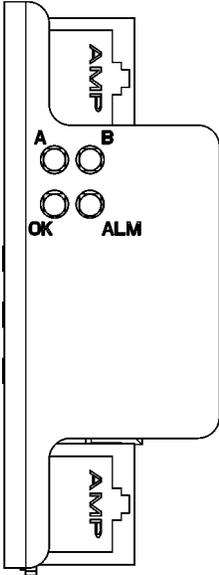
Figure 6-6: P700 Wiring Options

The connector on the left above comes from the DC source. The connector on the right goes to the CPS800 shelf.

6. Plug the cables together, checking to see that the integral latch is engaged.

Set Shelf ID and Attach Alarm Wiring

For systems where alarming is processed through a central controller using serial communications, each shelf must have a unique address. **Warning: You must properly protect yourself against ESD discharge prior to accessing the alarm card and setting shelf IDs.**

Step	Action
1.	<p>Take ESD precautions by grounding yourself using the ESD Jack provided.</p>  <p>The diagram shows a shelf with an ESD Jack on the left side, indicated by a line and the label 'ESD Jack'. The shelf contains four QS982A cards. On the right side of the shelf, there are two alarm cards, each with terminals labeled A, B, OK, and ALM.</p> <p style="text-align: center;">Figure 6-7: ESD Jack</p>
2.	<p>Remove the alarm card.</p>  <p>The diagram shows the front view of an alarm card. It has two AMP connectors at the top and bottom. Between the connectors are four terminals labeled A, B, OK, and ALM.</p> <p style="text-align: center;">Figure 6-8: Alarm Card Front View</p>

3. Use a Phillips Head screw driver to set the shelf address rotary switch to indicate a shelf ID. At publication date the dip switch settings should be 4, 0, 0 as shown here:

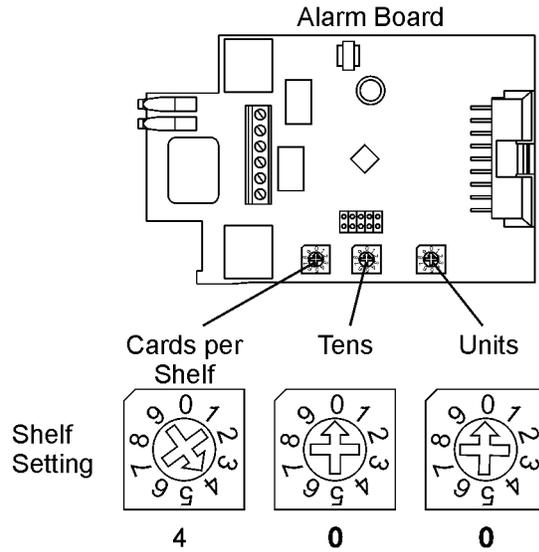


Figure 6-9: Setting Shelf ID

4. If local contact closures are also desired continue with Attach Alarm Wiring, otherwise reinstall alarm card.

Attach Alarm Wiring

Each CPS800U Shelf Provides Alarm contact closures for Power Major and Power Minor. Wire these relays into the alarm network.

Step	Action
5.	<p>Attach the required alarm leads to the office alarm screw terminals (TB1 on the alarm card) as designated.</p> <div style="text-align: center;"> <p>The diagram shows a terminal block labeled TB1 with six screw terminals numbered 1 to 6 from bottom to top. To the left of the terminals, two groups of three terminals are bracketed. The top group, labeled PMN, includes terminals 4, 5, and 6, with labels 'Close on Alarm', 'Return', and 'Open on Alarm' respectively. The bottom group, labeled PMJ, includes terminals 1, 2, and 3, with labels 'Close on Alarm', 'Return', and 'Open on Alarm' respectively. An arrow points from the TB1 terminal block to a corresponding terminal block on the Alarm Board, which is shown as a schematic of a circuit board with various components.</p> </div> <p style="text-align: center;">Figure 6-10: Office Alarm Pin Outs</p>
6.	Reinstall Alarm card.

7 Inspect the Network

Check and Mark Wiring Compliance

The CPS800U +/-190V system is classified as an A2 circuit tested according to GR-1089-CORE Issue 3. As such, each location in the network where the output is available to be touched must be protected and marked as an A2 voltage.

Step	Action																
1.	<p>Is accessibility to the circuit throughout the network consistent with A2 requirements?</p> <p>Table 7-1 Accessibility to Continuous Class-A Voltages</p> <table border="1" data-bbox="496 743 1360 1115"> <thead> <tr> <th data-bbox="496 743 667 825">Voltage Class</th> <th data-bbox="667 743 911 825">General Public</th> <th data-bbox="911 743 1138 825">Employees</th> <th data-bbox="1138 743 1360 825">Craftspersons</th> </tr> </thead> <tbody> <tr> <td data-bbox="496 825 667 915">A1</td> <td data-bbox="667 825 911 915">Restricted Access</td> <td data-bbox="911 825 1138 915">Exposed</td> <td data-bbox="1138 825 1360 915">Exposed</td> </tr> <tr> <td data-bbox="496 915 667 1005">A2</td> <td data-bbox="667 915 911 1005">Inaccessible</td> <td data-bbox="911 915 1138 1005">Restricted Access</td> <td data-bbox="1138 915 1360 1005">Exposed</td> </tr> <tr> <td data-bbox="496 1005 667 1115">A3</td> <td data-bbox="667 1005 911 1115">Inaccessible</td> <td data-bbox="911 1005 1138 1115">Inaccessible</td> <td data-bbox="1138 1005 1360 1115">Restricted Access (Exceptions)</td> </tr> </tbody> </table>	Voltage Class	General Public	Employees	Craftspersons	A1	Restricted Access	Exposed	Exposed	A2	Inaccessible	Restricted Access	Exposed	A3	Inaccessible	Inaccessible	Restricted Access (Exceptions)
Voltage Class	General Public	Employees	Craftspersons														
A1	Restricted Access	Exposed	Exposed														
A2	Inaccessible	Restricted Access	Exposed														
A3	Inaccessible	Inaccessible	Restricted Access (Exceptions)														
2.	Is the 5-pin protector marked as a special circuit?																
3.	Does the 5-pin protector protect each pair to a level corresponding to a CommScope 3C*EW Gas tube primary protector? This protector has a voltage breakdown range of 265-465 Volts and an impulse spark over range of <265-700 Volts. Protectors with a lower voltage breakdown rating will be problematic.																

To meet UL60950-21 specific procedural steps must be taken at the time of installation. This section goes through those steps. These steps should be performed before power is distributed in the network. Normally the final step is performed by closing the circuit using a 5-pin protector after DC power is applied to the system.

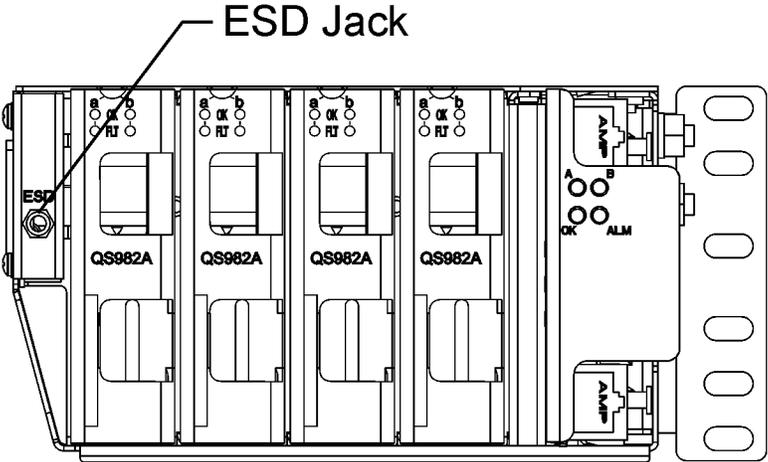
Step	Action
1.	Recognize that the Remote Feed Telecommunication Voltage limited (RFT-V) circuit is voltage limited to +190V and -190V from ground.
2.	Is the total capacitance to ground on each line of the circuit less than 10 μ F? The QS982A introduces 4.4 μ F. The remote electronics and line must introduce less than 5.6 μ F of capacitance. .
3.	Is the total capacitance line to line of the circuit less than 40 μ F? The QS982A introduces 2.2 μ F. The remote electronics and line must introduce less than 37.2 μ F of capacitance from tip to ring.
4.	Is the remote equipment also a RFT-V voltage limited circuit? Both ends of the circuit must be designed to the same standard. This must be verified before the equipment is connected together.
5.	Is the voltage rating of the Network Wiring sufficient to support 190V to ground?
6.	Is the chassis of the system bonded to ground? Verify by both observation and measurement before powering the system.
7.	Test each circuit by powering an open circuit at the remote end of the wire with a QS982 output. If red lights do not flash, there is no leakage path to ground at operating voltage. If the FLT light does not blink yellow, there is no hard short between tip and ring.

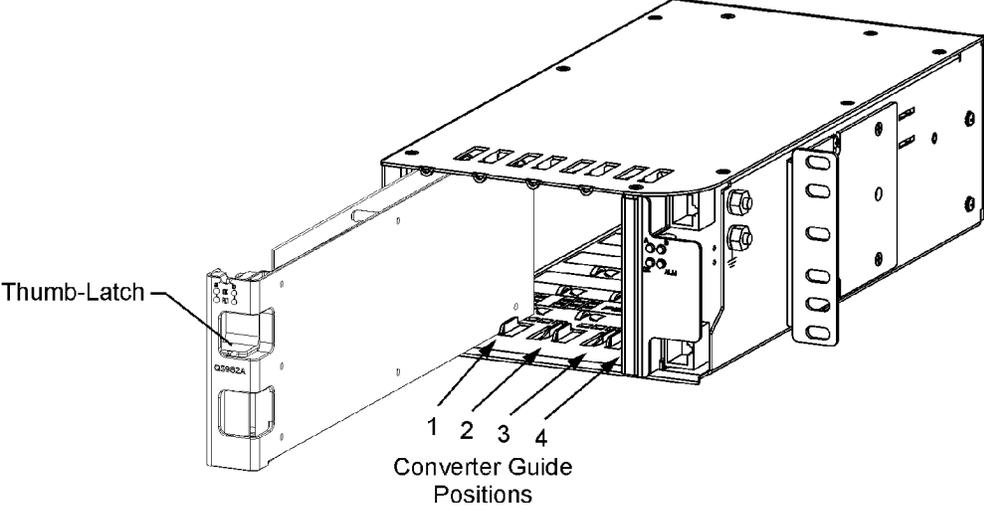
8 Final Installation

Installing the Converters

QS982A Converter Installation

QS982A Converters mount in the CPS800U shelf. Note that Converter Card numbering starts from the left and should be correlated to the marking on the panel located on the other end of the load cable that plugs into J100. This may be a cross connect panel or the 5-pin protector block near the cabinet entrance.

Step	Action
1.	Warning: You must properly protect yourself against ESD discharge prior to installing the QS982A Controller.
2.	Use the ESD jack on the left of each converter shelf to provide grounding before removing the QS982A converters from their anti-static wrap: <div style="text-align: center; margin-top: 20px;">  </div> <p style="text-align: center; margin-top: 10px;">Figure 8-1: Shelf Level ESD Jack</p>

3.	Remove the QS982A converter from its shipping container.
4.	Align the converter with the plastic converter housing on the right and insulated circuit board on the left.
5.	<p>Guide the converter into the first available slot by positioning the plastic converter housing in the notch on the top right edge of the opening.</p>  <p style="text-align: center;">Figure 8-2: Installing Converters</p>
6.	Slide the converter into the shelf until it is fully seated in the connector on the rear of the CPS800U shelf.
7.	Push the display faceplate into the shelf until the latch on the top of the converter housing catches.
8.	Repeat this process as needed for your application.
9.	Insert empty slot fillers into all unused slots to control airflow in multi-shelf systems as required by the cabinet application.

Apply DC Power

Apply DC power by turning on input fuses or circuit breakers. Power the system fan and the converter shelf simultaneously. The system will operate from voltages between -40 and -60 volts with normal status at feed voltages between -52 Volts and -54.5 Volts.

Complete UL 60950-21 step 7 under *Inspect the Network* to test each circuit after DC power is applied.

Recognizing Normal States

Once power is provided to the CPS800U system the LEDs on the converters will illuminate. Understanding what the LEDs mean allows one to recognize normal states and diagnose abnormal states.

Step	Action
1.	Observe the LEDs.
2.	Use the state table below to determine the state of the system and required corrective actions if needed.

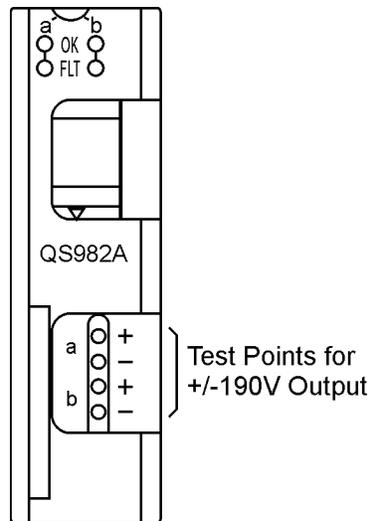
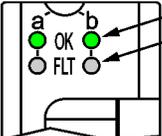
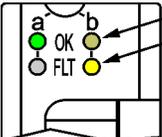
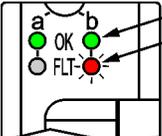
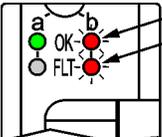
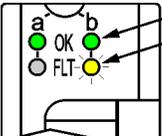
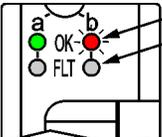
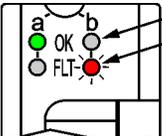
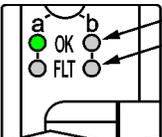
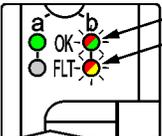


Figure 8-3: QS982A Faceplate and LEDs
(Note: Test points work best if each voltage is measured with respect to ground)

QS982A LED Information Map

Examples in the table are shown for conditions on the b circuit of the QS982A card. The same reasoning applies when the a circuit LEDs are illuminated.

LED Display	Conditions (on b circuit)	Action Required
 <p>Green Off</p>	All OK	None
 <p>Off Yellow</p>	Circuit Placed in Standby	None depending on desired state of circuit b. Standby state can be set using the QS941 controller or web browser.
 <p>Green Red Blinking</p>	Loss of comm.	Check seating on Alarm card and converter card
 <p>Red Blinking Red Blinking</p>	Ground fault	Check 5 pin protectors and faults to ground
 <p>Green Yellow Blinking</p>	Overcurrent or under voltage	Check output lines for shorts to each other
 <p>Red Blinking Off</p>	OV or internal failure	Replace unit
 <p>Off Red Blinking</p>	Thermal Alarm	Solve Thermal problem
 <p>Off Off</p>	card not powered or input fuse failure	Check source voltage
 <p>Red/Green Alternating Red/Yellow Alternating</p>	Lamps test requested from controller	Observe Lamp Test

Confirm Operation of Alarm Wiring

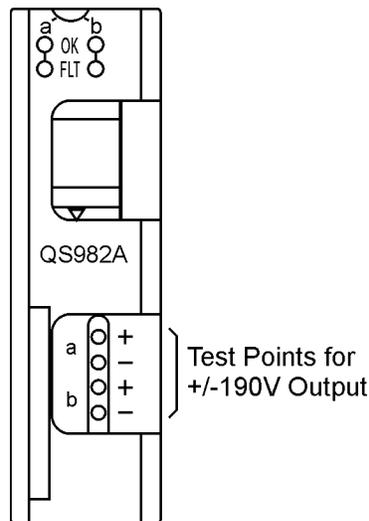
After the converters are recognized to be in a normal state, one should confirm the proper operation of the alarm contact closures. If alarm wiring is correct:

1. The loss of A or B input power should result in the assertion of a Power Minor.
2. The loss of both A and B input power, which will result in a loss of service, should result in a Power Major and a Power Minor.

9 Reference Information

Overview

This section contains additional information (connector pin designations, etc.) that may be required for making, customizing, or troubleshooting system connections.



QS982A Converter LED Information Map

Action Required	OK LED	Fault LED	Conditions	Notes
None	Green	Off	All OK	
Verify circuit configuration	Off	Yellow	Standby	Standby can be set using the QS941 controller display or remotely using a web browser.
Check seating on Alarm card and converter card	Green	Blink Red On ½ second, Off ¼ second	Loss of comm.	
Check 5 pin protectors and faults to ground	Red Blink	Red Blink	Ground fault	
Check output lines for shorts to each other	Green	Yellow Blink	Overcurrent or under voltage	
Replace unit	Red Blink	Off	OV or internal failure	
Solve Thermal problem	Off	Red Blink	Thermal Alarm	Latch off after 3 retry cycles
Check source voltage	Off	Off	card not powered or input fuse failure	
Observe Lamp Test	Bi-Color: 4.5 seconds on, 4.5 seconds on and 1 second off	Bi-Color: 4.5 seconds on, 4.5 seconds on and 1 second off	Lamps test requested from controller	

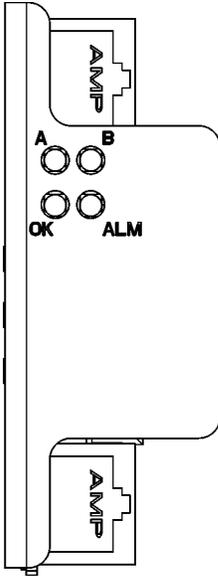
QS982A LED Information Map (visual)

Examples in the table are shown for conditions on the b circuit of the QS982A card. The same reasoning applies when the a circuit LEDs are illuminated.

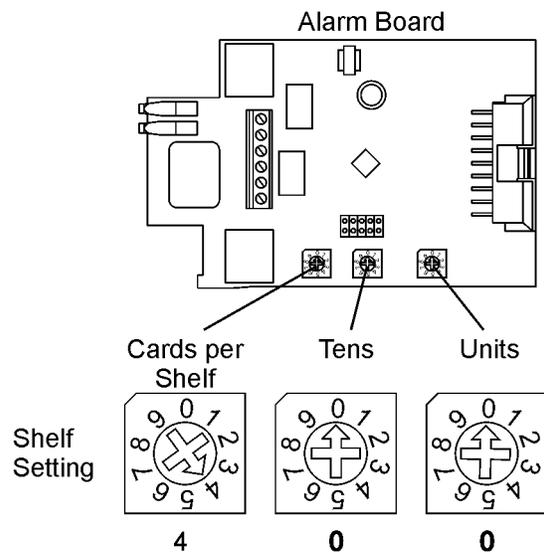
LED Display	Conditions (on b circuit)	Action Required
<p>Green Off</p>	All OK	None
<p>Off Yellow</p>	Circuit Placed in Standby	None depending on desired state of circuit b. Standby state can be set using the QS941 controller or web browser.
<p>Green Red Blinking</p>	Loss of comm.	Check seating on Alarm card and converter card
<p>Red Blinking Red Blinking</p>	Ground fault	Check 5 pin protectors and faults to ground
<p>Green Yellow Blinking</p>	Overcurrent or under voltage	Check output lines for shorts to each other
<p>Red Blinking Off</p>	OV or internal failure	Replace unit
<p>Off Red Blinking</p>	Thermal Alarm	Solve Thermal problem
<p>Off Off</p>	card not powered or input fuse failure	Check source voltage
<p>Red/Green Alternating Red/Yellow Alternating</p>	Lamps test requested from controller	Observe Lamp Test

Alarm Card Information

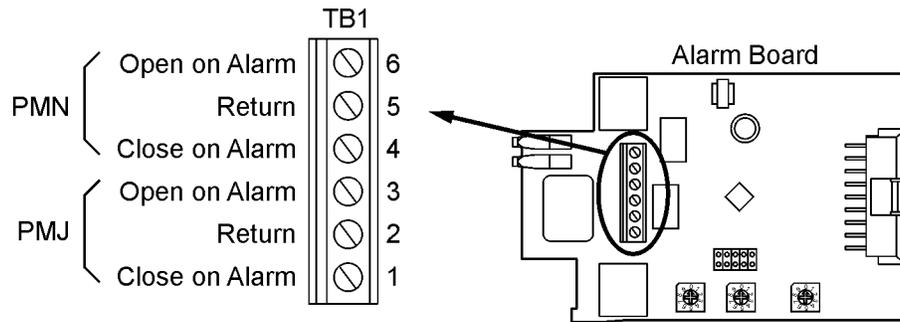
The alarm card faceplate looks like this:



The Shelf ID rotary DIP switches are as shown here:



The Alarm Relays are as shown here:



Office Alarm Pin Outs

This section shows Alarm and LED response for the Alarm Card LEDs and Relays:

CPS800U Shelf Alarm Card State Table

The CPS800U requires one A feed and a one B feed. The alarm card monitors the -48v on each of these two feeds, and asserts alarms and indicators as follows:

	-48V Input Feed		Vin LEDs		STATUS LEDs		ALARM RELAYs	
	A	B	A LED	B LED	OK LED	ALM LED	PMN	PMJ
1	OK	OK	GRN	GRN	GRN	OFF	E	E
2	LOW	OK	RED	GRN	OFF	YEL	D	E
3	OK	LOW	GRN	RED	OFF	YEL	D	E
4	LOW	LOW	OFF	OFF	OFF	OFF	D	D

Alarm Relay: E – Energized relay in non-alarm state; D – De-energized relay in alarm state

Alarm Card Logical Operation of LEDs and Alarm Relays

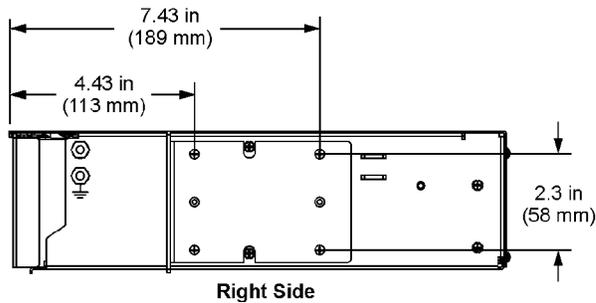
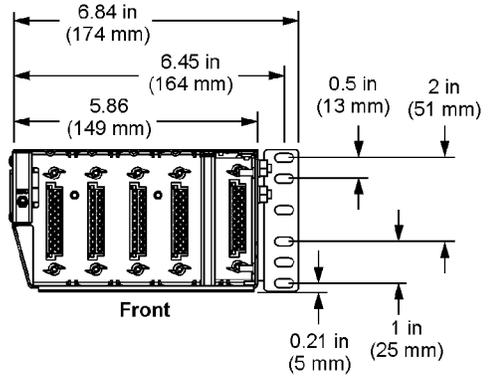
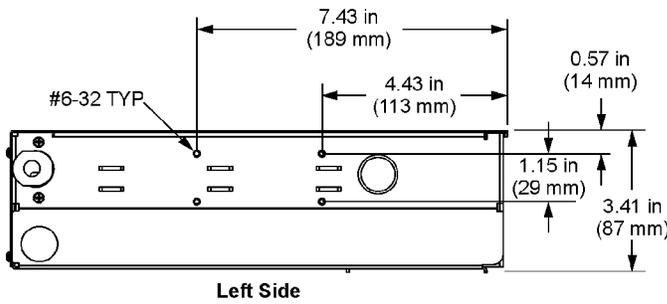
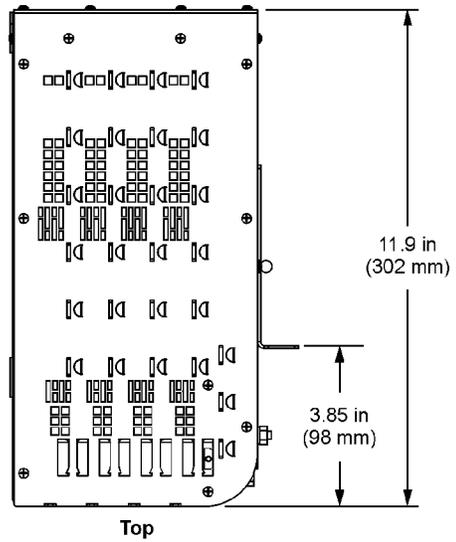
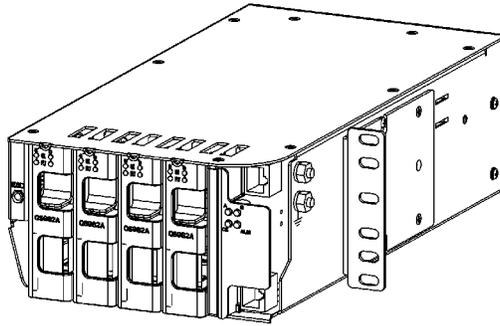
The Alarm Card contains a pair of form C relays to provide shelf PMN and PMJ isolated closures. The relays are energized, from both the A & B input bus, in their non-alarmed state, such that these relays will revert to the alarm state if both A and B input fail. The relay circuit interfaces to a pair of parallel buses connected to each of the 16 Converter/Limiter Cards. Each Converter has an open collector output on the bus, and pulls the bus low to chassis ground when it is asserting an alarm. The PMN/PMJ circuit on the Alarm card recognizes the bus state change and deenergizes the relay. The alarm card separately monitor both the PNM and PMJ bus. When the PMN bus is active (pulled low), the Alarm card asserts a PMN relay and lights the ALM LED Yellow. When the PMJ bus is active (pulled low), the Alarm card asserts a PMJ relay and lights the ALM LED Red. Even though the PNM bus is active, while the PMJ bus is active, the Alarm Card ignores the state of the PMN bus (and not assert a PNM relay/LED action), while an active PMJ is present. This IS necessary since the same LED is used for both Minor (Yellow) and Major (Red) visual indication.

The Alarm Card also monitors the -48V dc inputs and assert PNM/PMJ for conditions as describe in the earlier section dealing with input voltage monitoring.

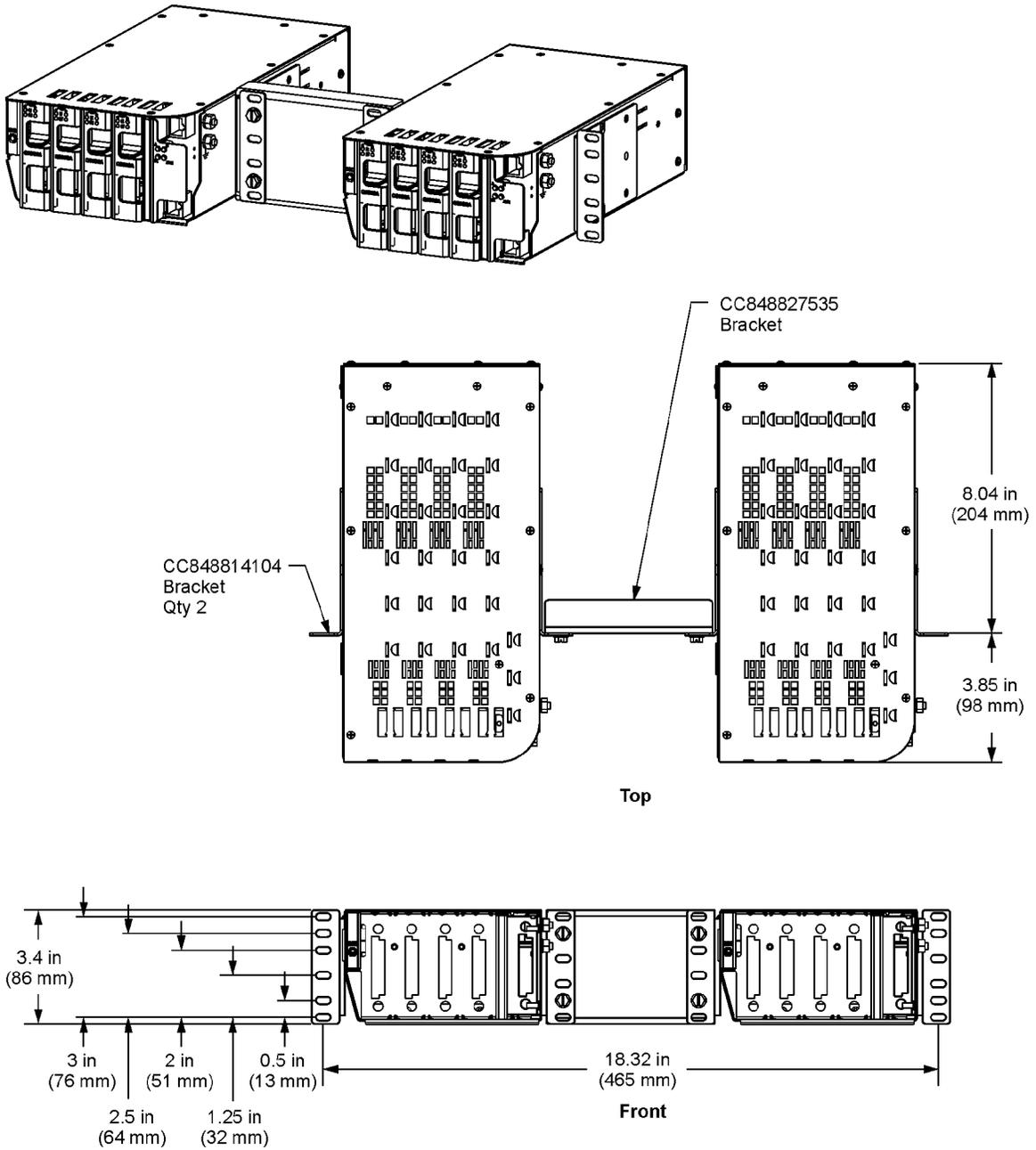
The AC also monitors the two fan tray alarms. When either of the two fan tray alarms is active, the Alarm Card asserts a PMN relay and Yellow ALM LED. When both of the fan tray alarms are active, the Alarm Card shall assert a PMJ relay and Red ALM LED.

The AC shall also monitor its internal I²C to RS-485 conversion processor. A failure of this processor shall constitute a PMN condition.

QS912C Converter Shelf



Two Converter Shelves with 19 inch Mounting Brackets



Output Connector Information (J100)

- The output power is supplied on an pigtail terminated with a covered female gender 50 pin connector: Lineage Power kit Part Number 1-229913-1 for 24-26 gage wire, or 552383-1 for 22 gage wire. The connector is arranged with a right angle housing such that the cable exits to the pin 25, 50 side. (Wire bundle will be dressed toward pins 25 and 50.) See the next page for construction details to make a wireset to mate with this one.

J100 Output Connector					
Conv Out	Pos	Color (optional)	Conv Out	Pos	Color (optional)
1a-	1	BL / W	1a+	26	W / BL
1b-	2	O / W	1b+	27	W / O
2a-	3	G / W	2a+	28	W / G
2b-	4	BR / W	2b+	29	W / BR
3a-	5	SL / W	3a+	30	W / SL
3b-	6	BL / R	3b+	31	R / BL
4a-	7	O / R	4a+	32	R / O
4b-	8	G / R	4b+	33	R / G
spare	9	BR / R	spare	34	R / BR
spare	10	SL / R	spare	35	R / SL
spare	11	BL / BK	spare	36	BK / BL
spare	12	O / BK	spare	37	BK / O
spare	13	G / BK	spare	38	BK / G
spare	14	BR / BK	spare	39	BK / BR
spare	15	SL / BK	spare	40	BK / SL
spare	16	BL / Y	spare	41	Y / BL
spare	17	O / Y	spare	42	Y / O
spare	18	G / Y	spare	43	Y / G
spare	19	BR / Y	spare	44	Y / BR
spare	20	SL / Y	spare	45	Y / SL
spare	21	BL / V	spare	46	V / BL
spare	22	O / V	spare	47	V / O
spare	23	G / V	spare	48	V / G
spare	24	BR / V	spare	49	V / BR
FR GRD	25	SL / V	FR GRD	50	V / SL

Output Connector Information (Mate to J100)

The customer side of the cable should look like this:

Wireset Connector: RJ-21 type 50 pin plug:

- 22 AWG solid or stranded AMP 552173-1 or equivalent.
- 24 AWG solid or stranded or 26 AWG solid AMP 229974-1 or equivalent.
- A complete assembly including connector, strain relief and securing screw is available as 1-229912-1 for 24-26 AWG solid wire or 552382-1 for 22 AWG solid wire.
- The connector shall be arranged with a right angle housing such that the cable exits to the pin 1 side.

Connector for Circuits 1a,b - 4a,b						
Conv Out	Pos	Color		Conv Out	Pos	Color
1a-	1	BL / W		1a+	26	W / BL
1b-	2	O / W		1b+	27	W / O
2a-	3	G / W		2a+	28	W / G
2b-	4	BR / W		2b+	29	W / BR
3a-	5	SL / W		3a+	30	W / SL
3b-	6	BL / R		3b+	31	R / BL
4a-	7	O / R		4a+	32	R / O
4b-	8	G / R		4b+	33	R / G
spare	9	BR / R		spare	34	R / BR
spare	10	SL / R		spare	35	R / SL
spare	11	BL / BK		spare	36	BK / BL
spare	12	O / BK		spare	37	BK / O
spare	13	G / BK		spare	38	BK / G
spare	14	BR / BK		spare	39	BK / BR
spare	15	SL / BK		spare	40	BK / SL
spare	16	BL / Y		spare	41	Y / BL
spare	17	O / Y		spare	42	Y / O
spare	18	G / Y		spare	43	Y / G
spare	19	BR / Y		spare	44	Y / BR
spare	20	SL / Y		spare	45	Y / SL
spare	21	BL / V		spare	46	V / BL
spare	22	O / V		spare	47	V / O
spare	23	G / V		spare	48	V / G
spare	24	BR / V		spare	49	V / BR
*FR GRD	25	SL / V		*FR GRD	50	V / SL

Output Connector Pinout

*EMI performance is enhanced when the output cable shield is grounded only at the CPS3200 end of the shield.

Input Connector Information (P700)

The Customer Side of the P700 input wireset should use these components:

	Description	Manufacturer Part Number
P700	3-position receptacle	Molex Receptacle 42816-0312 with 42815-0011 Contact (10 AWG wire) or 42815-0031 Contact (8 AWG wire)

P700	
Pin	Function
1	A -48V input
2	B -48V input
3	Return

10 Product Warranty

A. Seller warrants to Customer only, that:

- 1 As of the date title to Products passes, Seller will have the right to sell, transfer, and assign such Products and the title conveyed by Seller shall be good;
- 2 During the warranty period stated in Sub-Article B below, Seller's Manufactured Products (products manufactured by Seller), which have been paid for by Customer, will conform to industry standards and Seller's specifications and shall be free from material defects;
- 3 With respect to Vendor items (items not manufactured by Seller), Seller warrants that such Vendor items, which have been paid for by Customer, will be free from material defects for a period of sixty (60) days commencing from the date of shipment from Seller's facility.

B. The Warranty Period listed below is applicable to Seller's Manufactured Products furnished pursuant to this Agreement, commencing from date of shipment from Seller's facility, unless otherwise agreed to in writing:

Warranty Period

Product Type	New Product	Repaired Product*
Central Office Power Equipment**	24 Months	6 Months

* *The Warranty Period for a repaired Product or part thereof is six (6) months or, the remainder of the unexpired term of the new Product Warranty Period, whichever is longer.*

C. If, under normal and proper use during the applicable Warranty Period, a defect or nonconformity is identified in a Product and Customer notifies Seller in writing of such defect or nonconformity promptly after Customer discovers such defect or nonconformity, and follows Seller's instructions regarding return of defective or nonconforming Products, Seller shall, at its option attempt first to repair or replace such Product without charge at its facility or, if not feasible, provide a refund or credit based on the original purchase price and installation charges if installed by Seller. Where Seller has elected to repair a Seller's Manufactured Product (other than Cable and Wire Products) which has been installed by Seller and Seller ascertains that the Product is not readily returnable for repair, Seller will repair the Product at Customer's site.

With respect to Cable and Wire Products manufactured by Seller which Seller elects to repair but which are not readily returnable for repair, whether or not installed by Seller, Seller at its option, may repair the cable and Wire Products at Customer's site.

D. If Seller has elected to repair or replace a defective Product, Customer shall have the option of removing and reinstalling or having Seller remove and reinstall the defective or

nonconforming Product. The cost of the removal and the reinstallation shall be borne by Customer. With respect to Cable and Wire Products, Customer has the further responsibility, at its expense, to make the Cable and Wire Products accessible for repair or replacement and to restore the site. Products returned for repair or replacement will be accepted by Seller only in accordance with its instructions and procedures for such returns. The transportation expense associated with returning such Product to Seller shall be borne by Customer. Seller shall pay the cost of transportation of the repaired or replacing Product to the destination designated by Customer.

- E. Except for batteries, the defective or nonconforming Products or parts which are replaced shall become Seller's property. Customer shall be solely responsible for the disposition of any batteries.
- F. If Seller determines that a Product for which warranty service is claimed is not defective or nonconforming, Customer shall pay Seller all costs of handling, inspecting, testing, and transportation and, if applicable, traveling and related expenses.
- G. Seller makes no warranty with respect to defective conditions or nonconformities resulting from actions of anyone other than Seller or its subcontractors, caused by any of the following: modifications, misuse, neglect, accident, or abuse; improper wiring, repairing, splicing, alteration, installation, storage, or maintenance; use in a manner not in accordance with Seller's or Vendor's specifications or operating instructions, or failure of Customer to apply previously applicable Seller modifications and corrections. In addition, Seller makes no warranty with respect to Products which have had their serial numbers or month and year of manufacture removed, altered, or experimental products or prototypes or with respect to expendable items, including, without limitation, fuses, light bulbs, motor brushes, and the like. Seller's warranty does not extend to any system into which the Product is incorporated. This warranty applies to Customer only and may not be assigned or extended by Customer to any of its customers or other users of the Product.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. CUSTOMER'S SOLE AND EXCLUSIVE REMEDY SHALL BE SELLER'S OBLIGATION TO REPAIR, REPLACE, CREDIT, OR REFUND AS SET FORTH ABOVE IN THIS WARRANTY.

Appendix A: Operating Temperature Measurement and Vertical Spacing

Overview

The CPS800U has been designed for mounting small outdoor cabinets. It is designed for use with user provided vertical airflow cooling of at least 175 linear feet per minute over the entire flow cross-section of the shelf. Equipment may be placed on top of the CPS800U provided airflow is not impeded or sufficient spacing is provided.

Operating Temperature

The CPS800U is rated to work to 65 C with 175 linear feet per minute of air flow when engineered into a small cabinet application. With additional airflow it can work to 75C.

Slot Fillers

Gaps between the converter shelve and the fan system or absence of slot covers can cause service effecting problems. Please evaluate each application and use slot fillers as the data suggests.

Revision History

Issue 1

