Power Supply System
Guardian Access
GDN.C.48.M24
Instruction Manual

Document Number: GUARDIAN_ACCESS_M24-MAN rev. 6

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REV	DESCRIPTION	CHK'd & APPR'd / DATE
6	ECN# 46140	JR / 12-28-23

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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

Abbr.	Description	Abbr.	Description
ACX	Advance Controller Card	MC	Main Cabinet
ACDU	AC Distribution	MCCB	Molded Case Circuit Breaker
DC	Distribution Cabinet	MCB	Miniature circuit breaker
EC	Extension cabinet	PBC	P1 Battery Cabinet
FMD	Fan-cooled Modular Power Converter	PBDU	P1 Battery Distribution Unit
FMP	Fan-cooled Modular Power Rectifier	PCC	Prime Controller Card
GDN	Guardian system	PDU	P1 Distribution Unit
Genset	Diesel Generator	PLD	Partial load disconnection
LVD	Low voltage disconnection	SLI	SLI Inverter

1.4 Feedback & Support

Product support can be obtained using the following address and telephone numbers.

Manufacturing facility:
UNIPOWER, LLC
65 Industrial Park Rd
Dunlap, TN 37327
United States

Phone: +1-954-346-2442
Toll Free: 1-800-440-3504
Web site – www.unipowerco.com

When contacting UNIPOWER, please be prepared to provide:

1. The product model number, spec number, S build number, and serial number - see the equipment nameplate on the front panel
2. Your company's name and address
3. Your name and title
4. The reason for the contact
5. If there is a problem with product operation:
   - Is the problem intermittent or continuous?
   - What revision is the firmware?
   - What actions were being performed prior to the appearance of the problem?
   - What actions have been taken since the problem occurred?

1.5 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

This chapter contains an overview of the system and a short description of the units in the system.

The Guardian Access power system is designed to meet the requirements of modern telecommunication equipment. The power system is based on fan-cooled, hot-swappable Guardian family rectifier modules with output powers ranging from 2000W to 2900W.

The power system can be managed locally through messages and alarms displayed on the LCD screen of system controller, or remotely using the PC-based PowCom™ software package.

The power system contains rectifier shelves, system controller and distribution unit. To meet different application, the power system can be configured with one or two rectifier shelves (each with 5 rectifier position). The system controller can be either the ACX Advanced or the PCC. The distribution unit is also configurable according to customer's requirements.

The power system also includes optional units such as Rear and Top Cover, power cabinet and an extension PDU which adds a further 24 load breaker circuits over and above the maximum 26 available in the main distribution module.

There are four different sizes of cabinet available:

- 33.6"/854mm x 23.6"/600mm x 15.4"/390mm - 18RU internal
- 55.5"/1.4m x 23.6"/600mm x 23.6"/600mm - 30RU internal
- 70.9"/1.8m x 23.6"/600mm x 23.6"/600mm - 39RU internal
- 78.7"/2.0m x 23.6"/600mm x 23.6"/600mm - 43RU internal

The 18RU cabinet supports wall mounting and has 100mm adjustable feet.

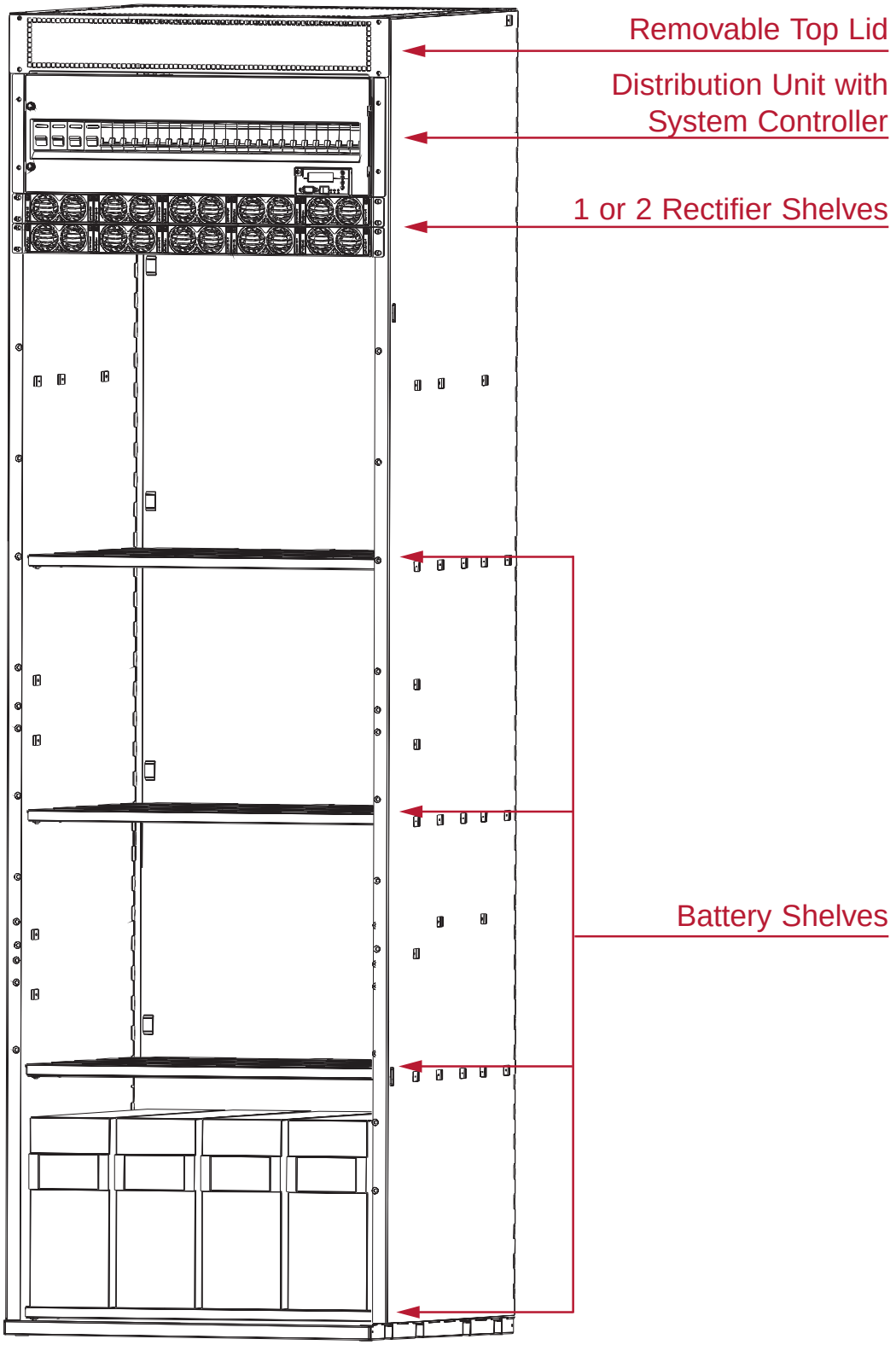


Figure 2-1 Power System Overview (2m Cabinet Shown)

2.2 Principal of Operation

The power system is normally configured with N+1 redundancy, with N as the number of rectifier modules necessary for feeding the load and charging the battery and 1 as the redundant rectifier module. In normal operation the rectifier modules are used to feed the load and simultaneously maintain the batteries in a fully charged state.

Once the mains input power is failed, the rectifiers are shut down and the batteries feed the load immediately. If the battery voltage drops below a preset level, the Low Voltage Disconnection (LVD) circuit disconnects the batteries automatically to prevent over-discharge of the battery to prolong battery life. When the mains input power is restored, the rectifiers will start up automatically to feed the load, close LVD circuit and recharge the batteries.

System performance is supervised and controlled by the controller, PCC or ACX Advanced. The DC output voltage, alarm thresholds, LVD circuit operation, temperature compensated battery charging can be set by the controller. Any malfunction will be indicated by LED, text in the display and operation of dry contacts.

However, the system controller is not a single point of failure. In the event of controller malfunction, basic tasks like feeding the load and charging batteries will be maintained by the rectifier modules directly at preset default values.

The alarm and threshold setting of the power system can be set either through the buttons and operation menu on the local controller, or remotely through the PowCom™ supervision software.

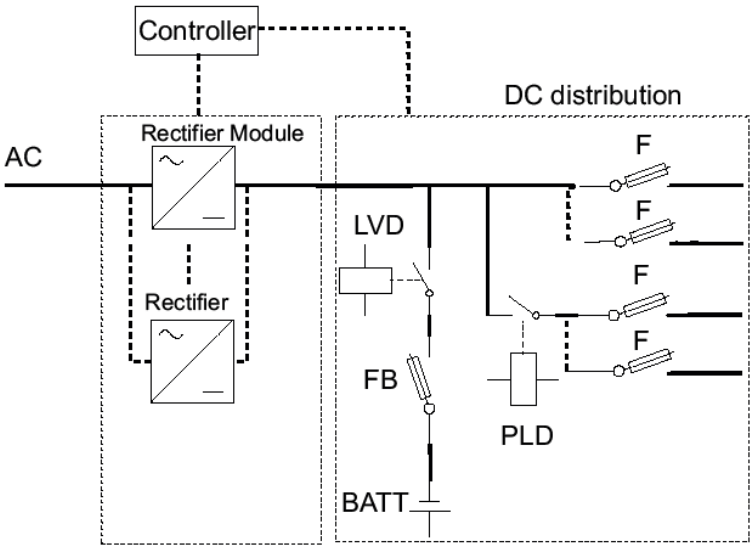


Figure 2-2 Principal of Operation

2.3 System Parameters

OUTPUT	
Power (max)	26.75kW load + 2.25kW battery charge @ 230/400VAC nominal 17.0kW load + 2.25kW battery charge @ 120VAC nominal
Output Current (max)	500A load + 42A battery charge @ 230/400VAC nominal 318A load + 42A battery charge @ 120VAC nominal
Voltage	44-57.6VDC
INPUT	
Voltage Range	100-120VAC, 1W+N+PE, 50/60Hz 200-240VAC, 2W+PE, 50/60Hz 208VAC, 3W+PE, 50/60Hz 220-240/360-416VAC, 3W+N+PE, 50/60Hz
Frequency	47-63Hz
Input Current	1-phase 200A @ 100-120VAC, 169A @ 200-240VAC 3-phase 56A per phase @ 230/400VAC
Power factor	>0.98
Surge Protection	Optional
DC DISTRIBUTION & BATTERY MANAGEMENT	
Battery Breakers	1, 2 or 3 x 80A, 100A or 125A
Symmetry Inputs	Up to 6 with PCC, up to 12 with ACX Advanced
Programmable LVD / PLD	125A or 200A (voltage) / 125A or 200A (voltage/time)
Load Breakers	21, 18 or 15 x 18mm, depending on number of battery breakers
Ratings	single pole - 4A, 6A, 10A, 16A, 20A, 25A, 32A, 40A, 50A, 63A
Battery Capacity	Up to 720Ah using 4 x 180Ah strings
MONITORING AND CONTROL	
Controller	PCC or ACX Advanced
Local Interface	4 x 20’ LCD, 4-key menu, USB (ACX 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)
Alarm Outputs	4 x potential free relays (C, NC, NO)
Digital Inputs	2 x, Logic 0: U<10VDC, Logic 1: U>12VDC (ACX only)
Digital Outputs	2 x, open collector type (ACX only)
Temperature measurement	2 x Temperature probe (Battery, Ambient)

CONNECTIONS	
Battery connections	M8 lugs, +Ve common from bus bar
AC connections	Max. 4AWG/16mm², screw type connector
Load breaker connections	-Ve termination direct to breakers, +Ve common from busbar 11AWG/4mm²
Alarm connections	Max. 14AWG/1.5mm², screw type connector

MECHANICAL	
Dimensions (WxHxD)	33.6”/854mm x 23.6”/600mm x 15.4”/390mm - 18RU internal
	55.5”/1.4m x 23.6”/600mm x 23.6”/600mm - 30RU internal
	70.9”/1.8m x 23.6”/600mm x 23.6”/600mm - 39RU internal
	78.7”/2.0m x 23.6”/600mm x 23.6”/600mm - 43RU internal
Mounting Options	Floor Standing or Wall-Mount (18RU only)
Cable Entry	Top or Bottom

STANDARD COMPLIANCE / ENVIRONMENTAL	
EMC and Immunity	EN 300 386 ; EN61000-6-3 (Emission) ; EN61000-6-2 (Immunity)
Safety	IEC60950-1:2005 2 Ed. +A1:2009
Environment	Storage: ETS300 019-2-1, Transport: ETS300 019-2-2, Operation ETS300 019-2-3, Damp Heat: IEC60068-2-78
Operating Temperature	-40°C to +65°C (derated above 55°C)
Storage Temperature	-40°C to +85°C

RECTIFIER MODEL	FMPe20.48G	FMP25.48G	FMPe30.48G
Efficiency	96%	92.5%	95%
Input Current (max)	<11.6A	<16.8A	<17.0A
Output Current (53.5V float)	37.4A	46.7A	54.2A
Output Power	1100W @ >180VAC 2000W @ 90-180VAC	1400W @ >180VAC 2500W @ 90-180VAC	1700W @ >180VAC 2900W @ 90-180VAC
Operating Temperature (without derating)	55°C	55°C	55°C
Input Voltage (Nominal 100-240VAC)	90-300VAC	85-300VAC	
Output Voltage	44-57.6VDC		
Load sharing	< 5% of nominal current		
Dimensions (HxWxD)	1.6 (41) x 4.2 (107) x 14 (355) ”(mm)		
Weight	4.6lbs / 2.1kg		
Cooling	Fan-cooled, speed controlled		
Protection	Short circuit, automatic current/power limiting, input/output overvoltage, thermal		

Alarms	Fan failure, Short circuit/arcing protection, High temperature/output voltage Low output voltage, Input voltage out of range Low fan speed (warning) Internal communication failure	
LED Indication	**Green:**	AC normal operation
	Yellow:	Steady - Low fan speed, High temperature Flashing - Communications failure
	Red:	Module alarm / shutdown
Audible noise	<45dBA @ ≤25°C (50% load) | <60dBA (100% load)	

NOTE For details of FMP20.48 and FMP30.48C available only in APAC region please see individual datasheets.

2.4 System Components

With the exception of the rectifier modules the Guardian Access system is delivered with all components mounted according to the ordered configuration. The main components are described below and in later chapters of this manual.

2.4.1 System Controller

The Guardian power system can be controlled by the ACX Advanced or PCC controller. The description and operation of these controllers is covered in separate manuals which are available at:

ACX Advanced: https://www.unipowerco.com/pdf/acc-man.pdf

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

2.4.2 DC Distribution Unit

The distribution unit includes configurable load breakers, battery breakers, a shunt for battery current measurement and fuse alarms for load and battery breakers.

The distribution unit has no special operation other than switching the load and battery breakers on and off. All trip states of breakers are supervised by measuring the voltage drop across each breaker.

Breakers that are not connected to any load will not cause a breaker alarm even if they are left open.

A battery fuse alarm may not be triggered instantly when a battery breaker is off. The alarm is triggered only when the voltage drop between the system voltage and the battery voltage is more than 1.5V. The interval that the voltage drop increases to 1.5V depends on the battery status.

Due to a small leakage current (2.5-3mA) through the alarm circuit, the voltage measured with a Digital Volt Meter (DVM) on an open breaker output will be nearly equal to the rectifier output voltage.

The distribution module has common "+Ve" with load breakers in "-Ve" leg. For more information see schematic drawing in Appendix A - Drawings.

2.4.2.1 Low Voltage Disconnect (LVD)

Generally, the system is equipped with low voltage battery disconnection, which prevents the batteries from deep discharging, thus prolonging the battery life. A disconnection requires a detected mains failure at the supervision unit.

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

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

2.3.2.2 Partial Load Disconnection / Load Shedding (PLD)

Partial load disconnection can be configured to be voltage on time dependent, this is selected when ordering the power system.

At a mains outage the controller will open the PLD contactor when the batteries have discharged to a certain voltage or if the battery voltage has been under a certain voltage for a predetermined time. The disconnection has to be set according to the present load and battery manufacturer's discharge tables or requirements.

2.4.3 Rectifier Module

The fan-cooled rectifier converts the AC input to -48VDC output for loads and batteries. It is designed for parallel operation and plug-in installation in the power shelf and supplies extremely stable DC power.

Each rectifier incorporates an internal microprocessor that sends frequent updates to the system controller and adjacent rectifiers. This ensures accurately controlled load sharing among rectifiers and supplies status and identification information to the controller.

The rectifier module features two LEDs for status indication, thermal protection with power derating, and input over voltage disconnection with automatic reset. The rectifier module is hot-swappable and can be quickly removed and replaced without disrupting the system or load.

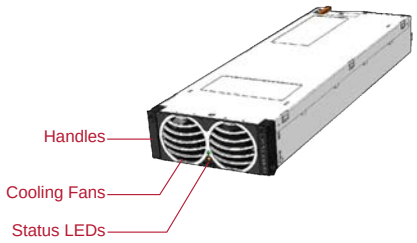


Figure 2-3 Guardian Rectifier

The power system is normally configured with N+1 redundancy, with N as the number of rectifier modules necessary for feeding the load and charging the battery and 1 as the redundant rectifier module. In normal operation the rectifier modules are feeding the load and simultaneously maintaining the batteries in a fully charged state.

2.4.4 Rectifier Module

The rectifier shelf is used for interconnecting the rectifier modules. Each rectifier shelf has five module positions. Module position are numbered from the left to right as viewed from the front.

The rectifier shelf has five mains input interfaces for AC input to each rectifier and two RJ45 ports for communication.

DIP switches are used to address module positions and have to be set for controller supervision. Each switch can address four-bit binary address, which means up to 16 rectifier shelves (with up to 64 modules) can be supervised. Addressing is performed by setting the four bits to ON or OFF (ON=1, position UP; OFF=0, position DOWN).

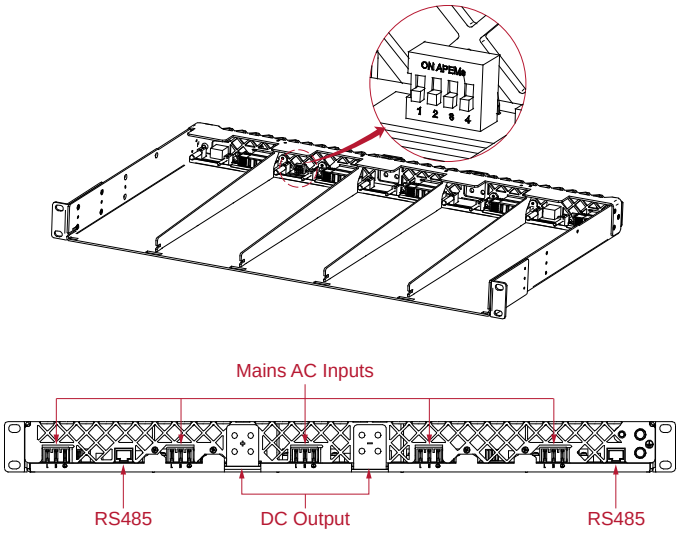


Figure 2-4 Guardian Rectifier Shelf

Rectifier Shelf Number	Module Position	DIP Switch (1 2 3 4)
1	1-5	0000
2	6-10	0100

Table 2-1 Addressing Module Positions

NOTE The rectifier shelves are numbered from top to bottom. The module position is numbered from the left to right viewed from the front.

2.4.5 Extension PDU (Option)

The extension PDU Distribution Unit supports the extension of load MCBs up to 24 positions using the same type of 18mm breakers used in the main system module, the maximum DC capacity is 200A.

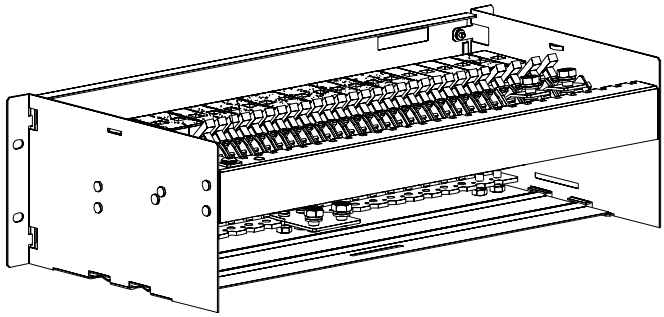


Figure 2-5 Extension PDU

For installation details, please see Chapter 4.

2.4.6 SLI 15 Inverter Module (Optional)

The SLI 15 Inverter Series offers four models for different input (24/48VDC) and output (110/230 VAC) voltage combinations. The inverter delivers 1500W in a compact 1RU x 19-inch rack-mountable unit with a very high efficiency, up to 93%, which extend the back-up time available from batteries, and can reduce the number of batteries needed to achieve a specified back-up power.

NEED MORE INFORMATION? See the SLI15 datasheet and manual on the UNIPOWER web site: https://www.unipowerco.com/products/1-5kva-inverter-sli15/

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:

Ground Symbol

DC Ground Symbol

Product Label - The product label contains the system part number, model number, system ratings and safety approvals. The label is located inside the system.

Safety Label - The safety label is located inside the system.

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 a 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.
- 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 should only be moved by qualified personnel and equipment.
- The Power System should be properly mounted to the building structure at the install location to prevent bodily injury.

3.1.4 Restricted Access Area Warnings

The Power System is designed for installation in locations with restricted access often secured by a locking mechanism. It can therefore be accessed only by a trained service person, who is fully aware of the restrictions applied to the location, or by an authority responsible for the location.

NOTE This may be disregarded for systems delivered in a UNIPOWER Outdoor enclosure.

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 Recommended Power Ratings

Exceeding the following recommended power ratings may result in the system overheating.

- 46-57VDC, 500A at 45°C ambient
- 46-57VDC, 450A at 55°C ambient
- 46-57VDC, 380A at 65°C ambient

3.1.8 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 AC power and 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 overcurrent 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 ground connections are secure.

3.1.9 Grounding

WARNING Grounding connection must be performed **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 should be hard-wired to the incoming earth ground. A solid high current ground connection capable of sinking the maximum system current is required.

CAUTION A conductor is connected between the ground point and the 0 VDC bus bar on the PBDU distribution. This conductor is connected to its own earth bar and not shared with other safety conductors.

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 tracability, 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

Maximum 45°C operating ambient:

1. Up to 32A CB maximum load must not exceed 80% of it's rating.
2. 40A CB maximum load shall not exceed 30A.
3. 50-63A CB maximum load shall not exceed 35A.

Maximum 55°C operating ambient:

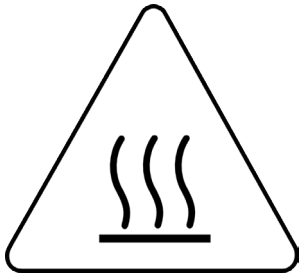
1. Up to 20A CB maximum load must not exceed 80% of it's rating
2. 25A to 63A CB maximum load must not exceed 60% of it's rating.

Maximum 65°C operating ambient:

1. Up to 20A CB maximum load must not exceed 80% of it's rating
2. 25A to 63A CB maximum load must not exceed 50% of it's rating.

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

3.2.6 Hot Surfaces



CAUTION Areas of the Power System may become hot. Take precautions and handle with care to avoid bodily harm.

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

CAUTION Make sure sufficient room is left around the system to enable optimal air circulation and thus prevent the system from overheating. Keep vent openings from blocking.

The following information should be read before attempting to install the Power System.

4.1 Site Requirements

The site should be suitable and ready for the Power supply. If it is not or you are unsure about this, contact your supervisor before continuing. Check, using a spirit level, that the site is level. Adjustment is provided in the cabinet to cater for floors that are not flat or smooth.

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:

- Anti-static hand strap.
- Socket wrench, insulated.
- Screwdriver set, flat, insulated.
- Screwdriver set, torx, insulated.
- Screwdrivers, pozidrive (cross head), sizes 1, 2, and 3, insulated.
- Torque spanner (for battery connection), insulated.

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

CAUTION Installation in USA / Canada must conform with the requirements in NEC/CEC.

CAUTION Care must be taken when installing this system. The units can be damaged and can cause damage if not handled with care. Pay particular attention to the order in which units are installed.

4.4 Cable Size

Please use the recommended cable size given below for the system installation.

Port	Current Max.	Cable Size Min.(mm²)	Cable Size Min.(AWG)	Temperature Rating
AC Input -L1	32A	10mm²	7 AWG	105°C
AC Input -L2	32A	10mm²	7 AWG	105°C
AC Input -L3	16A	10mm²	7 AWG	105°C
AC Input -N	32A	10mm²	7 AWG	105°C
AC Input -PE	-	10mm²	7 AWG	105°C
Battery MCB	80A	20mm²	4 AWG	105°C
Battery MCB	100A	25mm²	3 AWG	105°C
Battery MCB	125A	35mm²	2 AWG	105°C
DC Load -MCB	63A	16mm²	5 AWG	105°C
DC Load -MCB	50A	14mm²	6 AWG	105°C
DC Load -MCB	40A	10mm²	7AWG	105°C
DC Load -MCB	32A	8mm²	8 AWG	105°C
DC Load -MCB	25A	8mm²	8 AWG	105°C
DC Load -MCB	20A	6mm²	9 AWG	105°C
DC Load -MCB	16A	4mm²	10 AWG	105°C
DC Load -MCB	10A	2.5mm²	14 AWG	105°C
DC Load -MCB	6A	2.5mm²	14 AWG	105°C
DC Load -MCB	4A	1.5mm²	15 AWG	105°C

Table 4-1 Recommended Electrical Cable Sizes

4.5 Installation Procedure

4.5.1 Locating and fixing the floor cabinet

1. Move the cabinet to the right place and lift it into an upright position.
2. Use a spirit level to make sure that the cabinet is level. Adjust the cabinet feet if necessary.
3. If necessary the cabinet can be mounted to the concrete slab and existing structures to properly support the floor loading. In addition, the mounting site needs to be designed and installed in accordance with local building codes and regulations.
4. Mark the position of the four fastening bolts on the floor according to Figure 4-1.

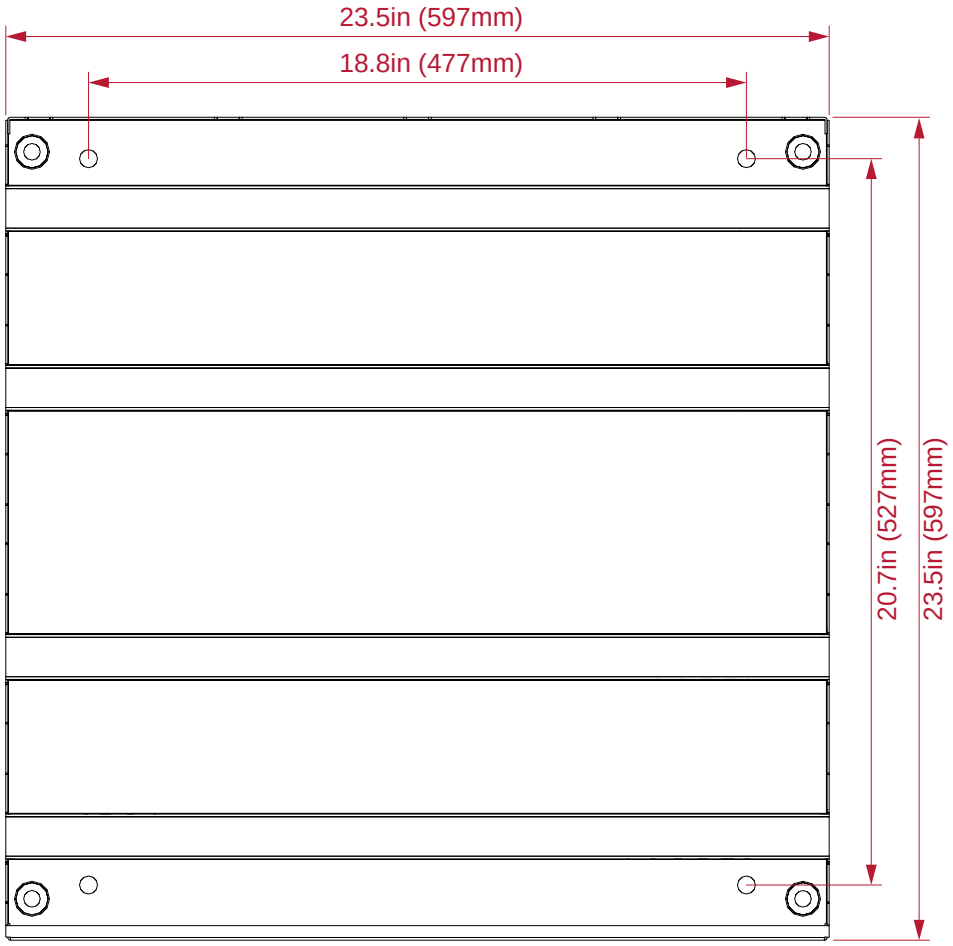


Figure 4-1 Cabinet Drilling Pattern

4.5.2 Cabinet Leveling

Level the cabinet using a screwdriver to adjust the four feet and a spirit level to verify.

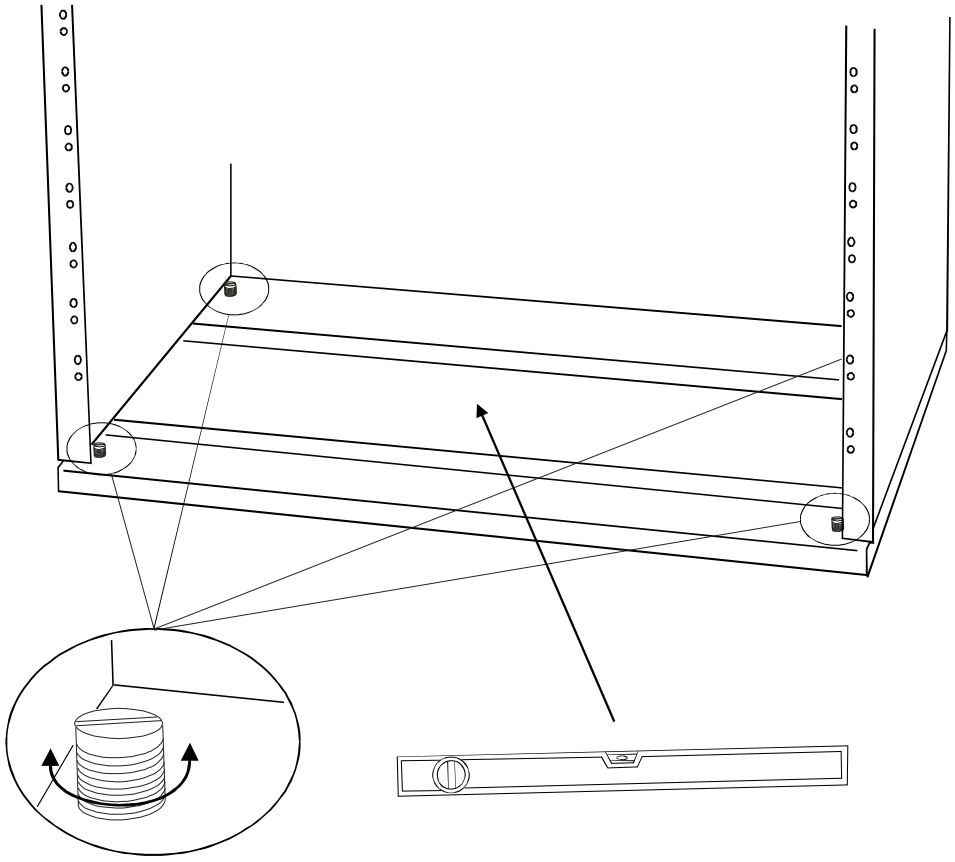


Figure 4-2 Cabinet Leveling

4.5.3 Removing the Top Cover from the Cabinet

Remove the top lid by loosening two screws at the front, pull the top towards you and lift it up to remove, as shown in Figure 4-3.

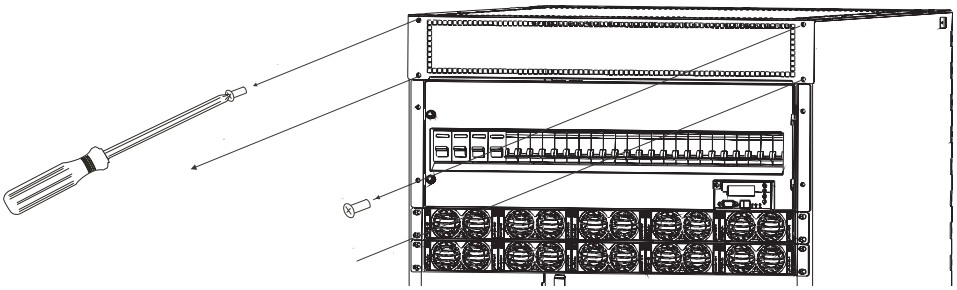


Figure 4-3 Floor Cabinet Top Cover Removal

4.6 Connecting Cabinet Frame Ground to the Main Earth Terminal

CAUTION Earth grounding connection is essential before connecting supply.

NOTE The internal earth cable is connected between the positive DC busbar and the cabinet.

1. Connect the grounding cable with a minimum cross sectional area of 16mm² between the earth grounding point at the top-rear of the cabinet and the Main Earth Terminal (MET) of the site. See Figure 4-4.
2. Tighten the cable connection to a torque of 10Nm.

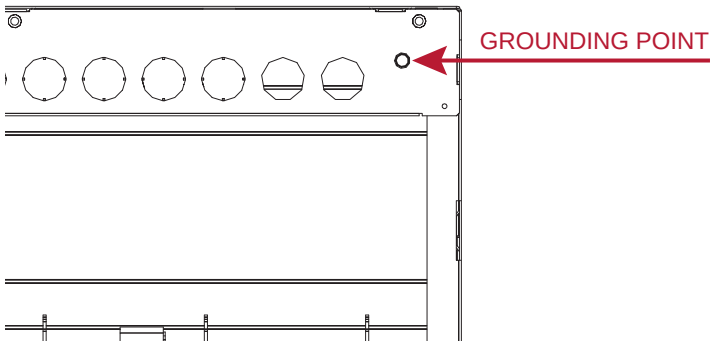


Figure 4-4 Connecting the Frame Ground

4.7 AC Input Connection

WARNING Ensure that mains input is turned off before connecting. The grounding must be connected to PE terminal as first.

WARNING High leakage current. Ensure earth is connected before connecting mains supply.

WARNING Only a qualified electrician may carry out the mains installation.

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, if not delivered with the system..

WARNING Used cable must be inserted into the terminal with as little insulation removed as possible, so as to prevents any stranded conductor coming loose and touching any other conductive parts. Tighten terminals securely with torque 1.5-1.8Nm.

Mains input terminal blocks are located on the back wall of the cabinet just above the main system unit. Mains cable size is max. 16mm².

The mains input terminal blocks can be connected to:

- 1-phase 110/120VAC or 220/230/240VAC (Figure 4-5)
- 2-phase 240VAC - N.A./CALA (Figure 4-5)
- 3-phase 208/230/400VAC (Figure 4-6)

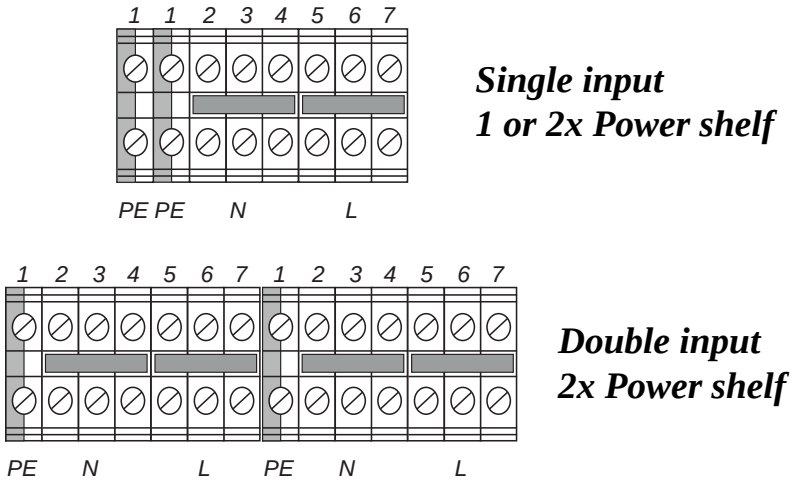


Figure 4-5 AC Input Terminal Block (1-phase or 2-phase)

Recommended mains breaker types:

Single pole 80A C-characteristic
or
Single pole 63A D-characteristic

NOTE If the total input current of all installed rectifiers exceeds this "default" breaker rate then use a 2 or 3-pole breaker to increase the overall rating.

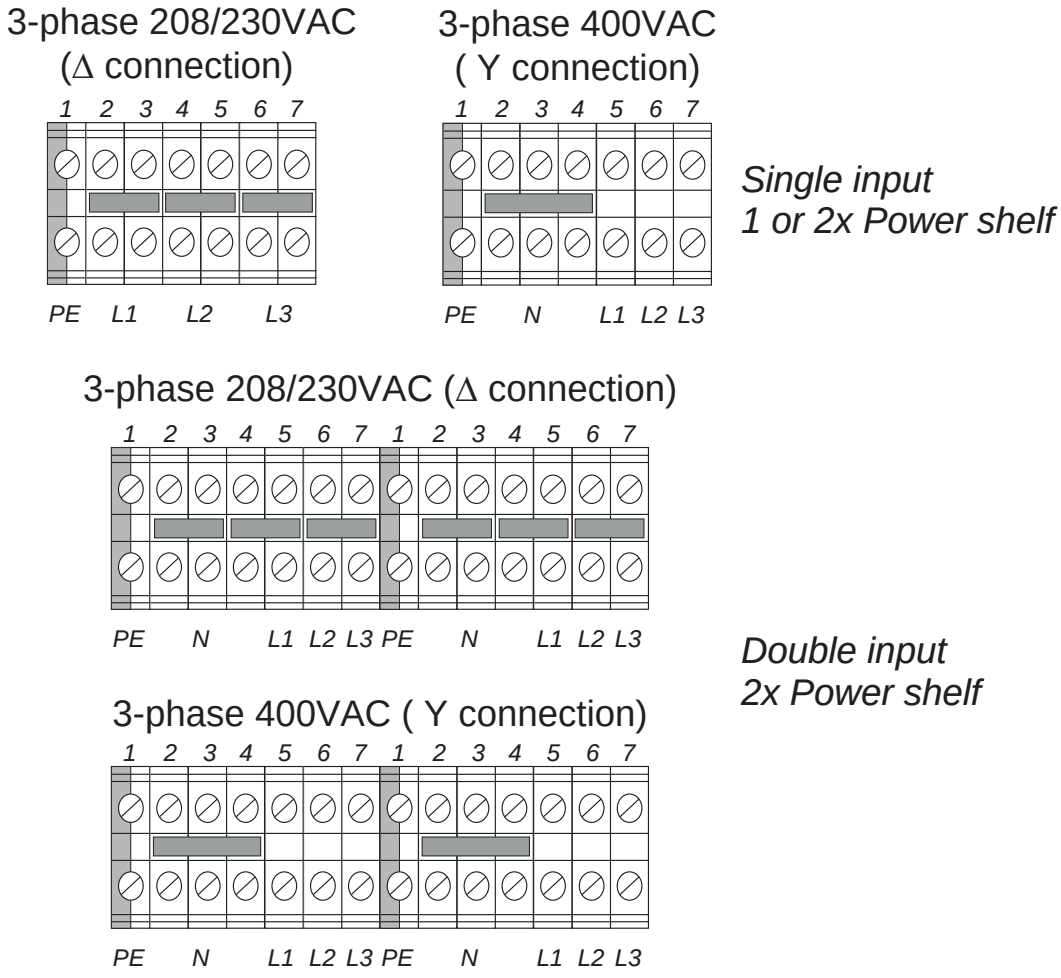


Figure 4-6 AC Input Terminal Block (3-phase)

Recommended mains breaker types:

Triple pole 80A C-characteristic
or
Triple pole 63A D-characteristic

4.8 DC Load Connection

This section details how to connect the loads to the DC load breakers. Use suitably sized cables according to Table 4-1. .

Check that all the MCB's are in the OFF position.

1. Connect the negative (-) DC supply cable to the appropriate negative DC distribution MCB by inserting the stripped cable in the opening on top of the MCB and tightening the screw. Make sure that the cable has the correct rating for the selected MCB.

2. Connect the positive (+) DC supply cable directly to the positive bus bar by inserting the stripped cable to the hole on top of the screw connector so that the cable is behind the bus bar, and then tightening the screw. Start connecting the loads to the bus bar from the first connector on the left. Make sure, the cable is the correct rating for the load. Check, that all the cables are secured tightly to the connectors.

Use Torque table in the Maintenance and Troubleshooting Chapter for the correct torque.

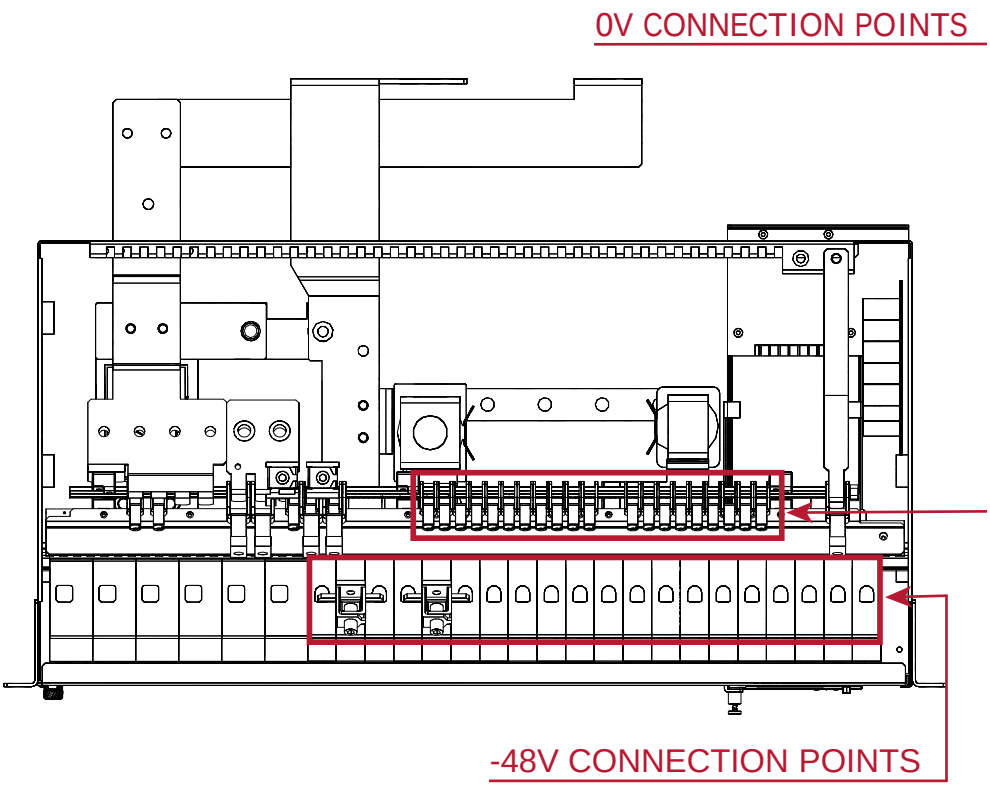


Figure 4-7 DC Load Connection

4.9 Battery Cable and Connection

If ordered, battery cables are pre-connected to the system battery breakers. If not, use suitably rated cable size (see Table 4-1 on page 24) and follow steps 1 to 4 below.

1. Check that all the battery MCBs are in the OFF position.
2. Connect the "+" cable of each battery string to the positive bus bar of the system. Tighten the cable terminal to 3.0Nm.
3. Connect the "-"cable of each battery string the battery circuit breaker. The copper bar with washer and nut installed on the circuit breaker is used to connect and tighten the battery cable lug.
4. Connect the other ends of the battery cables to the "-"and "+" terminals of the batteries once they have been installed as described in section 4.10..

Use Torque table in the Maintenance and Troubleshooting Chapter for the correct torque.

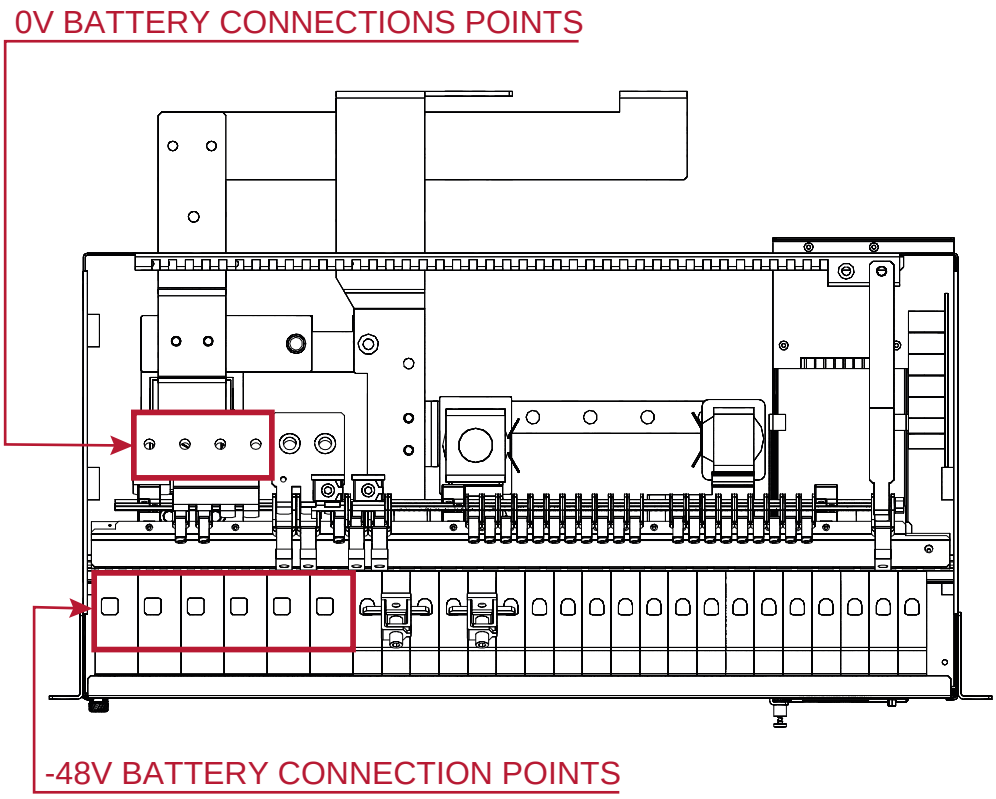


Figure 4-8 Battery Cable Connection

NOTE Figures 4-7 and 4-8 show a configuration with six battery breakers installed.

4.10 Battery Installation

The batteries should be handled according to the battery manufacturer's recommendations. When placed into the cabinet, the recommended distance of 5-15mm between the battery blocks should be adhered to to ensure proper ventilation.

1. Attach interblock connections between the battery blocks (Figure 4-9, Detail 1).
2. Connect the negative "-"cable to the negative pole of the battery string (Figure 4-9, Detail 2). Tighten the connection to a torque of 5-6Nm.
3. Connect the positive "+" cable to the positive pole of the battery string (Figure 4-9, Detail 3). Tighten the screw to 5-6Nm.
4. Attach plastic pole protection caps to the battery poles (Figure 4-9, Detail 4).

Repeat steps 1to 4 to connect the battery cables to the remaining battery strings.

NOTE The battery installation procedure is an example and may vary depending on the battery type.

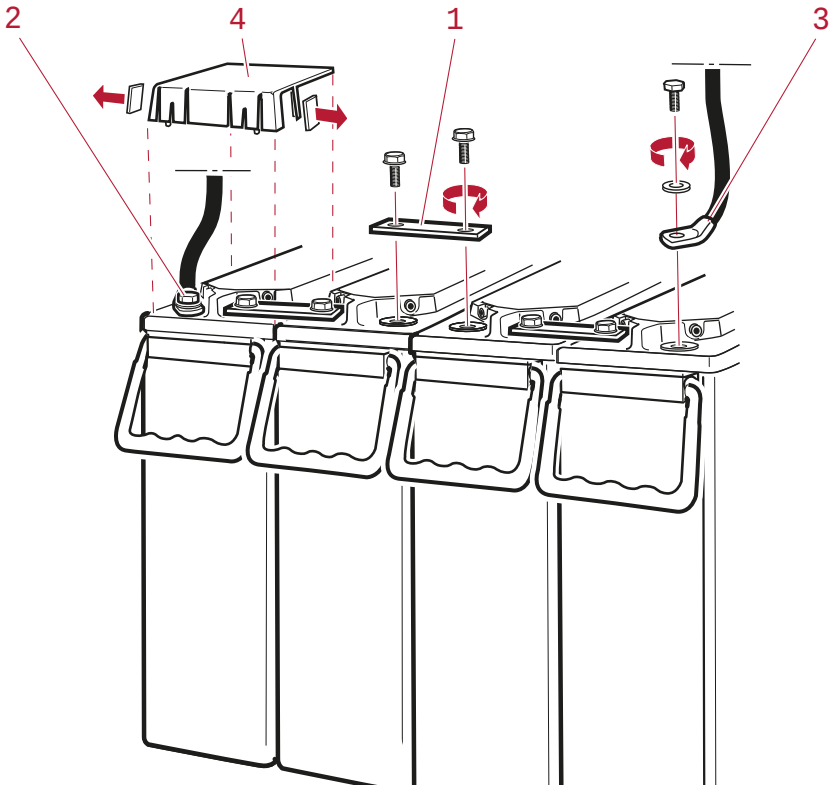


Figure 4-9 Battery Installation (Example only)

4.11 Alarm and Signal Connections

Alarm connections are positioned on the right side of the PBDU on Alarm interface board, see Figure 4-10.

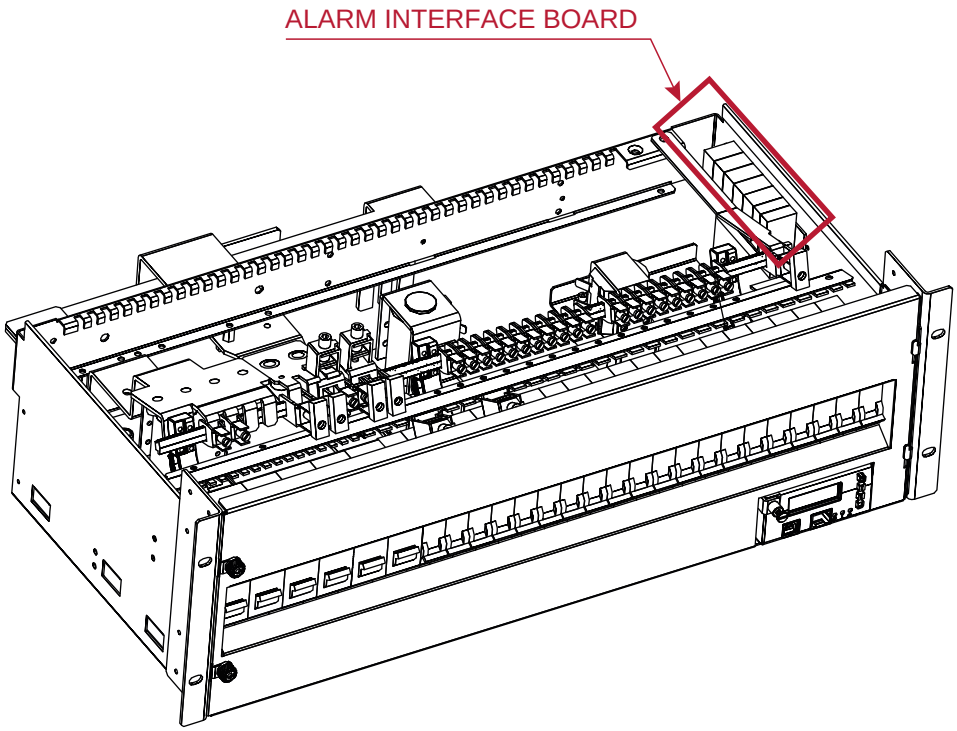


Figure 4-10 Alarm Board Location

For remote supervision of the alarms, there are maximum 4 or 10 potential free alarm contacts available:

- Standard interface (External connection board) - 4 alarms
- Extended interface (Alarm relay board) - 10 alarms

The extended Interface is compatible only with ACX controller. When PLD2 is used on the Extended Interface, there are 8 alarms available.

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, the NC is open.

NOTE Relays K1-K6 (Alarm 5 - Alarm 10) on the Alarm Relay Board are set to the alarm position if communication with the controller (due to malfunctioning or being pulled out) is lost for more than 7 minutes. (This function is available only for Alarm Relay Board firmware version 1.2 or later.) It has no influence on PLD2 functionality, if used.

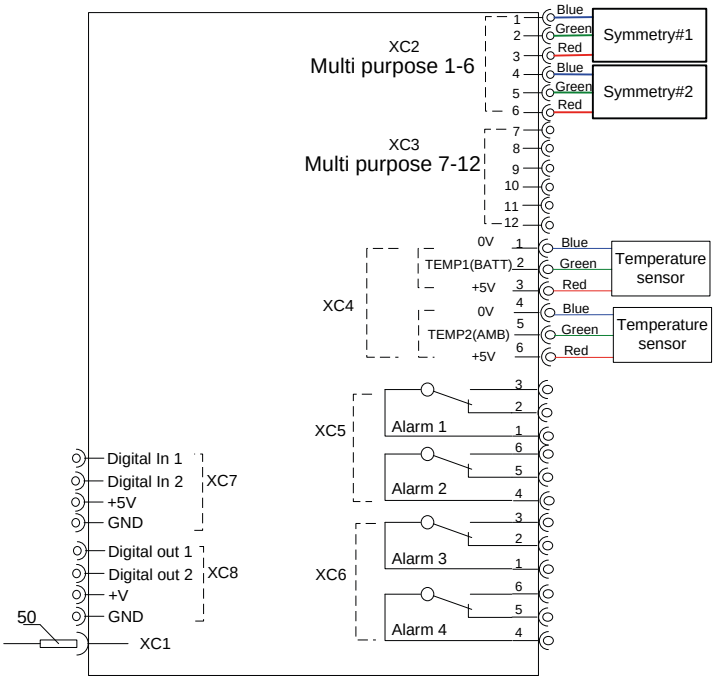


Figure 4-11 ACX External Board

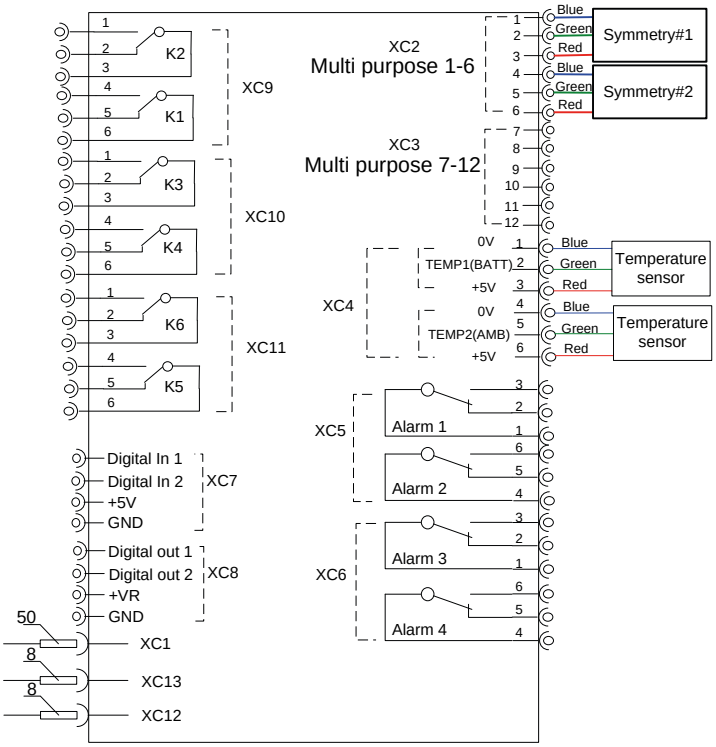


Figure 4-12 ACX Relay Board

To connect the alarm cable to the alarm interface board, follow the steps below:

1. Remove the green plug from each connector.
2. Determine whether to reference normally closed (NC) or normally open (NO) with reference to common for each alarm contact.
3. Strip the wires back approximately 10mm. Stranded wire may be soldered or covered with copper ferrule if desired.
4. Insert the wire into the top openings of the green plug and tighten the screw to clamp wire.
5. Re-insert the green plug with the alarm cable into the alarm interface board.

NOTE The alarm configuration will be dependent on your system configuration.

NEED MORE INFORMATION? For detailed information regarding Alarm connection see Appendix A, Installation Drawing.

4.12 Symmetry Connection

The ACX controller can supervise 4-block symmetry measurements on 4 battery branches. If the PCC controller is used, only 2 battery branches can be measured on 4 blocks.

NOTE Symmetry cables are pre-connected to the system.

NOTE Multi Purpose inputs which are not used for symmetry measurement can be reconfigured to user defined analog inputs.

1. Insert a suitably sized cable lug into one pole of the inter-block connection plate. Fasten the lugs and plates to individual battery poles.
2. For 2-block battery symmetry measurement fix one wire of the symmetry cable to the cable lug in the mid-point of the battery string, see Figure 4-13.

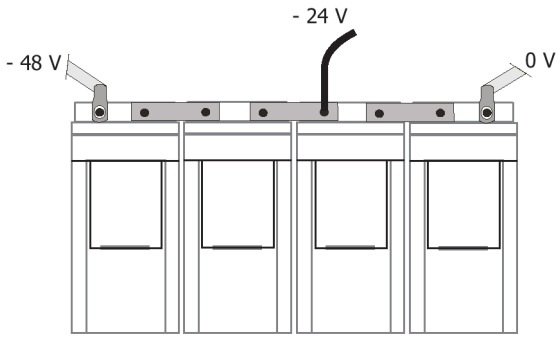


Figure 4-13 2-block Symmetry Measurement (for illustration only)

For 4-block measurement fix the 3 wires (red, green and blue) of the symmetry cable to individual cable lugs. Color coding of the cables must be followed for proper symmetry measurement, see Figure 4-14.

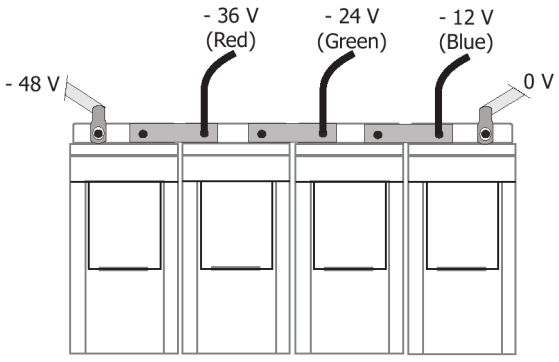


Figure 4-14 4-Block Symmetry Measurement (for illustration only)

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

4.13 Temperature Sensor Connection

NOTE The power system is usually delivered with pre-connected temperature sensor cables. If not, use a three-pin plug and connect according to the Appendix A - Installation Details.

Battery Temperature

Temperature sensor 1 measures the temperature of the battery bank while the controller adjusts the float charge voltage according to the temperature compensation factor set in the controller. This factor must be set in the controller according to the battery manufacturer ‘s recommendations.

Fasten the temperature sensor in the middle of the battery bank, Figure 4-16.

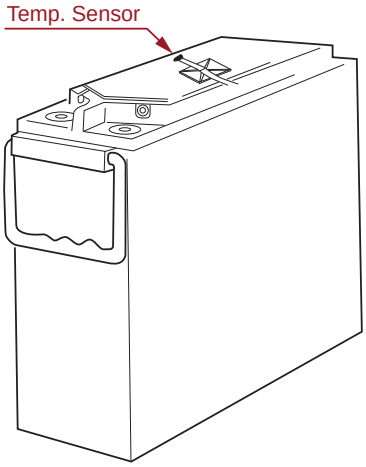


Figure 4-15 Temperature Sensor Connection

NOTE The temperature compensation factor can be set only for temperature sensor 1.

Ambient Temperature

Temperature sensor 2 allows a second temperature reading, most commonly the ambient temperature around the system. Place the sensor as required.

The temperature is displayed in the External Measurements menu in the ACX controller or in PowCom™ software.

NOTE Temperature sensor 2 can be activated only in the systems with the ACX controller installed.

4.14 Reinstalling Top Cover

After completing all connections, reinstall the cabinet top cover.

4.15 Rectifier Installation

NOTE Ensure that the rectifier handle is in the OPEN position (forms 35-40° angle with rectifier body) before inserting the module into the slot.

Rectifier module should be installed starting from the bottom left position in the rectifier shelf.

NOTE If you ordered a power system with 3 rectifier positions, leave the bottom two slots blank and install the rectifier from the middle left position.

1. Place the rectifier module in the desired slot with the handle facing out.
2. Slide the rectifier module into the slot until it contacts the interface connection at the rear of the shelf, Figure 4-16 1.
3. Fully insert the rectifier by pushing the handle towards the shelf. The rectifier handle will rise up and lock the rectifier into the position, Figure 4-16 2.

Repeat steps 1 to 3 for the remaining rectifier modules.

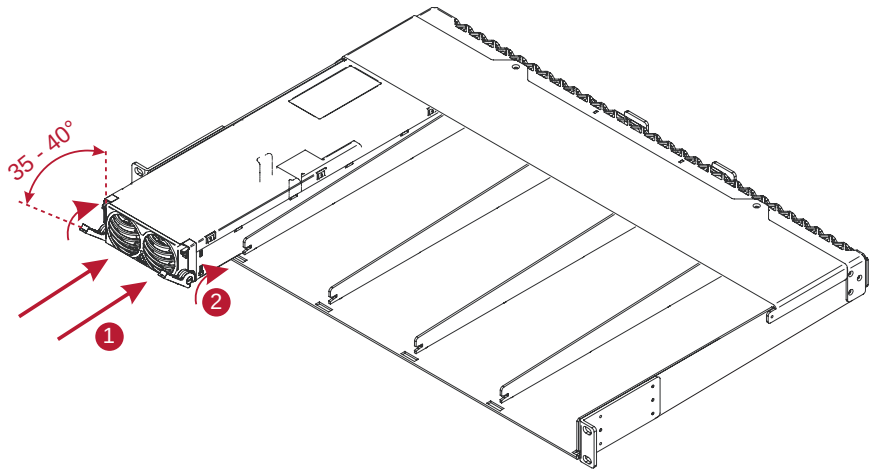


Figure 4-16 Rectifier Installation

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. The grounding cable size, color and routing conform to the requirements.
- Power: The incoming mains AC power is available for this site. The site power switch and circuit breakers are clearly labeled. The power cables 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 covers 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. If the rectifier subrack has dip switches for addressing, verify that the dip switches are set correctly.
5. Check the battery polarity with the multimeter (3½ Digit, 0·1% dc). Place the positive lead of the meter to the positive busbar and the negative lead to the battery breaker. The meter must now show a positive voltage. If the voltage is negative, change over the connection of the blue and black battery cables to the batteries.
6. Turn on the AC mains voltage.
7. Measure the AC voltage on the AC terminal block between phases and neutral. The correct value is approximately 230V. If the value is different, check the AC connection.
8. Plug in all rectifier modules, starting from the leftmost position. Make sure to fasten the rectifiers again. The rectifiers will turn on automatically.
9. Set all load breakers into the “1” (ON) position.
10. The green LED on the controller should blink for approximately 20 sec.
11. The output voltage will increase slowly to U1 (float charge voltage).
12. Turn the battery breaker(s) to the “1” (ON) position.
13. Set the battery current limit according to the battery manufacturers requirements.
14. If any alarms are present, they should be reset in accordance with the procedure for the installed controller, ACX or PCC.
15. The system should now be without alarms.
16. Attach all the system covers in their correct places.
17. Check that all changes to drawings, if any, have been completed.
18. Clean the site.
19. Fill in the commissioning record (see end of chapter).

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 pre-set 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.

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 pre-set 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 supplied:

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 temp. probe cable supplied:

Temperature compensation is factory pre-set. 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 subrack(s).		
3	Connect AC, and measure voltage on the mains input connections in the cabinet, Is to be 230V AC (Measure 230V from phase to N when 400V mains input is used)		L1-N:…….V AC L2-N:.....V AC L3-N:.....V AC
4	Mount the rest of the rectifiers		
5	After connection of battery, verify right polarity by measuring the voltage drop across the battery breakers (normally not more than 5V DC).		
6	Check float charge, U1, and boost charge, U2. It is to be adjusted according to the battery manufacturers requirements.		U1:…….V DC U2:.....V DC
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

6.1.1 Checking Terminal Connection

The connections on the terminal blocks and circuit breakers must be checked according to the Table 6-1 at least once a year.

TYPE OF CONNECTION	MODEL / DESCRIPTION	TORQUE (Nm)	TORQUE (Inch LB)
Terminal block for rail	AKG 16mm²	2.5	22
Terminal block for rail	AKG 35mm²	3.5	31
Front terminal for copper cables	FC Cu T2 95mm²	7.0	62
Terminal block Weidemullers	WDU 4mm	0.6	5
Terminal block Weidemullers	WDU 10mm	2.0	18
Terminal block Weidemullers	WDU 16mm	3.0	27
Miniature circuit breaker	Siemens	2.5	22
Miniature circuit breaker	Merlin G	3.5	31
Miniature circuit breaker	ABB	2.0	18
Miniature circuit breaker	CBI HY-MAG	3.0	27
Molded case circuit breaker	ABB 160A - S2	5.0	45
Molded case circuit breaker	ABB 160A/250A - S3/S4	9.0	80
Molded case circuit breaker	ABB 630A - S6	9.0	80
Molded case circuit breaker	Terasaki - XS125CJ	9.0	80
Connection unit for 2 or 3 pole breaker	Merlin G & Siemens	13.5	120
Terminal Block Phoenix	Phoenix Mini Combicon	0.25	2
Terminal block Phoenix	UK10 / UKLKG10	1.5-1.8	13-16
Terminal block Phoenix	UK16 / USLKG16	1.5-1.8	13-16
Terminal block Phoenix	UK35/UIK35/USKG35/UISKG35	3.2-3.7	28-33
Miniature circuit breaker	Nader	2.5	22

Table 6-1 Connection Torque Setting Check

6.1.2 Other Requirements

At least once a year the output voltage should be verified to be within acceptable limits. The result of the test should be recorded and filed to see any deviations.

In addition, the system requires periodic inspections and routine cleaning. It is very important to keep the 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.

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:

ACX Advanced: https://www.unipowerco.com/pdf/acx-man.pdf
PCC: https://www.unipowerco.com/pdf/pcc-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. Loss of AC power. Load exceeds module capacity.	Replace faulty module. Verify AC input connection. Add module to system.
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 AC input breaker is ON. 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.

Fault	Possible Cause	Suggestion/Solution
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, overvoltage 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.
Overvoltage Shutdown	Faulty module	Re-insert the module, wait for 5 minutes. Replace the faulty module.
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.

Fault	Possible Cause	Suggestion/Solution
Communication Failure	Module failure. Modules not installed in the correct position. Broken or disconnected communication wire.	Check the non-communicating address If the rectifier address does not communicate re-install the module and wait for 5 minutes. Verify that the communication cable is properly connected and it is not damaged. Replace if necessary. If the board address does not communicate, check if it is installed in the system. If it is, replace the board. If there is a non-communicating module or unit, remove the non-communicating address from the controller (Accept removed parts). Do so only if you are sure you do not use them any more. 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. Replace the breaker / fuse if necessary.
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. Replace the breaker / fuse if necessary.

Fault	Possible Cause	Suggestion/Solution
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).
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. For details see section 1.4 on Page 7 of this manual.

7.1 Controller Replacement

A faulty Controller can be easily replaced with a new one:

1. Loosen the front screw in the top left corner of the controller front panel using a flat screwdriver.
2. Pull the controller out of the system unit.
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.

This section describes how to replace a faulty rectifier in an active system.

1. Release the rectifier handles and remove the faulty rectifier.
2. Insert the new rectifier into the slot and fasten it with the handles. Refer to section 4.13 of this manual for details.
3. Ignore the module alarm caused by current sharing.
4. After 1 minute the yellow LED starts blinking. Wait for a maximum of 4 minutes for the indicator to stop blinking.

7.3 Battery and Load Breakers Replacement

WARNING Make sure the system is switched OFF.

The system unit is designed front accessible for easy maintenance. Battery and load breakers can be replaced without removing the system unit from the cabinet.

This section describes how to replace faulty breakers.

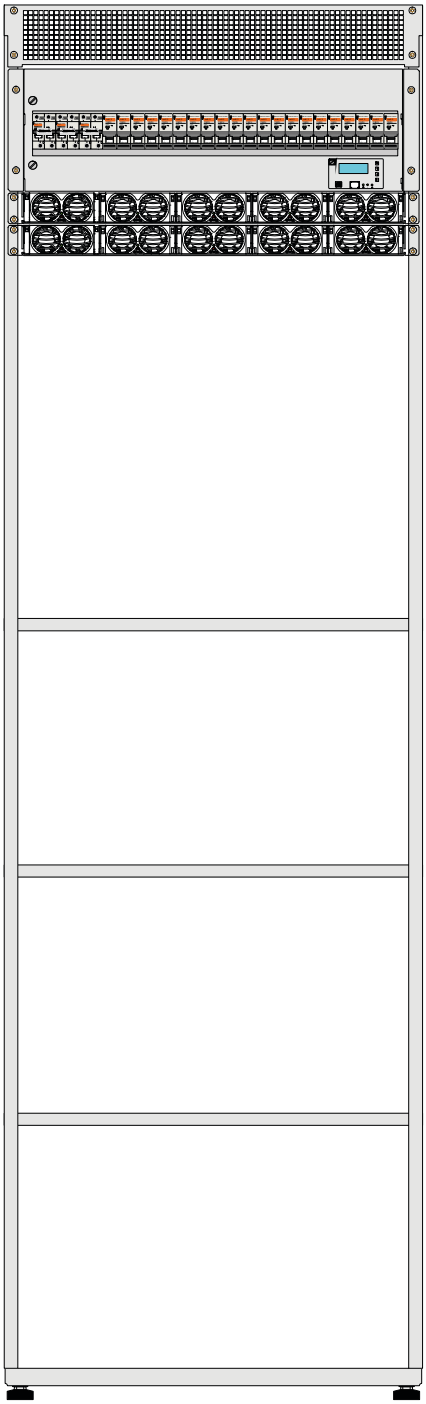
1. Open the system unit front panel by unscrewing the two knurled nuts to the left side.
2. Unscrew the DC load cable from the faulty breaker.
3. Pull out the faulty breaker(s).
4. Install the replacement breaker(s).
5. Close and lock the system unit front panel.

7.4 Surge Protection Device Replacement

This section describes how to replace a faulty surge protection module.

1. Switch off AC input power.
2. Remove the cabinet top cover.
3. Pull out the failed surge protection module.
4. Insert a new surge protection module into the corresponding position.
5. Reinstall the alarm interface board kit and fasten the retaining screw.
6. Reinstall the cabinet top cover.
7. Switch on AC input power.

A.1 System Layout

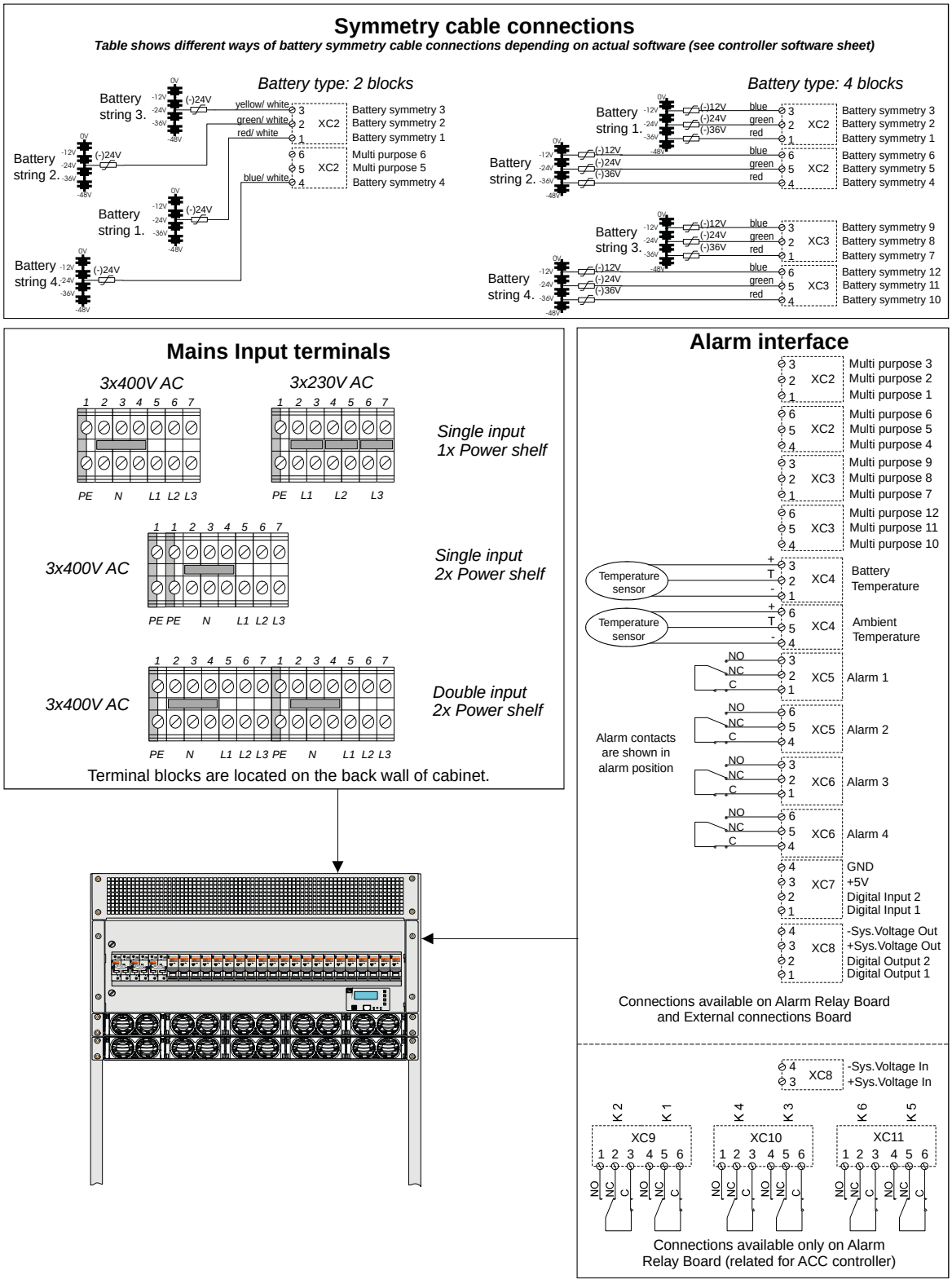


Cabinet size: 600x600x1400mm (WxDxH)

Cabinet size: 600x600x1800mm (WxDxH)

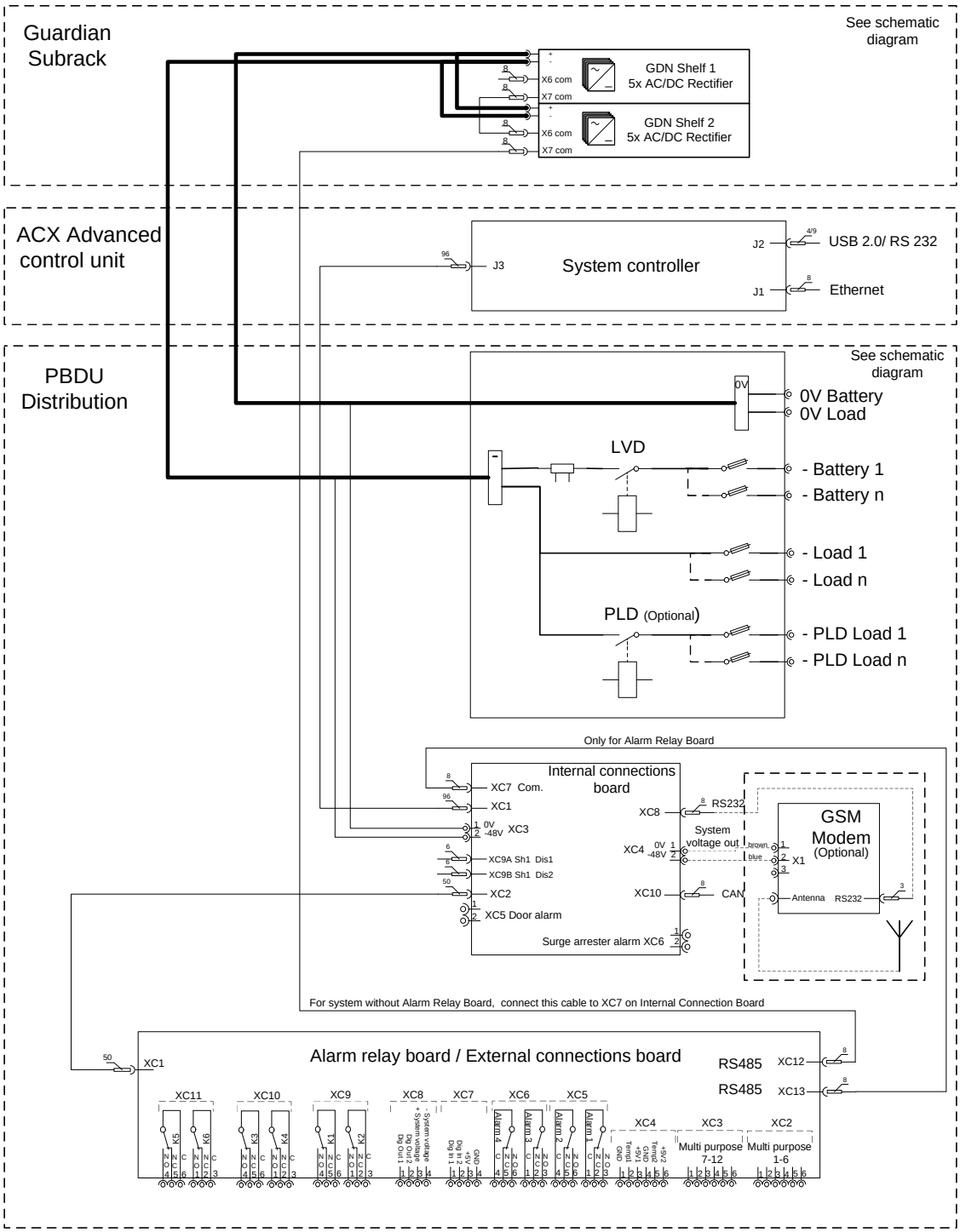
Cabinet size: 600x600x2000mm (WxDxH)

A.2 Installation Details - Connections

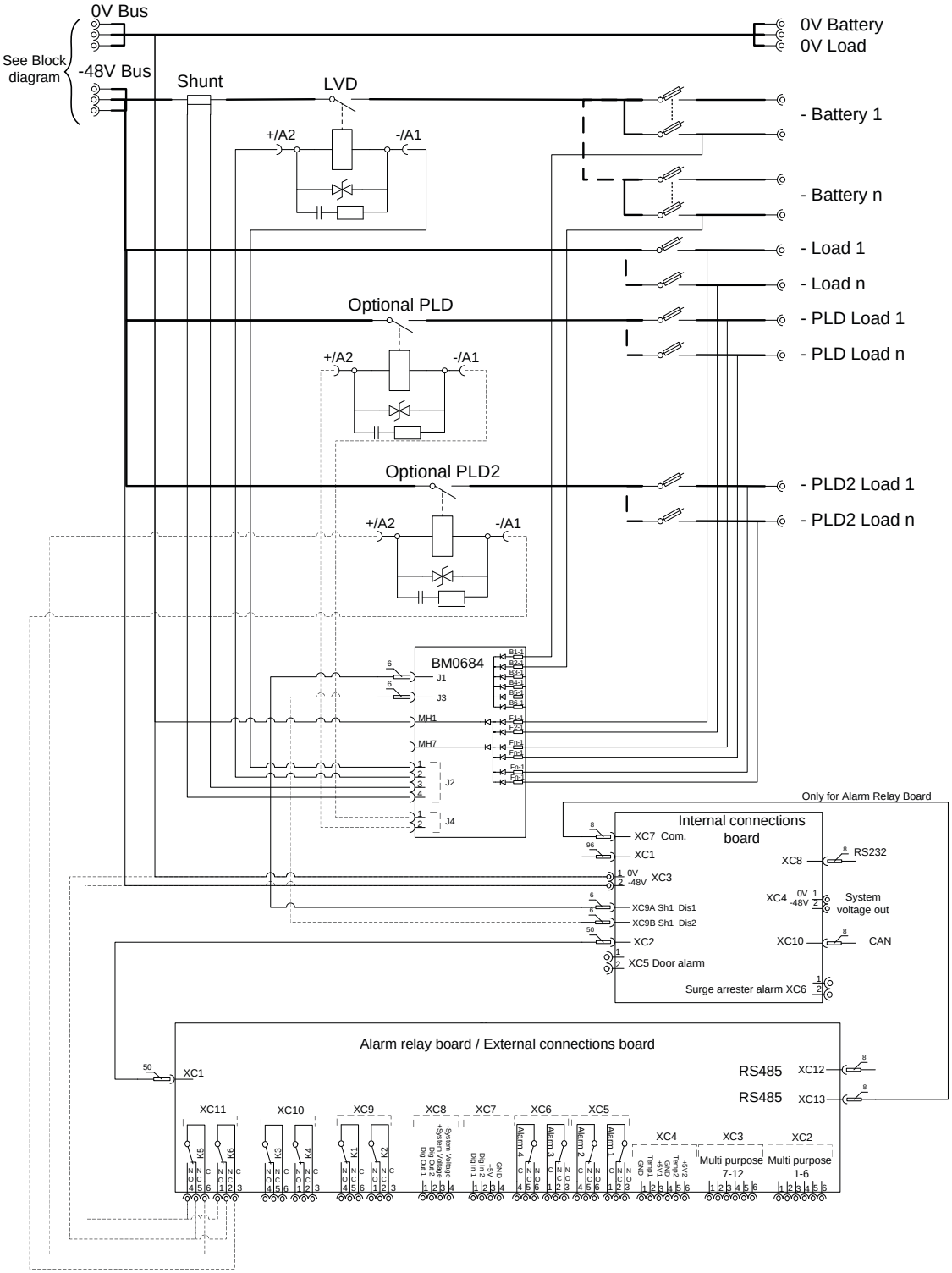


A.3 Block Diagram & Schematics

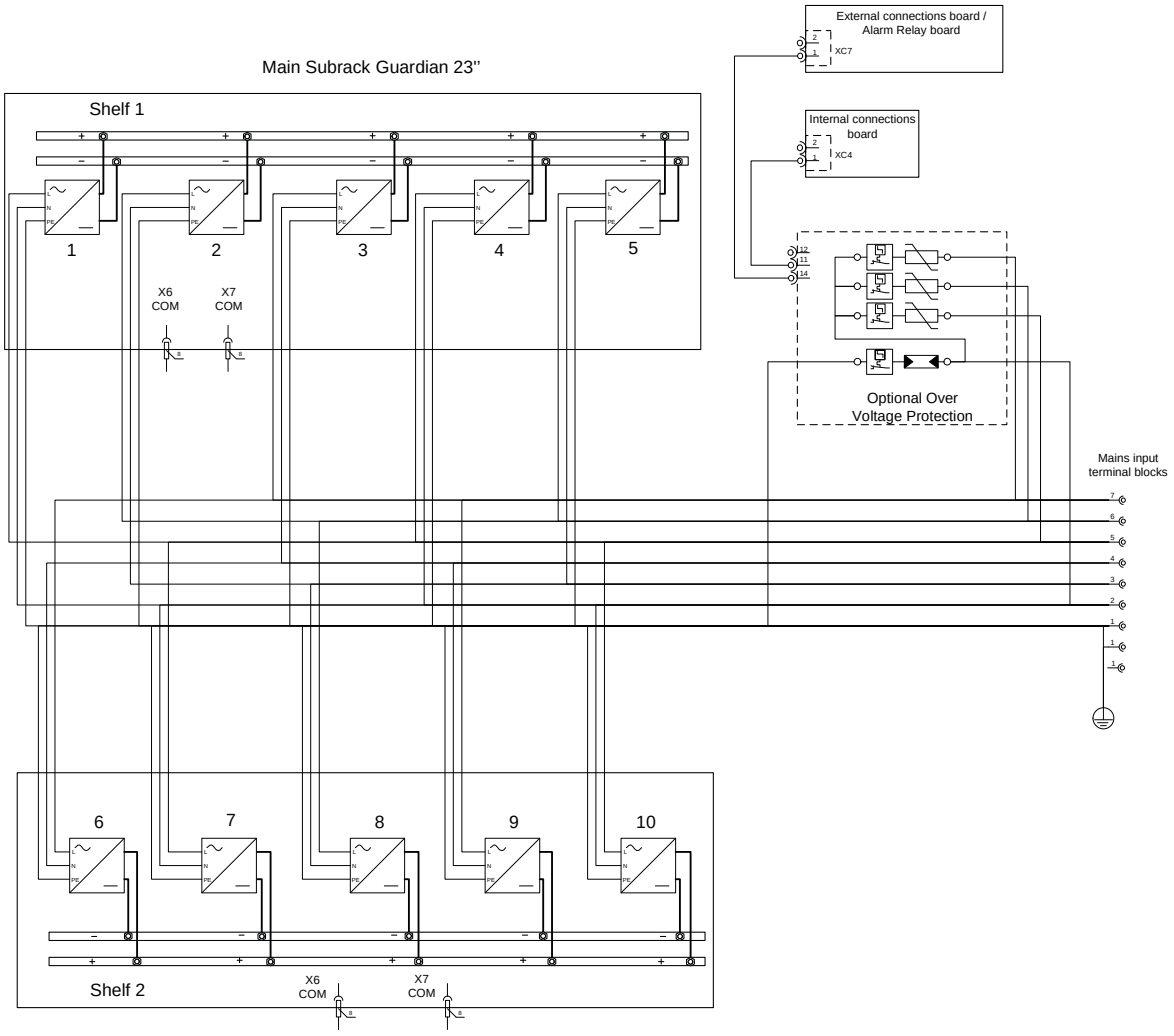
Block Diagram



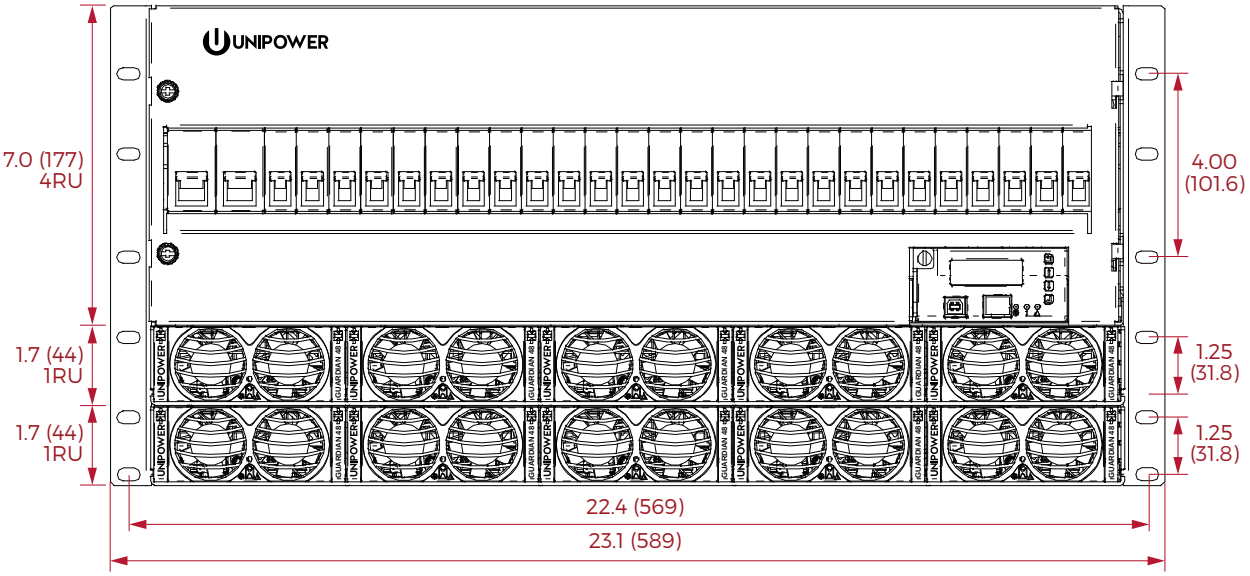
PBDU Schematic

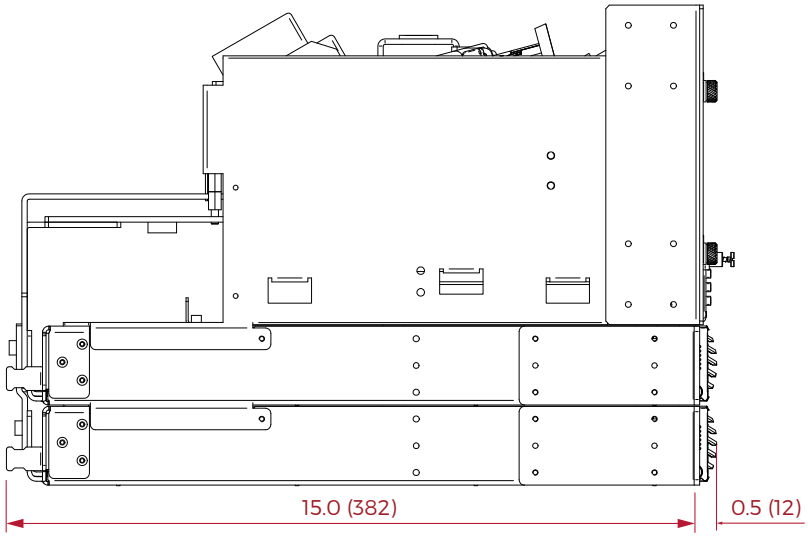


Rectifier Sub-rack Schematic (single mains block input)



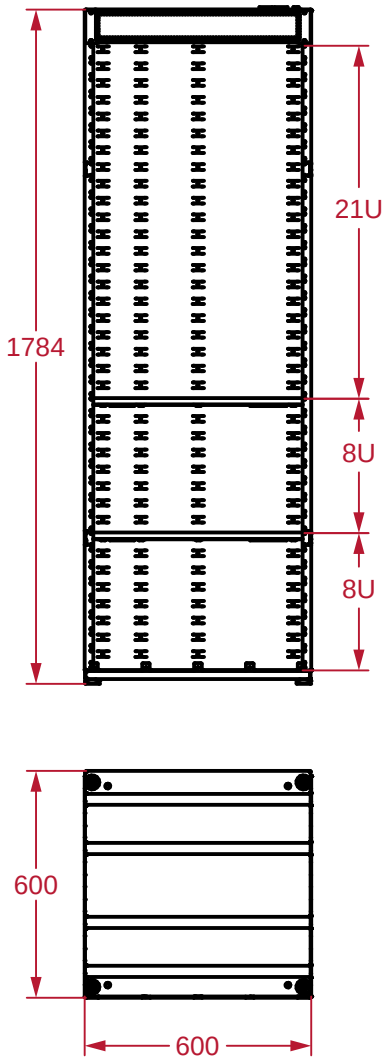
A.4 Detailed Dimensions - System Unit



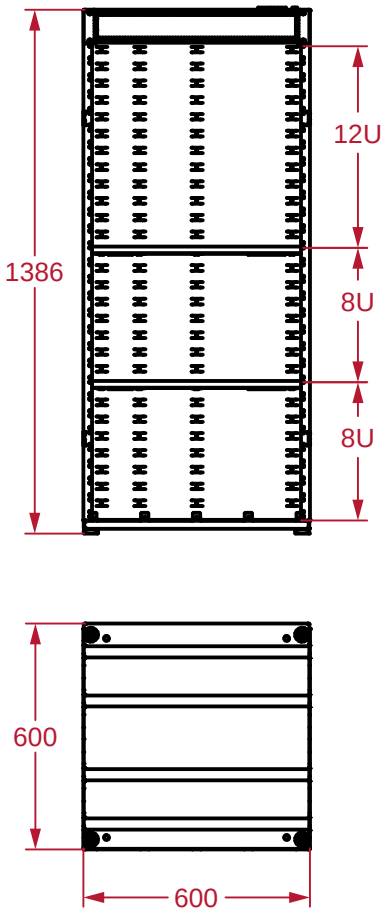


A.5 Detailed Dimensions - Cabinets

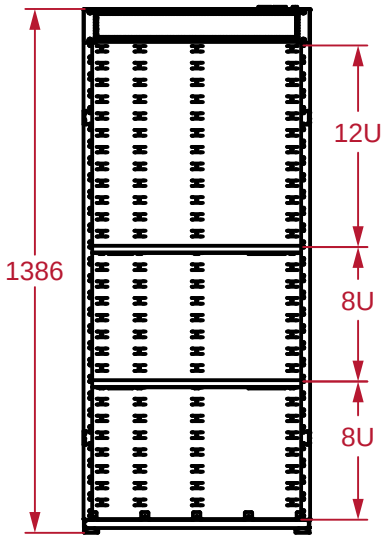
PBC 1.8m/600x600 Wide FH

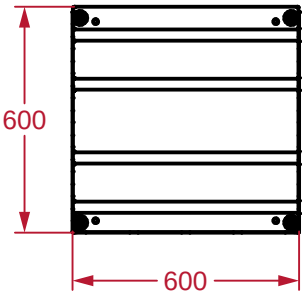


PBC 1.4m/600x600 Wide FH



PBC 1.4m/600x600 Wide FH





PBC 18U/600x400 Wall