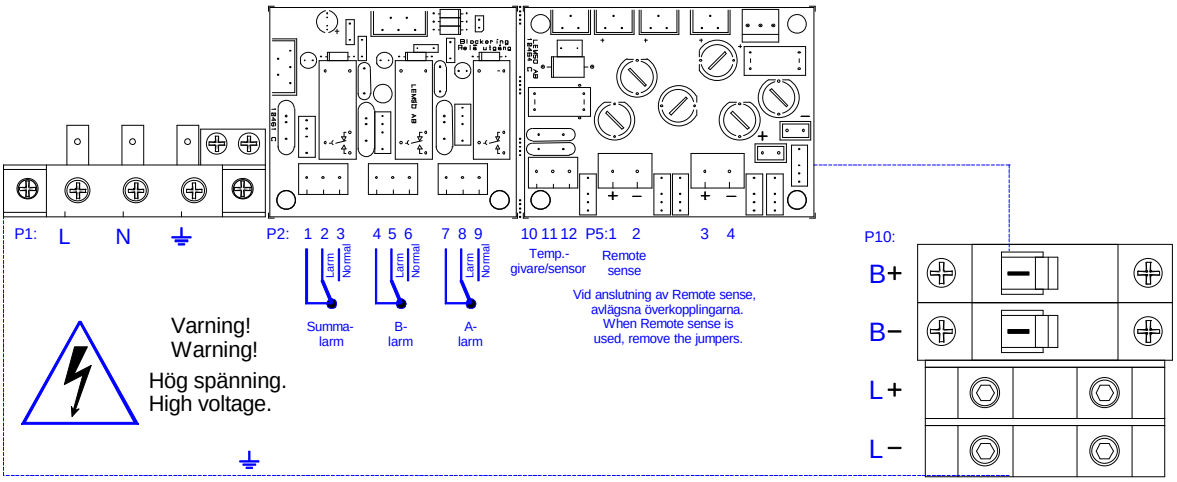
CONSTANT VOLTAGE
CHARGER TYPE UP 510

Mechanical Assemble

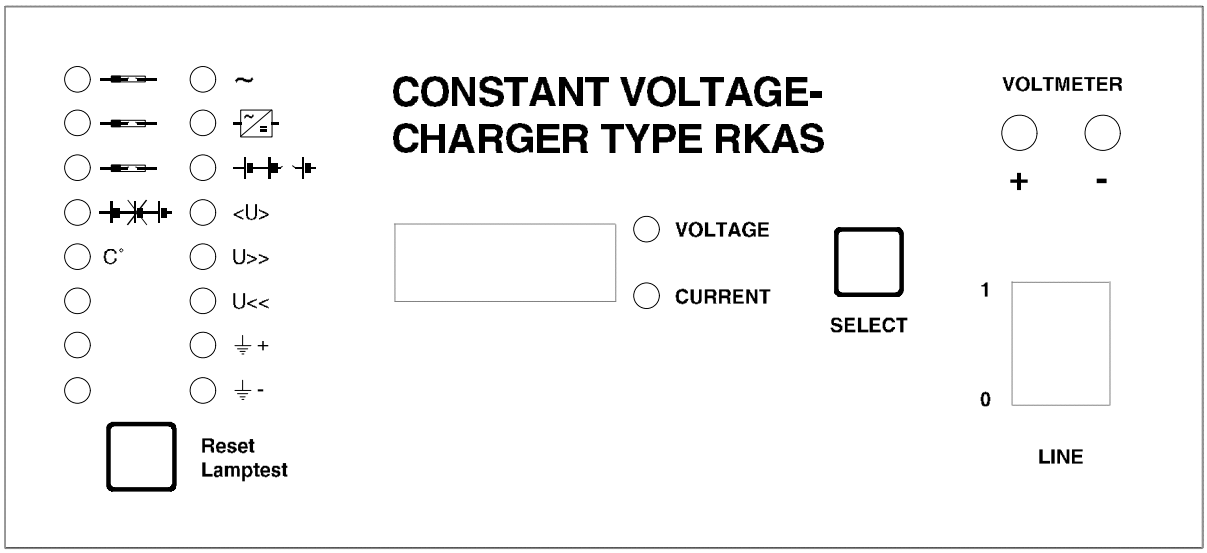
The rectifier is mounted in a cabinet intended for indoor wall mounting. The cabinet has ventilation holes on the top and on the bottom, to facilitate cooling by natural convection.

The rectifiers main circuit is assembled on a metal plate in the bottom of the cabinet. This plate also works as the base for the whole rectifier unit. Over the rectifier, there is a cover. This cover can easily be removed for installation and service. Also the cable inlet plate can easily be removed for aiding the disassembly, in case of servicing the unit.
The terminal block for **input** AC-voltage, is located to the left in the bottom of the cabinet (P1). There is also an additional GND connection on the M4 screw just below the terminal block P1. The terminals for **output** DC (P10), are located to the right of the cabinet.
The **alarm** terminals for A- ,B- and Sum- alarm are located between the input and output terminals (P2:1-9). On the PCB with the alarm relays there are 3 green LED's. These LED's will light when there are no alarms, i.e. when the respective alarm relays are pulled.
Temperature sensor (option) is connected to P2:10-12.



The two automatic fuses that are situated above the battery fuses are the output fuses for the rectifier itself.

In the upper part of the cabinet there is a metal profile on which the printed circuit board for the alarm LED's and digital instrument are mounted. On the same metal profile is the front panel glued. The front panel is reached through a hole-cut in the cover, when the cover of the rectifier is closed.



To the right on the front panel there is a **LINE** switch, with a built-in indication lamp for controlling power **on - off** of the rectifier. Above this switch there are two 4 mm female panel sockets for control measurement of the rectifiers output voltage by an external **VOLTMETER**.
In the center of the panel is a digital display. On this display you can see the chargers output voltage or output current. What currently is shown on the display is indicated by the two LED's to the right of the digital display. By pressing the switch "**SELECT**" you can switch between output voltage and output current.

To the left on the front panel there are LED's for alarm indication. As standard, the charger is delivered with eight alarm functions. These functions are shown in the right column of LED's. As an option, eight additional alarm functions are available. These functions are shown in the left column of LED's. Beneath the two columns of LED's, there is a push button for **LAMPTEST / RESET.** When this button is pressed, all the LED's (8 or 16) will light up for lamptest control, and at the same time the alarms are reset.

Alarm is indicated by a flashing LED until the reset button is pressed. At this time LED's indicating alarms that are no longer active will go out. LED's indicating alarms that are still active will become continuously on. When an alarm that are continuos on disappears and comes back again, the LED will pass from continuos to flashing again.

If an activated alarm is connected as A- or B-Alarm the corresponding relay is deactivated, when the pre-programmed delay time from the alarm occurrence runs out, and the alarm is still active. Is the A- or B-Alarm chosen to control the Sum-Alarm as well, the Sum-Alarm relay will react at the same time. All of the alarm relays will be restored (pulled) when the **RESET** button is pushed. If the alarm is still active (continuously shining), the alarm relay will deactivate, when the pre-programmed delay time once again runs out.

The alarm can also be configured as "Latch with time delay". In this case the LED does not "stick" in flashing mode at once the alarm is activated, but extinguish as the

alarm disappears. The condition for the LED to stay flashing is, that the alarm condition exists longer than the time delay that is set for this alarm. This time delay is the same delay as the time delay for A or B alarm, depending on which of these the alarm controls. Example: GND fault + is connected to B-Alarm and the time delay for B-Alarm is 30 sec. This means that GND fault + must exist more than 30 sec for the LED to continue flashing if the GND fault + comes and goes. This time is required every time an alarm condition exist, independently of if the relays for A and B alarms are closed or open.

The alarm can be selected as "not latching" which means that the LED automatically reset when the alarm disappears. If the alarm has lasted for so long time, that the A-, B-, and Sum-alarm have been activated, the alarm relay will also automatically reset. If indication of which alarm that caused the alarm relay to activate is wanted, then SW6:5 (AutoR) on the alarm PCB shall be in ON position. The LED's for alarms that caused the relay to activate will then continue to light even after that the alarm condition has disappeared. The alarm relays although, will automatically reset when the alarm condition disappears.

Fuse fault			Mains power failure
Fuse fault			Charger failure
Fuse fault			Battery circuit failure
Cell fault		<U>	Floating voltage failure
Temperature guard	C°	U>>	High battery voltage
spare		U<<	Low battery voltage
spare		⏚ +	Ground fault +
spare		⏚ -	Ground fault -

To the left of the front panel is a hole in the panel. It is possible through this hole to adjust and trim the alarm board. To adjust the alarm board, see instructions: "Adjust and trimming instructions for alarm and display board"

If the door to the cabinet is open, there is a jumper situated under the Select button just outside the front panel. This jumper shall normally be installed, but in special applications when the internal ground resistance measuring circuit is not used and can not be connected to protective ground this jumper shall be removed. This can be the case for instance if an external ground resistance measuring device is installed. In this case the internal ground fault alarm of course is not functioning.

Installation

The rectifier is intended for indoor wall mounting and stationary installations. The installation is to be carried out by a qualified and experienced person because there is **high voltage** on the rectifiers input and output side. Over and under the rectifier there has to be a free space of approximately 200 mm in order to achieve sufficient

cooling for the rectifier. This space will also be needed to get excess to the screws that holds the cover of the cabinet.

Before the rectifier is connected, the following shall be controlled:

A. Inspect the charger for transportation damage.
B. Inspect the charger's type label and the enclosed documents so they correspond to the line voltage and battery voltage.
C. Make sure that the LINE switch is in **0** position.
D. Make sure that the RECTIFIER fuse is in ON position.
E. Make sure that the BATTERY circuit breakers are in OFF position.

Connection

Input and output cables is to be drawn through the seven inlet holes, all directed downwards.

- The input power cable connects to terminal **P1**: **L**, **N**, **GND** (Line, Neutral and Protective Ground). Additional Protective ground connection can be made on the M4 terminal just below the line terminal. If additional protective ground connection is wanted, this connection can also be made to one of the two M6 holes in the two top corners of the inlet plate.

- The battery connects to the automatic fuse labeled **B+** and **B-**.

- The load connects to the terminals labeled **L+** and **L-**. For information on internal connections see block schematic in the end of this documentation.

- If the **Remote sense** function is to be used, the cable connects to terminal **P5:1** and **P5:2**, Remote sense + and Remote sense -. In this case the jumpers between P5:1-3 and P5:2-4 shall be removed.

- If the **Remote sense** is **not** in use, the jumpers between P5:1-3 and P5:2-4 shall be connected.

- If a temperature sensor is used (option), the cable connects to terminal P2:11 and P2:12, see instructions further back in this documentation.

- Alarm outputs for **Sum-alarm**, **A-alarm** and **B-alarm**, connects to terminal P2:1-9. See schematics at the terminals.

Operation

The charger starts by pressing the LINE switch on the front panel to **1** position. After a couple of seconds, the digital display for voltage and current reading, lights up. By pressing the **SELECT** button, the display switches between voltage and current. Please check one additional time that the battery is connected with the right polarity. If possible, use a voltmeter to check the polarity. Then the battery fuses can be

turned on. As the battery probably is discharged, the charger goes into current limit a number of hours until the correct battery voltage is obtained. (If the charger is started as above before the battery fuses are closed, you will not experience any sparks when the battery is connected.)

Technical specification

Charger:	
AC input voltage	230V +15% -15%, 1-phase 50 or 60 Hz
Cos fi	Better than 0.98
The principle of regulation	Primary switch technology, 40 kHz switch frequency
DC output voltage	Nominal 12, 24, 48, 110 and 220V DC
Load and line regulation	Better than ± 0,05%
Output current limit	102% of nominal current
Characteristics	I/U according to DIN 41773
Efficiency	Better than 85%
Ripple	Better than 0,02% RMS
RFI / EMI	According to EN 55022 B and CISPER 22 B
Cabinet	IP20

Please refer to the type label on the cabinets lower right side for information about the rectifiers output voltage and maximum current.

Standard Alarms:

Mains power failure	Fault in the power supply to the charger.
Charger failure	Remote sense fault (cable error, etc.) Temperature sensor fault
Over voltage protection OVP	112-130% of U-nominal
Floating voltage failure	The rectifiers output voltage is lowered to 1.8-2.1V/cell once every 24 hour. Alarm is generated if the output voltage follows the rectifier voltage. This indicates that the battery doesn't take over the load current.
Charge voltage	105-120% of U-nominal, 0-5% span.
Low battery voltage	90-105% of U-nominal
High battery voltage	105-120% of U-nominal
Ground fault + and -	0.1-1.1 Mohm
Delay time, A-alarm	16 steps, each step 10 sec (gives maximum 160 sec).
Delay time, B-alarm	16 steps, each step 0.5 min. (gives maximum 8 minutes).

We are continuously developing our products, and therefor reserves the right to make technical redesigns without prior notice.

Installation of the temperature sensor

Make sure that the main switch and the battery circuit breaker are in the off position before installation of the temperature sensor.

Connect **BLUE** conductor to **P2:12** and **BROWN** conductor to **P2:11** (the alarm-terminal).

Alarm for error in the temperature sense circuit can be obtained by inserting jumper **JP2** on one of the rectifier PCB. This alarm will be indicated as charger failure on the front panel.

The document "Adjusting the rectifier" shows the location of JP2.

Since the temperature sensor will change the output voltage according to the temperature there can be a floating voltage alarm. There are two ways to avoid this:

- Fixed alarm level, but increased tolerance for floating voltage error.
- Let the charger control the floating voltage alarm level so the alarm level follows the charger's reference voltage independent of variations in temperature.

What alternative to be chosen depends on the application. If big variation in temperature is likely to occur and accurate monitoring of the chargers output voltage is desired, the alternative with alarm level controlled by the charger is recommended.
If instead alarm on to high or to low temperature is important, the fixed level can be used and the floating voltage error level adjusted to the desired level.

If fixed level is chosen, jumper **J7** shall be in position **P** (factory pre-set).
The potentiometer "**Delta Hållsp**=floating voltage error level" can then be adjusted so that variations in output voltage caused by variations in temperature not causes floating voltage error. The level is adjustable **0-5%** symmetrical around the floating voltage alarm level.

If the charger's reference voltage is used as floating voltage alarm level, jumper **J7** shall be in position **L**. The floating voltage alarm level will now vary in the same extent as the output voltage and the floating voltage error level will be symmetrical around the floating voltage alarm level and adjustable **0-5%** around this level.
If factory pre-set levels of the temperature control are accepted (pre-set levels are documented in the installation manual), the installation is now completed.

Adjusting the temperature compensation.

This adjustments are made on **all** rectifier cards that are installed in the unit and the method is the same as when adjusting the output voltage. To adjust the temperature-zero (factory pre-set to +20ºC) for the temperature sensor, place the sensor in desired temperature, adjustment is done with **P4** "**TEMPNOLL**=temperature-zero" on the rectifier board.
Adjustment is made in that way that the output voltage is the same with or without the temperature sensor. On parallel connected rectifiers do the adjustment, (one at the time) on all rectifiers.

Tip:
Control of the sensor's temperature can be done with a digital voltage meter, plus to **P2:11** and minus in **P2:12**. The temperature sensor outputs a voltage that is the same as the temperature in **Kelvin/100**, e.g., +20ºC gives 293/100=2.93V.

Adjustment of the temperature compensation is a little bit tricky because the temperature sensor has to be in a stable temperature that differ from the temperature-zero by 5-20ºC.
The adjustment is done with **P5** "**Tempkomp**=temperature compensation" on the rectifier board. On parallel connected rectifiers do the adjustment, (one at the time) on all rectifiers.

E.g., temperature sensor +30ºC and "temperature-zero" +20ºC, output voltage 2.23V x 54 cells and desired temperature compensation 4.25mV/degree & cell.
The temperature compensation shall then lower the output voltage with
54 cells x 4.25mV x(30-20)ºC=2.295 V.
Output voltage at "temperature-zero" 54 x 2.23=120.42V (same as without the sensor)
Output voltage at +30ºC 120.42 - 2.295=118.13V.
Place the temperature sensor so it will adopt +30ºC, (note. don't put the temperature sensor in water, the sealing not guaranteed waterproof) and adjust **P5** to 118.13V.

Explanation:

Temperature-zero:
The breaking point where the temperature sensor does not affect the output voltage, i.e., the output voltage is the same with or without the temperature sensor.

Temperature compensation:
The temperature sensor's amplification, i.e., how much the temperature sensor is allowed to influence the output voltage.

Note:
Wrong polarizing of the temperature sensor will not cause any damage and is detected in internal protection circuitry as temperature sensor error, which then disconnects the temperature compensation.

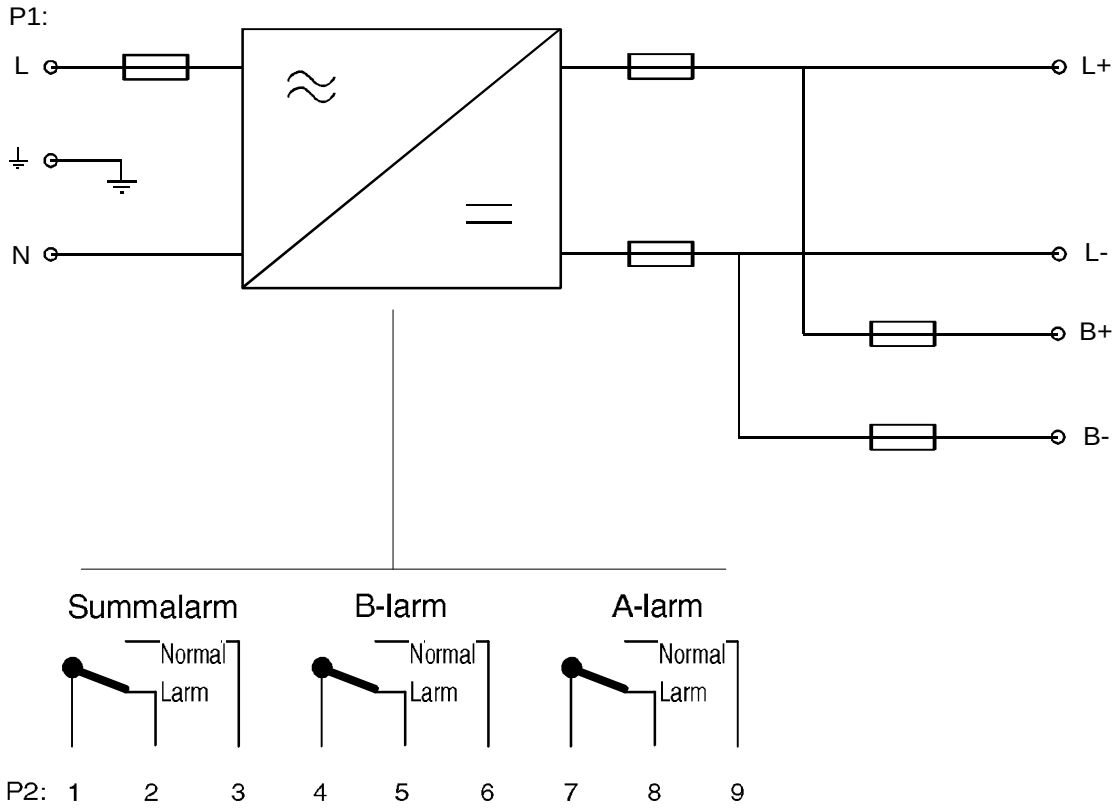
Function
The rectifier is designed with primary switch technology. The incoming power is rectified and filtered with electrolytic capacitors. The DC-voltage obtained is "chopped" by a switch to a pulse width modulated (PWM) square wave with a frequency of 40 kHz. This square wave signal is now transformed to the secondary side by a ferrite transformer. On the secondary side the voltage is rectified and filtered again, and delivers the voltage it is dimensioned for (12, 24, 48, 110V...). On the rectifier board is also the control electronics and adjustments to control the output voltage. The rectifier is made as a constant voltage type, with current limit and is short circuit proof. To adjust the factory set values for output voltage, etc., see document **Adjustment of rectifier**, in the end of this documentation.

Remote sense
The rectifier is able to regulate the voltage **at the battery poles** instead of as normal, at the output fuse inside the cabinet. This will give a correct voltage on the battery independent of the voltage drop in the battery cables between the rectifier and the battery. To obtain this function, connect two cables (sense leads, small area) between the output terminal **P5** in the charger, and the battery poles.

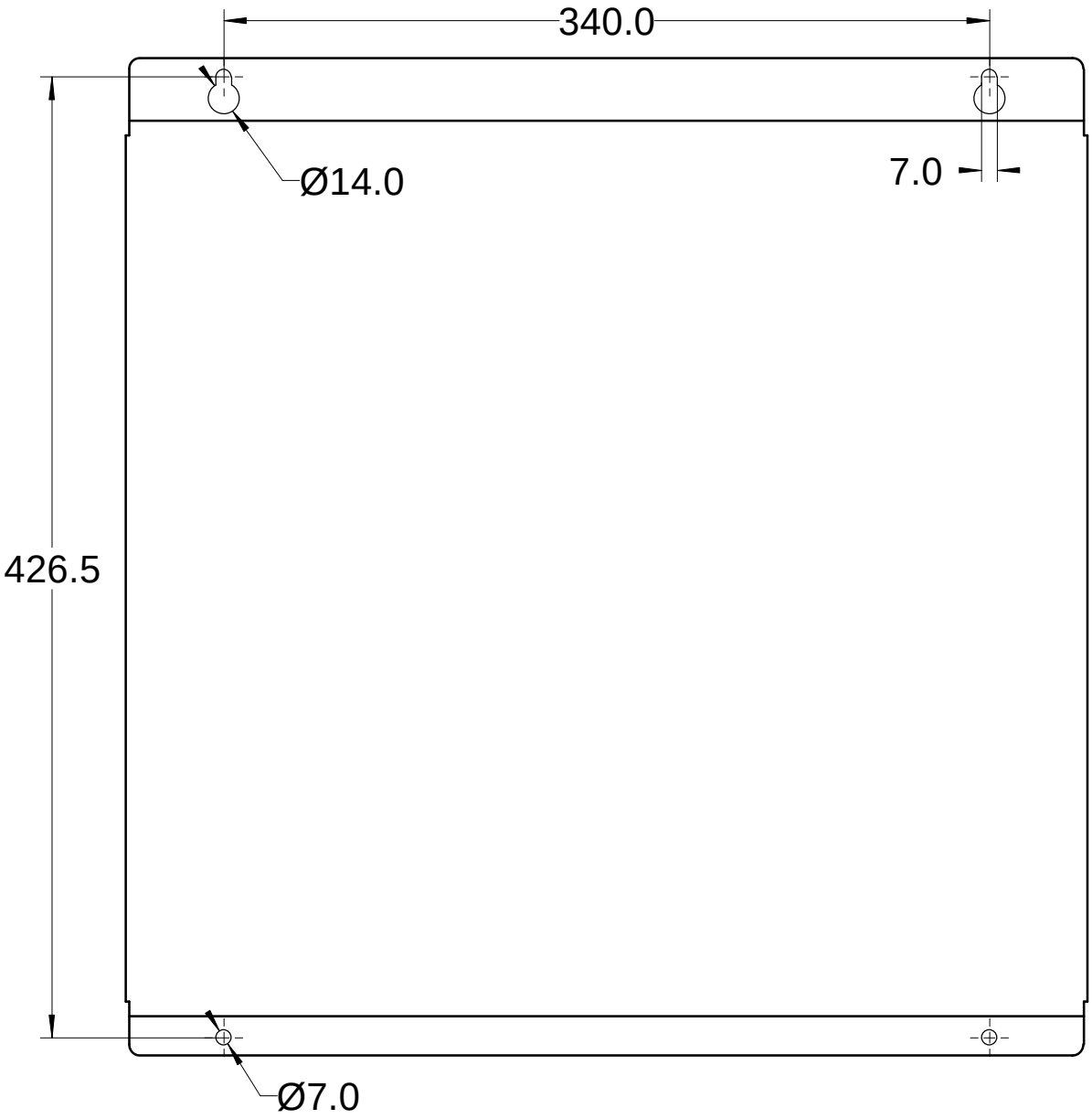
IR - compensation
The rectifier can increase its output voltage linear, as a function of the output current, to compensate for voltage drop in secondary cables. To adjust for IR-compensation, see **Adjustment of rectifier**, in the end of this documentation.

Temperature compensation of the charge voltage
If a temperature sensor (option) is connected, the rectifier can adjust the charge voltage to the battery with respect to the battery temperature. The compensation is factory adjusted to 3.3mV/cell & ºC within a range of ±20ºC with zero set at 20ºC.

SCHEMATIC


P1:
L
N
L+
L-
B+
B-
Summalarm
B-larm
A-larm
Normal
Larm
Normal
Larm
Normal
Larm
P2: 1 2 3 4 5 6 7 8 9

Dimensions for mounting holes:



Adjusting the rectifier

Over voltage protection "OVP" P1

The factory pre-sets the OVP to **120%** of the rectifiers nominal output voltage, and is normally **not** to be adjusted. The OVP is independent of other electronics on the secondary side. To reset the OVP, disconnect the primary line voltage for at least **one** minute.

Current "STRÖM" P2

The current limit pre-sets to **102% ±2%** of the rectifiers maximum output current, and shall **not** be adjusted by the user. A red light emitting diode (LED) **LD2**, indicates when the charger operates in the current limit mode.

Voltage "UTSP" P3

Use the potentiometer "UTSP" to adjust the output voltage.
The output voltage can be measured in the voltmeter output on the front panel.
The adjustment range is app. **2.2 - 2.35V/cell**, factory pre-sets at **2.23V/cell.**

When adjustment is made on parallel connected rectifiers (paralleled PC-board), adjust one of the rectifiers until the correct output voltage is obtained. (If the voltage is too high at first, lower the voltage on all rectifiers before adjustment is done.)
Then adjust a "Slave" (one at the time) so it "just about" switches to "Master". Then adjust backwards until it "just about" switches back to "Slave" again.
A green light emitting diode (LED) **LD3** on the rectifier, indicates which of the rectifiers that, at the moment, works as "Master". The rectifier shall be loaded with at least 5% of maximum output current during the adjustment procedure on parallel connected rectifiers. This is because the regulator for current sharing between the paralleled rectifier cards must be active. If this is not the case the green LED for master indication will light on all cards and it is impossible to know witch card that is master.
On the **110V** and **220V** version, jumper **JP5** and **JP6** on the rectifier PC-board can be inserted to change the output voltage without having to adjust the rectifier PC-board nor the alarm PC-board. Jumpers are supplied and are attached to the bracket supporting the alarm and display unit. This possibility is used to easy adept to different number of cells in the battery package.
On the **110V** version, the output voltage is altered from **54** to **53** cells, that is **120.42V** to **118.19V**, and on the **220V** version from **108** to **106** cells, that is **240.84V** to **236.38V**.
The alarm levels on the alarm board will also follow, i.e., be the same calculated in **Volt/cell**.

Remote sense is always active and when rectifiers delivered from factory, it's connected to the rectifier's output.
To use external remote sense, remove the jumpers, between P5:1 - P5:3 and P5:2 - P5:4 and connect the remote sense cables to **P5:1** and **P5:2**.
The remote sense input is totally protected, and can be left open, short circuited and even polarity switched without any damage. If left open, the remote sense input has no hazard voltage potential. If the remote sense voltage is app. **4%** lower than the rectifiers output voltage, it automatically switches to the internal sense.
Alarm indicating error in the remote sense circuit, can be obtained by jumper **JP4** on the rectifier PCB. This is then indicated as charger failure on the front panel.
As standard, JP4 is jumped.

Zero adjustment for temperature compensation "TEMPNOLL" P4

Factory pre-set to **+20ºC.**
In units with parallel connected rectifiers the adjustment must be done on all rectifiers. For further information see "Adjusting the temperature compensation" in the main part of this documentation.

Temperature compensation "TEMPKOMP" P5

P5 pre-set to **3,3mV/°C&cell** and has an active range between **0** and **+40°C.** Exceeding this active range, the temperature compensation automatically switches Off. This also protects against a break or short circuit in the temperature sensor. In units with parallel connected rectifiers, adjustment must be done on all rectifiers. Alarm indicating error in the temperature sense circuit can be obtained by jumper **JP2** on the rectifier PCB. This alarm then indicates as charger failure on the front panel.

IR-compensation "IRKOMP" P6

Insert the jumper **JP1** and start the rectifier without any load connected. Measure the output voltage at the load terminal and then connect a resistive load, adjust the potentiometer "IRKOMP" to get the same output voltage with and without load. Do **not** combine Remote sense and IR-compensation and it's not recommended to use IR-compensation with paralleled rectifiers.

Voltage decrease "SPMIN" P7

The potentiometer "SPMIN" is only for internal use and shall **not** be adjusted. This function used for Battery circuit failure alarm.

Adjustment of remote sense "KALIB REMOTE SENSE" P8

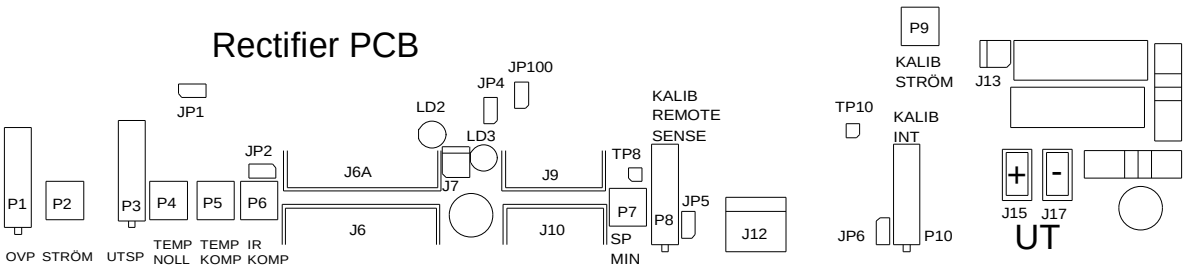
Factory pre-set and **not** to be adjusted.

Adjustment of current "KALIB STRÖM" P9

Factory pre-set and **not** to be adjusted.

Adjustment of the rectifiers internal voltage sense "KALIB INT" P10

Factory pre-set and **not** to be adjusted.



Trimming of alarm and display PCB

Warning!

The components on the alarm PCB are connected to the negative terminal of the battery. This means that these components in the worst case can be at 220V above ground (chassis). (This happens in an 220V unit that has an positive ground fault or with the batteries positive terminal grounded.) All trimming and adjusting shall be made with care and INSULATED tools MUST be used!

Adjustment of alarm levels.
The alarm levels are set by trimming the potentiometers on the alarm PCB (10861) left side. (see drawing of location on page 7 in this document) The potentiometers are accessible from the cabinets left side. All levels for voltage alarm can be checked and read on the digital display on the front panel. All levels are measured in Volt/cell. Which voltage level that is shown on the digital display can be selected by the switch "KALIB" **SW5** placed in the upper right corner of the cut out.

Position on the switch SW5	Read on digital display on the front panel
0 (Normal position)	Normal voltage or current. Selected by pressing the Select (U/I) switch on the front panels right side.
1	Cell voltage, output voltage measured in V/cell
2	Floating voltage (ref. for alarm levels) < U >
3	Floating voltage error, Upper alarm level
4	Floating voltage error, Lower alarm level
5	Low battery voltage, alarm level U<<
6	High battery voltage, alarm level U>>
7	Battery circuit failure, alarm level
8	Not used
9	Not used

To obtain a better accuracy when trimming the alarm levels, an external voltmeter can be connected to the output **J10** "Kalib ut". This output is located next to the switch SW5.

SW5
Position:

1. Cell voltage
The voltage at this point is to be the battery voltage divided by the number of cells. Adjusted on the rectifier PCB. If the Test mode jumper (se below) is connected, the display indicates the simulated cell voltage.

2. Floating voltage < U >
This level is adjusted to the desired value for the floating voltage (for ex. 2.23V/cell). Adjustment is done with the potentiometer labelled "Håll sp". NOTE: This adjustment is only for the alarm PCB and does not influence the voltage level of the rectifier. The rectifiers output voltage is adjusted on the rectifier PCB.

3. Floating voltage error, Upper alarm level

4. Floating voltage error, Lower alarm level
Both levels are influenced by the potentiometer labelled "Delta Hållsp" and the levels varies symmetrical around the floating voltage level.

5. Low battery voltage, alarm level U<<
Adjusted by the potentiometer labelled "Under sp".

6. High battery voltage, alarm level U>>
Adjusted by the potentiometer labelled "Över sp".

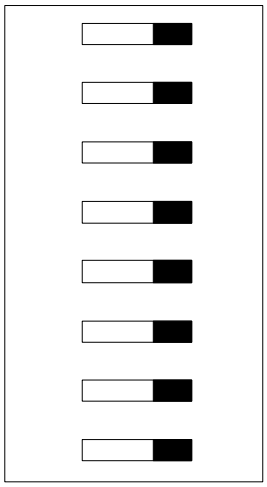
7. Battery circuit failure, alarm level
This is where the adjustment of the battery circuit alarm level is done. When test is performed, the output voltage from the rectifier is lowered, and the output voltage is measured. If the output voltage is equal to the output voltage from the rectifier, there is a Battery circuit failure existing. If the Battery circuit is in order, the battery will keep the output voltage to normal and supply the load during the time when the voltage from the rectifier is lowered. By the potentiometer "Batteri krets" the alarm level is adjusted to the value of which the battery voltage is **not** to be below, if the Battery circuit is to be considered intact.

Adjustment of ground fault alarm
The permitted ground fault resistance is set by the potentiometer "JORDFEL". The adjustment range is 0.1 - 1.1 Mohm.

Reference voltage
The reference voltage is set to 2.4V by the factory, and is normally **not** to be adjusted. If adjustment is to be made, adjust the potentiometer labelled "Ref". The voltage level can be measured at TP1, instrument ground at J8.

Selection of alarm to A-alarm or B-alarm
The selection is made by the dip-switches in the lower right corner (SW4 and SW7). With the switch SW4 the alarms that shall control A-alarm are selected and with SW7 the alarms to control B-alarm are selected. Move the sub miniature switch to **ON** position for each selected alarm to be activated as an A-alarm or B-alarm. Each alarm can be selected as both A-alarm and B-alarm.

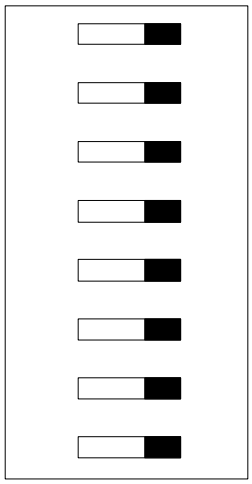
A-alarm



SW4

Mains power failure
Charger failure
Battery circuit failure
Floating voltage failure
High battery voltage
Low battery voltage
Ground fault +
Ground fault -

B-alarm



SW7

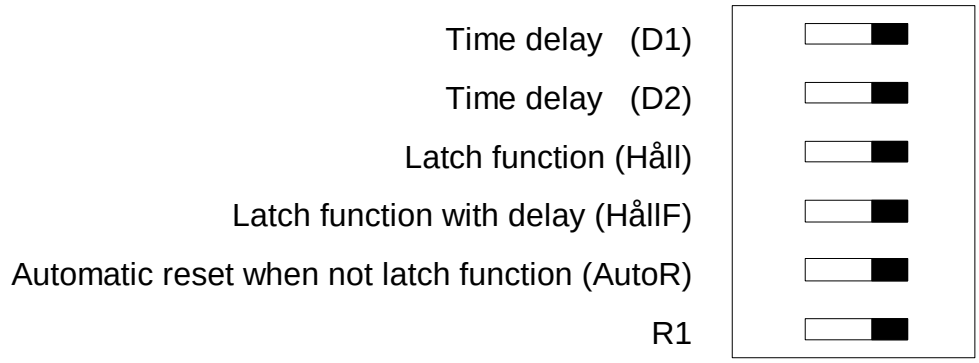
Delay A- and B-alarm

The time delay from alarm occurrence to that the alarm relay is deactivated can be selected by turning **SW2** (A-alarm) and **SW3** (B-alarm). The switches are located in the centre of the PCB.

Time delay

Position	**SW2** A-alarm (seconds)	**SW3** B-alarm (minutes)
0	10	0.5
1	20	1
2	30	1.5
3	40	2
4	50	2.5
5	60	3
6	70	3.5
7	80	4
8	90	4.5
9	100	5
A	110	5.5
B	120	6
C	130	6.5
D	140	7
E	150	7.5
F	160	8

With the dip-switch **SW6**, further alarm functions can be controlled. The time an alarm condition have to exist, before it is considered an alarm, can be adjusted by the dip-switch no 1 and 2. (D1 and D2). If the alarm is to have a latch function or not, is controlled by dip-switch no. 3 (Håll=ON=Latch). If the Latch function with time delay is wanted, **both** dip-switch no. 3 and 4 is to be in ON position. (Håll=ON=Latch, HållF=ON)
Position AutoR is used to get automatic reset of alarm relay when the alarm condition goes away (The LED for the offending alarm is though not reset.). This function is only working if "Latch function" is NOT selected (i.e. when switch position 3 and 4 are in OFF position)
The position R1 is reserved for special custom requests. (dip-switch no. 6 Option.)

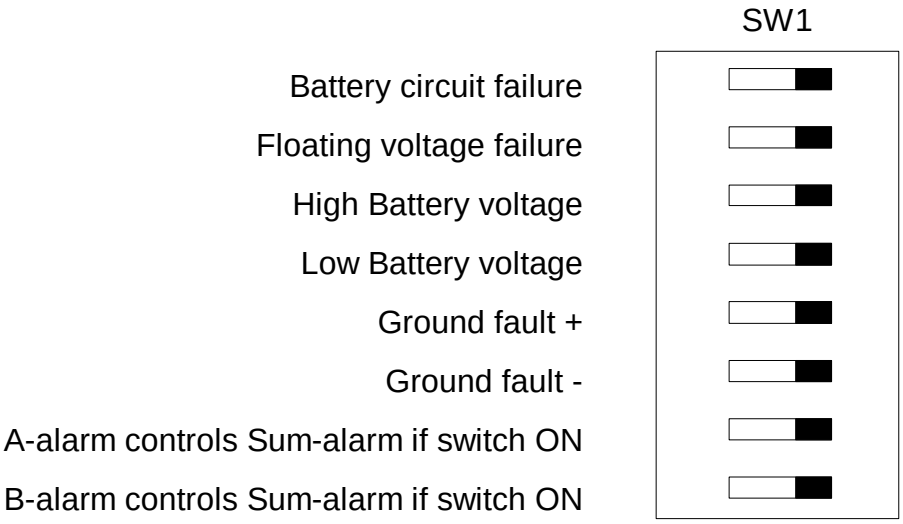


Time (sec)	D2	D1
0.5	Off	Off
1	Off	On
3	On	Off
6	On	On

Activate / Deactivate alarm

With the dip-switch **SW1**, individually alarms can be activated or deactivated. SW1 is located in the centre of the PCB. If an alarm is deactivated by switching one of the switches on SW1 to OFF position, the alarm indication from the other alarms will in no way be affected. Please note that the measuring circuit for ground fault is still connected between battery and GND even though the alarm is inactivated.
If this connection are not wanted, there is a jumper situated under the Select (U/I) button just outside the front panel. This jumper shall normally be installed, but in special applications when the internal ground resistance measuring circuit is not used and can not be connected to protective ground this jumper shall be removed. This can be the case for instance if an external ground resistance measuring device is installed. In this case the internal ground fault alarm of course is not functioning.

A and / or B alarm controlling Sum-alarm
With the switches labelled A and B on the dip-switch SW1, Sum-alarm functions can be selected. Both A and B alarm can be set to influence the Sum-alarm.



Test of Voltage alarm

If **J9** labelled "TEST" is jumped, the voltage alarm function can be controlled. With the potentiometer labelled "TEST", different voltage levels can be simulated and used for test of the alarm function. The simulated battery voltage can be read on the digital display if the SW5 is in position 1 (Cell voltage). If the relay outputs is **not** to be influenced by this test, the jumper JP1 on the relay PCB has to be jumped.
NOTE: don't forget after test, to remove jumpers J9 and JP1!
The J9 is located below to the left of SW5.

Adjusting the digital display

Calibration of current and voltage

Calibration is done by 3 potentiometers labelled "**I**", "**U**" and "**KALIB**" (see fig. below). The potentiometers can be reached through a hole in the upper side of frame for the alarm and display board. The potentiometer "KALIB" is used for calibration of the measuring circuit, and the "I" and "U" is used for adjusting the voltage divider for current and voltage.

"KALIB"

"KALIB" is factory adjusted and shall **not** normally be re-adjusted.

"U"

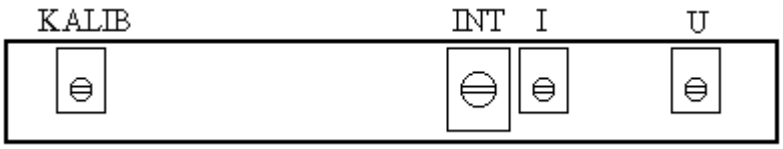
Select Voltage reading by pressing the **Select** (U/I) switch on the front panel. Measure the output voltage from the rectifier in the 4 mm female panel sockets, and adjust "U" until the display shows the accurate output voltage.

"I"

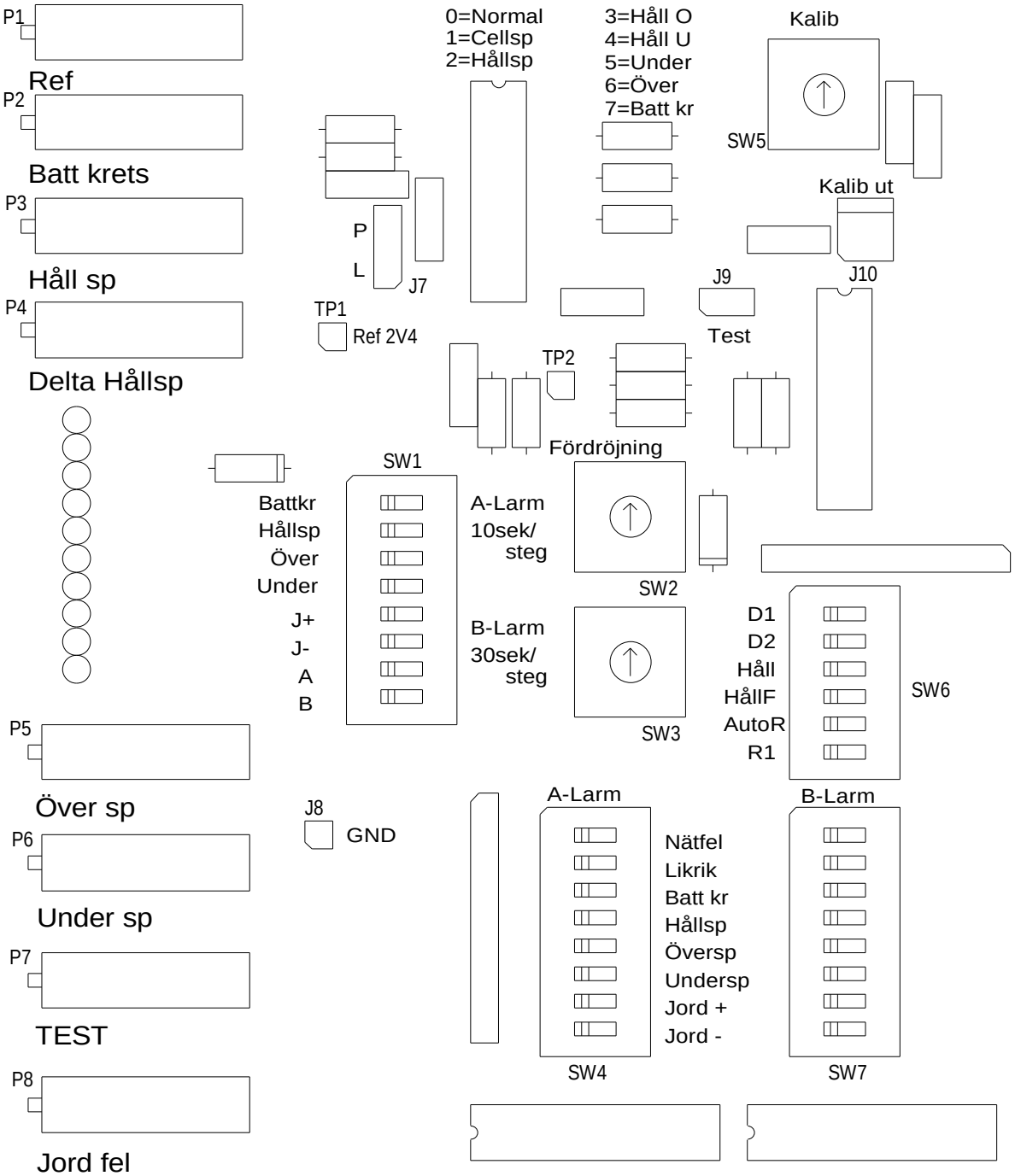
Select Current reading by pressing the **Select** (U/I) switch on the front panel. Measure the output current with an ampere meter and adjust "I" until the display corresponds with the output current.

"INT"

The potentiometer "INT" is used to calibrate the measuring of alarm levels. Connect a voltage meter to the output J10 "Kalib ut" below SW5, and adjust the potentiometer "INT" until the display and the voltmeter corresponds.



Drawing over location of potentiometers and switches on Alarm and digital display PCB.



Factory Settings

The following parameter values are standard values for this charger and are trimmed as follows:

CHARGE VOLTAGE

Charge voltage			V/cell
Number of cells			pcs
Output voltage			Volts

GROUND

Ground fault			Mohm

ALARM LEVELS

Over voltage			V/cell
			Volts
Under voltage			V/cell
			Volts
Delta Floating voltage			%
Upper voltage level			V/cell
Lower voltage level			V/cell

BATTERY CIRCUIT FAILURE

Lowering of rectifier voltage			V/cell
Lowering of rectifier voltage			Volts
Alarm level			V/cell
Alarm level			Volts

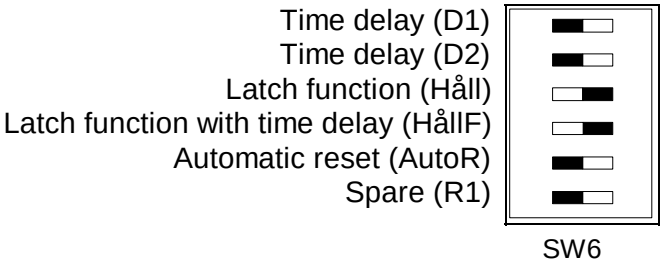
SELECTED TIME DELAY A / B alarm

Time delay A-alarm set to			seconds
Time delay B-alarm set to			minutes
Position of SW2 A-alarm			10sec/pos
Position of SW3 B-alarm			0.5min/pos

COMMENTS:

SELECTION OF ALARM to A-alarm or B-alarm

SELECTION OF Time Delay and Latch functions



Time delay from alarm occurrence until LED on front panel activates.

Time (sec)	D1	D2
0.5	Off	Off
1	On	Off
3	Off	On
6	On	On

Activate or Deactivate ALARM and SUM-ALARM