SWITCHING POWER SUPPLIES

BKE a.s.
U výzkumu 603
664 62 Hrušovany u Brna
Czech republic

JSD-1K2-545/DIN_ODP

with remote diagnostics

TECHNICAL DESCRIPTION, INSTRUCTIONS FOR DESIGN, ASSEMBLY, OPERATION AND MAINTENANCE OF THE SWITCHING POWER SUPPLY

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Content

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1 Warning

Warning

The device contains dangerous voltage. Failure to observe the safety conditions may result in death, injury or property damage. Routine maintenance on the device may only be carried out by personnel with the necessary qualifications. They must observe all safety principles applicable to working with electrical devices and those specified in these operating instructions. The trouble-free operation of this device is conditional on appropriate handling during transport, correct storage and working position. Routine maintenance and compliance with working conditions are also assumed.

2 Transport, acceptance

The device must not be exposed to shocks or strong impacts during transport.
Follow the instructions on the packaging during transport, storage and handling.
After unpacking and visually checking the completeness of the delivery, carry out the installation. If you have found damage caused during transport, then report this fact to the carrier.
The outer packaging is made of corrugated cardboard. Dispose of it in an environmentally friendly manner.

3 Installation and commissioning

Warning

All work on the device may only be carried out by personnel with the necessary qualifications. In doing so, they must observe all safety principles applicable to working with electrical devices and the instructions given in these operating instructions.
Faultless and reliable operation of the device requires appropriate handling during transport, correct storage, suitable installation and assembly.
The device corresponds to safety class 1. Any interruption or removal of the protective conductor can lead to a malfunction or a threat to health or life.
Built-in devices must be disconnected from all voltage sources before installation or dismantling. If the device needs to be opened, e.g. in the case of replacing a fuse, then it is necessary to wait for the time required for the capacitors to discharge from the time of disconnection from the mains - at least 3 minutes. However, interventions of this type may only be carried out by specialist personnel who are authorized for this activity.
The user is responsible for ensuring that the device is installed, connected and operated in accordance with the rules and standards applicable in the country of installation. Particular attention must be paid to the sizing of conductors, fuses, grounding and switching elements.

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Power supply connection:
Screw terminals allow you to connect wires with a cross-section of 6 mm2 (input and output terminals) and 2.5 mm2 (auxiliary terminals).

Ethernet – RJ45 terminal for Ethernet connection.

Indication - local	
Device is working	green LED and relay contact (connected COM, NO)
Device fault	red LED and relay contact (connected NC, COM)
Battery low	relay contact (battery OK - connected COM, NO/Battery low – connected NC, COM)
Power OK	relay contact (source is working - connected COM, NO/Source error – connected NC, COM)

The output voltage and current limit to the battery can be set using remote monitoring.

Before turning on the power supply, check the polarity and reliability of all electrical connections made.

Commissioning:

Before connecting the mains voltage, perform the following steps:
- Make sure that the external circuit breaker connected to the power supply system is OFF.
- Make sure that all inputs and outputs have the correct polarity and are securely fastened.
- Turn the external circuit breaker connected to the power supply system ON.

After switching on, check the following:

- The green LED marked POWER on the front panel must be on. This indicates that the power supply is in operation. In the event of an error, the green LED will go out and the red FAIL will light up, indicating an error. If an error is indicated, check for the presence of mains input voltage. If this procedure does not solve the problem and the green POWER is not on, disconnect the input voltage and contact your supplier.

If the green POWER is on, the system is correctly installed and ready for operation.

4 Operating conditions

4.1 Input voltage

The device is intended for power supply from a single-phase network with a nominal voltage of AC 230 V. The connection is three-wire (PE/N/L). Incorrect connection may lead to damage or destruction of the appliance (more in the chapter "Installation and commissioning").

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4.2 Cooling

The ambient temperature is determined as the temperature measured in the device, approximately 20 mm from the wall.
Make sure that sufficient air flow is not obstructed.

4.3 External protection

We recommend installing external 10 A circuit breakers (characteristic C) in the power supply phase.

4.4 Grounding

The power supply system has a cabinet and all conductive parts are grounded. The grounding is connected to the grounding contacts of the input terminal block. The output voltage is not grounded.

4.5 Overvoltage protection

Equipment supplied from a TN-C system must be equipped with surge protection of the 1st, 2nd and 3rd stages. A system supplied from an IT system must be equipped with surge protection of the 2nd and 3rd stages. The surge protection is usually placed in the power distribution board.

5 Device description

The switching power supply is designed to power electronic devices for control and monitoring applications in industrial areas, in environments without the risk of explosion. The power supply is equipped with an active PFC at the input, which ensures a wide range of input voltage. The power supply is equipped with an isolating diode and remote monitoring. Remote monitoring allows monitoring and setting the power supply via a web interface and MODBUS protocol.
It has a T10AH/250V fuse at the input and does not need to be externally protected. The supply voltage supply must have the ability to be switched off.
The working position of the power supply is arbitrary, optimally vertical.

5.1 Technical design

The power supply is placed in a metal box with the possibility of mounting on a DIN35 rail. Input and output connections are solved using screw terminal blocks. Output circuits are of the SELV type (for variants with output voltage up to 48 V).
The power supply is equipped with active PFC, IU charging characteristic and ensures optimal battery charging mode.

5.2 Charging characteristics

The power supply is factory-set to connect a Pb battery with a nominal voltage of 54.5 V.

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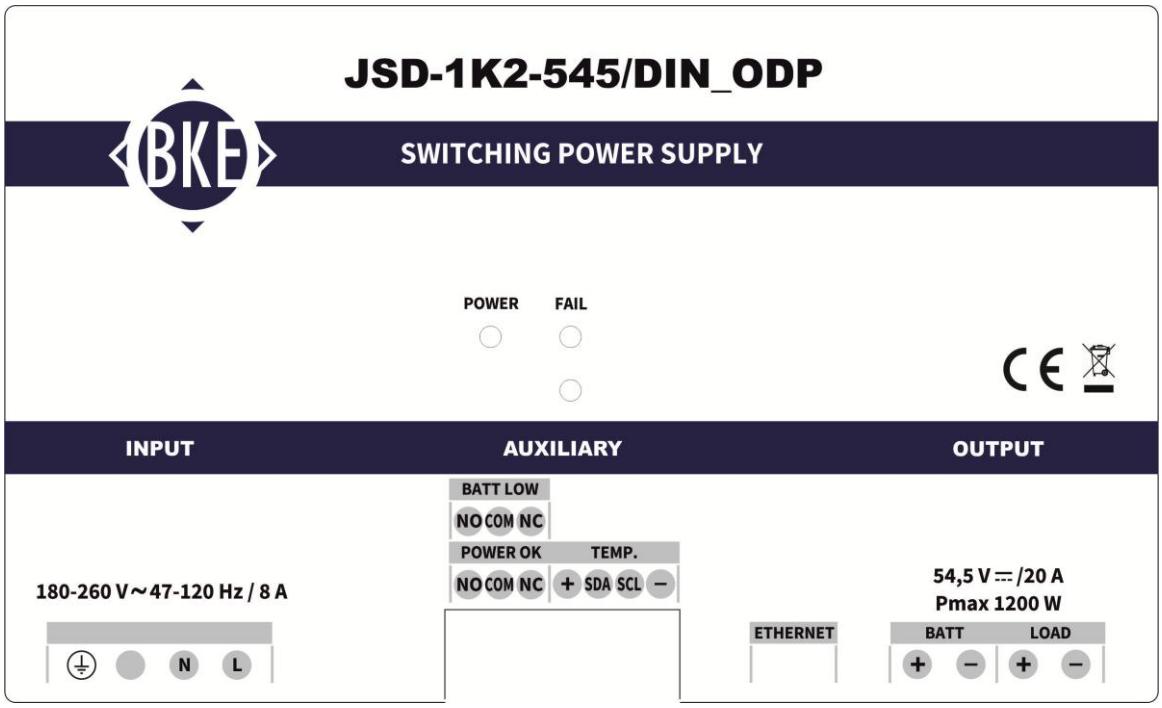
5.3 System messages and indications

Control function	LED indication	Potential-free contacts	Function
POWER	yes	yes	The charging module is operating OK. Charging is in progress.
FAIL	yes	yes	Output overvoltage or undervoltage, current or thermal overload, internal fault and power failure.
ETHERNET			Remote source monitoring via MODBUS protocol and web interface.
BATT LOW	ne	ano	Battery OK.



6 Control

The supervisory (IP) module enables simple and clear monitoring of individual power supply parameters. The sources can be integrated into higher units using the Modbus protocol or monitored individually via the integrated web interface and can report on exceeding the monitored parameters by sending e-mail messages. The limit values of the monitored parameters can be set by the user and the module can warn the operator in time when an event occurs. The supervisory module is not compatible with PoE (power over Ethernet).

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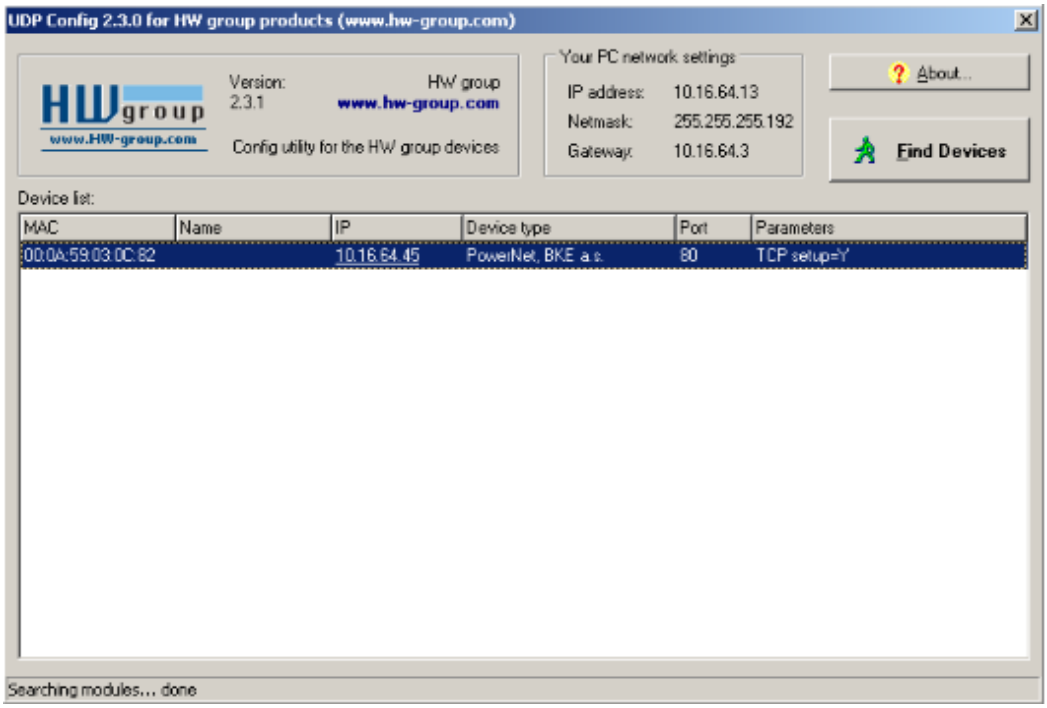
6.1 Network connectivity settings

Setting network IP addresses

For proper operation and clear identification, a fixed IP address setting is required. Since the charger has a different IP address set at the factory, it must first be changed. To set the IP address, you must run the UDP config program, which is supplied with the system or download it directly from the manufacturer at the address provided.
http://www.hw-group.com/software/udp_config/index_cz.html



After starting, the following environment will appear, in which we can see all connected devices. We select the desired device, guided by the MAC address of the device.
After that, we right-click on the selected device and select the item „Show detail setting of device“

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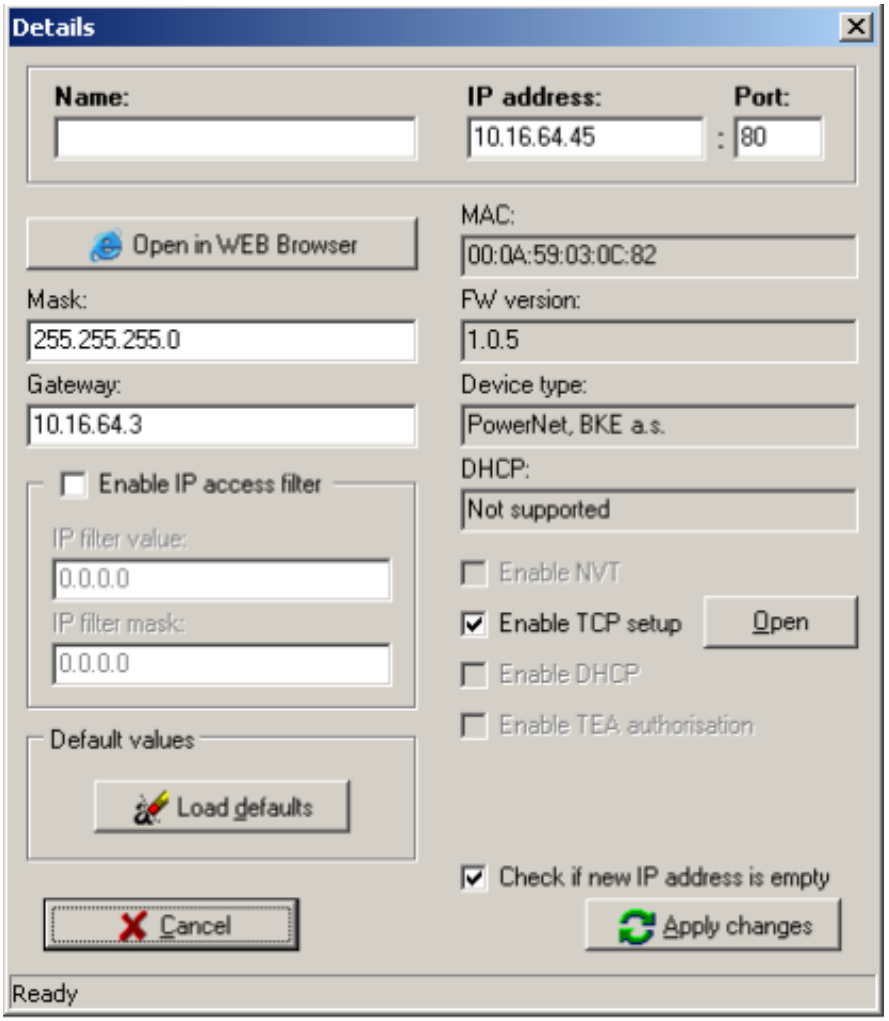

Then we set the required IP address, subnet mask and gateway and press "Apply changes". This gives us a fixed IP address and a connection to the network.
If we only use connectivity via MODBUS, no further network settings are required.
If we want a connectivity other than MODBUS or want to modify the settings, then we must first connect to the web server that is in the device being set up. Therefore, we enter the IP address of the device into the browser. The monitor screen will be displayed. To set up the system, it is necessary to log in. In the menu on the left side there is a login item, after clicking it we will get to the login page. After clicking the "Log in another user" button, a login form will be displayed. The form must be filled in with a name and password, then confirm OK. For the first login, use the name and password "system". As confirmation, a login page will open with the new rights listed. For the factory settings, the name and password "admin" will be used. ATTENTION!! In the factory settings, the system can also be set so that it is not functional. This setting is reserved for factory service only and we do not recommend interfering with it!
After logging in, the left bar will be updated, where new items will be added, including "Network Settings", after clicking on it, the "Network Settings" page will be displayed, where you can configure the network settings according to chapter 6.2.3.

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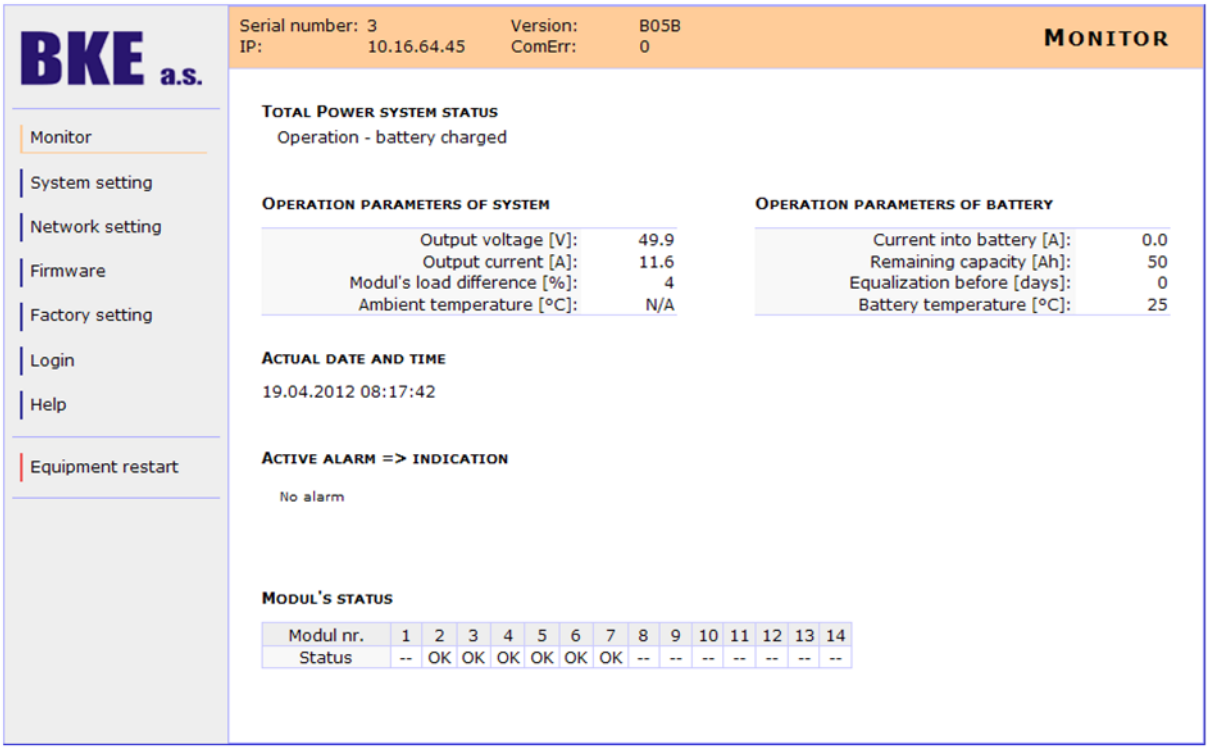
6.2 User interface description

The user interface is made in the form of a web server that sends pages to the user's web browser. A regular web browser is sufficient for viewing, no special control software needs to be installed. The interface has been tested with IE7, IE10 and FireFox2 browsers.
The interface pages consist of three parts. The first is the header, which contains information about the system, i.e. the serial number, system version and its IP address.
The second part is the menu, which is vertically oriented on the left side. It contains page options for monitoring, system settings, logging in, changing firmware and help. The menu content varies depending on the rights of the logged in user. These two parts are the same for all pages.
The third part is the actual page, which is selected using the menu.

6.2.1 Monitor

The monitor page is used to view the current operating values of the system.



The overall status of the power system describes the current state of the system and can take on the following values:

Overall status of the power system	
Operation – battery charged	The system has finished charging the battery and entered the maintenance phase. The system is fully prepared to cover a possible power outage.
Operation – battery charging	The system is charging the battery. This state typically occurs after a backup state where a large amount of energy has been drawn from the battery.

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Overall status of the power system	
Backup – battery operation	The system has switched to battery backup power. Power is being drawn from the battery.
Disconnected – battery discharged	**Not implemented** The charger is not equipped with a battery disconnect switch.
Battery test in progress	The battery function test is currently running.
Battery equalization in progress	Battery equalization is currently running, either automatically or manually started.

The system operating parameters contain data related to the power supply system, namely:

System operating parameters	
Output voltage	It indicates the voltage on the output Bus before the distribution block, i.e. also the voltage on the battery.
Output current	It indicates the current flowing from the charger, i.e. the total system load with loads on all output circuits and the charging current.
Module current difference	**Not implemented** The charger is single-module.
Ambient temperature	Temperature sensed by the temperature sensor inside the charger.

Battery operating parameters include data related to the backup battery:

Battery operating parameters	
Current to battery	**Not implemented** The charger is not equipped with battery current measurement.
Remaining capacity	**Not implemented** The charger is not equipped with a battery current measurement from which the capacity is derived.
Equalization before	Indicates the time elapsed since the previous battery equalization was completed. This is used to automatically start equalization after a specified time interval. If zero, automatic equalization is disabled.
Battery temperature	Indicates the temperature of the battery temperature sensor [Tbat], according to which the temperature compensation of the battery charging and float voltage is performed. If not connected, it reports N/A and compensation is not performed.

Date and time obtained from the specified SNTP server

Active alarms => report here is a list of alarms that are active, i.e. are reported.
They can be the following:

Active alarms => report	
A-F protection	**Not implemented** The relevant circuit is protected – it is disconnected from the power supply.
Baterie odpojena	**Not implemented**

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Active alarms => report	
	A battery disconnection occurred due to low battery voltage (LVD).
Network 1-2	**AC2 implemented - input network** AC2 network is below the allowed range. Charging will be disconnected.
Battery protection	**Not implemented** Battery protection is provided and the battery is disconnected from the system. Loss of backup function!
Battery overheating	The battery temperature sensor has a temperature higher than the set limit. There is a risk of battery damage due to temperature.
Low battery temperature	The battery temperature sensor has a temperature lower than the set limit. The battery may not have the designed capacity.
BUS overvoltage	The output voltage is higher than the set limit.
BUS undervoltage	The output voltage is lower than the set limit.
Inadequate battery	The battery failed the last functional test as good. If the functional test is designed correctly, then it would not fully cover the expected backup time.
Power supply module alarm	The charger has lost charging functionality.

The table of installed modules displays information about individual power modules.
Not implemented, the charger is single-module.

The monitoring page is refreshed every 5 seconds. This ensures that the visible data is up-to-date. Therefore, when writing direct addresses to the browser, it is better to display a different system page than the monitoring page, because when the page is overwritten, the broken link that was not confirmed is also deleted.

6.2.2 Login

The page is used to log in to the system for system setup and management purposes. Without logging in, only system monitoring (monitor) is possible.

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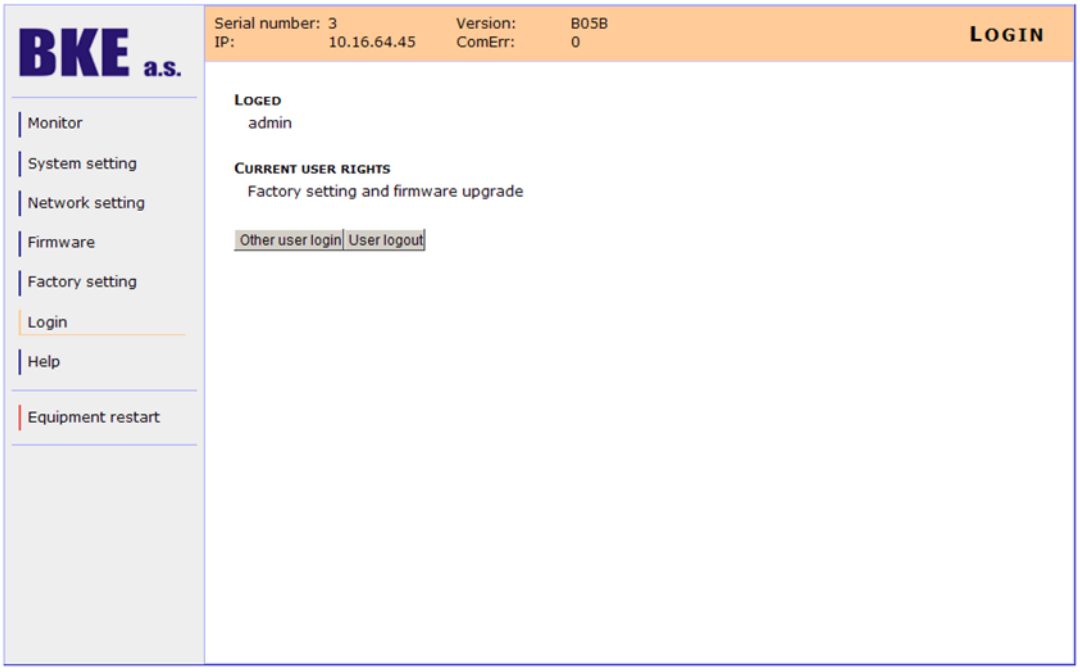
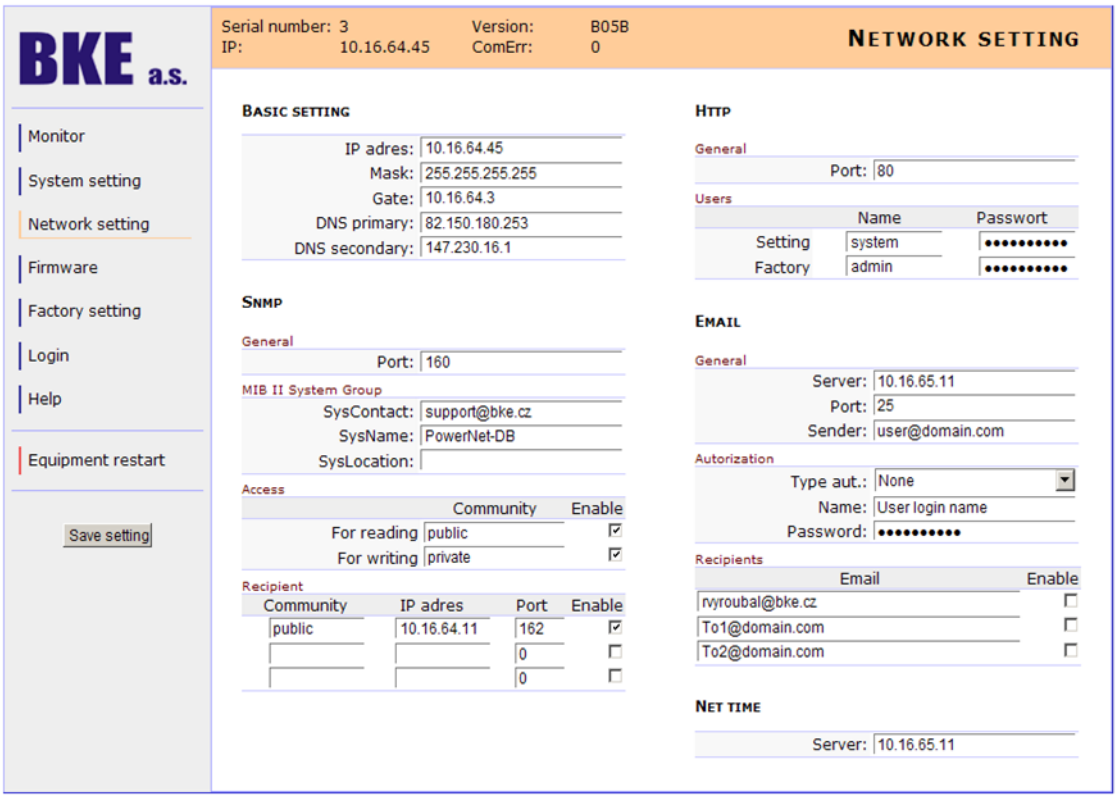


To log in, press the "Log in new user" button and a window will appear where you can enter your name and password and confirm with OK. As confirmation, the login page will be played with the new rights listed. After logging in, the left bar will be updated with new items.
The name and password for the first login to set up the system are the same, namely "system". The name and password can be changed on the network settings page.

6.2.3 Network settings



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It is used to set up the system's network connectivity and consists of modifying the data preset by the manufacturer.
We fill in the individual parts gradually.

Basic settings
Contains network address settings, consult your network administrator for settings.

- IP address is the current address of the power system
- Subnet mask determines the addressing range
- Gateway is the address of a node for access to other networks
- DNS primary (domain name system) is the address of a distributed database of network information
- DNS backup meaning as DNS primary

SNMP
Contains settings for the SNMP section. To receive traps, you need to enter the IP address of the recipient. It is possible to send it to up to 3 different recipients.

• General
  o port is the port number for SNMP communication (default 161)
• MIB II system group
  o SysContact, SysName, SysLocation – editable items to specify the identification and location of the system.
• Access
  o Possibility to set passwords with permissions, which are used for authorization during SNMP communication.
• Recipients
  o These are the addresses where SNMP traps are sent with additional information and the possibility of enabling or disabling sending to a given address.

Modbus
  o Port settings for Modbus communication

Http
  o Setting the port, names and passwords for http communication

Email
• General
  o Server - address of the email server supporting the SMTP protocol
  o Port - port number of this server through which communication is made
  o Sender - sender's address as it will be displayed
• Authorization
  o Type. Authorization - type of authorization that the specified email server requires
  o Name - confirmation data for authorization
  o Password - confirmation data for authorization
• Recipients
  o Addresses of 3 recipients with the option of allowing and prohibiting delivery

Time from the Internet
  o Enter the address of the server with which you want to synchronize the time and which supports the SNTP protocol

After filling in, press the "Save settings" button and the modified values will be saved.

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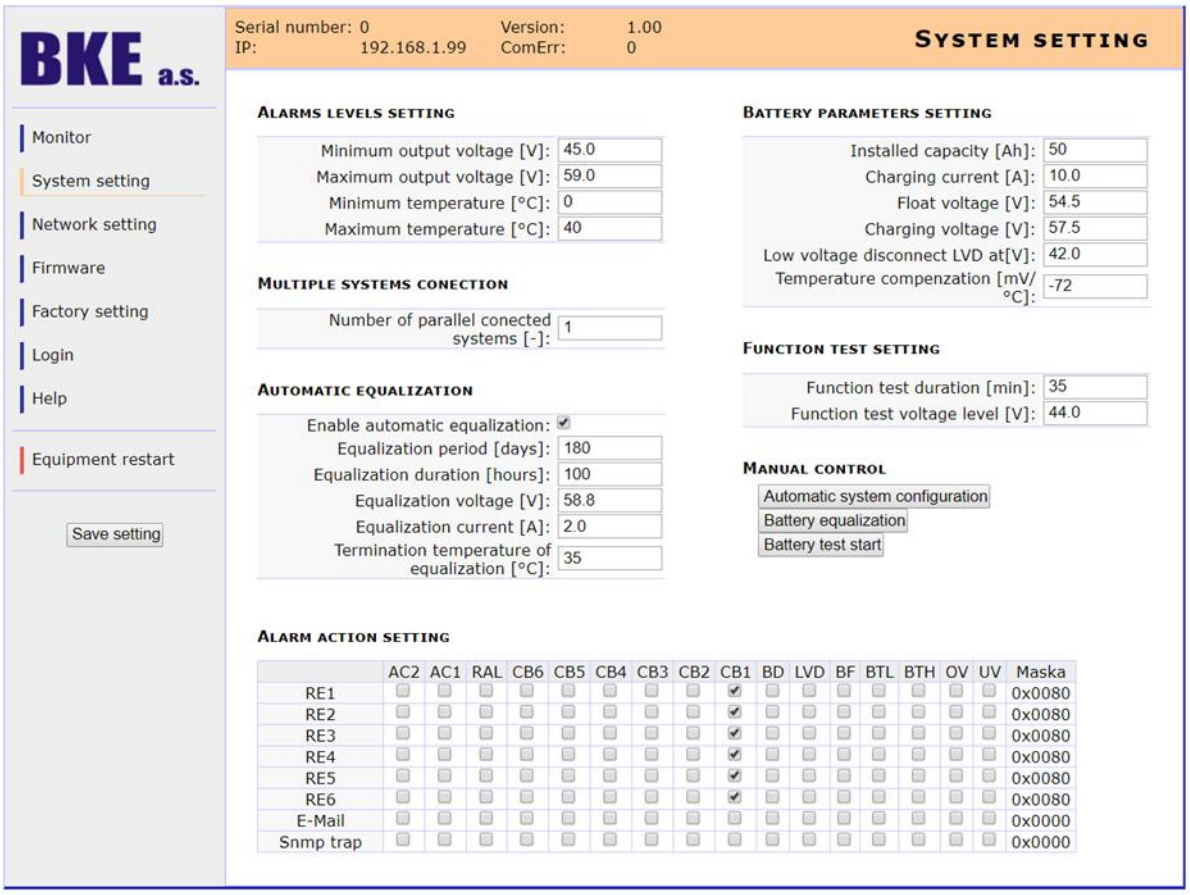
6.2.4 System settings



After we have set the network parameters, we can set or just check the settings that the manufacturer has already made. These are the settings of alarm thresholds and actions to be taken in response to a given alarm.

Setting alarm levels	
Minimum output voltage	Level at which the UV “undervoltage” alarm will be reported
Maximum output voltage	Level from which the OV “overvoltage” alarm will be reported
Minimum temperature	Level at which the BTL alarm “Battery temperature low” will be reported – low battery temperature
Maximum temperature	Level at which the BTH alarm “Battery temperature high” will be reported – high battery temperature

Output voltage alarms have a hysteresis of 0.5 V, when returning to the idle state, temperature alarms have a hysteresis of 1 °C.

Manual control - buttons	
Battery equalization	Triggers user-forced equalization.
Battery test	Starts a user-forced battery functional test.
Automatic system configuration	**Not implemented** - the charger is single-module Starts a user-forced system initialization. It is used, for example,

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Manual control - buttons	
	after replacing a faulty module with a new one and the system will correct its configuration according to the current state.

Parallel connection of systems
Leave value 1. Not implemented.

Battery parameter settings	
Installed capacity	**Not implemented – The charger does not have battery current measurement** Nominal battery capacity specified by the manufacturer. Indicates the capacity that the system takes as the maximum value. The current capacity is calculated from the installed and removed (delivered) charge.
Charging current	**Not implemented – The charger does not have battery current measurement** The amount of current that the system should not exceed when charging.
Holding voltage	The amount of voltage that is maintained on a battery after it is charged.
Charging voltage	The voltage level in the battery charging phase. After 2 hours, the charger switches to trickle charging.
LVD battery disconnection threshold	**Not implemented – The charger does not have a disconnector** The voltage at which the battery should be disconnected during backup to prevent damage. The battery will only be disconnected after 30 seconds of remaining below this threshold.
Temperature compensation	Temperature compensation of the float and charge voltage. The value is related to 25 °C and the entire battery (if we know the value per cell, we must multiply it by the number of cells.

Setting up a functional test	
Functional test time	The time for which the battery is supposed to supply current.
Test evaluation level	The voltage used to determine whether the battery is capable of providing backup power for the duration of the test. The charger's set backup voltage is 1V lower.

Automatic battery equalization	
Enable automatic equalization	Visibility when automatic equalization is enabled. Enable by checking. Disable by unchecking. Must also be enabled to start manual equalization.
Equalization period	The time after which automatic equalization should be triggered periodically.
Equalization duration	Equalization length.
Equalization voltage	Determines the amount of voltage that will be maintained on the battery during equalization.
Equalizing current	**Not implemented – Charger does not have battery current**

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Automatic battery equalization	
	measurement Specifies the current limit to the battery during equalization.
Equalization end temperature	Battery temperature at which equalization will be terminated, regardless of elapsed time. Battery overheating protection during equalization.

Principle of configuring alarm relays Email and SNMP trap
The charger does not have implemented configurable relays, but has two relays with fixed function. Setting RE1-6 has no function.
Each email can be assigned any combination of alarms to which it should respond - to switch from idle to active or back. This combination is selected by checking the appropriate boxes in the alarm table. If the appropriate alarm is checked, the email will respond to it. The email is sent when the alarm is activated and deactivated, so that the time sequence can be monitored and archived. The email contains the flags of all alarms in hexadecimal format. Decoding is performed according to the alarm description table. The SNMP trap configuration works in the same way.
Tab. 4.1

bit	**Alarm description**		
15	AC2	Alternating Current 2	The flag is set if the input voltage is not within the allowed range, one phase is enough.
14	AC1	Alternating Current 1	Not implemented
13	RAL	Rectifier Alarm	The flag is set if any of the power modules reports alarm(s).
12	F*	Circuit braker 6	Not implemented
11	E	Circuit braker 5	Not implemented
10	D	Circuit braker 4	Not implemented
9	C	Circuit braker 3	Not implemented
8	B	Circuit braker 2	Not implemented
7	A	Circuit braker 1	Not implemented
6	BD	Battery Disconnect	Not implemented
5	LVD	Low Voltage Disconnect	Not implemented
4	BF	Battery Fail	The flag is set if the battery failed the last functional test or integrity test as good.
3	BTL	Batery Temperature Low	The flag is set when the battery temperature is lower than the set limit.
2	BTH	Batery Temperature High	The flag is set when the battery temperature is higher than the set limit.
1	OV	OverVoltage	The flag is set if the voltage on the output BUS is higher than the set limit.
0	UV	UnderVoltage	The flag is set if the voltage on the output BUS is lower than the set limit.

Note: Some alarms may not be available in all versions of the system, in which case they are grayed out and cannot be activated.

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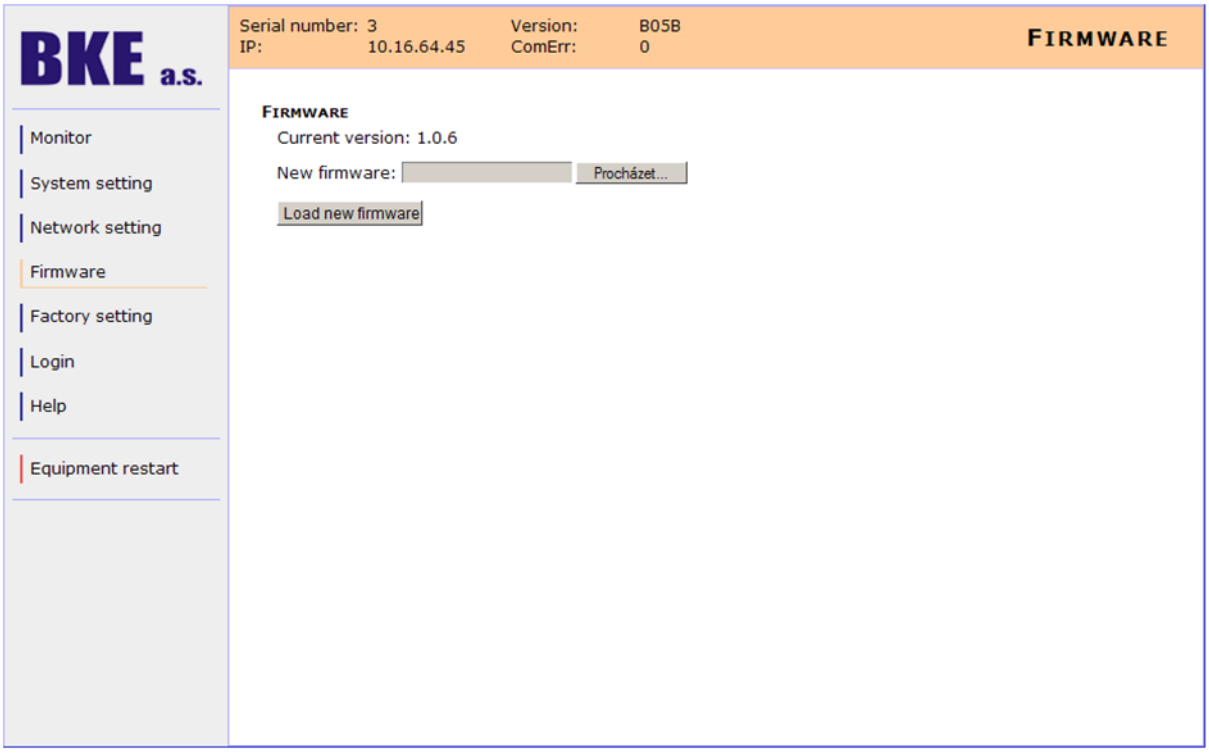
Holding the cursor over the field will display the name of the alarm.

6.2.5 Firmware

The firmware page is used to change the firmware of the web, SNMP and MODBUS servers. We do not write the name of the new firmware file and the path in the window, or we press the browse button and select the firmware. Then we press the "upload new firmware" button. The file is first checked to see if it is for the corresponding device, then it is transferred and finally loaded into memory. After that, the web server restarts and works with the new firmware.



If the web server does not work with the newly uploaded firmware, it is possible to upload a working version back via the direct address, e.g. http://192.168.1.50/upload upload.

6.2.6 Restart device

This item is used to restart the web and SNMP server. The power and backup functions remain uninterrupted during the restart.

6.2.7 Format of sent emails

It contains date, time, device name, IP address, active alarms (the alarm that triggered the email is marked as activated/cancelled according to the current change), as well as output voltage and current. It has the following form:

```
------------------------------------------------------------
23.08.2007  10:36:17  PowerNet-DB          010.016.064.045
------------------------------------------------------------

[activated] Network failure AC1              UBUS[V]: 54.4
                                             IBAT[A]: 0.0
                                             ACTCAPAH[C]: 50
------------------------------------------------------------
```

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6.2.8 Trap format

The system has two types of traps. The first AlarmStart, which is sent when an alarm is activated, and the second AlarmEnd when an alarm is deactivated. In order to determine the cause and state of the system at the time the trap was sent, information about the alarm that triggered the trap and the output voltage and current at the time the trap was sent are also attached to it.
See a sample of a captured trap:

Source:10.16.64.45

Timestamp:49 minutes 50 seconds

Enterprise:.1.3.6.1.4.1.27533.4.2

SNMP Version:1

Specific:1

Generic:enterpriseSpecific

Variable Bindings:

Name:.iso.org.dod.internet.private.enterprises.bke.powernet.nsd1800.nsdAlarms.almTable.almEntry.almDescription.15

Value:(Integer)VypadekSiteAC1

Name:.iso.org.dod.internet.private.enterprises.bke.powernet.nsd1800.nsdSystem.sysNsdUbus.0

Value:(Integer)529

Name:.iso.org.dod.internet.private.enterprises.bke.powernet.nsd1800.nsdBattery.batNsdIbat.0

Value:(Integer)6

Name:.iso.org.dod.internet.private.enterprises.bke.powernet.nsd1800.nsdBattery.batNsdActcapah.0

Value:(Integer)50

6.2.9 Factory settings

Factory settngs are used by the manufacturer to set up the system, which the user should not change.

MIB table

The system MIB table can be downloaded directly from the device by entering a direct address in the form IPAddress/nsd1800.mib (e.g. http://192.168.1.50/nsd1800.mib) or the download link is located in the system help. Do not use the monitor page to enter a direct address, as it is refreshed every 5 seconds and therefore the address content in the browser is overwritten.
The MIB table is identical to the NSD1800 MIB.

6.3 MODBUS

Datová struktura MODBUS

Group	Variable	Read/Write/ Value	Variable type	Modbus address	Active
Analog (Modbus fce Read holding register)					

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Group	Variable	Read/Write/ Value	Variable type	Modbus address	Active
Identifier		”BK”	[16b String2] pattern	40000	yes
		“E0“	[16b String2] pattern	40001	yes
nsdSystem	idNsdSystem	101	[16b int] block id	40002	yes
	sysNsdLength	5	[16b int] block length	40003	yes
	sysNsdUbus	R	[16b int] analog	40004	yes
	sysNsdIbus	R	[16b int] analog	40005	yes
	sysNsdLshq	R	[16b int] analog	40006	no
	sysNsdEtemp	R	[16b int] analog	40007	yes
	sysNsdState	R	[16b int] analog N/A (0), Operation-battery charged (1), Operation - charging battery (2), Backup - on battery (3), LVD - battery discharged (4), Battery equalization running (5), Battery test running (6), Battery test finishing (7)	40008	yes
nsdBattery	idNsdBattery	102	[16b int] block id	40009	yes
	batNsdLength	10	[16b int] block length	40010	yes
	batNsdIbat	R	[16b int] analog	40011	-
	batNsdActcapah	R	[16b int] analog	40012	-
	batNsdEqbefore	R	[16b int] analog	40013	yes
	batNsdTbat	R	[16b int] analog	40014	yes
	batNsdBcap	R	[16b int] analog	40015	-
	batNsdInab	R	[16b int] analog	40016	-
	batNsdUdrz	R	[16b int] analog	40017	yes
	batNsdUnab	R	[16b int] analog	40018	yes
	batNsdLvd	RW	[16b int] analog	40019	no
	batNsdKt	R	[16b int] analog	40020	yes
Alarmy					
nsdAlarms	idnsdAlarms	103	[16b int] block id	40021	yes
	almNsdLength	1	[16b int] block length	40022	yes
	almDescription *The value corresponds to the sum of individual*	R	[16b unsigned int] binary (AlarmDescription) OutputUndervoltage (1) OutputOvervoltage (2) BatteryTemperatureHigh (4) BatteryTemperatureLow (8)	40023	See tab.4.1.

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Group	Variable	Read/Write/ Value	Variable type	Modbus address	Active
	alarms. e.g. BatteryTemperatureHigh, CircuitDOpen and NetAC1Failed *4 + 1024 + 16384 = 17412*		BatteryTestFailed (16) BatteryDischargedAndDisconnected (32) BatteryCircuitOpen (64) CircuitAOpen (128) CircuitBOpen (256) CircuitCOpen (512) CircuitDOpen (1024) CircuitEOpen (2048) Rectifier overheat (4096) RectifierAlarm (8192) NetAC1Failed (16384) NetAC2Failed (32768)		
	almNsdUbusmin	RW	[16b int] analog	40024	yes
	almNsdUbusmax	RW	[16b int] analog	40025	yes
	almNsdTbatmin	RW	[16b int] analog	40026	yes
	almNsdTbatmax	RW	[16b int] analog	40027	yes
Status of individual power modules					
nsdModules	idnsdModules	104	[16b int] block id	40028	yes
	modNsdLength	14	[16b int] block length	40029	yes
	modState[0] *The value corresponds to the sum of the individual alarms. The lower 8 bits are valid. E.g.Overvoltage, Fanfail* *2 + 8 = 10*	R	[16b int] binary (ModuleStateDescription) Undervoltage (1) Overvoltage (2) Overheat (4) Fanfail (8) Overcurrent (16) OK (32) Reserved (64) ComunicationFail (128)	40030	no
	modState[1]	R	[16b int] binary (ModuleStateDescription)	40031	no
	modState[2]	R	[16b int] binary (ModuleStateDescription)	40032	no
	modState[3]	R	[16b int] binary (ModuleStateDescription)	40033	no
	modState[4]	R	[16b int] binary (ModuleStateDescription)	40034	no
	modState[5]	R	[16b int] binary (ModuleStateDescription)	40035	no

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Group	Variable	Read/Write/ Value	Variable type	Modbus address	Active
	modState[6]	R	[16b int] binary (ModuleStateDescription)	40036	no
	modState[7]	R	[16b int] binary (ModuleStateDescription)	40037	no
	modState[8]	R	[16b int] binary (ModuleStateDescription)	40038	no
	modState[9]	R	[16b int] binary (ModuleStateDescription)	40039	no
	modState[10]	R	[16b int] binary (ModuleStateDescription)	40040	no
	modState[11]	R	[16b int] binary (ModuleStateDescription)	40041	no
	modState[12]	R	[16b int] binary (ModuleStateDescription)	40042	no
	modState[13]	R	[16b int] binary (ModuleStateDescription)	40043	no

Finding diagnosed states from MODBUS registers

Diagnosed condition	MODBUS Address	Format / Units / Bits	Alarm Relay Fixed	Default alarm value
Output voltage	40004	0,1 V		-
Output current	40005	0,1 A		-
Battery temperature	40014	1 °C		-
Input voltage failure	40023	Mask 8000 h		-
Charging failure	40023	Mask 2000 h	Power OK	-
Battery discharge	40023	Mask 0001 h		22,5V
Battery temperature	40023	High temperature Mask 0004 h Low Temperature Mask 0008 h Mask temperature range 000C h		Outside the interval 0 ºC…40 ºC
Inadequate battery	40023	Maska 0010 h	Batt low	Alarm baterie

To find out other states or values, use the ModBus data structure table.
Changing alarm levels, mapping and merging alarm relay messages can be changed on the system settings web page.

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7 Maintenance

Warning

During operation of the device, some components are under dangerous voltage.
Extraneous voltages higher than safe may occur on the remote signaling contacts.
Incorrect or rough handling of the device can cause property damage or serious injury.
When maintaining the device, observe all safety regulations valid in your company, described in this chapter and on the warning notices:
* Maintenance of the device may only be carried out by qualified personnel who are familiar with all safety regulations specified in these operating and maintenance instructions.
* Before starting tests and maintenance work, make sure that the supply voltage has been switched off, its voltage has been blocked and that the device is grounded.
* There is still dangerous voltage on the capacitors for 3 minutes after switching off. Therefore, do not handle the device until this time has elapsed.

Furthermore, protect the device from excessive dirt and surges to ensure its service life is extended. Dust and foreign bodies, especially those that may obstruct the flow of cooling air, must be removed at regular intervals, at least every 12 months. Blow the device, and especially the cooling fins, with dry, compressed air (overpressure max. 0.1 Mpa).

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8 Technical data

8.1 Mechanical design

The power supply is placed in a metal box with the possibility of mounting on a DIN35 rail. Inputs and outputs are connected to terminal blocks on the front of the device. Optical indication is on the front panel of the device.

Weight	3,5 kg
Box material	Al sheet + galvanized sheet
Dimensions	230 x 152 x 135 mm (W x H x D) including DIN bracket

8.2 Electrical parameters

Input voltage	AC 180-260 V
Input frequency	47-120 Hz
Maximum input current	8 A (AC 180 V)
Power factor (cosØ)	0,98
Charging characteristics	I/U two-stage
Output voltage	DC 40-60 V (54,5 V factory set)
Output voltage ripple	<150 mVpk-pk
Nominal output current	20 A
Battery charging current	1-20 A (9 A factory set)
Maximum output power	1200 W
Overall efficiency	>88 %
Isolation diode in the positive branch	yes
Load capacity of potential-free contacts	6 A/AC 250 V (max. load 1500 VA, section AC 4kV)
Temperature compensation	-3 mV/cell a °C
Ventilation	forced, fans
Electrical strength	DC 5,6 kV primary-secondary circuits DC 5,6 kV primary-box DC 2,8 kV secondary-box
Insulation resistance	bigger than 50 MΩ
MTBF	1050 000h according to IEC61709 SN29500)@25°C

The power supply is designed as a device of protection class I, installation overvoltage category 3 according to ČSN EN 61010-1, it is resistant to output short circuit.

8.3 Operating conditions

Operating temperature range	-20 to 50 ºC
Humidity (non-condensing)	10 to 90 % RV
Altitude	up to 3000 m.a.s.l.
Environment	without explosion hazard
Degree of protection	IP20

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8.4 Connection points

The connection terminals are on the front of the device:

Inputs:

Screw terminals	min. 1 mm^2 / max. 6 mm^2

Outputs:

Screw terminals	min. 1 mm^2 / max. 6 mm^2
Auxiliary terminals	min. 0,75 mm^2 / max. 2,5 mm^2

Polarity of individual terminals according to the label.

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9 Norms

Standards related to the product:

ČSN EN 50121-1
ČSN EN 50121-4
ČSN EN 61000-3-2 ed. 4
ČSN EN 61000-4-2
ČSN EN 61000-4-3
ČSN EN 61000-4-4
ČSN EN 61000-4-5
ČSN EN 61000-4-6
ČSN EN 61000-6-4
ČSN EN 60068-2-1
ČSN EN 60068-2-2
ČSN EN 60068-2-78
ČSN EN 61010-1 ed. 2

CE marking

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Warranty

The product is manufactured according to the manufacturer's production and testing regulations. The product is covered by a 24-month warranty from the date of delivery stated on the delivery note. The warranty covers defects caused by defective materials or product design. The warranty expires if modifications have been made to the product and if the product has been damaged mechanically or by improper use. Any complaint stating the defect must be sent in writing, together with the defective product, secured against damage during transport, back to the manufacturer.

2K119012

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