Quick Start Guide

Installation, Operation, Commissioning and Maintenance

356825.103

Flatpack2 PS System, SP2

Smartpack2-based, DC Power Supply System

Integrated 4U Distribution, Cabinetized and Outdoor Applications

Power Supply System ~ Telecom

ELTEK VALERE

The *Smartpack2*-based Product Range

Eltek Valere's Smartpack2-based product range utilizes *Flatpack2* rectifiers and the *Smartpack2* distributed control system as building blocks for implementing effective DC power systems, suitable for a wide range of applications and power ratings.

Flatpack2 Systems, SP2-based Indoor and Outdoor Cabinets

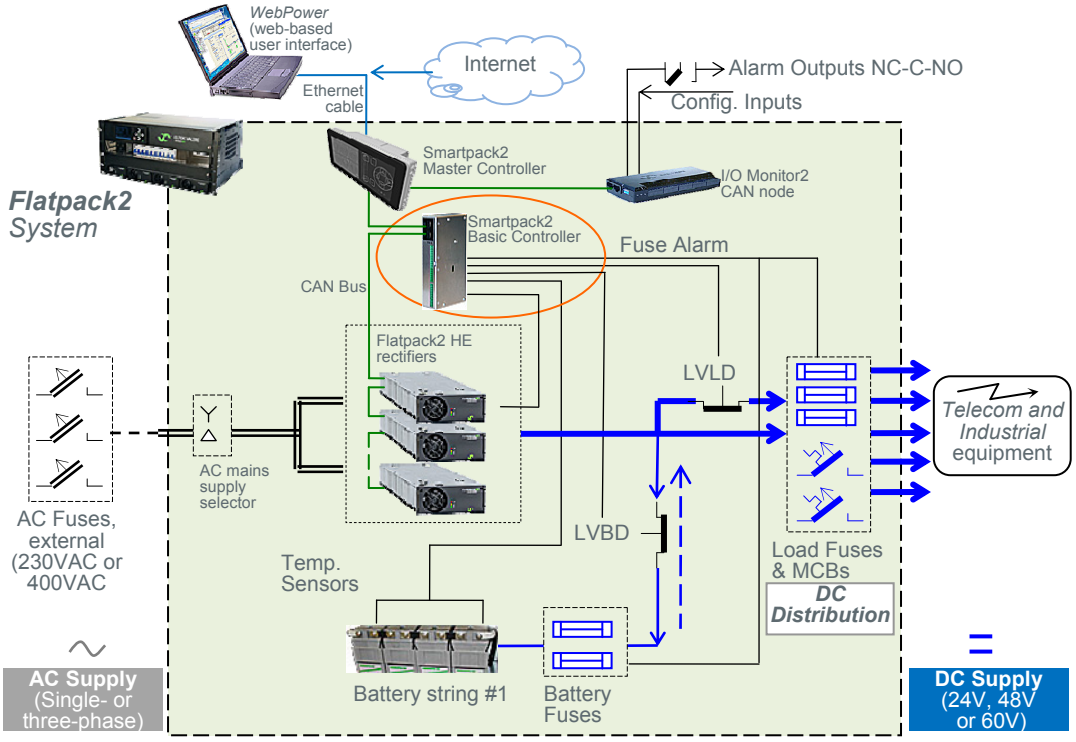
Flatpack2 System, SP2-based Integrated 4U Distributions

Cabinetized systems are suitable for indoor or outdoor applications. In addition to the power system and the distribution unit, the cabinet may also contain battery banks, additional distribution and other dedicated equipment.

Integrated power systems consist of rectifiers, *Smartpack2 Master* and *Smartpack2 Basic* controllers, I/O Monitor2 nodes and the distribution unit (4U high). Integrated systems are sold primarily for mounting in existing cabinets.

Brief Description — Smartpack2-based System

The *Smartpack2*-based *Flatpack2 PS* system is a compact, powerful and cost-effective DC power supply system, specifically developed for telecom and industrial applications.



Example of a typical *Smartpack2*-based *Flatpack2* system used for DC power supply of telecom and industrial equipment. The system is fed from an external AC mains supply, and consists of rectifiers in power shelves, master and basic controllers and DC distribution unit. Battery banks, LVD contactors, etc. are typically also a part of the system.

Installing Rectifiers and Opening *Smartpack2 Master*

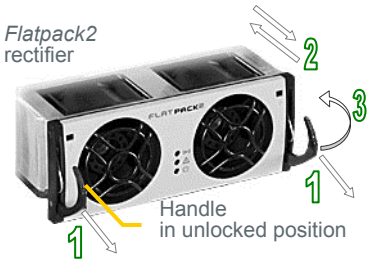
Device Hazard

CAUTION:
- The rectifiers may be warm, but **do not hand-carry** them by their handles
- **Open the handles before inserting** them into the power shelves (hot-pluggable)

The rectifier incorporates a Mains fuse in each line. Double Pole / Neutral Fusing

Mounting or Removing *Flatpack2* Rectifiers

For an overview of available rectifiers, refer to "User Guide *Flatpack2* Rectifier Modules", document 350002.013.



1. **Unlock the handles** by
   inserting a screwdriver into the holes to release the spring mechanism
2. **Insert or remove the rectifier** by
   sliding it fully into the power shelf, so that it makes proper contact
   or
   using both handles to pull the module loose. Support from underneath before the unit is completely free
3. **Lock the handles** by
   pushing the handles up into their housings (locked position). Then, the rectifier will be securely locked in the shelf, or ready for transport
4. **Mount blind panels** in
   unused rectifier locations

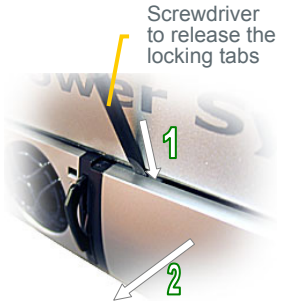
Electric Shock

Device Hazard

CAUTION: Do not relocate **already hot-plugged rectifiers** to other positions in the power shelf. **New rectifiers** must be hot-plugged in the power shelf, one at time, starting from ID number 1, 2, 3 and so on; refer to page 19.

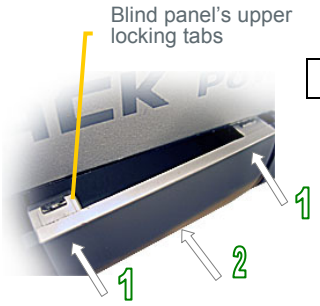
WARNING: To replace installed rectifiers with new ones, remove the installed rectifiers and wait for the controller to notify communication error with the extracted rectifiers. Push the new rectifiers fully into the power shelf — one module at a time, allowing a 2s delay. Start with the shelf position with lowest ID number. Lock their handles.

Removing Blind Panels



1. **Release the panel's upper left and right corners** by
   inserting a small screwdriver into the panel's upper left gap and carefully press down and out to release the locking tabs. Repeat on the upper right gap.
2. **Remove the blind panel** by
   using you hand to pull the panel loose

Mounting Blind Panels

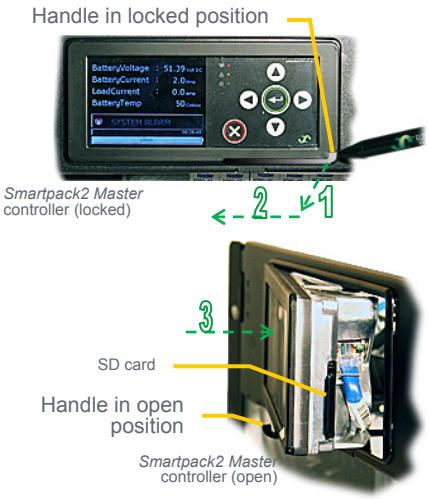


1. **Insert the panel's upper** edge by
   pressing gently so that its upper locking tabs engage
2. **Lock the panel's lower** edge by
   pressing with your hand so that the blind panel's lower tabs lock into position.

Opening and Closing *Smartpack2 Master* Controller

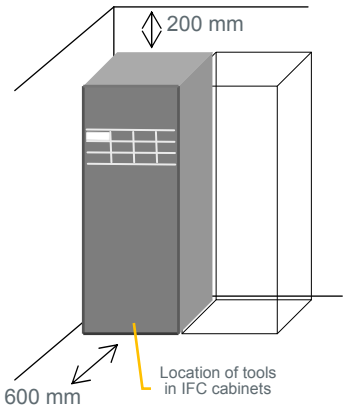
Opening the controller's right side enables inserting an SD card and temporarily connecting an Ethernet cable.

1. To open it,
   pull the handle's knob slightly outwards
   (use your fingers or a pen) and
2. then **slide the handle to the left**
   (the controller's right side opens)
3. To close it,
   push the controller's front inwards



Installation Steps

Check off in the *Installation Check List,* that you find in the pullout section of this folder. Also, refer to the system's specific drawings.



Preparing the Installation Site

Begin preparing the following:

1 Organize the installation site
- Min. clearances for cabinet access: 60 cm in front, 20 cm on top
- Levelled surface able to support 600 kg (cabinetized systems)
- Explosive atmospheres are to be avoided. Ensure suitable ventilation
- 60V systems are only to be installed in Restricted Access Locations (RAL)

EMC Regard

2 Prepare the installation tools
- Use insulated tools suitable for telecom installations

3 Prepare AC Supply: AC input cable(s) and fuses
- Correct type AC supply is available
- External AC fuses have correct rating
- AC input cable(s) are sized correctly

For external AC fuses and AC input cable ratings, refer to your site's AC supply specification. Read also our **external AC fuse recommendations** in section "*Appendix*". In general, a site with better AC supply quality (stable nominal voltage) may use smaller breakers.

Mechanical Installation

Power is OFF!

Carry out the following:

Flatpack2 PSS, batteries, Doc. Chart, Spec. Drawings

4 Remove packaging and check equipment
- Check you have received all the parts, correct cabinet, documentation, batteries (if applicable), etc.
- Inspect the equipment for physical damage (report any damages)
- Leave rectifier modules in their packaging or in the selves, if factory installed. To be installed under commissioning

Device Hazard

5 Remove top cover and dummy front panels
- Cable entry from the top. Connection terminals are located behind the upper dummy panels
- Battery shelves (if any) are placed behind the lower panels

Location of tools in IFC cabinet's bottom
(Lifting plates, leg adjusting plates and open-ended spanner or wrench)

6 Position and fasten the cabinet or subassembly
- *Cabinets* are floor-mounted on levelled surface. Adjust the legs if necessary. If the cabinet must be fastened, unscrew the legs and use suitable bolts to fasten it to the floor
- *Subassemblies* are fastened in existing 19" or in ETSI cabinets, using brackets. Mount the support & heat deflecting plate under the lower power shelf

7 Mount the batteries on the shelves
- Start (if applicable) placing the batteries on the lower shelf first, and continue upwards
- *Do not terminate* the battery cables yet!

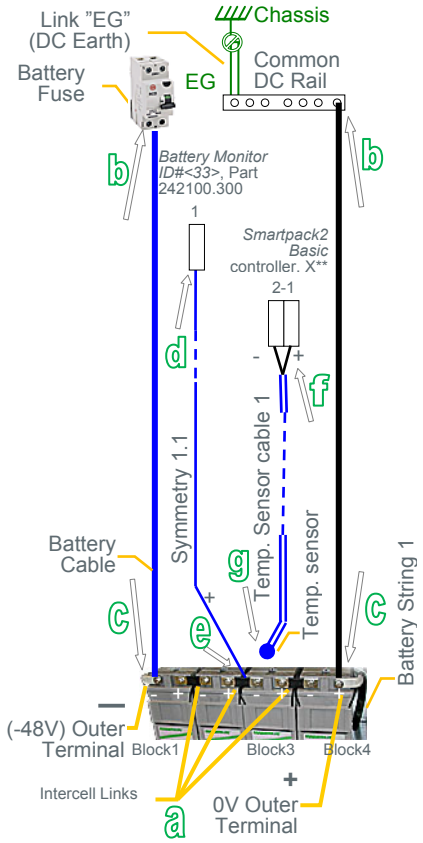
Electric Shock

General Torque
Recommended Ratings, FP2 Systems

Application, Type & Size	*Torque (Nm)*
Circuit Breakers	
SIEMENS 18 mm, 5SX2, 5SX5	3.5
SIEMENS 27 mm, 5SX6, 5SX7, 5SP4	5.0
MG, C60 <=25A	3.5
MG, C60 >25A	3.5
CBI 13 mm, QY, QF, QA	3.0
Hex Nuts & Screws (Knife Fuses, general)	
M8.0	10.0
M10.0	16.0
M12.0	25.0
AC Terminal Blocks	
1.5 mm^2	0.5
2.5 mm^2	0.5
4.0 mm^2	0.6
10 mm^2	2.0
16 mm^2	3.0
35 mm^2	4.0
70 mm^2	10.0
DC Rail Terminals	
AKG 16	3.0
AKG 35	3.5

Note: General tolerance: ±10%.

NEC/CEC Requirements



Electrical Installation — Power is OFF!

Carry out the following: (Refer to the system's specific drawings)

8 Make the system completely voltage free

- Switch OFF or remove all load fuses (MCB1, MCBx), battery fuses (Fb1, Fbx) and the AC supply fuses, in external fuse boards

9 AC Connections

- *Check AC configuration*: the AC terminals are correct configured to the external AC supply, otherwise reconfigure the terminals
- *Connect the AC Earth wire (PE)* to the terminals AC Earth (PE)
- *Connect the AC input cable(s)* to the terminals. Cable and terminal block labeling are to correspond

10 DC Connections — Load Circuits

- *Terminate DC Earth (TE)*, and check that the common DC Output Rail is connected to "Telecom Earth" (TE) at only one place (at the cabinet or at a central distribution point). See chapter about AC, DC earthing systems
- *For each DC load*, connect one of the cables to the common DC output rail, and the other directly to the MCB or load fuse

11 DC Connections — Alarm & Signal Circuits

- Refer to your system's connection drawings and configuration, or to the "Appendix, CAN Bus Nodes" section (Factory Settings)
- *Terminate Alarm Circuit cables* to the relay output terminals
- *Terminate Signal Circuit cables* to the digital input/output terminals

Electric Shock

12 DC Connections — Battery Cables

CAREFUL! Use correct polarity.

For 48V systems using the battery symmetry mid-point measurement, refer to the figure in this page.

For other measurement methods and for 24V systems, refer to the Battery Monitor's user guide.

For each battery shelf:

(In cabinetized systems, steps b, d and f are usually performed in factory)

a *Mount 3 intercell links* to connect in series 4 battery blocks

b-c *Connect battery cables* to fuses and common DC rail, and to the shelf's outer terminals; (+) and (-)

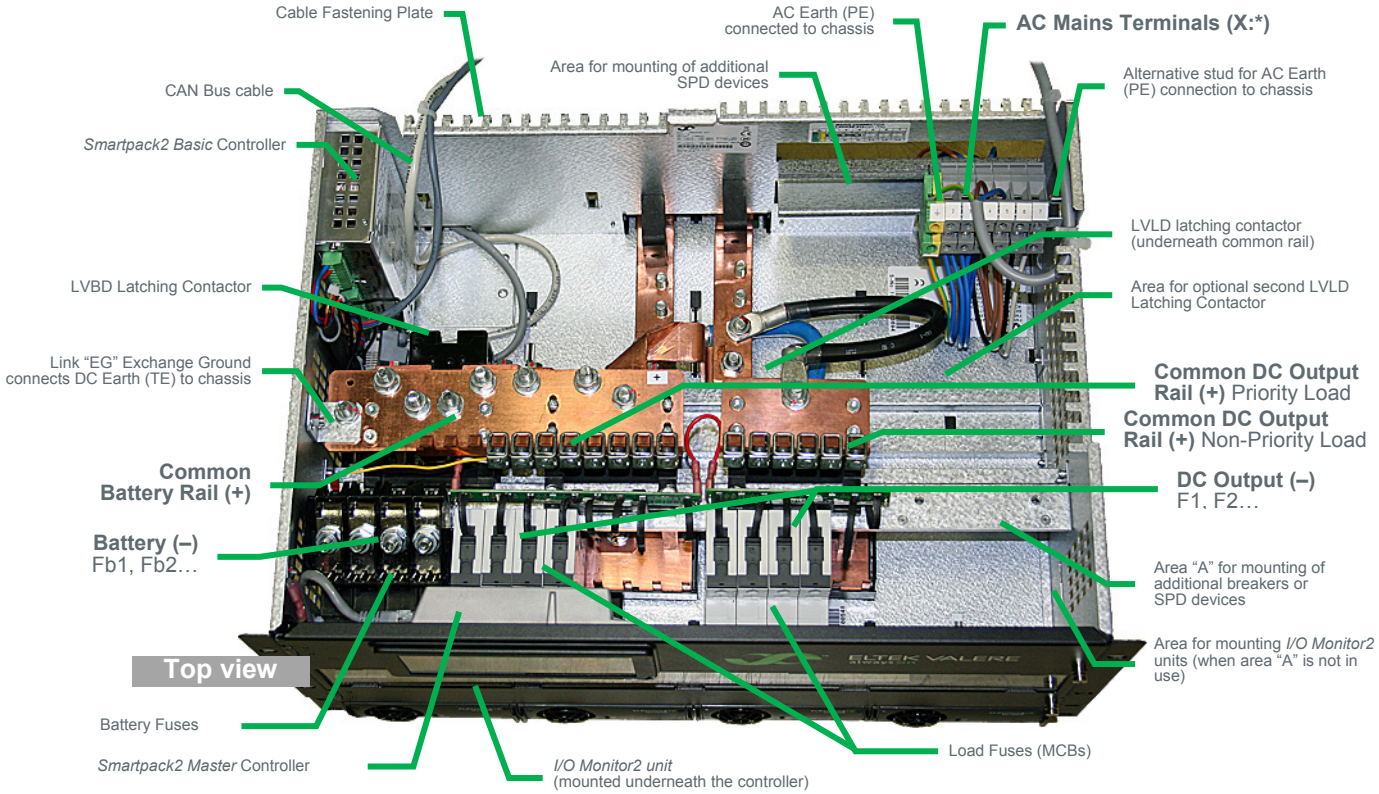
d-e *Connect battery symmetry cable*, if applicable, to the input terminal, and to the center terminal of the battery string (+). Deviation from factory settings requires Symmetry reconfiguration via *PowerSuite*

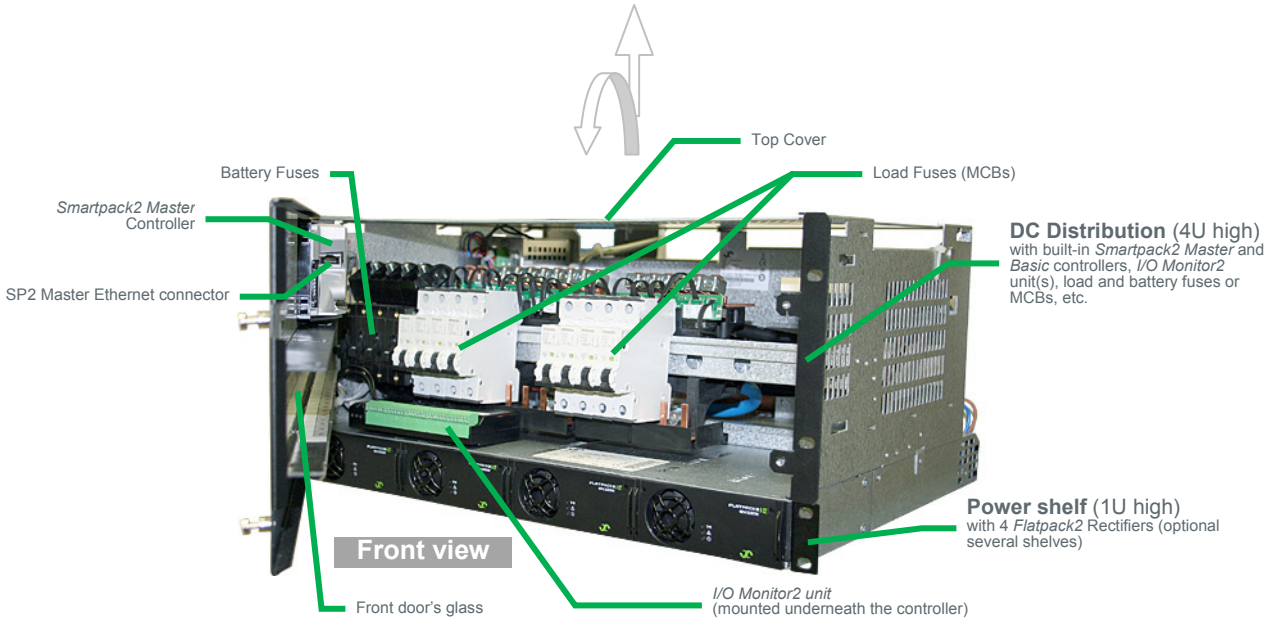
f-g *Connect the temperature sensor cable*, if applicable, to the input terminals, and fix the temperature sensor (at the end of the cable) to a suitable place in the middle of the installed battery bank

Location of Components, GA drawing

The pictures show an example of the location of components in *Smartpack2*-based *Flatpack2* PS Systems with 4U DC Distribution. Or refer to **specific drawings** included with your system.

The *Smartpack2 Basic* controller is located either inside the subassembly (picture below) or under the top cover (see chapter on page 23).





Connections, Factory Settings, etc

The schematic shows the connection terminals in *Smartpack2*-based *Flatpack2* PS Systems with 4U DC Distribution. Or refer to **specific drawings** included with your system.

Flatpack2 System, Integrated 4U DC Distr. with SP2 Ctrls

Smartpack2 Basic controller

FUNCTION | SIGNAL | PIN-OUT

X:**

Configurable Inputs

Temp Sense 1 + – 1 2 — Temperature Sensor 1

Temp Sense 2 + – 3 4 — Temperature Sensor 2

Temp Sense 3 + – 5 6 — Temperature Sensor 3

Max. 1.5 mm², (14AWG) wire section

(These multipurpose inputs may also be used as digital inputs, e.g. for SPD monitoring)

FUNCTION | SIGNAL | TERM. POINT

X:*

AC Mains Input

7 L3, 6 L2, 5 L1, 4, 3 N, 2, 1 PE

AC Mains Cable (Y)

35 mm², 1AWG, max. wire section

PE (Protective Earth)

(For Mains wiring reconfiguration, see section "Miscellaneous")

Load Fuses

F1 — Load Circuit 1

F2 — Load Circuit 2

F3 — Load Circuit 3

F4 — Load Circuit 4

Fx — Load Circuit x

16 mm², 4AWG max. wire section

Battery Fuses

Fb1 — Battery Cables, string 1

Fb2 — Battery Cables, string x

16 mm², 4AWG max. wire section

(Only used in *Flatpack2* systems with external battery bank)

Common DC Output & Battery Rails

For installations in USA and Canada only!

– The installation has to comply with the NEC/CEC requirements

– The distribution can only be used as a branch circuit distribution, if the circuit breakers are UL489 (DITT) certified.

–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

For installations in USA and Canada only!

External AC Output Wires Recommended Ratings

Current Max. (A)	Wire Section (mm^2)	(AWG)
6	0.75	18
10	1.0	16
13	1.5	14
16	1.5	14
20	4	10
25	6	8
32	6	8
40	10	6
50	16	4
63	25	3

Recommendations if used as branch circuits. Based on 45˚C ambient (factor 0.82)

For installations in USA and Canada only!

External DC Output Wires Recommended Ratings

Current Max. (A)	Wire Section (mm^2)	(AWG)
1	0.75	18
2	0.75	18
4	0.75	18
5	0.75	18
6	0.75	18
10	1.0	16
15	1.5	14
16	1.5	14
20	2.5	12
25	4	10
30	6	8
32	6	8
40	6	8
50	10	6
60	16	4
63	16	4

Recommendations if used as branch circuits

For installations outside USA and Canada!

External AC Input Wires Recommended Ratings

Current Max. (A)	Wire Section (mm^2)	(AWG)
6	0.75	18
10	1.00	16
13	1.25	16
16	1.50	14
25	2.50	12
32	4.00	10
40	6.00	8
63	10.00	6
80	16.00	4
100	25.00	2

I/O Monitor2 CAN Node

X:***

Programmable Inputs

Config. Input 1 – + — Input Circuit 1

Config. Input 2 – + — Input Circuit 2

Config. Input 3 – + — Input Circuit 3

Config. Input 4 – + — Input Circuit 4

Config. Input 5 – + — Input Circuit 5

Config. Input 6 – + — Input Circuit 6

(From external equipment)

X:****

Alarm Relay Outputs

Relay 1 **Common Alarm** NO C NC — Alarm Circuit 1

Relay 2 **Mains Alarm** NO C NC — Alarm Circuit 2

Relay 3 **Fuse Alarm Load & Battery** NO C NC — Alarm Circuit 3

Relay 4 **High Battery Alarm** NO C NC — Alarm Circuit 4

Relay 5 **Low Battery Alarm** NO C NC — Alarm Circuit 5

Relay 6 **Rectifier Alarm** NO C NC — Alarm Circuit 6

(To external equipment)

Max. 1.5 mm², (14AWG) wire section

The figure shows the position of the relay contacts when the PS system is in alarm mode of operation; the relay coils are then de-energized (fail-safe mode). The relay outputs are preprogrammed from factory (**Factory Settings**).

Commissioning

The commissioning of *Flatpack2 PS System* consists of following stages:

I. Perform a pre-start check before the PS system is switched ON
II. Switch ON the system with disconnected load; adjust output voltage
III. Adjust the nominal output voltage with connected batteries and load

I Pre-Start Check — Power is OFF!

Check off in the *Commissioning Procedure,* that you find in the pullout section of this folder.

If you have just finished the system installation successfully and filled in the *Installation Check List*, jump over the Pre-Start Check and continue with stage II.

Before you switch ON the *Flatpack2 PS* system, verify the following:

1. **System installation is completed**
   - Ensure a correctly performed system installation, with correct polarity on all connections, has been carried out (*Installation Check List* filled in)
   - All cabling and copper bars are securely terminated and supported
   - All components, terminal blocks, MCBs/ fuses, etc. are clearly labeled
2. **Battery and load fuses are disconnected**
   - Verify that all battery and load MCBs/ fuses are switched OFF or removed
3. **AC input cable(s) and AC Earth wire (PE) are terminated**
   - Make sure that the AC input cable(s) are connected to correctly configured AC terminals
   - Verify that the AC input cable(s) and external AC fuses are sized and rated as specified
   - Check that AC Earth (PE) is terminated, and electrically connected to chassis
4. **Site specific parameters and settings are known**
   - Read the system specific drawings and documentation
5. **AC supply and all MCBs, fuses are switched OFF**
   - Make sure that all external AC fuses and internal MCBs/ fuses are switched OFF

Commissioning Steps, Startup

Check off in the *Commissioning Procedure,* that you find in the pullout section of this folder.

After the ”Pre-start Check” is performed, you can begin with stage II. During the stage, you will switch ON the *Flatpack2 PSS* — while the batteries and load are disconnected — then measure the output voltage, and adjust it if required. Carry out the following:

II Startup and No-Load Adjustments — Power is ON!

1. **Disconnect all rectifier modules, without removing them (keep original location)**
   - Read how to install modules, on page 3 in this guide. Also, read about the correct rectifier position on page 19, and then,
   - If *Flatpack2* rectifier modules *are installed*, unlock the handles and pull the modules partially out (fan housing visible), but do NOT physically remove them from the power shelves
   - If *Flatpack2* rectifier modules *are not yet mounted*, release their handles and insert them partially into the correct position in the shelves
2. **Switch ON the system**
   - Switch ON the AC input supply (external AC fuses) to the PS cabinet
3. **Measure and verify that the *AC input voltage* is correct**
   - Measure the AC input voltage at the cabinet’s mains connection box
   - Verify the AC voltage is within range

4. **Mount all *Flatpack2* rectifier modules in the power shelves (keep original location)**
   - Push all rectifiers firmly inwards — one module at a time, allowing a 2s delay — to plug them in the same shelf location. Lock their handles. Refer also to page 19
   - Mount blanking panels over unused positions

5. **Ensure that the *Smartpack2 Master* controller and all rectifiers are working: LEDs are ON**
   - Verify correct operation, by monitoring the modules' LED lamps and display: No alarms are present on rectifiers; The controller displays fuse alarms

6. **Connect a PC to the PS system (to facilitate operation)**
   - Plug a standard Ethernet cable between the PC and the *Smartpack2 Master* controller
   - Start the "*Eltek Valere Network Utility*" program and establish access to the controller. Refer to chapter "Controller Access ", page 10, if required
   - Log in and access the controller's configuration pages in your Web browser

7. **Measure and adjust *DC output voltage***
   - Read the DC output voltage on the controller's display
   - With a multi-meter, measure the DC output voltage at the most accessible point, e.g. between the common DC rail and the lower connection of one of the priority load MCBs
   - If required, adjust the voltage using the controller's front keys or via the PC's browser

8. **Verify the alarm relays are working correctly (alarm relay test)**
   - Run the alarm relay test using the controller's front keys (refer to page 10) or via the PC's browser

9. **Make sure the *System Setup* is in accordance with configuration**
   - Verify system settings using the controller's front keys or via the PC's browser
   - Use the opportunity to enter site related information, number of used AC phases, type of batteries, etc.

Load Adjustments — Power is ON! — III

Now, you can begin with stage III, where you will adjust again the output voltage to the battery voltage, and connect the batteries and the load. Carry out the following:

10. **Adjust *DC output voltage* to equal measured *battery voltage***
    - Measure the battery voltage is within range (*check connections have correct polarity*)
    - Adjust DC output voltage — using the controller's front keys (refer to page 10) or via the PC's browser — to equal the measured battery voltage. (Important adjustment to avoid arcing when connecting the batteries)

Device Hazard

11. **Unplug all rectifiers but one, and connect the battery fuses /MCBs**

> CAUTION: Have *only one* rectifier connected when switching ON the battery fuses, thus avoiding damaging all rectifiers, due to possible incorrect polarity connections, etc.

Device Hazard

    - Disconnect all rectifiers but one, by unlocking the handles and pulling them partially out (fan housing visible). Do NOT physically remove them from the power shelves
    - Switch ON all battery fuses or MCBs

12. **Adjust DC output voltage again to equal the nominal battery voltage**
    - Adjust DC output voltage — using the controller's front keys or the PC's browser — to equal the nominal battery voltage (or the nominal load voltage, when not using batteries)

13. **Plug in again all rectifiers, and verify the rectifiers' current sharing**
    - Connect all rectifiers again by pushing them firmly inwards — Repeat step 4, in stage II
    - Wait for about 2 min., and check — using the PC's browser —that each of the rectifiers delivers the same output current. A deviation of 1A is acceptable.

14. **Connect the load breakers and verify that no alarms are displayed**
    - Switch ON all load MCBs/ fuses
    - Verify correct operation: rectifiers and controller display no alarms

Front Keys and display, Controller Access via PC

Smartpack2 Master Controller — front panel

Display: is in *Status Mode* (displays the system's status) or in *Menu Mode* (displays the menu structure).

Operation: Press on the key to change from *Status Mode* to *Menu Mode* and to select options, enter values.

Press the key to navigate to previous level and cancel options and values. Press the or keys to navigate up- or downwards, point at options and increase and decrease values. Press the or keys to navigate one page up- or downwards and point at options.

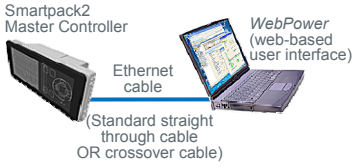
Menus: When you "enter" *Menu Mode,* you access the *Main Menu* (Level 1). Default pin code <0003> (should be changed) is used to change parameters.

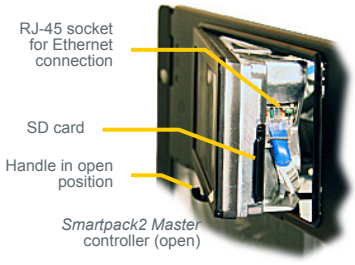
Flatpack2 Rectifier Module — front panel

Power LED is **OFF** (mains unavailable), **Flashing** (controller accessing information) or **ON** (powered).
Warning LED is **ON** (derating or similar minor warning), **Flashing** (over-voltage mode) or **OFF** (OK)
Alarm LED is **ON** (shutdown or similar major alarm) or **OFF** (OK, no alarm)

Controller Access — Via Stand-alone PC

You can access the *Smartpack2 Master* controller directly from a stand-alone computer, or via a Local Area Network (LAN) if available. Each controller is shipped with a unique *Eltek Valere* MAC address stored inside the controller and marked on the controller's label, and with the fixed IP address <192.168.10.20>. Do the following to access the controller:





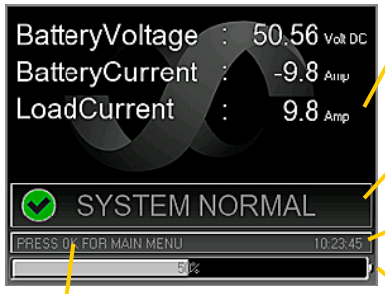
1. **Start the "*Eltek Valere Network Utility*"** (EVNU) program (EVIPSetup.exe)
2. **Connect the computer to the controller;** check its MAC address is displayed
3. **Find the computer NIC's IP address** and subnet mask (network card)
   Tip: e.g. using DOS command IPCONFIG in a Command Prompt window
   e.g. computer's IP address <169.254.52.132> Subnet mask <255.255.0.0>
4. **Change the controller's IP address** and Network Mask to the same range as the computer's (using the EVNU program)
   Tip: 1. Select the controller, 2. Click in the "Configuration" button 3. Change from e.g. default <192.168.10.20> <0.0.0.0> to IP address <169.254.52.133> <255.255.0.0>, 4. Click on the "Enable Static IP" button
5. **Access the controller**'s configuration pages in your web browser (from EVNU)
6. **Log in** with the <admin> account,
7. Change the controller's Device Name

After accessing the controller, you can configure and monitor the power system with a standard web browser (via *WebPower*) or via the *PowerSuite* program. *PowerSuite*'s newest version is always available on our FTP server. Contact your closest *Eltek Valere* representative.

Software Menus — Smartpack2 Master Controller

The *Smartpack2*-based DC power system's functionality is accessed via a network of software menus and submenus[1], enabling you to configure and control the whole power system from the controller's front panel. When browsing the menus, the Menu Level Indicator shows where you are, the menu level you are in. Editing parameters is password protected, (default pin code <0003> should be changed). The display can be in *Status Mode* or in *Menu Mode*.

Status Mode



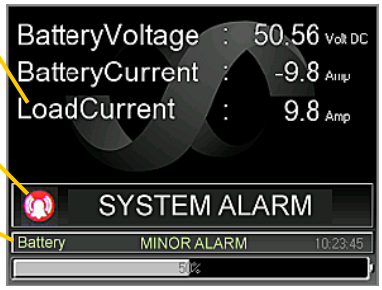
System in **Normal Mode**

System Parameters
Display more with the → and ← arrow keys.
(Display area **P**)

System Status
Normal mode, Alarm mode, etc.
(Display area **S**)

System Messages
Animated icons, keys to press, alarms, system time, etc
(Multi-Info field, Display area **M**)

Status Battery Bank
Displayed in % or in Ah
(Display area **B**)



System in **Alarm Mode**

To change from *Status Mode* to *Menu Mode* press on this key:

Animated System Messages (M) in Normal Mode

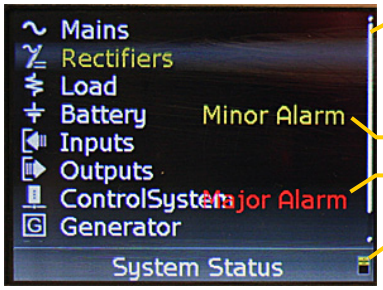
Icon	*Enabled Function*
none	Float Batt. Charging
	Battery Charging
	Battery Discharging
CL	Current Limitation
	Efficiency Management
GEN	Generator running
BB	Batt. Boost Charging
BT	Battery Test
TC	Temp. Compensated Ch.
BO	Outputs Blocked

When no battery bank installed, the icons are shown in Display area B

Menu Mode

Chosen option
Menu Icons
Menu Names
Menu Level Indicator hierarchical menus (Level 1)

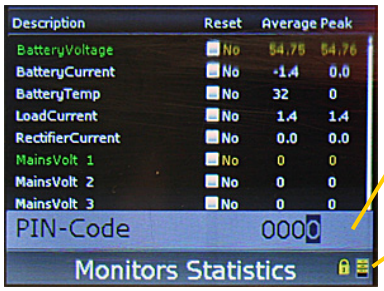
Main Menu Options (Level 1)



Scrollbar
Chosen option (yellow text) Press "Enter" to display the Mains submenu
Warning (minor alarm)
Alarm (major alarm)
Menu Level Indicator hierarchical menus (Level 2)

Submenu "System Status" (Level 2)

Submenu "System Configuration" (Level 2)



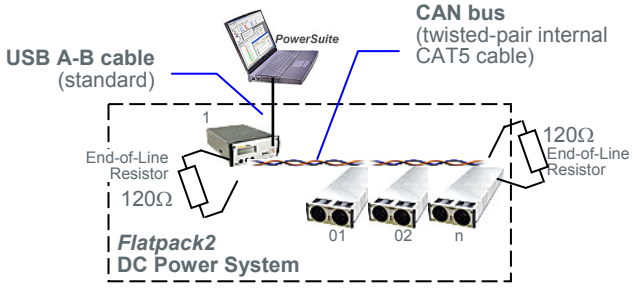
Pin Code required for changing configured parameters (use the ↑ or ↓ arrow keys to enter code).
Default pin code <0003> (should be changed)

Menu Level Indicator hierarchical menus (Level 3)

Example **Submenu** "Monitors Statistics" (Level 3)

[1] From a PC's web browser, via *WebPower,* or running the *PowerSuite* program, you can also access the complete system functionality, described in the programs' Online Help.

CAN Bus Termination



Flatpack2 systems are shipped from factory with the CAN bus already terminated with 120Ω resistors.

To ensure a correct bus communication and avoid data reflection, you must *always* terminate the CAN bus with two 120Ω resistors, one at each end of the line (60Ω bus impedance). The figure shows a *Flatpack2* system communicating via the CAN bus.

CAN Bus Addressing

All rectifiers and control units (controllers and CAN nodes) connected to the *Eltek Valere*'s CAN bus must have a unique address or ID number. The power system's master controller assigns automatically the rectifiers' addresses (**software assignment**). The master controller registers the rectifiers' ID numbers – or CAN bus address (01, 02 ...) – together with their Serial Numbers.

The power system's control units make use of DIP switches for configuring their unique CAN bus ID number (**hardware assignment**). The only exception is the *Compack* and *Smartpack2 Master* controllers, which have factory assigned specific ID numbers <1>and <11> (not changeable).

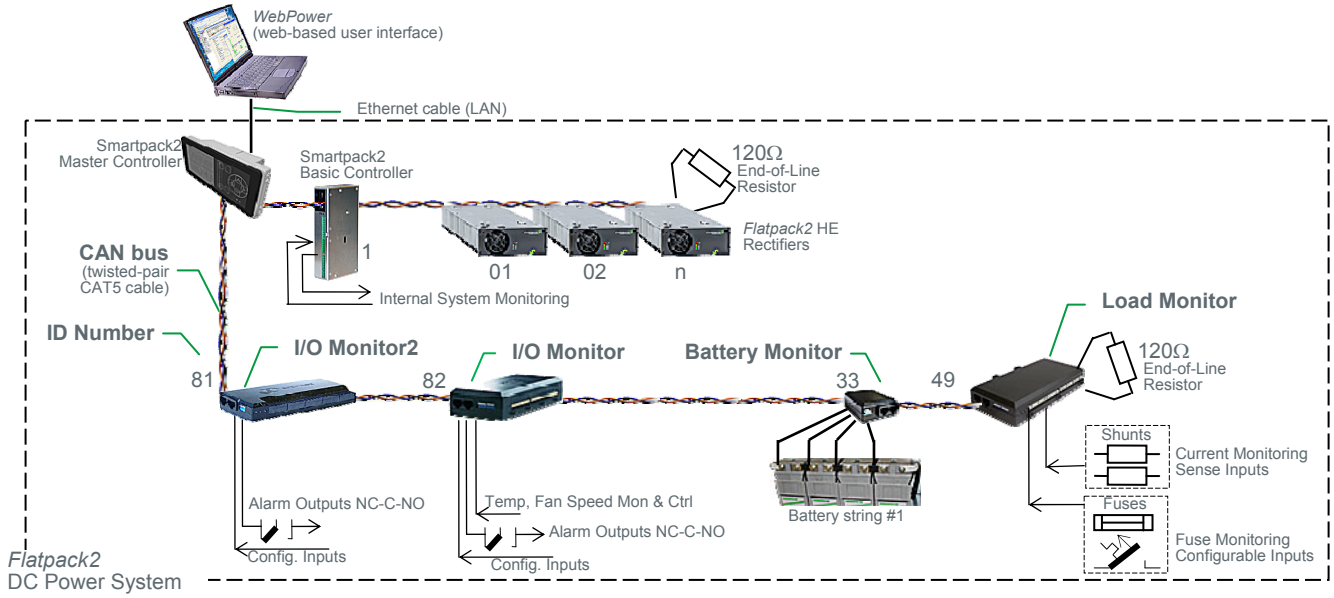
In the control system's CAN bus, you can address a maximum of 14 CAN nodes of each type, 8 *Smartpack* and *Smartpack2 Basic* controllers and 8 *Smartnode* units. See table below:

Number of nodes >> Control Units' Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Smartpack & Smartpack2 Basic Controllers	1	2	3	4	5	6	7	8	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	**<< ID #**
Smartnode Control Units	17	18	19	20	21	22	23	24	*25*	*26*	*27*	*28*	*29*	*30*	*31*	*32*	**<< ID #**
Battery Monitor CAN nodes	33	34	35	36	37	38	39	40	41	42	43	44	45	46	*47*	*48*	**<< ID #**
Load Monitor CAN nodes	49	50	51	52	53	54	55	56	57	58	59	60	61	62	*63*	*64*	**<< ID #**
**	*65*	*66*	*67*	*68*	*69*	*70*	*71*	*72*	*73*	*74*	*75*	*76*	*77*	*78*	*79*	*80*	**<< ID #**
I/O Monitor & I/O Monitor2 CAN nodes	81	82	83	84	85	86	87	88	89	90	91	92	93	94	*95*	*96*	**<< ID #**
Mains Monitor CAN nodes	97	98	99	100	101	102	103	104	105	106	107	108	109	110	*111*	*112*	**<< ID #**

ID numbers formatted in grey italics are not available due to software constraints.
** Only 4 of the 8 mounted DIP switches may be used (max. 14 Load Monitors may be connected).

For DIP switch configuration, refer to actual control unit's guide or to *WebPower* Help.

The figure shows a *Flatpack2* DC power system with *Smartpack2*-based control system and 4 CAN nodes to implement additional digital inputs, relay outputs or similar functionality.



External AC Fuses — Recommended Rating

The site's AC supply quality is of great importance. In general, a site with better AC supply quality (stable nominal voltage) may use smaller breakers.

Recommended External AC Fuses per AC Mains Feed Input
Flatpack2 Systems with 2000W Rectifiers

AC Mains Input Type**	No of Power Shelves (Type)	Current Max. per input (A) 205VAC	185VAC	Ext. Fuse Type Th/Mag 205VAC	185VAC	Ext. Fuse Type Hy/Mag 205VAC	185VAC
TN net (Y) 400VAC +N 3 phase	1 (4AC)	21.5	24.0	← 25A-D →		← 25A-C2 →	
	2 (4AC)	32.2	36.0	← 40A-C →		← 40A-C2 →	
	3 (4AC or 2AC)	43.0	47.9	← 50A-C →		← 50A-C2 →	
IT net (Δ) 230VAC 3 phase	1 (4AC)	28.4	31.7	← 32A-D →		← 32A-C2 →	
	2 (4AC)	55.8	62.3	← 63A-C →		← 63A-C2 →	
	3 (4AC or 2AC)	74.4	83.0	80A-C	100A-C	80A-C2	100A-C2
230VAC 1 phase	1 (4AC)	21.5	24.0	← 25A-D →		← 25A-C2 →	
	2 (4AC)	32.2	36.0	← 40A-C →		← 40A-C2 →	

Doc 2020432,3v0

1AC Feed to 1 *Flatpack2* rectifier Recommended External Fuse Type	FS=I	FS=0
Th/Mag	25A-D	16A-C
Hy/Mag	25A-C2	16A-C2

FS=I (***Fuse Selectivity: Internal***) which means that the Flatpack2 rectifier's internal fuse 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 fuse trips first.

** The external AC Mains Input is internally connected to the power shelves and rectifiers at factory. Refer to your system's specific schematic and connection drawings for more details.

Notes:
- Use the values in the 185VAC column, if you are unsure or know that the available AC mains voltage may drop below 205VAC
- The recommendations apply for use of
  – Thermal magnetic circuit breaker (Th/Mag), type Siemens 5SX or 5SY series, MG C60H series or similar; and
  – Hydraulic magnetic breaker (Hy/Mag), type CBI QF frame or QY frame, Airpax or similar
- For more information regarding External AC fuses, please read the document 2020432
- Systems with more than 3 power shelves require more than 1 AC Mains Feed Input

Recommended External AC Fuses per AC Mains Feed Input
Flatpack2 Systems with 3000W Rectifiers

AC Mains Input Type**	No of Power Shelves (& Rectifiers)	Current Max. per input (A) 205VAC	176VAC	Ext. Fuse Type Th/Mag 205VAC	176VAC	Ext. Fuse Type Hy/Mag 205VAC	176VAC
TN net (Y) 400VAC +N 3 phase	1 (4)	32.9	38.3	← 50A-D →		← 60A-C2 →	
	2 (8)	49.3	57.5	50A-D	63A-D	← 60A-C2 →	
	3 (12)	65.8	76.6	← 80A-D/100A-C →			
IT net (Δ) 230VAC 3 phase	1 (4)	43.5	50.7	50A-D	60A-D	← 60A-C2 →	
	2 (8)	85.4	99.5	← 100A-C →			
	3 (12)	113.9	132.7	125A-C	150A-C		
230VAC 1 phase	1 (1)	16.5	19.2	***← 50A-D →		← 60A-C2 →	
	1 (2)	32.8	38.4	← 50A-C →		← 60A-C2 →	
	1 (3)	49.3	57.5	50A-D	63A-D	← 60A-C2 →	
	1 (4)	65.8	76.6	← 80A-D/100A-C →			

Doc 2052045,1v0

** The external AC Mains Input is internally connected to the power shelves and rectifiers at factory. Refer to your system's specific schematic and connection drawings for more details.
***When no Fuse Selectivity is required, you can use a 25A-C fuse instead of the recommended 50A-D

Notes:
- Use the values in the 176VAC column, if you are unsure or know that the available AC mains voltage may drop below 205VAC.
- The recommendations apply for use of
  – Thermal magnetic circuit breaker (Th/Mag), type Siemens 5SX or 5SY series, MG C60H series or similar; and
  – Hydraulic magnetic breaker (Hy/Mag), type CBI QF frame or QY frame, Airpax or similar
- For more information regarding External AC fuses, please read the document 2052045
- The system is implemented with 4AC-3KW Power Shelves. Systems with more than 3 power shelves require more than 1 AC Mains Feed Input

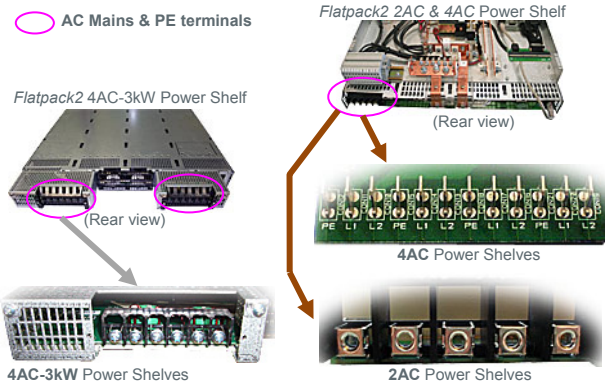
WARNING:
Always replace a rectifier with blown internal AC fuse with a new module, and send the malfunctioning module for servicing.

For installations in USA and Canada only

- For external fuses above 50A, only the high current backplane can be used
- External fuse rated 32A is replaced by 40A
- External fuse rated 63A is replaced by 70A
- The installation has to comply with the NEC/CEC requirements
- Connection to AC Mains shall be in accordance with the number of power shelves in the tables. If number of shelves exceeds the numbers in the table, a combination of several AC Mains must be used instead

NEC/CEC Requirements

Identifying Power Shelves: 4AC, 2AC or 4AC-3kW



Flatpack2 rectifiers are accommodated in one or several power shelves. Following types of power shelves are available:

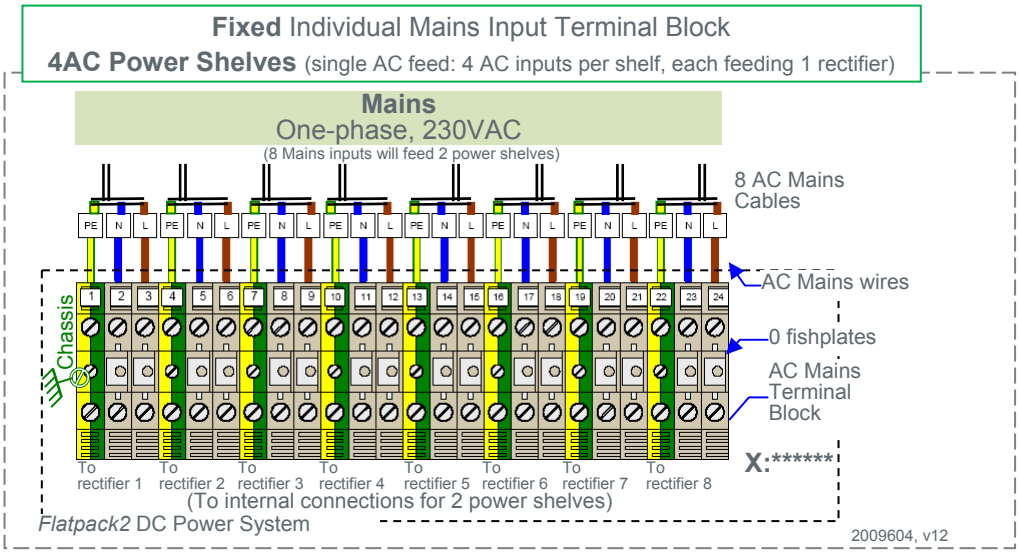
- ***4AC Power Shelves***, or single AC feed, 1 TB (4 AC inputs per shelf, each feeding 1 rectifier)
- ***4AC-3kW Power Shelves***, or single AC feed, 2 TB (4 AC inputs per shelf, each feeding 1 rectifier)
- ***2AC Power Shelves***, or dual AC feed, 1 TB (2 AC inputs per shelf, each feeding 2 rectifiers)

You can identify the type of power shelves used by your system by reading the shelf's label, or by looking at the shape of the shelf's AC mains terminals, at its rear; (viewable by removing the rectifier in the shelf's 1st and or 4th position). Also, 4AC-3kW power shelves are longer in depth, and have 2 terminal blocks (TB).

Individual AC Mains Terminals ~ NOT Reconfigurable

Mains reconfiguration is NOT possible when the system is shipped with *fixed* individual Mains input terminal blocks.

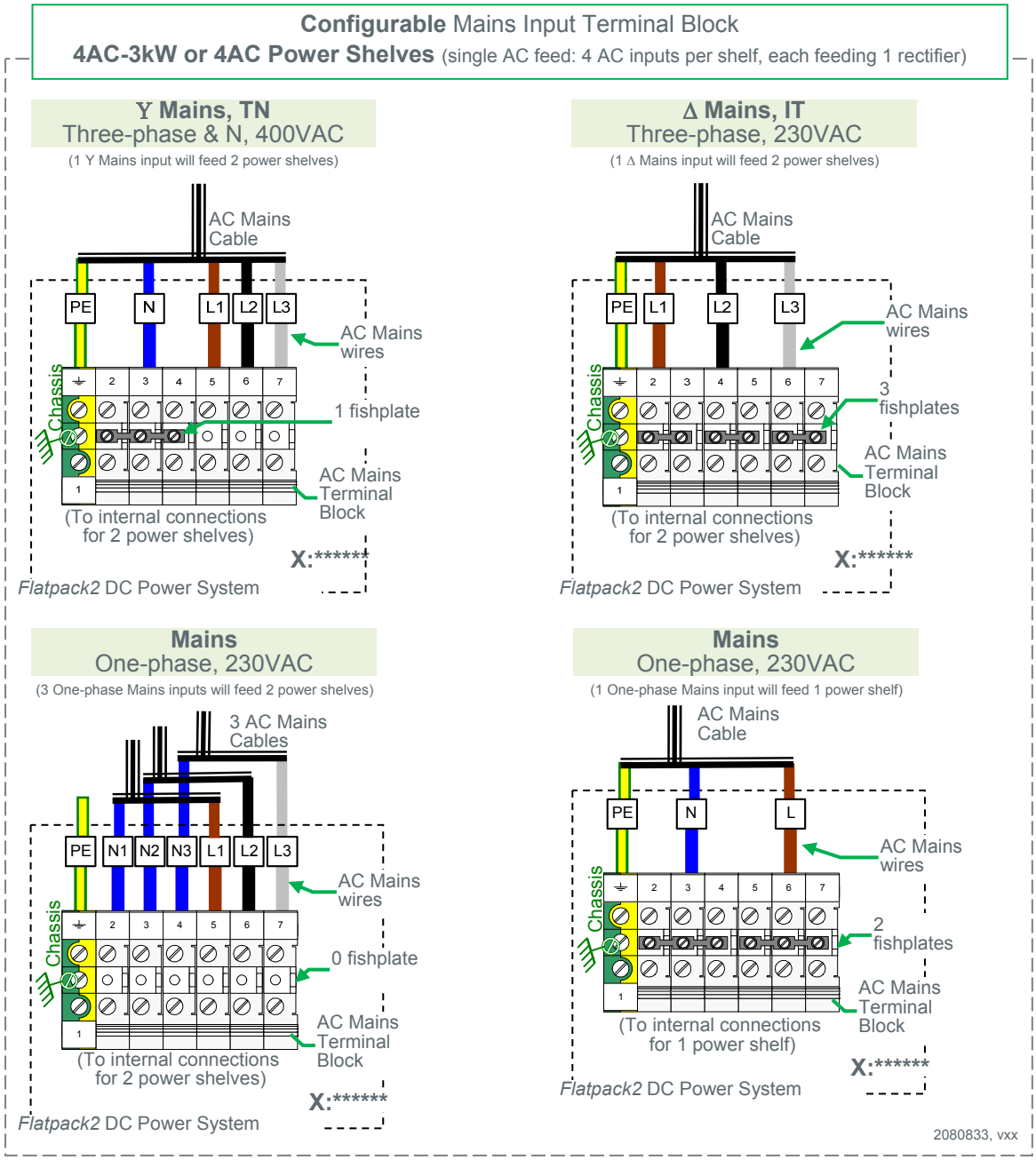
Such systems have to be configured at the factory prior to delivery.



II AC Mains Terminal Block ~ Reconfigurable

To reconfigure the AC mains feed of *Flatpack2* DC **power systems that use the AC Mains terminal block**, you have to reconnect the AC mains wires and fishplates on the terminal block.

1. **Switch OFF** the AC supply fuses in external fuse boards
2. **Check that** your system is implemented with **4AC-3kW or 4AC powers shelves** (read the Identifying Power Shelves section, page 14). If your system utilizes 2AC power shelves, you can NOT reconfigure it as described in this section
3. **Connect** the AC Mains wires to the AC terminal block, **and mount** the fishplates, **according to the type of AC mains to be used**, as shown in the actual example in this section



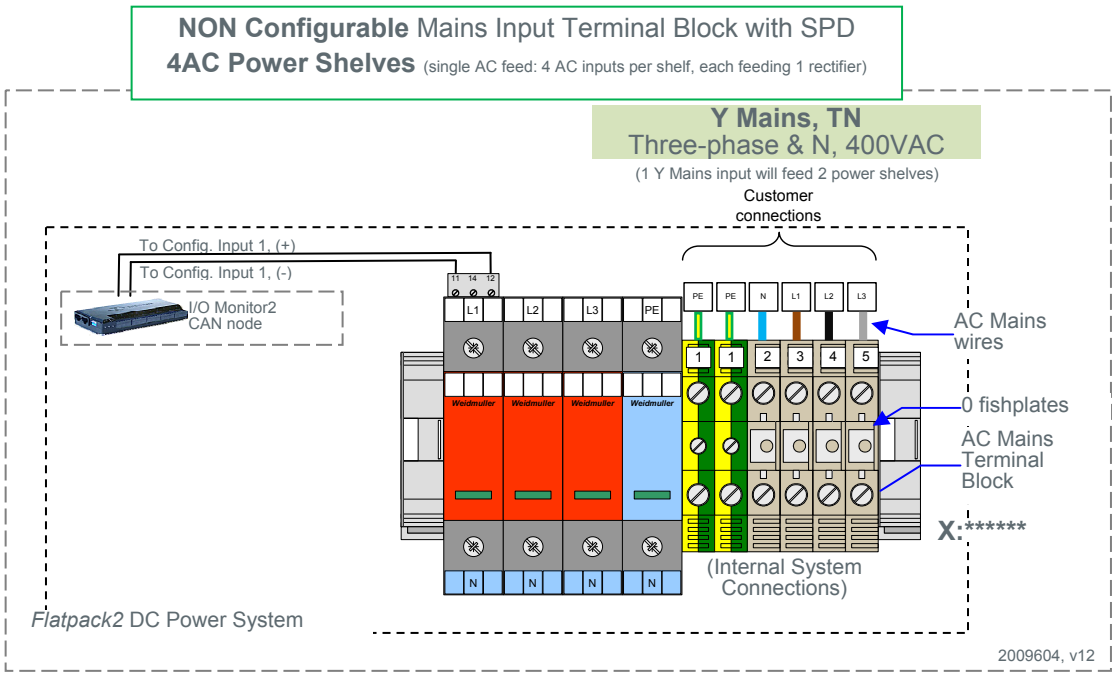
Cable section for all AC Mains wires: 10mm² max.

Warning:
Ensure that no excess material sticks out from the fish plates' sides after cutting, thus avoiding damaging short-circuits between them

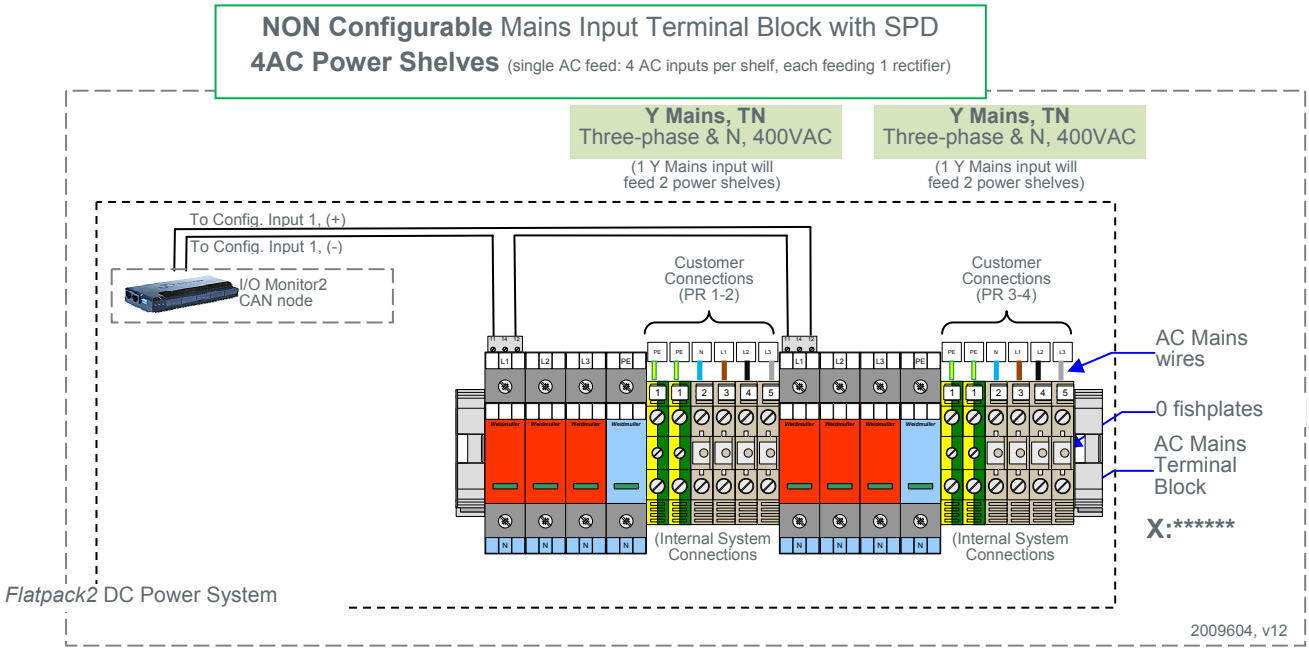
III AC Terminal Block with SPDs ~ NOT Reconfigurable

Mains reconfiguration is **NOT possible** when *Flatpack2* DC power systems are shipped with **AC terminal blocks with SPDs**[2]. Such systems have to be configured at the factory prior to delivery.

Refer also to page 7 for more information about connection to Digital Input 1 on *I/O Monitor2* CAN node.



Cable section for all AC Mains wires: 10mm² max.



Cable section for all AC Mains wires: 10mm² max.

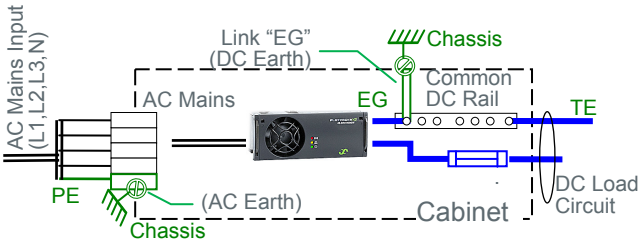
[2] Surge Protective Device (SPD), also called overvoltage protectors or surge arresters

About AC, DC Earthing Systems

To prevent the risk of electric shock, all cabinet's chassis are to be electrically connected to AC Earth (PE). Also, it is a common practice for telecom equipment to have its common DC output rail (+ or –) connected to a separate "Telecom Earth" (TE) or DC Earth.

PE (Protective Earth)
TE (Telecom Earth)
EG (Exchange Ground)

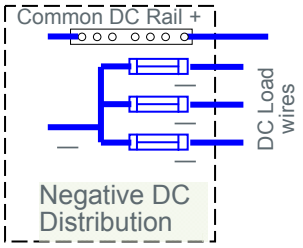
Earth connections are in particular important where frequent lightning might induce high voltage levels in AC supply and in battery and load cables.

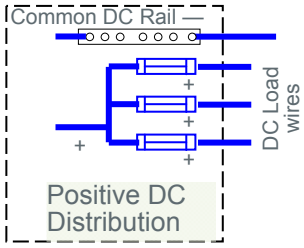


At factory, AC Earth (PE) and DC Earth (TE) are connected to chassis. Remove "Link EG" ("floating earth") for compliance with other local earthing systems.

Refer to your system's **specific drawings** to identify how earth connections are implemented in your DC power system.

"Common Positive DC Output Rail" is usual in 48 and 60V DC supply systems: *Negative DC Distribution*. "Common Negative DC Output Rail" is usual in 24V systems: *Positive DC Distribution*.



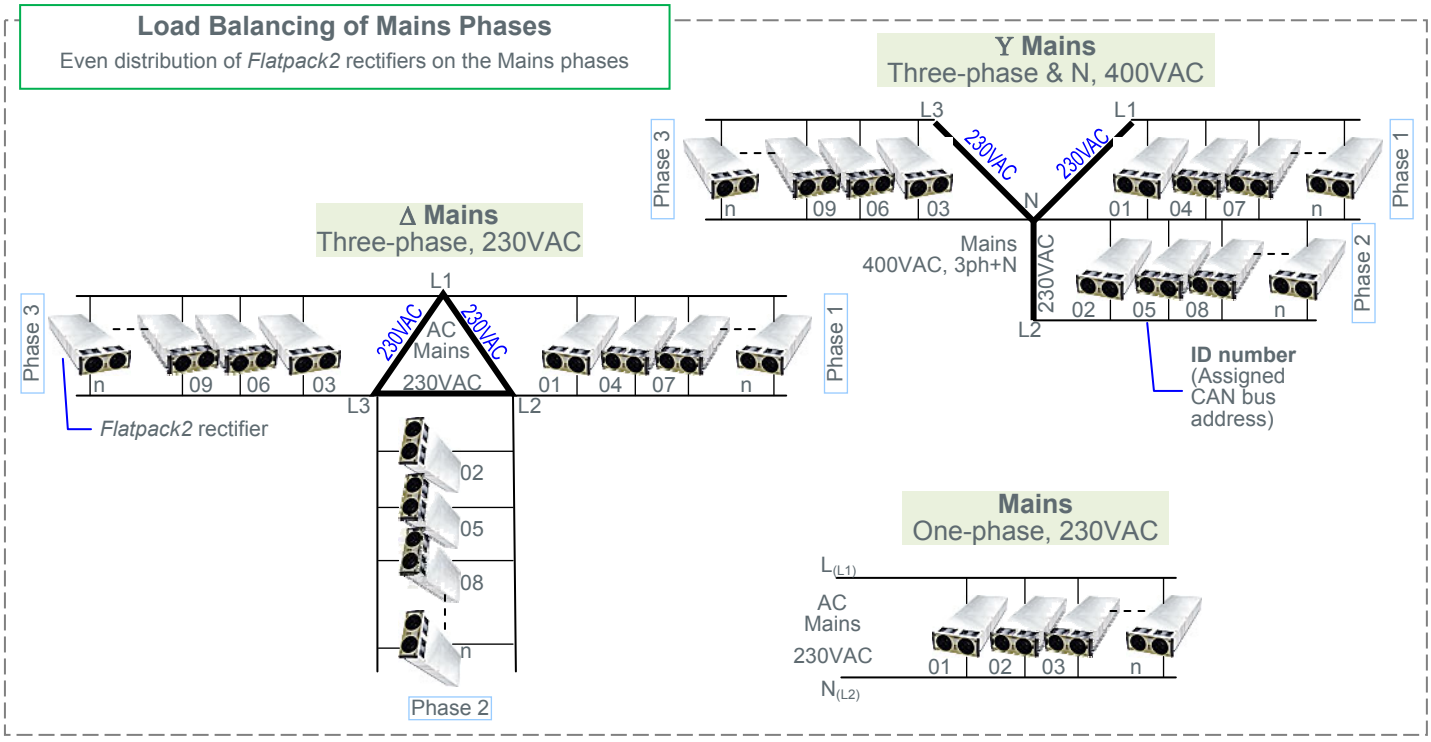


Mains Phases versus Rectifier ID

Phase Balancing & Monitoring

When *Flatpack2* systems are fed with a 3-phase AC Mains input circuit, each rectifier is internally connected to the 230VAC phases, in such a pattern that loads the 3 phases evenly.

The distribution of rectifiers among the phases is implemented both via internal wiring to the power shelves, and how the shelf's back-wiring card routes the phases to each rectifier position. There are 3 types of shelves: 4AC, 4AC-3kW and 2AC power shelves. Read also the *Identifying Power Shelves* section, page14.



Plug-and-Play Rectifiers versus Phase Monitoring

When a rectifier is **hot plugged in a power shelf for the first time**, the system's master controller assigns the next available ID number to the rectifier, starting with "01". The controller registers the rectifier's Serial Number and ID number.

When a **previously installed (hot plugged)** *Flatpack2* rectifier is inserted in a power shelf, the master controller "recognizes" the module, and assigns the same ID to the rectifier. In other words, the controller and the rectifier "remember" the assigned ID number, even after removing and reinserting the rectifier in the shelf.

To achieve a more controlled ID assignment, you should always insert & hot-plug new *Flatpack2* rectifiers **in the indicated power shelf position, one module at a time, starting with ID number 1, 2, 3**, and so on. The sequence is indifferent after ID number 6. You find more information on page 19.

This position-versus-ID number relationship is very important, as the controller always uses rectifier IDs 01 and 04 to monitor mains phase L1, rectifier IDs 02 and 05 to monitor mains phase L2 and rectifier IDs 03 and 06 to monitor mains phase L3. When both rectifiers, monitoring the same phase, report that the **mains phase voltage is lower than the configured limit**, then the controller broadcasts a "Mains Phase Lx" warning (one phase has failed).

For example: accidentally inserting a rectifier with ID02 in a power shelf position internally connected to mains phase 1, will cause the controller to monitor phase 1 "thinking" it monitors phase 2. Then a phase 1 fault will be alarmed as a phase 2 fault.

Correct Rectifier Positions in Power Shelves

Flatpack2 DC power systems are normally shipped from factory with empty power shelves. The rectifier modules are shipped in separate packaging, and you have to install the modules in the correct position in the power shelves, with respect to their ID number (or CAN bus address). Do not relocate already pre-installed rectifiers.

For first time installations of rectifiers in *Flatpack2* systems, follow the scheme below:

1. Find out your system's power shelf type, by reading the *Identifying Power Shelves* section, page14
2. Find out if your system's AC mains feed is <230VAC, 3 phase> or <400VAC, 3 phase and N>
3. Insert & hot-plug the rectifiers in the indicated power shelf positions, one module at a time, allowing a 2s delay between them and starting with ID number 1, 2, 3, and so on. (indifferent after ID# 6)
   Follow one of the four figures (I, II, III or IV) below:

Smartpack2 Master and *Smartpack* Located **in Distribution Shelf**

Correct Rectifier Position in 4AC Power Shelves (I)

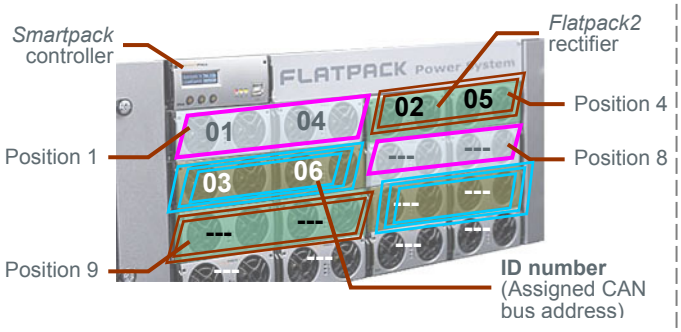
Single AC feed: 4 AC inputs per shelf, each feeding 1 rectifier

Δ Mains Three-phase, 230VAC and **Y Mains** Three-phase & N, 400VAC

Correct Rectifier Position in 2AC Power Shelves (II)

Dual AC feed: 2 AC inputs per shelf, each feeding 2 rectifiers

Δ Mains Three-phase, 230VAC and **Y Mains** Three-phase & N, 400VAC



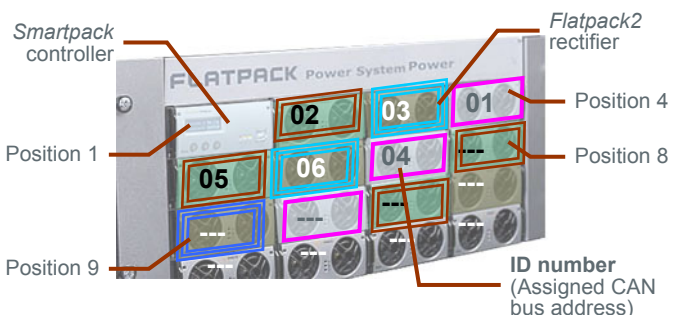
Notice:
For *Smartpack2*-based systems follow figure I or II, as the *Smartpack2 Master* controller is always mounted in the distribution shelf. The examples in the figures show *Smartpack*-based systems.

Smartpack Located **in Power Shelf**

Correct Rectifier Position in 4AC Power Shelves (III)

Single AC feed: 4 AC inputs per shelf, each feeding 1 rectifier

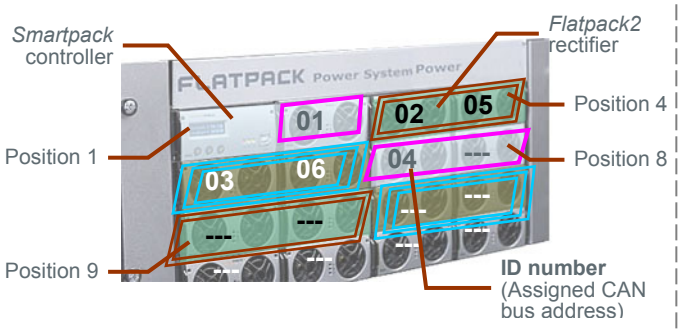
Δ Mains Three-phase, 230VAC and **Y Mains** Three-phase & N, 400VAC



Correct Rectifier Position in 2AC Power Shelves (IV)

Dual AC feed: 2 AC inputs per shelf, each feeding 2 rectifiers

Δ Mains Three-phase, 230VAC and **Y Mains** Three-phase & N, 400VAC



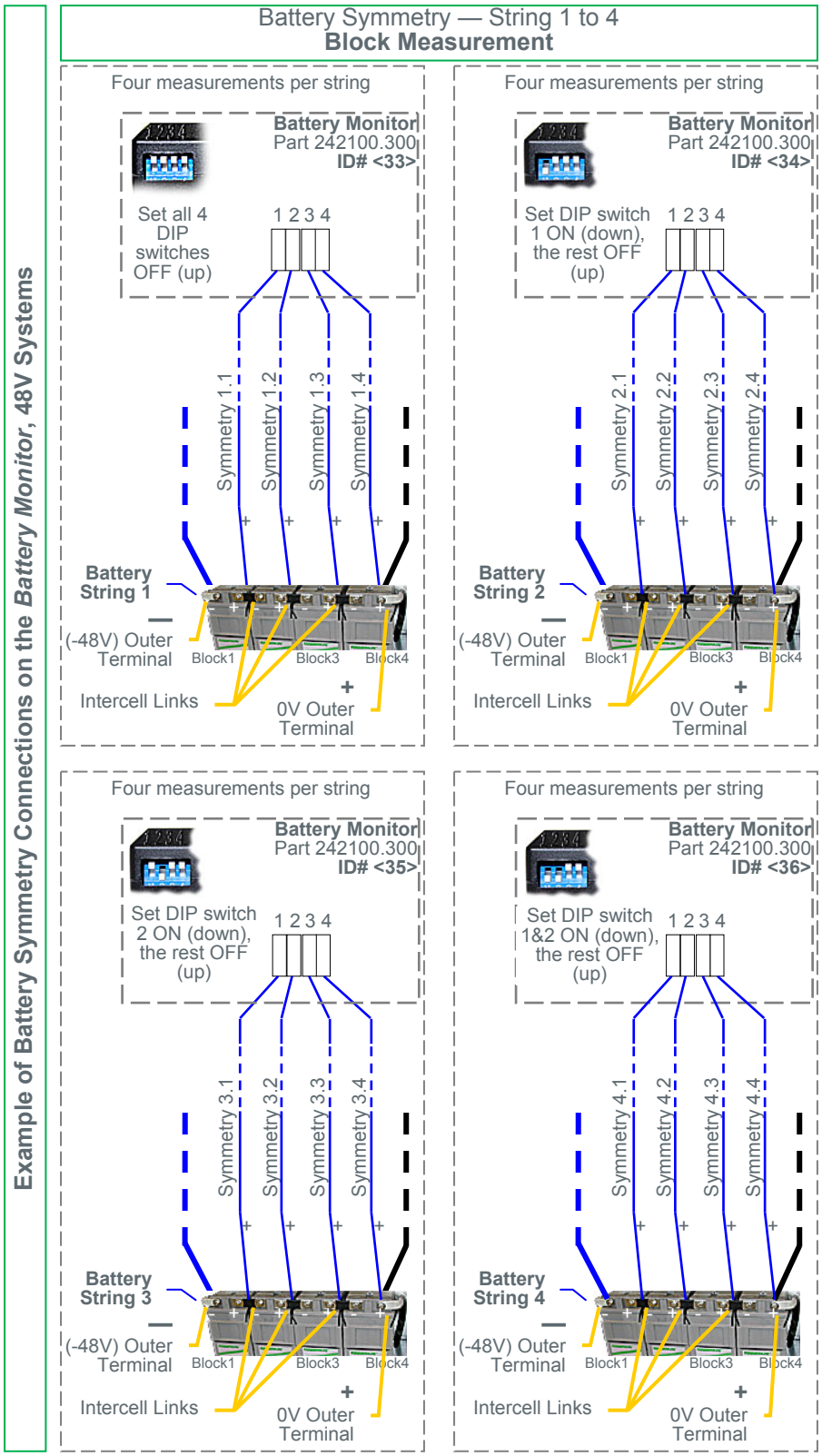
Battery Symmetry Connections

Smartpack2-based systems use *Battery Monitor* CAN nodes for battery symmetry measurements.

Battery Monitor's Symmetry Connections — 48V (Block Measurement)

Each *Battery Monitor* is equipped with 4 battery symmetry inputs, enabling symmetry measurement of 1 battery string using the *Block Measurement Method.*

Read the installation guides for *Battery Monitor CAN Node* (351507.033) and for *Battery Monitor – Symmetry Kit* (351497.033), which is included with the kit.



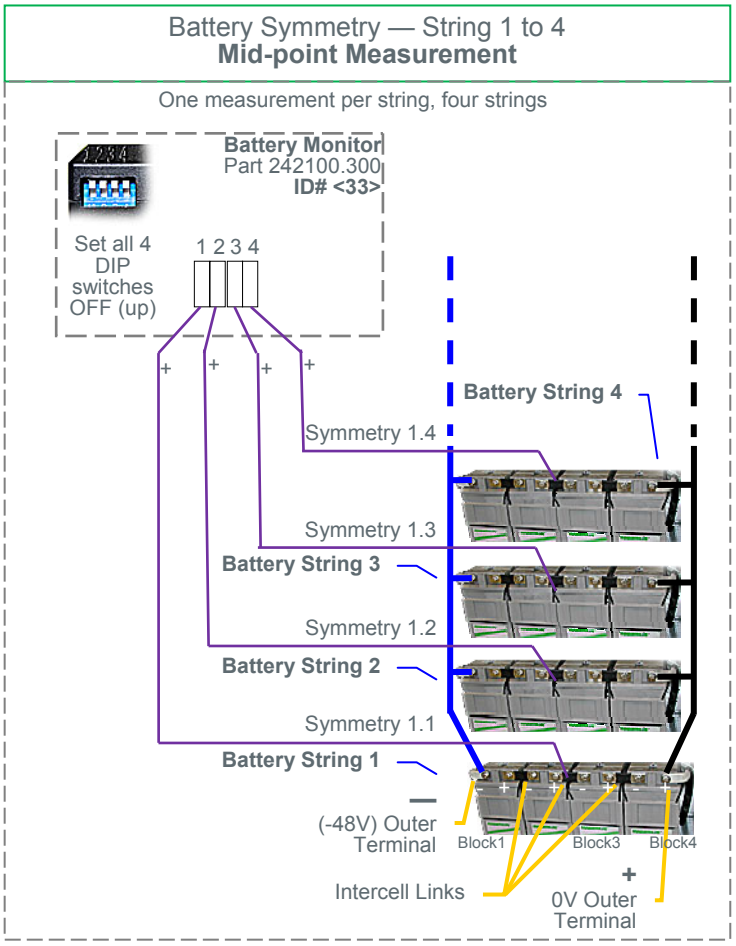
Notice:
Always connect Battery Monitor with ID#<33> to battery string 1 (lowest), with ID#<34> to string 2, and so on. The controller will then refer to the correct battery string.

Battery Monitor's Symmetry Connections — 48V (Mid-Point Measurement)

Each *Battery Monitor* is equipped with 4 battery symmetry inputs, enabling symmetry measurement of 4 battery strings using the *Mid-Point Measurement Method.*

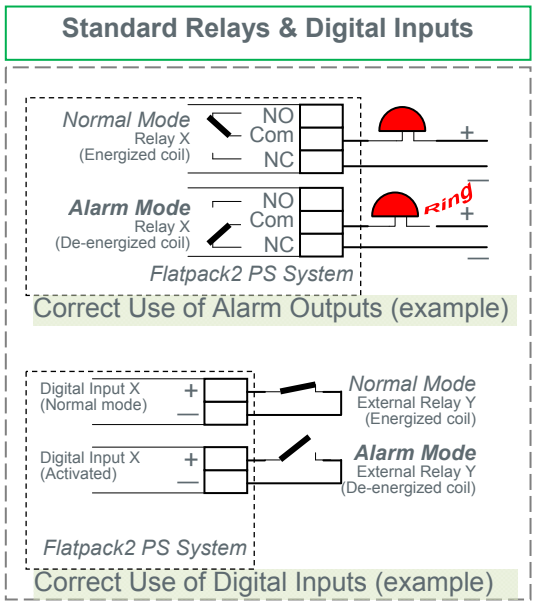
Read the "*Installation Guide Battery Monitor CAN Node"*, document number 351507.033. Refer also to "*Installation Guide Battery Monitor – Symmetry Kit*", document number 351497.033, which is included with the kit. The Battery Fuse and Battery Current cables are not shipped with the *Battery Monitor ~ Symmetry Kit.*

Example of Battery Symmetry Connections on the *Battery Monitor*, 48V Systems



Notice:
When monitoring many battery strings, always connect Battery Monitor with ID#<33> to battery strings 1 (lowest), 2, 3 and 4. Then Battery Monitor with ID#<34> to string 5, 6, 7 and 8. And so on. The controller will then refer to the correct battery string.

Standard Alarm Relays & Digital Inputs Connections



The alarm outputs in *Flatpack2* systems use the *Fail-Safe Operation Mode* (relay coils energized in the system's normal operation mode). When the system is in alarm mode, the alarm relay coils are de-energized.

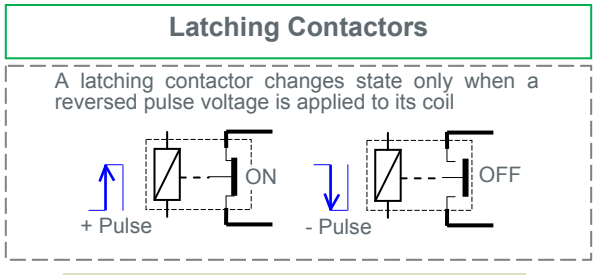
The figure shows the position of the relay contacts when the relay coils are de-energized (PS system in alarm mode)

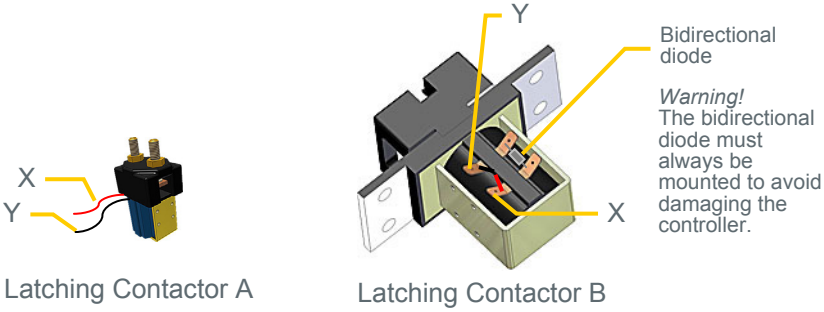
In order to implement monitored fail-safe digital inputs circuits, the external relay coil must be energized and the contacts closed in the system's normal mode of operation.

LVD Latching Contactors Connections

Flatpack2 systems' LVBD and LVLD[3] functionality is implemented with magnetically latching contactors[4].

The coil of latching contactors is not energized in any state. They change state from open to close, or vice versa, when a reversed pulse is applied to the coil.





[3] LVBD, Low Voltage Battery Disconnect; LVLD, Low Voltage Load Disconnect
[4] *Smartpack2*-based *Flatpack2* systems may be implemented with latching and with non-latching contactors

Replacing the *Smartpack2 Basic* Controller

The *Smartpack2 Basic* controller is always factory installed either under the subassembly's top cover or inside the subassembly. The length of the controller's connection cables is suitable for mounting in both locations.

Device Hazard

CAUTION:
When the *Smartpack2 Basic* controller is mounted under the top cover, you must unfasten the controller (steps 1-3) before you can remove the top cover (step 4)

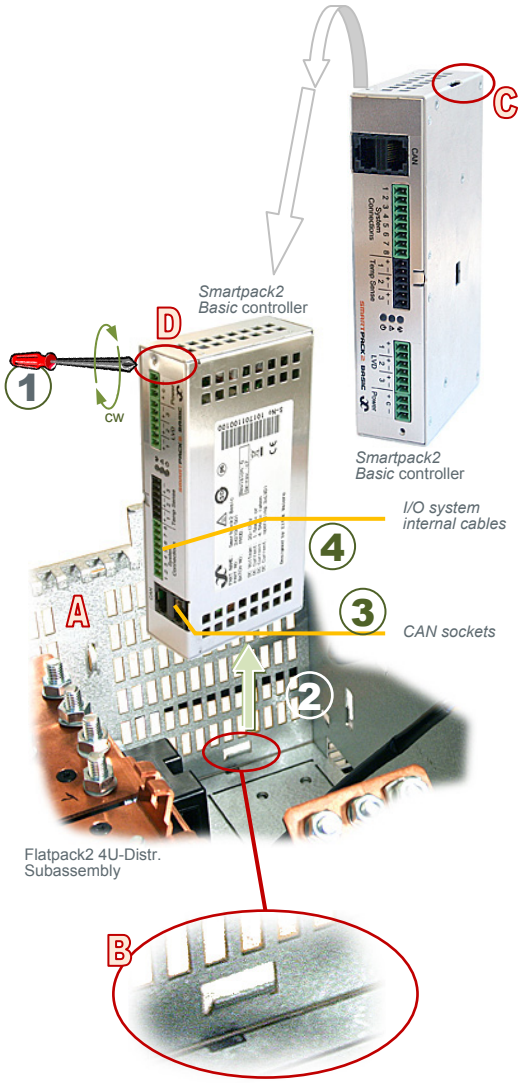
Fastening/Unfastening Inside-Mounted Controllers

To unfasten the *Smartpack2 Basic* controller from the power system, switch OFF the power system, and

Power is OFF!

1. Loosen the top fixing tab screw from the screw hole (D)
2. Lift the controller carefully upwards, (the slot (C) disengage from the lower fixing tab (B)
3. Unplug the cables from the CAN bus sockets
4. Disconnect the pluggable I/O terminals by pulling them out

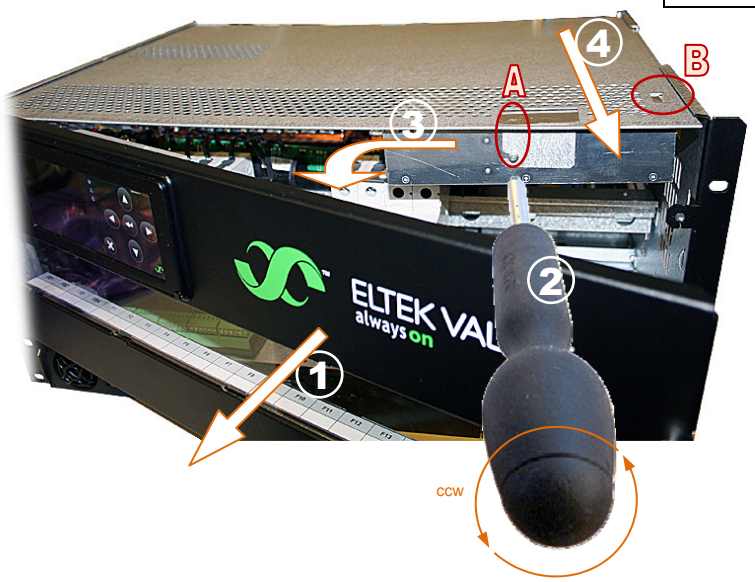
To fasten a new *Smartpack2 Basic* controller to the power system, first configure its CAN ID address and then, in the inverse order, carry out the opposite as described above (4, 3, 2, 1).



Fastening/Unfastening Top Cover-Mounted Controllers

To unfasten the *Smartpack2 Basic* controller from the top cover, switch OFF the power system, and

Power is OFF!



1. Open the power system's front panel
2. Loosen the fixing tab screw (A)
3. Slide the controller to the left — so that its tab disengage from the top cover's fixing tab (B) — and let the controller rest on the breakers
4. Slide the top cover towards the front and remove it (the CAN bus and I/O cables can now be disconnected)

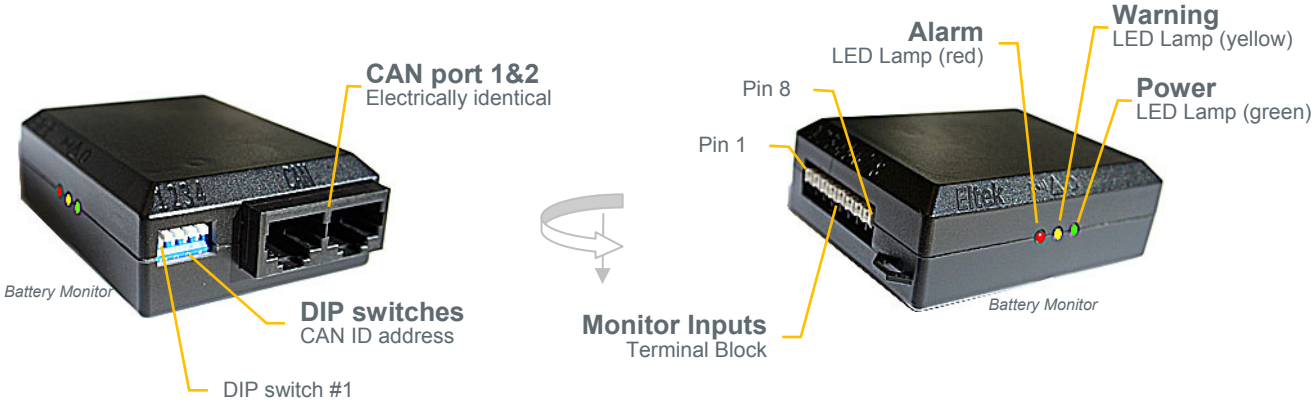
CAN Bus Nodes

The CAN Bus Nodes are control units connected to the power system's CAN bus. They have a rugged sealed-plastic design, with DIN-rail or Velcro tabs as standard mounting options.

When the CAN bus address is configured and the unit connected to the bus, it will automatically communicate with the power system's controller ("plug and play"). Configure then the CAN node functionality using *WebPower* or *PowerSuite*.

Battery Monitor CAN Node

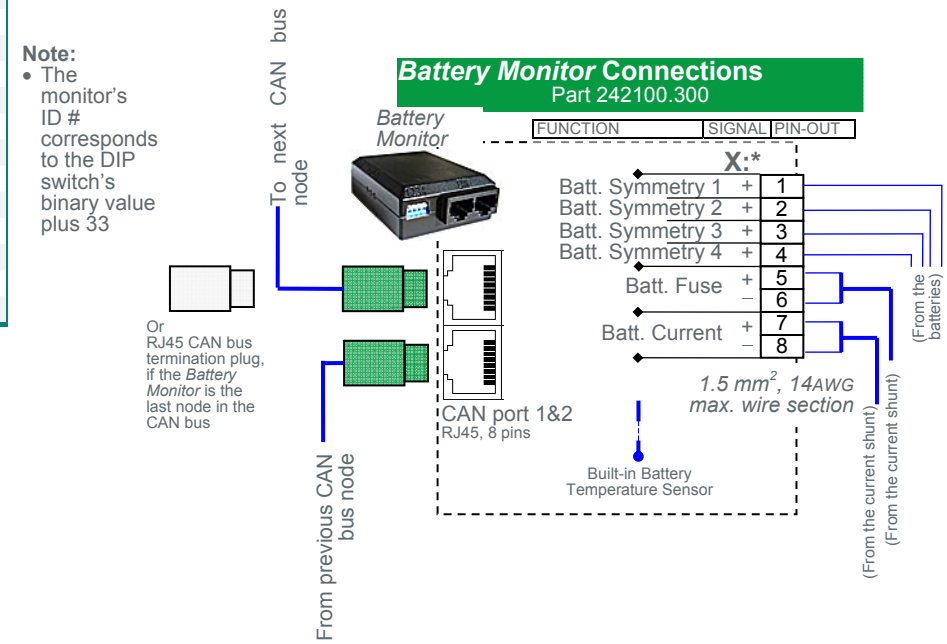
The *Battery Monitor CAN Bus Node* enables you to decentralize or increase the number of battery symmetry measurements in your *Compack*-, *Smartpack*- or *Smartpack2*-based DC power supply system. Also, it monitors the battery compartment temperature – using the built-in sensor – the battery fuse – with a fuse monitoring input – and the battery current – via a current sense input.



ID <33>
(All switches OFF)

Battery Monitor	ID #	DIP Switch Position 1 —2 —3 —4
1st Monitor	33	OFF—OFF—OFF—OFF
2nd Monitor	34	**ON**—OFF—OFF—OFF
3rd Monitor	35	OFF—**ON**—OFF—OFF
4th Monitor	36	**ON**—**ON**—OFF—OFF
5th Monitor	37	OFF—OFF—**ON**—OFF
6th Monitor	38	**ON**—OFF—**ON**—OFF
7th Monitor	39	OFF—**ON**—**ON**—OFF
8th Monitor	40	**ON**—**ON**—**ON**—OFF
9th Monitor	41	OFF—OFF—OFF—**ON**
10th Monitor	42	**ON**—OFF—OFF—**ON**
11th Monitor	43	OFF—**ON**—OFF—**ON**
12th Monitor	44	**ON**—**ON**—OFF—**ON**
13th Monitor	45	OFF—OFF—**ON**—**ON**
14th Monitor	46	**ON**—OFF—**ON**—**ON**

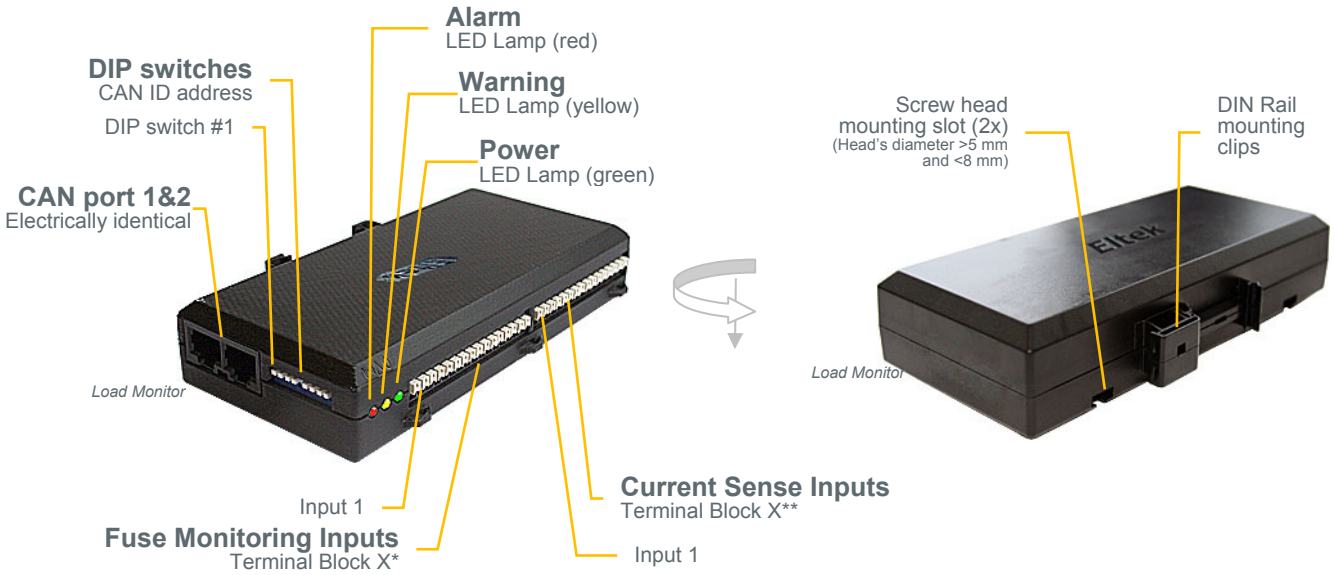
Note:
- The monitor's ID # corresponds to the DIP switch's binary value plus 33



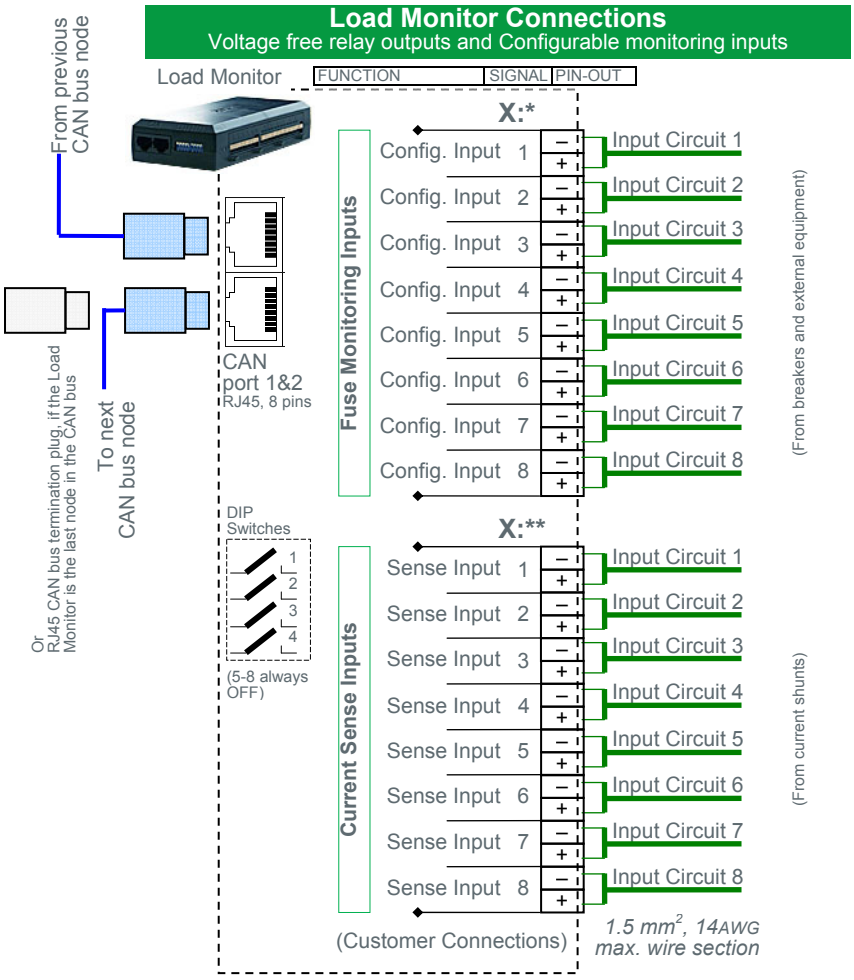
Read also the "Installation Guide Battery Monitor CAN Node", document 351507.033.

Load Monitor CAN Node

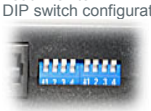
The *Load Monitor CAN Bus Node* enables you to decentralize and increase the number of input fuse monitoring and current sense signals in your *Compack*-, *Smartpack*- or *Smartpack2*-based DC power supply system. The fuse monitoring inputs are suitable for monitoring a wide range of breakers in both positive and negative DC distributions.



Read also the "Installation Guide Load Monitor CAN Node", document 351506.033.



Load Monitor
DIP switch configuration



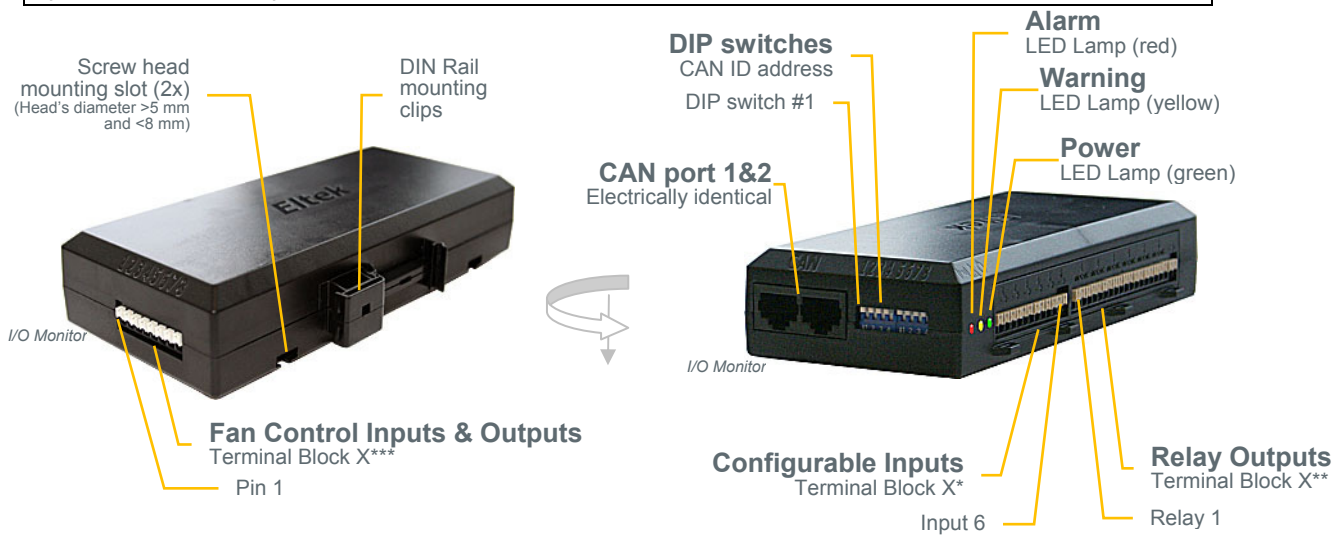
ID <49>
(All switches OFF)

Load Monitor	ID #	DIP Switch Position 1 —2 —3 —4
1st Monitor	49	OFF—OFF—OFF—OFF
2nd Monitor	50	**ON**—OFF—OFF—OFF
3rd Monitor	51	OFF—**ON**—OFF—OFF
4th Monitor	52	**ON**—**ON**—OFF—OFF
5th Monitor	53	OFF—OFF—**ON**—OFF
6th Monitor	54	**ON**—OFF—**ON**—OFF
7th Monitor	55	OFF—**ON**—**ON**—OFF
8th Monitor	56	**ON**—**ON**—**ON**—OFF
9th Monitor	57	OFF—OFF—OFF—**ON**
10th Monitor	58	**ON**—OFF—OFF—**ON**
11th Monitor	59	OFF—**ON**—OFF—**ON**
12th Monitor	60	**ON**—**ON**—OFF—**ON**
13th Monitor	61	OFF—OFF—**ON**—**ON**
14th Monitor	62	**ON**—OFF—**ON**—**ON**

Note:

- DIP switch positions 5 through 8 are always to be OFF
- The monitor's ID # corresponds to the DIP switch's binary value plus 49

I/O Monitor and I/O Monitor2 CAN Nodes

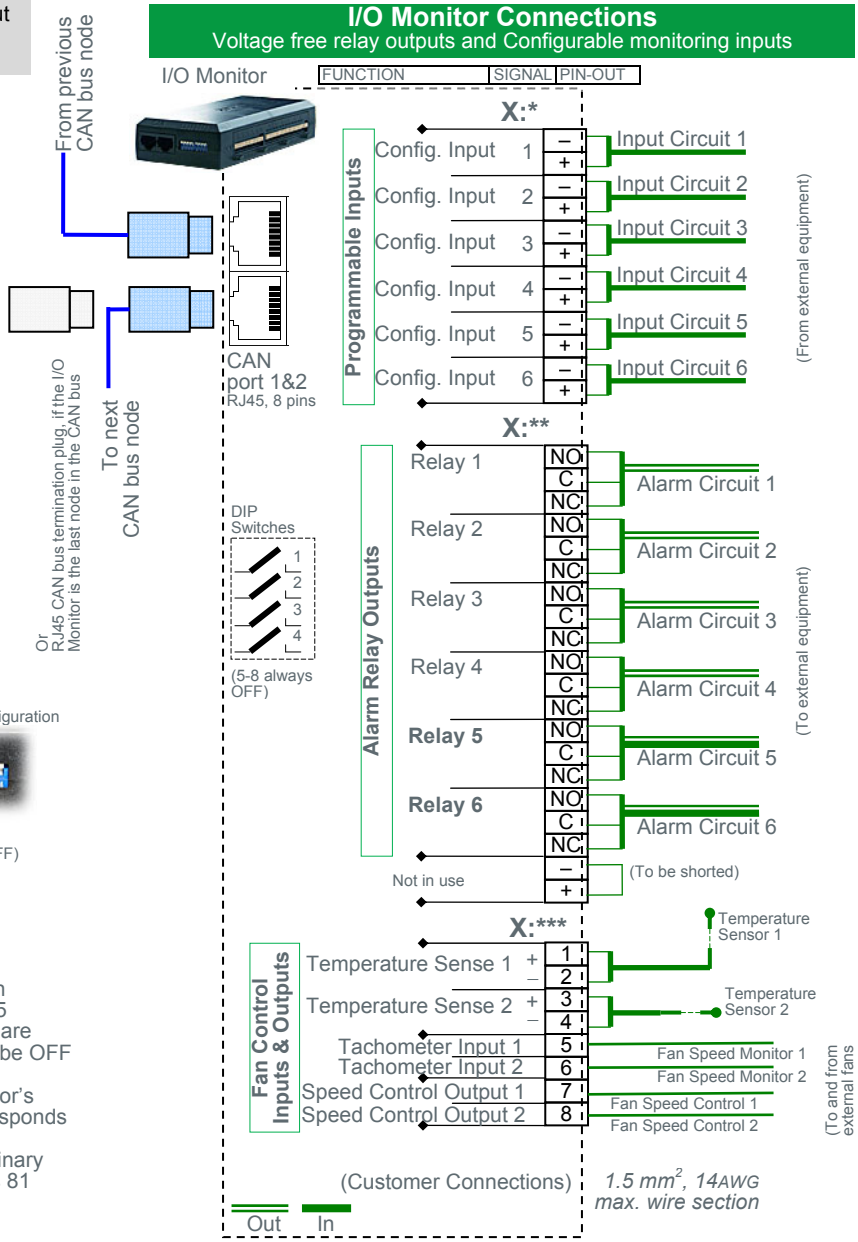


Notice:
The figure shows the location of terminals and LEDs in the *I/O Monitor* node.
The *I/O Monitor2* node implements the same input and outputs as the *I/O Monitor* node (X:*, X:**), except for the Fan Control signals (X:***)

The *I/O Monitor* and the *I/O Monitor2 CAN Bus Nodes* enable you to decentralize and increase the number of input monitoring and output controlling signals in your *Compack*-, *Smartpack*- or *Smartpack2*-based DC power supply system.

Also, the *I/O Monitor* node monitors and controls the compartment temperature inside fan-cooled outdoor cabinets.

Read also the installation guides for *I/O Monitor CAN Node* (document 351503.033) and for *I/O Monitor2 CAN Node* (document 351509.033).



I/O Monitor
DIP switch configuration

ID <81>
(All switches OFF)

I/O Monitor	ID #	DIP Switch Position 1 —2 —3 —4
1st Monitor	81	OFF—OFF—OFF—OFF
2nd Monitor	82	**ON**—OFF—OFF—OFF
3rd Monitor	83	OFF—**ON**—OFF—OFF
4th Monitor	84	**ON**—**ON**—OFF—OFF
5th Monitor	85	OFF—OFF—**ON**—OFF
6th Monitor	86	**ON**—OFF—**ON**—OFF
7th Monitor	87	OFF—**ON**—**ON**—OFF
8th Monitor	88	**ON**—**ON**—**ON**—OFF
9th Monitor	89	OFF—OFF—OFF—**ON**
10th Monitor	90	**ON**—OFF—OFF—**ON**
11th Monitor	91	OFF—**ON**—OFF—**ON**
12th Monitor	92	**ON**—**ON**—OFF—**ON**
13th Monitor	93	OFF—OFF—**ON**—**ON**
14th Monitor	94	**ON**—OFF—**ON**—**ON**

Note:
- DIP switch positions 5 through 8 are always to be OFF
- The monitor's ID # corresponds to the DIP switch's binary value plus 81

This product is CE marked and complies with all current requirements for relevant standards and directives.

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Art. No. 356825.103, Issue 2.0, 2011 Sep
Published 2011-10-07

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Check Lists Pullout

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

INSTALLATION CHECK LIST

System Data

Flatpack2 PS System

Flatpack2 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:	Installation carried out by, name:

Site Preparations

CARRY OUT FOLLOWING:	OK
1. Organize the installation site o Check min. clearances for cabinet access: front access, 60cm, top access, 20cm o Check that the levelled surface is able to support 600 kg (cabinetized systems) o Ensure the installation site is suitably ventilated and in a non-explosive atmosphere. 60V systems in RAL areas	☐
2. Prepare the installation tools o Check that insulated tools suitable for telecom installations are used	☐
3. Prepare AC Supply: AC input cable(s) and fuses o Check the AC supply is the correct type, and that the external AC fuses and AC input cable(s) are suitably rated	☐

EMC Regard

Mechanical Installation

Power is OFF!

CARRY OUT FOLLOWING:	OK
4. Remove packaging and check equipment o Check you have received all the parts, correct cabinet, documentation, batteries (if applicable), etc o Inspect the equipment for physical damage (report any damages) o Leave rectifier modules in their packaging or in the selves, if factory installed. (commissioning task)	☐
5. Remove top cover and dummy front panels o Check that cable entry from the top is possible	☐
6. Position and fasten the cabinet or subassembly o *Cabinets* on levelled surface, adjust the legs. If necessary, unscrew the legs and fasten the cabinet to floor o *Subassemblies* in existing 19" or in ETSI cabinets, using brackets. Mount the support & heat deflecting plate	☐
7. Mount the batteries on the shelves o Start (if applicable) on the lower shelf first, and continue upwards o *Do not terminate* the battery cables yet!	☐

Device Hazard

Electric Shock

Electrical Installation

Power is OFF!

CARRY OUT FOLLOWING:	OK
8. Make the system completely voltage free o Switch OFF or remove all load fuses (MCB1, MCBx), battery fuses (Fb1, Fbx) and external AC supply fuses	☐
9. AC Connections o *Check AC configuration*: The AC terminals are correct configured to the external AC supply o *Connect the AC Earth wire (PE)* to the terminals AC Earth (PE) o *Connect the AC input cable(s)* to the terminals. Cable and terminal block labeling are to correspond	☐
10. DC Connections — Load Circuits o *Terminate DC Earth (TE):* Common DC Output Rail is connected to TE at only one place o *For each DC load*, connect one of the cables to the common DC output rail, and the other directly to the MCB	☐
11. DC Connections — Alarm & Signal Circuits o Refer to your system's connection drawings and configuration, or to the Factory Settings in the Quick Start Guide o *Terminate Alarm Circuit cables* to the relay output terminals o *Terminate Signal Circuit cables* to the digital input/output terminals	☐
12. DC Connections — Battery Cables *Careful! Use correct polarity.* For each battery shelf, o *Mount 3 intercell links* to connect in series 4 battery blocks, (In 24V systems: 1 link and 2 blocks) o *Connect battery cables* to fuses and common DC rail, and to the shelf's outer terminals; (+) and (-) o *Connect battery symmetry cables*, if applicable, to the input terminals o *Connect the temperature sensor cable*, if applicable, to the input terminals, and fix the sensor (at the end of the cable) to a suitable place in the middle of the installed battery bank	☐

Electric Shock

Approval

Responsible of installation, sign.:	Date:	Approved by customer, sign.:

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CIRCUIT DISTRIBUTION LIST

System Data

Flatpack2 PSS, type:	Article No.:
Site, name:	

CIRC.	NO.	FUSE KNIFE	TYPE MCB	LVD CONTROLLED	DESCRIPTION	FUSE AMPERE	CABLE mm^2
BATT.	Fb1						
	Fb2						
	Fb3						
	Fb4						
	Fb5						
	Fb6						
LOAD	F1						
	F2						
	F3						
	F4						
	F5						
	F6						
	F7						
	F8						
	F9						
	F10						
	F11						
	F12						
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	F35						

Continue

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CIRCUIT DISTRIBUTION LIST

CIRC.	NO.	FUSE KNIFE	TYPE MCB	LVD CONTROLLED	DESCRIPTION	FUSE AMPERE	CABLE mm^2
LOAD	F36						
	F37						
	F38						
	F39						
	F40						
	F41						
	F42						
	F43						
	F44						
	F45						
	F46						
	F47						
	F48						

Form 172-gb-v4-C01_356825-103_qstart_flatpack2-4u-distr-sp2-syst_2v0.docx_mfm_2009-09-17

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MAINTENANCE PROCEDURE

System Data

Flatpack2 PS System

Flatpack2 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:

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.

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.	☐
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	☐
3. The equipment is free from damage, dust or dirt; verify. Carefully vacuum clean or remove any accumulation of dust, corrosion or dirt.	☐
4. All cabling and copper bars are securely terminated and supported. Correct any loose connections, excessive cable temperature, defective insulation, etc.	☐
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.	☐
6. All rectifier's functionality & controller's keys and display work OK; verify Correct possible abnormalities before continuing.	☐
7. Connect the system's controller to a PC (Ethernet connection) Access the controller from the PC's web browser, thus enabling system configuration	
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 (±1A)	☐
9. Display the stored log of Alarm Messages. Using the keypad on the controller or from the PC.	☐

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 ±1% from the display reading, calibrate the output voltage from the controller's keypad or the PC.	☐
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 ±2% from the display readings, calibrate the current from the PC (calibration value>50% of system's max. capacity)	☐
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)	☐
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	☐
5. Battery bank control; measure and verify battery specifications. Follow the recommendations of the actual battery manufacturer.	☐

Approval

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

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ELTEK VALERE

PULLOUT

COMMISSIONING PROCEDURE

System Data

Flatpack2 PS System

Supplier's Order No.:	*Flatpack2 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:	Commissioning carried out by, name:

I Pre-Start Check

Power is OFF!

CHECK FOLLOWING:		OK
1. Flatpack2 system installation is completed;	The *Flatpack2 Installation Check List* is filled in. All cabling is securely terminated with correct polarity	☐
2. All battery and load MCBs/ fuses are disconnected		☐
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 MCBs/ fuses are switched OFF		☐

Device Hazard

II Start-up, No-Load & Load Adjustments

Power is ON!

CARRY OUT FOLLOWING:		OK
1. Disconnect all rectifier modules, without removing them (keep original location)		☐
2. Switch ON the system (external AC fuses ON)		☐
3. AC input voltage is correct;	Measure and verify	☐
4. Insert all *Flatpack2* rectifiers in their original locations in the power shelves		☐
5. The *Smartpack2 Master* 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 load MCBs/ fuses, and verify no alarms are displayed		☐

Device Hazard

III

Device Hazard

Approval

Responsible of commissioning, sign.:	Date:	Approved by customer, sign.:

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