

Power Supply System

Aspiro

Instruction Manual



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Chapter 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
LVD	Low Voltage Disconnection
PLD	Partial Load Disconnection
XR04.48	400 W Rectifier
XR08.48	800 W Rectifier
DB22	Distribution Drawer (4 x load, 1 x battery)
D22	Distribution Drawer (3 x load)
D33	Distribution Drawer 2 x load)
B33	Distribution Drawer (2 x battery)

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Contact telephone numbers are:

Region	Contact Number
Asia/Pacific	+ 65-6896-3363
Europe, Middle East, and Africa	+ 800-76937663
The Americas and Caribbean	+ 1-805-987-8742

1.5 Layout, Numbering and Printing

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

The pages are numbered consecutively within each chapter, prefixed by the chapter number.

1.6 Disclaimer

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

Chapter 2 Aspiro System Description

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 highly-efficient, dense, and reliable plug-in rectifier modules XR04.48 or XR08.48, with output power available at either 400 W or 800 W 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 alarms displayed on the LCD screen of the system controller, remotely using the PC-based PowCom™ software, or through a web browser with Ethernet connection.

2.2 System Configurations

The Aspiro power system is available in a variety of configurations to suit the specific needs for the installation site. The 2 RU Aspiro system includes a **Power Shelf** and a **Distribution Shelf**.

Each of the shelves are configurable with rectifier quantity, distribution drawer quantity, as well as circuit breaker type and quantity.

The 2 RU Aspiro system is available as 3 or 4 rectifier system, each with shelves designed to best accommodate the functionality of each configuration. Three Rectifier system has 4 drawer positions available for breakers, while four Rectifier system has 3. In both, one drawer position is designated for Battery breakers.

- | | |
|---|--|
| 1. Load Breaker Drawers | 4. XR04.48 or XR08.48 Rectifiers (maximum 4) |
| 2. Battery Breaker Drawer including LVD contactor | 5. Rear Connections |
| 3. System Controller | |

Figure 2-1 3 Rectifier Version

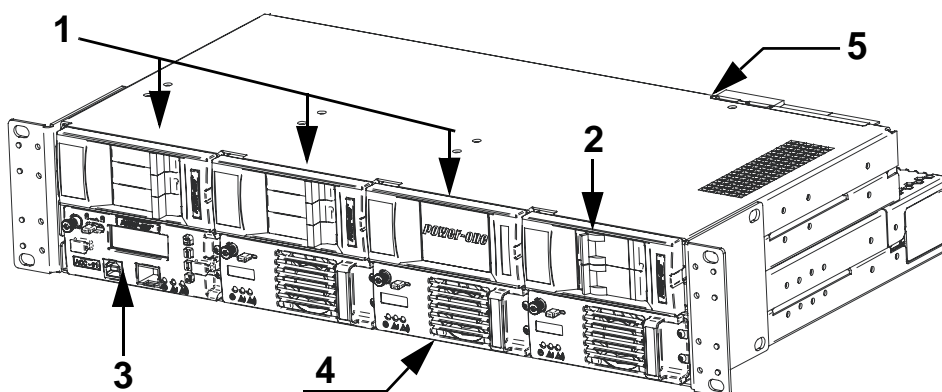
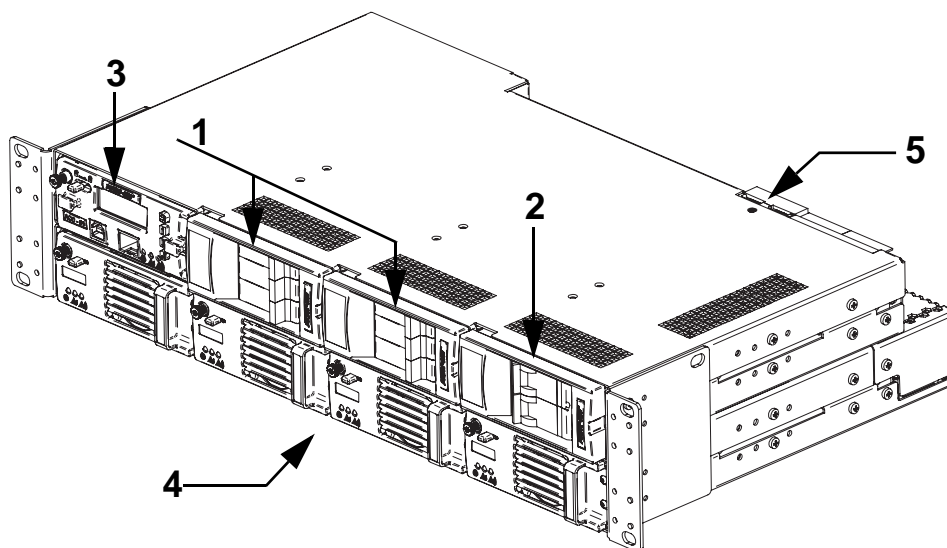


Figure 2-2 4 Rectifier Version



NOTE 3 and 4 rectifier versions are delivered in specially designed shelves. 3 rectifier system can not be reconfigured to 4 rectifier system, and the 4 rectifier system can not be reconfigured to a 4 distribution drawer system.

2.3 System Parameters

Output

Power (maximum)	1200 W / 1600 W (XR04.48) 2400 W / 3200 W (XR08.48)
Current (maximum)	27.3 A / 36.4 A (XR04.48) 52.5 A / 70 A (XR08.48)
Voltage (nominal)	46 - 57 VDC (53.5 V)

Input

AC Input Connections	Single-phase (phase/neutral), phase to phase (phase/phase/E) or 3-phase (Phase/Phase/Phase/N/E)
Voltage	85-300 VAC single phase (shelf-dependant)

Mechanical

Dimensions (WxHxD)	482.6 mm x 88.9 mm x 280 mm
Mounting Options	19"/ETSI/Mid-mount
Cable Entry	Rear Access
Weight (without rectifiers)	10 kg (2400 W system) 9.80 kg (3200 W system)

MONITORING AND CONTROL

Controller	PCC/ACC
Alarm relays	4
Local Interface	LCD display, 4 key menu, RS232/USB
Remote Interface	Ethernet / Modem with PowCom software
Visual Indication	Green LED - System On Yellow LED - Message(s) Red LED - Alarm(s)
External Digital I/O	1 x Inputs, 2 x Outputs (open collector)

RECTIFIER	XR04.48	XR08.48
Input Voltage	85-300 VAC (Nominal: 100-240 V)	
Input Current (max)	< 5.5 A	< 9.3 A
Output Voltage	46-57 VDC	
Output Current (max)	9.1 A	18.2 A
Output Power	400 W	800 W
Efficiency	88% typical @I _{out} nom	90% typical @I _{out} nom
Load sharing	< 5% of nominal current	
Dimensions (WxHxD)	40.6 (1.6") x 101.62(4") x 228.5(9") mm	

System Parameters

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 Prewarning / thermal protection Communication Failure (flashing) Red: Module failure / high output voltage shutdown
Audible noise	< 55 dBA according ISO7779

STANDARD COMPLIANCE

EMC and Immunity	EN 55022 / 2006 - class B EN 55022 / A1:2007 EN 61000-6-2 / 2005 EN 55024 / 1998 + A1 / 2001 + A2 / 2003 EN 61000-4-2 / 1995 + A1 / 1998 + A2 / 2001 EN 61000-4-3 / 2006 EN 61000-4-4 / 2004 EN 61000-4-5 / 2006 EN 61000-4-6 / 2007 EN 61000-4-8 / 1993 + A1 / 2001 EN 61000-3-2 / 2006 EN 61000-3-3 / 1995 EN 61000-3-3 / A1:2001 EN 61000-3-3 / A2:2005
Safety	UL 60950-1 CSA C22.2, No. 60950-1-03 IEC 61204-7
Environment	Storage ETS 300 019-2-1 Transport ETS 300 019-2-2 Operation ETS 300 019-2-3
Operating Temperature	50°C ambient

2.4 System Components

The Aspiro system is delivered with all components mounted according to the ordered configuration. The main components are described below and in the following chapters of the manual.

2.4.1 System Controller

The Aspiro power system can be controlled by the ACC or PCC controller. Operation of the system controller is described in Chapter 6 [System Controller on page 6-1](#).

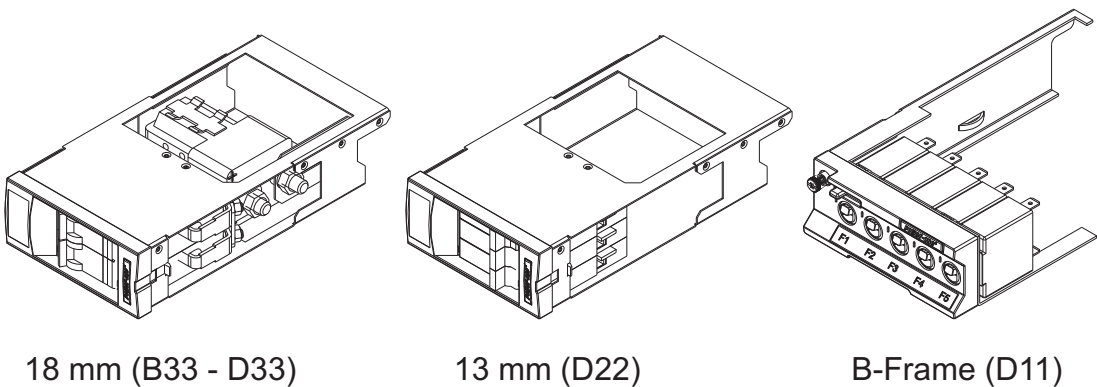
2.4.2 Breaker Drawers

A selection of breaker drawers are available for the Aspiro system, and each drawer type is configurable with a range of battery or load breakers. Variety of drawer and breaker types is described in [Table 2-1](#) and [Figure 2-3](#).

Table 2-1 Breaker Drawer Configurations

Breaker Type / Size	Maximum Breaker Quantity
B-frame	5
13 mm	3
18 mm	2
GMT	10

Figure 2-3 Breaker Drawer Types for 2 RU



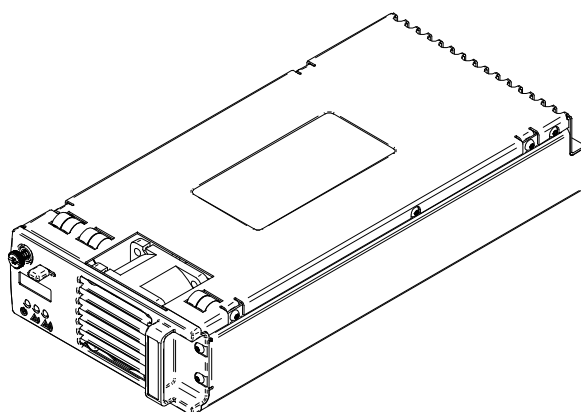
2.4.3 Rectifier

The fan-cooled XR04.48 and XR08.48 rectifiers are modular power supplies designed for parallel operation and plug-in installation in the Aspiro Power Systems.

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

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

Figure 2-4 XR04.48/XR08.48

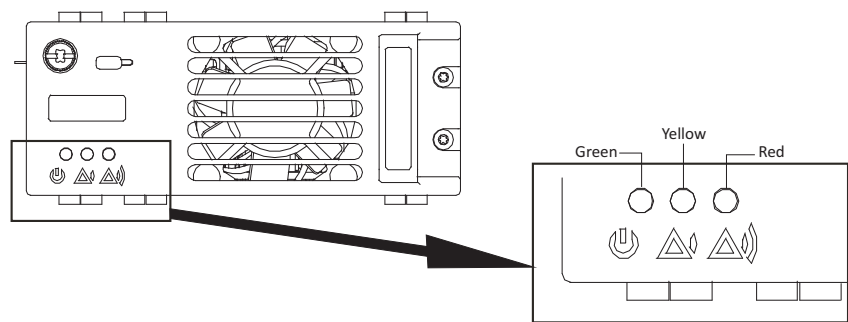


2.4.3.1 Rectifier Operation

The XR rectifier has status indicators that are located on the front panel of the module. The output voltage is adjusted from the controller.

There are three LEDs situated on the rectifier front panel, which indicate the operating condition of the rectifier.

Figure 2-5



Chapter 3 System Safety

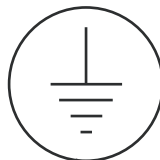
3.1 Safety Warnings and Guidelines

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 and system rating. 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 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 to the install location:

- 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.
- Installation of the equipment in the rack should be properly installed so that hazardous conditions are not present due to uneven loading.
- When installing the system in a rack, allow adequate room to prevent blocking of the vent openings on the power equipment and to allow for optimal air circulation and to reduce the chance of system overheating.

3.1.4 Restricted Access Area Warnings

The Power System should be installed in a restricted access area. A restricted area is an area that can only be accessed by trained service personnel.

3.1.5 Electrical and Fire Enclosure

The unit is for building-in. A suitable Electrical and Fire enclosure shall be provided.

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 meet the National Electrical Code (NEC) and must conform to all local codes.
- 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 which 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 setting all power switches to OFF, disconnecting all relevant connectors and removing all relevant breakers before attempting any maintenance work. Do not rely on switches alone to isolate a 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.

3.1.8 Grounding



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.



WARNING A conductor is connected between the ground point and the 0 V DC busbar of the system/ cabinet. This conductor is connected to its own earth bar and not shared with other safety conductors.

3.1.9 Batteries



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

3.1.9.1 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.

3.1.10 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 labelled 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 for 2RU systems

When installed in the end use equipment, the following are among the considerations to be made.

The following must be evaluated at end use:

1. Fire and mechanical enclosure must be provided.
2. The following restrictions should be followed when D11 Distribution module is installed.
3. Consideration should also be given to re-conducting Temperature Tests if the equipment is intended for use in an ambient greater than 65°C, or if the load configuration is different than described below.

Maximum 50°C Operating Ambient Temperature

D11:

Maximum 25 A circuit breaker rating must be installed.

Maximum load per circuit breaker is 80% of its rating.

15-25 A circuit breaker requires one free space between circuit breakers.

Maximum input current 40 A.

D33:

Maximum 32 A circuit breaker rating must be installed.

Maximum load per circuit breaker is 80% of its rating.

Maximum two 32 A circuit breakers per Distribution tray.

Maximum input current 68 A.

B33:

Maximum 63 A circuit breaker rating must be installed.

Maximum 50 A battery charging and 80 A battery discharging.

Maximum input current, discharging 80 A, charging 50 A.

Maximum 65°C Operating Ambient Temperature**D11:**

Maximum 25 A circuit breaker rating must be installed.

Up to 8 A, 15 A to 25 A circuit breaker rating maximum load is 70% of its rating.

10 A to 12 A circuit breaker rating maximum load is 60% of its rating.

15-25 A circuit breaker requires one free space between circuit breakers.

Maximum input current 25 A.

D33:

Maximum 32 A circuit breaker rating must be installed.

Up to 10 A circuit breaker rating maximum load is 80% of its rating.

16 A to 32 A circuit breaker rating maximum load is 70% of its rating.

Maximum two 32 A per Distribution tray.

Maximum input current 68 A.

B33:

Maximum 63 A circuit breaker rating must be installed.

Maximum 44 A (22 A per breaker) battery charging and 60 A (30 A per breaker) battery discharging.

Maximum input current, discharging 60 A, charging 44 A.

3.2.6 Hot Surfaces



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

Chapter 4 Installation Guide



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 ([Chapter 3](#)) 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 blocking.

4.1 Introduction

The Aspiro power system can be delivered with several configurations in a 2 RU solution allowing for site-specific power output, load and battery distribution setups. This installation procedure describes installation for all configurations.

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.

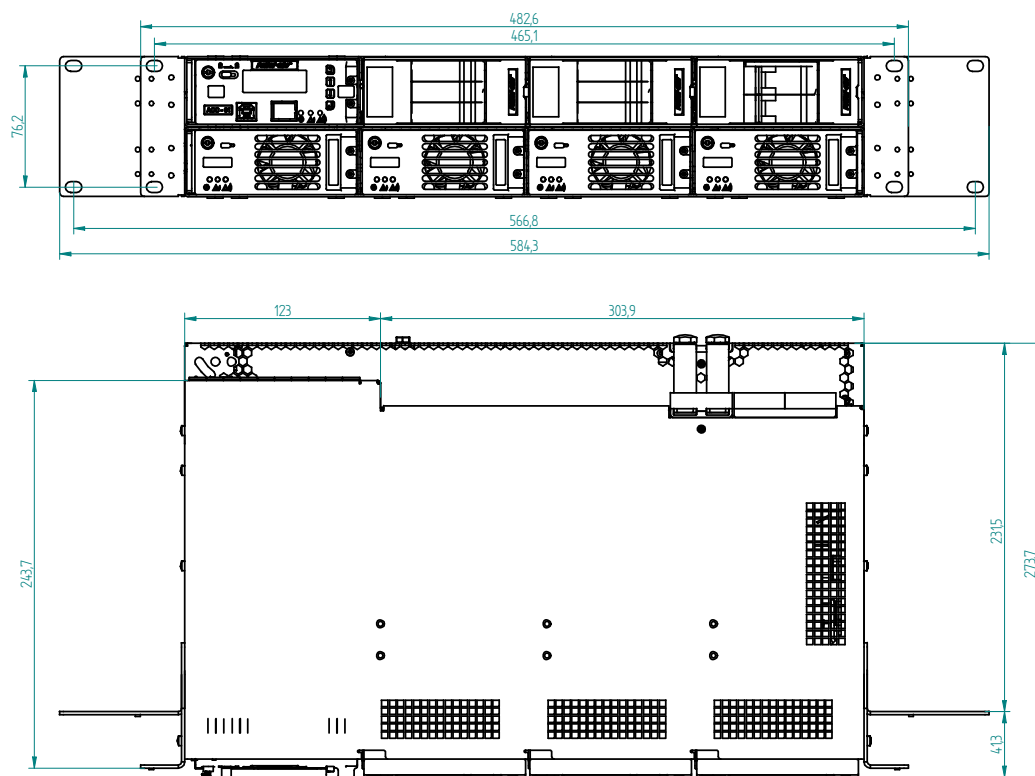
- Anti-static hand strap
- Insulated socket wrench
- Insulated screwdriver set, flat
- Insulated Screwdriver set, torx
- Insulated screwdrivers, pozidrive (cross-slot), sizes 1, 2, and 3
- Insulated torque spanner (for battery connection)

4.4 Rack Mounting

The power system is designed for rack mounting, and the default bracket is for 19-inch rack width. This bracket can be easily adjusted to ETSI mounting as [Figure 4-1 on page 4-3](#) shows.

The brackets are front mounted but can be moved by the user for centre mount rack setup. There needs to be sufficient clearance at the front for rectifier installation, and at the rear for connections and airflow.

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

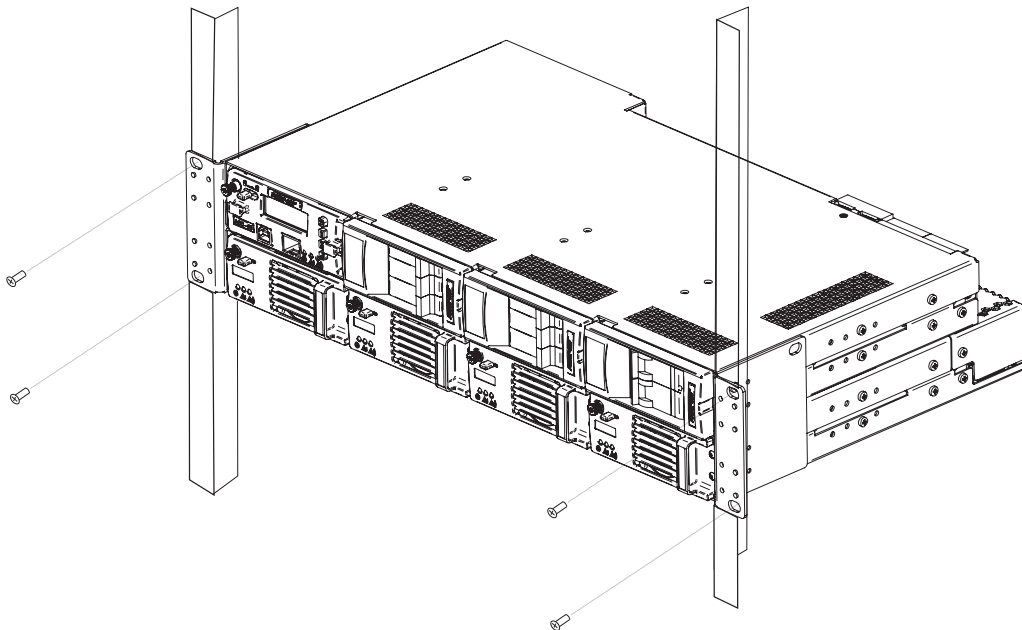


2 RU Aspiro systems are easily mounted to a rack using the supplied taptite screws to fasten the mounting brackets to the rack as shown in [Figure 4-2 on page 4-4](#).



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

Figure 4-2 2 RU Rack Mounting



4.5 Connections

All cable connections for the Aspiro systems are available at the rear of the system. Load and battery connections are performed at the rear of the breaker drawer.



CAUTION Use UL-listed wires with an insulation rated to at least 90°C.



WARNING Before inserting the cable 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 3 Rectifier System with Distribution

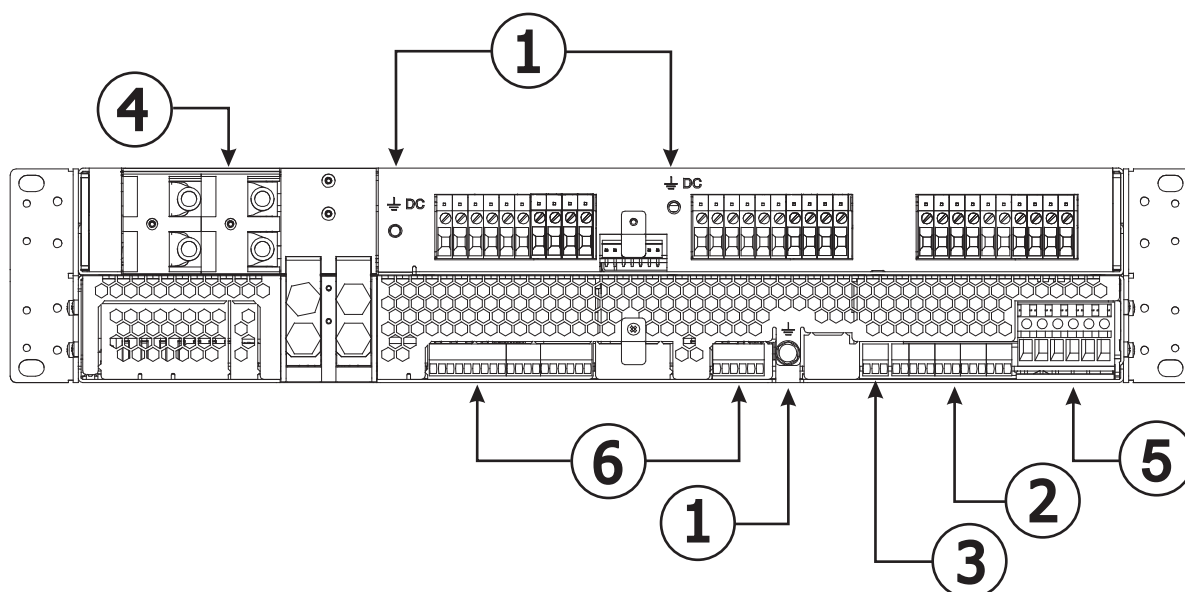
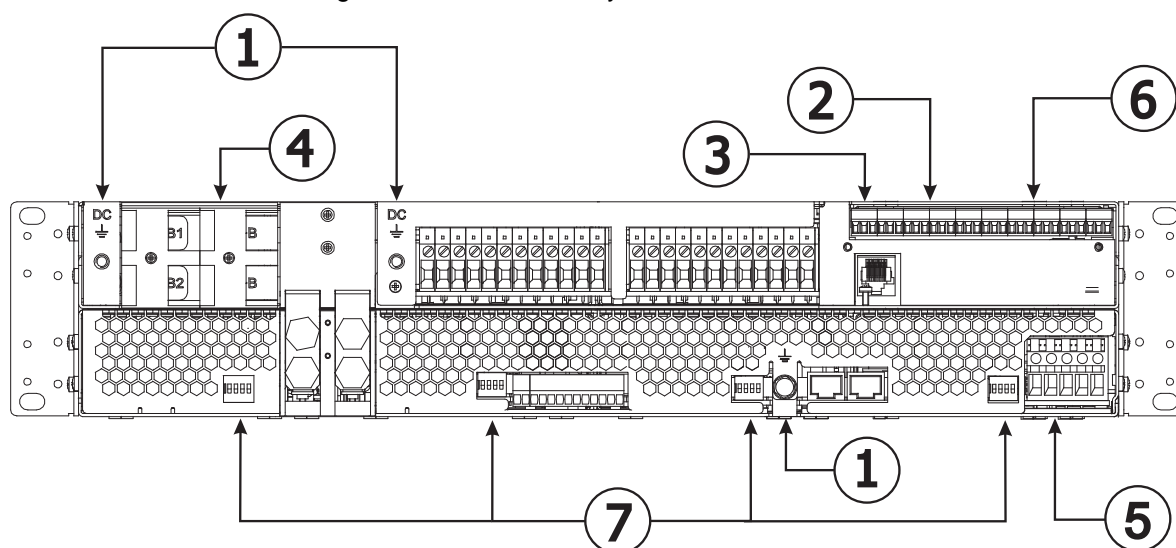


Figure 4-4 4 Rectifier System with Distribution



1. **Earth Connection**
2. **Configuration-specific Alarms Connection**
3. **Temperature Sensor Connection**
4. **Battery Connectors**
5. **Mains Connections** (may vary, single-phase or three phase connection)
6. **Multi Purpose (Symmetry and Analog Inputs) Connections**
7. **Rectifier Addressing (4R System)**

4.5.1 DC Earth Connection

Earth Connection of the rack is located on the rear of the power system as shown in [Figure 4-3](#) and [Figure 4-4 on page 4-5](#).

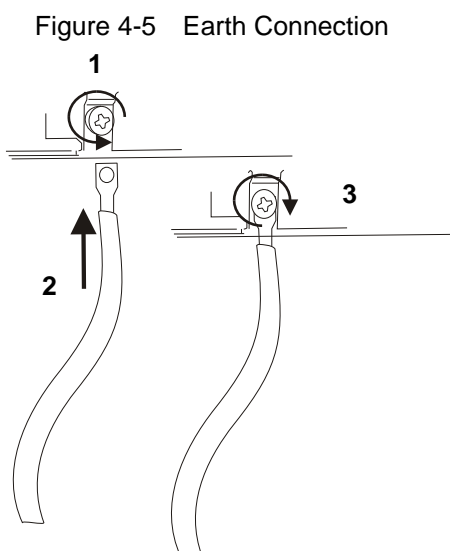
The power system needs to be properly grounded to the rack or cabinet frame to ensure its safe and efficient operation.

2 RU systems are interconnected between the grounding points of the two shelves, so connecting one only to the central office ground is sufficient.

To connect:

1. Loosen the screw (M5).
2. Attach suitably sized cable lug.
3. Tighten the screw with torque 3 Nm.

Recommended cable size is 6.0 mm².



4.5.2 Mains Connection

2 RU Aspiro system family is available with two options for mains connection:

- Single-phase/Phase to Phase (USA) connection
- Three-phase connection

First, check which mains solution is delivered and then follow the appropriate installation instructions below. It is recommended that a UL listed Mains Protection Circuit Breaker is used, voltage rating 240 V.

The connections are labeled and configured as in [Figure 4-6](#) and [Figure 4-7 on page 4-7](#).

Figure 4-6 Single-phase Connection (Top fastening)

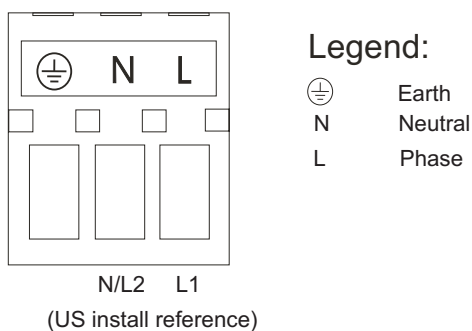
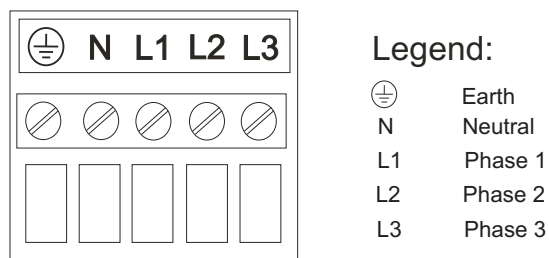


Figure 4-7 Three-phase Connection (Rear fastening)



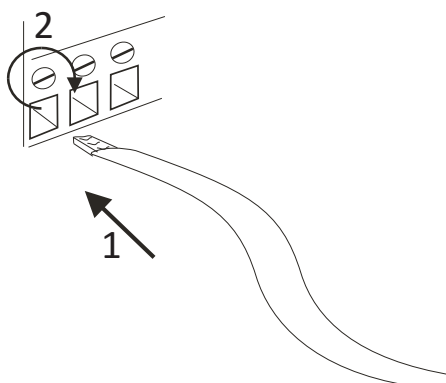
Connectors are situated on the right side (viewed from the rear).

To connect:

1. Remove sufficient insulation from the cables and insert the stripped cables in the appropriate terminal.
2. Then tighten the corresponding screw on the terminal with a flat screwdriver, see [Figure 4-8](#).

Maximum cable size for connection is 4 mm² (12 AWG). Torque according to [Torque table on page 8-4](#).

Figure 4-8



4.5.2.1 Mains Protection

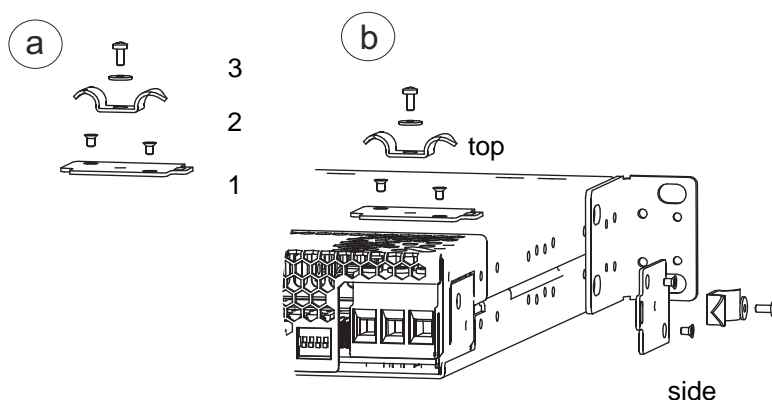
Table 4-1 Recommended Mains Circuit Protection

Shelf Type (See product label)	Number of Rectifiers	I _{max} at 100 V AC	Recommended Mains CB	
			XR04.48	XR08.48
ASPIRO XS19.48 2RU 48 V / 2400 W - E1 (Single-phase)	3	28 A at 100 VAC	C25 A	C32 A
ASPIRO XS19.48 2RU 48 V / 2400 W - E4 (Three-phase)	3	9.3 A at 173 VAC	3 x C25 A	3 x C32 A
ASPIRO XS19.48 2RU 48 V / 3200 W - E1 (Single-phase)	4	38 A at 100 VAC	C25 A	C50 A
ASPIRO XS19.48 2RU 48 V / 3200 W - E4 (Three-phase)	4	10.9 A at 173 VAC	3 x C25 A	3 x C32 A

4.5.2.2 Cable Relief Kit

The Aspiro power system is delivered with a kit for mounting a mains cable relief near the mains connector. The kit may be mounted according to customer needs as shown in [Figure 4-9](#).

Figure 4-9



- a The Cable Relief Kit consists of the mounting plate with two screws for fastening it to the shelf (1), the cable relief (2) and a screw and washer (3) to fasten the cable relief and cable to the mounting plate.
- b With rear-mounted mains connector the options for mounting the relief kit is either on the top or on the side.

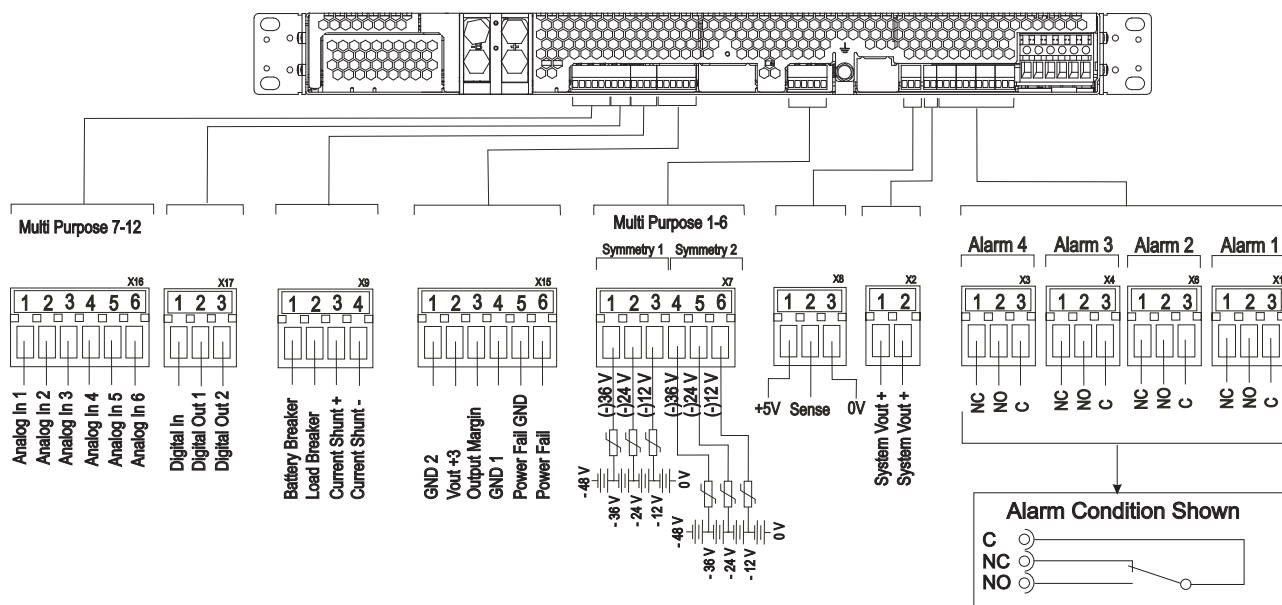
4.5.3 Alarm and Signal Connections

4.5.3.1 3 Rectifier System

For remote supervision of alarms, there are 4 potential free alarm contacts available. Each alarm contact represents different condition, see Appendix B - Configuration for alarm connection. 2x3 connections are reserved for the symmetry measurements. Multi Purposes 7-12 can be reconfigured as external analog inputs.

Pin configuration detail for all signal connections is shown in [Figure 4-10](#).

Figure 4-10 Pin Configuration 3R System (Power Shelf)





NOTE Multi Purposes 7-12 (Pin X16) and Digital In/Outs (Pin X17) are enabled only with ACC controller.



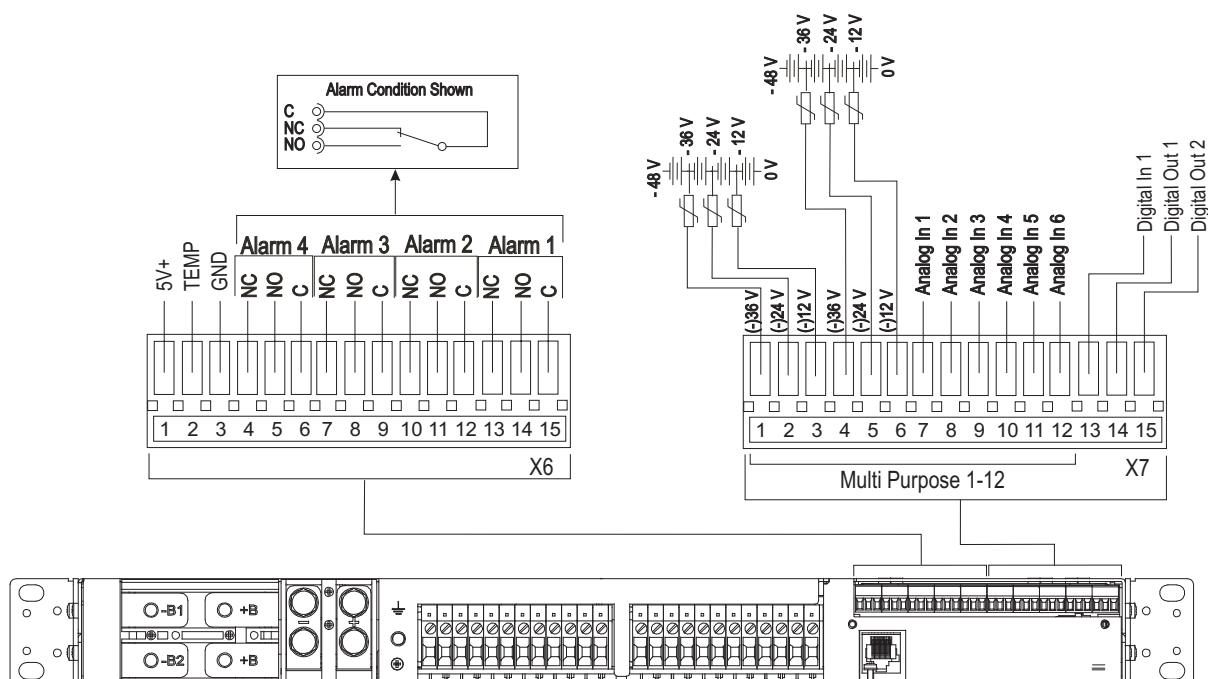
NOTE Connectors X9 and X15 are not normally required.

4.5.3.2 4 Rectifier System

For remote supervision of alarms, there are 4 potential free alarm contacts available. Each alarm contact represents different condition, see Appendix B - Configuration for alarm connection. 2x3 connections are reserved for the symmetry measurements. Multi Purposes 7-12 can be reconfigured as external analog inputs.

Pin configuration detail for all signal connections is shown in [Figure 4-11](#).

Figure 4-11 Pin Configuration 4R System (Distr. Shelf)

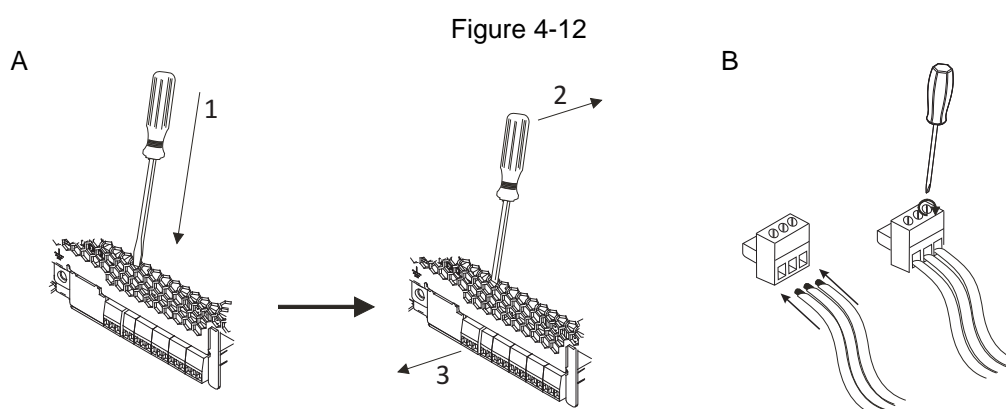


NOTE Multi Purposes 7-12 and Digital In/Outs (Pin X7) are available only with ACC controller.

To connect:

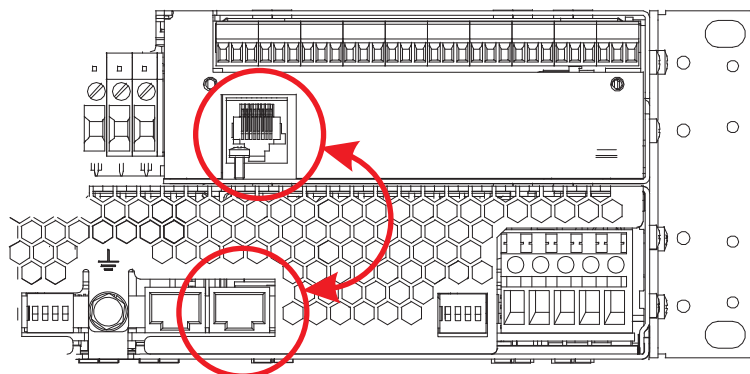
1. Release a connector from terminal use a screwdriver as shown in [Figure 4-12 \(A\)](#), and pull the connector out.
2. Remove sufficient insulation from the cables and insert the stripped cables into the appropriate connector. Then tighten the corresponding screw on the connector with a flat screwdriver [Figure 4-12 \(B\)](#).
3. After fastening all the cables, insert the connector back to the terminal.

Maximum cable size is 1.5 mm².



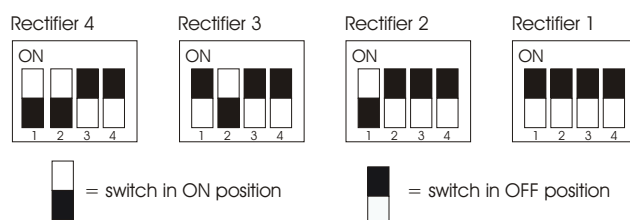
NOTE Communication cable connecting the system controller with the power shelf is pre-installed. It is recommended to verify that the cable is properly fastened to the connector on both shelves to ensure proper communication.

Figure 4-13 Communication Cable Connection



The 4 rectifier Power Shelf also features rectifier address switches for each rectifier position to properly communicate with the system controller, see [Figure 4-14](#). For 4 rectifier systems this is done using dip-switches for each rectifier position. These are set at the factory, but the addressing should be verified by the installer before starting up the power system. Correct addressing is shown in [Figure 4-14](#).

Figure 4-14 Dip-switch Addressing (Rear view - left to right)



4.5.4 Load and Battery Distribution Connections

Breaker drawers mounted into Aspiro distribution shelf are front access distribution modules that allow in-service replacement of battery and load breakers.

Load and Battery connections are available at the rear of the Distribution Shelf. Each breaker drawer has corresponding connectors on the rear as shown in [Figure 4-15](#) and [Figure 4-16 on page 4-13](#).



CAUTION Instructions for removing the breaker front cover and replacing breakers can be found in [Replacing Units on page 9-1](#). Follow these instructions closely to avoid damage to the equipment.

Figure 4-15 3 Rectifier Breaker Reference

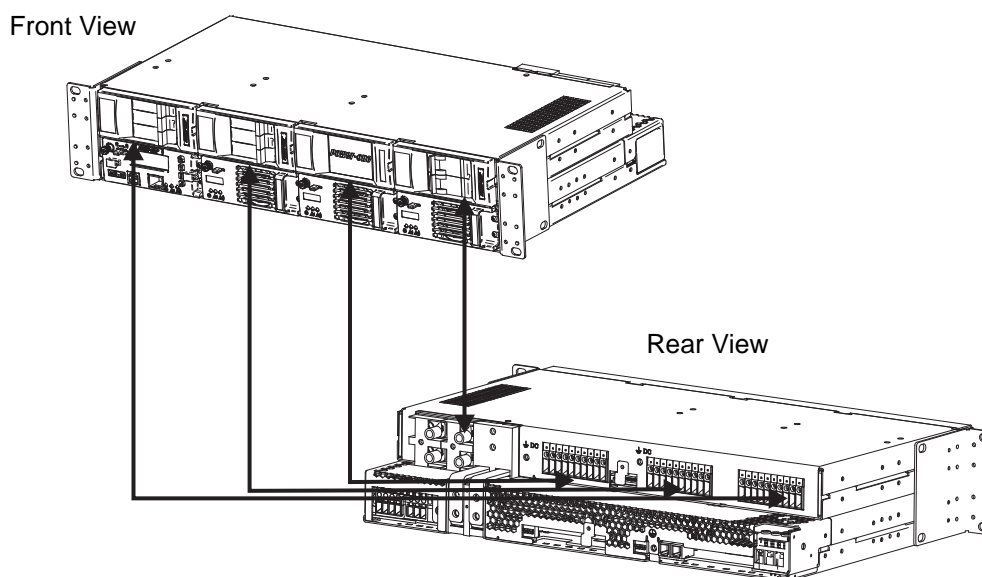
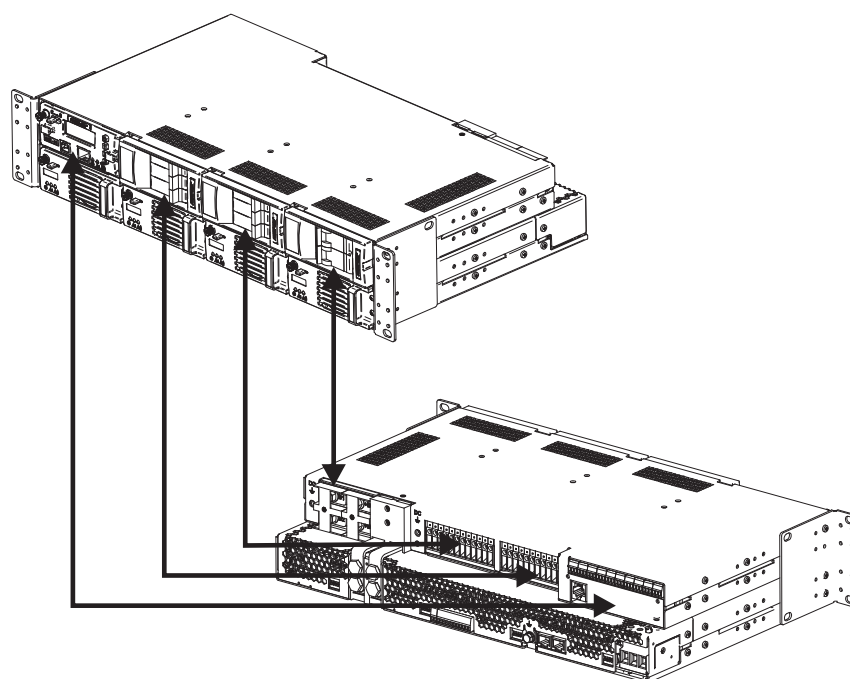


Figure 4-16 4 Rectifier Breaker Reference



4.5.4.1 Wire Sizes

It is recommended that the wire sizes for Aspiro load and battery connections, provided in the tables below are UL compliant and rated for 90°C and minimum 60 V rating.

D11

Breaker Size	1 A	4 A	5 A	7.5 A	10 A	15 A	20 A	25 A
wire size (mm ² /AWG)	1/18	1/18	1/18	1/18	1/18	2.5/14	2.5/14	2.5/14

D33

Breaker Size	2 A	4 A	6 A	10 A	16 A	20 A	25 A	32 A
wire size (mm ² /AWG)	1/18	1/18	1/18	1/18	2.5/14	2.5/14	2.5/14	4/10

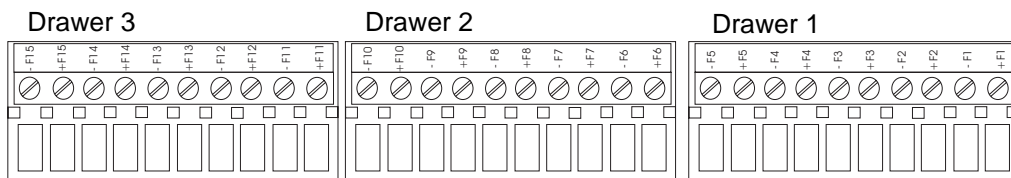
B33

Breaker Size	32 A	40 A	63 A
wire size (mm ² /AWG)	4/10	8/8	16/6

4.5.4.2 Load Connections

For Load connection there is one connector corresponding to each breaker drawer in the shelf, with the rear connectors labelled according to the breaker labelling. The maximum cross-section for the connector is 6 mm² (10 AWG), but the cable needs to be carefully selected according to the breaker size.

Figure 4-17 Load Terminals With Labels (3R System)



NOTE 4 rectifier system has connectors only for Drawer 1 and 2.



NOTE Load terminals in Figure 4-17 are used only for illustration and labels may vary depending on breaker drawer type. The marking on the drawers always corresponds with labeling on the front.

For DC load connection of the cables see connection instructions and [Figure 4-8 on page 4-7](#).



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

4.5.4.3 Battery Connections



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

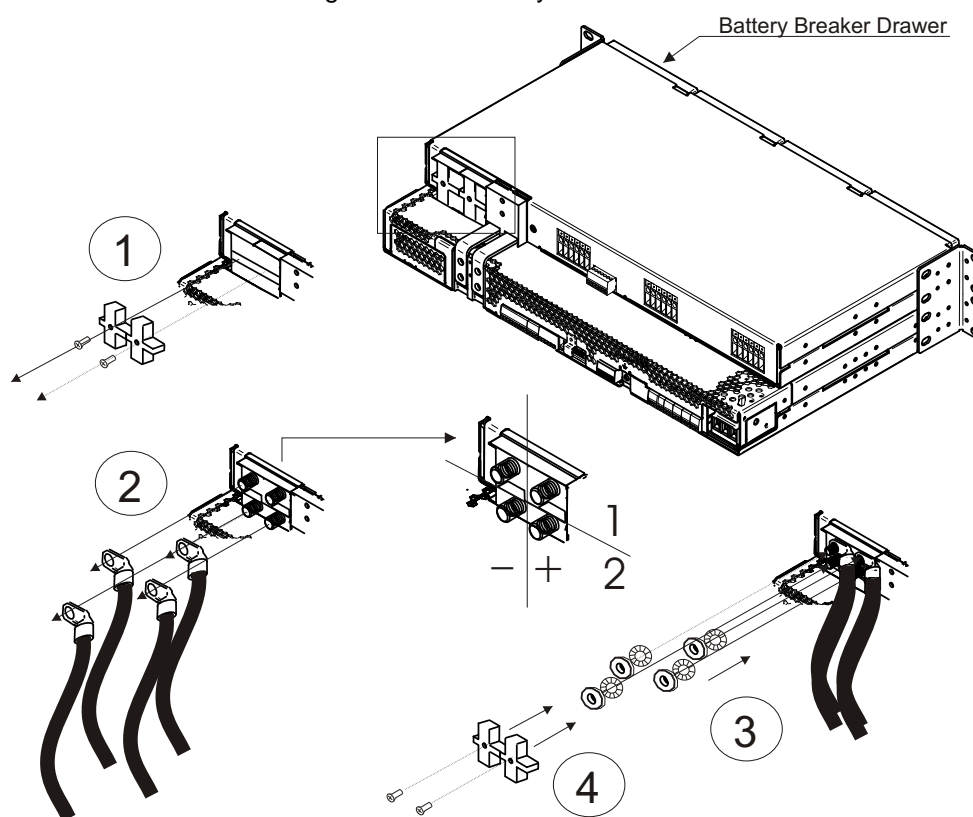


CAUTION Delivered battery cables are without polarity labels.

Battery connections are available on the rear left side of the power system, marked with -B1 (top left), +B1 (top right), -B2 (bottom left), +B2 (bottom right) for the maximum two battery breakers in the battery breaker drawer.

1. Remove two cover plates by loosening the screw on each cover. It is recommended to use 90 degree angled cable lug. The mounting screws are size M6, and the cable lug can be maximum 15 mm wide.
2. Connect the positive and the negative battery cables of each battery string to the appropriate battery breakers.
3. After fastening the battery cables (recommended torque: 8 Nm), guide the cables out to the right and reattach the cover plates.

Figure 4-18 Battery Connection



4.5.5 Symmetry Connection

1. Attach the interblock connections plates between the batteries.
2. Insert the suitably sized cable lug into one pole of the interblock connection plate. Fasten the lugs and plates to individual battery poles.
3. For 2-block battery symmetry measurement fix one wire of symmetry cable to the cable lug in mid-point of the battery string, see [Figure 4-19](#).
4. For 4-block measurement fix 3 wires (red, green and blue) of symmetry cable to individual cable lugs. Colour code of the cables must be respected for proper symmetry measurement see [Figure 4-20](#).

Figure 4-19 2-block Symmetry Measurement

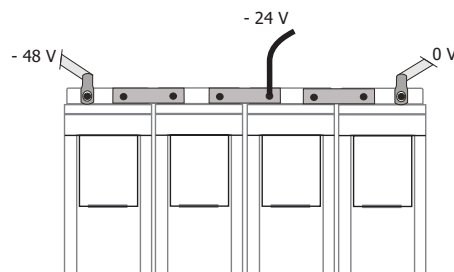
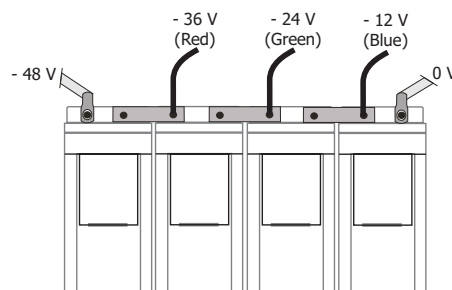


Figure 4-20 4-Block Symmetry Measurement



NOTE Interblock Connection Kit is not delivered with the system.



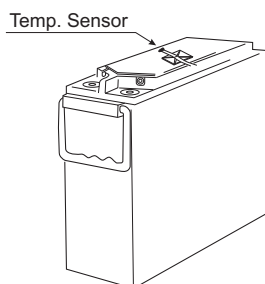
NOTE Symmetry cable is normally pre connected to the system, see [Figure 4-10 on page 4-9](#) and [Figure 4-11 on page 4-10](#).

4.5.6 Temperature Sensor Connection

Temperature Sensor Connection for supervising battery temperature is usually delivered pre-installed when used. If it is added later, use a three-pin plug and connect.

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 4-21](#).

Figure 4-21 Temperature sensor Connection



NOTE Temperature sensor is normally pre connected to the system, see [Figure 4-10 on page 4-9](#) and [Figure 4-11 on page 4-10](#).

4.5.7 Redundant AC Input

For connecting two Aspiro Power Systems to redundant AC Input, follow the steps below:



CAUTION Only one of the two interconnected systems can have the system controller inserted and batteries connected otherwise proper operation of the system cannot be guaranteed.



CAUTION For correct operation and communication between the power shelves, rectifier addressing must be set correctly, see [Figure 4-22 on page 4-18](#).

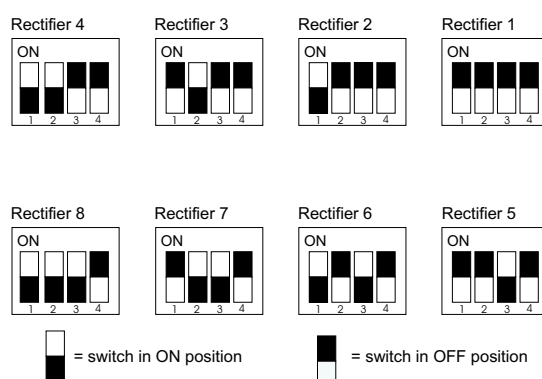
1. Install both systems into the rack.



NOTE Do not leave any space left between the subracks due to the length of interconnection cables.

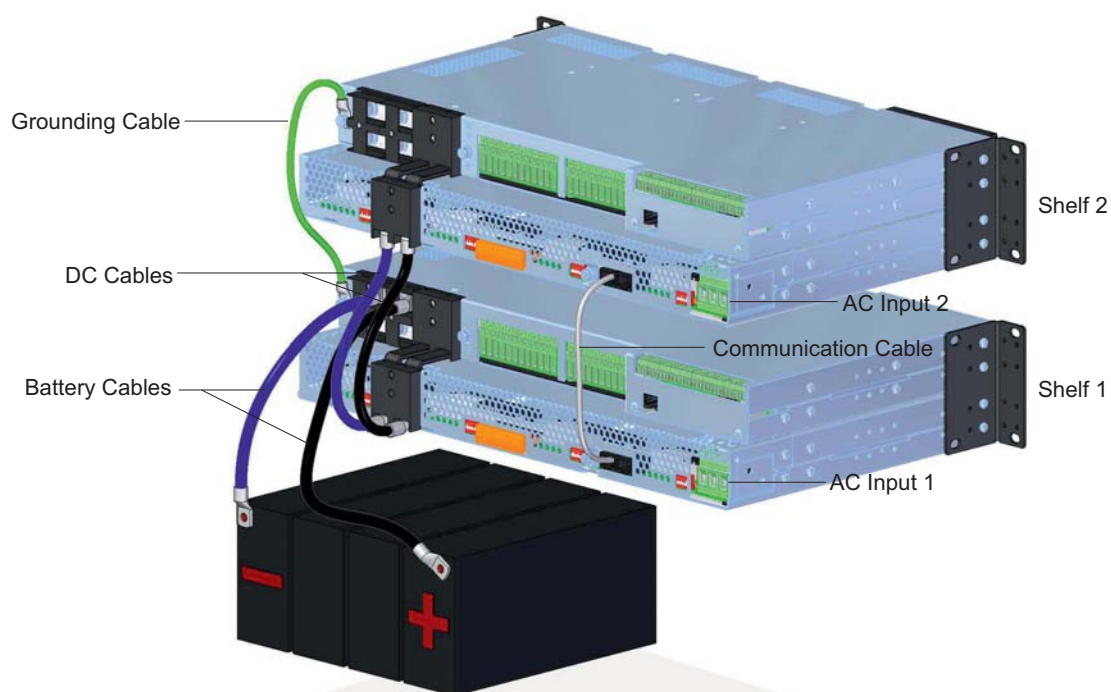
2. Remove the system controller from Shelf 2 and replace it with delivered dummy module.
3. Make sure both subracks are properly grounded (cable size 16 mm², cable lug M5).
4. Take off the plastic covers from DC busbars on each power shelf and connect the power shelves using DC interconnection cables (cable size 16 mm², cable lug M6), see [Figure 4-23 on page 4-19](#).
 - ✱ Connect one end of the cable with 90 degree cable lug to DC busbars on Shelf 1, route them to Shelf 2 and fasten the other end of the cables with 180 degree cable lugs to appropriate DC busbars.
 - ✱ After fastening the cables, reattach the plastic covers.
5. Connect both power shelves with the communication cable, connector X6 (RJ45).
6. Connect AC Mains cables to each power shelf (AC Input 1, AC Input 2).
7. Connect battery cables to Shelf 1.

Figure 4-22 Rectifier addressing



NOTE For interconnecting two Aspiro shelves it is necessary to order Paralleling Kit (YGA.00819.0).

Figure 4-23 Shelf Interconnection



Chapter 5 Commissioning

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 (3 ½ Digit, 0 – 1% DC)
- Load resistance, to fully load of two rectifiers

5.3 Preparation

Check the installation to ensure the following:

- Site is clean and safe
- 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 labelled. The power cables are correctly terminated.

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 load and battery MCB breakers are set to OFF position - ensuring the load and battery strings are connected.
3. Ensure all rectifier modules are removed. If not, remove each one in turn starting from the rightmost position.
4. If the rectifier subrack has dipswitches for addressing, verify that the dipswitches 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 load breakers into "1" (ON) position.
10. Verify right polarity on battery connection by measuring the voltage drop across battery breaker(s) (Normally not more than 5V DC)
11. Green LED on controller should blink for approximately 20 sec.
12. Output voltage will increase slowly to U1.
13. Turn battery breaker to "1" ("on") position.
14. If any alarms are present, they should be reset in accordance with "Show alarms" in product description controller.
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)

Be sure that the controller is operating.

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

Check the voltage according to the battery manufactures requirements. If the batteries require other float charging voltage, adjust the output voltage from the controller. (See product description controller)

If nothing else is required, use the following values:

Table 5-1

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	-

5.5.2 Adjustment of Float Charge, U1

Output voltage is factory pre-set to: See Appendix B. 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 output voltage from the control unit.



NOTE A sealing protects the potentiometer in the subrack. Do not break the seal.

5.5.3 Boost charging (U2) (if applicable)

Open lead-acid batteries.

Automatic boost charging - calculation of 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 control unit.

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 PowCom¹ installed.

5.6 Battery supervision

For systems with symmetry cables supplied:

Set number of battery strings according to 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 is to 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:

The temperature compensation is factory pre-set. Check that the temp. probe is activated and verify that the compensation level is according to the battery manufacturers requirements. (If no compensation level is available from the battery manufacture, Power One recommends it to be set to 0,5V).

5.7 Battery test

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

1. Communication program for remote control of the power supply system.

5.8 Commissioning record

This is a step-by-step commissioning record for easy commissioning of Power-One 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.

Table 5-2 Commissioning record

	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.		

Chapter 6 System Controller PCC

6.1 General - Product Description PCC

The Power-One Prime Controller Card (PCC) is a pluggable microprocessor controller that provides monitoring and control for a broad range of Power-One DC Power Systems. The PCC monitors all system parameters including: DC voltage, rectifier current, rectifier temperature, system capacity, battery parameters, and circuit breaker status.

Alarm and warning notifications are indicated by front panel LEDs, and through potential free alarm contacts that allow remote signaling. External monitoring of alarms is accomplished through an RS232 port using PC-based PowCom™ software. The PCC has an Ethernet port allowing monitoring and control over a TCP/IP network. Alarms can be mapped via SNMP traps to customer OSS platforms such as HP Openview™

To meet individual site requirements, the PCC contains a Programmable Logic Unit that can be used to monitor and control specified requirements. This allows individual alarm routing and logic operations to be set as actions, alarms to be triggered, and outputs to be activated based on internal and external signal monitoring, comparing, and processing.

6.2 Technical specification:

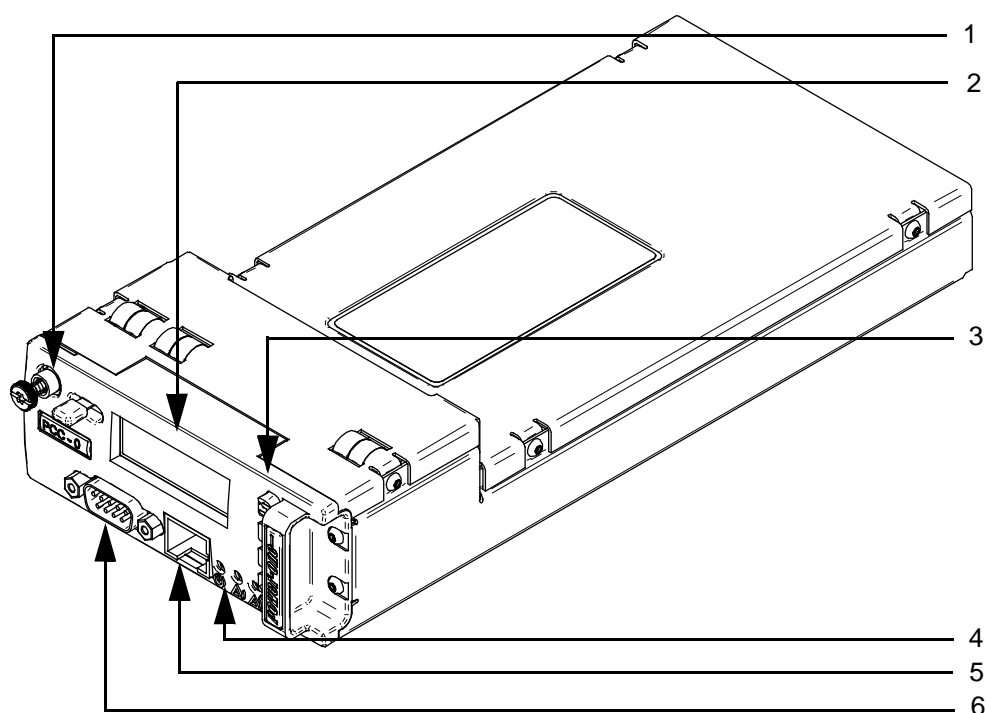
Input voltage:	30-60 V DC
Current:	<200 mA at 48V
Instrumentation:	Three LED's, Green - OK, Yellow - Message, Red - Alarm. LCD Display with backlight
Interface:	RS232 for remote operation via a PC. RS485 for internal communication with 20 modules.
Basic functions:	Simple menu-guided operation User-selectable alarm parameters Temperature compensated charging Boost charging, manual and automatic LVD/PLD control of two contactors, voltage or time controlled Battery test, manual or automatic with symmetry measurement. Alarm relay test Software controlled start up after mains outage and battery test Built in Web server and SNMP (Ethernet connection)

6.3 Operation - Introduction

The PCC communicates through an alarm interface board and a backplane that connects to the rectifier modules.

The following section contains basic PCC functions including starting the PCC, adding modules and removing modules from the PCC system.

Figure 6-1 PCC User Interface



1. Fastening Screw and Retaining Latch
2. LCD
3. Push Buttons for Menu operation
4. Left to right: Power LED (Green), Warning LED (Yellow) and Alarm LED (Red)
5. Ethernet Connection
6. RS232 Interface Connection (USB connection on the ACC)

6.3.1 Starting the PCC

When power is applied to the PCC:

The PCC will spend approximately 5 seconds analyzing the system and testing all addresses for connected modules and units. The green LED on the PCC will blink (Figure 6-1). No alarms will be given during this period.

When the PCC finds a module or a unit it will add it to the inventory. The module will remain in system memory until a master reset or a reconfiguration is performed.

6.3.2 Adding modules

When a rectifier is added to the system it will remain off until the PCC detects it.

1. The PCC constantly scan for new modules and units.
2. The PCC will locate the module, and the new module will give a current sharing fault until its output voltage has been adjusted to the correct voltage. This may take additional time.

6.3.3 Removing modules

Physically removing a module from the system appears as a communication error on the PCC.

1. To remove the error message press the reconfigure button in the Inventory window in PowCom.
2. Make sure that there are no communication faults caused by any other failure before doing this as it will cause all non-communicating modules to be removed from the inventory.
3. This will make all communication faults disappear, but it will not fix any problems so it must only be used if the communication fault is caused by the module being intentionally removed.

6.3.4 PCC Control

The control unit is equipped with four push buttons:

- **CANCEL** - Used to go cancel the current selection on the menu hierarchy. When pressed the menu will return to the previous screen.
- **UP ARROW** - Used to go up in the menu hierarchy. select options and to adjust limits.
- **DOWN ARROW** - Used to go down in the menu hierarchy. select options and to adjust limits.
- **RETURN** - Used to select and confirm an option or to go down a level in the PCC software hierarchy.

To adjust the alarm limits, use the arrow keys to select "adjust limits". Press RETURN to enter the sub menu, and RETURN once more to select "alarm limit". By using the arrow keys the various alarm limits can be checked. For adjusting a limit: select the correct limit and press RETURN. The correct password must be entered before a new value can be set.

The password is set to 1234 by default, but can be changed. Use the arrow keys to set and RETURN to confirm each digit. CANCEL can be used to correct a digit. For more information on setting the system password, see the section "Set New Password" in this chapter.

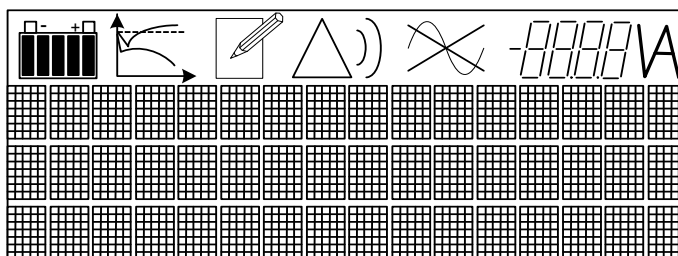
Adjust mode is indicated by a the edit icon being visible and a blinking cursor. Use the arrow keys to adjust the alarm limit and press RETURN to confirm the value or CANCEL to revert to the previous value.

To return to main menu, press the CANCEL button. If the PCC is left unattended the display will return to main menu automatically after 2 minutes.

6.3.5 PCC Icons

The top bar on the PCC display includes icons explaining status for various system parameters. This chapter describes these icons.

Figure 6-2 PCC Icons



Battery Icon



The battery icon displays the charge status for the batteries shown in 20% increments. The charge status is calculated from an accumulated amount of discharged Ah. It also takes into account the load current and the voltage to predict the remaining capacity.

During charging the battery icon will pulsate. During the final fill charge of the battery only the rightmost segment will blink.

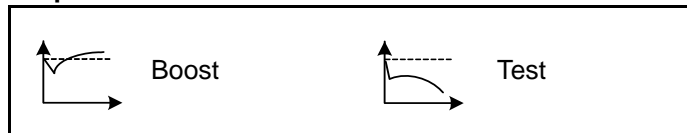
After the system is started the first time it will take up to 48 hours before the battery icon is fully operational. The battery capacity must be set correctly in the Adjust

Limits | Battery settings menu for the Icon to work properly. If the Battery capacity is set to 0 the icon is not shown.



NOTE The battery charge status may not be correct if the battery is malfunctioning.

Graph Icons



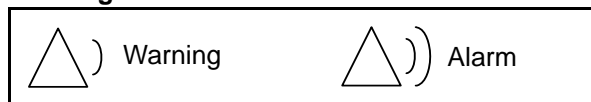
The graph icons indicate charging mode either Boost mode or Battery Test mode. The graph showing an upgoing curve is the Boost icon, while Battery Test is indicated with a downgoing curve on the graph.

Update Mode



This icon is displayed in editing mode when the user is accessing editable parameters in the menu tree. The values that can be updated can be accessed by pressing the enter button when the value is shown.

Warning and Alarm Icons



The Warning icon is present when a warning is present, while the alarm icon indicates an alarm situation.

Mains Failure Icon



This icon indicates mains failure.

7-segment Display



The 7-segment displays the system voltage with 2 decimal points (V).

6.3.6 PCC Menus

The PCC menu is divided into nine sections. Some of these sections are further divided into more menu options. [Figure 6-3](#) Menu tree shows the hierarchy tree. The following section contains descriptions of each menu option.

6.3.6.1 Show voltage and currents

The default PCC screen displays system voltage and battery current. Pressing the down arrow will display system voltage and distribution current, pressing down once more will display system voltage and rectifier current.

6.3.6.2 Show alarms

Displays the current alarm status. If there are several alarms use the arrow keys to scroll through the alarms. Any new alarms or alarms that disappear will be added or taken off of the menu immediately. Battery failure and symmetry failure alarms need to be reset manually by pressing RETURN at the show alarms display.

6.3.6.3 Show messages

This item displays any messages. If there are several messages use the arrow keys to view the various messages. New or disappearing messages will be updated immediately on the menu.

6.3.6.4 Show data

This menu displays information about: modules, units, temperature, and symmetry voltage. Information on each of these menus is in the following section:

Module Data

This menu displays information from each rectifier module. Use the arrow keys to select the module number.



NOTE Rectifier modules are numbered from the top to bottom, and left to right.

Once the rectifier is selected on screen, Pressing RETURN will display a new menu with the following information: communication status, module current, mean current, module temperature, module measured voltage, Module OVP limit and alarm information.

Module alarms are indicated by 3 letter flags. The meanings of these are as follows.

- MNS - No input mains.
- LOW - Input voltage low
- OFF - No operation, caused by no mains or other failure
- OVS - Overvoltage shutdown
- FAN - Fan failure, will cause the module turn off (depending on type of module.)

- CUR - Current sharing fault. Current deviates too much from average
- TMP - Temperature is high. This alarm must be reset manually

Temperature

This menu displays the battery temperature.

Symmetry Voltage

The symmetry voltage for each battery branch is displayed.

6.3.6.5 Select / adjust U1 - U4

This menu is used to select one of the references for the 4 charge modes, U1 - float voltage, U2 - boost voltage, U3 - battery test voltage, U4 - spare, and to adjust these references.



CAUTION Always consult the battery user's guide before attempting to boost. Improper settings can damage batteries.

The voltage references can be adjusted in steps of 0,1V.

U1 Normal. The U1 reference is shown, press RETURN to change U1 (The float charge voltage) and use the arrow keys to adjust to the proper voltage.

U2 Boost. The U2 reference is shown, press RETURN to change U2 (The boost charge voltage).

U3 Test. The U3 reference is shown, press RETURN to change U3 (The Battery test voltage).

U4 Spare. The U4 reference is shown, press RETURN to change U4 (The spare voltage). The U4 setting is normally not used in this system.

6.3.6.6 Adjust limits

The Adjust Limits menu allows the user to change and add limits to the system. The menu has the following options: alarm limits, boost parameters, battery test, temperature compensation, battery current limit, system specific limits and distribution current limits. Parameters can be set and adjusted by selecting the different sub-menus.

Alarm limits.

This menu allows the following alarm limits to be changed:

- High voltage
- Low voltage
- Over voltage shutdown limit
- Low voltage disconnect
- Partial low voltage disconnect limits
- Load reconnect limit

- High load limit
- High temperature limit.

Change these limits using the arrow keys and RETURN to select. See Appendix B, Configuration for default settings.

Boost parameters.

This menu contains the limits for boost charging control. See section "Boost charging" for more information.

Battery test.

This menu contains the limits for battery test. See section "Battery test" for more information.

Temperature comp.

This menu turn the temperature compensation on and off, and is used to set the compensation factor.

System specific limits

Only available for specific systems. For more information see Appendix B, Configuration



NOTE Current limiting is not available on all systems.

6.3.6.7 Miscellaneous

The miscellaneous menu is used to set the date and time, change password, view version information, initialize modem, show symmetry voltages and temperature.

Set time

The clock is shown. Press RETURN to adjust the clock. The clock has a battery back-up and will keep the time even if the PCC is turned off.

Relay test

Press RETURN to check the alarm relays. Use the arrow keys to select the relay to be activated.

Alarm blocking

Use Alarm Blocking to disable the relays during service. One alarm relay will normally be active as long as the alarms are blocked.

Version

Show the PCC software version, configuration number and serial number.

Set new password

Choose "set new password" from the "miscellaneous" menu. Press RETURN, enter the old password and press RETURN. Enter the new password and confirm by pressing RETURN. To avoid mistyping the new password has to be entered once more. Confirm by pressing RETURN.



NOTE Be sure to note the new password. If the password is not known or access is denied, contact Power-One technical support for assistance.

Shunt A

Displays the current rating of the battery shunt. I.e. this parameter shows the value of current in the current/voltage ratio of the shunt.

Shunt mV

Displays the voltage drop of the battery shunt at rated current. I.e. this parameter shows the value of voltage in the current/voltage ratio of the shunt.

Network address

Displays the network address for each module. Several PCC's may be connected together in a multidrop RS232 network. The modules require a unique address between 2 and 255. This address may be set here. Also this submenu is used to set TCP/IP address for use on the ethernet version of the controller.

Baud rate

Select the baud rate for the RS232 serial port of the PCC. Either 2400 or 9600.

Init modem

Press RETURN to send a string to initiate a modem. The initiation string will set the modem to auto-answer after two rings. See the modem instructions to see if it requires additional initialization to operate.

Accept removed parts

Removing a module or unit will appear to the PCC as a communication error. If the module or unit is intentionally removed then the PCC will need to be informed. Select "YES" in the Accept Removed Parts menu to inform the system that the module was removed.

NOTE Do not accept removed parts if there is an alarm on a module that has not been removed.

Reset to defaults

This command will reset the system to default values without deleting logged data or system information. It is recommended to try this instead of Master Reset if a reset is needed. After a reset always check all limits and adjust them to the desired level.

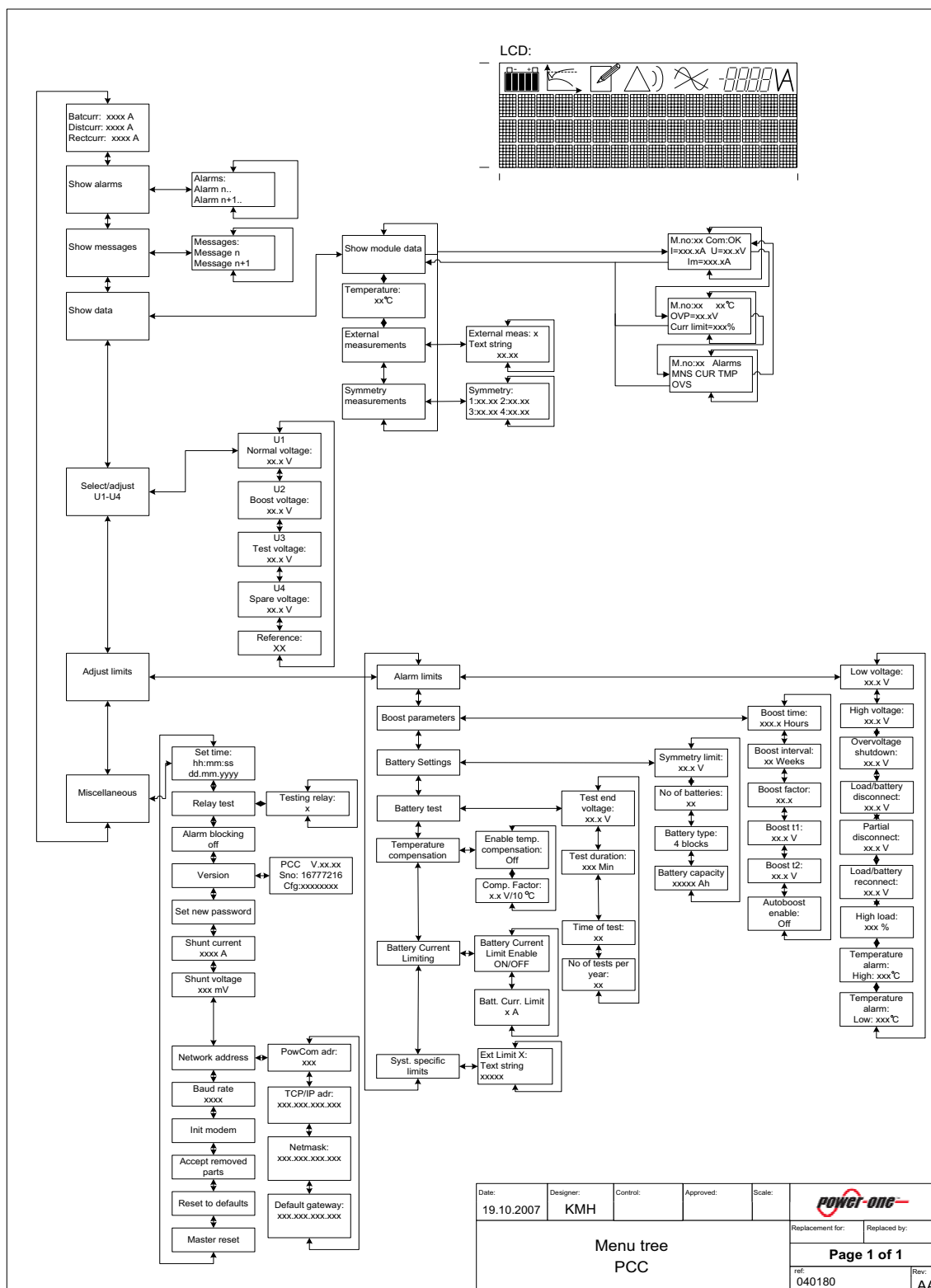
Master reset


Will completely reset the PCC, deleting all stored data. If possible backup the data to a PC before doing a master reset. After a reset always check all limits and adjust them to the desired level.



CAUTION A Master Reset will delete all information from the system. Use the master reset feature only as a last resort.

Figure 6-3 PCC Menu tree



Date:	19.10.2007	Designer:	KMH	Control:		Approved:		Scale:			
Menu tree PCC										Replacement for:	Replaced by:
										Page 1 of 1	
										ref:	040180

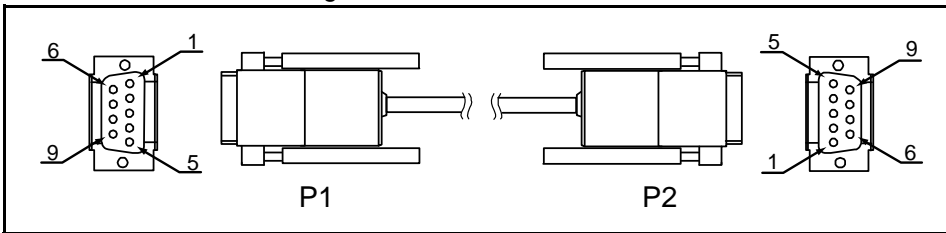
6.3.7 Connecting to PC

The PCC to PC connection requires a RS232 cable to connect to the PCC and to the PC serial port connection.

Cable

The PC to PCC connection is made using a modem, or directly with a null-modem cable (*PCC to PC cable*). P1 and P2 are both 9-pin female D-sub plugs. P1 is to be connected to the PCC.

Figure 6-4 PCC to PC cable



Pin	P1	P2
2	Receive	Transmit
3	Transmit	Receive
5	0V (Ground)	0V (Ground)

Table 6-1 RS232 Cable Pin Outs

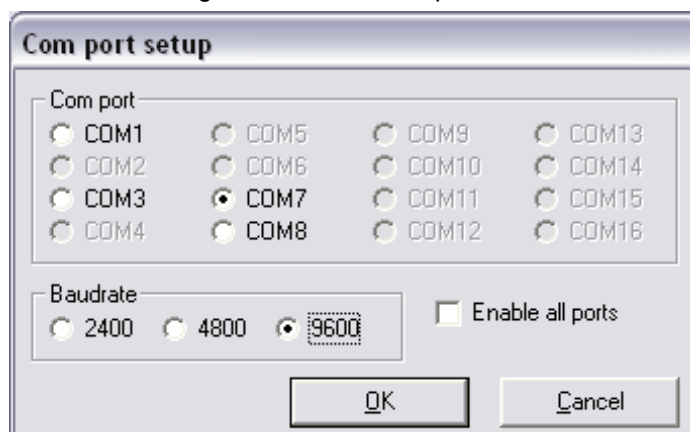
1. To connect the PCC to the PC, locate the RS232 interface connector on the front of the PCC.
2. Connect one end of the RS232 cable to the interface connection.
3. Route the cable to the rear of the PC (the PC should be powered "Off").
4. Connect the RS232 cable to the #1 serialport on the PC.
5. Power up the PC and start the PowCom software.
6. Choose "Communications" from the PowCom menu, and select "Port Setup" ([Figure 6-5](#)).

Figure 6-5 Communications menu



1. Select "9600" baud rate from the Port Setup menu (Figure 6-6).

Figure 6-6 Port Setup Menu



2. Select "OK"
3. Choose "Direct Communication" from the Communications menu.
4. Enter Password (1234 by default).
5. Consult PowCom documentation for more information about using PowCom software

6.3.8 Connecting a Modem

Modem can be connected to the serial port using a standard modem cable. To setup the modem to auto-answer use the init modem command from the Miscellaneous menu (see menu tree). Some modems may require further initiation to be done

before it is connected to the PCC. Please refer to the modem manufacturer's documentation.

To dial up the system using PowCom, please refer to the PowCom user manual delivered with the PowCom software package.

6.3.9 Boost charging

Open the "Select/Adjust" menu on the PCC.

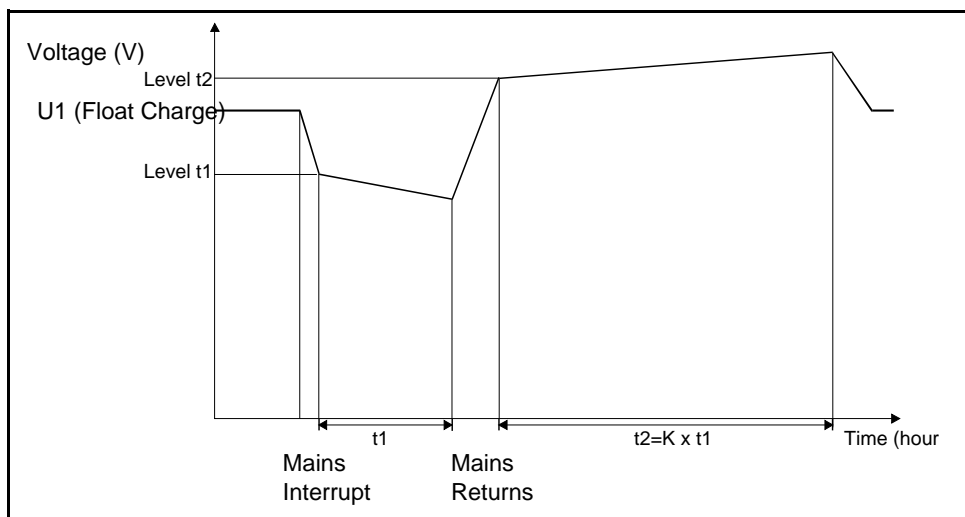
Boost charging can be activated by three methods:

Manual boost charging - Choose "U2" in the reference menu for activating boost charging. (Return to float charge manually by choosing "U1", or automatically after a pre-set time.)

Periodic boost charging - after a pre-set period boost charge will be automatically activated for a pre-set time. Interval and boost time to be programmed (for example 4 hours every 3rd week).

Automatic boost charging - when during a mains failure the battery voltage falls below LEVEL t1 value, a timer is started. When the mains return, the system will start an automatic boost. This will last a certain time after the battery voltage reach LEVEL t2. This time will be multiplied with a factor, K. LEVEL t1, LEVEL t2 and the factor can all be set.

Figure 6-7 Boost charging



The following values are adjustable for boost charging:

Boost voltage 40 - 60 Volts
Boost time 0 - 200 hours
Boost interval 3 - 16 weeks
Boost factor 1.0 - 16

Boost t1 40 - 60 Volts
Boost t2 40 - 60 Volts
Auto boost enable Passive - Active

Disabling Automatic Boost Charge:

Select "Boost parameters" in the "Adjust limits" menu. Push RETURN, up arrow and RETURN / then select disable.



NOTE Most manufactures of sealed lead acid batteries do not recommend boost charging. If this type of battery is used, the boost function should be totally disabled by settings as follows:
Boost time = 0; U2= U1

6.3.10 Battery test

The following section contains the procedure for testing the batteries in the system.

Battery testing is activated by selecting U3 (in the "Choose reference" menu.)

Once selected the rectifier voltage will decrease to a pre-set value (U3, adjustable).

The battery test will automatically be interrupted and output rectifier voltage will raise to U1 level, if programmed time or end voltage is reached during the test.

The test is considered as accepted if time causes the interruption.

If the battery voltage reaches programmed end voltage, the battery is considered as faulty, and an alarm will be indicated and further automatic testing is interrupted.

Battery tests can also be set to activate automatically 1-6 times a year. In the "Choose Reference" menu, select "Select no. of tests".

Parameter Settings.

The parameter settings feature allows for the partial discharge of the batteries (approx. 30-40% of the capacity) in order to test the batteries for errors. The settings should be done according the battery manufacturer requirements, however, the following settings can be used for standard VR lead batteries:

U3 = 1,9 V/cell
End voltage = 1,94V/cell
Time = 40% of expected backup time

Parameters to be set/adjusted from the "battery test" menu or PC with PowCom installed.

Battery test voltage:U3 0- 100 Volts
Symmetry limit: 0.0 - 4.0 Volts
Test end voltage: 0-100 Volts
Test duration: 0- 20 hours
Time of test: 0 - 23 (0=midnight)

No of test/year: 0 - 4
No of batteries: 0 - 12
Battery type: 4 blocks, 3 blocks or 2 blocks

Number of batteries must be equal to number of symmetry measurements. If symmetry cables are not in use, number of batteries must be set to 0 (zero).

6.3.11 Temperature compensation

The supervisory module can adjust the charging voltage to compensate for temperatures above or below 20°C. $T > 20^{\circ}\text{C}$ lower charging voltage. $T < 20^{\circ}\text{C}$ higher charging voltage. The zero point for temperature compensation can optionally be set to 25°C.

The temperature compensation function can be enabled and disabled and the level of compensation is adjustable.

6.3.12 High load

The "High Load" alarm is activated when the load current exceeds the capacity of the installed modules multiplied by the high load limit. This is an indication that the system requires increased rectifier capacity.

6.4 Ethernet Connection

The controller can be connected directly to an Ethernet 10 base T network for supervision using a Web interface. The Web interface will allow setting of parameters. The parameters should be checked so that only legal values are set. Web supervision requires any graphical internet browser (ie MS Internet Explorer, Mozilla, Firefox, Netscape or other). It is convenient for administration by network connection.



NOTE For connectivity verification in the network between PC and PCC controller it is possible to use ICMP (Internet Control Message Protocol). It is chiefly used by the operating systems of networked computers to send error messages—indicating, for instance, that a requested service is not available or that a host or router could not be reached.

The tool **ping** is used directly by user network applications. it sends "Echo request" and expects "Echo replay".

PCC can work with 32 Bytes only (Windows ping default).

6.4.1 Commissioning

For successful installation of Ethernet connection, follow the instructions below.

1. In order to communicate with the site network, a valid IP address, netmask and default gateway are required. These should be provided by the site network administrator. These should be obtained before continuing with the installation.
2. Enter the IP address, netmask and gateway using the Miscellaneous network menu on the LCD display. (Alternatively you can set this via Powcom and a RS232 connection)
3. Connect to the controller using the Ethernet interface located on the Controller frontplate. Connect this directly to the remote Ethernet 10 base T network connection.
4. Start the internet browser on the PC and enter the IP address of the PCC to start connection. On the first connection both the user name and password shall be left blank. The user name and password can be changed in the Configuration - Admin menu on the left hand of the screen. See [Admin Configuration on page 6-19](#). There is only one user and only one level of access.



NOTE Until the user name and password has been changed the user name and password shall be left blank when logging in.

Figure 6-8 User name and password



6.4.2 General information about the interface

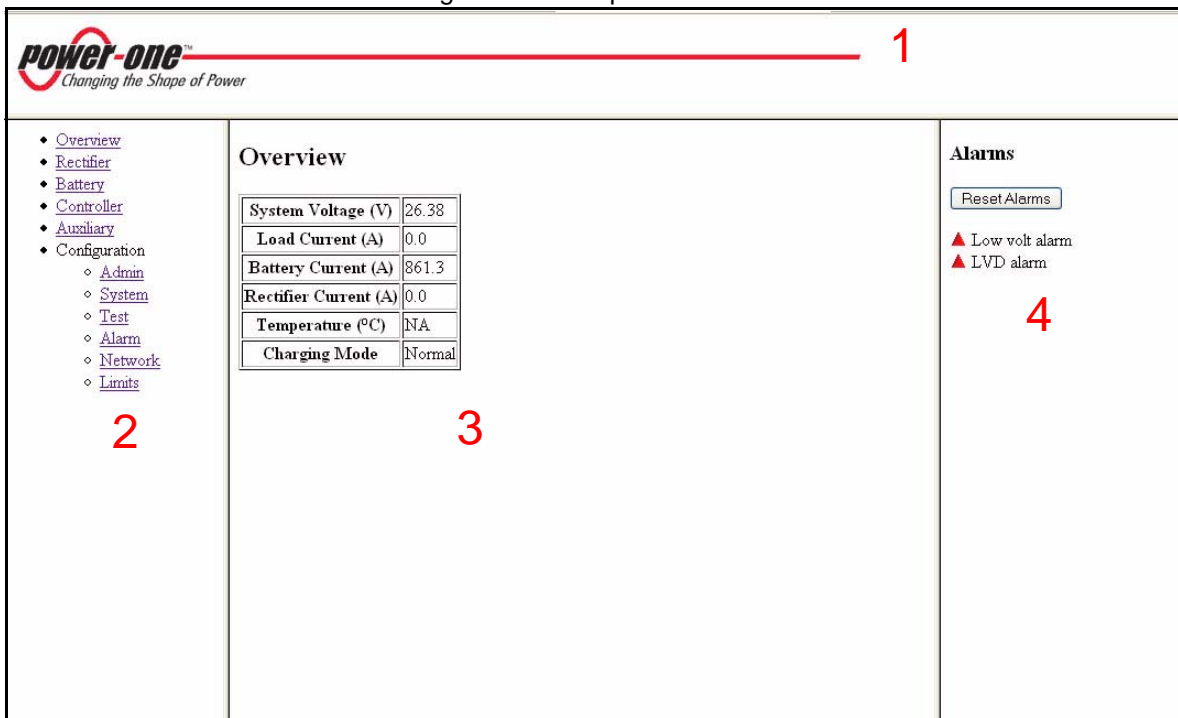
The interface (Web page) is divided into 4 frames. See [Figure 6-9](#)

The title frame (1) on the top shows the Power-One logo.

The menu frame (2) on the left control what is shown in the main frame (3). The main frame displays the information according to menu choices. In this case the Overview frame is shown.

The left frame (4) is used to display the alarms.

Figure 6-9 Graphic interface



6.4.3 Menu Options

6.4.3.1 Overview

This page shows the system measurements, Voltage, battery current, load currents, rectifier current, battery temperature and charge mode.

6.4.3.2 Rectifier

This page shows the rectifier data for individual rectifiers one at the time.

- Voltage
- Current
- Mean current
- Temperature
- Alarm Status

6.4.3.3 Battery

This page shows the symmetry measurements.

6.4.3.4 Controller

This page show controller information (type, serial number, software version and configuration number)

6.4.3.5 Auxiliary

This page shows the external measurements that have been programmed in the configuration (including the programmed text).

6.4.3.6 Admin Configuration

This page allows system name, time, date, service contact name, service contact phone to be set. The user name and password can also be set.

6.4.3.7 System Configuration

This page allows the selection and adjusting of U1, U2, U3 & U4, Boost parameters and Battery information.

Boost parameters:

- Boost time
- Boost interval
- Boost factor
- T1 limit
- T2 Limit
- Automatic boost on/off

Battery info:

- Battery capacity
- Battery Type (4 blocks, 3Block, 2 Blocks)
- Number of battery strings (branches)
- Temperature compensation On/Off
- Temperature compensation factor
- Battery current limiting on/off (if enabled in configuration)
- Battery current limiting limit (if enabled in configuration)

6.4.3.8 Test Configuration

This page allows the setting of Battery Test parameters.

- Symmetry limit
- End voltage for test
- Battery test time

Time for test
No. of tests pr. Year

6.4.3.9 Alarm Configuration

This page allows the setting of alarm limits.

Low Voltage
High Voltage
Overvoltage shutdown
Low voltage disconnect
Partial disconnect (V or min. depending of config)
Load connection limit
High load
High temperature limit
Low temperature limit

6.4.3.10 Network Configuration

IP-address, Netmask, Gateway and Host name can be set. In this window it is also possible to set up the trap recipient for SNMP traps.



NOTE Do not change IP address, netmask or gateway unless you are sure that you can reach the new address. Connection will be lost with the current address.

6.4.3.11 System Specific Limits

In this window it is possible to change the programmable limits that have been assigned in the configuration of the system. Programmed text in the config is used as description.

6.4.4 SNMP

General SNMP Managers can supervise a variety of networked equipment simply by importing a text file called MIB (Management Information Base). The SNMP Manager program can access and control the DC-Power systems by adding the MIB describing the PNI SNMP Agent to its collection of MIB files.

The SNMP support is according to SNMP V1. The MIB is a simple Custom MIB.

Readable system information

- System Name
- Controller Type
- Controller software version
- Controller Serial number
- DC output description
- Battery Description
- Battery Capacity

This is basically the system information set from PowCom when the system is installed and some additional controller information.

Readable Measurements

- System Voltage
- Load Current
- Battery Current
- Rectifier Current (Total)
- Battery Temperature

Readable Alarm data

- Number of active alarms
- Alarm text of the 16 programmable alarms
- Alarm Data 1-3
- Ext Alarm data 1-2
- Status bytes 1-3

Alarm data 1-3, Ext Alarm data 1-2 and Status bytes 1-3 are bit patterns that contain the current alarm status etc. See following table for more information.

Table 6-2 Alarm data

Bit	Description	Comment
	Alarm data 1	
0	Low voltage alarm	
1	Hige voltage alarm	
2	Low voltage disconnect	Ref: Battery/Load disconnected alarm
3	Mains failure	
4	Distribution fuse failure	Ref: Load breaker failure
5	Earth failure	Not in use
6	Battery failure	
7	Rectifier module alarm	
	Alarm data 2	
0	High temperature alarm	
1	Symmetry failure	
2	Battery fuse failure	
3	High Load alarm	
4	Battery fuse disconnected	Not in use
5	Urgent module alarm	
6	Communication fault	
7	Partial load disconnect	

Table 6-2 Alarm data

Bit	Description	Comment
	Alarm data 3	
0	Temp probe failure	
1	Distr load high	Not in use
2	Batteries on discharge	
3	Output overvoltage shut down alarm	
4	Low battery temperature alarm	
5	Reserved	
6	Reserved	
7	Alarms blocked	Other alarms disabled during maint.
	Extra Alarms 1 (Alarm data 4)	Ext alarm 1-8 (user defined alarms)
0	Ext alarm 1	
1	Ext alarm 2	
2	Ext alarm 3	
3	Ext alarm 4	
4	Ext alarm 5	
5	Ext alarm 6	
6	Ext alarm 7	
7	Ext alarm 8	
	Extra Alarms 2 (Alarm data 5)	Ext alarm 9-16 (user defined alarms)
0	Ext alarm 9	
1	Ext alarm 10	
2	Ext alarm 11	
3	Ext alarm 12	
4	Ext alarm 13	
5	Ext alarm 14	
6	Ext alarm 15	
7	Ext alarm 16	
	Status 1	
0-1	U1 Normal	Bit 0 and 1 = 0
0-1	U2 Boost	Bit 0 and 1 = 1
0-1	U3 Test	Bit 0 and 1 = 2
0-1	U4 Spare	Bit 0 and 1 = 3

Table 6-2 Alarm data

Bit	Description	Comment
2	Time controlled load disconnect	
3	Not load/batt disconnect	
4	Partial load disconnect extst	
5	Time controlled partial disconnect	
6	Battery current limit enabled	
7	OVP disable	Not Supported. Always 0
	Status 2	
0	Battery current measured	
1	Load current measured	
2	Rectifier current measured	
3	3 block symmetry	
4	2 block symmetry	
5	IP inforamtion updated	
6		
7		
	Status 3	
0	Two password system	Not Supported. Always 0
1	Function 16 and 17 available	Always 1
2	Dial back available	
3	Extended sysinfo in msg 11 (13)	Always 1
4	Extended batt. Test length	Not Supported. Always 0
5	Large system	Not Supported. Always 0
6	Internal PNI	Network option installed. Set to 1 when ethernet

Traps sent from controller when events occur.

- All the 20 standard alarms sent individually with a variable showing if the alarm is set or cleared
- All the 16 programmable alarms sent individually with a variable showing if the alarm is set or cleared
- Trap sent when the charge mode change. 4 different traps depending on mode it is changed to (U1-U4)

Traps are sent to a single trap recipient that can be set up from the web interface.

6.5 ACC Controller Additional Features

The ACC is a supervisory system particularly designed for supervision of power supply systems based on Power-One rectifier modules. The controller consists of the main controller board, a user interface board, and two interface boards for internal and external signaling. A RS485 data bus is used for internal communication with the extension boards. USB (or RS232) serial interface or Web interface can be used for remote control from a PC with PowCom™ software.

6.5.1 ACC Menu

Show Unit Data

This menu option displays serial number, communication status and software version for other communicating units, if installed. Alarm extension boards are examples of communicating units.

Temperature

This menu displays the battery temperature in celsius, as measured by the temperature sensor (if installed) and additional temperature.

Remaining Battery Hours:

The controller calculates the remaining battery time, and this is displayed here. The remaining battery capacity is displayed in the battery icon

External Measurements

If configured, external measurements can be read here.

Symmetry Measurements

The symmetry voltage for each battery branch is displayed here if symmetry measurement is set up for the system.

Module ON/OFF

Module ON/OFF can be used to switch on or off single rectifier units.

No. of Shunts

The total number of Battery shunts for the power system should be set here. The default is 1, and this value should not be changed unless there are extension boards connected to the controller that supervise additional shunts.

6.5.1.1 Miscellaneous

The miscellaneous menu is used to set the date and time, change password, view version information, initialize modem, show symmetry voltages and temperature.

Current Offset

Current offset can be used for calibration of the current measurement in order to avoid a measurement offset. To calibrate, turn all battery breakers OFF and adjust the Current Offset to zero.

Voltage Offset

Voltage offset may be used for calibration of the output DC voltage. Measure the voltage on the DC busbars with a calibrated voltmeter and enter the measured value in the Voltage Offset menu.

Audible Alarm

An audible alarm can be toggled on or off in this menu option. When switched on the controller will create a sound when alarms occur.

6.5.2 Connecting to the PC

- Via USB PowCom™ version required
- Via Network

6.5.3 Menu Options

Battery Test Log

The Battery test log menu will display start and end results of the last ten Battery Tests.

Monthly Battery Log

The monthly battery log results can be found in this menu.

Inventory Log

Addition or removal of system inventory will be logged and displayed in this menu. Rectifiers will have serial numbers and type numbers stored, and this is displayed here when they are registered as installed or removed.

Peak Load Log

Daily Peak Load statistics will be displayed here.

Site Data

In the Site Data menu the user can add details about the breaker configuration for the system, with size and descriptions. The first entry will be listed as Fuse 1, and then consecutively for each entry.

Maintenance and Service Log

Maintenance personell can enter details about each maintenance job performed on the system, and this is done using this menu. When the date, time and maintenance details have been added in the text boxes, click Add to save it and display it on the log below.

Statistical Data

The statistical data log will display statistic for key system values; Battery Temperature, Load Current and Rectifier Current.

The statistics are presented as increments of ten percent, and the controller calculates the time the system has been inside the different value thresholds. The time is provided as percentage of total hours in one table, and in hours in a second table.



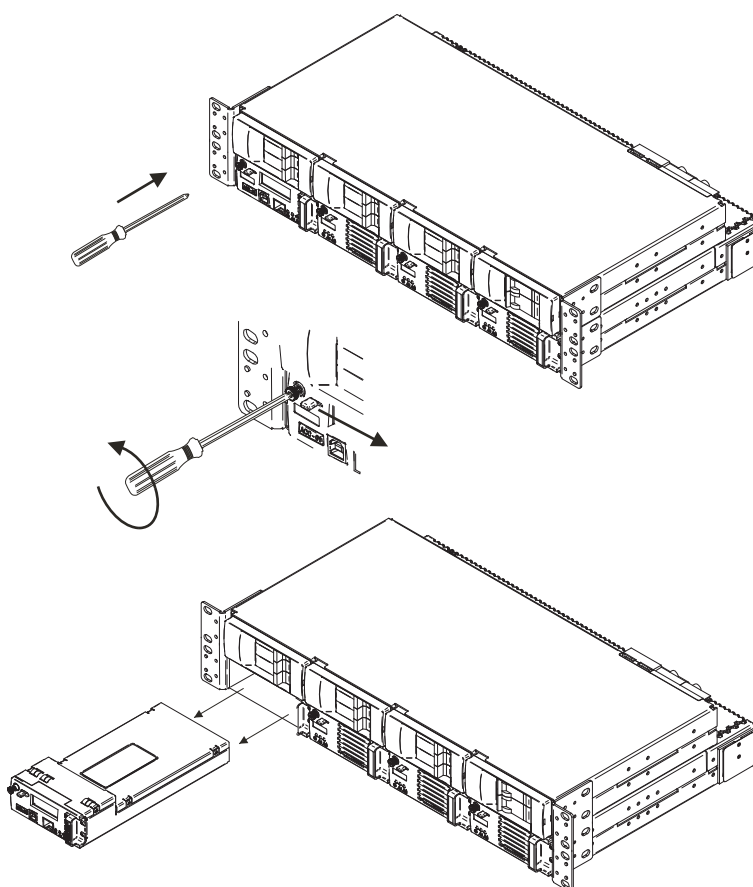
NOTE The total percentage may not always be 100, as the controller will round values down to the nearest integer.

Chapter 7 Replacing Units

7.1 Replacing the Controller

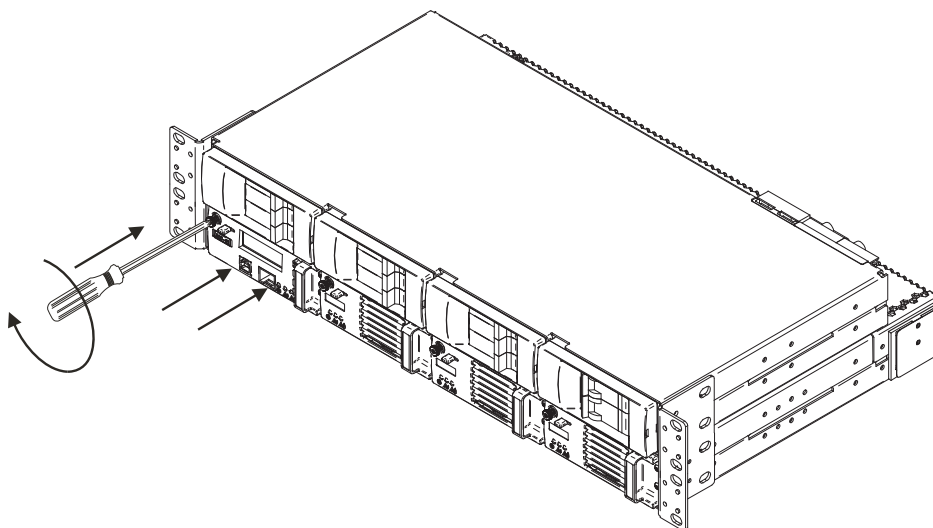
If the Controller unit is faulty it can be easily replaced by a new one. Unscrewing the front screw allows the handle for the release spring to be moved to the right, then pull out the controller as shown in [Figure 7-1](#).

Figure 7-1 Removing the Controller



When the faulty controller has been removed, insert the new controller in the empty slot and fasten the screw as shown in [Figure 7-2](#).

Figure 7-2 Inserting New Controller



It is important to verify that the controller configuration file is the correct one for this power system. This can be verified after startup, see the PowCom™ software documentation for details. The correct configuration file can be obtained from Power-One if it is not available, but any local adjustments that were done on the faulty controller will have to be adjusted also on the new controller.

7.2 Replacing the Rectifier

Since the Rectifier features the same release spring and screw as the Controller, the mechanical replacement of the XR rectifier is done following the same steps as described in [Figure 7-1 on page 7-1](#) and [Figure 7-2](#). The rectifier can be hot-swapped.

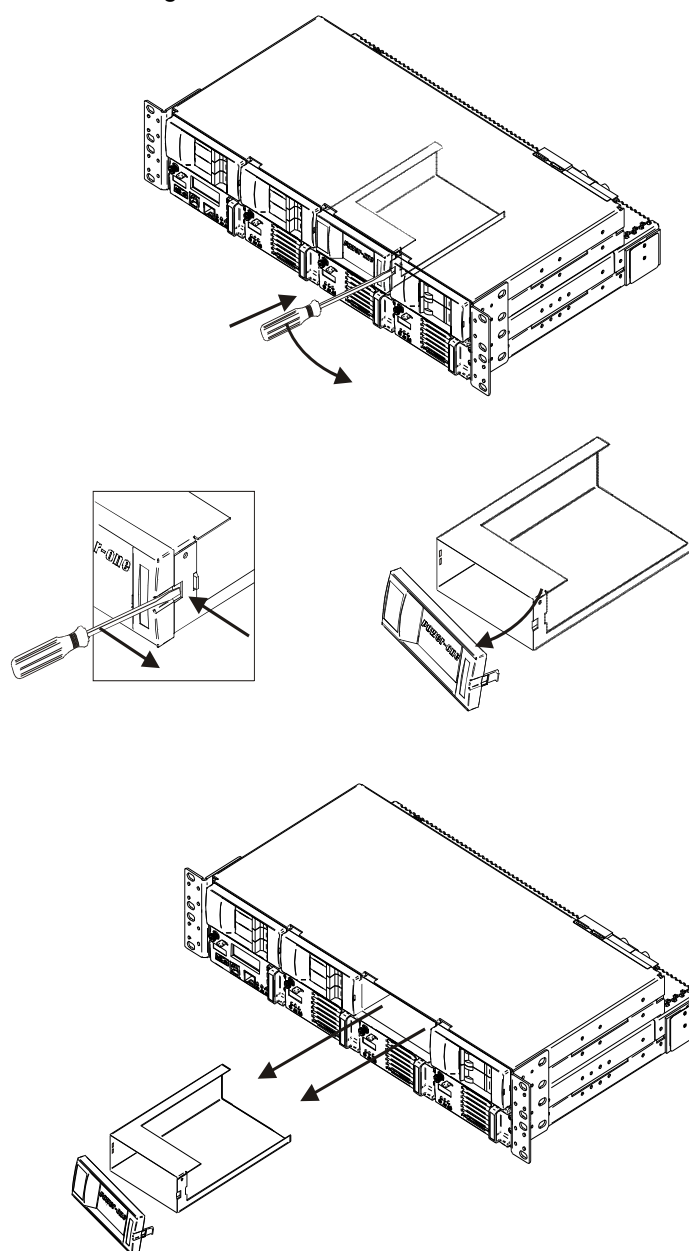
7.3 Removing the Blind Drawer

The Blind Drawer for the Aspiro system is installed in positions where no other drawer type is installed. For system expansion the Blind Drawer can be removed and replaced by either a Rectifier or a Breaker Drawer. Note that a system position is defined either as a Rectifier position, a Load breaker

position or a Battery breaker position by the rear subrack. This varies with system configuration.

Use a screwdriver to release the panel lock, insert the screwdriver as shown and press the screwdriver handle to the right. This will move the locking tap to the left and release the drawer. Pull it out for removal while the locking tap is in the left position.

Figure 7-3 Blind Drawer Removal



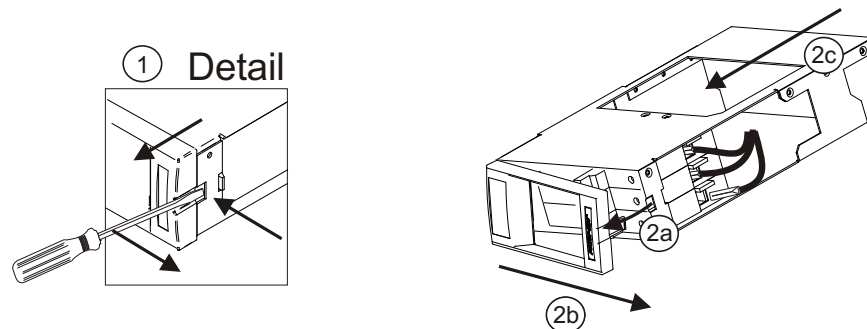
7.4 Replacing Breakers

Faulty circuit breakers can be replaced easily by pulling out the breaker drawer with the faulty breaker. The different breaker types for the Aspiro Power System are replaced according to different procedures. Verify the breaker type and application, then replace according to the procedures below.

7.4.1 The Breaker Cover

The breaker cover for Aspiro breaker drawers is similar to the dummy cover, and must be removed and re-inserted carefully to avoid damage to the equipment. The procedure for this is described below. Use a flat-head screwdriver to release the panel lock on the right side (1) in [Figure 7-4](#). Then pull the right side of the cover out until the lock is released (2a) and pull the cover to the right to release it from the shelf to access the breakers.

Figure 7-4



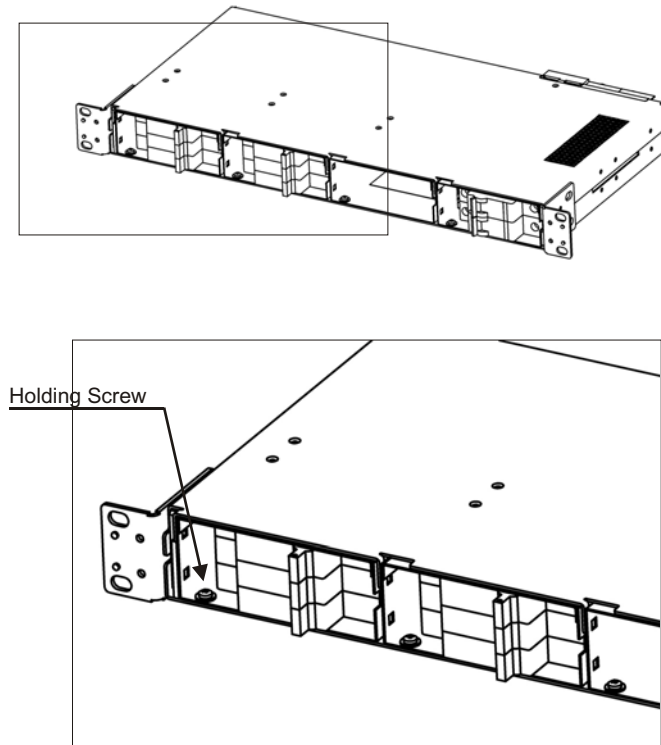
7.4.2 Releasing the Drawer

Each breaker drawer is fastened to the shelf with a screw on the left side. After removing the cover, remove the screw shown in [Figure 7-5 on page 7-5](#) to release the breaker drawer from the shelf.



NOTE The breaker cabling will still be holding the breaker drawer to the rear connections, so the breaker drawer can not be completely removed unless all cables are removed.

Figure 7-5

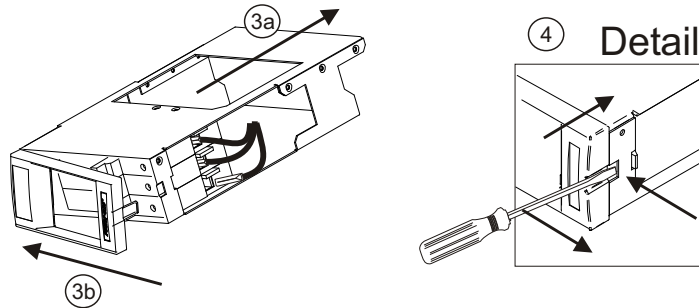


After replacing the breaker (according to procedures provided later in this chapter), push the breaker drawer back into the shelf (3a) in [Figure 7-6 on page 7-6](#). Fasten the drawer to the shelf by fastening the holding screw on the bottom left side of the drawer shown in [Figure 7-5](#). Torque the screw to 0.45 Nm. Re-insert the cover panel by first inserting it into the two guide holes on the left (3b). Lock the panel and drawer into position by using a screwdriver on the locking piece to the right.



CAUTION Do not attempt to push the panel into position without first aligning it with the guide holes or without using a screwdriver on the lock piece, as this may cause damage to the panel.

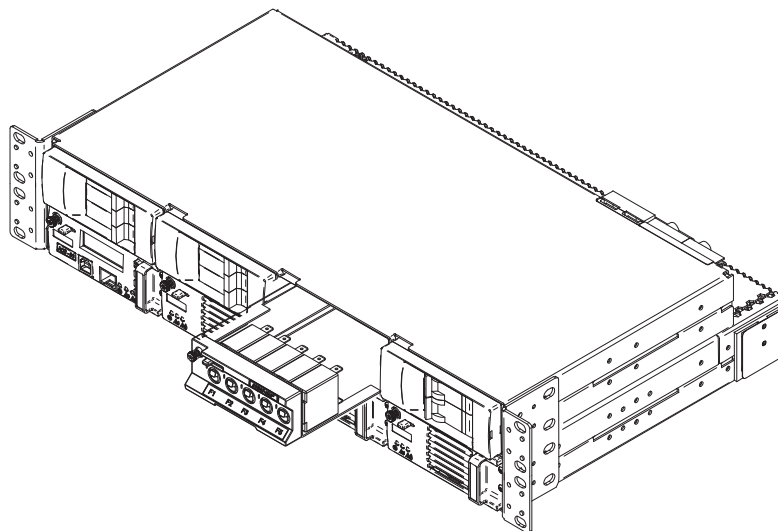
Figure 7-6



7.4.3 Replacing B-Frame Type Breakers

If any circuit breaker is faulty it can be easily replaced by a new one. Unscrewing the front screw enables the release spring handle to be moved to the right. If it is not possible to release the spring handle, press the drawer backwards and try again. Then pull out the Breaker Cassette. It cannot be pulled out of the rack completely, only to its frontstop as shown in [Figure 7-7](#).

Figure 7-7



The procedure for replacing breakers is described below:

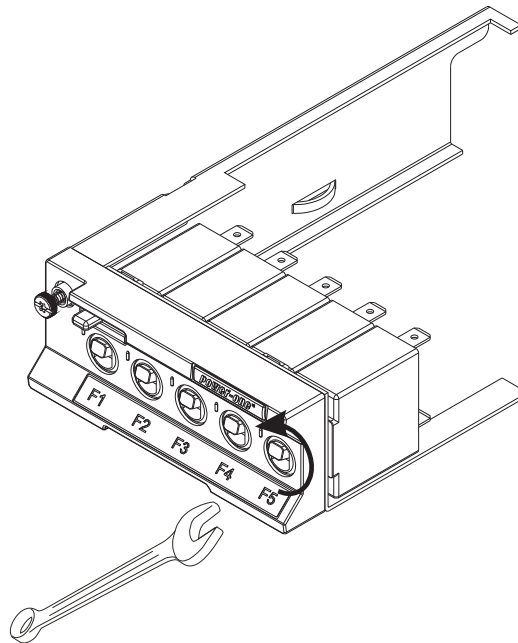
1. Remove the plastic cap from the spring handle.
2. Unlock the 2 clicks on the top of the plastic breaker cover. Angle it to the front and remove the cover completely.
3. Loosen the breaker fastening nut at the front. See [Figure 7-8](#). Then loosen the breaker, unplug and remove it.
4. Insert the new breaker (the same type and current value) in an empty slot, apply the fastening nut and fasten it.



NOTE Some breakers can have a knurled nut. In that case use the pliers instead of a spanner.

5. Plug the cables to the breaker in the same position.
6. Place back the plastic cover and the plastic cap.
7. Insert the Breaker Cassette back to the backstop of the slot and fasten the front screw.

Figure 7-8 Replacing the Circuit Breaker



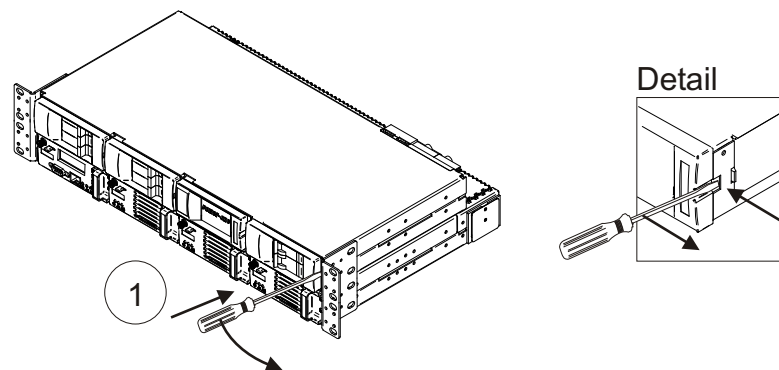
7.4.4 Replacing 13 or 18 mm Type Breakers

Below is described the procedure for replacing 13 mm or 18 mm type breakers for load or battery.



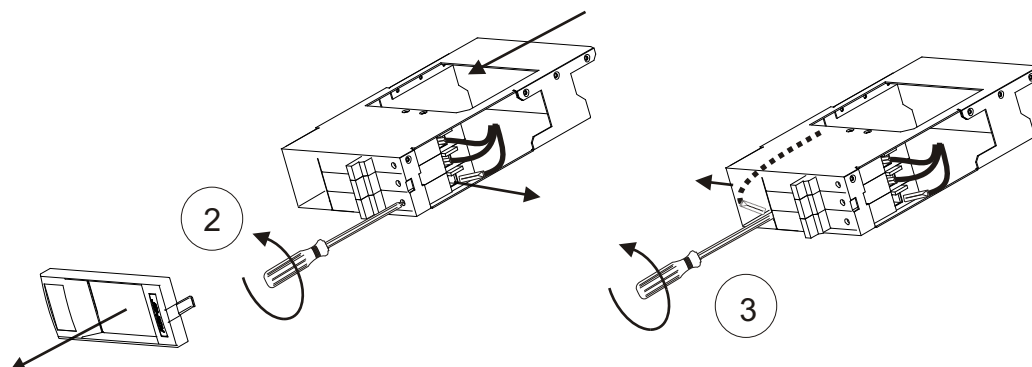
WARNING Working with battery connections can be dangerous. Before removing breakers, disconnect any batteries and insulate any wires and terminals as removed.

Figure 7-9



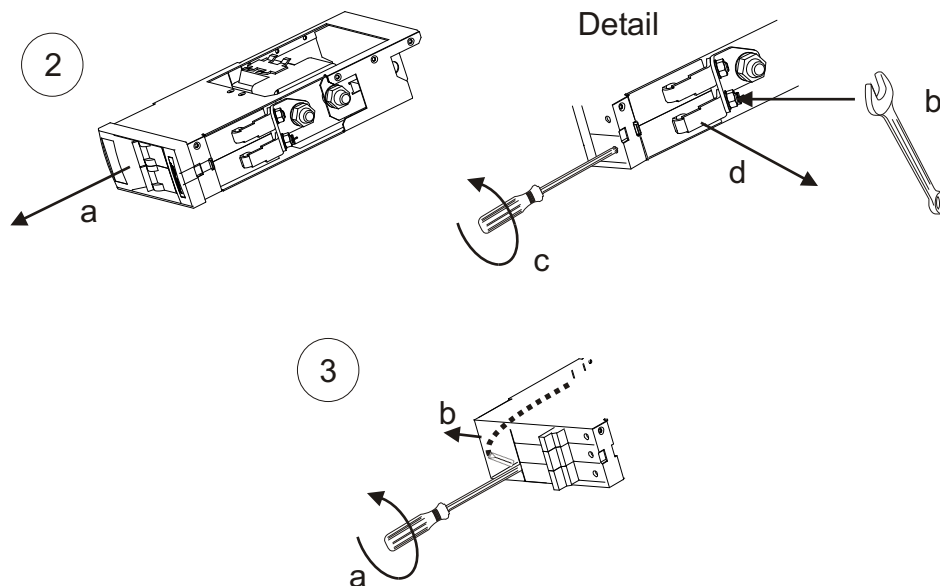
1. Release the breaker cover according to the procedure provided above.
- 2-3 For load breakers release the cable on each side of the breaker using a cross-slot screwdriver.

Figure 7-10 Removing a Load Breaker



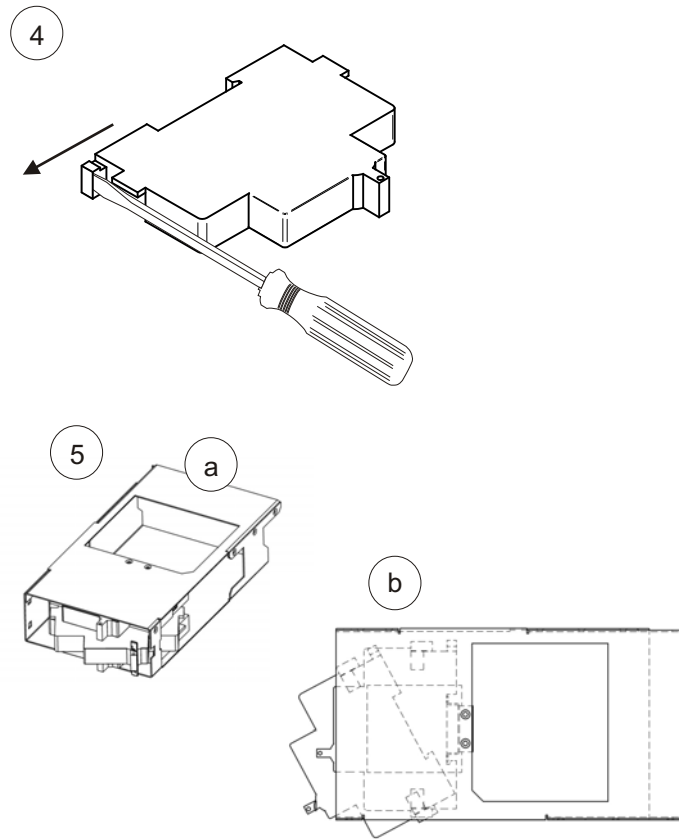
- 2 For battery breakers, first remove the front cover as before (a), pull out the drawer and release the nut fastening the copper bar to the contactor parts using a spanner (b). Then release the connector by loosening the screw on the breaker (c) and pulling out the connector (d).
- 3 Release the cable on the left side of the breaker by using a cross-slot screwdriver to loosen the screw (a) and then pull out the cable (b)

Figure 7-11



4. Release the breaker by pulling out the spring bar holding the breaker to the breaker drawer.
5. The breaker is mounted on a rail inside the breaker drawer as shown in [Figure 7-12 on page 7-10](#). To release the breaker from the tap on the right side or the rail, first pull the left side out then push the breaker slightly to the right. Then pull the breaker to the left and out of the drawer.

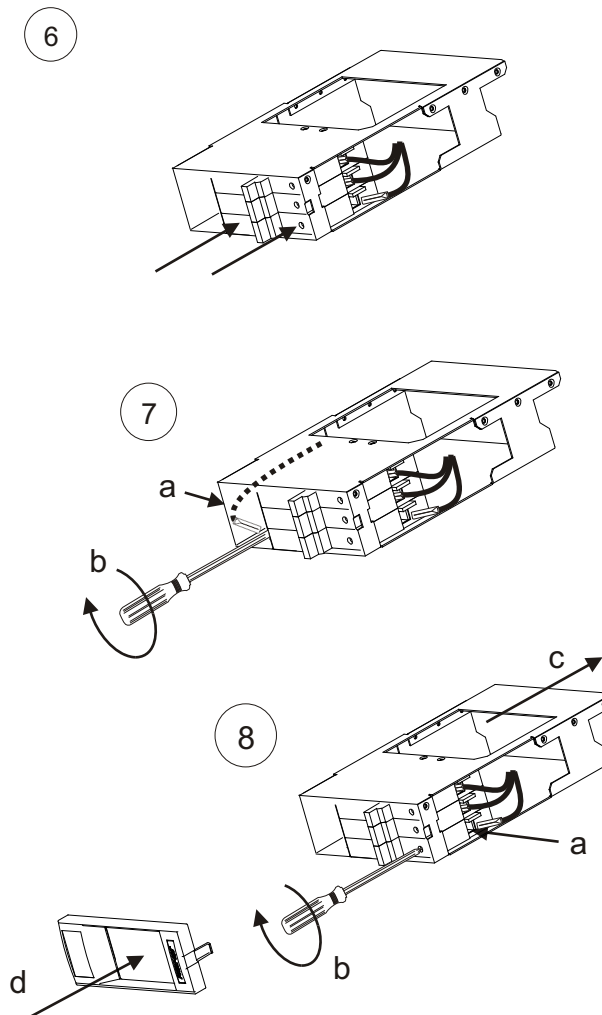
Figure 7-12



NOTE 13 mm load breaker is shown, but the procedure is similar also for 18 mm load and battery breakers.

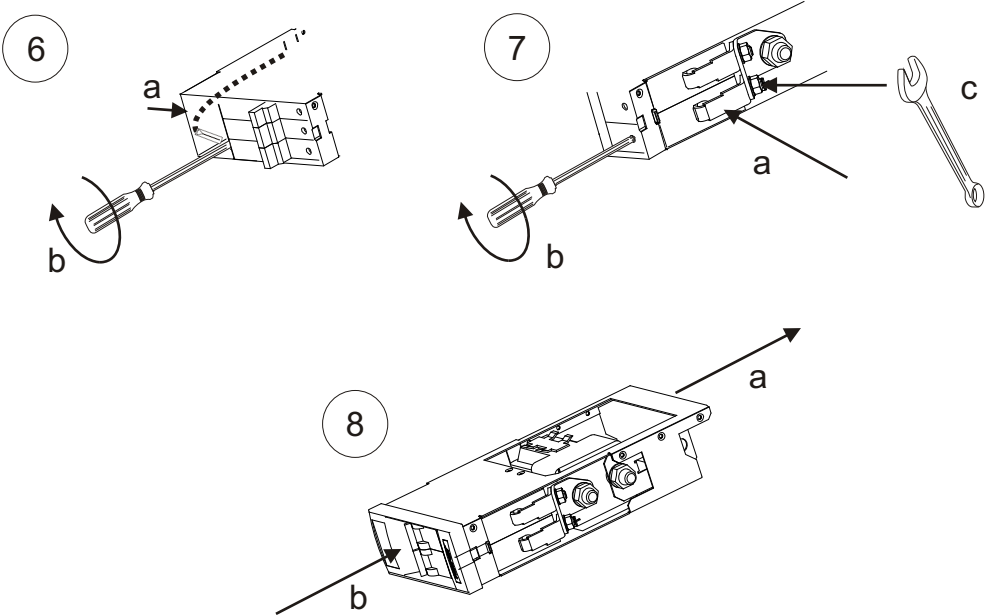
6. Insert the new load breaker into the vacant slot. Insert on the right side first to fit it onto the rail, then push the left side in and push the spring bar back into position, clicking the breaker onto the rail.
7. Insert the cable on the left side (a) and tighten the screw on the front using a cross-slot screwdriver (b)
8. Insert the cable on the right side (a) and tighten with a cross-slot screwdriver (b). Push the breaker drawer back into position in the rack (c) and reattach the front cover (d) according to the procedure provided in [The Breaker Cover on page 7-4](#).

Figure 7-13 Inserting New Load Breaker



6. Insert the new *battery* breaker into the vacant slot. Insert on the right side first to fit it onto the rail, then push the left side in and push the spring bar back into position, clicking the breaker onto the rail. Fasten the cable on the left side (a) using a cross-slot screwdriver (b).
7. Insert the copper bar on the right side (a) and tighten the screw on the front using a cross-slot screwdriver (b). Then use the spanner to fasten the nut that holds the copper bar to the contactor parts (c).
8. Insert the breaker drawer into the rack (a) then put the front cover back into position according to the procedure provided in [The Breaker Cover on page 7-4](#).

Figure 7-14 Inserting New Battery Breaker



Chapter 8 Maintenance & Troubleshooting

8.1 Installing New Modules

Install new modules according to following steps:

1. Plug in module
2. Ignore the module alarm caused by current sharing
3. Wait. After 1 minute the yellow LED starts blinking. Wait for max. 4 min.
4. Verify that yellow LED stops blinking
5. The alarm should now disappear
6. Tighten front screw

8.2 Troubleshooting

If any problem occurs follow the instructions and recommendations given below. If the problem persists, please call your local Power-One office for assistance.



NOTE Before Commissioning and Maintenance are carried out a PC with PowCom™ installed must be connected to the RS232/USB connector.

Low system voltage:

- Check the batteries with a voltmeter.
- Check “low volt alarm” limit in controller / PowCom.
- Check that the system is not in battery “test mode”.
- Check modules, mains and load situation compared to rectifier capacity.

High system voltage:

- Check the batteries with a voltmeter.
- Check “High volt alarm” limit in controller / PowCom.
- Check that the system is not in “boost/Charge mode”.

Load/battery disconnected:

- Verify that input mains is present
- Check system DC voltage with voltmeter
- Compare system DC voltage with disconnected thresholds in controller / Powcom.
- If breaker blows once more, there is either a too high load or short circuit at the system

Mains error:

- Check mains breakers.
- Check mains voltage.

Distribution breaker failure:

- Localise the blown breaker.
- Check the equipment that is connected to the blown breaker (there may be a reason for this breaker to blow) and reconnect it.

Battery failure:

- Check the batteries.
- Check the “battery test” parameters in controller / Powcom.

Module failure:

- Localise the module.
- Pull it out.
- Wait for 30 sec. and reinstall it according to [Installing New Modules on page 8-1](#).

Battery temp alarm:

- Check the batteries.
- Check ventilation.
- Check reading in controller / Powcom.

Symmetry fault:

- Reset the alarm.
- Check connections according to number of batteries in controller / Powcom.
- Check batteries.

Battery breaker failure:

- Localise the breaker.
- Check the batteries.
- Reconnect the breaker.

High load:

- Check load situation according to capacity of the system.
- Increase number of modules.

Urgent module failure:

- See "Module failure".

Communication failure:

- Check if there is a module in current position.
- See "module failure".
- Check if the patch cable in 4 rectifier system is properly fastened to the connector on both shelves to ensure proper communication.

Temp probe failure:

- Check connection on temp probe.
- Replace temp probe.

Alarms are blocked (only with LCD display):

- Check "miscellaneous" menu in controller.

8.3 Maintenance

The connections on the terminal blocks and circuit breakers must be checked according to the [Torque Table](#) below, at least once a year.

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

In addition, the system needs normal cleaning and verifying of correct operation. It is very important to keep air inlets and outlets free from dust or other materials, which may prevent air circulation.

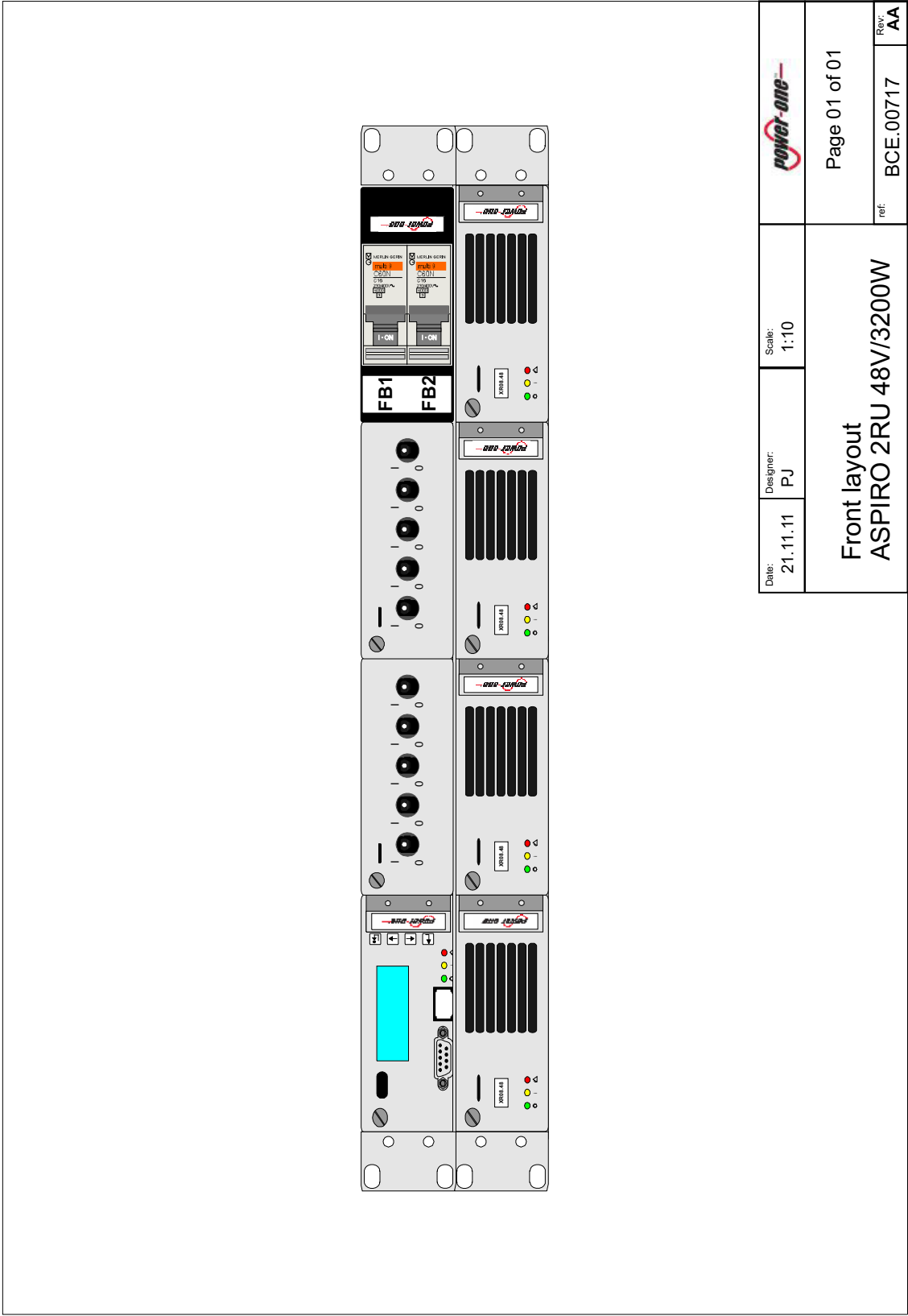
8.4 Torque Table

Figure 8-1

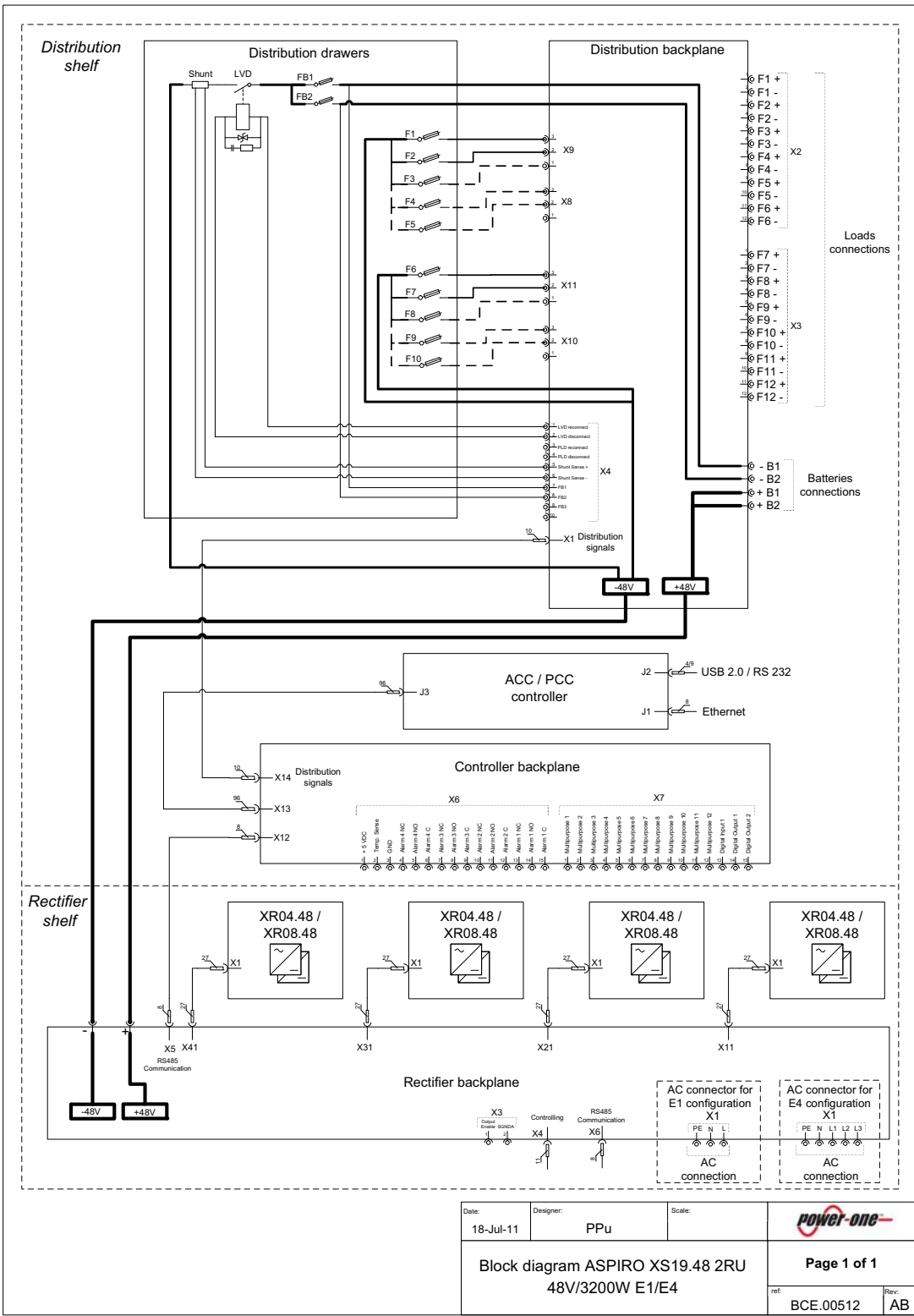
TYPE:	TORQUE (Nm):	TORQUE (Inch LB):
DC Load Connections	0.5	4.5
Battery Connections	8	70
Mains plug single-phase rear fastening	0.5	4.5
Mains plug single-phase top fastening	1.2	11
Alarm, Symmetry and Temp Sense plug	1.5	13
Ground Connection	8	70

Drawings

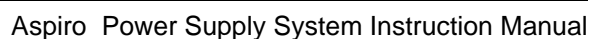
A.1 Front Layout ASPIRO 2RU 48 V/3200 W - BCE.00717_AA



A.2 Block Diagram ASPIRO 2RU 48 V/3200 W - BCE.00512_AB



A-4



Configuration PCC (C-000590)

The screenshot shows the 'Config Wizard - 1' window. It has a blue title bar with a close button. The window is divided into several sections. On the left, there are two sections for low voltage disconnection: 'Low voltage disconnection' and 'Partial low voltage disconnection'. The 'Low voltage disconnection' section has a checked box for 'Primary low voltage disconnection' and a radio button for 'Voltage controlled'. The 'Partial low voltage disconnection' section has an unchecked box for 'Partial low voltage disconnection' and radio buttons for 'Voltage controlled' and 'Time controlled'. Below these is a 'Common' section with a tab. It contains several checkboxes: 'Large system (Currents may exceed 3000A)', 'Battery current limiting available (Read note)' (checked), 'Two password system', 'PLD on low voltage alarm when timectrl PLD', 'Grey out Overvoltage Shutdown limit (PPS10 system)', 'Auto reset symmetry alarm', 'Extended symmetry', and 'Temp.comp zero point to 25 °C instead of 20 °C'. On the right, there are several input fields and dropdown menus: 'Controller type' (PCC), 'Menu language' (English), 'Baud Rate' (9600), 'Com.channel 2 protocol' (PCS Internal), 'Network Address' (1), 'Battery shunt [A]' (100), 'Battery shunt [mV]' (50), 'Default Password' (****) with a 'View' button, 'Top menu show:' with radio buttons for 'I batt' (selected), 'I load', and 'I rect', 'Max tempcomp. UP (0-mean not limited)' (0.0 V), and 'Max tempcomp. DOWN (0-mean not limited)' (0.0 V). At the bottom, there is a 'Load Configuration file' button and three buttons: 'Back', 'Next', and 'Cancel'.

Config Wizard - 1

Low voltage disconnection

- ☒ Primary low voltage disconnection
 - ☒ Voltage controlled
- ☐ Allow PLS control

Partial low voltage disconnection

- ☐ Partial low voltage disconnection
 - ☒ Voltage controlled
 - ☐ Time controlled
- ☐ Allow PLS control

Common

- ☐ Large system (Currents may exceed 3000A)
- ☒ Battery current limiting available (Read note)
- ☐ Two password system
- ☐ PLD on low voltage alarm when timectrl PLD
- ☐ Grey out Overvoltage Shutdown limit (PPS10 system)
- ☐ Auto reset symmetry alarm
- ☐ Extended symmetry
- ☐ Temp.comp zero point to 25 °C instead of 20 °C

Controller type: PCC

Menu language: English

Baud Rate: 9600

Com.channel 2 protocol: PCS Internal

Network Address: 1

Battery shunt [A]: 100

Battery shunt [mV]: 50

Default Password: **** **View**

Top menu show: ☒ I batt ☐ I load ☐ I rect

Max tempcomp. UP (0-mean not limited): 0.0 V

Max tempcomp. DOWN (0-mean not limited): 0.0 V

Load Configuration file

Back **Next** **Cancel**

Config Wizard - 2

Adjust limits | **Battery settings**

Set U1-U4: 1-4

☒ Normal U1 normal: V

☐ Boost U2 boost: V

☐ Test U3 test: V

☐ Spare U4 spare: V

Auto test (no. of tests pr year):

☒ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

Battery test limits

Symmetry limit: V

End voltage b.test: V

Batt.test time: min

Time for test: (0-23)

Alarm limits

Low volt. alarm: V

High volt. alarm: V

O. V. shutdown V

Load/batt.discon.V

Partial disconnect [M]

Load connection: V

High load %

High temperature limit: °C

Low temperature limit: °C

Config Wizard - 2

Adjust limits | **Battery settings**

Battery type:

☒ 4 Blocks

☐ 3 Blocks

☐ 2 Blocks

No. of batt.branches:

Boost limits

Boost time: hour

Boost interval: weeks

Boost factor:

t1 limit: V

t2 limit: V

☐ Automatic boost

Temperature compensation

☒ Temperature compensation

Temperature compensation

Battery current limit

☐ Enable

Current limit A

System Current Limit

☐ Enable

Current limit A

Back Next Cancel

Config Wizard - 5

M= Treat as message D= Dial back for this alarm

Alarm relay no.

M	D	Alarm texts :	1	2	3	4	5	6	7	8	9	10	11	12
<input type="checkbox"/>	<input type="checkbox"/>	LOW SYSTEM VOLTAGE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	HIGH SYSTEM VOLTAGE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	LOAD/BATTERY DISCONNECTION	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	MAINS ERROR	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	DISTRIBUTION FUSE FAILURE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	EARTH FAILURE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	BATTERY FAILURE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	MODULE FAILURE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Select alarms

☒ Alarm 0-7
☐ Alarm 8-15
☐ Alarm 16-23
☐ Alarm 24-31
☐ Alarm 32-39

Load relay info from config

Back **Next** Cancel

Config Wizard - 5

M= Treat as message D= Dial back for this alarm

Alarm relay no.

M	D	Alarm texts :	1	2	3	4	5	6	7	8	9	10	11	12
<input type="checkbox"/>	<input type="checkbox"/>	HIGH BATTERY TEMPERATURE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	SYMMETRY FAULT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	BATTERY FUSE FAILURE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	HIGH LOAD	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	BATTERY FUSE DISCONNECTED	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	URGENT MODULE FAILURE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	COMMUNICATION FAILURE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	PARTIAL LOAD DISCONNECTION	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Select alarms

☐ Alarm 0-7
☒ **Alarm 8-15**
☐ Alarm 16-23
☐ Alarm 24-31
☐ Alarm 32-39

Load relay info from config

Back Next Cancel

M= Treat as message

D= Dial back for this alarm

Alarm relay no.

M	D	Alarm texts :	1	2	3	4	5	6	7	8	9	10	11	12
<input type="checkbox"/>	<input type="checkbox"/>	TEMP.PROBE FAILURE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	HIGH DISTRIBUTION LOAD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	BATTERY IS DISCHARGING	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	OVERVOLTAGE SHUTDOWN	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	LOW BATTERY TEMPERATURE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	ALARMS ARE BLOCKED	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Select alarms

☐ Alarm 0-7

☐ Alarm 8-15

☒ Alarm 16-23

☐ Alarm 24-31

☐ Alarm 32-39

Load relay info from config

Back

Next

Cancel

Distribution Setup Aspiro

Table C-1 Breaker Drawer 1

Breaker	Size(A)	Characteristic	Type of equipment
F1	15	U3	
F2	15	U3	
F3	15	U3	

Table C-2 Breaker Drawer 2

Breaker	Size(A)	Characteristic	Type of equipment
F4	15	U3	
F5	15	U3	
F6	15	U3	

Table C-3 Breaker Drawer 3

Breaker	Size(A)	Characteristic	Type of equipment
FB1	40	D	
FB2	40	D	