

# Quick Installation Guide

Installation, Commissioning and Maintenance

356835.103

# Flatpack S, 1U PS Systems

DC Power Supply System, 48 VDC, 2R&3R  
Integrated 1U Multi DC Distribution



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Commissioning Procedure and Maintenance Procedure

## SAFETY and ENVIRONMENTAL PRECAUTIONS

The **product warranty** becomes invalid if the following safety precautions are not followed during handling, installation, commissioning and general use/operation of *Eltek* DC power supply system.

### General Precautions



Device Hazard

**CAUTION:** Even though the product incorporates protection circuitry and other safeguards, it can be **damaged, perform poorly or have a reduced lifetime** if it is exposed to **incorrect treatment** during transport, installation or service. Always handle the equipment using proper lifting techniques, do not roll, climb or drill hole in the cabinets or enclosures.



Electric Shock

**WARNING:** Opening the equipment may cause terminal injury — even if the mains AC supply is disconnected. Hazardous voltages may be present inside, as large capacitors may still be charged.

### Environmental Precautions



Ventilated Hot Surface

**CAUTION:** To avoid damage the equipment, **keep objects clear of system ventilation inlets, outlets and system fans**, if any, ensuring the **airflow** through the units is **not obstructed**, and that the fans rotate freely. Use caution with rectifiers, as they can reach **extreme temperatures** under load and normal operation.



Current Surge Protection

**WARNING:** The installer/user is responsible for ensuring that the DC power system is not damaged by current surges, over-voltages, etc. caused by external transients, lightning, electrostatic discharge, etc. To avoid damage and obtain the expected system reliability, it is mandatory to always install SPDs in *Eltek*'s power supply systems. Follow the instructions given in "Guidelines for Lightning and Surge Protection", doc. 2024623.



Humidity &amp; Dust Protection

**WARNING:** The electronics in the power supply system are designed for indoor, clean environment. When installed in outdoor enclosures, it is important to keep the door closed during operation, and replace the filters on a regular basis. Indoor installations in dusty or humid areas require appropriate air filtering of the room, or filtering of the air entering the DC power system. Follow the instructions given in "Generic Guidelines Environmental Protection.", doc. 2038879

### Precautions during Installation



Qualified Personnel

**CAUTION:** Read the user documentation carefully before installing and using the equipment, as installation and operation is to be performed as described in it. Always tighten screws and bolts with the **torque values recommended** in the documentation. For safety reasons, the **commissioning and configuration of the equipment is only to be performed** by *Eltek*'s personnel or by authorized and qualified persons.



EMC, NEC/CEC Regard

**CAUTION:** The **installer is responsible** for ensuring that the EMC properties of this product/ system do not deteriorate during installation, and that it is performed in accordance with applying regulations.

**Installations in USA and Canada** must comply with NEC/CEC requirements.



Device Hazard

**CAUTION:** Before you start the electrical installation, you must **always disconnect** all external AC supply fuses, as well as internal battery and load fuses/ breakers, if any.



Electric Shock

**WARNING:** For safety reasons (high leakage current / high touch current) you must always connect the AC earth wire (PE) to the terminals, before you connect the AC input cable(s).

The batteries, if any, represent a major energy hazard. To avoid short-circuit of battery poles, you must always remove metallic objects — uninsulated tools, rings, watches, etc. — from the vicinity of the batteries.



Electric Shock

**WARNING:** 60V DC power systems are only to be installed in Restricted Access Locations (RAL). Access must be limited by use of tool, i.e. lock and key.



## Warnings

A:

**WARNING:**

- Never mount the *Flatpack S* system in the vicinity of heaters or **above heat sources**
- Check min. **air-flow clearances**: front access, 30 mm; rear access, 30 mm!

**NOTICE:**

For technical **specifications and functionality description**, refer to following documents:

- CTOS0X01.DS3, Datasheet *Flatpack S 1U 19", 48V 2R/3R Systems*
- 241122.105.DS3, Datasheet *Flatpack S 48V 1kW HE Rectifiers*
- 350030.013, User Guide *Smartpack S controller*
- For generic power system functionality, refer to *WebPower Online Help* and *PowerSuite Online Help*

## Tools &amp; Torque Recommendations

B:



## Tools



## Torque Recommendations

Type & Size	Torque (Nm)
T1 M6 screws	2.5
T2 M3 & M4 screws (top cover)	0.8-1.0
T3 Load Term. 7xMCB	0.5
T4 Battery Term.	2.0-2.3
T5 AC Mains Term.	0.6-0.8
T6 I/O Term.	0.4
T7 Load Term. 4xMCB & 7x Fuse	0.5
T8 M6 bolts, Load & Batt. connect.	1.5

Note: General tolerance:  $\pm 10\%$

## Recommended External AC Fuses

C:

**Recommended External AC Fuses**

*Flatpack S 48V, 1U-3R PS Systems, Option 4*

Rectifier: FP S 48/1000 HE

Type	**FS=I	*FS=0	Note
1 ▶ 1	Th/Mag	10A-D	10A-B
1 ▶ 3	Th/Mag	20A-C / 16A-D	FS not important

(Doc 2126770, 1v0)

Rectifier: FP S 48/1800 HE

Type	185VAC		205VAC		Note
	1 ▶ 1	Th/Mag	20A-D** / 16A-B*	20A-D** / 10A-B*	
1 ▶ 3	Th/Mag	32A-C**	32A-C**		

(Doc 2126770, 1v0)

1 ▶ 1= 1AC Feed to 1 *Flatpack S* rectifier

1 ▶ 3= 1AC Feed to 3 *Flatpack S* rectifiers (linked input terminals)

\*\*FS=I (Fuse Selectivity: Internal) which means that the *Flatpack S* rectifier's internal fuses will trip before the external AC fuse.

\*FS=0 (Fuse Selectivity: none) these fuse types may be used when it is irrelevant whether the internal or the external fuses trip first.

Use the values in the 185VAC column, if you are unsure or know that the available AC mains voltage may drop below 205VAC.

**Recommended External AC Fuses**

*Flatpack S 48V, 1U-2R PS Systems, Option 1, 2 & 3*

Rectifier: FP S 48/1000 HE

Type	**FS=I	*FS=0	Note
1 ▶ 1	Th/Mag	10A-D	10A-B
1 ▶ 2	Th/Mag	20A-C / 16A-D	FS not important

(Doc 2126770, 1v0)

1 ▶ 1= 1AC Feed to 1 *Flatpack S* rectifier

1 ▶ 2= 1AC Feed to 2 *Flatpack S* rectifiers (linked input terminals)

\*\*FS=I (Fuse Selectivity: Internal) which means that the *Flatpack S* rectifier's internal fuses will trip before the external AC fuse.

\*FS=0 (Fuse Selectivity: none) these fuse types may be used when it is irrelevant whether the internal or the external fuses trip first.



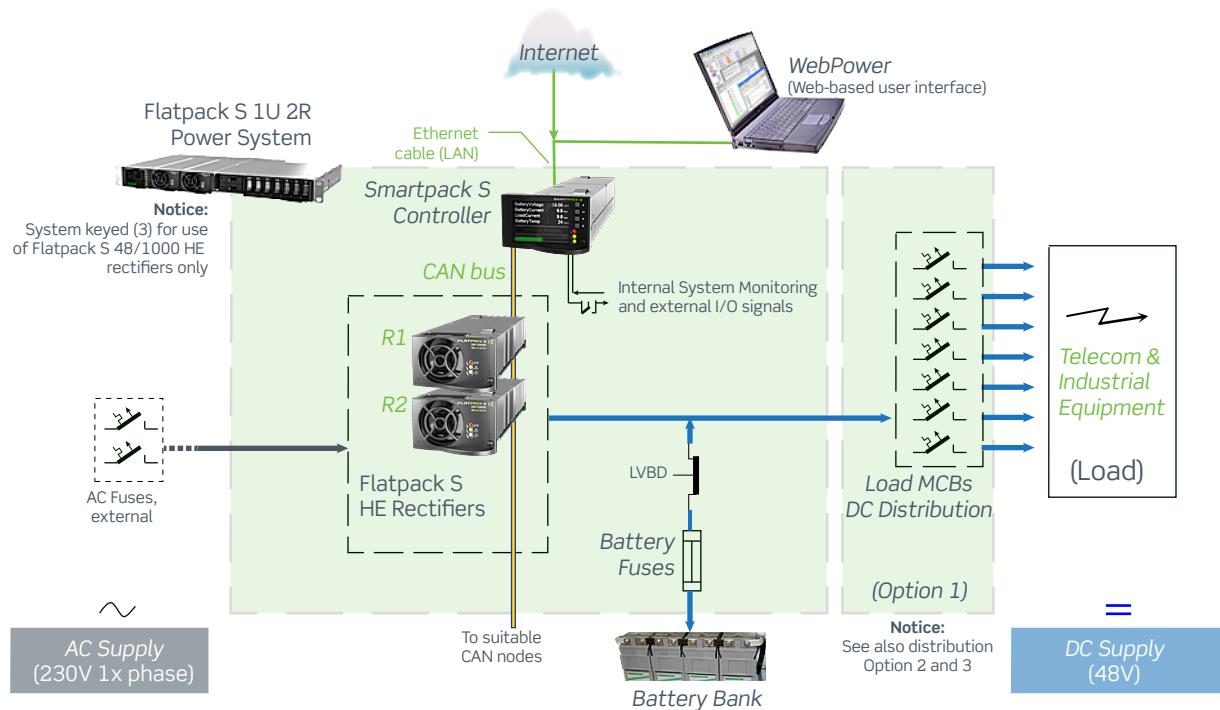
# Introduction

A-E

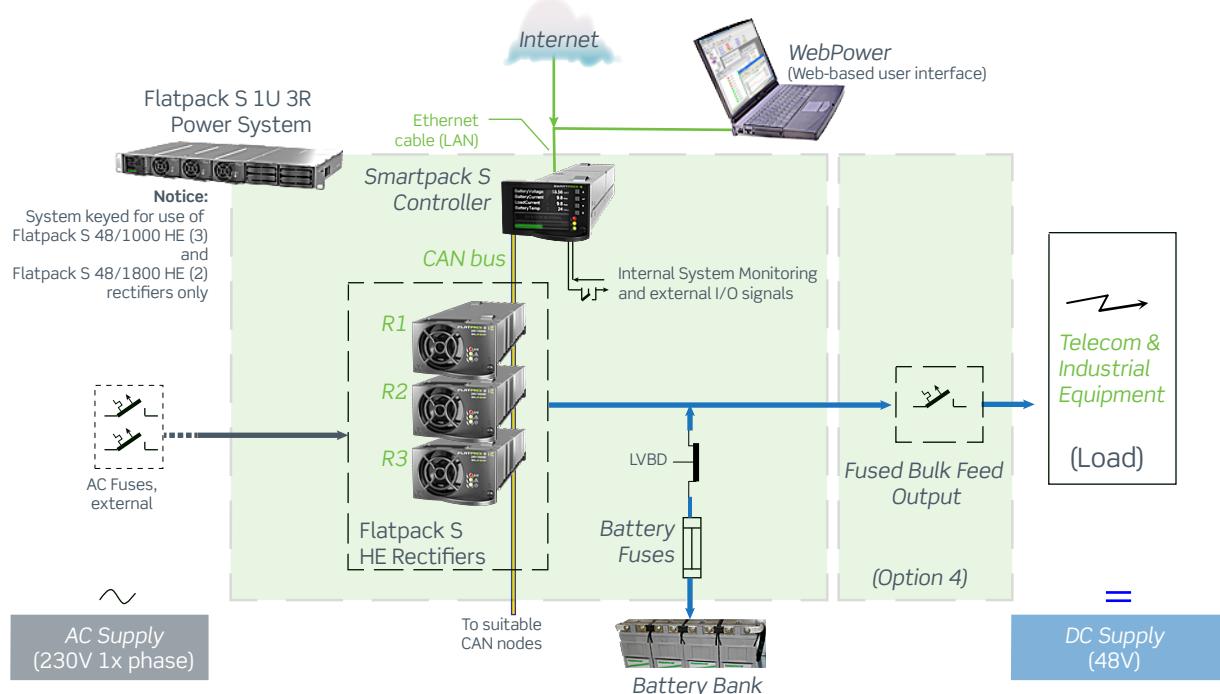
## Overview ~ Block Diagrams

D:

### Flatpack S 1U-2R Multi DC Distribution



### Flatpack S 1U-3R 2xMCB Bulk Feed Output, Front





## Installing Rectifiers, Controller and Blind Panels

E:

Removing and Mounting *Flatpack S* Rectifiers

Removing Rectifiers



## NOTICE:

Rectifiers may be mounted with the locking screw in either position

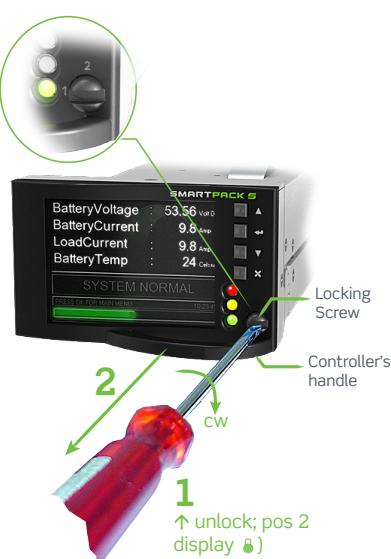


Mounting Rectifiers

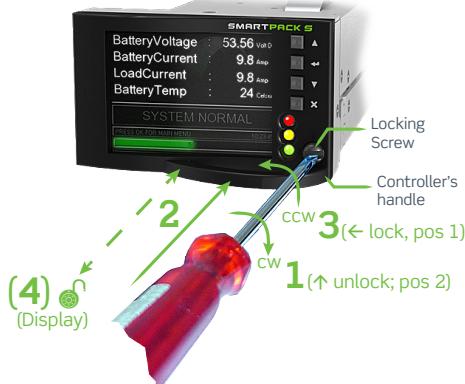
Removing and Mounting *Smartpack S* Controller

## NOTICE:

Controllers may be mounted with the locking screw in either position

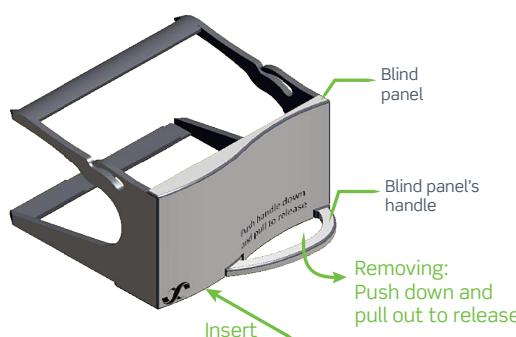


Removing the Controller



Mounting the Controller

## Mounting and Removing Blind Panels





## Option 1

## 7xMCB DC Distribution, Drawer • A-E

Parts Overview: CTOS0201.001, FP S 48V, 1U-2R, 7xMCB Drawer

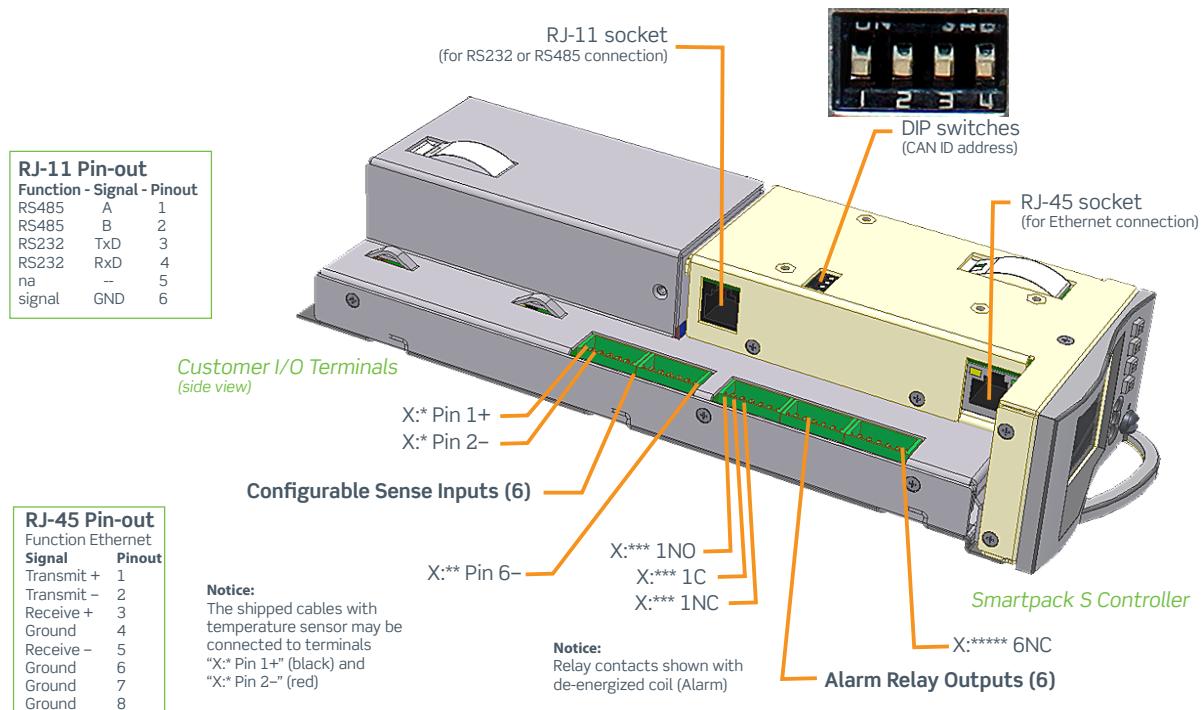
A:





## Location of Terminals &amp; Com. Ports ~ Controller

B:



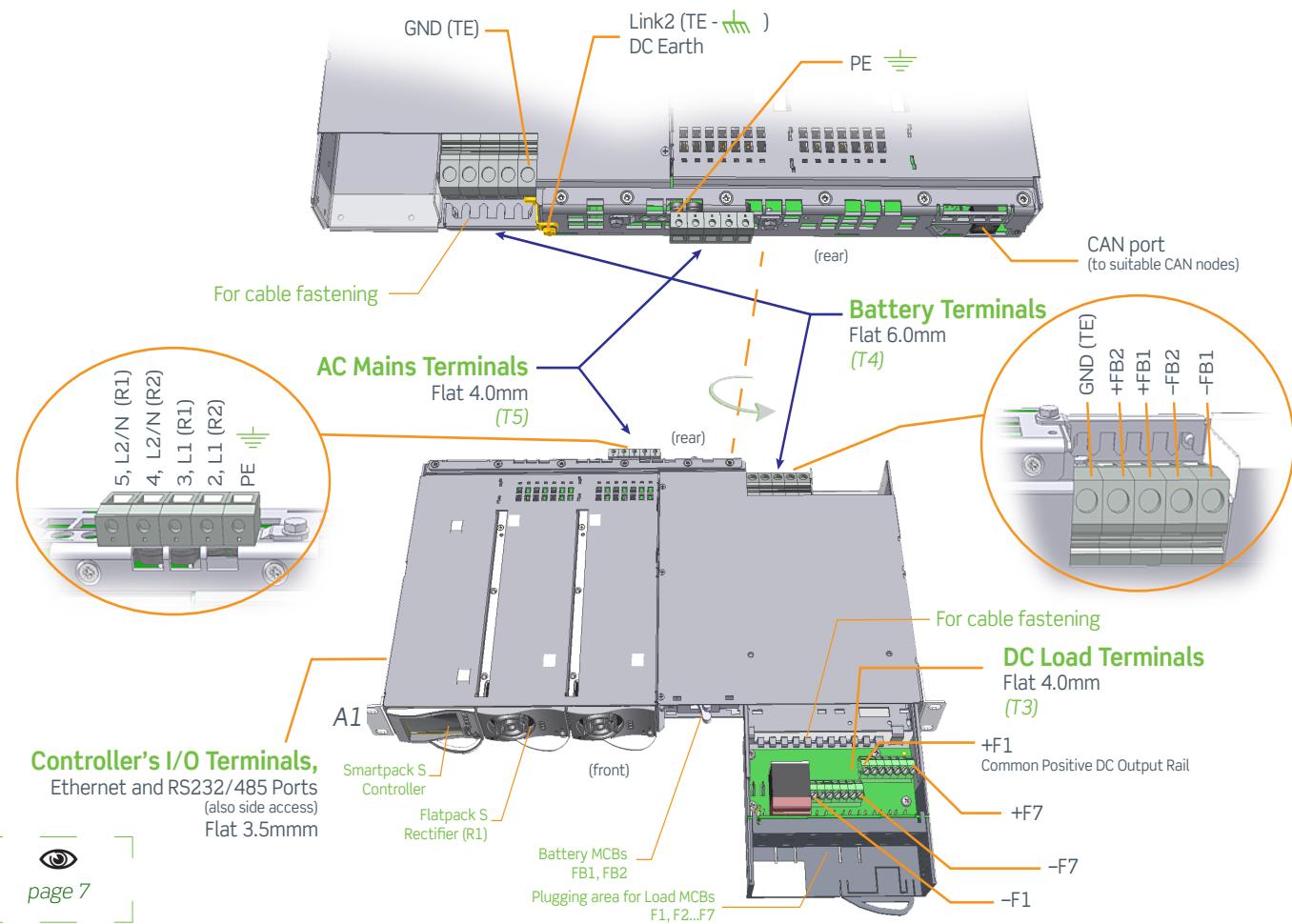


# Option 1

## 7xMCB DC Distribution, Drawer • A-E

Location of Terminals ~ Power System

C:



# PULLOUT

## Check Lists Pullout

Pull out the pages with the gray outer band,  
and use them as check lists

# COMMISSIONING PROCEDURE

## System Data

Flatpack S System

Supplier's Order No.:	Flatpack S Power Supply System, type:		Article No.:
Site, name:			
Serial No.:	Software, version No.:		Rectifiers, type & number of:
AC Input Voltage, measured:	Battery Type, if applicable:	Battery Capacity:	Commissioning carried out by, name:

I

## Pre-Start Check

Power is OFF!



Device Hazard

### CHECK FOLLOWING:

OK

1. Flatpack S system installation is completed; All cabling is securely terminated with correct polarity
2. All external load MCBs/ fuses are switched OFF
3. AC input cable(s) and AC earth wire (PE) are terminated
4. Site specific parameters and settings are known
5. AC supply and all external and internal MCBs/ fuses are switched OFF

II

## Start-up, No-Load & Load Adjustments

Power is ON!



Device Hazard

### CARRY OUT FOLLOWING:

OK

1. Disconnect all rectifier modules (keep original location)
2. Switch ON the system (external AC MCBs/fuses ON)
3. AC input voltage is correct; Measure and verify
4. Connect all Flatpack S rectifiers in their original locations
5. The Smartpack S controller and all rectifier modules are working, LEDs are ON; Verify
6. Connect a PC to the PS system Use a standard Ethernet cable and access the controller
7. DC output voltage; Measure and adjust
8. Alarm relay test; Verify all alarm relays are working correctly
9. System Setup is in accordance with configuration Enter site spec. info via front keys or PC
10. Adjust DC output voltage to equal measured battery voltage Check correct polarity!
11. Unplug all rectifiers but one, and connect all battery fuses /MCBs
12. Adjust DC output voltage to equal nominal battery or load voltage
13. Plug in again all rectifiers, and verify the rectifiers' current sharing
14. Connect all external and internal load MCBs/ fuses, and verify no alarms are displayed

III



Device Hazard

## Approval

Responsible of commissioning, sign.:	Date:	Approved by customer, sign.:
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# MAINTENANCE PROCEDURE

## System Data

Flatpack S PS System

Flatpack S Power Supply System, type:		Article No.:
Site, name:		
Serial No.:	Software, version No.:	Rectifiers, type & number of:
AC Input Voltage, measured:	Battery Type:	Battery Capacity:
Maintenance carried out by, name:		
<b>WARNING: Maintenance work on live equipment is only to be performed by authorized and qualified persons using calibrated instruments of measurement and insulated tools. Hazardous voltages inside may cause terminal injury.</b>		



## System Inspection

Power is ON!

CARRY OUT FOLLOWING:		OK
1. Site specific parameters and settings are known. User manuals and site specific connection & arrangement drawings are available.		<input type="checkbox"/>
2. The battery bank has been fully charged in advance. At least for 12 hours since start-up or mains failure. Enables correct measurements & calibration		<input type="checkbox"/>
3. The equipment is free from damage, dust or dirt; verify. Carefully vacuum clean or remove any accumulation of dust, corrosion or dirt.		<input type="checkbox"/>
4. All cabling and copper bars are securely terminated and supported. Correct any loose connections, excessive cable temperature, defective insulation, etc.		<input type="checkbox"/>
5. The system controllers & all rectifier modules are ON, no alarm present; verify. Otherwise, correct and put the PS system in normal mode of operation.		<input type="checkbox"/>
6. All rectifier's functionality & controller's keys and display work OK; verify Correct possible abnormalities before continuing.		<input type="checkbox"/>
7. Connect the system's controller to a PC (Ethernet connection) Access the controller from the PC's web browser, thus enabling system configuration		<input type="checkbox"/>
8. Rectifiers' load current sharing; verify. (Using the keypad on the controller or from the PC) Check all rectifiers output the same amount of current ( $\pm 1A$ )		<input type="checkbox"/>
9. Display the stored log of Alarm Messages. Using the keypad on the controller or from the PC.		<input type="checkbox"/>

## System Adjustment

Power is ON!

CARRY OUT FOLLOWING:		OK
1. DC Output Voltage Calibration; ensure correct display readings. If measured DC output voltage at the load terminals deviates more than $\pm 1\%$ from the display reading, calibrate the output voltage from the controller's keypad or the PC.		<input type="checkbox"/>
2. Load & Battery Current Calibration; verify correct display readings. Measure with a clip-on ammeter the battery current & every load circuit current. Calculate the total load & battery current. If the calculated total values deviate more than $\pm 2\%$ from the display readings, calibrate the current from the PC (calibration value > 50% of system's max. capacity)		<input type="checkbox"/>
3. DC Output Voltage Adjustment; measure and adjust. Measure and, if required, adjust the output voltage to the nominal voltage recommended by the battery manufacturer. (Voltage measurements to be done at the DC rail, with little load current)		<input type="checkbox"/>
4. Alarm Relay Test; verify all alarm relays are working correctly. From the controller's keypad or PC use the Relay Test function; verify activation of external equipment		<input type="checkbox"/>
5. Battery bank control; measure and verify battery specifications. Follow the recommendations of the actual battery manufacturer.		<input type="checkbox"/>

## Approval

Responsible of maintenance control, sign.:	Date:	Approved by customer, sign.:
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# PULLOUT

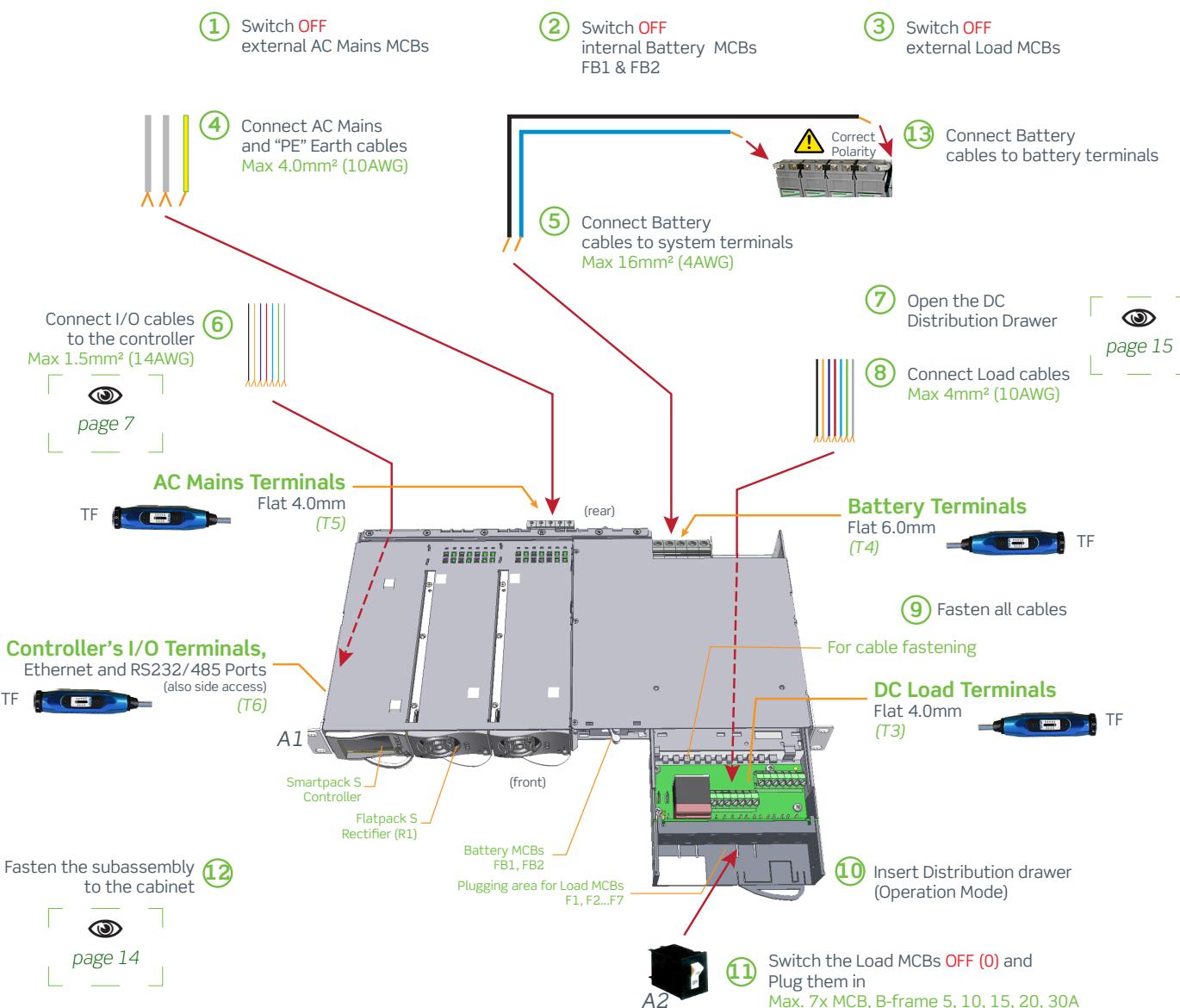
## Check Lists Pullout

Pull out the pages with the gray outer band,  
and use them as check lists



## Cable Connections, step by step

D: 1-13

**CAUTION:**

This equipment is designed to permit the connection of the earthed conductor of the DC supply circuit to the earthed conductor at the equipment. See installation instructions

**CAUTION:**

Suitable for connection to IT networks  
DC Short Circuit Capacity = 1kA Max. .

UL Approved System Ambient Temperatures  
with Specified DC Cables and DC Load Breakers

System's Ambient Temp	DC Cables' Temp Rating	DC Load Breaker
Max. 30°C	60°C, Cu wire**	Max. 30A
Max. 40°C	75°C, Cu wire	Max. 30A
Max. 55°C	90°C, Cu wire	Max. 30A
Max. 60°C	75°C, Cu wire	Max. 20A
Max. 60°C	90°C, Cu wire	Max. 25A
Max. 50°C	60°C, Cu wire	Max. 15A

\*\* Default UL approved DC cables

## For installations in USA and Canada only!

- The installation has to comply with the NEC/CEC requirements
- The building installation must serve as branch circuit protection, and comply with NEC/CEC requirements
- For supply connectors, use wires suitable for at least 75°C (167°F), type: FEPW, RH, RHW, THHW, THW, THWN, ZHHW, USE, ZX or similar. Use copper conductors only



# Option 1

## 7xMCB DC Distribution, Drawer • A-E

### Start-Up

E:1-9

Switch ON external AC Mains MCBs	①	Verify $V_{out}=V_{batt}$ or $V_{load}$ Adjust, if necessary	⑥
Verify AC input voltages are OK and green LED lamps are ON	②	Switch ON external Load MCBs	⑧
Verify DC output voltage ( $V_{out}$ ) is OK, e.g. unplug FB1 and measure Adjust, if necessary	③	Verify no alarms are displayed	⑨
Verify all Alarm Relays work OK	④		



⑤ Switch ON internal Battery MCBs FB1 & FB2

⑦ Switch ON internal Load MCBs F1, F2...F7



### Adjusting DC Output / Battery Charging Voltage

With the controller's front keys, select:

1. System Configuration > Power System > System Voltages Levels > Reference Voltage
2. Adjust the voltage



### Alarm Relay Test

With the controller's front keys, select:

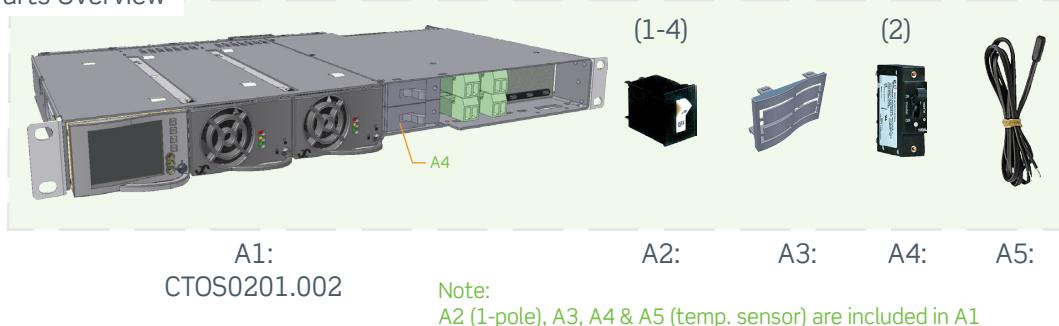
1. Commands > Outputs Test
2. Select relay to test  
(relay contacts will toggle for some minutes)



Parts Overview: CTOS0201.002, FP S 48V, 1U/2R, 4xMCB Front

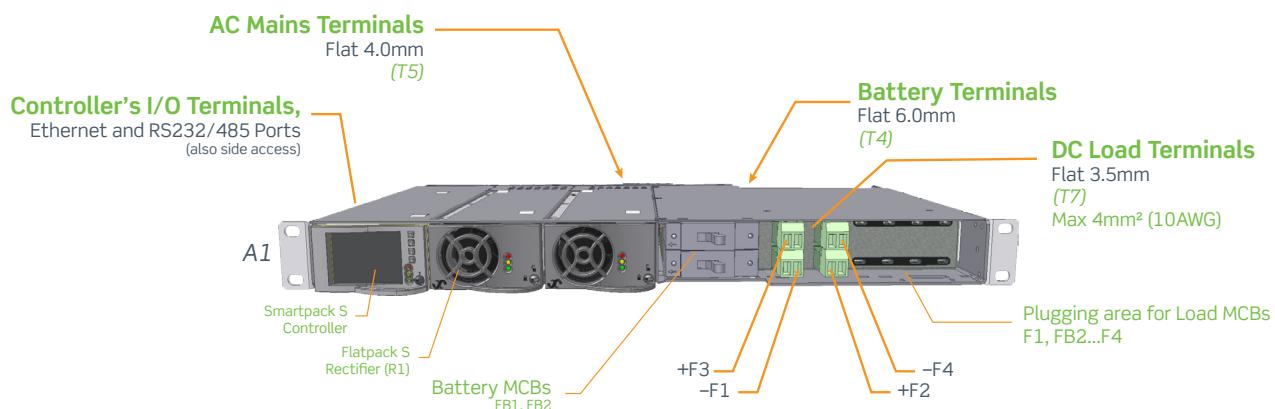
A:

## Parts Overview



## Location of Terminals

B:



For pin-out reference other than DC Load terminals, refer to topic “[Location of Terminals ~ Power System C:](#)” on page 8

## Cable Connections

C:

Follow the steps in topic “[Cable Connections, step by step D: 1-13](#)” on page 9, but skip steps 7 and 10 (not applicable to this option). Refer to the Location of Terminals for Option 2, when connecting the DC Load cables at the front (in step 8).

For torque reference, read topic “[Tools C:](#)” on page 3.

For system start-up, refer to topic “[Start-Up E:1-9](#)” on page 10.

For mounting or removing the rectifiers and controller, refer to topic “[Installing Rectifiers, Controller and Blind Panels D:](#)” on page 5.

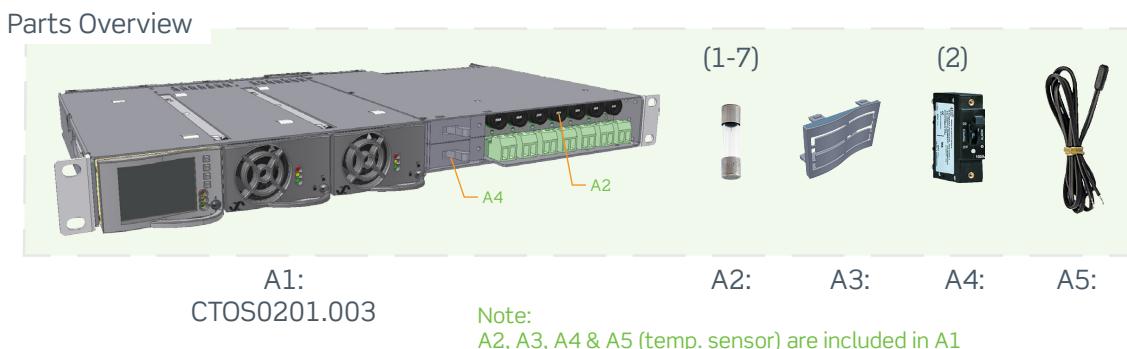


## Option 3

## 7xFuse DC Distribution, Front Access • A-C

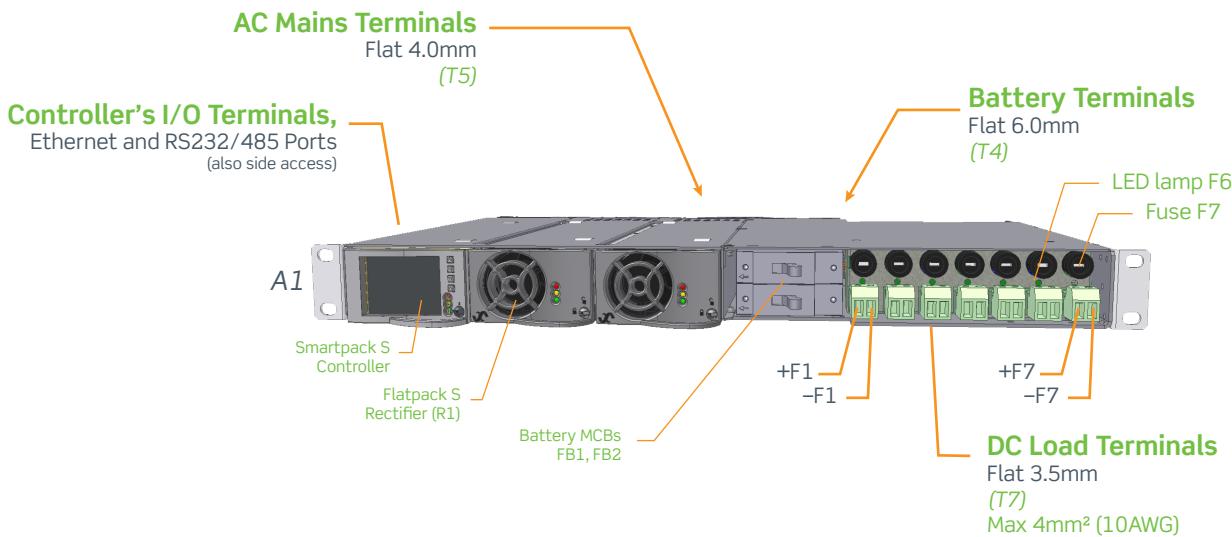
Parts Overview: CTOS0201.003, FP S 48V, 1U/2R, 7xFuse Front

A:



### Location of Terminals

B:



The LED lamp is OFF when the output fuse (F1 – F7) is blown.

For pin-out reference other than DC Load terminals, refer to topic “[Location of Terminals ~ Power System C:](#)” on page 8

### Cable Connections

C:

Follow the steps in topic “[Cable Connections, step by step D: 1-13](#)” on page 9, but skip steps 7, 10 and 11 (not applicable to this option). Refer to the Location of Terminals for Option 3, when connecting the DC Load cables at the front (in step 8).

For torque reference, read topic “[Tools C:](#)” on page 3.

For system start-up, refer to topic “[Start-Up E:1-9](#)” on page 10.

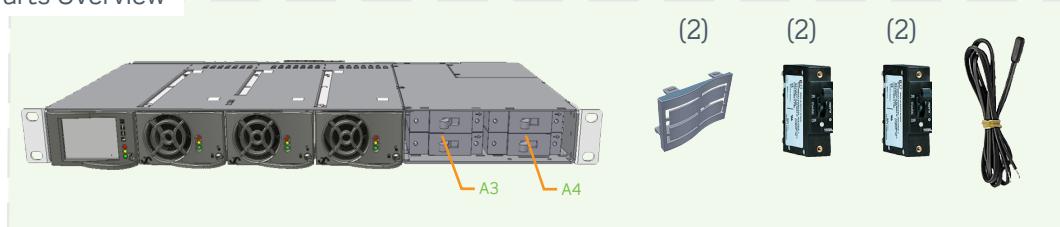
For mounting or removing the rectifiers and controller, refer to topic “[Installing Rectifiers, Controller and Blind Panels D:](#)” on page 5.



Parts Overview: CTOS0301.001, FP S 48V, 1U/3R, 2xMCB BFO Front

A:

## Parts Overview

A1:  
CTOS0301.001Note:  
A2, A3, A4 & A5 (temp. sensor) are included in A1

A2:

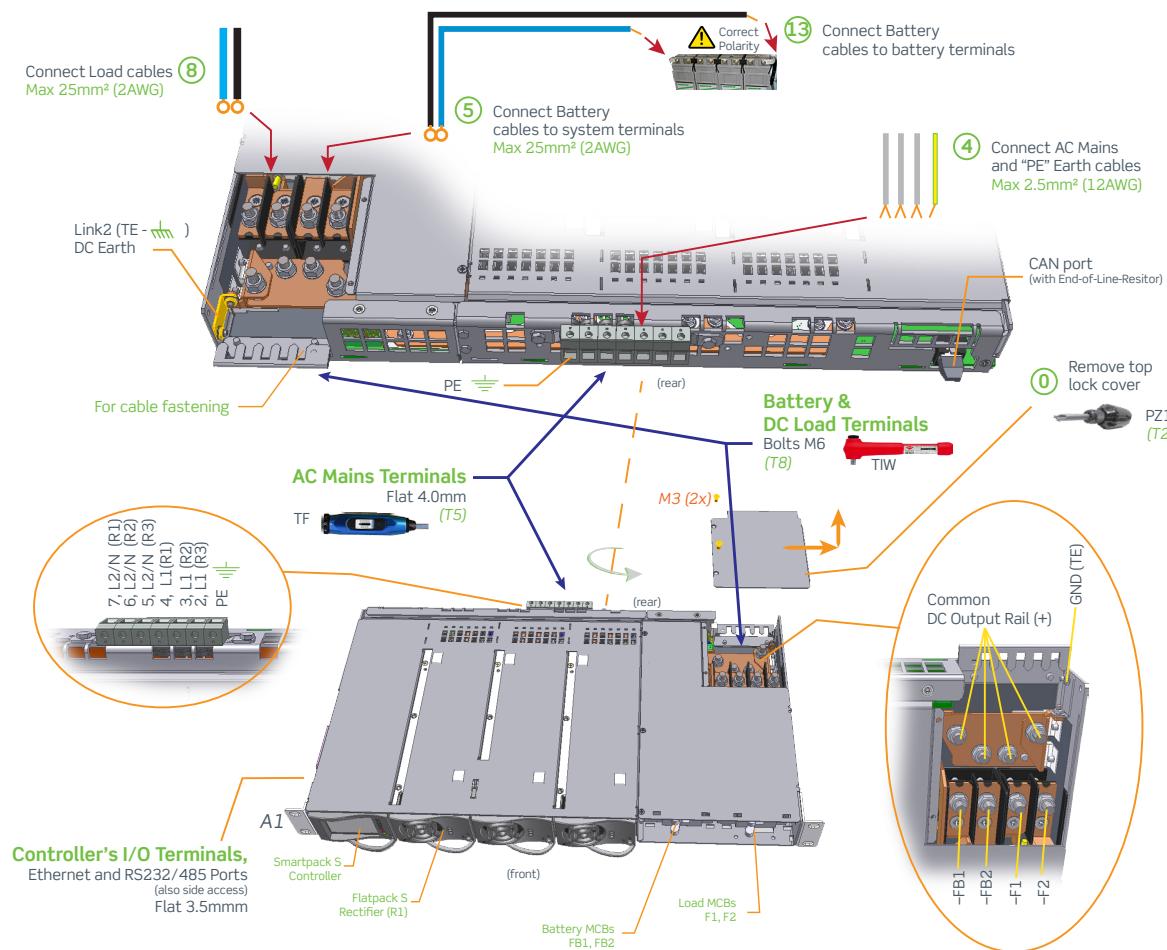
A3:

A4:

A5:

## Location of Terminals and Cable Connections

B:



For pin-out reference other than AC Mains, Battery and DC Load terminals, refer to topic “[Location of Terminals ~ Power System C:](#)” on page 8

Remove top lock cover (step 0), then follow the steps in topic “[Cable Connections, step by step D: 1-13](#)” on page 9, except for steps 4, 5, 8 and 13 which are described in this chapter. Also, skip steps 7 and 10 (not applicable to this option).

For torque reference, read topic “[Tools C:](#)” on page 3.

For system start-up, refer to topic “[Start-Up E:1-9](#)” on page 10.

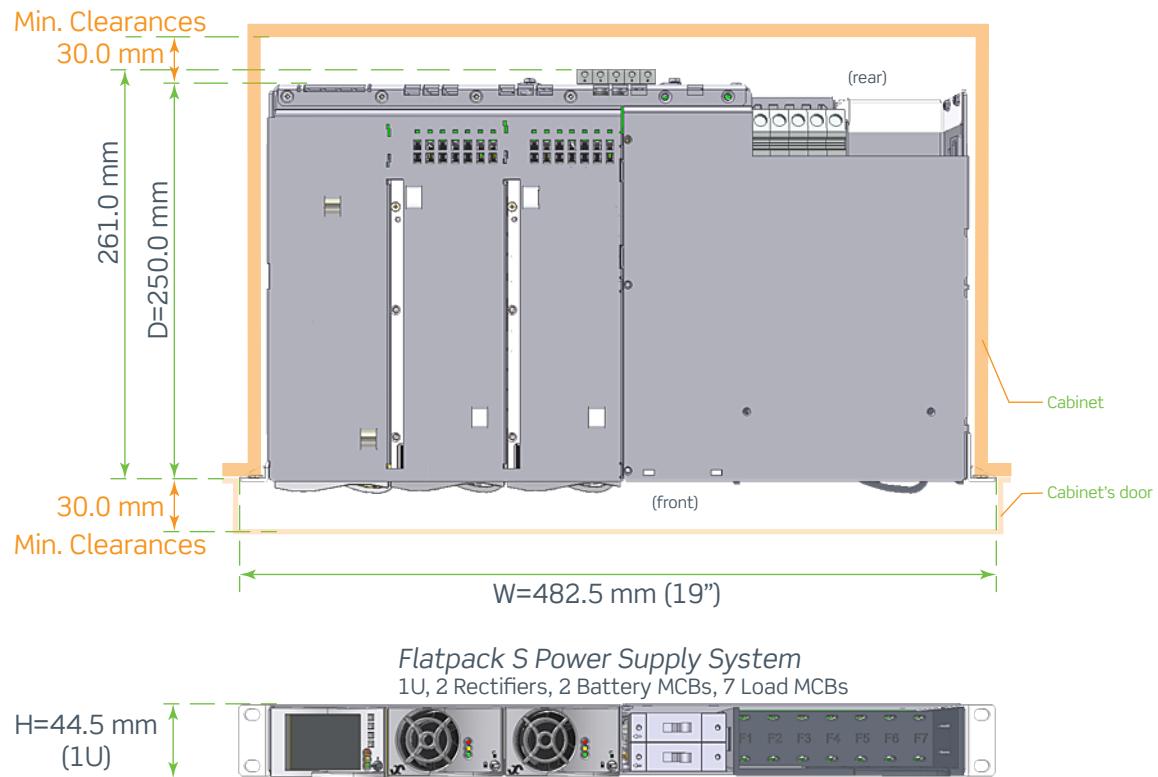
For mounting or removing the rectifiers and controller, refer to topic “[Installing Rectifiers, Controller and Blind Panels D:](#)” on page 5.



# Mounting the Subassembly

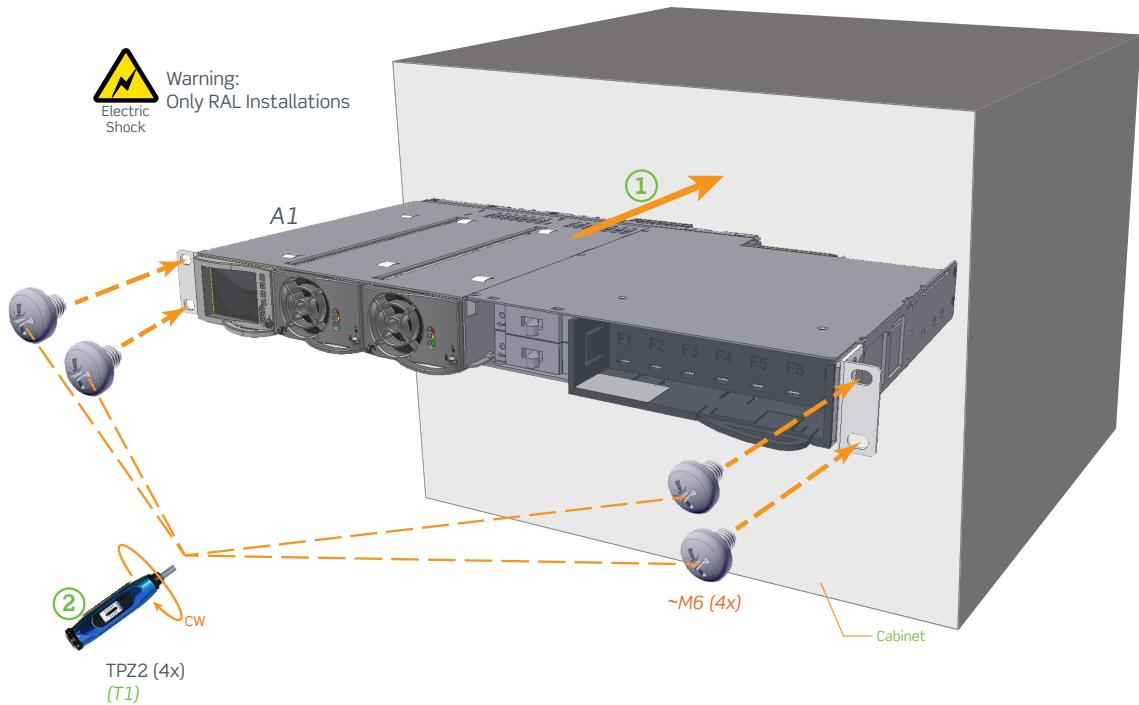
A-D

Dimensions and Minimum Clearances



Fasten to the Cabinet

B:1-2



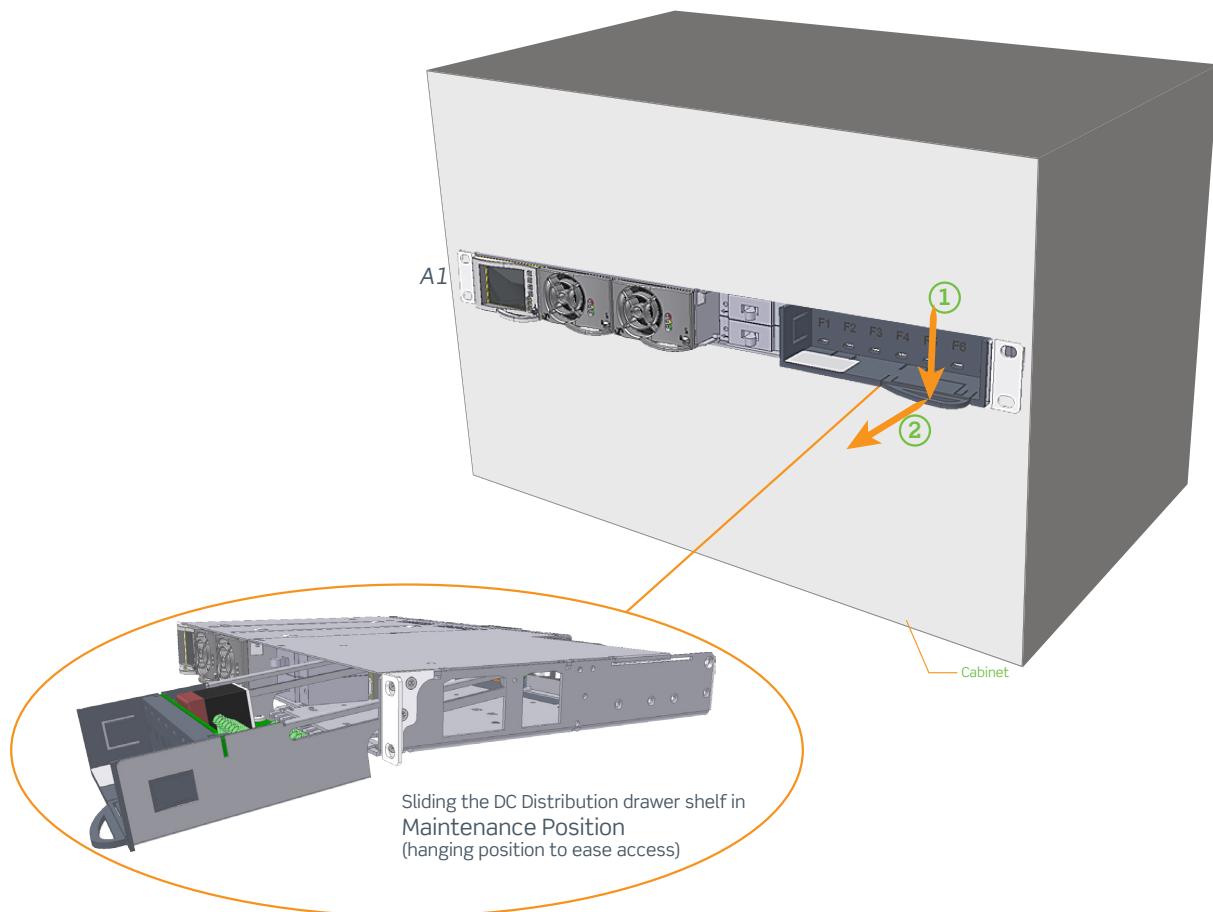
A-D

# Mounting the Subassembly



Open DC Distribution Drawer

C:1-2



Accessing the Controller's Ethernet Port

D:1-2

