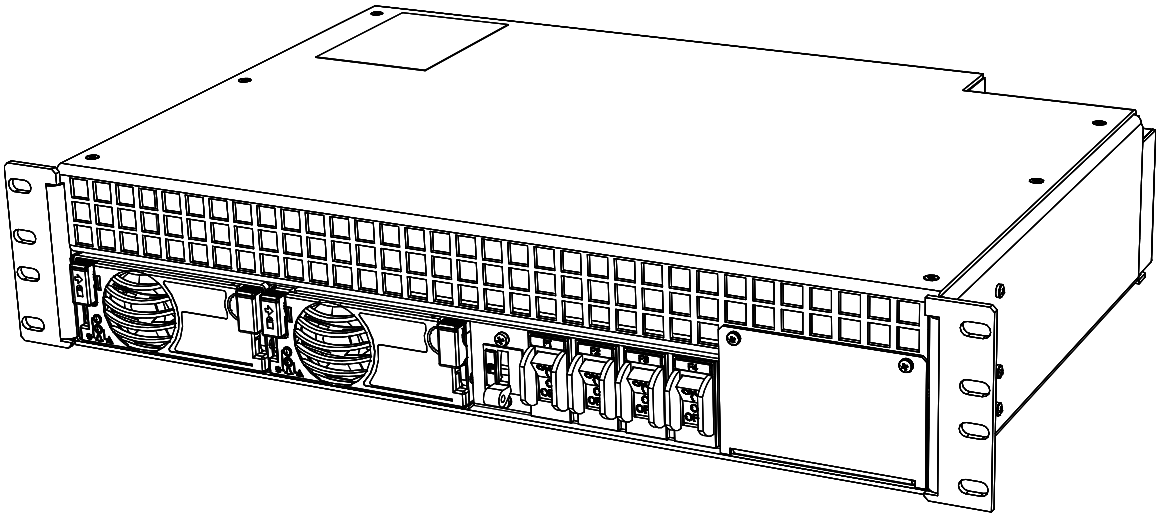
Power Supply System
Aspiro 1U in a 2U Enclosure
Instruction Manual



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1. About This Manual

This chapter contains an overview of the information that is presented in this Power System Manual. This includes information on objectives, the intended audience, and the organization of this manual. In addition, this chapter also defines the conventions used to indicate warnings, cautions and noteworthy information.

1.1 Objectives

This manual describes the Power System, explains how to unpack and install the system, how to perform the initial power-up and operational system check.

The information presented in this document is current as of the publication date.

1.2 Audience

This manual is to be used by installers and technicians who are preparing the site for a new installation and installing the power system. This manual assumes that the technician has an understanding of power systems in general and understands safety procedures for working around AC and DC voltage.

The user of this document should be familiar with electronic circuitry and wiring practices and have some expertise as an electronic, power, or electromechanical technician.

1.3 Document Key

This manual uses the following conventions:

WARNING This symbol indicates a situation that could cause bodily injury. Always be aware of hazardous conditions when working in or around the power system.

CAUTION This symbol indicates a situation that might result in equipment damage. The reader should be aware that their actions could result in equipment or data loss.

NEED MORE INFORMATION? This symbol is used to reference information either in this manual or in another document.

NOTE This symbol means the reader should take note. Notes are helpful suggestions or reminders.

Table 1-1 Abbreviations

Abbreviation	Description
PCC	Prime Controller Card
ACC	Advance Controller Card
LVBD	Low Voltage Battery Disconnection
PLD	Partial Load Disconnection
XR04.48	400 W Rectifier
XR08.48	800 W Rectifier
XPGe12.48	1200 W Rectifier
DB22	Distribution Drawer (4 x load, 1 x battery)

1.4 Feedback & Support

For technical support or feedback, please visit http://www.unipowerco.com/contact/.

Alternatively, email: technical.support@unipowerco.com

1.5 Layout, Numbering and Printing

This manual is intended for two-sided black and white printing. Some pages are intentionally left blank.

1.6 Disclaimer

UNIPOWER is not responsible for system problems that are the result of installation or modification of the instructions provided in this manual.

2.1 Overview

Aspiro DC power systems offer a range of solutions for diverse applications such as broadband access, cable head ends, micro/pico BTS Cells, Enterprise, E911, and GSM-R.

The Aspiro shelf system utilizes efficient, dense, and reliable plug-in rectifier modules XR04.48, XR08.48 or XPGe12.48, with output power available at either 400W, 800W or 1200W per rectifier, based upon a soft-switching approach. Features include wide input operating range, wide operating temperature, full self-protection and three LEDs for immediate rectifier status indication.

The power system can be managed locally through messages and alarm displayed on the LCD screen of the system controller or remotely, using the PC-based PowCom™ software, or through a web browser with Ethernet connection.

2.2 System Configurations

Aspiro 1U system consists of:

1. System Controller (not shown), user defined.
2. 4 x 15A Load and 1 x 40A Battery breakers including LVBD
3. XR04.48 / XR08.48 / XPGe12.48 Rectifiers (Maximum 2), user defined.

CAUTION Do not mix rectifier types in a single system.

4. Rear Connections

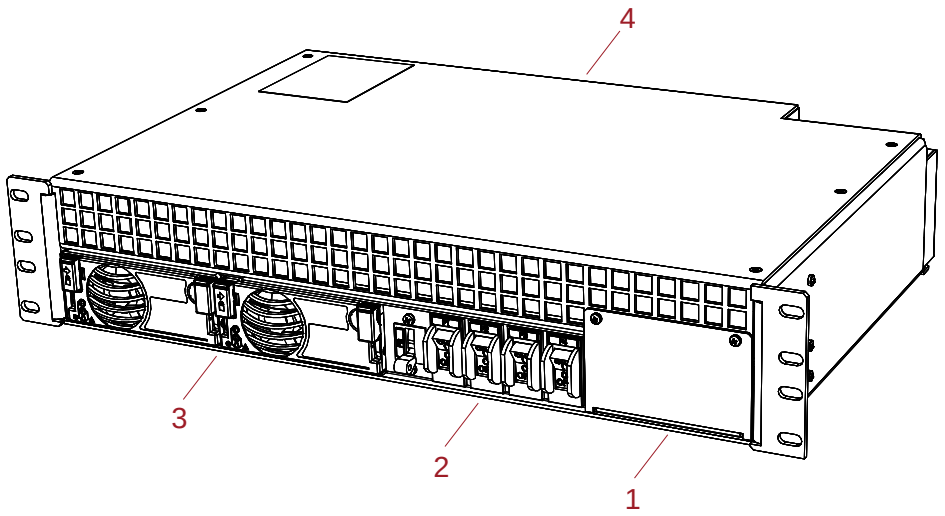


Figure 2-1 Power System Overview

2.3 System Parameters

OUTPUT	
Power (max)	2400W @ >180VAC, 800W @ <180VAC
Output Current	52A max. @ 46VDC, 45A nominal
Voltage	46-57VDC

INPUT	
Voltage Range	85-275VAC (per plug), see rectifier specifications on page 10.
Frequency	50-60Hz
Input Current	<10.5A
Power factor	>0.98

DC DISTRIBUTION	
Battery Breakers	1 x (AIRPAX, IER Series)
Ratings	40A
Load Breakers	4 x (NADER NDB3 Series)
Ratings*	15A

MONITORING AND CONTROL	
Controller	None, PCC or ACC Extended (ACX)
Local Interface	4 x 20 LCD, 4-key menu, USB (ACC only) and RS232
Remote Interface	Ethernet / Modem using PowCom™ software
Visual Indication	Green LED - System On Yellow LED - Message(s) Red LED - Alarm(s)
Analog Inputs	12 x voltage inputs (range 0-100VDC) - used for symmetry inputs
Analog Outputs	4 x potential free relays (C, NC, NO)
Digital Inputs	2 x, Logic 0: U<10VDC, Logic 1: U>12VDC
Digital Outputs	2 x, open collector type
Temperature measurement	2 x Temperature probe (Battery, Ambient)

CONNECTIONS	
Battery connections	Anderson power Products SB-50 Blue
AC connections	IEC Power Entry Connector 15A
Load breaker connections	Tyco Electronics Mate - N - Lock 2-position
Alarm connections	Stripped cable with ferule, max. 1.5mm^2, screw type connector

Cooling	Air flow direction front lower (intake) to front upper (exhaust)

* For load breaker derating limitations see chapter 3.2.5 Breakers on page 17.

RECTIFIER MODEL	XPGe12.48	XR08.48	XR04.48
Efficiency	95% typical @ I_{out} nom.	90% typical @ I_{out} nom.	88% typical @ I_{out} nom.
Input Current (max)	<7.3A	<10.5A	<5.3A
Output Current (max) 53.5V float	22.4A	15.0A	7.5A
Output Power	1200W @ >180VAC 600W @ 90-180VAC	800W	400W
Operating Temperature (without derating)	40°C max.	40°C max.	40°C max.
Input Voltage (Nominal 100-240VAC)	90-275VAC	85-275VAC	
Output Voltage	46-57VDC		
Load sharing	< 5% of nominal current		
Dimensions (W x H x D)	40.6 (1.6") x 101.62(4") x 228.5(9") mm		
Weight	1.1 kg		
Cooling	Fan-cooled, speed and alarm controlled, air flow direction rear to front		
Protection	Short circuit proof, automatic current limiting, selective shutdown of modules at excessive output voltage.		
Alarms	High output voltage/ shutdown, Low voltage/ module failure		
LED Indication	Green: Power ON Yellow: Current limit/ thermal protection Fan failure / Over temperature Pre-warning / thermal protection Communication Failure (flashing) Red: Module failure / high output voltage shutdown		
Audible noise	<55dBA according to ISO7779		

MECHANICAL	
Dimensions, inches (mm)	18.89 (480) W x 3.48 (88.4) H x 12.28 (312) D
Weight of the system (fully equipped)	~29lb (13kg)
Mounting Options	19"/ ETSI
Cable Entry	Rear Access

STANDARD COMPLIANCE / ENVIRONMENTAL	
EMC and Immunity	ETSI EN 300 386 V.1.5, FCC part 15, ICES-003 EN 55022 EN 55024, EN 61000-4
Safety	**UL Listed**, EN 60950-1
Operating Temperature	-40°C to +40°C
Storage Temperature	-40°C to +85°C

2.4 System Components

The Aspiro system components are described below and in later chapters of the manual.

2.4.1 System Controller

As standard the system operates without a controller. A cover plate must be installed when using no controller to protect against injuries. The system can also be controlled by the ACC Extended (ACX) or PCC controller. The description and operation of these controllers is covered in separate manuals which are available at:

ACC Extended (ACX): http://www.unipowerco.com/pdf/acc-man.pdf

PCC: http://www.unipowerco.com/pdf/pcc-man.pdf

The system can be remotely managed using UNIPOWER's PowCom™ which works in conjunction with the controller. This is covered in its own manual which is available at http://www.unipowerco.com/pdf/powcom-man.pdf.

2.4.2 DC Distribution

DC Distribution consists of 1 x 40A battery and 4 x 15A load breakers.

The distribution unit is designed for switching the battery and load on and off.

The battery and load breakers are supervised by measuring the voltage drop across each breaker. In the case of load breakers, those which are not connected to any load will not cause a breaker alarm even if they are left open.

A battery fuse alarm is generated after the battery voltage drops below a certain level, depending on the actual battery capacity and condition.

2.4.3 Low Voltage Battery Disconnect (LVBD)

The system is equipped with a low voltage battery disconnect which prevents the batteries from deep discharging, thus prolonging the battery life. The disconnect requires a detected mains failure at the supervision unit (controller).

If disconnection occurs, the batteries will not supply power to the load until they have been recharged to a set voltage level, which can be adjusted by the user.

If disconnection occurs, the batteries will be reconnected when the mains supply returns.

2.4.4 Rectifier Module

The Fan-Cooled XPGe12.48 (1200W), XR08.48 (800W) and XR04.48 (400W) rectifiers are modular power supplies designed for parallel operation and hot-plug installation in the Aspiro Power Systems.

CAUTION Do not mix rectifier types in a single system.

Each rectifier provides extremely reliable DC power in a very high density. The module incorporates power monitoring through an internal microprocessor, giving up to the second updates to the system controller and companion rectifiers. This guarantees tightly controlled load sharing among rectifiers, and provides status and identification information to the controller.

The rectifiers operate in parallel using active load sharing. They incorporate soft-start at both the input and the output, which protects against high incoming and outgoing currents. The output voltage of the rectifier is automatically adjusted to the required voltage by the controller.

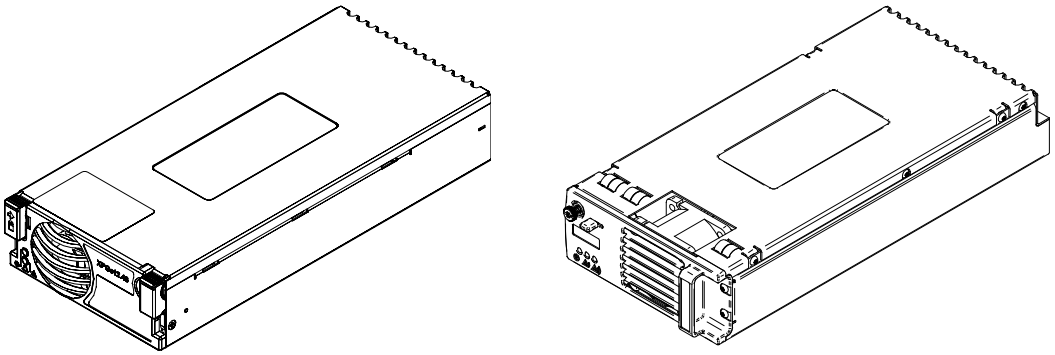


Figure 2-2 XPGe12.48 and XR04.48/XR08.48

XPGe12.48 rectifiers cannot be used in the same rack as XR04.48 / XR08.48 rectifiers.

3.1 Safety Warnings and Guidelines

The following warnings and guidelines should be followed by properly trained and authorized personnel when installing, operating, commissioning or maintaining this equipment. Neglecting the instructions may be dangerous to personnel and equipment.

3.1.1 System Markings

The following markings are found on the Power System:

Product Label - The product label contains the system part number, model number, system ratings and safety approvals. The label is located on the left side of top cover.

3.1.2 Safety Recommendations

Any device that uses electricity requires proper guidelines to ensure safety.

- The Power System should only be installed or serviced by qualified personnel.
- Always keep tools away from walkways and aisles. Tools present a tripping hazard in confined areas.
- Keep the system area clear and dust-free during and after the installation.
- Always know the location of emergency shut-off switches in case of an accident.
- Always wear appropriate eye protection and use appropriate tools for working with high voltage equipment and batteries.
- Do not perform any action that creates a potential hazard to other people in the system area.
- Never work alone in potentially hazardous conditions.
- Always check for possible hazards before beginning work.
- Remove watches, rings and jewelry that may present a hazard while working on the power system.

3.1.3 Installation Warning

The following safety guidelines should be observed when transporting or moving the system:

- Before moving the Power System, read the system specifications sheet to determine whether the install site meets all the size, environmental, and power requirements.
- The system and the equipment included, should only be moved and installed by qualified personnel to prevent bodily injury or any other hazardous conditions.

3.1.4 Electrical and Fire Enclosure

This system is designed for being used in 19 inch open relay racks. Suitable Electrical and Fire enclosure requirements have been integrated into the system.

3.1.5 System Enclosure

Appropriate measures need to be taken to avoid intrusion of any unwanted objects or insects into conductive areas of the power system as there is a potential risk of system damage.

Disclaimer: UNIPOWER LLC assumes no liability or responsibility for system failures resulting from inappropriate enclosure around the system.

3.1.6 Operating Temperature Warnings

To prevent the Power System from overheating, an automatic shutdown mechanism has been installed. It is not recommended to continually operate the Power System in an area that exceeds the maximum recommended operating temperature.

3.1.7 Electrical Safety Warnings

The following are electrical safety recommendations for working near the Power System:

WARNING Observe low voltage safety precautions before attempting to work on the system when power is connected. Potentially lethal voltages are present within the system.

WARNING Caution must be exercised when handling system power cables. Damage to the insulation or contact points of cables can cause contact with lethal voltages. For safety reasons, cables should be connected to the power system before power is applied.

- Remove all metallic jewelry like watches or rings that may present a hazard while working on the power system.
- Before connecting the AC input source to the power system, always verify voltage.
- Verify the AC source capacity. See system specifications for AC information.
- All AC connections must conform to local codes and regulations, e.g. ANSI, CEC, NEC, etc.
- When making AC connections, all DC load distribution breakers should be in the OFF position.
- All circuit breakers should meet the original design specifications of the system. In addition, equipment connected to the system should not overload the circuit breakers as this may have a negative effect on over-current protection and supply wiring, causing system or user harm.

- Verify the DC capacity before making connections. See system specifications for DC information.
- Potentially lethal voltages are present within the system. Ensure that all power supplies are completely isolated by turning all power switches OFF, disconnecting all relevant connectors and removing all relevant breakers before attempting any maintenance work. Do not rely on switches alone to isolate the power supply. Batteries should also be disconnected.
- Potentially lethal voltages are present within this system. Ensure that low voltage safety requirements are implemented before attempting to work on the system with power connected.
- Potentially lethal voltages can be induced if the equipment is not grounded (earthed) correctly. Ensure that all AC cords are 3 wired with ground.

3.1.8 EMC Considerations

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING changes or modifications not expressly approved by UNIPOWER could void the user's authority to operate the equipment.

3.1.9 Grounding

WARNING Proper 3-wire AC power cord must be connected to a properly grounded outlet. Grounding connection is required before operating the system. Refer to local codes, e.g. ANSI, CEC, NEC, T1-333, ETSI 300-386-TC specifying the connection of power system to building ground. In case of any doubt regarding the grounding connection, please contact a person responsible for the system.

WARNING The system includes a frame ground which must be properly bonded to a suitable ground point at the installation location.

3.1.10 Batteries

WARNING When installing or replacing batteries, there is risk of explosion if an incorrect battery type is used.

3.1.10.1 Lead Acid Batteries

WARNING This equipment may use Lead Acid Batteries. When handling batteries, follow the instructions included with the battery set, as the fluids contained within these batteries are known to be a health hazard. The disposal of lead acid batteries is subject to legal requirements for hazardous waste disposal. Local guidelines should be followed for disposal.

Ensure the following guidelines are observed when dealing with equipment that may contain lead acid batteries:

- Any attempt to burn these batteries may result in an explosion and the generation of toxic fumes.
- Should a lead acid battery suffer damage, it must be moved into a well-ventilated area. Contact with the corrosive fluid must be avoided.
- Neutralize any acid corrosion with copious amounts of a solution of baking soda and water, and then wipe off all traces of soda.
- If the lead acid battery is removed from the equipment, any exposed contact must be insulated prior to disposal.
- Ensure that protective full-face shields, rubber gloves and aprons are worn and insulated tools are used when working with the batteries. It is advised also to have water available in case acid gets in contact with the eyes.

3.1.11 In Case of an Accident

In the event of an accident resulting in injury:

1. Use caution and check for hazards in the area.
2. Disconnect power to the system.
3. If possible, send someone to get medical aid. If not, check the condition of the victim and call for help.

3.2 Caution

3.2.1 Storage and Transportation

CAUTION During storage and transportation, the units must remain in their original packages in order to avoid mechanical damage, maintain traceability, and protect the units against electrostatic discharge.

3.2.2 Disposal

CAUTION The product should not be disposed with other wastes at the end of its working life so as to prevent possible harm to the environment or human health from uncontrolled waste disposal.

3.2.3 Handling Electrostatic Sensitive Devices

CAUTION An electrostatic sensitive device is an electronic component that may be permanently damaged by the discharge of electrostatic charges encountered in routine handling, testing and transportation.

3.2.4 Traceability

CAUTION Units are labeled with permanently attached product identification labels. The labels are designed to be indelible throughout the life span of the equipment, unless mistreated. Make sure that the product identification labels are present on the equipment and are not subjected to unusual wear or mistreatment.

3.2.5 Breakers

CAUTION Breakers should always be replaced with the same type and rating in order to avoid damage to system components.

3.2.5.1 Circuit Breaker Limitations

1. Limitations for ambient temperature up to 55°C

   15A load circuit breakers should be rated at 80% of their nominal rate.

2. Limitations for ambient temperature up to 75°C

   15A load circuit breakers should be rated at 30% of their nominal rate.

WARNING There are potential hazards related to installing this power system. It is important to carefully read and understand the contents of Chapter 3 System Safety before performing system installation.

CAUTION Make sure sufficient room is left around the system, enabling optimal air circulation and thus preventing the system from overheating. Keep vent openings from being blocked.

4.1 Introduction

This chapter provides detailed instructions for installing the Aspiro 1U Power System.

4.2 Unpacking

Check that the received equipment is in accordance with the packing list. Ensure that the cabinet and the equipment have not been damaged during transportation.

Report any parts that are damaged, missing or incorrect. If possible, correct the problem before continuing.

4.3 Tools

The following tools are required for a safe installation of the system:

WARNING Use only single-ended, fully insulated tools. Shafts of for example screwdrivers should be insulated.

- Anti-static hand strap.
- Insulated screwdrivers, flat, sizes 1, 2 and 3.
- Insulated screwdrivers, Pozidrive (cross-slot), sizes 1, 2 and 3.
- Insulated torque wrench (for battery connection).

4.4 Rack Mounting

The power system is designed for 19 inch rack mounting with 1” c-c mounting holes. See Figure 4-1.

WARNING Read Appendix C - UL Listing Requirements, before commencing installation of the system.

The brackets are front mounted. There needs to be sufficient clearance at the front for rectifier installation, and at the rear for connections. When using side mains and DC connectors, sufficient space should be allowed for access in this case.

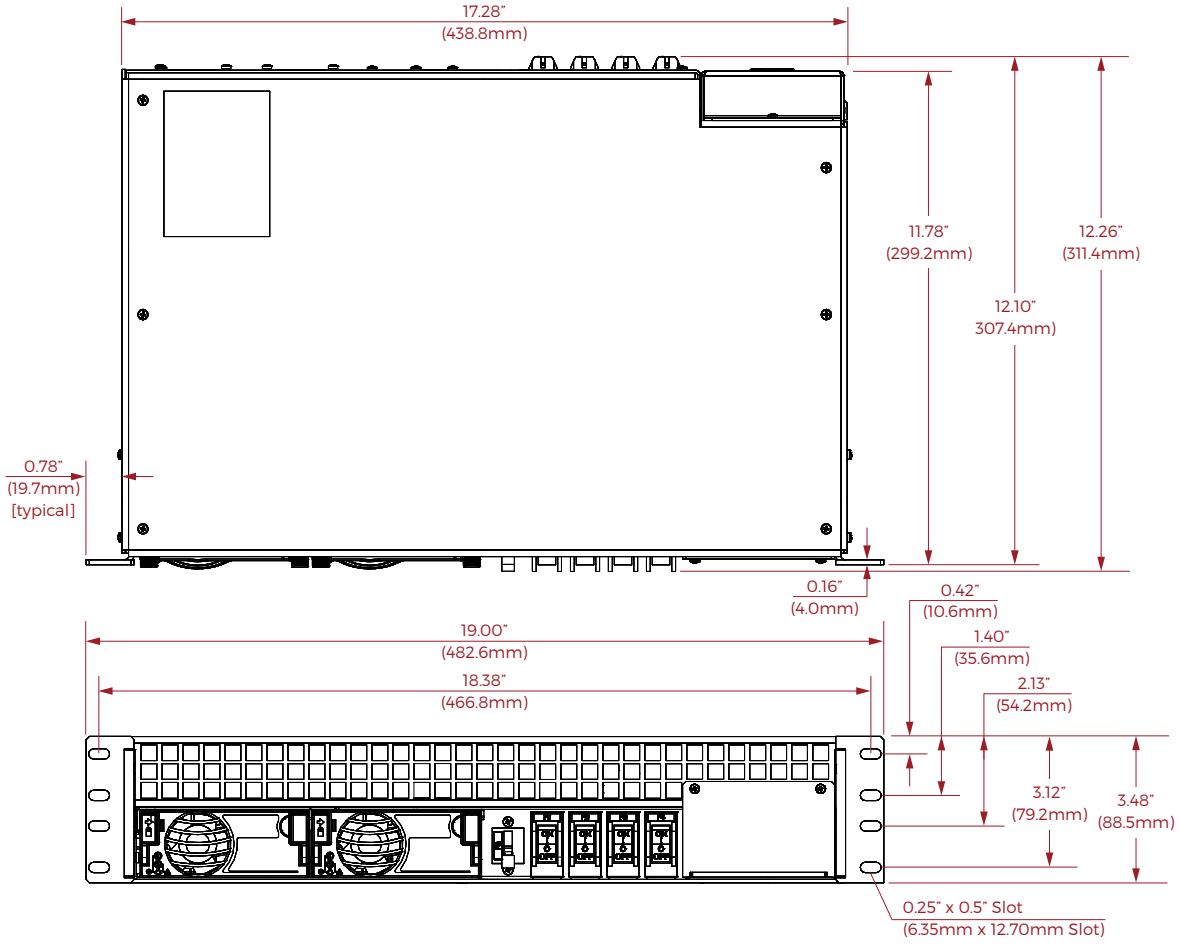


Figure 4-1 Dimensional Drawing (Front and Top View)

Aspiro system can be easily mounted to a rack using the taptite screws to fasten the mounting brackets to the rack as shown in Figure 4-2.

NOTE It is recommended to remove the rectifiers before installing the shelf to the cabinet or rack.

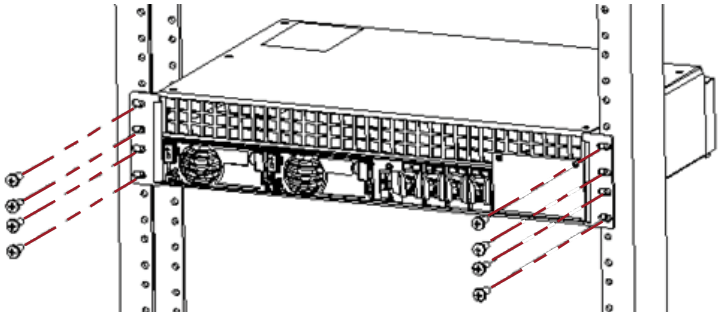


Figure 4-2 System Mounting (19" mount)

NOTE Mounting hardware is not supplied with the system.

4.5 Rear Connections

All cable connections for the Aspiro system are available at the rear of the system, see Figure 4-3.

CAUTION Use UL-listed power cords.

WARNING Before inserting signal cables into the connector, remove as little insulation on the cable as possible, to prevent the stranded conductor to come loose and touch any other conductive parts.

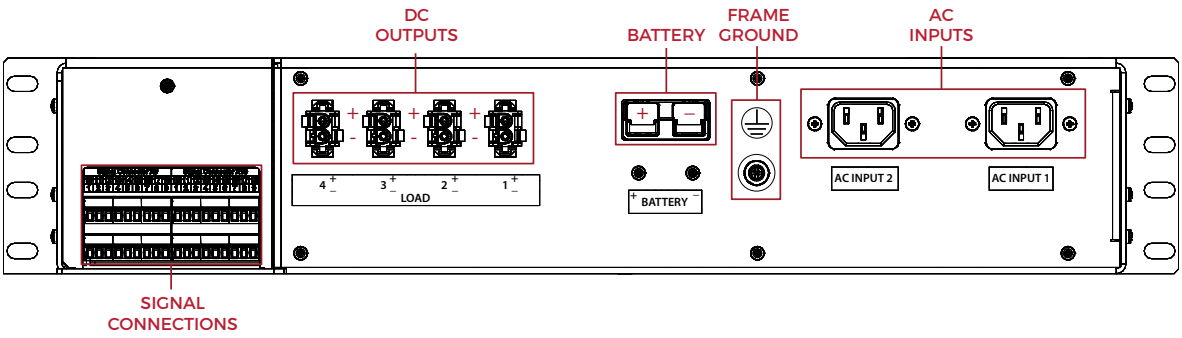


Figure 4-3 Rear Connections

4.5.1 Earth Connection (FRAME GROUND)

WARNING The system includes a frame ground which must be properly bonded to a suitable ground point at the installation location.

The frame ground connection is an M5 Pozidrive screw with captive locking washer and is situated on the rear panel to the right of the battery terminals as shown in Figure 4-4.

The cable used to make this connection must be of sufficient size to carry a 35A fault current, 12AWG or larger.

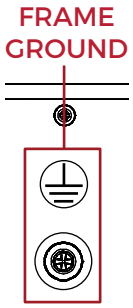


Figure 4-4 Frame Ground Connection (viewed from rear)

4.5.2 Mains Connection

CAUTION Depending on deployment region with regards to lightning strikes and heavy inductive energy, it is highly recommended to install AC Surge Protection Class C at the electrical panel.

AC connectors are situated on the right rear side of the system shown in Figure 4-5.

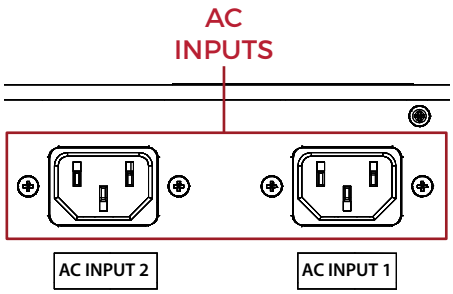


Figure 4-5 Mains Connection (viewed from rear)

NOTE AC inputs are independent and feed only the associated rectifier slot; i.e. AC Input 1 feeds rectifier slot 1 and AC Input 2 feeds rectifier slot 2.
Connect AC power cords to the same or separate feeds as desired.

Rectifiers in branch feed	Mains Breaker
2	20A for 120VAC 16A for 250VAC
1	12A for 120VAC 8A for 250VAC

Table 4-1 Recommended Mains Circuit Protection

4.5.3 Alarm and Signal Connections

Alarm and Signal connections are positioned on the left rear side of the Power Shelf, see Figure 4-3.

For remote supervision of alarms, there are 4 potential free alarm contacts available. Each alarm contact represents different condition. Multi Purpose Voltage Inputs 1-12 can be reconfigured as external analog inputs.

The pin description detail for all signal connections is shown in Figure 4-6.

Alarm connections are Form C relays and can be monitored either Normally Closed (NC) or Normally Opened (NO). When the power is OFF NC is closed and when the power is ON NC is open.

NOTE Each alarm contact represents a different alarm condition or conditions. These are defined in the controller's alarm matrix setup.

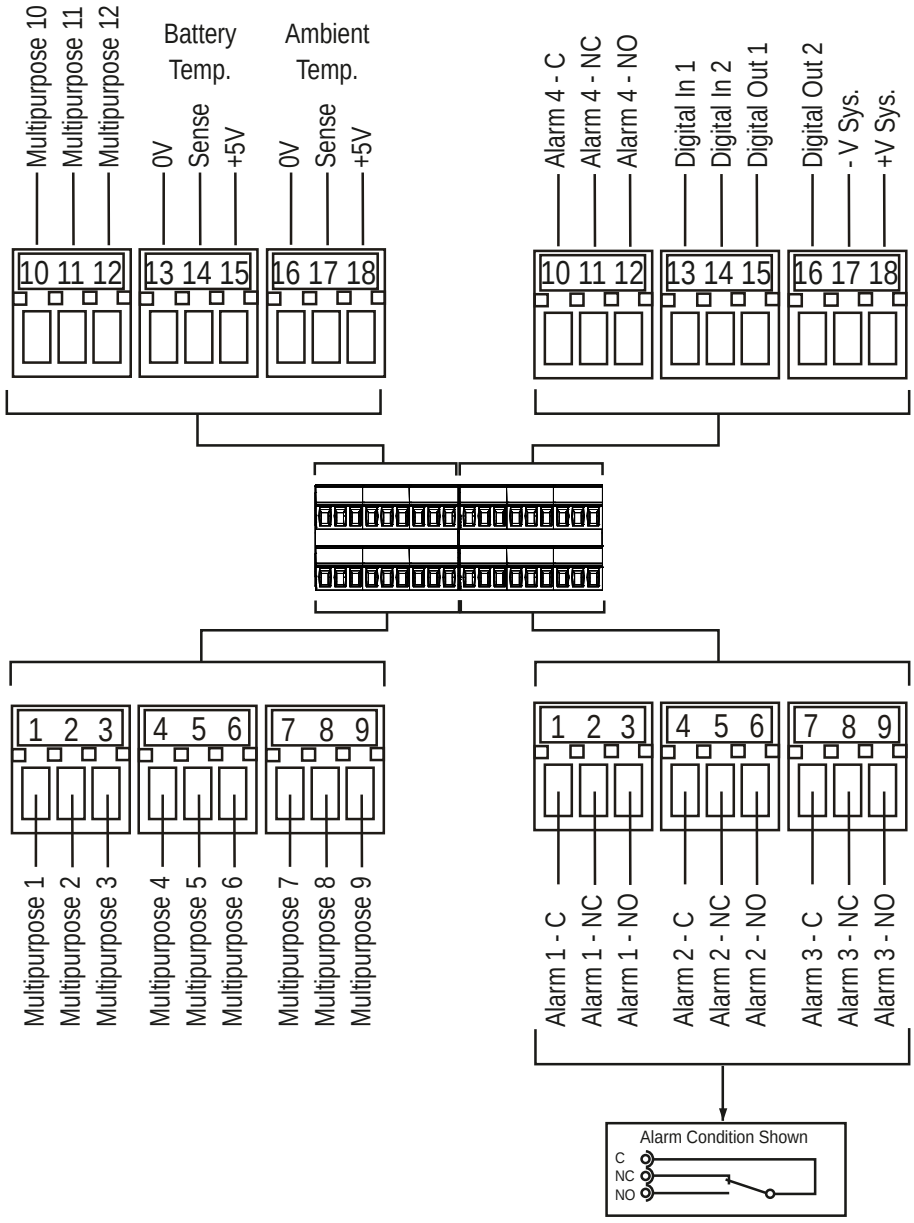


Figure 4-6 Signal Pin Designations

To connect:

1. Release a connector from the terminal using needle-nose pliers and pull it out.
2. Remove sufficient insulation from the cables and insert stripped cables into the appropriate connector. Then tighten the corresponding terminal screw using a flat screwdriver Figure 4-7.
3. After fastening all the cables, insert the connector back into the terminal block.

   Maximum cable size is 1.5mm^2. Maximum torque required for tightening the screw is 0.25Nm.

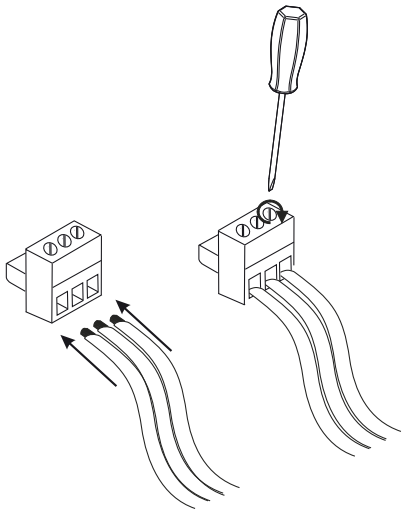


Figure 4-7 Signal Connection Detail

4.5.4 DC Load Connections

Load Connections are available at the rear, with connections labeled corresponding to each load breaker, Figure 4-8.

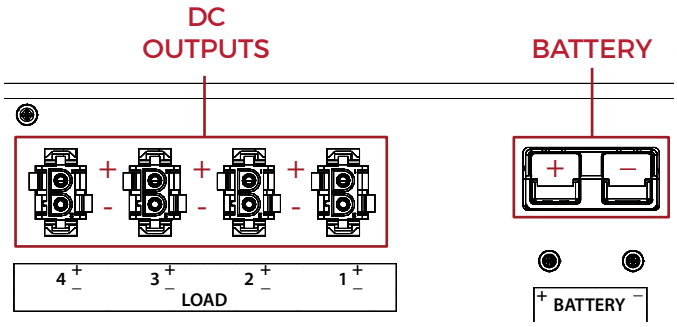


Figure 4-8 Load and Battery Connections (Rear View)

For DC load connections, Mate-N-Lock connectors are used. See appendix B for more details.

CAUTION For correct electrical polarity of DC loads see connector labels.

Load Breaker Size [A]	**15A**
Wire Size [mm²/AWG]	2.5/14

Table 4-2 Cable Sizes - Load

4.5.5 Battery Connections

WARNING Improper handling with batteries can be dangerous. Please read and understand the information in the Safety chapter before connecting batteries.

WARNING The battery breaker should be in the OFF position.
The battery cables should be connected to the battery first, then to the system.

Battery cable (ZLH.00254.01) is custom design for the Aspiro enclosure. (connections are available at the rear of the system adjacent to the load connections), see Figure 4-9.

To connect:

1. Connect the other end of the battery cables to the batteries.
2. Connect the SB-50 connector to the rear of the enclosure labeled BATTERY.

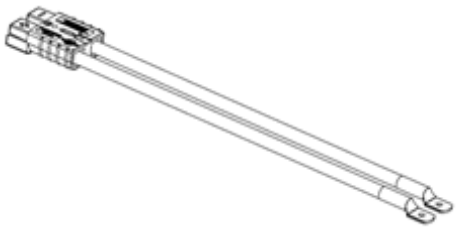


Figure 4-9 Battery Cable Detail

Battery Breaker Size [A]	**40A**
Wire Size [mm²/AWG]	10/8

Table 4-3 Cable Sizes - Battery

4.5.6 Symmetry Connection

1. Attach the inter-block connection plates between the batteries.
2. Insert a suitably sized cable lug into one pole of the inter-block connection plate. Fasten the lugs and plates to individual battery poles.

3. Fix the 3 wires (red, green and blue) of the symmetry cable to individual cable lugs. Color coding of the cables must be respected for proper symmetry measurement see Figure 4-10.

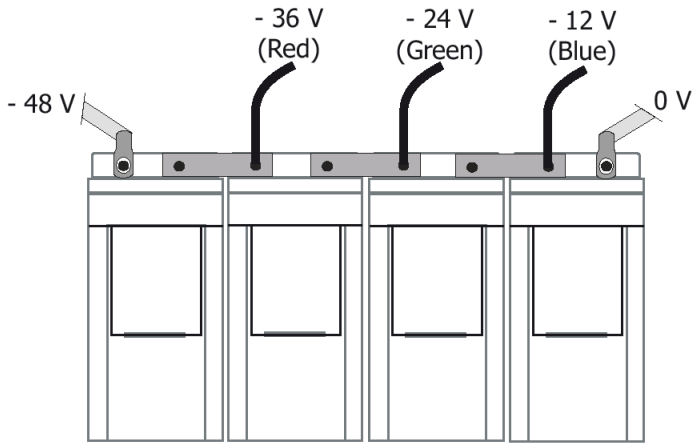


Figure 4-10 Symmetry Measurement (for illustration only)

NOTE The **i**nter-block Connection Kit is not delivered with the system.

NOTE See Figures 4-6 and 4-7 for connection to the system.

4.5.7 Temperature Sensor Connection

Temperature sensor connections for supervising battery temperature and measuring ambient temperature are made using three-pin plugs according to the same procedure as for the alarm connections.

For battery temperature measurement the sensor itself should be fastened to the battery after battery installation: Unwind the cable, remove the paper covering the adhesive for the sensor and fasten the sensor to the battery as shown in Figure 4-11.

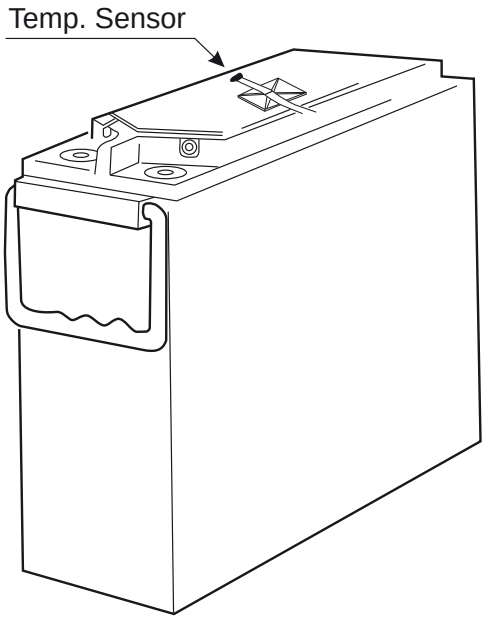


Figure 4-11 Temperature Sensor Connection

NOTE See Figures 4-6 and 4-7 for connection to the system.

5.1 Commissioning Overview

Before delivery the system was thoroughly inspected and tested. The following chapter is a guide to the set-up and operation of the control functions of the system.

NOTE Before starting commissioning read the product description for the individual components.

WARNING ONLY TECHNICAL STAFF WITH THE NECESSARY EXPERIENCE AND KNOWLEDGE, WITH REGARD TO THE POWER SUPPLY SUPPORT SYSTEM AND ITS BATTERIES, MAY PERFORM THE COMMISSIONING. IT IS IMPORTANT TO FOLLOW ALL SAFETY REGULATIONS.

If there are any difficulties in increasing the voltage to alarm level, the alarm level can be adjusted to a lower level.

5.2 Tools and Test Equipment

5.2.1 Tools List

The essential commissioning tools are listed in the Installation chapter.

5.2.2 Test Equipment

- Multimeter (3½ Digit, 0–1%DC)
- Load resistance, to fully load of two rectifiers

5.3 Preparation

Check the installation to ensure the following:

- Grounding: The equipment is correctly grounded through the 3 conductor AC cord.
- Power: The incoming mains AC power is available for this site. The site power switch and circuit breakers are clearly labeled. The power receptacles are correctly terminated.
- The site is clean and safe. Check that the system/cabinet is free of any unwanted objects or insects that may have got in during the installation.

5.4 Commissioning procedure

1. Remove the alarm cover and check that all connections are made according to the installation drawing. Verify that all connections are properly tightened with sufficient torque.
2. Ensure that load and battery MCB breakers are set to OFF position - ensuring the load and battery strings are connected.
3. Ensure that all rectifier modules are removed. If not, remove each one in turn starting from the rightmost position.
4. Check the battery polarity with the multimeter at the SB-50 connector. Place the positive lead of the meter to the positive contact and the negative lead to the battery contact. The meter must now show a positive voltage. If the voltage is negative, change over the connection of the gray and black battery cables to the batteries.
5. Plug in the AC power cord.
6. Plug in the rectifier modules, starting from the leftmost position. Make sure to fasten the rectifiers again. The rectifiers will turn on automatically. Empty rectifier positions must be cover with rectifier blanks.
7. Set all load breakers into the “1” (ON) position.
8. The green LED on the controller should blink for approximately 20 sec.
9. The output voltage will increase slowly to U1 (float charge voltage).
10. Turn the battery breaker to the “1” (ON) position.
11. If any alarms are present, they should be reset in accordance with the procedure for the installed controller, ACC Extended (ACX) or PCC.
12. The system should now be without alarms.
13. Attach all the system covers in their correct places.
14. Check that all changes to drawings, if any, have been completed.
15. Clean the site.
16. Fill in the commissioning record (table 5-2 in section 5.8).

5.5 Test of output voltage

5.5.1 Float charge (U1)

Ensure that the controller is operating.

Connect a load, approx. 50% of total capacity, to the system.

Check the voltage according to the battery manufacturer's requirements. If the batteries require a different float charging voltage, adjust the output voltage from the controller. (See the section for the appropriate controller)

If no change is required, use the following values:

Battery type	Float charge	Boost charge
Open lead-acid batteries	2.23 V/Cell	2.33 V/Cell
Valve regulated lead-acid batteries	2.27 V/Cell	-

Table 5-1 Float/Boost Charge Voltages

5.5.2 Adjustment of Float Charge, U1

Unless otherwise ordered the default output voltage is factory preset to 53.5V. The total voltage has to be in accordance to the number of battery cells.

Please verify number of cells and the battery manufacturers requirement.

Adjust the output voltage from the control unit as necessary.

NOTE A seal protects the potentiometer in the sub-rack. Do not break the seal.

5.5.3 Boost charging (U2) (if applicable)

Open lead-acid batteries.

Automatic boost charging - calculation based on the time the battery voltage has been below certain levels. Automatic activating of boost charging for this calculated time multiplied by a (boost) factor.

Activate boost charging from the "Set/select U1-U4" menu in the controller.

Return to float charge manually by selecting "U1", or automatically after a preset time.

VRLA batteries.

Most of the manufactures of valve regulated lead acid batteries **do not recommend** boost charging. If this type of battery is used, the boost function should be disabled.

Boost charging figures

Observe and write down all of the boost charging figures. Parameters to be read/set/adjusted from control unit or PC with PowCom™ installed.

5.6 Battery supervision

For systems with symmetry cables:

Set the number of battery strings according to the number of battery strings in the system. The settings are to be made in the control unit via a PC with PowCom™ installed or directly in the controller (if symmetry failure is indicated).

The symmetry fault alarm can be simulated by pulling out one symmetry cable from the battery string. Measure that setting to make sure that it is in accordance with the battery manufacturer's recommendations.

For systems with battery temp. probe cable:

Temperature compensation is factory preset. Check that the temp. probe is activated and verify that the compensation level is in accordance with the battery manufacturer's requirements. (If no compensation level is available from the battery manufacture, UNIPOWER recommends that it is set to 0.5V).

5.7 Battery test

Settings should be made according to the battery manufacturer's requirements, but as a rule of thumb the following settings can be used for standard VR lead batteries:

No. of test pr. year	=	2
U3 Test	=	1,9 V/cell
End voltage b.test	=	1,94V/cell
Batt. test time	=	40% of expected backup time
Ah limit for test	=	40% of nominal battery capacity

Parameters should be set/adjusted from the controller (Battery test menu) or "Supervision - Set parameters" menu in PowCom™.

5.8 Commissioning record

This is a step-by-step commissioning record for easy commissioning of Power Supply Systems. Do not continue if any faults occur during this commissioning. The checkpoints are to be considered as a minimum for commissioning of the system.

		Checked (✔)	Result
1	Check that the rack is level		
2	Check that all breakers are turned to "off" position and that no rectifiers are mounted in the system.		
3	Connect AC, and measure voltage on the outlet.		AC Input 1:…....VAC AC Input 2:.....VAC
4	Mount the rest of the rectifiers		
5	After connection of the battery, turn the battery breaker "on" and the controller (if fitted) will read the battery current.		
6	Check float charge, U1, and boost charge, U2. It is to be adjusted according to the battery manufacturers requirements.		U1:…….VDC U2:.....VDC
7	Check temperature compensation. It is to be adjusted according to the battery manufacture requirements. Check temperature read from the controller compared to the ambient temperature.		Comp.:…….V/10°C Read off:……°C
8	Check symmetry measurement and set number of battery strings according to actual number of supervised battery strings in the system.		Number: …. Alarm limit:……
9	Check alarm transmission by running an alarm test.		

Table 5-2 Commissioning Record

6.1 Maintenance

Power system maintenance includes maintaining all parts of the system.

Annual maintenance should involve checking all connections on the terminals and circuit breakers. Output voltage should be verified to be within the acceptable limits at least once a year. Test results should be recorded and filed to see any deviations.

The power system requires periodic inspections and routine cleaning. It is very important to keep all areas and components of the system free from dust or other unwanted objects to ensure free air circulation and safe operation of the system.

CAUTION To undertake any further maintenance, strictly follow all manufacturer's recommendations provided in the equipment manual.

6.2 Troubleshooting

This troubleshooting chapter helps to determine the cause of the problem and suggests possible repair solutions. If the first step of the recommendation does not solve the problem continue to the next one.

NOTE If the malfunctioning of the system persists, please contact UNIPOWER technical support.

NOTE For a description of Alarms and Messages generated by the system controller see the Alarms/Messages section of the appropriate controller manual:

ACC Extended (ACX): http://www.unipowerco.com/pdf/acc-man.pdf
PCC: http://www.unipowerco.com/pdf/pcc-man.pdf

The system can be remotely managed using UNIPOWER's PowCom™ which works in conjunction with the controller. This is covered in its own manual which is available at http://www.unipowerco.com/pdf/powcom-man.pdf.

By default, alarms are set to be indicated with a red light (higher priority) and messages with a yellow light (lower priority).

Fault	Possible Cause	Suggestion/Solution
Low System Voltage	Module failure.	Replace faulty module.
	Loss of AC power.	Verify AC input connection.
	Load exceeds module capacity.	Add module to system.

Fault	Possible Cause	Suggestion/Solution
High System Voltage	Module failure. System voltage exceeds the set limit.	Replace the faulty module. Check the High Voltage Alarm limit setting.
Mains Error	AC supply OFF on one rectifier in the system with one plugged in rectifier. AC supply OFF on at least two rectifiers in the system with minimum two plugged in rectifiers.	Verify that the rectifier position 1 has a rectifier installed. Verify AC input connection.
AC Low Voltage	AC voltage drops below the set limit.	Verify the Low AC voltage limit setting. Verify AC Input connection. Verify AC Input voltage.
AC High Voltage	AC voltage rises above the set limit.	Verify the High AC voltage limit. Verify the AC Input voltage.
Module Failure	Faulty module. AC OFF on a single rectifier (if more than one rectifier is installed). Rectifier current sharing fault. Low DC output voltage, over-voltage shutdown, module fan failure, module is overheated.	Check if module sends alarm flag. Verify the AC voltage to the failed module. Re-insert the faulty module, wait for 30 seconds Replace the faulty module.
Urgent Module Failure	More than one rectifier is reporting Module failure.	See Module failure alarm.
High Load	Faulty module . Rectifier load current exceeds the set High load limit [%].	Compare the load current with installed rectifier capacity. Add a rectifier or reduce load. Verify the High load limit setting. Replace the faulty module.
Over-voltage Shutdown	Faulty module	Re-insert the module, wait for 5 minutes. Replace the faulty module.

Fault	Possible Cause	Suggestion/Solution
Load/Battery Disconnection	System voltage drops below the set limit. System shutdown.	Check the battery condition. Check the AC mains connection. Check the input breaker. Check the rectifier modules.
Communication Failure	Module failure. Modules not installed in the correct position. Broken or disconnected communication wire.	If the rectifier address does not communicate re-install the module and wait for 5 minutes. Verify, if the controller is operating properly. If not, replace the controller.
Distribution Fuse Failure	Tripped load breaker / blown load fuse.	Verify there is no short circuit in load cabling. Reset the breaker, if it trips again, there is a problem with the load or a breaker itself. Return the system to the factory for repair
Battery Fuse Failure	Tripped load breaker / blown load fuse	Verify there is no short circuit in load or battery cabling. Verify the breaker / fuse is correctly rated. Reset the breaker, if it trips again, there is a problem with the load or battery or a breaker itself. Return the system to the factory for repair.
Symmetry Fault	Battery at end of life. Wrong symmetry cable connection. Wrongly set Symmetry limit value.	Verify the battery condition. Verify the symmetry cable connection. Verify the Symmetry limit value.
Low Battery Temperature	Battery temperature drops below the set Low battery temperature limit.	Check the heating of the system. Check the ambient temperature (it should not be lower than recommended battery temperature).

Fault	Possible Cause	Suggestion/Solution
High Battery Temperature	Battery temperature exceeded the set limit.	Check the cooling or ventilation. Verify the battery condition. Check the Battery Current Limit.
Temp. Probe Failure	The temperature probe is not properly connected to the system. Faulty temperature probe. Temperature probe wire is interrupted. Temperature difference between the controller temperature and the probe temperature is greater than 60°C.	Verify the temperature probe connection. Verify the internal / external temperature via controller front panel. Replace the faulty probe with a new one. Identify the root cause of the hot environment at the batteries and/or controller.
Alarms Blocked (only with LCD display)	Alarm is manually activated by the serviceman on the site (used during system servicing, no other alarm is displayed)	Needs to be manually turned OFF to allow the alarms to be displayed

If none of the above solves the problem please contact customer support.

To phone us please visit http://www.unipowerco.com/contact/ where you will find the correct phone number for your region.

Alternatively, email: technical.support@unipowerco.com

7.1 Controller Replacement

A blank panel or faulty Controller can be easily replaced with a new controller:

1. Loosen the front screw(s) at the top of the controller or blanking panel using a flat or Pozidrive screwdriver as appropriate, see Figure 7-1.

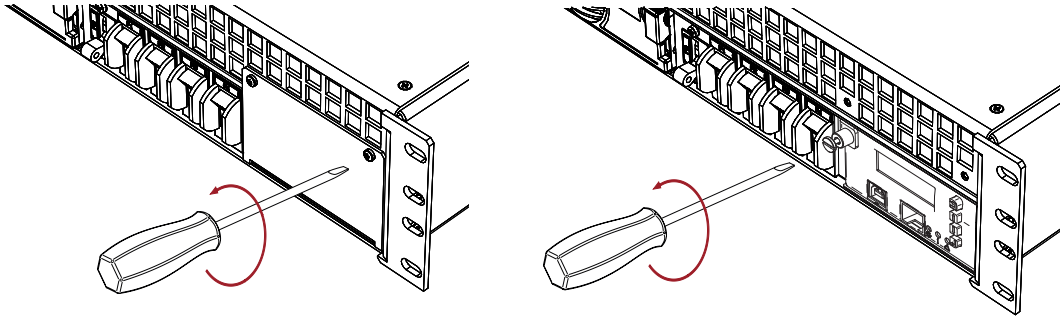


Figure 7-1 Unlocking the Controller / Removing the Blanking Panel

2. If removing a controller out it of the shelf as shown in Figure 7-2.

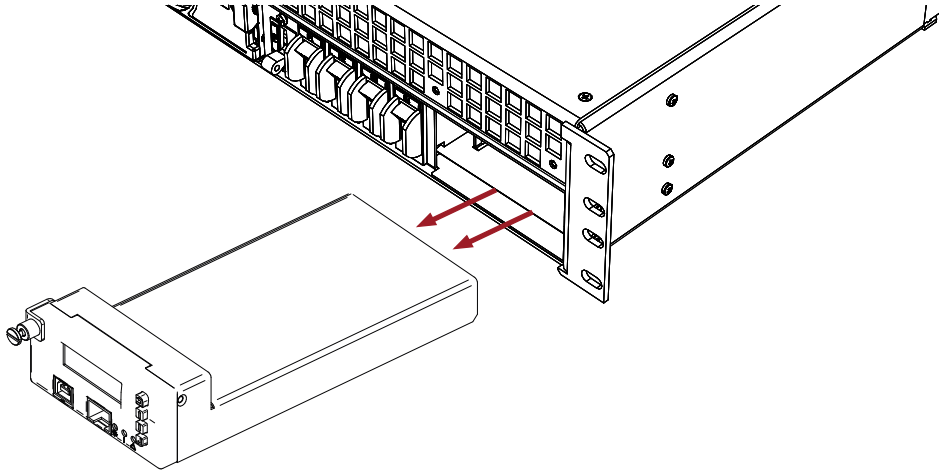


Figure 7-2 Removing the Controller

3. Reverse the process to insert the new controller into the empty slot and fasten the screw.

CAUTION After controller start-up, verify if the appropriate configuration file is uploaded to the controller. If necessary, refer to the PowCom™ User Guide.

7.2 Rectifier Replacement

NOTE Rectifiers can be hot-swapped.

CAUTION Do not mix rectifier types in a single system.

7.2.1 XR04.48 / XR08.48 Replacement

To replace an XR04.48 or XR08.48 rectifier, follow the steps below:

1. Loosen the screw on the rectifier front panel using a screwdriver, Figure 7-3 (1).
2. Push the release spring to the right and at the same time pull the handle to remove the rectifier from the slot, Figure 7-3 (2).
3. Replace the module and fasten the screw.

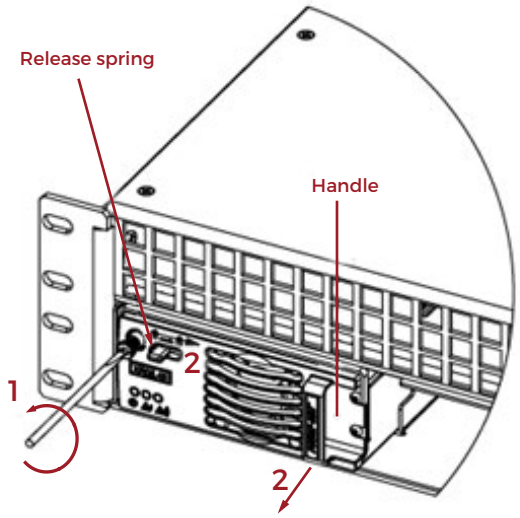


Figure 7-3 Replacing an XR04.48 or XR08.48 Rectifier

7.2.2 XPGe12.48 Replacement

1. Insert a flat screwdriver into the rectangular opening next to the left handle to unlock it, Figure 7-4 (1).
2. Once unlocked, pull both handles down and remove the rectifier from the slot, Figure 7-4 (2).
3. Replace rectifier. Make sure that the rectifier handle is in OPEN position (forms 35-40° angle with rectifier body) before XPGe12.48 is fully inserted in the slot.
4. Push both handles upwards until the left handle locks the rectifier into the correct position.

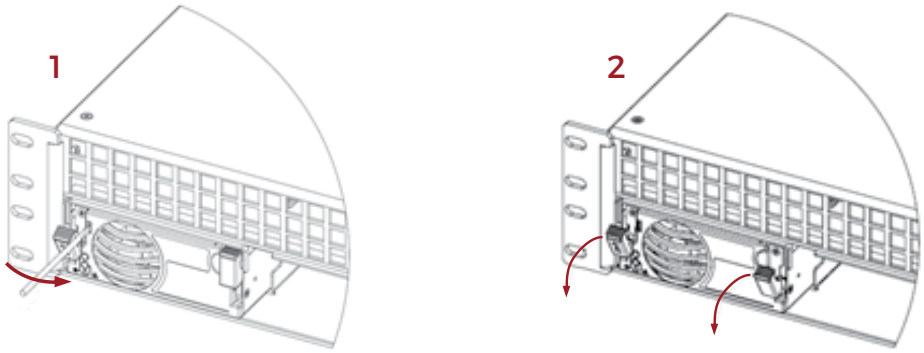
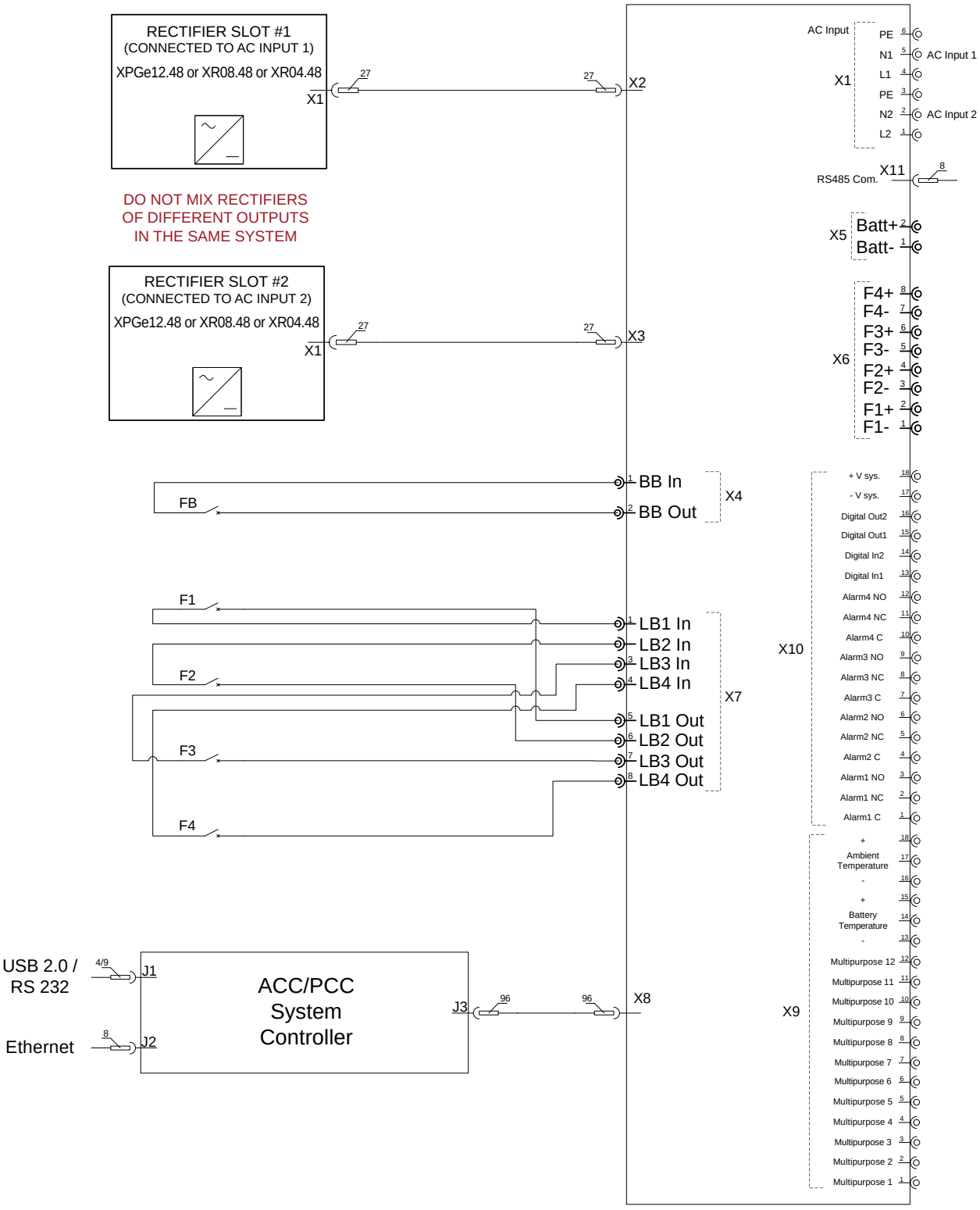


Figure 7-4 Replacing an XPGe12.48 Rectifier

CAUTION After rectifier rebooting, check that the green LED is lit.

7.3 Breaker Replacement

WARNING Breakers are not field replaceable. To replace a faulty circuit breaker, send complete enclosure to an authorized repair facility.


RECTIFIER SLOT #1
(CONNECTED TO AC INPUT 1)
XPGe12.48 or XR08.48 or XR04.48
X1
27
27
X2
DO NOT MIX RECTIFIERS
OF DIFFERENT OUTPUTS
IN THE SAME SYSTEM
RECTIFIER SLOT #2
(CONNECTED TO AC INPUT 2)
XPGe12.48 or XR08.48 or XR04.48
X1
27
27
X3
AC Input
X1
PE
N1
L1
PE
N2
L2
AC Input 1
AC Input 2
X11
RS485 Com.
8
X5
Batt+
Batt-
X6
F4+
F4-
F3+
F3-
F2+
F2-
F1+
F1-
FB
BB In
BB Out
X4
F1
F2
F3
F4
LB1 In
LB2 In
LB3 In
LB4 In
LB1 Out
LB2 Out
LB3 Out
LB4 Out
X7
X10
+ V sys.
- V sys.
Digital Out2
Digital Out1
Digital In2
Digital In1
Alarm4 NO
Alarm4 NC
Alarm4 C
Alarm3 NO
Alarm3 NC
Alarm3 C
Alarm2 NO
Alarm2 NC
Alarm2 C
Alarm1 NO
Alarm1 NC
Alarm1 C
+
Ambient Temperature
-
+
Battery Temperature
-
Multipurpose 12
Multipurpose 11
Multipurpose 10
Multipurpose 9
Multipurpose 8
Multipurpose 7
Multipurpose 6
Multipurpose 5
Multipurpose 4
Multipurpose 3
Multipurpose 2
Multipurpose 1
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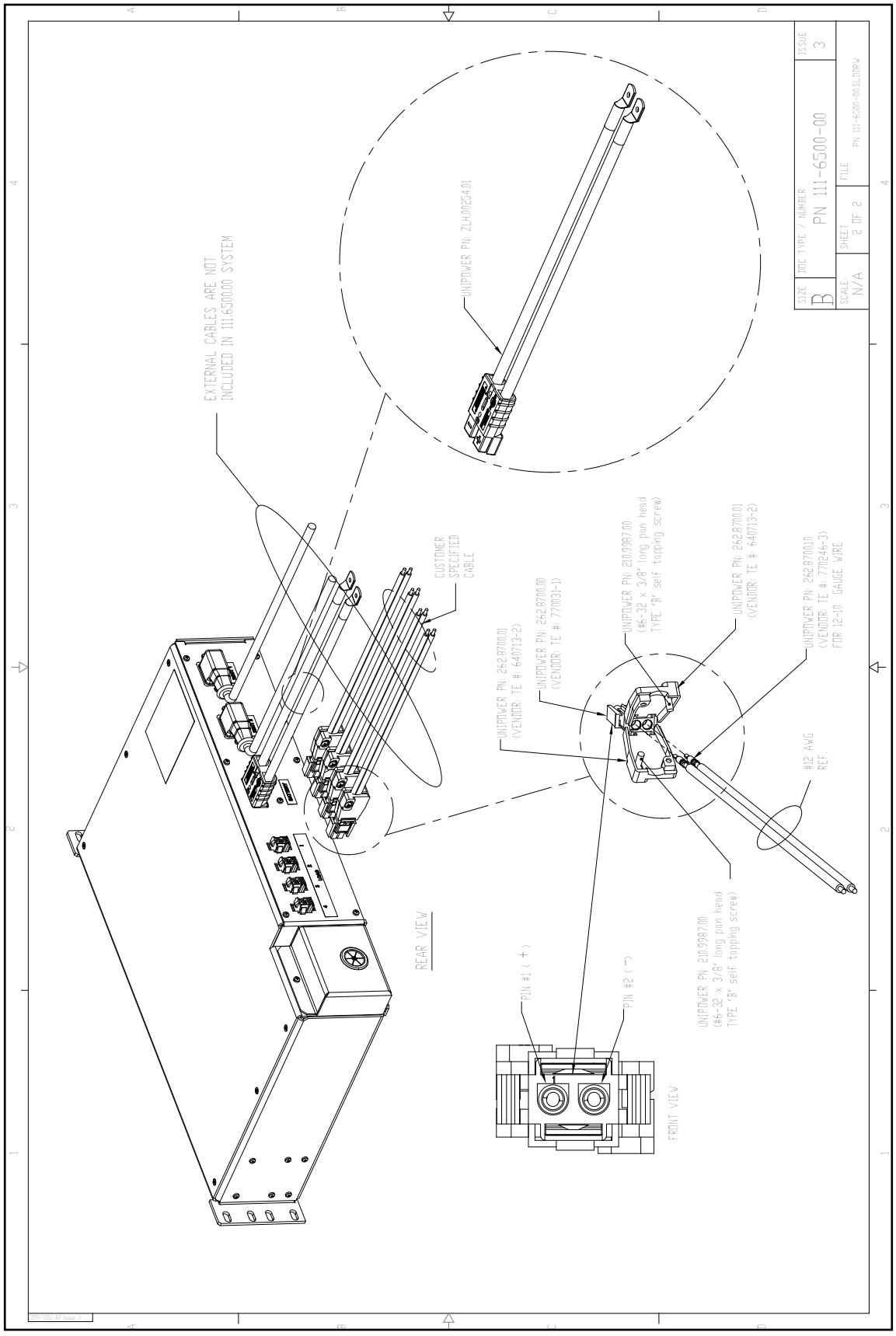
J2
ACC/PCC
System
Controller
J3
96
96
X8


EXTERNAL CABLES ARE NOT
INCLUDED IN 111-6500-00 SYSTEM
UNIPOWER P/N: ZLH-002541-01
CUSTOMER
SPECIFIED
CABLE
UNIPOWER P/N: 262870001
(VENDOR: TE #: 640713-2)
UNIPOWER P/N: 262870001
(VENDOR: TE #: 770031-1)
UNIPOWER P/N: 2109987-00
(#6-32 x 3/8" long pan head
TYPE "B" self tapping screw)
UNIPOWER P/N: 262870001
(VENDOR: TE #: 640713-2)
UNIPOWER P/N: 262870110
(VENDOR: TE #: 770246-3)
FOR 12-10 GAUGE WIRE
#12 AWG
REF.
REAR VIEW
PIN #1 (+)
PIN #2 (-)
UNIPOWER P/N: 2109987-00
(#6-32 x 3/8" long pan head
TYPE "B" self tapping screw)
FRONT VIEW
SIZE
B
DRG TYPE / NUMBER
PN 111-6500-00
SHEET
2 OF 2
FILE
PN 111-6500-00-SL.DRW
SCALE
N/A
ISSUE
3

The following must be taken into account when installing the system:

A) Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.

B) Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

C) Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

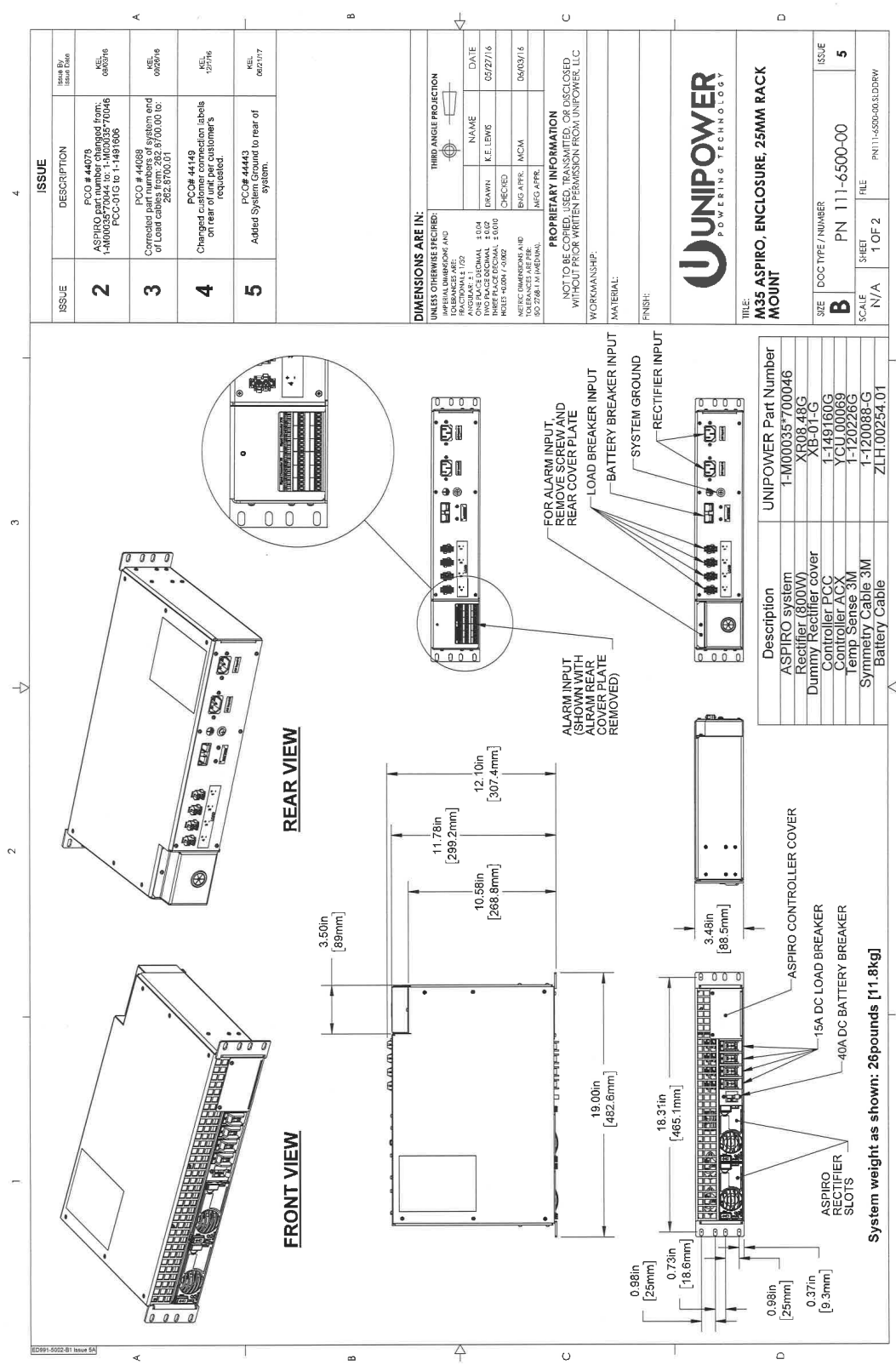
D) Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

E) Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips)."

F) Restricted Access - This system must be installed within a restricted access location where access is through the use of a tool, lock and key, or other means of security and is controlled by the authority responsible for the location. This system must be installed and maintained only by qualified technicians.

Appendix D - Revision History

Revision	Page(s) Altered	Description	Issued by/Date
4		See PCO# 44446	NF 06/22/2017


ISSUE
ISSUE
DESCRIPTION
Issue By Issue Date
2
PCO # 44079
ASPIRO part number changed from: 1-M000357*00046 to: 1-M000357*00046 PCO-0115 to 1-1497606
KEL 08/08/16
3
PCO #44088
Corrected part numbers of system end of Load cables from: 282.9700.00 to: 282.9700.01
KEL 09/26/16
4
PCO# 44149
Changed customer connection labels on rear of unit per customer's requested.
KEL 12/7/16
5
PCO# 44443
Added System Ground to rear of system.
KEL 05/27/17
DIMENSIONS ARE IN:
UNLESS OTHERWISE SPECIFIED:
IMPERIAL DIMENSIONS AND TOLERANCES ARE: PER ASME Y14.5-1M-1994
METRIC DIMENSIONS AND TOLERANCES ARE PER: ISO 2768-1 M (MEDIUM).
THIRD ANGLE PROJECTION
NAME
DATE
DRAWN
K.E. LEWIS
05/27/16
CHECKED
ENG APPR.
M.CM
06/03/16
MFG APPR.
PROPRIETARY INFORMATION
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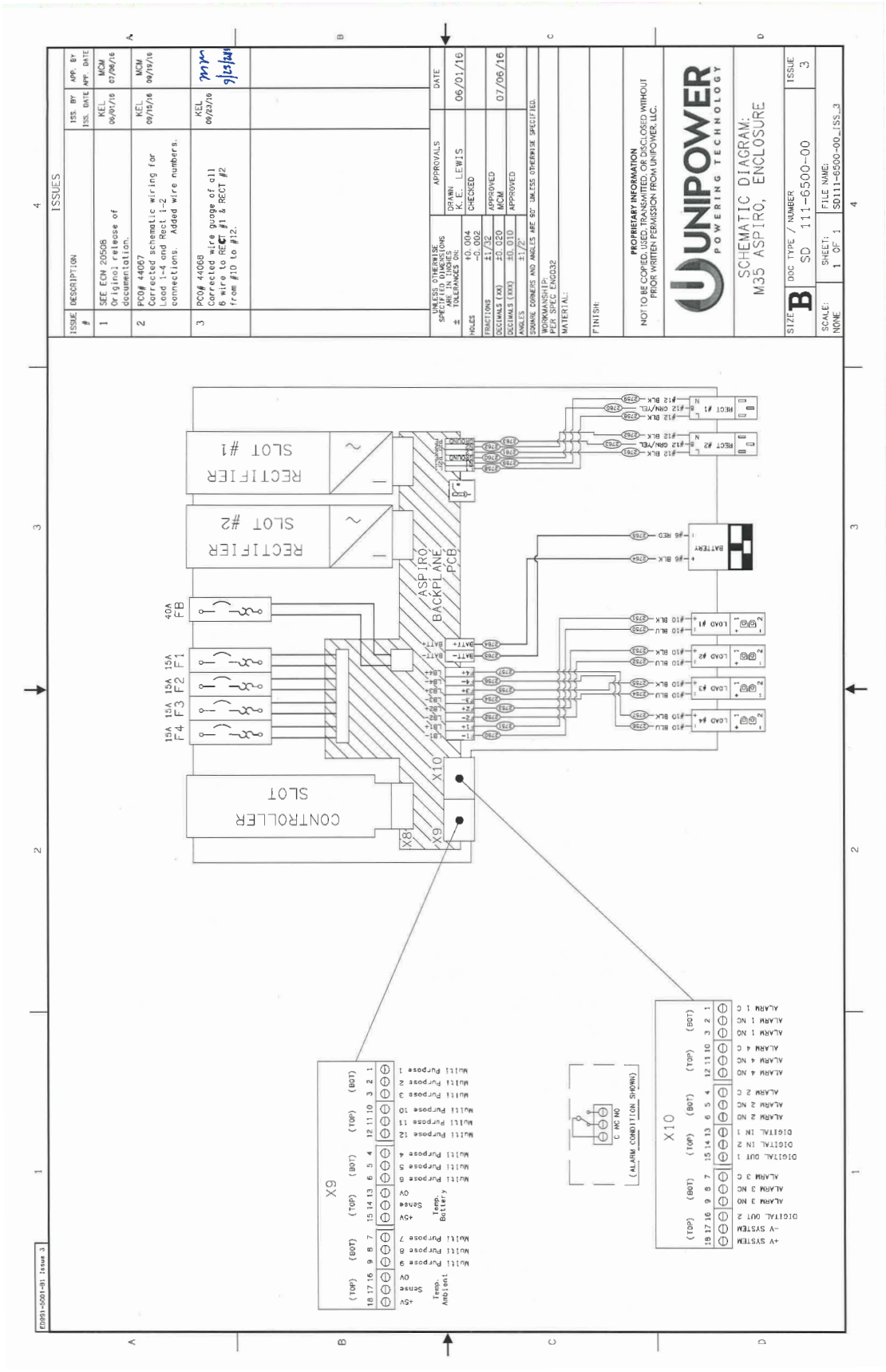
WORKMANSHIP:
MATERIAL:
FINISH:
UNIPOWER
POWERING TECHNOLOGY
TITLE:
M35 ASPIRO, ENCLOSURE, 25MM RACK MOUNT
SIZE
B
DOC TYPE / NUMBER
PN 111-6500-00
ISSUE
5
SCALE
N/A
SHEET
1 OF 2
FILE
PN111-6500-00.SLDDRW
REAR VIEW
FRONT VIEW
ALARM INPUT (SHOWN WITH ALRAM REAR COVER PLATE REMOVED)
FOR ALARM INPUT, REMOVE SCREW AND REAR COVER PLATE
LOAD BREAKER INPUT
BATTERY BREAKER INPUT
SYSTEM GROUND
RECTIFIER INPUT
Description
UNIPOWER Part Number
ASPIRO system
1-M000357*00046
Rectifier (800W)
XR08.48G
Dummy Rectifier cover
XB-01-G
Controller PCC
1-1491600G
Controller ACX
YCU.00069
Temp Sense 3M
1-1202266G
Symmetry Cable 3M
1-1200886-G
Battery Cable
ZLH.00254.01
12.10in [307.4mm]
11.78in [299.2mm]
10.58in [268.8mm]
3.50in [89mm]
19.00in [482.6mm]
3.48in [88.5mm]
18.31in [465.1mm]
ASPIRO CONTROLLER COVER
15A DC LOAD BREAKER
40A DC BATTERY BREAKER
ASPIRO RECTIFIER SLOTS
0.98in [25mm]
0.73in [18.6mm]
0.98in [25mm]
0.37in [9.3mm]
System weight as shown: 26pounds [11.8kg]
ED991-5002-B1 Issue 5A


ISSUES
ISSUE #
DESCRIPTION
ISS. BY ISS. DATE
APP. BY APP. DATE
1 SEE ECN 20508 Original release of documentation. KEL 06/01/16 MCM 07/06/16
2 PCO# 44067 Corrected schematic wiring for Load 1-4 and Rect 1-2 connections. Added wire numbers. KEL 09/15/16 MCM 09/19/16
3 PCO# 44068 Corrected wire guage of all 6 wire to RECT #1 & RECT #2 from #10 to #12. KEL 09/23/16
APPROVALS
DRAWN K.E. LEWIS 06/01/16
CHECKED
APPROVED MCM 07/06/16
APPROVED
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON:
HOLES ±0.004 -0.002
FRACTIONS ±1/32
DECIMALS (XX) ±0.020
DECIMALS (XXX) ±0.010
ANGLES ±1/2°
SHARP CORNERS AND ANGLES ARE 90° UNLESS OTHERWISE SPECIFIED.
WORKMANSHIP: PER SPEC ENG032
MATERIAL:
FINISH:
PROPRIETARY INFORMATION
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UNIPOWER
POWERING TECHNOLOGY
SCHEMATIC DIAGRAM:
M35 ASPIRO, ENCLOSURE
SIZE B
DOC TYPE / NUMBER SD 111-6500-00
ISSUE 3
SCALE: NONE
SHEET: 1 OF 1
FILE NAME: SD111-6500-00_ISS_3
RECTIFIER SLOT #1
RECTIFIER SLOT #2
CONTROLLER SLOT
ASPIRO BACKPLANE PCB
40A FB
15A F1
15A F2
15A F3
15A F4
X10
X9
X8
BATTERY
LOAD #1
LOAD #2
LOAD #3
LOAD #4
RECT #1
RECT #2
X9
X10
Multi Purpose 1
Multi Purpose 2
Multi Purpose 3
Multi Purpose 10
Multi Purpose 11
Multi Purpose 12
Multi Purpose 4
Multi Purpose 5
Multi Purpose 6
Multi Purpose 7
Multi Purpose 8
Multi Purpose 9
+5V Sense
0V Temp. Battery
+5V Sense
0V Temp. Ambient
ALARM 1 C
ALARM 1 NC
ALARM 1 NO
ALARM 4 C
ALARM 4 NC
ALARM 4 NO
ALARM 2 C
ALARM 2 NC
ALARM 2 NO
DIGITAL IN 1
DIGITAL IN 2
DIGITAL OUT 1
ALARM 3 C
ALARM 3 NC
ALARM 3 NO
DIGITAL OUT 2
-V SYSTEM
+V SYSTEM
C NC NO
(ALARM CONDITION SHOWN)