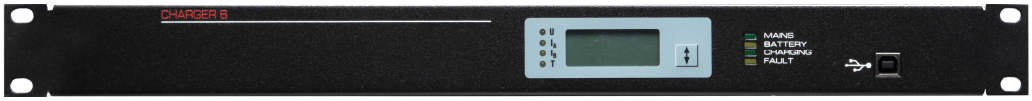
CHARGER 6

Emergency Power Supply



CHARGER 12

Emergency Power Supply

Battery charger for use in *Voice Alarm Systems* (*VAS*)
and *Sound Systems for Emergency Purposes* (*SSEP*)

Manual

english

Rel. 1.3e 201130
Nov. 2020

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CHARGER 6 / CHARGER 12

Compliant to:
EN-54-4:1997+A1:2002+A2:2:2006 & EN-121001-10:2005

CE 1438 **Declaration of Conformity - Certificate of Performance No. 1438-CPR-0330**

version 17.05.2013

Warnings

- **Read this User Manual thoroughly before using the device.**
- **Do not touch internal elements of an operating device – doing so poses a risk of an electric shock or burns.**
- **Protect the device from the possibility of any items or fluids entering in – doing so poses a risk of electric shock and device damage.**
- **Do not cover ventilation openings – doing so may result in device damage.**
- **Provide a free space of at least 10 cm at the sides of the device, enabling its proper ventilation.**
- **The device must be supplied from mains with a protective earthing terminal.**
- **The device may interfere with operation of sensible radio and television equipment located nearby.**

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1. Technical Description

1.1 Intended use

The power supplies are intended to be used as power supply of voice alarm systems (VAS), providing them with the backup battery power for acoustic amplifiers and controllers and other VAS modules separately:

CHARGER 6 providing 6+2 outputs cooperating with one or two battery banks

CHARGER 12 providing 12+4 outputs cooperating with one or two battery banks

1.2 construction

The Power supplies are designed for installation in a typical 19" rack and are assembled within a metal case:

CHARGER 6 19" / 1 U (1 unit rackspace)

CHARGER 12 19" / 2 U (2 units rackspace)

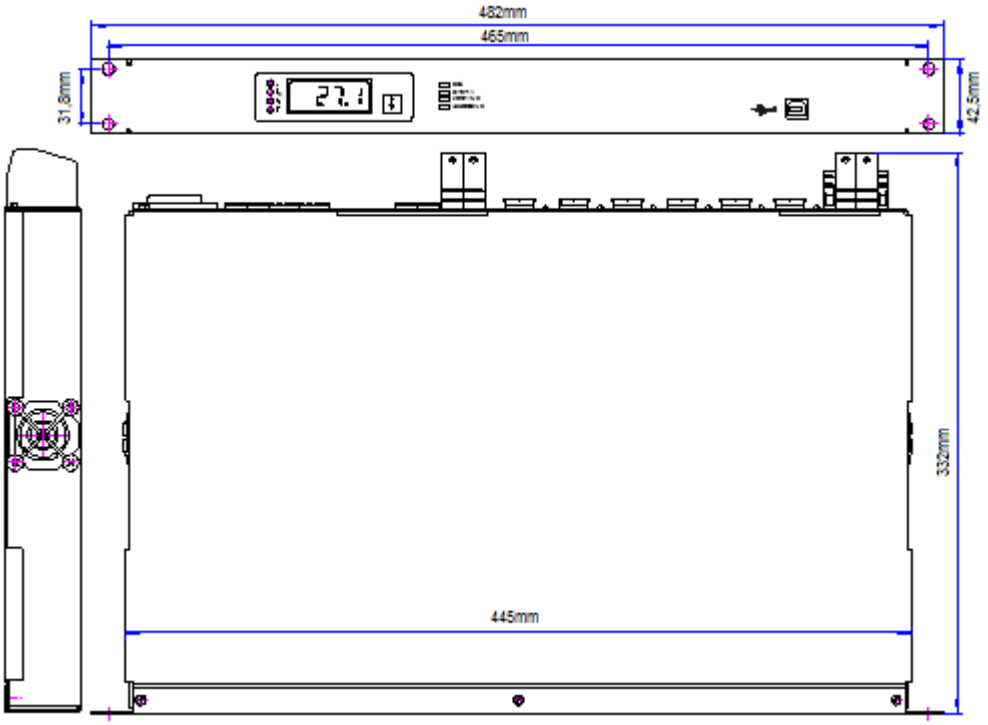


Fig. 1 View and nominal dimensions of CHARGER 6 power supplies.

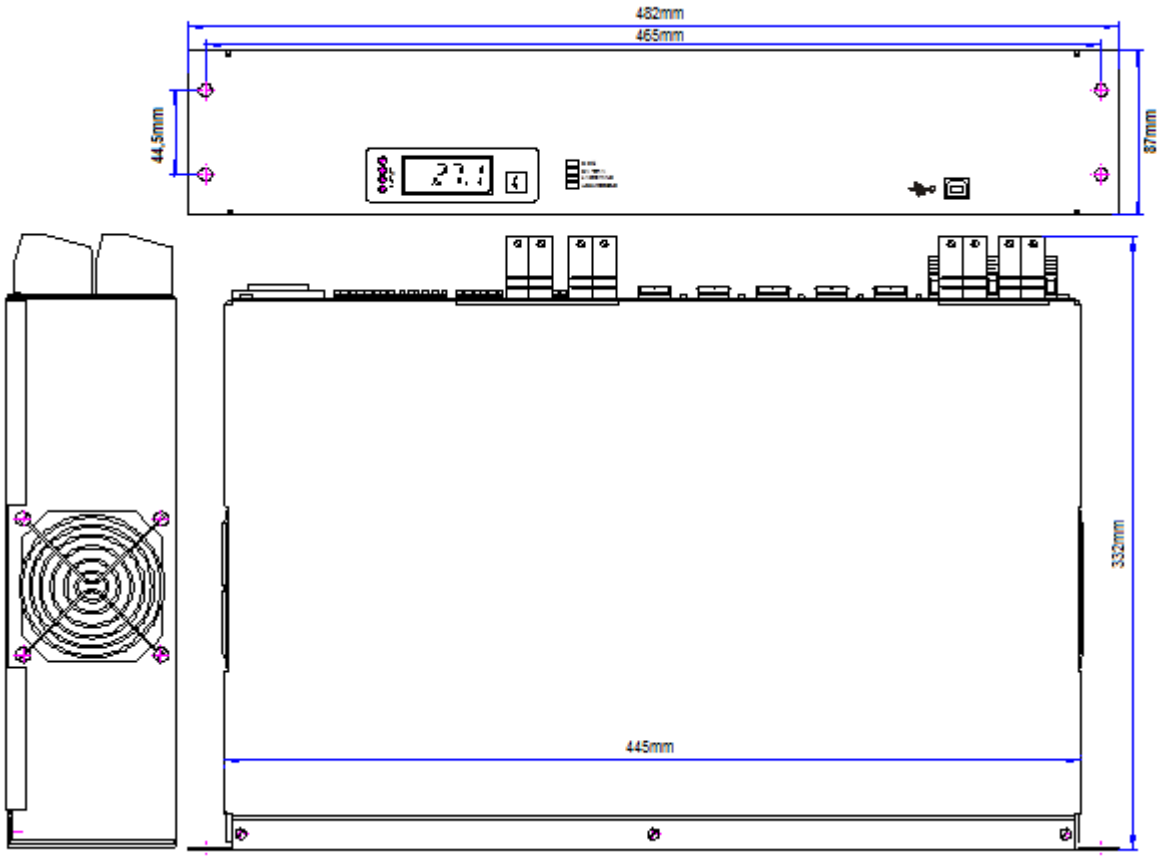


Fig. 2 View and nominal dimensions of CHARGER 12 power supplies.

1.2.1 Battery charger CHARGER 6

The power supply unit is shipped together with:

1. The 230V mains cable equipped with the IEC plug;
2. A temperature sensor;
3. Set of plugs for connecting power supply of VAS amplifiers (6 pcs. of the PC 5/2-ST-1-7 plugs);
4. Set of plugs for connecting power supply of VAS controllers (2 pcs. of the MSTB2,5/2-ST plugs);
5. Set of plugs for connecting inputs and outputs of the indication system (5 pcs. of the MSTB2,5/2-ST plugs)

A digital display panel, a USB port and 4 LED indication diodes are installed in the front panel of the power supply unit:

A: **U – battery voltage**
B: **IA – current for controllers**
C: **IB – current of charge/discharge**
D: **T – battery temperature**

1. **Mains -** (green)
2. **Battery** - (yellow)
3. **Charging** - (green)
4. **Fault** - (yellow)

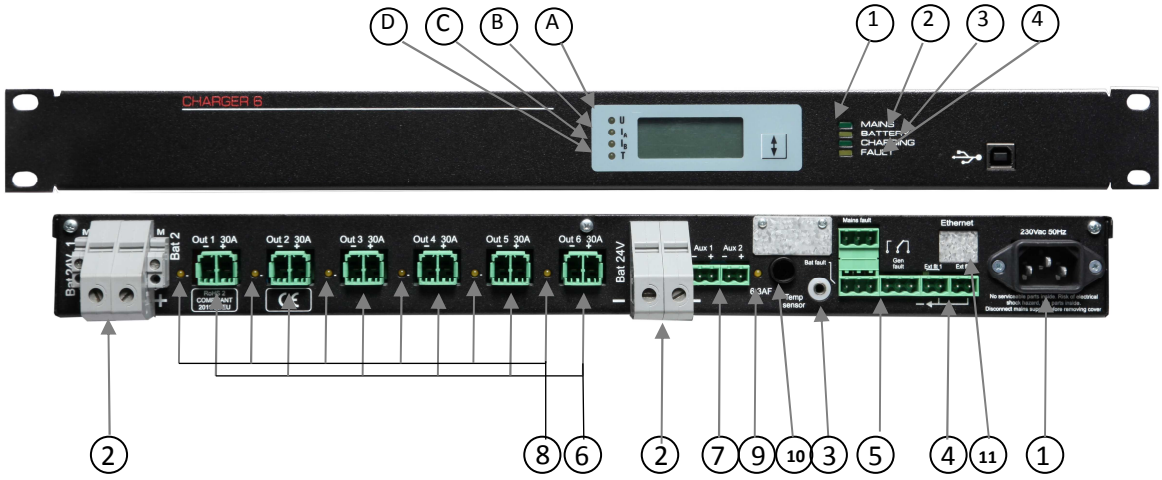


Fig. 3 View of the front and back panel of the **CHARGER 6** power supply unit

The back panel contains:

1. A male IEC socket for connecting the mains cable (230Vac 50Hz).
2. Four screw connectors for connecting two 24 V battery banks (BAT1, BAT2) and two neighbouring connectors of the circuit equalizing voltages of the battery banks M.
3. A socket for connecting the temperature sensor (TEMP SENSOR).
4. Two input sockets for external fault indication (EXT. FAULT 1 and EXT. FAULT 2).
5. Three output sockets of relay indication system (MAINS FAULT, BATTERY FAULT and GENERAL FAULT).
6. 6 sockets for connecting VAS 24V amplifiers (from OUT1 to OUT6). They can also be used for connecting the heat and smoke control system.
7. A double socket for connecting the network controller and other VAS modules designed for work with 24V power supply (ADDITIONAL OUTPUT 24V).
8. LEDs to monitor output conditions of high current outputs
9. LEDs to monitor output conditions of high AUX outputs
10. Connector “M” for battery balancer
11. Primary fuse 6.3 AF
12. Ethernet connector. (optional)

1.2.2 Battery charger CHARGER 12

The power supply unit is shipped together with:

1. The 230V mains cable equipped with the IEC plug;
2. A temperature sensor;
3. Set of plugs for connecting power supply of VAS amplifiers (12 pcs. of the PC 5/2-ST-1-7 plugs);
4. Set of plugs for connecting power supply of VAS controllers (4 pcs. of the MSTB2,5/2-ST plugs);
5. Set of plugs for connecting inputs and outputs of the indication system
   (5 pcs. of the MSTB2,5/2-ST plugs)

A digital display panel, a USB port and 4 LED indication diodes are installed in the front panel of the power supply unit:

A:	**U – battery voltage**
B:	**IA – current for controllers**
C:	**IB – current of charge/disacharge**
D:	**T – battery temperature**

1.	**Mains -** (green)
2.	**Battery** - (yellow)
3.	**Charging** - (green)
4.	**Fault** - (yell

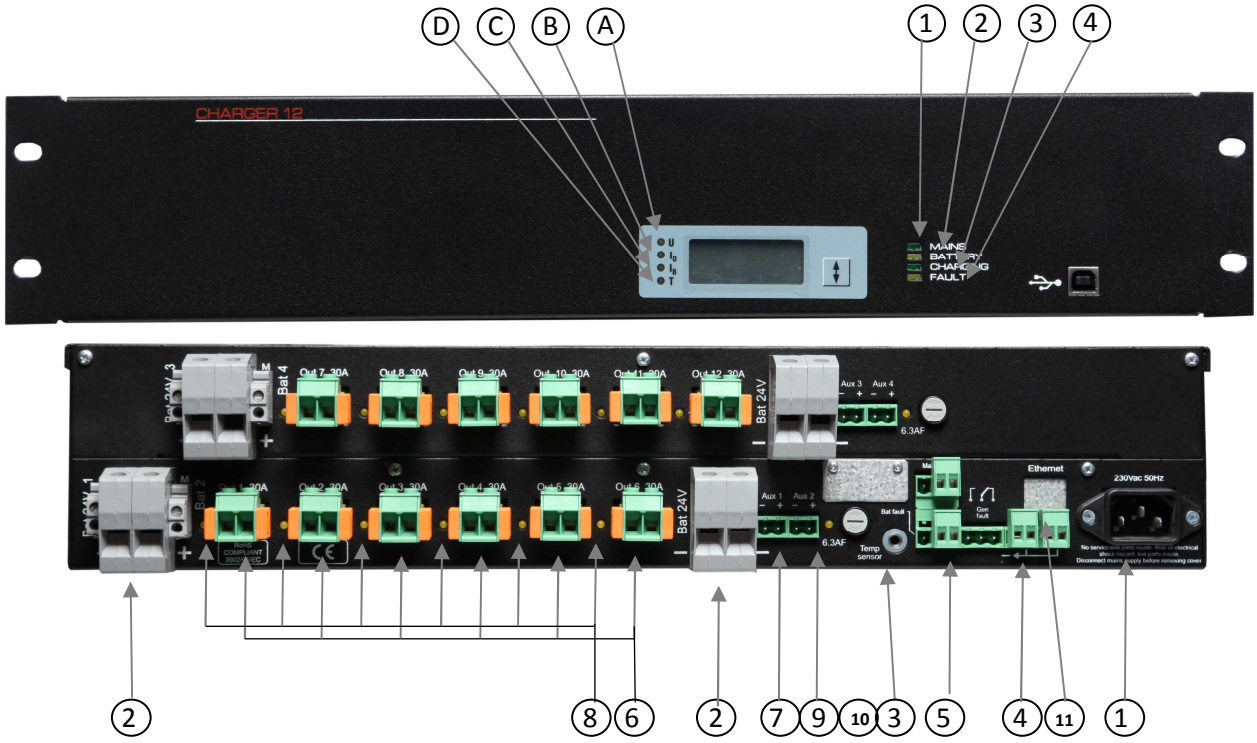


Fig. 4. View of the front and back panel of the CHARGER 12 power supply unit

The back panel contains:

1. A male IEC socket for connecting the mains cable (230Vac 50Hz).
2. Four pairs screw connectors for connecting up to four 24 V battery banks (BAT1, BAT2, BAT3, BAT 4) and four neighbouring connectors of the circuit equalizing voltages of the battery banks M.
3. A socket for connecting the temperature sensor (TEMP SENSOR).
4. Two input sockets for external fault indication (EXT. FAULT 1 and EXT. FAULT 2).
5. Three output sockets of relay indication system (MAINS FAULT, BATTERY FAULT and GENERAL FAULT).
6. 12 sockets for connecting VAS 24V amplifiers (from OUT1 to OUT12).
7. 4 sockets AUX 1 .. AUX 4 for connecting controllers and other VAS modules designed for work with 24V power supply (ADDITIONAL OUTPUT 24V).
8. LEDs to monitor output conditions of high current outputs
9. LEDs to monitor output conditions of high AUX outputs
10. Connector “M” for battery balancer x2
11. Primary fuse 6.3 AF x2
12. Ethernet connector. (optional)

1.3 Basic electrical parameters

	CHARGER 6	CHARGER 12
Nominal mains voltage	230V +10% -15% 50Hz	
Power factor	0.94	
Efficiency (while charging the battery)	84 %	
Output voltage stabilisation	0.5 %	
Leakage current in the protective cable	<1.5 mA	<3 mA
Maximum input current	2.7 A	5.4 A
Nominal voltage of the external battery bank	24 V	24 V
Nominal voltage of the floating mode operation at 25°C	27.1 V	27.1 V
Nominal voltage of the bulk charging mode operation at 25°C	28.3 V	28.3 V
Temperature compensation factor of the floating mode operation and bulk charging	- 48 mV/ºC)	- 48 mV/ºC)
Maximum capacity of supplied battery banks	430 Ah *2)	860 * 2)
Maximum number of battery strings	2	4
Maximum charging current	16 A *2)	32 A *2)
Maximum growth of resistance of battery circuit *1)	25 mΩ	25 mΩ
Load capacity of power supply outputs provided for VAS amplifiers	6 x 30 A	12 x 30 A
Load capacity of power supply output provided for network controller and other VAS modules	1x6 A	2x6 A
The quiescent current consumption from the battery	< 400 mA	< 800 mA
Current consumption from the batteries after LVD disconnection	< 5m A	< 5m A
Range of output voltage *3)	21.0...28.8 V	21.0...28.8 V
Maximum current which the power supply unit can take from a single battery when the main power supply is cut off or disconnected [A]	90 A	90 A

*1) *Guaranteed value of battery circuit resistance, at which the fault indication system is switched on for each battery string separately.*

*2) *Listed battery capacities do not include current consumption from 24V outputs provided for the VAS controller .*

*3) *The listed range includes voltage values between the voltage of a discharged battery bank (at the end of the buffer mode cycle) and the value of the bulk charging mode voltage, including temperature compensation*

1.4 Recommended working conditions

Relative humidity	max. 80%
Direct sunlight exposure	inadmissible
Strokes during operation	inadmissible
Ambient temperatures	
Limits of acceptable storage temperature	-40...+85°C
Working temperature	-5 ... +45°C

class **3K5** according to **EN 60721-3-3**

2 Operation principle

The microprocessor controller checks the presence of the mains power, battery state, state of external alarms inputs and a number of internal parameters (e.g. acceptable time of the bulk charging).

If an improper operation of the device is detected, a fault indication is generated.

This operational state is signalled by corresponding diodes, lighting up in the front panel, and by three remote indication relays accessible in the back panel. The relays are activated, when no fault indications are being generated; it means that a fault indication causes deactivation of the relay.

The power supply circuit is based on a direct floating mode system. The power supply, supplied from the mains, is connected in parallel with an external battery bank.

The VAS amplifiers supplied with their own power supplies are required not to consume power from the 24V voltage. However, when power failure, they should automatically switch over to use the battery power supply.

Figs. 5a. and 5b. below present flowcharts of both power supplies

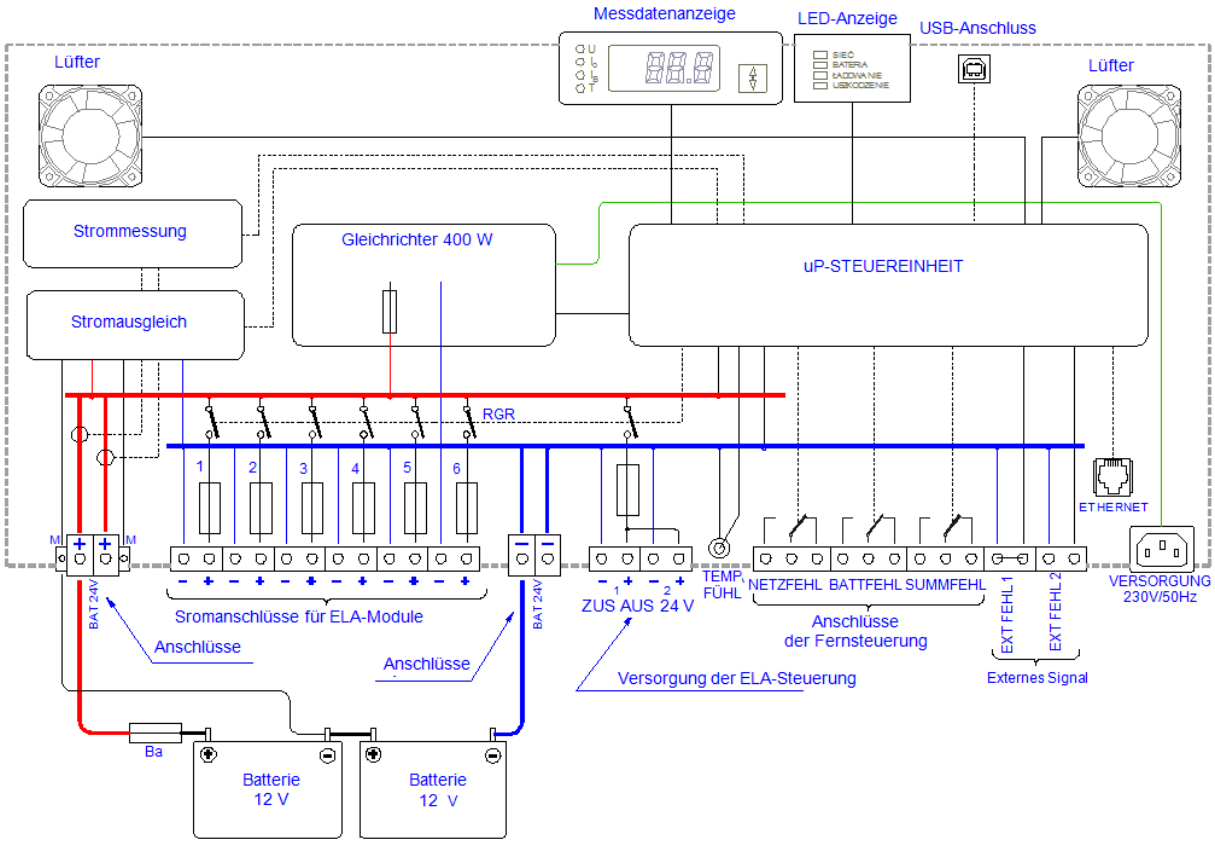


Fig.5a Block diagram of CHARGER 6 power supply

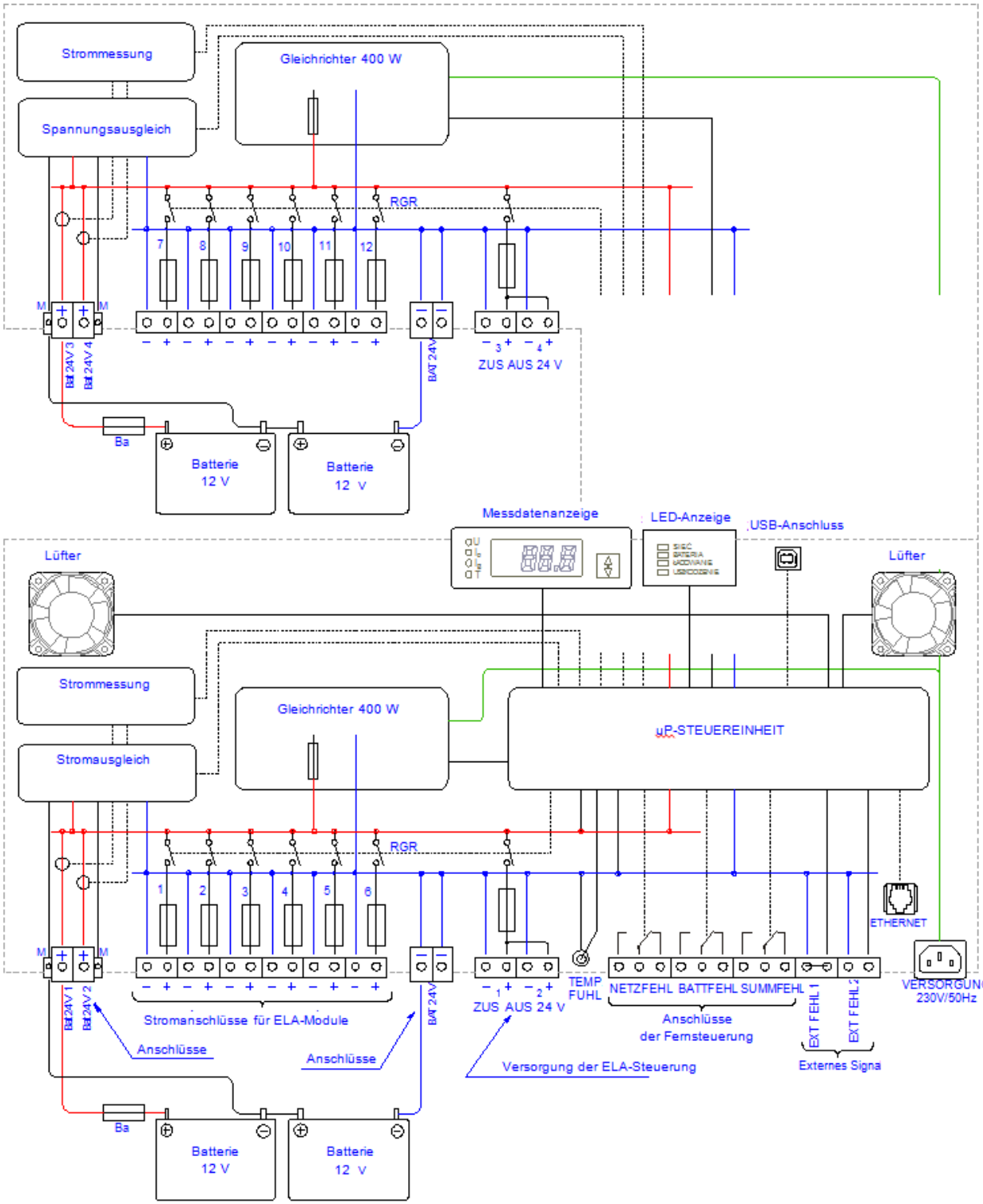


Fig.5b Block diagram of CHARGER 12 power supply

When the mains present, the power supply maintains the external battery banks in their fully charged state. Power supply's operation is controlled by the microprocessor controller, which independently supervises the batteries, maintaining the floating mode voltage in them (depending on ambient temperature, if the external temperature sensor has been connected). This sensor should be located near the battery. If the sensor is absent, the controller maintains voltage corresponding to the ambient temperature of 25°C.

In case of power failure, the loads connected to the power supply are supplied directly from the battery bank – this is the battery mode. As the mains power supply returns, the battery bank charging current is above the set point, the power supply proceeds to the bulk charging mode.
This mode is characterized by charging using limited current at the increased voltage. The end of the bulk charging at a fully operational battery bank is defined by a significant drop of charging current after the preset charging voltage has been reached, after which the power supply decreases the voltage to the level of floating mode voltage, continuing charging at this voltage. If the battery bank is faulty, the bulk charging is interrupted in the fault mode after the maximum, preset charging time has been exceeded or when the permissible ambient temperature of the battery bank is exceeded.

The circuit of the CHARGER 6 or CHARGER 12 power supply is equipped with a Low Voltage Disconnector (LVD) – an internal switch of deep discharge implemented in the relays in their output circuits (one relay in each circuit for powering one amplifier and one at each double outputs for powering the VAS controller). They disconnect the outputs from the battery banks when the battery reaches the minimum permissible discharge level, thus preventing it from further discharging and preventing it from being destroyed.
The second RB disconnector – battery disconnector disconnects the additional outputs when detecting short circuit in the battery circuit supplying power to the additional outputs from the rectifier.

Measurement of battery circuit resistance is an additional function of the controller. The resistance measurement takes place only in the floating mode operation. Detection of battery circuit resistance increase caused by an increase in internal resistance of the battery or by an increase of battery connection resistance, causes the indication for reaching high battery circuit resistance to be sent. If the battery bank gets disconnected, the controller detects a significant increase of battery circuit resistance and indicates a device configuration error.

The power supply is equipped with a function of voltage equalisation between batteries of each battery string. Voltage equalisation takes place as a result of loading the half of batteries which exhibit higher voltage, with a small current, of 100mA. This function is called for if the voltage difference exceeds 0.1V.
The use of voltage equalising circuit requires an additional connection to be introduced between the M terminal of a given battery string and the median point of the battery itself. This system is resistant to an incorrect connection of this connector (to an inappropriate terminal of any battery), indicating a fault in such situations. The lack of this connection is automatically detected which results in switching off the voltage equalising system.

The circuit of the CHARGER 6 or CHARGER 12 power supply is continuously controlling the state of outputs fuses on each output for amplifier and controllers. A fault to any of them results in a fault signal being generated (the signalling lights on the front panel of the power supply unit are switched on and the remote signalling to be put out), and in addition, switching on a yellow LED diode located near the faulted outputs.

When the power supply unit is switched on, state of load at the outputs designed for VAS amplifiers is checked. Lack of current consumption from these outputs is required. If any of the amplifiers has e.g. its own power supply switched off (or faulty), which results in an attempt of switching it on using output voltage of the power supply unit, such the state shall be detected and the relay present at this

output shall not switch on, and, in addition, fault indication shall be switched on. Relays present at the other outputs shall simply switch on, supplying voltage to operational amplifiers.
During the power supply start-up, the current consumption from the output designed for the VAS controller is permitted only. Its load present at this output, however, decreases the current provided for battery bank charging.

NOTES
If the system has already been switched on and any of the amplifiers starts current consumption using output voltage as a result of fault, malfunction or disconnection of its individual mains power, the power supply shall detect and indicate such the situation, if the current being consumed by the outputs exceeds 1A. Leaving the power supply system in this state may eventually result in an uncontrollable discharge of the battery, despite proper functioning of the power supply system itself.

3. Installation and connection

3.1 Installation

The power supplies have been designed and manufactured as a cassette offering the IP20 protection rating, prepared for installation in a typical 19" rack using four mounting holes located in the front panel (Fig. 1, 2).
The rack dedicated to the Voice Alarm Systems must have IP30 protection rating.
Installation of power supply units in the rack requires guide bars to be used. Guide bars supporting the power supply cassette should be installed in such a way as not to impede the flow of air to the fans located on the both sides of the cassette. A 10 cm ventilation space is required on both sides of the case.

The power supply is not equipped with its own mains switch, thus it is necessary to use an adequate switch in the power supply circuits (outside the power supply unit).
The required electric installation should be provided as a permanent installation equipped with an overvoltage protection system.

3.2 Connection

connecting to power supply network

Connecting the mains to the power supply should be implemented by using a 3-wire YLY-type cable with the 1.5 mm^2 cross-section, equipped with the IEC plug.

Load connection

The CHARGER 6 or CHARGER 12 power supply has been designed for connecting the VAS amplifier modules supplied with the 24V voltage, and separately, the network controllers and other VAS modules supplied with the 24V voltage.
The sockets located in the back panel allow for connection of amplifiers using 2-pin connectors.

If a single main amplifier is equipped with its dedicated spare amplifier present in the VAS system, it is possible to connect both amplifiers to the common power supply output. However, this connection should be made excluding connectors of the power supply units.

Plugs for output connection are supplied with the power supply unit. Maximum cross-section of the connected wires is 6 mm2 in case of outputs provided for amplifiers and 2.5 mm2 for the 24V power supply output providing power supply for the VAS controllers and other VAS modules.
The CHARGER 6 power supply is equipped with two power supply outputs for VAS controllers, while the CHARGER 12 power supply unit is equipped with four such outputs. If the VAS system requires a higher number of controllers and cooperating devices to be used, corresponding splitting should be implemented outside the power supply unit.

connecting battery bank

Power supply units are designed to cooperate with VRLA-AGM battery banks.
Note: Because the power supply unit is not equipped with a battery bank circuit breaker, appropriate circuit breakers, separate for each of the battery banks, should be installed near each positive terminal of each battery.
Connection of a battery set should be made using connector wires with a maximum cross-section of 16 mm2 for terminals located in the back panel of the power supply unit, marked as Bat taking a proper care to provide them with a proper polarity. A reverse connection of a battery bank may result in severe fault to the power supply unit itself, as well as in connected, external devices.
Positive terminal poles, marked with numbers, enable distinguishing of battery banks as each of them is supervised separately. Negative poles are short-circuited together.
The **M** outputs of the voltage compensation circuit should be connected with the center of the appropriate battery string by means of the cables of the cross section of 0.75mm2. The connection must be protected near the battery with its own fuse of 0.5 ... 2AF.

Note: If only single battery path is used, so connect to Bat1
If two battery paths were used, so connect to Bat1 and Bat2
If three battery paths were used, so connect to Bat 1, Bat2 and Bat3
Minimum Akku capacity is 45Ah recommended is 65Ah or higher!
Remind maximum current for each battery-connector is 90A

Connecting external fault indication system

The power supply is equipped with two inputs for connecting external fault indication systems, the sockets of which are located in the back panel. Corresponding plugs are supplied with the power supply unit. One of the plugs has a factory pre-installed jumper and it has to be placed in the alarm socket **EXT. FAULT 1**, even if this input is not used, since it is activated when its contacts become disconnected.
The second input **EXT. FAULT 2** is activated by short-circuiting its terminals.
External fault indication systems should be connected using fire-resistant type cables (the cross-section of 0.8 mm2).

Output of remote indication

Outputs of remote relay indication are implemented as 3-pin sockets. The power supply unit is supplied with 2-pin plugs. You can use the normally connected (NC) or normally open (NO) contacts of the internal indication relays by placing them in the appropriate socket. Remote indication circuits should be connected by using fire resistant type cables (of the cross-section of 0.8 mm^2)

Temperature sensor connection

The external temperature sensor supplied with the power supply unit should be connected to the appropriate socket (**Temp sensor**). The sensor should be placed in a direct proximity of the battery bank, if possible, between the walls of two adjacent batteries.

4. Operation

4.1 General information

Output voltages and signalling thresholds are preset as factory default values. Power supplies after installing require supervision by the service team as some emergency states may occur during the operation of the device.

4.2 Operation safety

The power supply unit is a Class I device according to the standard EN 60950-1:2007/A1:2011 (IEC950), designed for connecting to a permanent, one-phase installation using an earthing cable, according to the HD 60364-4-41:2007 Standard Electric installations at construction sites.
The metal case of the power supply units is connected to a protective terminal (PE). The circuits used for connecting the battery, remote indication outputs and remote indication inputs are separated from power supply circuits and from the case.
Contacts of remote indication relays are completely separated from all other circuits (including output circuits).
Inputs of external fault indications are located on the potential of negative bus of the battery bank.

The interference filters used in the CHARGER 6 and in CHARGER 12 power supplies are equipped with the Y class capacitors causing the appearance of the leakage current in the protective conductor of maximum 1.5 mA for the CHARGER 6 and 3mA in CHARGER 12.

4.3 Digitale display

Power supply units allow for digital measurements of basic operation parameters of the system: current voltage of the supervised battery bank (U), its charging or discharging current (IB), current consumed by the VAS controllers from the 24V power supply (IO) and of the ambient temperature (T), if the temperature sensor has been connected. The current measurement type (selected by using the vertical arrow button) is distinguished by switching on a LED diode with the corresponding marking. In addition, one can read the error code detected by the power supply unit controller (all diodes indicating measurement type are switched off). This position is active only then, when an operation error has been detected in the system and the fault indication has been activated.

A list of particular errors (many errors can be caused by a particular type of fault) is performed by using the vertical arrow button. The long press of the arrow button allows basic operation parameters of the system to be measured, starting with U..

4.4 Digital communication

The front panel of the power supply unit is equipped with a USB communication socket used routinely for servicing. The servicing software allows for diagnostic works to be performed, enabling to check numerous operation parameters of the power supply and to modify its default settings. This output is galvanically insulated from all other circuits of the power supply unit.
Optionally, the power supply unit may be equipped with an Ethernet interface, enabling operation within a TCP/IP network. It has two simple service servers implemented:
- a http server for presentation of the current system state as web pages available for browsing using a web browser;
- Modbus TCP protocol server enabling device controlling and supervision.
Detailed information can be obtained from the manufacturer.-

4.5 Operation state signaling

The power supply is equipped with LED, sound and remote indication systems. The LED indication is used in order to bring attention of the personnel to the operation state of the device and to inform about the reason of a potential malfunction. The sound indication system is activated together with the lighting signalling.
Fault indication is maintained as active until it is deactivated using the vertical arrow button located in the display panel. Short press of the button switches the sound indication system off, while keeping the LED and remote indication systems active. The remaining indication systems can be deactivated by pressing and holding the vertical arrow button for over 5 seconds. However, the use of the key is effective only when the reason triggering the event generation is no longer present. The indication systems are reset automatically only when the network power supply is restored and external signals at the **EXT. FAULT 1** and **EXT. FAULT 2** inputs are no longer detected. In the case of the power failure, instead of a continuous sound signal, a short, intermittent signal is generated every 15 seconds.
The LED indication system comprises four LED diodes located in the front panel of the power supply. Three diodes represent the current operation mode (**MAINS** - green, **BATTERY** - yellow, **CHARGING** - green), and the fourth - fault (**FAULT** - yellow).
The remote indication system includes three sockets denoted MAINS FAULT, BATTERY FAULT and GENERAL FAULT. Each of the sockets has three plugs, switched between by using relays, completely separated from all other circuits. During normal, correct operation of the power supply unit, relay coils are active. It means that Mains Fault (power failure) indication, Battery Fault and General Fault indications are executed by switching the appropriate relay off (current loss in the relay coil).
The contact setting in this state (so called zero-voltage state) has been presented next to each corresponding socket.

List of states of the LED and remote indication systems is presented in the tables below.

LED indication system in the front panel.

DESCRIPTION	COLOUR	STATE	EVENT DESCRIPTION
MAINS	green	on	Normal operation state at the mains present.
		off	No mains or rectifier fault.
BATTERY	yellow	on	Battery operation (no mains or rectifier fault).
		off	Normal operation state at the mains present.
CHARGING	green	pulsating	Bulk charging.
		on	Charging during floating mode (after the bulk charging has finished).
		off	Charging has finished.
FAULT	yellow	on	Fault occurred within the power supply unit or external fault. Please read the error code from the display in order to determine the reason.
		pulsating	External fault indication at **EXT. FAULT 1** or **EXT. FAULT 2** input. ***).**

) If it is sent together with the external fault indication an internal fault occurs, the LED diode **FAULT will be on continuously.*

L

LED indication system in the back panel.

DESCRIPTION	COLOUR	STATE	EVENT DESCRIPTION
From **Out 1** to **Out 12**	yellow	on	Fault of output circuit breaker.
		pulsating	Current is consumed from the particular output (the indication is activated only before the outputs are switched on).
		off	Output switched on.
AUX	yellow	on	Fault of circuit breaker of additional outputs
		off	Output switched on.

Relay indication system.

DESCRIPTION	STATE	EVENT DESCRIPTION
MAINS FAULT	on	Normal operation state at the mains present.
	off	No mains or rectifier fault.
BATTERY FAULT	on	Correct battery operation.
	off	High resistance of battery circuit or battery voltage below a preset level (battery discharged).
GENERAL FAULT	on	No fault.
	off	Fault within the power supply or external fault.

4.6 Maintenance

The device does not require any specific maintenance operations to be performed. During normal operation of the unit care should be taken to maintain clean and tidy area around the power supply unit.

5 Servicing

5.1 Circuit breakers

Fuse type circuit breakers are easily accessible for the service team. Their parameters have been specified in the table below.

Protected circuit in the power supply	Fuse type and value of CHARGER 6	Fuse type and value CHARGER 12
Amplifiers output circuits – accessible after cover has been dismounted (Fig. 6 - #2)	6 x 30AF (6,3x32mm)	12 x 30AF (6,3x32mm)
Additional output 24V circuit (Fig. 6 - #1)	1 x 6.3AF (6.3x32mm)	2 x 6.3AF (6.3x32mm)

Caution: If fuse replacement requires the cover to be removed, it can be done only after disconnected the mains and from the battery bank.

The VAS system personnel can exchange the above mentioned fuses only. If other circuit breakers used within the power supply unit are faulty, a repair performed by qualified service personnel is required. Fig. 6 below presents location of the fuses inside the power supplies.

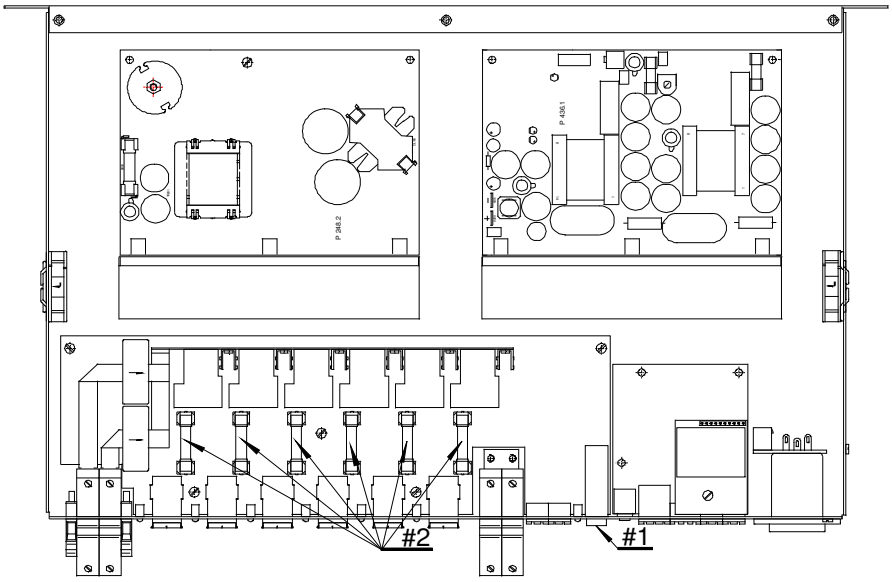


Fig. 6. Location of circuit fuses inside the power supply units.

Attention

The 2U height power supply has two sets of sockets and fuses – the upper one and the lower one. To access the upper fuses set, the screws that fix the upper shield (A), should be unscrewed. In order to access the lower set of fuses, the screws (B) needs to be unscrewed and the upper set of fuses and sockets needs to be raised.

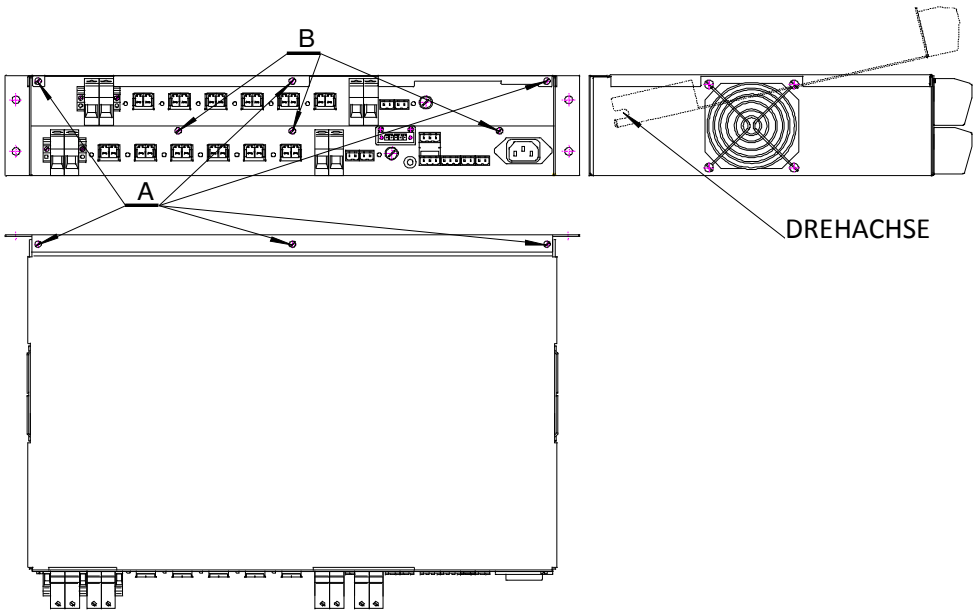


Fig.7. Access to the fuses in the 2U power supply version

5.2 Detecting faults and troubleshooting.

Most cases of malfunctions which can occur during device operation is indicated and handled by the microprocessor installed in the device. The unit is equipped with 7 fuses (or 14 in the power supply of the 2U height), replacement of which may be undertaken by qualified service personnel. These are fuses of output circuits – amplifiers power supply and the VAS controller power supply or the heat and smoke control system devices.
Output fuses may be faulty as a result of short-circuit of device outputs. The VAS controller power output breakers are accessible directly on the rear panels of the power supplies. The VAS power output breakers replacement requires the access described in the point 5.1.

Warranty and after-warranty repairs are performed by service of the manufacturer or by an authorized service partner of the manufacturer.

6 Additional information

6.1 Remarks of the manufacturer

The manufacturer reserves the right to introduce construction and technology changes to the product, without diminishing its quality

6.2 List of indicated error codes

Below, a list of codes accessible to the user is presented. It is possible to read the codes from the digital display. It is possible only then, when the system has detected a fault and the fault indication has been activated.

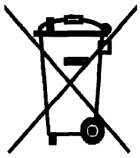
Codes denoted with the letter E indicate fault or error caused by an external factor. The letter P indicates an internal cause within the power supply..

Description	Code
Output(s) not disconnected	P01
Output(s) loaded	E02
Output(s) not connected	P03
Output circuit breaker(s) fault	E04
Network controller 1 circuit breaker fault	E05
Network controller 2 circuit breaker fault	E06
External fault 1 *)	E07
External fault 2 *)	E08
Package 1 rectifier fault	P09
Package 2 rectifier fault	P10
Power failure *)	E11
Battery loaded despite the mains present (overload)	E12
High battery voltage	E13
Low battery voltage	E14
Output disconnection voltage	E15
DC-DC converter fault	P16
Maximum bulk charging time exceeded	E17
Maximum bulk charging temperature exceeded	E18
Low battery temperature	E19
High battery temperature	E20
High device temperature (internal)	E21
Current detection at the outputs *OUT 1..12* despite the mains present	E22
	E23
Voltage regulation error	P24
Permissible resistance level for battery series 1 exceeded	E25
Permissible resistance level for battery series 2 exceeded	E26
Permissible resistance level for battery series 3 exceeded	E27
Permissible resistance level for battery series 4 exceeded	E28
Battery 1 configuration error **)	E29
Battery 2 configuration error **)	E30
Battery 3 configuration error **)	E31
Battery 4 configuration error **)	E32
No communication with the output package 1	P33
No communication with the output package 2	P34
Measurement/configuration error of the battery temperature sensor	E35
Internal temperature measurement error	P36
Battery 1 connector high current	E37
Battery 2 connector high current	E38
Battery 3 connector high current	E39
Battery 4 connector high current	E40
Battery 1 balancer system fault	P41
Battery 2 balancer system fault	P42
Battery 3 balancer system fault	P43
Battery 4 balancer system fault	P44
Battery 1 fault (or an improper balancer connection)	E45
Battery 2 fault (or an improper balancer connection)	E46
Battery 3 fault (or an improper balancer connection)	E47
Battery 4 fault (or an improper balancer connection)	E48

*) Fault without latched indication – disappears independently when the fault reason is ceased.
Other faults require manual reset, which can be not efficient if the failure cause has not ceased.
**) Battery has been disconnected or connected during operation (after the system start-up)

6.3 Handling packagings and used products

Product packaging is made of non-hazardous materials (wood, paper, cardboard, plastics), which can be recycled. Packages which are no longer needed should be passed on to a waste collection station, after they had been sorted.



The used product is a non-hazardous waste which should not be disposed of in the general waste bin, but it has to be transferred to the local waste collection/recycling station accepting electric and electronic equipment.
Proper handling of used electric equipment contributes to avoiding harmful influences on people and environment resulting from improper warehouse storage and processing of such equipment.

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