Important safeguards

Prior to installing or operating this product, always read the Important Safety Instructions which are available as a separate document (9922 141 **%). These instructions are supplied together with all equipment that can be connected to the mains.
Table of Contents

Important safeguards.........................................................................................................................................................2
Table of Contents ...............................................................................................................................................................3

1. Introduction ..................................................................................................................................................................5

1.1 Purpose ..................................................................................................................................................................5
1.2 Digital document .....................................................................................................................................................5
1.3 Intended audience .....................................................................................................................................................5
1.4 Related documentation ............................................................................................................................................5
1.5 Alerts ....................................................................................................................................................................5
1.6 Signs .....................................................................................................................................................................5
   1.6.1 Note signs .......................................................................................................................................................5
   1.6.2 Caution, Warning, and Danger signs .............................................................................................................5

1.7 Conversion tables .....................................................................................................................................................6

2. Product Overview ........................................................................................................................................................7

2.1 Battery Charger .......................................................................................................................................................7
2.2 Application types .......................................................................................................................................................7
2.3 Plena Voice Alarm System .......................................................................................................................................7

3. PLN-24CH10 Battery charger ......................................................................................................................................9

3.1 Controls, connectors and indicators ........................................................................................................................9
   3.1.1 Front panel indicators .......................................................................................................................................9
   3.1.2 Rear panel connections ....................................................................................................................................9

3.2 Installation ................................................................................................................................................................11
   3.2.1 Rack mounting ................................................................................................................................................11
   3.2.2 Compliance with standards ................................................................................................................................11
   3.2.3 Capacity adjustment ........................................................................................................................................11

3.3 External connections ................................................................................................................................................13
   3.3.1 Battery ..........................................................................................................................................................13
   3.3.2 Back-up power connection ................................................................................................................................13
   3.3.3 Temperature sensor .........................................................................................................................................13
   3.3.4 Auxiliary outputs .............................................................................................................................................14
   3.3.5 Trigger outputs ................................................................................................................................................14
   3.3.6 Power ............................................................................................................................................................15
   3.3.7 Ground connection ..........................................................................................................................................15

4. Operation .....................................................................................................................................................................17

4.1 Power on and off .......................................................................................................................................................17
   4.1.1 Switch on .......................................................................................................................................................17

4.2 Switch off ..................................................................................................................................................................17

4.3 Battery capacity ........................................................................................................................................................17
   4.3.1 Introduction ...................................................................................................................................................17
   4.3.2 Charging modes .............................................................................................................................................17
   4.3.3 Charge voltage and current ...........................................................................................................................18
5. Technical data ........................................................................................................................................... 21
  5.1 Electrical ............................................................................................................................................. 21
  5.2 Inputs .................................................................................................................................................. 21
  5.3 Indicators ............................................................................................................................................. 21
  5.4 System connection ................................................................................................................................. 21
  5.5 Fault output .......................................................................................................................................... 21
  5.6 24 V DC out ....................................................................................................................................... 21
  5.7 Environmental conditions ..................................................................................................................... 21
  5.8 General ............................................................................................................................................... 21
1 Introduction

1.1 Purpose
The purpose of these Installation and User Instructions is to provide information required for installing, configuring and operating a Plena 24 VDC battery charger.

1.2 Digital document
These Installation and User Instructions are also available as a digital document in the Adobe Portable Document Format (PDF).

1.3 Intended audience
These Installation and User Instructions are intended for installers and users of a Plena system.

1.4 Related documentation
Safety Instructions (9922 141 ****).

1.5 Alerts
Four types of alerts are used in this manual. The alert type is closely related to the effect that may be caused if it is not observed. These alerts - from least severe effect to most severe effect - are:

- **Note**
  Alert containing additional information. Usually, not observing a note alert does not result in damage to the equipment or personal injuries.

- **Caution**
  The equipment can be damaged if the alert is not observed.

- **Warning**
  Persons can be severely injured, or the equipment can be seriously damaged, if the alert is not observed.

- **Danger**
  Not observing the alert can result in death.

1.6 Signs

1.6.1 Note signs
The signs used in combination with Notes provide extra information about the Note. See the following examples:

![Note](image)
General sign for notes.

![Note](image)
Consult the indicated source of information.

1.6.2 Caution, Warning, and Danger signs
The signs used in combination with Caution, Warnings, and Dangers indicate the type of hazard present. See the following examples:

![Caution, Warning, Danger](image)
General sign for cautions, warnings and dangers.

![Caution, Warning, Danger](image)
Risk of electric shock.

![Caution, Warning, Danger](image)
Risk of electrostatic discharge.
1.7 Conversion tables

In this manual, SI units are used to express lengths, masses, temperatures etc. These can be converted to non-metric units using the following information.

**table 1.1: Conversion of units of length**

<table>
<thead>
<tr>
<th>Unit of Length</th>
<th>Metric Unit</th>
<th>Conversion Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 in</td>
<td>25.4 mm</td>
<td>1 mm = 0.03937 in</td>
</tr>
<tr>
<td>1 in</td>
<td>2.54 cm</td>
<td>1 cm = 0.3937 in</td>
</tr>
<tr>
<td>1 ft</td>
<td>0.3048 m</td>
<td>1 m = 3.281 ft</td>
</tr>
<tr>
<td>1 mi</td>
<td>1.609 km</td>
<td>1 km = 0.622 mi</td>
</tr>
</tbody>
</table>

**table 1.2: Conversion of units of mass**

<table>
<thead>
<tr>
<th>Unit of Mass</th>
<th>Metric Unit</th>
<th>Conversion Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 lb</td>
<td>0.4536 kg</td>
<td>1 kg = 2.2046 lb</td>
</tr>
</tbody>
</table>

**table 1.3: Conversion of units of pressure**

<table>
<thead>
<tr>
<th>Unit of Pressure</th>
<th>Metric Unit</th>
<th>Conversion Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 psi</td>
<td>68.95 hPa</td>
<td>1 hPa = 0.0145 psi</td>
</tr>
</tbody>
</table>

**Note**

1 hPa = 1 mbar.

**table 1.4: Conversion of units of temperature**

<table>
<thead>
<tr>
<th>°F</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{9}{5} \cdot °C + 32$</td>
<td>$\frac{5}{9} \cdot (°F - 32)$</td>
</tr>
</tbody>
</table>
2  Product Overview

2.1  Battery Charger
The Plena 24VDC Battery Charger is available for the complete Plena range, and specifically for the Plena Voice Alarm System. The battery charger has all the necessary features for compliance to evacuation standards: IEC60849, NEN2575 and BS5839/8. It is also compliant to the standard EN54-4 for power supplies for alarm systems.

The battery charger is connected directly to a back-up battery and can support different battery capacities.

The Battery charger has 4 states:
- **Bulk mode** - Charging states always start with Bulk mode. A constant current source is used for the battery charging in this state.
- **Full mode** - A lesser current that completes the battery charge.
- **Float mode** - A constant trickle charge that does not cause damage to the battery.
- **Equalization** - Once a month the charger charges the battery with the 3 modes to keep the battery in good condition.

2.2  Application types
Typically, the battery charger is used in a Plena Voice Alarm System.

2.3  Plena Voice Alarm System
The Battery Charger is part of the Plena Voice Alarm system, which is an emergency sound system. The system complies to IEC60849 and all information about the installer, end users, and the general system requirements, please refer to the Plena Voice Alarm System Installation and User Instruction manual.
Intentionally left blank
3 PLN-24CH10 Battery charger

3.1 Controls, connectors and indicators

3.1.1 Front panel indicators
See figure 3.1 for an overview of the indicators on the battery charger:

1. **Charger status** - Shows the mode of the charger: On, Bulk, Full, Float (see section 2.1).
2. **Mains LED** - The power LED is green if the battery charger is connected to the mains and switched on. The LED is yellow if there is a mains fault.
3. **Fault** - General fault shows as yellow.
4. **Battery** - The LED is green when the battery charger is connected to the battery. The LED is yellow when there is a battery fault: the battery is not connected, or the total battery voltage is either lower than 16 V or higher than 32 V.
5. **Current limit** - The LED shows yellow and closes the output when:
   - the output current of the battery is above 70 A.
   - the auxiliary output is greater than 5 A.
6. **Battery in use** - Shows when the net current from the battery to the system (load) is greater than 1 A.
7. **Over temp/Sensor Fault** - The LED is yellow when the temperature sensor connected to the battery is greater than 60 °C. Sensor Fault shows when the sensor is not connected and the temperature switch of the temperature sensor is on.
8. **Voltage display** - Shows the voltage of the battery.
9. **Current display** - The LCD display shows the charge current to the battery (positive value), and the delivered current when the battery gives output (negative value).

3.1.2 Rear panel connections
See figure 3.2 for an overview of the rear panel of the battery charger:

10. **Out +/-** - Power out connector to the 24 VDC 70 A limit output back-up power for the Voice Alarm System.
11. **In +/-** - Power connector to the battery.
12. **Temperature sensor** - Connector for the temperature sensor of the battery.
13. **Slide switch** - ON/OFF selector for the temperature sensor.
14. **ON/OFF Switch** - Connects and disconnects the mains power supply.
15. **Mains power inlet** - A socket for connecting the battery charger to the mains power. Mains voltage of 100 - 240V ± 10% is accepted
16. **Battery Capacity** - Adjustor for selecting the charging current of the battery.
17. **Trigger Outputs** - Give a fault trigger output if a fault occurs on: Mains, Battery, Battery in Use, General Fault. All fault relays have normally closed and normally open contacts (SPDT), and by default are normally energized (i.e. are fail safe).
18. **24VDC for volume override** - 24 VDC 3 A output back-up power for the volume override.
19. **RCP** - 2 x 24 VDC 3A output back-up power for the Remote Control Panel (RPC1 and RCP2), 5 A in total for RCPs and volume override.
figure 3.1: Front view of battery charger

figure 3.2: Rear view of battery charger
3.2 Installation

3.2.1 Rack mounting
The battery charger is 2 rack units high, and is suitable for a 19-inch rack-mounting installation. Two brackets for rack-mounting are supplied (see figure 3.3).

*Figure 3.3: Brackets for rack mounting*

Make sure that there is a free space of at least 100 mm behind the unit for ventilation.

3.2.2 Compliance with standards
Some standards require that each connected appliance has a fuse. All Plena equipment has an internal fuse for the 24VDC power supply in each appliance. Please ensure this is sufficient for your local standard. Also see figure 3.4 (on the next page) for a schematic overview of the Plena 24 VDC Battery Charger.

*Note*

The PLN-24CH10 is compliant to the EN54-4 standard for relevant articles. For full compliance, the installation and other equipment must also be compliant.

3.2.3 Capacity adjustment

The battery capacity switch influences the maximum current supplied by the battery charger. Set the battery capacity switch to the capacity of the battery. The values are:

- 2 - 4Ah
- 4 - 7Ah
- 7 - 13Ah
- 13 - 25Ah
- 25 - 50Ah
- 50 - 200Ah

Once the capacity has been adjusted, it is advisable to either remove the battery capacity knob or prevent access to the rear panel. This will prevent the capacity adjustment from being accidently altered.

*Caution, Warning, Danger*

If the capacity of the battery charger is incorrectly adjusted, this can damage the battery or reduce its lifetime.
Figure 3.4: Schematic overview of the Plena 24 VDC Battery Charger
3.3 External connections

3.3.1 Battery
The battery charger has 2 screw terminal connections to the battery. Connect In + to the plus terminal of the battery, connect the In - to the minus terminal of the battery (see example in figure 3.5).

![figure 3.5: Connecting batteries to charger (example)](image)

**Caution**
Always connect the batteries in series as shown in figure 3.5. The total sum of the batteries must equal 48 Volts. Only use batteries of equal voltage, capacity and type.

3.3.2 Back-up power connection
The battery charger has 2 screw terminal for connecting to the Voice Alarm System or public address system. Connect Out + to the plus terminals of the system components, connect the Out - to the minus terminal of the system components.
It is recommended that this back-up power connector is not used for the Remote Control Panels or volume overrides. Use the 24V DC output connectors. Refer to 3.3.4.

3.3.3 Temperature sensor
The battery charger has one connector for a temperature sensor, which is supplied with the battery charger.

To improve the lifetime of the battery, applied voltages and current are temperature dependant; therefore, connect the sensor in such a way that a good thermal reading is possible. For example, you can either connect the sensor to the battery tray, or place it between two batteries (see figure 3.6). If the temperature sensor is not being used, the slide switch for the temperature sensor should be set to off.

![figure 3.6: Connecting the temperature sensor](image)
### 3.3.4 Auxiliary outputs

The battery charger has 3 connections for 24 V DC output for the back-up power supply of a Plena unit:
- RCP1 and 2
- 24V DC Out for volume overrides and general purpose.

**Note**

24 VDC outputs are regulated 24 V and current limited to 3 A per output and 5 A in total. The main output is 20 to 25.5 VDC and the current is limited to 70 A.

Connect the RCP 1 and 2 connectors to the 24 V DC input on the Remote control panels 1 and 2.

**Note**

Refer to chapter 9.3 External connections of the Plena Voice Alarm System Installation and User Instructions.

### 3.3.5 Trigger outputs

#### 3.3.5.1 Introduction

The battery charger has 4 trigger outputs that can be connected.
- Fault - Gives a signal if there is an internal fault in the battery charger.
- Battery in use - Gives a signal when the load current from the battery to the system exceeds the battery charging current by more than 1 A.
- Battery - Gives a signal if the battery is either defective or not connected.
- Mains - Gives a signal if the mains supply is either not connected or is too low.

#### 3.3.5.2 Trigger Out

Each trigger output has 3 terminals; normally open, normally closed and common.

**Note**

Refer to chapter 5.3 External connections of the Plena Voice Alarm System Installation and User Instructions.

**Figure 3.7: Connecting emergency trigger inputs**

- Connect these as required to the trigger inputs of the Voice Alarm Controller.

**Note**

Refer to chapter 9.3 External connections of the Plena Voice Alarm System Installation and User Instructions.
3.3.6 Power
The charger is able to automatically use the power source between 100 and 240 V. It is not necessary to select the source voltage.

3.3.6.1 Mains power
Do as follows to connect the battery charger to the mains power:
1. Connect a locally approved mains cord to the battery charger (see figure 3.6).
2. Connect the mains cord to a locally approved mains outlet.

3.3.7 Ground connection

⚠️ Caution,
Make sure the safety ground is connected to the battery charger via the mains power cable.

⚠️ Caution,
Do not make a separate ground connection to the battery. The 24VDC connection is already internally grounded in the Plena equipment.

⚠️ Caution,
Do not make a separate ground connection to the 24 VDC output. The 24 VDC output has a common return (it is connected via the 0 V).

*figure 3.8: Connecting the mains power*
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4 Operation

4.1 Power on and off

4.1.1 Switch on
Put the Power switch on the rear of the Battery Charger (see figure 4.1) in the I position.

When mains power is available, the power indicator on the front of the battery charger is lit (see figure 4.2).

4.2 Switch off
Put the Power switch of the battery changer (see figure 4.1) in the O position.

4.3 Battery capacity

4.3.1 Introduction
A rotary Battery Capacity switch at the rear of the unit is used to adjust the output current to the capacity of the battery. To comply with the IEC 60849 standard, the first 80% charge capacity of the battery has to be charged within the first 24 hours. The full charge is complete in the following 24 hours.

4.3.2 Charging modes
The battery charger has 4 charging modes:
- Bulk mode - Charging state always start with Bulk mode. A constant current source is used for the battery charging in this state.
- Full mode - When the battery voltage greater than the threshold, the battery charger goes to full mode. A constant voltage is used to complete the charge of the battery. Once the charging current drops below a certain threshold, battery is defined as full charged and charger goes to the float-mode.
- Float mode - A constant trickle charge lower than Full mode, that maintains battery capacity.
- Equalization - Once a month the charger charges the battery with the 3 modes to keep the battery in good condition.

Note
Applied voltages and current are temperature dependant; therefore, connect the sensor in such a way that a good thermal reading is possible (see section 3.3.3).
4.3.3 Charge voltage and current
When the unit is connected to the battery (battery array), the charge current and charge voltage are as shown in figure 4.3 and figure 4.4 respectively.

When the mains voltage is removed, the output voltage on the main 24V output (marked LOAD) is as shown in figure 4.5.

When switching from the mains to the backup power:
• the main system output will decrease in voltage from the charge voltage to the battery voltage (the system will not be affected by this).
• the auxiliary outputs can have a small dip in voltage, depending on the load (if the load is very high, the system may report this as a fault on the remote controls).

A battery voltage below 20 V will automatically disconnect the load from the battery (this is for deep discharge protection). When the mains voltage is restored, the unit will reset and deliver output voltage again.

When the charger has disconnected the load from the battery, the outputs and system are without power. The following procedure should then be followed.

Before the mains is restored:
1. Switch off the charger.
2. Switch off all amplifiers.
3. Switch off other equipment (if high inrush current is expected).
4. Restore the mains supply.
5. Switch on the amplifiers.
6. If applicable, switch on other equipment.
7. Switch on the charger.

If this procedure is not followed (for example, if the power is restored automatically), the charger might activate the current limiter during power up. This can be caused by the inrush current required to charge the internal capacitors of the equipment, such as the amplifiers. If this happens, turn the charger off and then back on again.

Note
Equipment that has low power consumption such as the Plena Message Manager can be left in the On position.
An overload or short circuit in the secondary / auxiliary outputs, RCP outputs, or volume override outputs will not:
• affect the main 24V output.
• cause other outputs to shut down.

If two secondary outputs are overloaded, this may lead to loss of the third auxiliary output.

**Note**
If the main 24 V output is shut off, the secondary 24 V is also switched off.

**Note**
If an over current or short circuit in the main 24V output causes the current limiter to shut down the output, the secondary outputs will also be switched off.

If the battery voltage is below 16 V, this is treated as a fault.

If the current limiter is activated, it will switch the output off. When the output is disconnected, by either the current limiter or under voltage protection, the charger can be reset by turning it off and then back on again.

**Note**
If the charger activates the under voltage protection, but the mains is not restored, turning the unit off and then back on again will also reset the charger.
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5 Technical data

5.1 Electrical

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains voltage</td>
<td>240/90 V(AC), ± 10%, 50/60 Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>550 VA max</td>
</tr>
<tr>
<td>Minimum output voltage (automatic shutdown)</td>
<td>20 V</td>
</tr>
<tr>
<td>Maximum output voltage (Regulated independent of battery)</td>
<td>25.5 V</td>
</tr>
<tr>
<td>Maximum charge current</td>
<td>10.0 A (maximum load)</td>
</tr>
<tr>
<td>Maximum system current</td>
<td>70 A</td>
</tr>
<tr>
<td>Auxiliary output current</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Auxiliary current</td>
<td>3 A per output, 5 A total maximum load</td>
</tr>
<tr>
<td>Battery type</td>
<td>Lead - acid traction battery</td>
</tr>
</tbody>
</table>

5.2 Inputs

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery capacity</td>
<td>2 - 200 Ah</td>
</tr>
<tr>
<td>Temperature sensor</td>
<td>External - defeat</td>
</tr>
</tbody>
</table>

5.3 Indicators

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervision</td>
<td>On EMG inputs, programmable</td>
</tr>
<tr>
<td>Fault</td>
<td>Correct function of charger</td>
</tr>
<tr>
<td>Battery in use</td>
<td>Battery is being drained during normal condition</td>
</tr>
<tr>
<td>Battery</td>
<td>Battery is defective or not connected</td>
</tr>
<tr>
<td>Mains</td>
<td>Mains is not connected</td>
</tr>
</tbody>
</table>

5.4 System connection

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 VDC</td>
<td>100 A screw terminals</td>
</tr>
<tr>
<td>Fuse</td>
<td>70 A slow</td>
</tr>
<tr>
<td>Regulation polarity</td>
<td>RTN</td>
</tr>
<tr>
<td>Temperature sensor</td>
<td>Semiconductor with mounting eye</td>
</tr>
</tbody>
</table>

5.5 Fault output

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault output voltage</td>
<td>&lt; 24 V</td>
</tr>
<tr>
<td>Type</td>
<td>Normally opened (default) or normally closed</td>
</tr>
</tbody>
</table>

5.6 24 V DC out

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 VDC out</td>
<td>24 V(DC), max. 0.8 A</td>
</tr>
</tbody>
</table>

5.7 Environmental conditions

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>+5 to +55 °C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-25 to +55 °C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>&lt; 95%</td>
</tr>
<tr>
<td>Make sure the charger is not exposed to sources of water or water splashes.</td>
<td></td>
</tr>
</tbody>
</table>

5.8 General

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMC emission</td>
<td>According to EN55103-1</td>
</tr>
<tr>
<td>EMC immunity</td>
<td>According to EN55103-2</td>
</tr>
<tr>
<td>Dimensions</td>
<td>88 x 430 x 260 wide, 19” rack installation 2 U high, 260 mm deep (leave 50 mm for connections)</td>
</tr>
<tr>
<td>19” mounting brackets</td>
<td>included</td>
</tr>
<tr>
<td>Weight</td>
<td>3 kg</td>
</tr>
</tbody>
</table>
Intentionally left blank