

## Multi-PL Control Unit Installation and Users Manual

### General

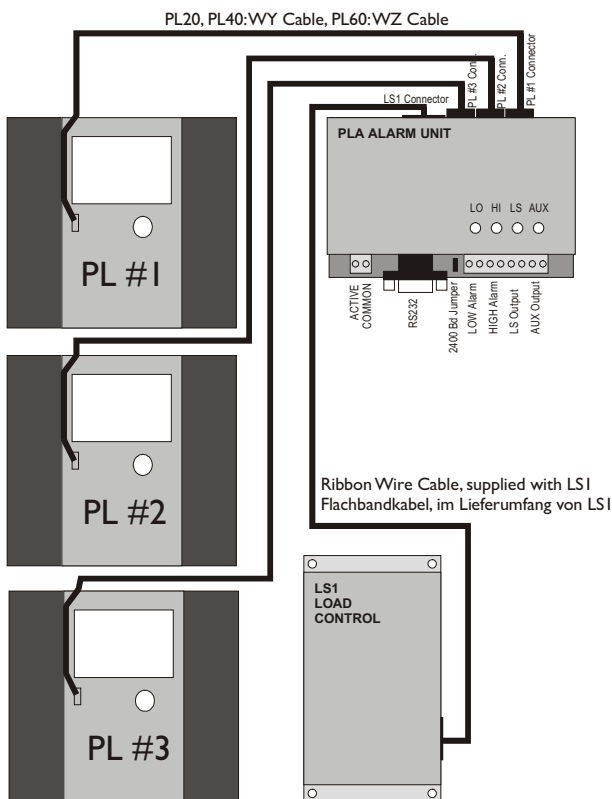
The PLA is a device which allows multiple PL series charge controllers to work together and provides a common communication interface. It provides four alarm or control channel outputs and can also control an LS1 load switch and load current measuring unit. Up to three PL controllers can be connected.

The PLA makes system performance data retrieval easier by providing system total information. The stored data in the PLA can be read by computer in a similar way to PL controllers but it contains the total system information.

### Installation

#### WARNING

PLA or PL regulators can be damaged in case of wrong installation. Follow the installation instructions carefully.



#### Connecting the supply voltage

The PLA has two terminals to connect the supply voltage: COMMON and ACTIVE. These terminal are not named Plus and Minus because

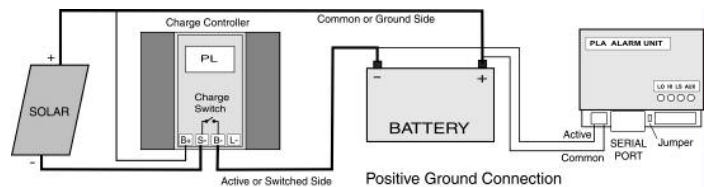
the PLA can be used in both common positive and common negative systems.

#### SYSTEMS WITH COMMON POSITIVE (PL CONTROLLERS)

If the PLA is used with PL controllers, the common potential is always the positive line. The PL controllers switch the negative line.

Connect battery positive (+) to the COMMON terminal.

Connect the battery negative (-) to the ACTIVE terminal



#### SYSTEMS WITH COMMON NEGATIVE

Connect battery negative (+) to the COMMON terminal.

Connect the battery positive (-) to the ACTIVE terminal

#### WARNING

Never connect the supply voltage with wrong polarity. PLA or PL controller can be damaged!

#### NOTE

If a LS1 is connected to the PLA, do not connect the COMMON and ACTIVE terminal to the battery. The PLA is supplied via the LS1.

#### Connecting the PL controllers

There are three connectors for connecting the PL controllers to the PLA (see left figure). The order of the PL controllers does not matter, the number of the connector corresponds with the site number for retrieving the PL data by the PLCOM software.

PL20, PL40 or PL60 can be connected to the PLA, even mixed types in the same system.

#### NOTE

The system voltage setting of the PLA and all connected PL controllers must be the same, otherwise the system will not operate properly!

#### Connecting the LS1 load switch (optional)

To extend a system with an additional load output, the LS1 with 40A or 60A load capacity is available as an accessory.

Connect the LS1 with the ribbon cable to the corresponding terminal of the PLA. This cable is supplied with the LS1.

**NOTE**

If a LS1 is connected to the PLA, do not connect the COMMON and ACTIVE terminal to the battery. The PLA is supplied via the LS1.

**Connecting the serial port to a PC**

The PLA's serial port can be connected to a PC with a standard serial cable. The serial port of the PLA is DC isolated.

**Connecting the serial port to a modem**

By using a „Zero Modem“ serial cable, the PLA's serial port can be connected directly to a modem for remote data transmission.

**Connecting the alarm and control outputs****WARNING**

The built-in solid-state relays can carry max. 100V, 0.3A. The relays might be damaged if these values are exceeded.

The 8-pin connector below the 4 LEDs provides 4 DC-isolated switches for control and alarm functions. Each switch is connects to two terminals side by side. The LEDs indicate the status:

GREEN	Inactive
RED	Active

Low Alarm	Alarm if the battery voltage falls below an adjustable threshold.
High-Alarm	Alarm if the battery voltage rises above an adjustable threshold.
LS-Output	Load disconnect if the battery voltage falls below a threshold, load reconnect if the battery voltage rises above a threshold. Both thresholds can be adjusted. This output also indicates the status of an LS1 connected.
AUX-Output	Disconnect if the battery voltage falls below a threshold, reconnect if the battery voltage rises above a threshold. Both thresholds can be adjusted.

All outputs are normally closed when inactive and open when active. This can be reversed for each output individually.

The time delay of the outputs is 100 seconds. This delay can be changed to 5 seconds for all outputs together.

**Communicating with a PC**

1. Connect a PC to the PLA as described above. If required, use a modem connection after a direct connection was successfully established.
2. Install PLCOM V 2.07 or higher on your PC and open the software.
3. Open the 'Modem Setup' Window and select baud rate 2400 and the correct COM port where the serial cable is connected. Set the time delay setting (at the bottom of the window) to maximum (=20). Close the window
4. Make sure that the jumper beside the 8-pin terminal is in place.
5. If the furthest right button on the top bar shows the word LOG then select the 'Set Site mode' command from the tools drop down list. This will change the program into site mode. The button will change to show the 'Site Number'. Close the window.
6. Press the site select button and set the site number to 4. (This is the PLA site number). Close the window.
7. Open the "Current State" window and click inside. PLCOM now should communicate with the PLA and download the current values.

**NOTE**

If the communication fails, check the serial cable connection, the COM port number and the baud rate setting.

**Retrieving system data**

After setting up the PC connection successfully, data from the PLA and connected PL controllers can be read.

**Reading and setting the PL controllers**

Change the site number in PLCOM to 1, 2 or 3 by using the 'Select Site Number' button. The number you set up is the same as the number of the PLA terminal for the PL controllers.

Now you can communicate with the selected PL as if a single PL with a PLI interface were connected. All values can be read or set up.

**Reading the PLA**

Change the site number in PLCOM to 4 by using the 'Select Site Number' button.

The following data is calculated by the PLA

Folgende Daten werden durch den PLA berechnet:

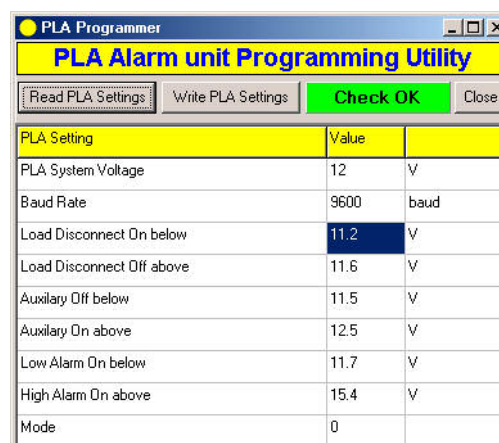
Value	Note
Battery voltage	Measured by PLA
Charge current	Sum of charge currents in PL 1-3, max. 255 A in 1A steps
Load current	Sum of load currents in PL 1-3 and LS1, max. 255 A in 1A steps
Charged Ah	Sum of Ah of PL's, max 4000 Ah
Discharged Ah	Sum of Ah of PL's and LS1, max 4000 Ah
Max. Battery voltage	Measured by PLA
Min. Battery voltage	Measured by PLA
History	Sums or averages of PL's and LS1. The PLA stores the history data of the LS1

The values can be read in the corresponding windows of PLCOM.

**Programming the PLA****NOTE**

The PLA can only be programmed via a PC. It does not have any buttons for programming..

1. Make sure that PLCOM communicates with the PLA (see above).
2. Open the 'Tools' window in PLCOM. Select "Program PLA in the Command drop down list. The PLA programming window pops up.



3. Click 'Read PLA Settings' to load the current PLA data. Set the desired settings:

Value	Range	Note
System Voltage	12, 24, 48V	Must be the same as connected PLs
Baud Rate	300, 1200, 240, 9600 baud	Only valid if the 2400 bd jumper on PLA has been removed
Load Disconnect on below	12V System 10-17 V 24 V System 20-34 V 48 v System 40-68 V	Disconnect voltage for LS output
Load Disconnect Off above	12V System 10-17 V 24 V System 20-34 V 48 v System 40-68 V	Reconnect voltage for LS output.
Auxiliary Off below	12V System 10-17 V 24 V System 20-34 V 48 v System 40-68 V	Disconnect voltage for AUX output
Auxiliary On above	12V System 10-17 V 24 V System 20-34 V 48 v System 40-68 V	Reconnect voltage for AUX output.
Low Alarm On below	12V System 10-17 V 24 V System 20-34 V 48 v System 40-68 V	Threshold Low Alarm
High Alarm On above	12V System 10-17 V 24 V System 20-34 V 48 v System 40-68 V	Threshold High-Alarm
Mode	0 bis 31	See Table below

Mode	Low Alarm	High Alarm	LS Output	AUX Output	Time Delay Outputs
0	Active open	Active open	Active open	Active open	100 s
1	Active closed	Active open	Active open	Active open	100 s
2	Active open	Active closed	Active open	Active open	100 s
3	Active closed	Active closed	Active open	Active open	100 s
4	Active open	Active open	Active closed	Active open	100 s
5	Active closed	Active open	Active closed	Active open	100 s
6	Active open	Active closed	Active closed	Active open	100 s
7	Active closed	Active closed	Active closed	Active open	100 s
8	Active open	Active open	Active open	Active closed	100 s
9	Active closed	Active open	Active open	Active closed	100 s
10	Active open	Active closed	Active open	Active closed	100 s
11	Active closed	Active closed	Active open	Active closed	100 s
12	Active open	Active open	Active closed	Active closed	100 s
13	Active closed	Active open	Active closed	Active closed	100 s
14	Active open	Active closed	Active closed	Active closed	100 s
15	Active closed	Active closed	Active closed	Active closed	100 s
16	Active open	Active open	Active open	Active open	5 s
17	Active closed	Active open	Active open	Active open	5 s
18	Active open	Active closed	Active open	Active open	5 s
19	Active closed	Active closed	Active open	Active open	5 s
20	Active open	Active open	Active closed	Active open	5 s
21	Active closed	Active open	Active closed	Active open	5 s
22	Active open	Active closed	Active closed	Active open	5 s
23	Active closed	Active closed	Active closed	Active open	5 s
24	Active open	Active open	Active open	Active closed	5 s
25	Active closed	Active open	Active open	Active closed	5 s
26	Active open	Active closed	Active open	Active closed	5 s
27	Active closed	Active closed	Active open	Active closed	5 s
28	Active open	Active open	Active closed	Active closed	5 s
29	Active closed	Active open	Active closed	Active closed	5 s
30	Active open	Active closed	Active closed	Active closed	5 s
31	Active closed	Active closed	Active closed	Active closed	5 s

## Synchronisation between the PL controllers

### Charge Synchronization

The PLA keeps the individual PL controllers synchronised. When one controller changes charge mode, then all the other controllers follow that change. This means that charging is properly shared between controllers. Synchronization may take 4 minutes after a change in the charging cycle.

This synchronization method operates even if one of the PL should fail (multi mastering). This is important for redundant systems.

### NOTE

For predictable operation, the corresponding charge mode settings in each PL controller should be the same. (i.e. BMAX, EMAX, ETIM, EFRQ, ABSV, ATIM, FLTV, BRTN, BFRQ).

### Time Synchronization

The time settings for the PL controllers are also kept in sync so that the measuring days correspond between units. To do this, the PLA reads the time on each of the PL controllers present. It makes an estimate of the correct time and resets all times to that value. This is done once each day at 11pm.

## Technical Characteristics

Operating voltage	7 to 100 V
Baud rates	300, 1200, 2400, 9600 Baud
RS232 level requirements	>+/- 5V
Min. RS232 load impedance	3K
Output impedance TX	300 Ohm
DC isolating voltage	500V
Temperature range	-20 to +60 o C
Supply current	70 mA bei 11 V, 22 mA bei 48 V
Outputs	max 100V 0,3 A