

DC Power supply system LSA-Compact



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Rectifier unit type ADC with alarm CL30 (150-600W)	MA0224
Alt. Rectifier unit type ADC with alarm CL30 (1000W)	MA0176

Preface

These operating instructions provide information essential for correct operation of the unit. To ensure its safe operation, these instructions must be read and understood before the unit is switched on. All the information they contain must be observed!

This avoids:

- danger during operation
- danger to operating personnel
- downtime, and
- increases the reliability and lifespan of the unit.

Keep these instructions in a safe place for future reference.

Customer service:

For further information apply to the supplier or the manufacturer of the unit.

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Safety notes



Before starting the unit:

Please read the description, paying special attention to the safety notes.

The charging rectifier is an electrical unit with dangerous voltage and current levels. For this reason, the following safety instructions must be observed:

- 1) Installation, operation, servicing and maintenance should be carried out only in accordance with the instructions given in this document.
- 2) Ensure that only qualified and authorized personnel have access to the equipment. No other persons should be able to open the door.
- 3) Even when the unit is completely switched off, certain interior components remain live as long as they are connected with the mains supply or the battery.
- 4) Integrated capacitors may still be charged even when the unit is completely voltage-free. These must be properly discharged by a qualified person before the connections are touched.
- 5) When working on the unit, only properly insulated tools should be used.
- 6) All persons carrying out work on the unit must be acquainted with the first aid measures to be taken in cases of accidents involving electricity.
- 7) Always observe the safety regulations of the local power supply company as well as other safety regulations.

1. Presentation

1.1 DC power supply type LSA-Compact

LSA-Compact is a power supply system containing of one rectifier unit type ADC, distribution MCB's and a battery. LSA-Compact can also be equipped with a supervision panel type CL30 (optional).

LSA-Compact is made in two types of enclosures, one for wall mounting and one 19" type. The battery is to be placed behind the unit's door.

All levels for the rectifier and alarms are set at delivery. If necessary, adjustment of charging voltages and alarm levels can easily be made by potentiometers at the rectifier and the alarm unit's front panels.

The battery is placed inside the closure, and is connected to the double insulated battery cables.

Connections of mains and alarm cables are made terminal blocks placed behind the unit's door. Load cables are to be connected directly to the distribution MCB's. The battery is connected to the double insulated battery cables. All cable entries are made from below.

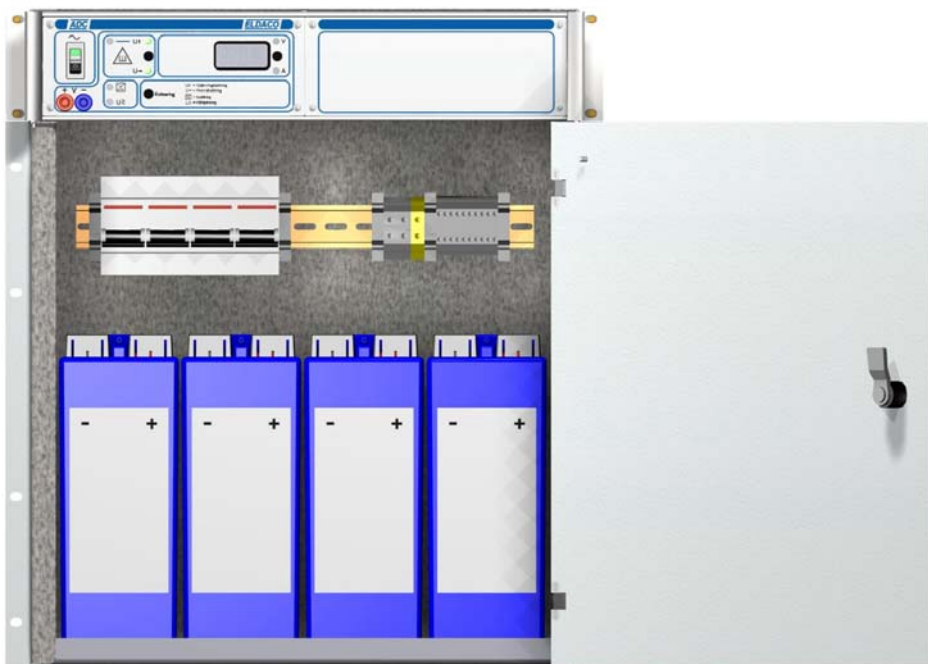
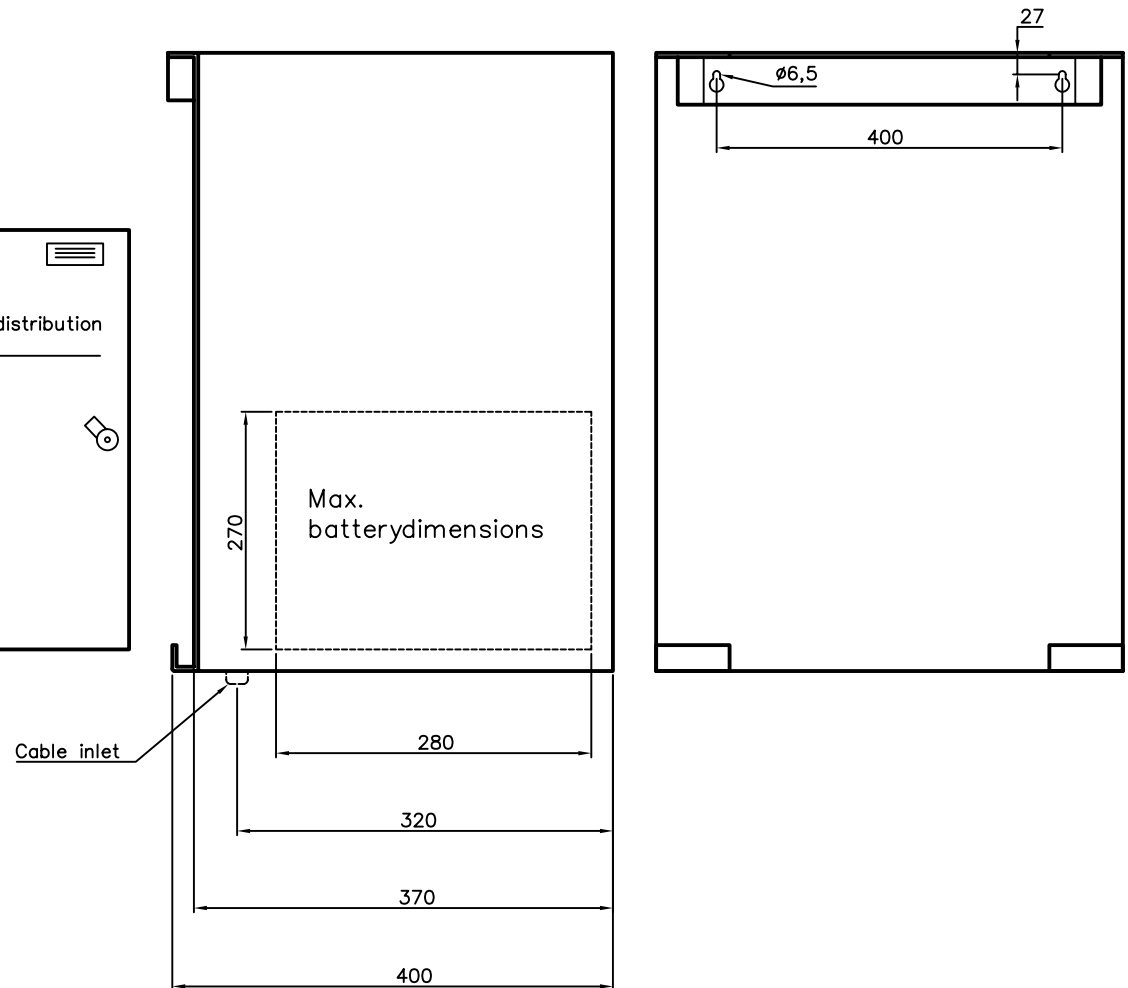
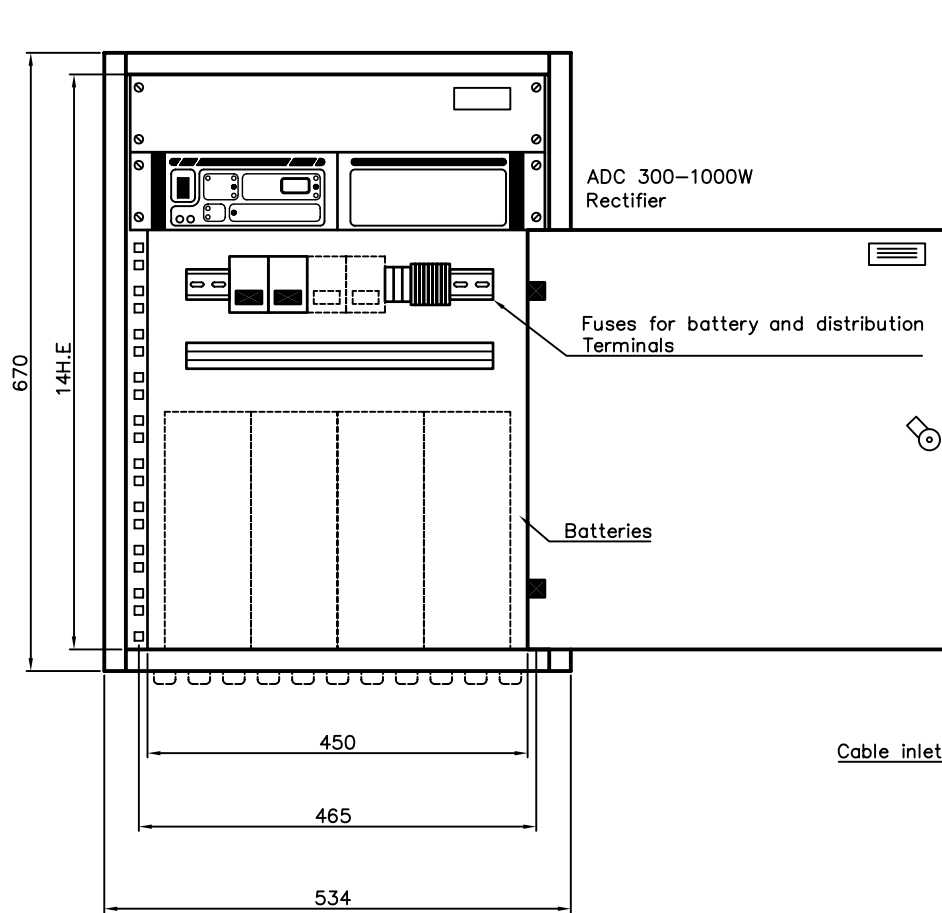
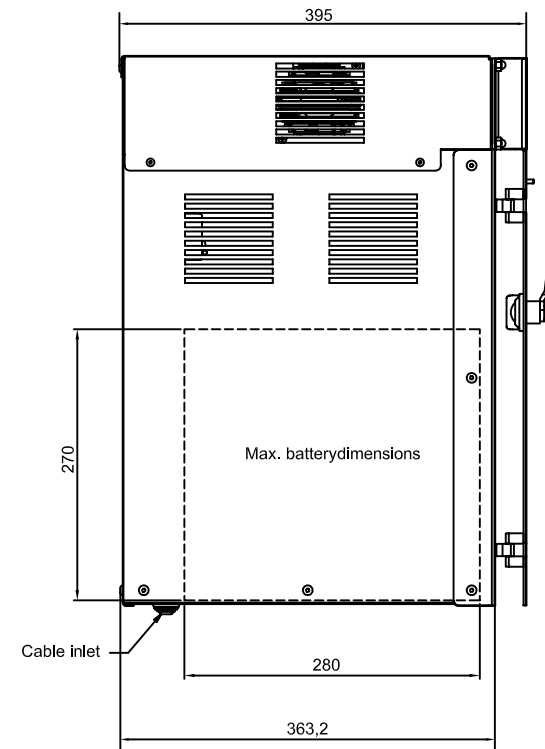
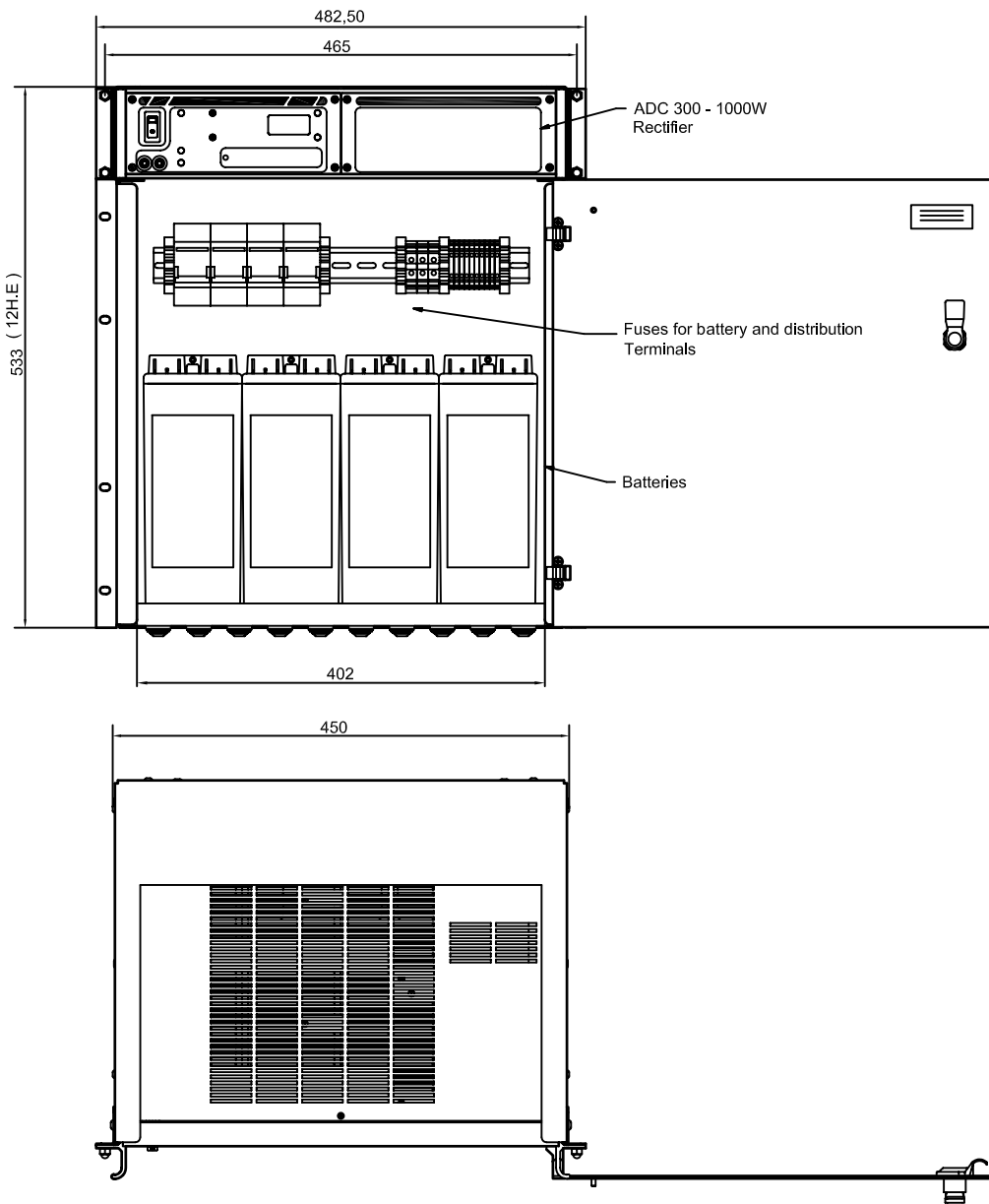


Figure 1. LSA-Compact 19"



Protection class: IP20
Weight: Approx. 35kg without battery

Design.by: TS	Drawn by: Date: TS 030827	LSA-Compact WGZ 654 Dimensions	Material	Dimension
Approved by: HS			Scale:	Tolerances:
ELDACO			Rev.by: Date: MC 050706	Rev.: G
			Art.no:	Drawing No: KO-001822



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Protection class: IP20
 Weight: Approx. 25kg without battery

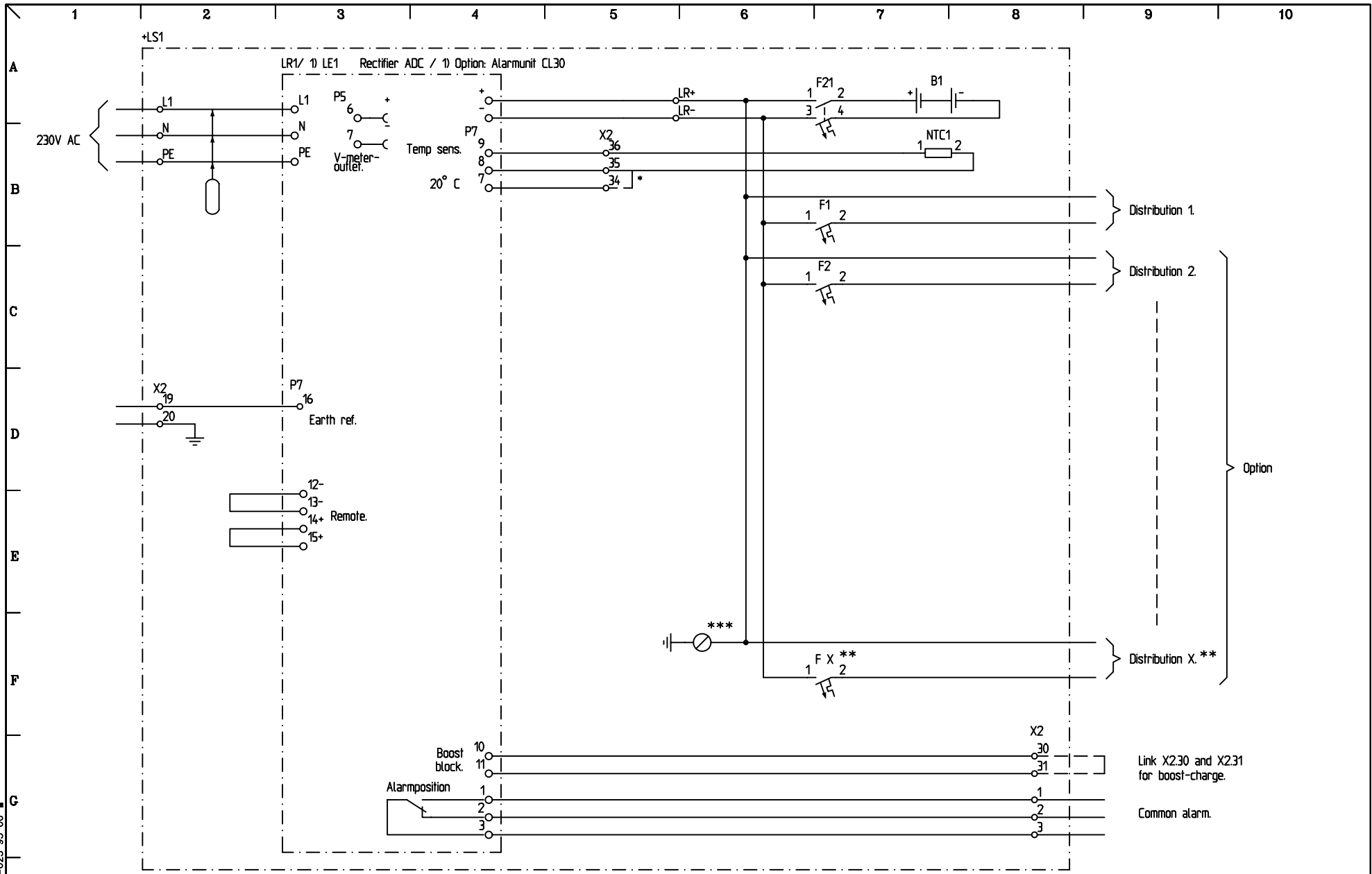
Design.by: TS	Drawn by: Date: TS 030909
Approved by: HS	



LSA-Compact
 19"
 Dimensions

Material	Dimension
Scale:	Tolerances:
Rev.by: Date: MC 050706	Rev.: F
Art.no:	Drawing No: KO-001858

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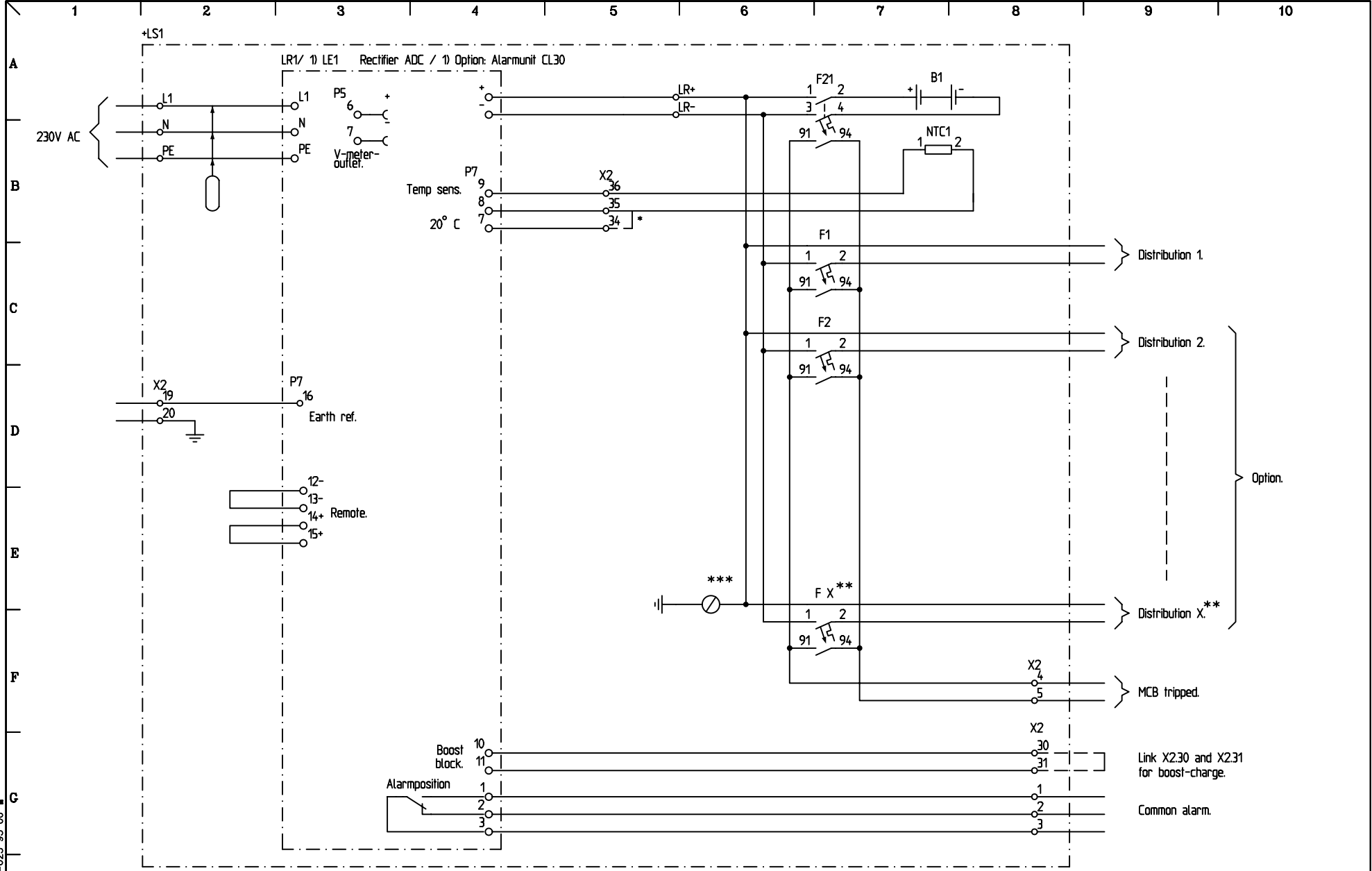


* Link X2.34 and X2.35 when adjusting charging level.
 ** Maximum number of distribution fuses is 16 in wall mounted version, and 13 in 19" version.
 *** Cable is marked "+GND"

	LSA-Compact 1-pole distribution		Design.by:	Drawn.by: Date:	Sheet No.
			MS	MS 030821	01
			Appr.by:	Rev.by: Date:	Cont Sh.No.
		SH	MC 040610	-	
		Rev.:	Drawing no:		
		E	KO-001781		

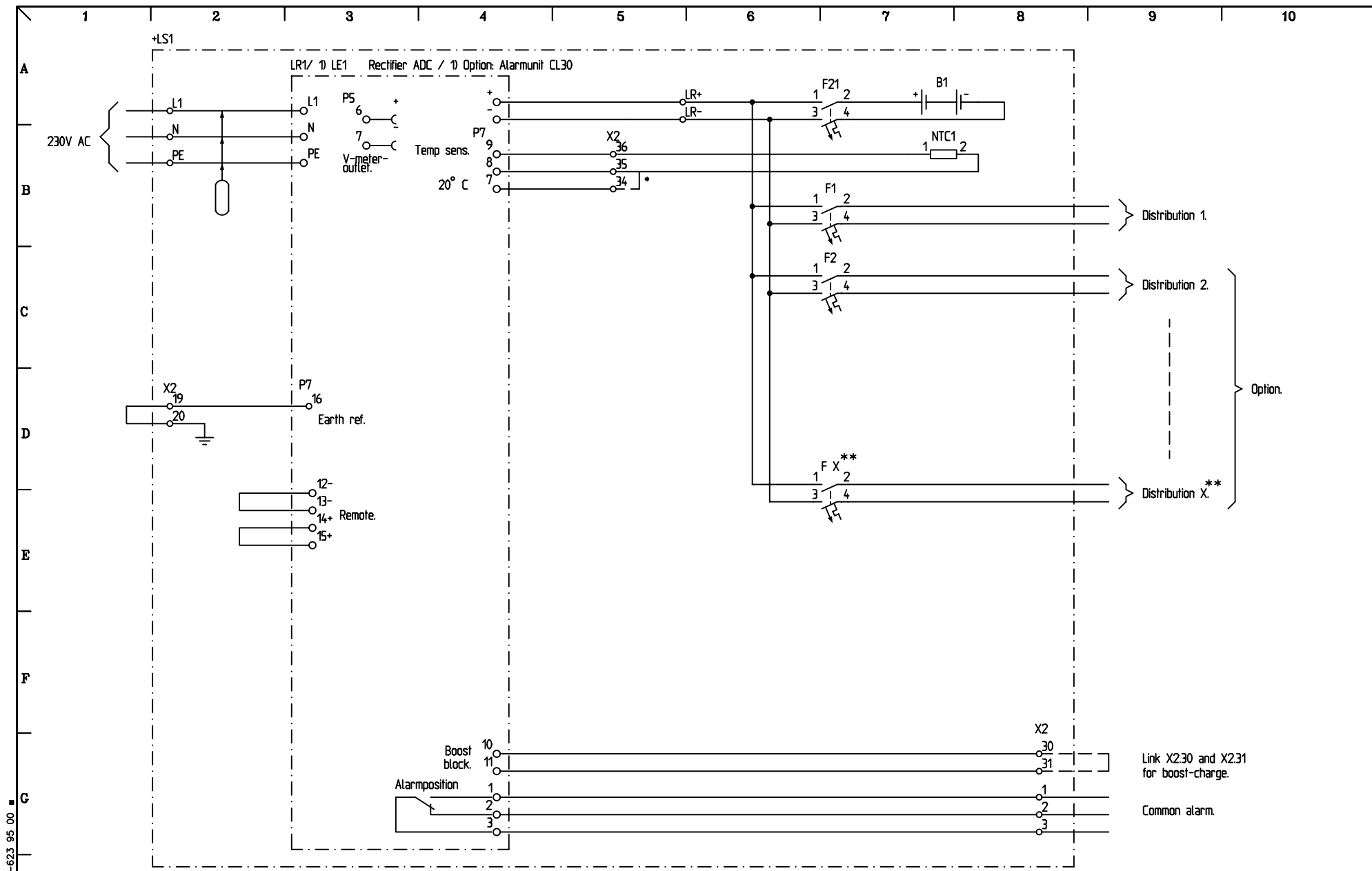
Link X2.30 and X2.31 for boost-charge.
 Common alarm.

ELDACO AB **46-(0)8-623 95 00




* Link X2.34 and X2.35 when adjusting charging level.
 ** Maximum number of distribution fuses is 10 in wall mounted version, and 8 in 19" version.
 *** Cable is marked "+GND"

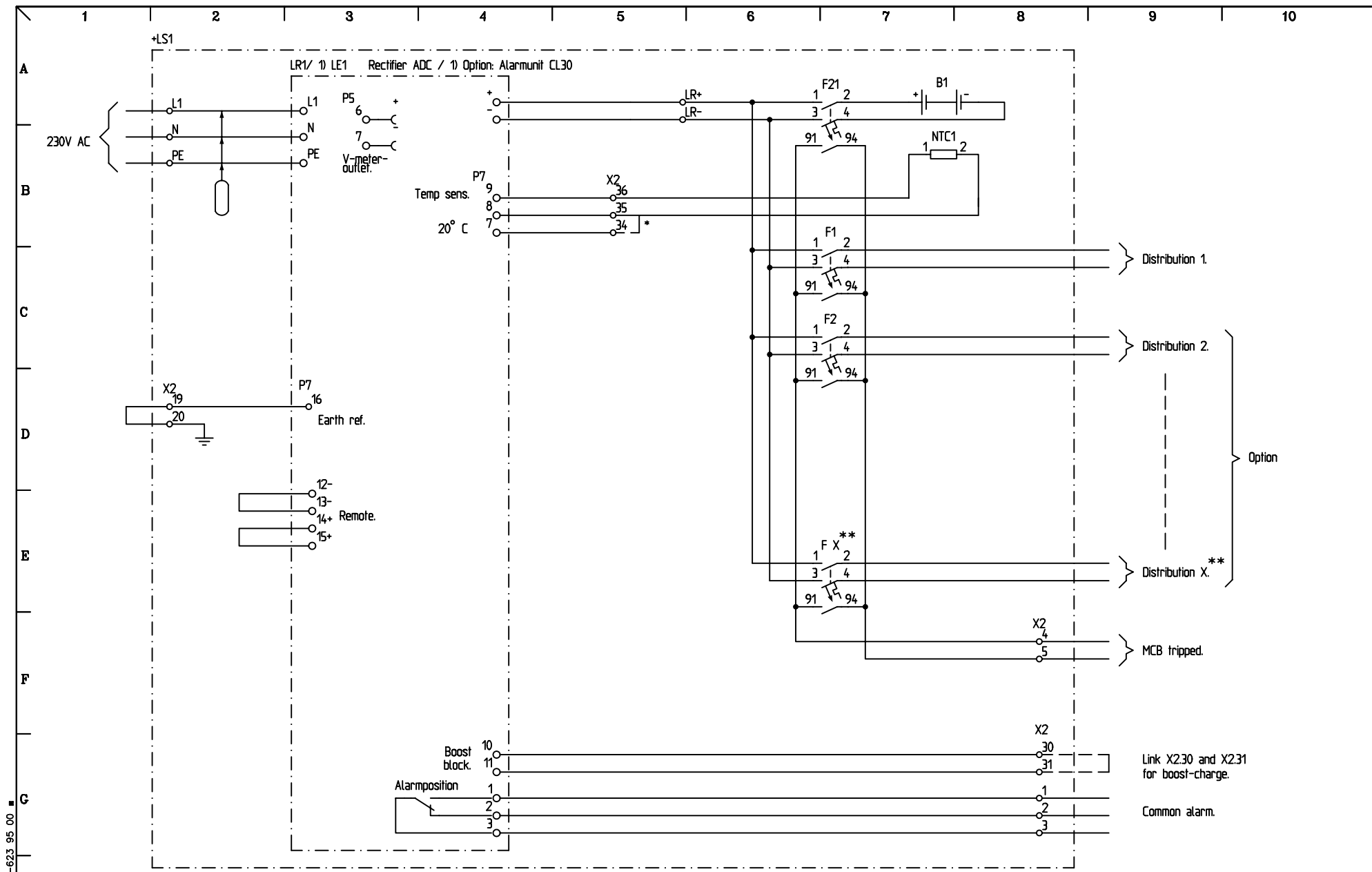
	LSA-Compact 1-pole distribution with aux. contacts.		Design.by: MS	Drawn.by: Date: MS 030909	Sheet No. 01
			Appr.by: SH	Rev.by: Date: MC 040610	Cont Sh.No. -
			Rev.: C	Drawing no: KO-001855	



* Link X2.34 and X2.35 when adjusting charging level.
 ** Max number of distribution fuses is 8 in wall mounted version, and 6 in 19" version.

	LSA-Compact 2-pole distribution		Design.by: MS	Drawn.by: Date: MS 030821	Sheet No. 01
			Appr.by: HS	Rev.by: Date: MC 031112	Cont Sh.No. -
			Rev.: D	Drawing no: KD-001780	

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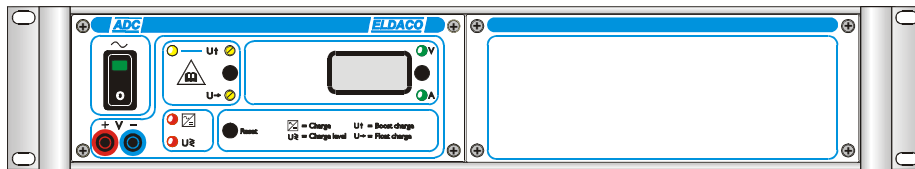
* Link X2.34 and X2.35 when adjusting charging level.
 ** Max number of distribution fuses is 6 in wall mounted version, and 5 in 19" version.

ELDACO	LSA-Compact	
	2-pole distribution with aux. contacts.	
	Link X2.30 and X2.31 for boost-charge.	
Design.by: MS	Drawn.by: Date: MS 030827	Sheet No. 01
Appr.by: HS	Rev.by: Date: MC 031112	Cont Sh.No. -
Rev.: C	Drawing no: KO-001823	

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Description ADC 150-600W 19"-model (eng.)		Doc.no. MA0224	Rev.no. 2
Designed by Håkan Lundh	Approved by Sören Hartvik	Page 1 of 26	Date 2002-12-04

Constant voltage rectifier ADC 150-600W 19"-model



Description ADC 150-600W 19"-model (eng.)		Doc.no. MA0224	Rev.no. 2
Designed by Håkan Lundh	Approved by Sören Hartvik	Page 2 of 26	Date 2002-12-04

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Circuit diagram:

ADC 150-300W 19".....	4E 9346
ADC 450-600W 19".....	4E 9347

Specifications and information herein are subjected to change without prior notice.

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Presentation

Constant voltage rectifier ADC 150-600W:

- Converts the mains' AC voltage to regulated DC voltage. The rectifier can be used for DC power supply or for operation together with batteries. All charge-, protection- and alarm levels are adjusted at the factory.
- Is designed for 19"-installation. All connections are made to terminals located at the rear of the unit. Everything that is needed during normal operation is easily accessible and visible on the frontpanel of the rectifier. Voltage and current are clearly shown on LCD-display. Selection is made with a push button for V (voltage) or A (ampere) and is indicated with LEDs.
- Gives an alarm at charge failure and high/low floating charge level.
- Operates at floating charge or equalization charge. The levels are adjusted at the factory, but can be readjusted with resp. potentiometer on the front. Equalization charge is indicated with a LED and is started with a push button or automatically after a mains failure if the rectifier operates at current limit for 30s or more. The function automatic equalizing charge can be set to active or inactive. After a selectable time 2, 4, 8 or 24h the equalization charge will switch over to floating charge. Can also be switched over manually.
- Has temperature compensated of charging voltage to optimize the lifetime of the battery.
- Has semi-protected V-meter plugs.
- External voltage sensing (remote sensing) can be connected to compensate the voltage drop in battery cables.
- Can easily be equipped with a monitor unit CL 30 or CL 40 for additional monitoring. CL 30 gives the alarm for charge level high, charge level low, battery circuit fault and earth fault +/- . CL 40 contains, together with the above mentioned alarm, also separate alarm relays for each alarm and individual alarm delay for charge level high/low and earth fault +/- . Alarms are indicated with LEDs on the front.
- Has the possibility to connect several ADC rectifiers in parallel for higher output current.
- Fulfils the EMC and low voltage directive and is CE marked.

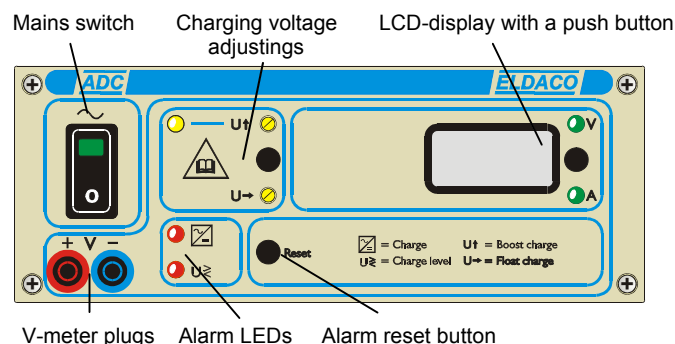


Figure 1. ADC standard

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Mounting

The rectifier should only be installed by experienced and qualified personnel as dangerous voltage may occur at the AC and the DC terminals. The rectifier is designed for indoor stationary mounting in a 19"-rack. Make sure that no heat radiant unit is mounted below the rectifier and that free circulation of cooling air is available. For the range of 60-120V, the rectifier must be mounted in a way that it is well protected against unintentional contact according to IP20.

Before connecting the rectifier, carry out the following:

1. Check the outside and inside of the rectifier to make sure that there are no transportation damages.
2. Check that line- and battery voltage correspond to the type label of the rectifier.
3. Check that the mains switch is in position "0" (off).

Standard connection

Connections are made to the terminals located at the rear of the unit.

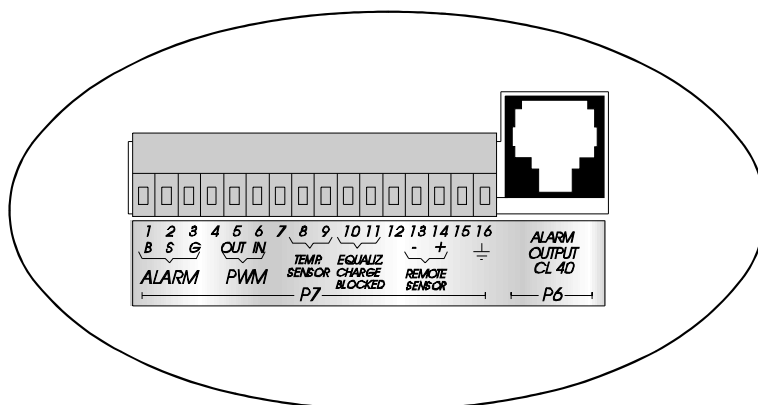


Figure 2. Connection terminals (B=Normally open, S=Normally closed, G=Common)

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cont. Standard connection

Mains: Connect the mains cable to the mains inlet. Recommended mains fuse is 6A.

Load: Check that the battery- and load fuses are removed. Connect the load (battery) to the terminal signed (+)/(-) (load output).

Temp.sensor: Temperature compensation of charging voltage is recommended if the battery system consists of lead-acid batteries. Temp.compensation optimize the lifetime of the battery. Remove the clamp between terminals P7:7 and 8. The clamp should only remain if no temperature compensated charging is needed. Open the enclosed temperaturesensor box and connect cables from the built-in sensor to terminals P7:8 and 9. Place the temp.sensor as closely as possible to the most central battery cell.

Equalization: charge At delivery the equalization charge is normally blocked and can not be started. If equalization charge is required, terminals P7:10 and 11 has to be short-circuited.

If automatic equalizing charge is requested, set switch SW1:6 at the adaptationboard 7794 in position "ON" (see "TIME DELAY AND BLOCK SETTINGS").

The duration for equalizing charge can be adjusted by the switch SW4 located at rear of the frontpanel PCB 7782, see below. The factory setting is set to 24h.

SW4:	2h	4h	8h	24h
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	OFF	OFF	ON	OFF

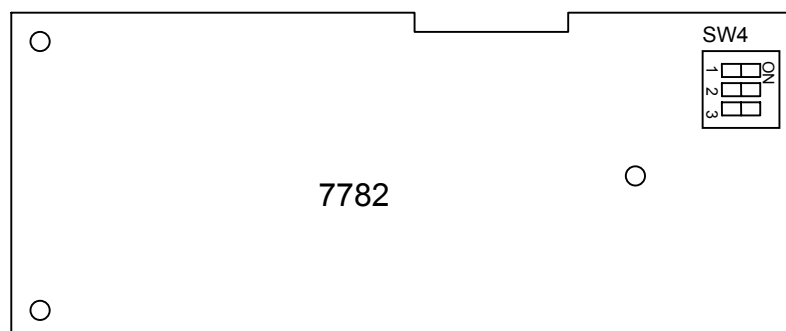


Figure 3. SW4

Description ADC 150-600W 19"-model (eng.)		Doc.no. MA0224	Rev.no. 2
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cont. **Standard connection**

Parallel operation:

With rectifiers connected in parallel, choose one (arbitrary) rectifier as master and the remaining rectifiers as slaves.

Connect a cable from terminal P7:5 (PWM-out) on the chosen master to terminal P7:6 (PWM-in) on the slave. If more than 1 slave, connect cables from terminal P7:5 (PWM-out) on the 1:st slave to terminal P7:6 (PWM-in) on the 2:nd slave etc.

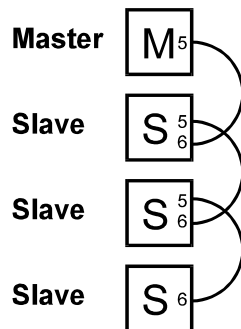


Figure 4. Parallel operation

Earth sensing:

Is used only if the rectifier consists of optional monitor unit CL 30 or CL 40. In standard configuration, the terminal P7:16 should be left open.

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cont. Standard connection

Common alarm: relay Connect alarm cable for floating charge level too high or low and charge failure alarm to terminals P7:1-3. At alarm, contact is obtained between terminals P7:2 and 3. Red LED for alarm present is lit. The LED can be blocked with the DIP-switch 2 on board 7794 (see "TIME DELAY AND BLOCK SETTINGS"). Normally, there is contact between terminals P7:1 and 3.

Remote sensing: If the voltage drop between the rectifier and the battery is large for example caused by long cables, remote sensing is recommended. Remove the clamps between terminals P7:14 and 15 resp. P7:12 and 13. Connect remote sensing cables from the battery distribution fuses to terminals P7:13(-) and 14(+). It is important that connection is done right. (see figure 5). The voltage displayed (on the LCD-display) will then be the actual battery voltage. The battery voltage can also be measured on the front.

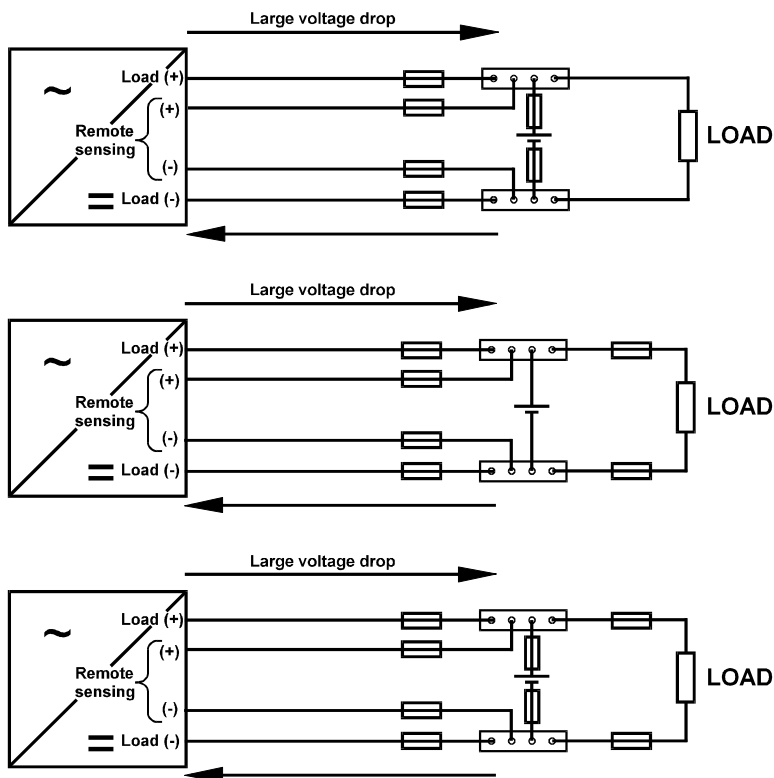


Figure 5. Remote sensing

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Monitor unit CL 30 connection (option)

If monitor unit CL 30 is not mounted at delivery:

Unscrew the top cover of the rectifier. Unscrew the four screws on the right hatch cover and remove the cover. Replace it with monitor unit CL 30. Connect a cable from CL 30 to terminal P2 on board 7794. Screw on the top cover.

If monitor unit CL 30 is mounted at delivery:

Earth sensing:

If earth sensing is required, connect earth sensing cable between terminal P7:16 and earth of chassis (screw).

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Monitor unit CL 40 connection (option)

If monitor unit CL 40 is not mounted at delivery:

Unscrew the top cover of the rectifier. Unscrew the four screws on the right hatch cover and remove the cover. Replace it with monitor unit CL 40. Connect a cable from CL 40 to terminal P2 on board 7794. Screw on the top cover. CL 40 has a separate relay box, which can be easily connected on DIN-busbar. Connect a cable from the rear of the rectifier, terminal P6, to the relay box.

If monitor unit CL 40 is mounted at delivery:

Earth sensing: If earth sensing is required, connect earth sensing cable between terminal P7:16 and earth of chassis (screw).

Remaining cable connections are done to terminals on the relay box.

Battery circuit fault:



Connect alarm cable for battery circuit fault to terminals P1:1-3. At alarm, contact is obtained between terminals P1:2 and 3. Normally, there is contact between terminals P1:1 and 3. If no battery is used in the system, check that the DIP-switch 3 on board 7794 is set to position "ON" (see "TIME DELAY AND BLOCK SETTINGS").

Charge level high:



Connect alarm cable for charge level high to terminals P1:4-6. At alarm, contact is obtained between P1:5 and 6. Normally, there is contact between P1:4 and 6.

Charge level low:



Connect alarm cable for charge level low to terminals P1:7-9. At alarm, contact is obtained between P1:8 and 9. Normally, there is contact between P1:7 and 9.

Earth fault:



Connect alarm cable for earth fault alarm to terminals P1:10-12. At alarm, contact is obtained between P1:11 and 12. Normally, there is contact between P1:10 and 12.

Common alarm:



Connect alarm cable for common alarm to terminals P1:13-15. At alarm, contact is obtained between P1:14 and 15. Normally, there is contact between P1:13 and 15.

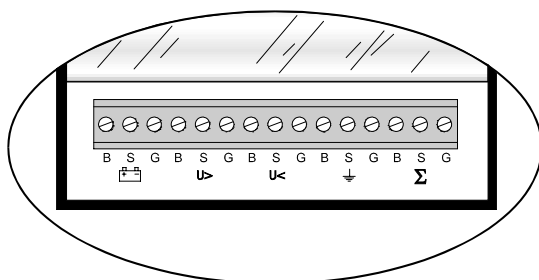


Figure 6. Terminals on the relay box (B=Normally open, S=Normally closed, G=Common)

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Start-up

All adjusting levels in this manual are valid, unless something else is mentioned.

Start: Check that battery- and load fuses are removed. Switch on the rectifier with the mains switch to position "~".

Vented- and valve regulated lead-acid cells:

Floating charge: Connect a V-meter (class 0.2 or better) to the plugs on the frontpanel and check that the output voltage for floating charge corresponds to the battery supplier's recommendations. Adjust according to "STANDARD ADJUSTING INSTRUCTION" for floating charge (U →), if necessary.

If vented lead-acid cells are used:

Equalization charge: Check the level for equalization charge. Start equalization charge (see "STANDARD CONNECTION") by pushing the button for equalization charge for approx. 2sec. The yellow LED for equalization charge starts to flash. Check that the voltage level corresponds to the battery supplier's recommendations. Adjust according to "STANDARD ADJUSTING INSTRUCTION" for equalization charge (U ↑), if necessary. After 2, 4, 8 or 24h, adjustable duration, the equalization charge will be switched over to floating charge and the LED for equalization charge goes out. The equalization charge voltage can be switched over manually to the floating charge level if start button for equalization charge is pushed one more time.

Charging of battery:

Connect the load- and battery fuses. The current increases towards current limit (if the battery is discharged) and the voltage level increases slowly towards the floating charge level. Check the current by pushing the button on the right side of the display, so that the green LED (A) is lit.

When the battery has reached the adjusted floating charge level, the current starts to decline. Check the voltage level on the display and adjust if necessary. If temp.sensor is connected (at lead-acid battery), consider the temp.compensation (see "STANDARD ADJUSTING INSTRUCTION").

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cont. Start-up

If the battery consists of vented lead-acid cells, push the start button (see "STANDARD CONNECTION") for equalization charge. The current increases to current limit and the voltage level increases slowly towards the preset equalization charge level. When the current starts to decline, check the equalization charge level and adjust if necessary.

After 2, 4, 8 or 24h, adjustable duration, the rectifier will be switched over to the floating charge level and the LED for equalization charge goes out. If return to floating charge is required earlier, push the start button for equalization charge one more time.

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Standard adjusting instruction

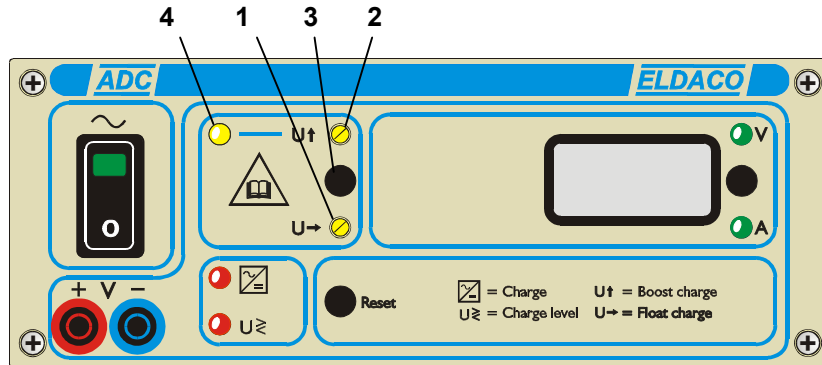


Figure 7. Adjustment of charging voltages

Push the instrument button next to the display for voltage reading. The green LED for V (voltage) is lit.

- 1. Adjustment of floating charge (U →):** Connect a V-meter (class 0.2 or better) to the plugs on the frontpanel and check that the voltage level for floating charge corresponds to the battery supplier's recommendations. If not, remove load- and battery fuses. Only if the system consists of lead-acid batteries, a temp.sensor is needed. Connect a clamp between terminals P7:7 and 8 and remove the external temp.sensor. Adjust the level with the potentiometer (1). For range of adjustment, see technical data. Turning clockwise gives higher voltage. If temp.sensor is connected (when lead-acid battery is used), remove the clamp between terminals P7:7 and 8.
- 2. Adjustment of equalization charge (U ↑):** Can only be started if the terminals for equalization charge are short-circuited (see "STANDARD CONNECTION"). Push the start button (for approx. 2sec.) for equalization charge (3). The yellow LED starts to flash. Check on the display that the voltage level for equalization charge corresponds to the battery supplier's recommendations. If not, remove load- and battery fuses and adjust the level with the potentiometer (2). For range of adjustment, see technical data. Turning clockwise gives higher voltage.
- 3. Start button for equalization charge (3):** After 2, 4, 8 or 24h, adjustable duration, the equalization charge will switch over to floating charge. This is to prevent overcharging of battery. For manually return to floating charge, push the button one more time.
- 4. Yellow LED for equalization charge (4):** Flashes as long as the rectifier is operating on equalization charge.

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Monitor unit CL 30 adjusting instruction (option)

The rectifier can, as an option, be equipped with a monitor unit CL 30. CL 30 operates together with the standard frontpanel and gives the alarm for charge level high, charge level low, battery circuit fault and earth fault +/- . Alarms are indicated with LEDs on the front and is connected to the common alarm relay in the rectifier. The voltage alarm levels are easy to set, since this levels are shown on the display. The earth fault alarm is set with a scale potentiometer.

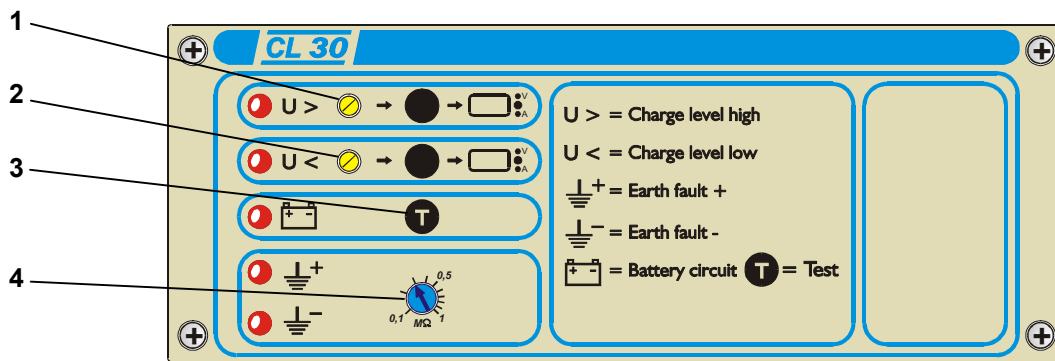


Figure 8. Adjustment of alarm levels

- 1. Adjustment of charge level high (U>):** Is adjusted for alarm at 2.33V/cell (if nothing else has been specified). Adjustable between 110-130% of the nominal voltage.
Push the button for charge level high. The display shows the level set for charge level high. Keep the button pressed and slowly adjust the alarm level with the potentiometer (1) to desired level. At alarm, the red LED for charge level high flashes.
If the alarm level is set too low, the alarm is activated at equalization charge. If the level is set too high the load can be damaged.
- 2. Adjustment of charge level low (U<):** Is adjusted for alarm at 95% of the nominal voltage (if nothing else has been specified). Adjustable between 90-110% of the nominal voltage.
Push the button for charge level low. The display shows the level set for charge level low. Keep the button pressed and slowly adjust the alarm level with the potentiometer (2) to desired level. At alarm the red LED for charge level low flashes.
If the alarm level is set too low, the battery can be damaged. If the level is set too high, a false alarm may occur.

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cont. Monitor unit CL 30 adjusting instruction (option)

3. **Battery circuit fault alarm:** Is adjusted to 1.96V/cell. Test occurs once/24h. The level is adjusted at the factory and cannot be adjusted. If there is an interruption in the battery circuit during test, the common alarm relay in the rectifier will drop after adjusted time delay and the red LED for battery circuit fault will flash. The battery circuit can also be tested manually by pushing the TEST-button (3). If the LED remains off, the battery circuit is OK.

4. **Adjustment of earth fault alarm (+/-):** Is adjusted for alarm at 0.5M Ω . Can be adjusted between 0.1-1M Ω with the potentiometer (4) (scale-potentiometer). At alarm the red LED for earth fault (+) resp. earth fault (-) flashes.

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Monitor unit CL 40 adjusting instruction (option)

The rectifier can, as an option, be equipped with a monitor unit CL 40. CL 40 operates together with the standard frontpanel and gives the alarm for charge level high, charge level low, battery circuit fault and earth fault +/- . CL 40 has individual time delayed alarm relays for each alarm. Alarms are indicated with LEDs on the front and is connected to the individual alarm relay and the common relay. The voltage alarm levels are easy to set, since this levels are shown on the display. The earth fault alarm and time delays for alarms are set with scale potentiometers.

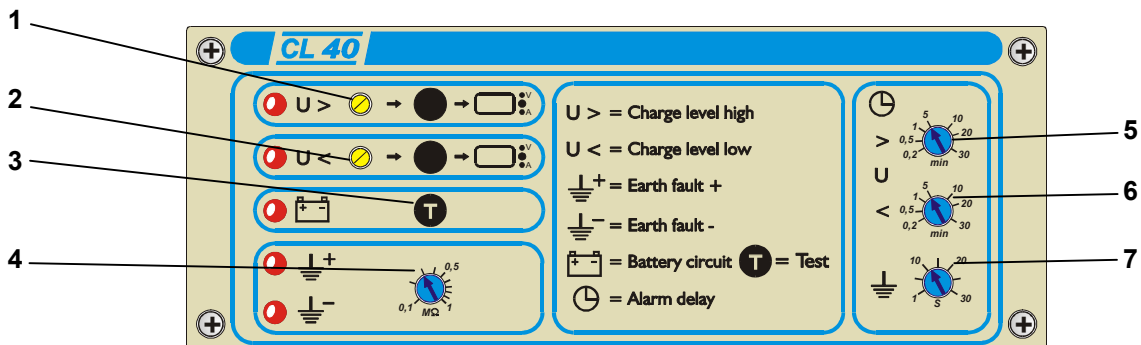


Figure 9. Adjustment of alarm levels

- 1. Adjustment of charge level high (U>):** Is adjusted for alarm at 2.33V/cell (if nothing else has been specified). Adjustable between 110-130% of the nominal voltage.

Push the button for charge level high. The display shows the level set for charge level high. Keep the button pressed and slowly adjust the alarm level with the potentiometer (1) to desired level. After time delay (adjustable between 10s-30min with the potentiometer (5)) the relay for charge level high, and the common relay drop. After that the red LED for charge level high flashes.

If the alarm level is set too low, the alarm is activated at equalization charge. If the level is set too high the load can be damaged.
- 2. Adjustment of charge level low (U<):** Is adjusted for alarm at 95% of the nominal voltage (if nothing else has been specified). Adjustable between 90-110% of the nominal voltage.

Push the button for charge level low. The display shows the level set for charge level low. Keep the button pressed and slowly adjust the alarm level with the potentiometer (2) to desired level. After time delay (adjustable between 10s-30min with the potentiometer (6)) the relay for charge level low, and the common relay drop. After that the red LED for charge level low flashes.

If the alarm level is set too low, the battery can be damaged. If the level is set too high, a false alarm may occur.

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cont. **Monitor unit CL 40 adjusting instruction (option)**

3. **Battery circuit fault alarm:** Is adjusted to 1.96V/cell. Test occurs once/24h. The level is adjusted at the factory and can not be adjusted. If there is an interruption in the battery circuit during test, the alarm relay will drop without any further time delay and the red LED for battery circuit fault will flash.
The battery circuit can also be tested manually by pushing the TEST-button (3). If the LED remains off, the battery circuit is OK.
4. **Adjustment of earth fault alarm (+/-):** Is adjusted for alarm at 0.5M Ω . Can be adjusted between 0.1-1M Ω with the potentiometer (4) (scale-potentiometer). After time delay (adjustable between 1s-30s with the potentiometer (7)) the red LED for earth fault (+) resp. earth fault (-) flashes.
5. **Adjustment of time delay for charge level high:** The time delay of the relay function can be adjusted between 10s-30min with the potentiometer (5). Is adjusted to 10s (if nothing else has been specified).
6. **Adjustment of time delay for charge level low:** The time delay of the relay function can be adjusted between 10s-30min with the potentiometer (6). Is adjusted to 10s (if nothing else has been specified).
7. **Adjustment of time delay for earth fault:** The time delay of the relay function can be adjusted between 1s-30s with the potentiometer (7). Is adjusted to 10s (if nothing else has been specified).

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Temperature compensation

If the system consists of lead-acid batteries, a temperature compensation of the charging voltage is recommended. The temp.compensation is activated in the area +10 to +30°C.

The temperature is sensed by an external temp.sensor (enclosed in the rectifier), connected to the connection terminal of the rectifier and placed as closely as possible to the most central battery cell (see "STANDARD CONNECTION").

The charging voltage temp.compensates with -3.3mV/°C and cell when the temperature of the battery exceeds +20°C and with +3.3mV/°C and cell when the temperature falls below +20°C. At a temperature over +40°C or if the temp.sensor is short-circuit, the rectifier will control the charging voltage down to 2.1/cell.

If there's an interruption in the temp.sensor or if the temperature is below -5°C, the temp.compensation will be +10°C, i.e. +33mV/cell. Floating charge level alarm is given in both cases. The use of temp.compensation optimize the lifetime of the battery.

At parallel operation the temp.sensor should only be connected to the master.

Parallel operation

The rectifier can be connected in parallel with one or more rectifier in the ADC-series. You can also connect rectifiers within different power classes in parallel, e.g. 1pcs. ADC 24/10 (300W) and 1pcs. ADC 24/20 (600W).

In parallel operation the rectifier, which is set to master, controls the rest of the rectifiers. To choose master/slave see "STANDARD CONNECTION". To adjust the systems charging voltage, you only have to adjust on the master. If you try to adjust the charging voltage on a slave, nothings happens because the master controls all of the slaves, even if the master is turned off. This holds for all adjustments of the charging voltage. This means activating equalization charge or to do a manual battery circuit test, has to be done on the master.

To avoid floating charge level alarm on the slaves, e.g. when equalization charging, the floating charge level alarm should be blocked on the slaves in parallel operation (see "TIME DELAY AND BLOCK SETTINGS").

If a slave is equipped with option CL30 or CL40 the battery circuit fault alarm should be blocked (see "TIME DELAY AND BLOCK SETTINGS"). This is because the master has to determine the interval between the battery circuit tests.

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Remote sensing

If the voltage drop between the rectifier and the battery is large for example caused by long cables, remote sensing is recommended. If remote sensing is required, remove the clamps between terminals P7:12 and 13 resp. P7:14 and 15. Connect remote sensing cables from the battery distribution fuses to terminals P7:13(-) and 14(+). This means that the charging voltage on the rectifiers output becomes higher and correct battery voltage will be obtained. Maximal compensation is +3% of adjusted floating charge. If there is an interruption in the remote sensing cables, the charging voltage will automatically be adjusted on the rectifiers output to 3% over adjusted floating charge and gives an alarm for floating charge level.

In parallel operation the remote sensing should only be connected to the master.

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Time delay and block settings

There are six DIP-switches for time delay and block settings placed on adaptation board 7794 (see figure 10).

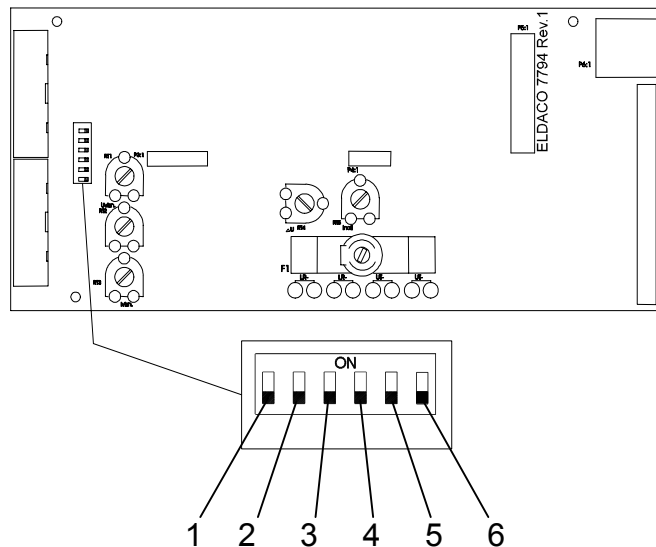


Figure 10. SW1

1. **Switch for alarm delay of common alarm relay:** Can be set to 10s (pos. "ON") or 10min (pos. "OFF"). Factory setting is pos. "ON".
2. **Switch for blocking of LEDs:** Set to pos. "ON" if the alarm LED is to go out without resetting of the alarms. Factory setting is pos. "OFF".
3. **Switch for blocking of battery circuit fault alarm:** Set to pos. "ON" to block the battery circuit fault alarm. Factory setting is pos. "OFF".
4. **Switch for blocking of charge failure alarm:** Set to pos. "OFF" to block the mains failure and rectifier failure alarm. Set to pos. "ON" if SW1:6 is set to "ON" (automatic equalizing charge). Factory setting is pos. "ON".
5. **Switch for blocking of floating charge level too high or low alarm:** Set to pos. "OFF" to block the floating charge level too high or low and/or temp.sensor failure and fuse failure alarm. Factory setting is pos. "ON".
6. **Switch for automatic equalizing charge:** Set to pos. "ON" if automatic equalizing charge is requested. Factory setting is pos. "OFF".

CL 30/CL 40: The alarm for high and low charging voltage is blocked by turning resp. alarm potentiometer to the maximum. Turn the alarm potentiometer for charge level high max clockwise and the alarm potentiometer for charge level low max anti-clockwise.

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Standard monitoring

The rectifier gives the alarm for charge failure and floating charge level too high or low. The alarms are indicated with LEDs on the front and by a common alarm relay.

Charge failure gives the alarm for:

- Mains failure
- Rectifier failure

Floating charge level too high or low gives the alarm for:

- Fuse failure
- Incorrect charging voltage
- Temp.sensor failure
- External voltage sensing fault

Indication:

Mains failure is indicated when there is no mains voltage.

Rectifier failure is indicated if the main circuit of the rectifier is faulty, at regulation fault or when the over-voltage protection is activated.

Fuse failure is indicated when an DC fuse in the rectifier has blown.

Incorrect floating charge voltage is indicated at $\pm 2\%$ from the floating charge voltage level set at 20°C.

Temp.sensor failure is indicated when the temperature falls below -5°C or exceeds +40°C.

External voltage sensing fault is indicated at remote sensing fault.

Function:

In the event of fault the resp. LED for charge failure and floating charge level too high or low alarm will flash. After the time delay (selected by the DIP-switch 1 on board 7794 to 10s or 10min, see "TIME DELAY AND BLOCK SETTINGS") the charge failure relay drops and the LED flashes.

After reset the LED will continue to flash if the fault remains. When the fault disappears the relay is energized again and the LED continues to flash until the next reset. Blocking of LEDs can be selected by the DIP-switch 2 on board 7794 (see "TIME DELAY AND BLOCK SETTINGS"). The DIP-switch 2 is common to both LEDs.

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CL 30 monitoring (option)

If the rectifier is equipped with CL 30 the following alarm also obtains:

- Charge level high
- Charge level low
- Battery circuit fault
- Earth fault +/-

Function:

In the event of fault the resp. red LED will flash. Each alarm follows selected time delay (10s or 10min) for the common alarm relay in the rectifier. After the time delay the common alarm relay in the rectifier drops and the LED flashes. After reset the LED will continue to flash if the fault remains. When the fault disappears the relay is energized again and the LED continues to flash until the next reset. Blocking of LEDs can be selected by the DIP-switch 2 on board 7794 (see "TIME DELAY AND BLOCK SETTINGS"). The DIP-switch 2 is common to all LEDs.

CL 40 monitoring (option)

If the rectifier is equipped with CL 40 the following alarm and individual time delays also obtains:

- Charge level high (time delay 10s-30min)
- Charge level low (time delay 10s-30min)
- Battery circuit fault
- Earth fault +/- (time delay 1s-30s)


Function:

CL 40 has four separate relays and a common relay. At charge level high, charge level low, battery circuit and earthfault the resp. red LED will flash. After the time delay, the relay in question drops, as well as the common relay. The time delays are adjustable independent of each other. Therefore the common alarm will drop after various time delay depending on which fault that has occurred. After reset the LED will continue to flash if the fault remains. When the fault disappears the relay is energized again and the LED continues to flash until the next reset. Blocking of LEDs can be selected by the DIP-switch 2 on board 7794 (see "TIME DELAY AND BLOCK SETTINGS"). The DIP-switch 2 is common to all LEDs.

The common alarm relay in the rectifier is connected to the common relay in the CL40. I.e. when a charge failure alarm or a floating charge level alarm occurs, the common relay both in the rectifier and in the CL40 drops. If any of the alarms in the CL40 occurs, and non of the two a.m. alarms are active, only the common alarm relay in the CL40 will drop.

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Trouble shooting

Failure indication	Cause of failure	Measure
The LED for charge failure flashes. 	1. Mains failure.	1. Check if mains is available and check the mains fuse.
	2. Charge failure.	2. Check the charging voltage, the rectifier may have detected a high voltage on the DC output. Try to reset the alarm by switching the rectifier "ON/OFF". If no output voltage is given from the rectifier, check the internal main fuse F1 on PCB 7778.
The LED for floating charge level too high or low flashes. "U _z "	1. Incorrect charging voltage.	1. The rectifier is running in current limit, this is all right if the battery is discharged and the rectifier is charging. Check that the load is not too high.
	2. Fuse failure DC.	2. Check the DC fuse F1 on PCB 7794.
	3. Temp. sensor failure.	3. Check the battery temperature, alarm is given at <-5°C and >+40°C. Check that the sensor isn't shorted or interrupted, and correct connected, see "STANDARD CONNECTION".
	4. Fault in the remote sensing.	4. Check that the remote sensing cables are connected properly see "STANDARD CONNECTION". Check that the voltage drop between the rectifier output and the battery/load (where the remote sensing cables are connected) isn't more the 3% of adjusted floating charge. The rectifier can't compensate more than 3%.

Service department at Eldaco AB:

Tel: +46(0)8-623 95 00, Fax: +46(0)8-96 97 72, E-mail: power@eldaco.se

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Technical data

Input voltage	230V AC, $\pm 15\%$, 1-phase, 45-65Hz
Efficiency	80-90% at 230V AC input and maximum load
Power factor	>0.98 at 230V AC input and maximum load
Regulation	Static regulation, $<\pm 0.5\%$ at all operating conditions
Charging voltage levels	Adjustable 95-120% of U_{nom} Terminal for external voltage sensing (remote sensing) Temp.compensation of charging voltage
Equalization charge	Timer controlled function, with selectable time 2, 4, 8 or 24h. Can also be reset manually
Ripple voltage	Max 0.05% RMS of U_{nom} Psophometric max 1mV (12-24V), max 2mV (36-60V)
Instrument	Digital voltage and ampere meter (3½ digits LCD)
Safety	<ul style="list-style-type: none">- Safety circuits for high AC voltage and over heating- DC over-voltage protection (at approx. 125% of U_{nom})- Current limited- Short-circuit proof
Standard monitoring	<ul style="list-style-type: none">- Charge failure, indicates for<ul style="list-style-type: none">- Mains failure- Rectifier failure- Floating charge level too high or low alarm, indicates for<ul style="list-style-type: none">- Fuse failure DC- Incorrect charging voltage- Temp.sensor failure- External volt. sensing fault <p>Indication with LEDs on frontpanel and by a 1-polar switched relay. Maximum contact load: AC: 1200VA, 150V, 8A resistive load DC: 50W, 150V, 8A resistive load</p> <p>Time delay for alarm relay 10s or 10min</p>

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cont. Technical data

Ambient temperature 0 to +40°C

Enclosing IP20

Colour RAL 7035

Standards

Emission	EN 50081-1, 50081-2 (110-120V: EN 50081-2)
Immunity	EN 50082-1, 50082-2 (110-120V: EN 50082-2)
Electrical safety	EN 60950
Harmonics	EN 61000-3-2

EMC and low voltage directive
CE marked

Terminals

AC terminal:	Mains inlet
DC terminal:	max 10mm ²
Signal terminals:	max 1.5mm ²

CL 30, CL 40 monitoring (option)

- Gives the alarm for
 - Charge level high (U>)
 - Charge level low (U<)
 - Battery circuit fault
 - Earth fault +/-

CL 30: Indication with LEDs on frontpanel and by the same relay as the standard relay.
Time delay for alarm relay: 10s or 10min

CL 40: CL 40 has four separate relays and a common relay. Indication with LEDs on frontpanel and by a common alarm relay.

Time delay for alarm relay
Voltage alarm adjustable between 10s-30min
Earth fault alarm adjustable between 1s-30s

Terminals max Max 2.5mm²

Max contact load

AC:	1200VA, 300V, 8A resistive load
DC:	50W, 300V, 8A resistive load

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cont. Technical data

Rectifier, output power, mains fuse, dimensions and weight

Rectifier	Power (W)	Mains fuse (A)	Dimensions (H×W×D)	Weight (Kg)
ADC 12/10	150	6	88×19"×320	5
ADC 12/20	300	6	88×19"×320	6
ADC 24/6	150	6	88×19"×320	5
ADC 24/10	300	6	88×19"×320	5
ADC 24/15	450	6	88×19"×320	6
ADC 24/20	600	6	88×19"×320	6
ADC 36/4	150	6	88×19"×320	5
ADC 36/8	300	6	88×19"×320	5
ADC 36/12	450	6	88×19"×320	6
ADC 36/16	600	6	88×19"×320	6
ADC 48/3	150	6	88×19"×320	5
ADC 48/6	300	6	88×19"×320	5
ADC 48/9	450	6	88×19"×320	6
ADC 48/12	600	6	88×19"×320	6
ADC 60/2.5	150	6	88×19"×320	5
ADC 60/5	300	6	88×19"×320	5
ADC 60/7.5	450	6	88×19"×320	6
ADC 60/10	600	6	88×19"×320	6
ADC 110/2.5	300	6	88×19"×320	5
ADC 110/5	600	6	88×19"×320	6
ADC 120/2.2	300	6	88×19"×320	5
ADC 120/4.5	600	6	88×19"×320	6

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cont. Technical data

Range of adjustment

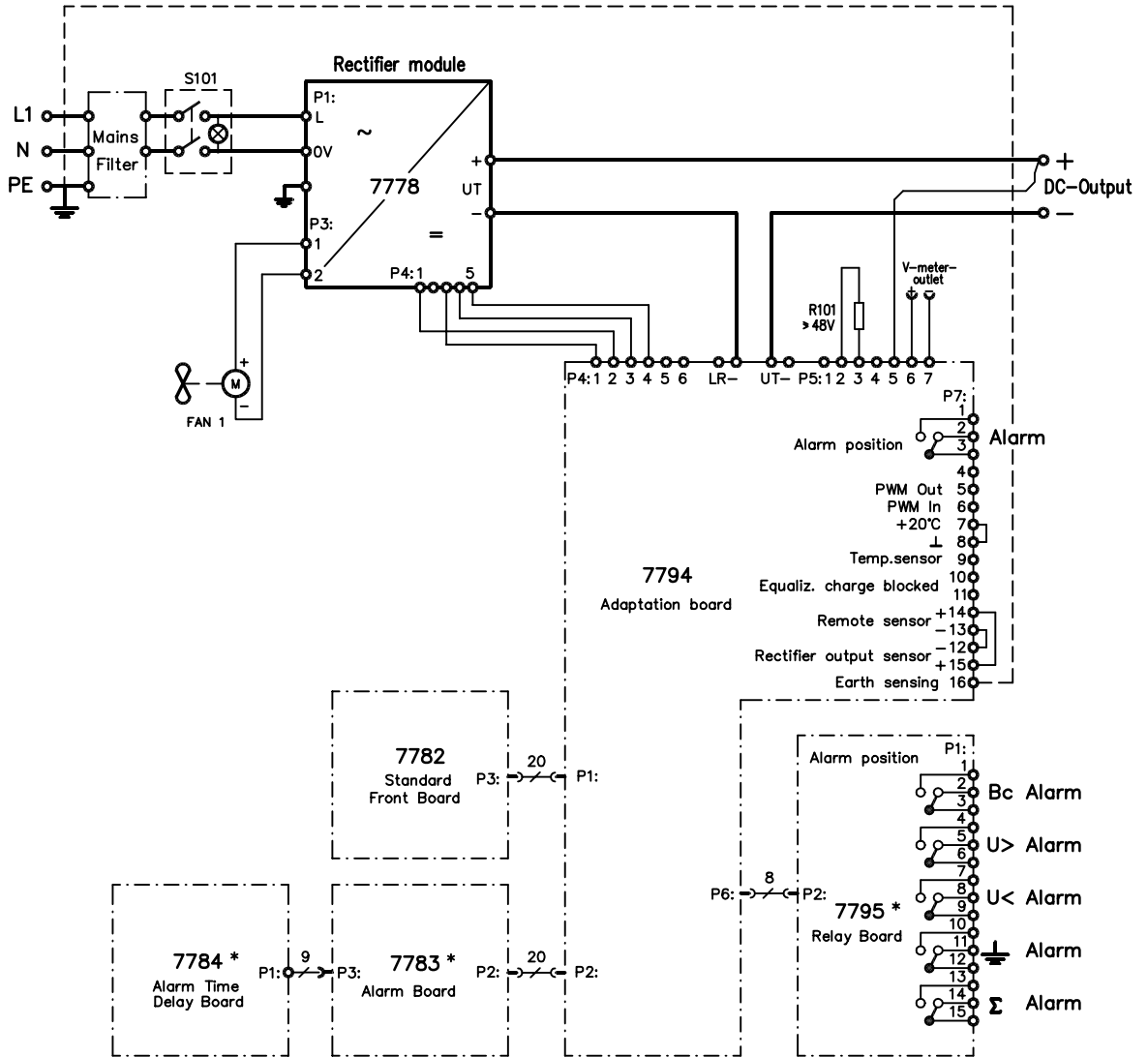
Nom. voltage (V)	Range of adjustment (V)	Nom. voltage (V)	Range of adjustment (V)
12	11.4-14.4	60	57.0-72.0
24	22.8-28.8	110	104.5-132.0
36	34.2-43.2	120	114.0-144.0
48	45.6-57.6		

Standard factory set values

Unom (V)	No. of lead-acid cells	Floating charge 2.28V/cell (V)	Equaliz. charge 2.35V/cell (V)	DC Over-volt. protection (V)
12	6	13.7	14.1	15.1
24	12	27.4	28.2	30.2
36	18	41.0	42.3	45.3
48	24	54.7	56.4	60.5
60	30	68.4	70.5	75.6
110	53	120.8	124.6	133.5
120	60	136.8	141.0	151.2

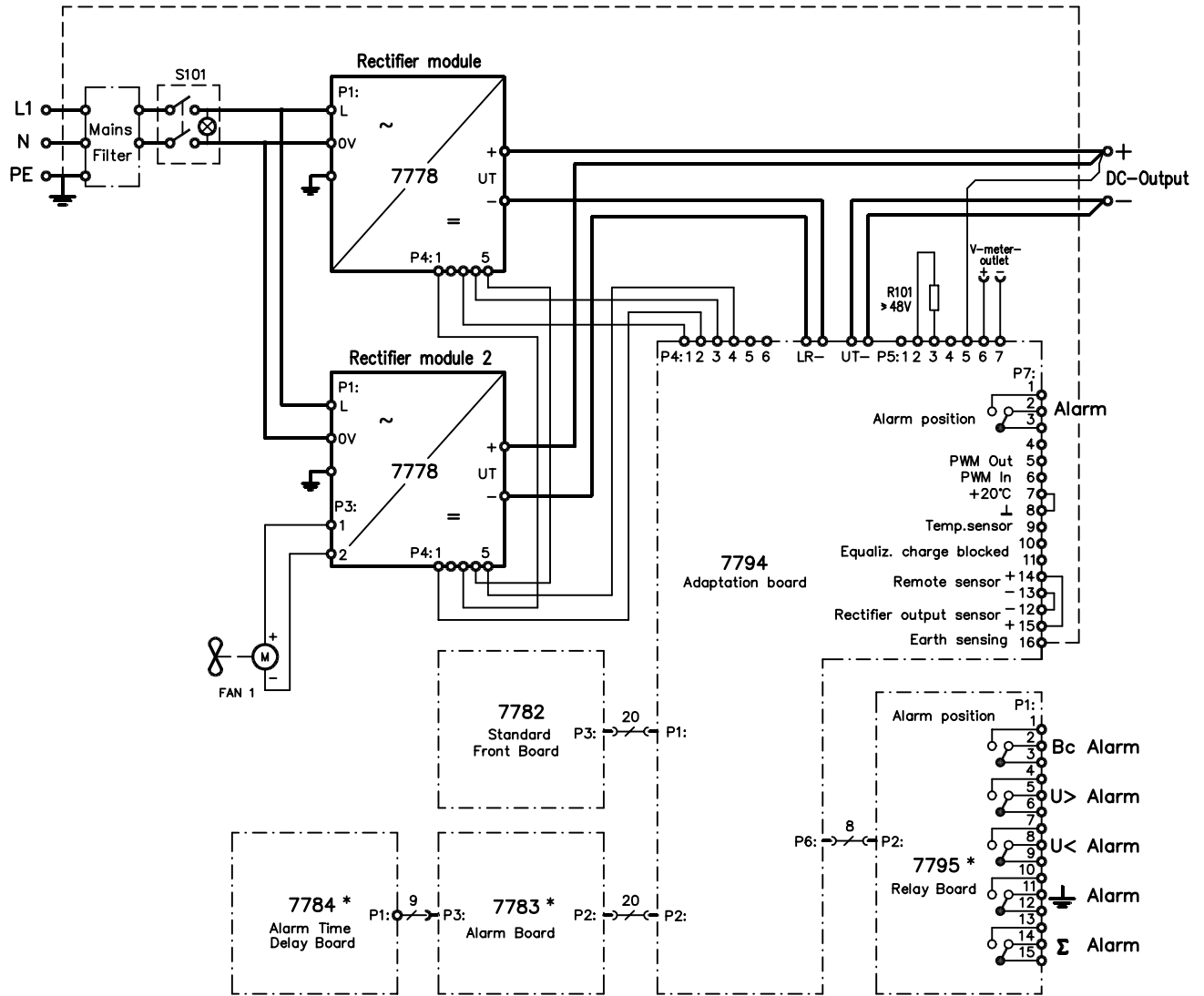
Standard factory set values on CL30 and CL40

Alarm for charge level high (DC) 2.33V/cell (V)	Alarm for charge level low (DC) 95% of Unom (V)	Batt. circuit fault 1.96V/cell (V)	Earth fault (Ω)
14.0	11.4	11.8	0.5M
28.0	22.8	23.5	"
41.9	34.2	35.3	"
55.9	45.6	47.0	"
69.9	57.0	58.8	"
123.5	104.5	103.9	"
139.8	114.0	117.6	"



* = Optional equipment

					Art.No: 11064
Dwg.-No	Pcs.	Denomination	Material	Dimension	Tolerances:
Constr.by: Date: S.H 950609	Drawn by: Date: R.A 960208		Approved by: J.H.	Scale:	Replaces Rev.1 Replaced by
ADC 150 - 300W 19" 1 Rectifier module			Rev.No: 2	Rev.by: Date: M.A. 990615	Drawing No: 4E 9346/1



* = Optional equipment

					Art.No: 11065
Dwg.-No	Pcs.	Denomination	Material	Dimension	Tolerances:
Constr.by: Date: S.H 950609	Drawn by: Date: R.A 960208		Approved by: J.H.	Scale:	Replaces Rev.1 Replaced by
ADC 300 - 600W 19'' 2 Rectifier modules			Rev.No: 2	Rev.by: Date: M.A 990615	Drawing No: 4E 9347/1