



Instruction Manual

AKKUTEC 1220 AKKUTEC 4810

NBPA0347G01***



English Version

Instruction Manual

AKKUTEK 1220

AKKUTEK 4810



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1 General information

1.1 General safety instructions



NOTICE

The operating manual is provided for qualified electricians. Read the operating manual installing or using the device. Comply with the instructions. Failure to comply with operating manual can result in loss of warranty claims! Keep the operating manual on hand for later reference.



WARNING

Only qualified electricians are allowed to install, commission, maintain and decommission the device. Improper handling of the device or the batteries can cause electric shock, arcing, and severe burn injuries.



WARNING

Only perform tasks on the device when it is de-energised. Comply with the 5 safety rules specified in EN 50110! Do not open the enclosure. Modifications on the device are prohibited. Only the manufacturer is allowed to repair the device! Failure to comply can result in severe burn injuries due to arcing.



CAUTION

Wear protective goggles and protective clothing when performing tasks on batteries. Comply with the accident prevention regulations and EN 62485-2. Contact with electrolyte can result in skin irritation and chemical burns.



CAUTION

The electrolyte in the battery is highly corrosive. In normal operation the possibility of contact with electrolyte is virtually excluded. Nevertheless, if there is contact with electrolyte, rinse off the affected area with water. If electrolyte gets into the eyes seek medical attention. Contact with electrolyte can result in skin irritation and chemical burns.



CAUTION

Batteries have a high dead weight. Use suitable transport equipment. Improper handling can result in personal injury and material damage.



NOTICE

Only use under controlled ambient conditions. Comply with the information specified under chapter 9 *Technical data*. Failure to comply can result in failure of the device and material damage.



NOTICE

In the event of malfunction or damage, switch off the input voltage without delay and take the device out of service. Send it back to the manufacturer to be tested.

1.2 Brief description

The **AKKUTEK** is a battery-buffered power supply and it works in accordance with the standby parallel principle. The batteries are charged in grid mode. The connected consumers are supplied simultaneously. At grid failure the **AKKUTEK** in conjunction with the batteries ensures that a safe supply of direct current remains intact for a specific period of time.

The **AKKUTEK** has the following properties:

- Primary clocked, switched-mode supply with I/U charging curve
- Active power factor correction (PFC)
- Microcontroller-supported battery management
- Operating and display panel for installation in control cabinet door (*Options*)
- Temperature tracking of the charging voltage via external sensor (*Options*)

1.3 Intended use

The device has been designed and developed for the industrial and plant engineering sectors. Only qualified electricians are allowed to install the device.

If the device is operated other than for its intended use, the protection supported by the device cannot be ensured.

1.4 Device variants

Designation	Item number	Comment
AKKUTEK 1220	NBPA0347G01002	Standard device
AKKUTEK 4810	NBPA0347G01007	Standard device
AKKUTEK 1220 AKKUTEK 4810	NBPA0347G01***	Customer-specific parameters / software: Different characteristics deviate from those of the standard device described here. The deviations are defined via the item number and are described in the item text.

1.5 Definition of terms

Trickle charging:

Charging of a battery to compensate for self-discharge, to keep the battery in fully charged status.

Charging plateau voltage:

Specified highest voltage on a battery, at which the battery is completely charged.

Heavy charging:

With heavy charging the charging plateau voltage is increased in order to reactivate a deep discharged (over-discharged) battery and to charge batteries quickly.

2 Transport and storage

Only transport the device in suitable packaging. Comply with the ambient conditions for transport and storage (see chapter 9 *Technical data*). Protect the device from moisture and direct sunlight.



NOTICE

If batteries are included, these batteries must be recharged at least every six months, if they are stored for a longer period of time. The batteries are delivered in charged status.

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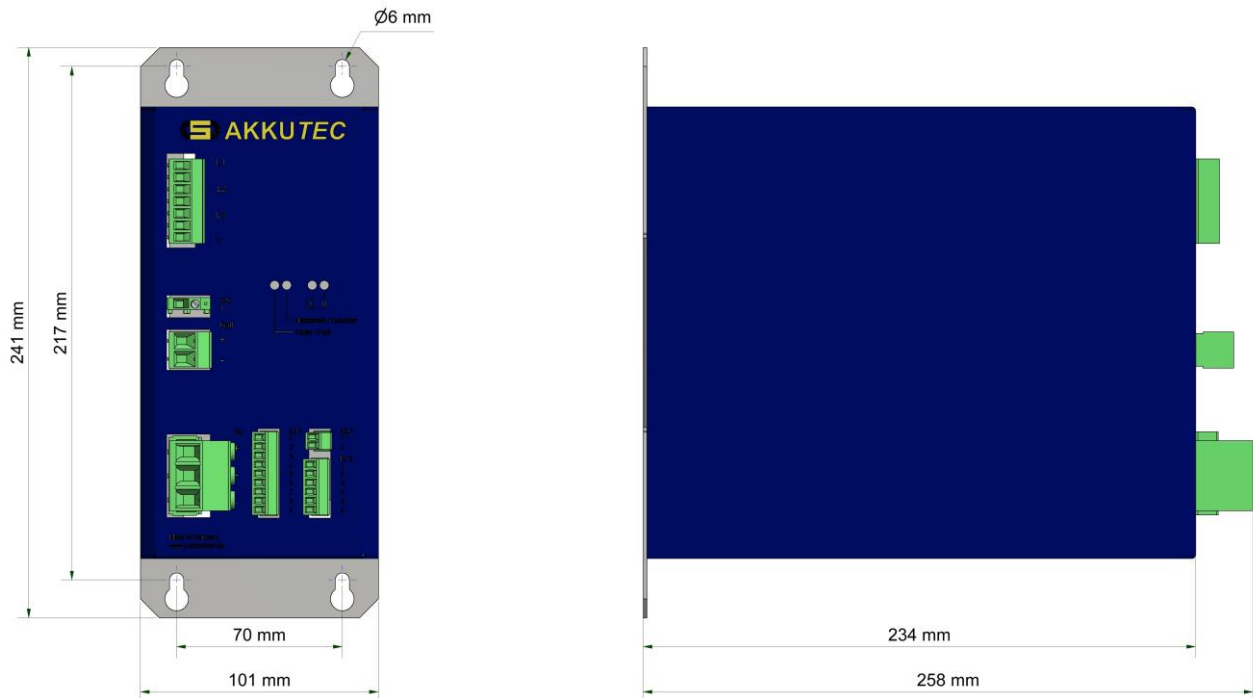
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3 Installation and connection

3.1 Dimensions



3.2 Installation

Install the device such that the necessary air circulation is ensured. A minimum distance of 75 mm must be maintained to adjacent devices or assemblies. Ensure that there are no heat sources under the device. Comply with the specified climate conditions (see chapter 9 *Technical data*).

Always use all fastening points to fasten the device.



NOTICE

During installation, cover the device, if drilling swarf could get on the device or get into the interior of the device. There is a risk of short-circuit.



NOTICE

The device is a built-in device, configured for Pollution Degree 2. Only operate the device in dry rooms and in closed control cabinets or enclosures. The control cabinets or enclosures used must meet the requirements specified in EN 62368-1. Comply with the specifications for ventilation openings in the enclosure cited in Section 6.4.8.3.3 and 6.4.8.3.4. A warning sign "Warning – High Voltage" (ASR A1.3 W012) must be affixed on the enclosure.

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3.3 Battery selection

Configure the rated capacity such that in buffer mode the required output current is available for the buffer time. Take the internal consumption in buffer mode into account (see chapter 9 *Technical data*).

The following batteries are available:

Item number Battery	Designation	Capacity /Ah	Rated voltage /V	Dimensions H x W x D /mm	Weight /kg
452011.47	1.2 – 12	1.2	12	58 x 97 x 43	0.6
452011.20	2.3 – 12	2.3	12	67 x 178 x 53	1
452011.36	7 – 12	7	12	100 x 151 x 65	2.3
452011.22	12 – 12	12	12	101 x 151 x 98	3.7
452011.2	17 – 12	17	12	167 x 181 x 77	5.3
452011.4	24 – 12	24	12	125 x 166 x 175	7.6
452011.8	40 – 12	40	12	170 x 197 x 165	12.8
452011.9	65 – 12	65	12	179 x 350 x 167	20.4
452011.40	100 – 12	100	12	222 x 330 x 171	29
452011.53	120 – 12	120	12	222 x 330 x 171	32.5

The following battery modules are available:

Item number Battery module	Designation	Rated voltage /V	Capa- city /Ah	Dimensions H x W x D /mm	Weight /kg
NBBHQ33G1M01	NBBH 2401	24	1.2	96 x 69 x 105	1.6
NBBHQ33G1M04	NBBH 2402	24	2.3	100 x 184 x 75	2.7
NBBHL33G1M01	NBBH 2407	24	7	115 x 174.5 x 159	6.0
NBBHL33G1M02	NBBH 2412	24	12	115 x 240.5 x 159	8.3
NBBH0336G01001	NBBH 2417	24	17	170 x 155 x 182	11.8
NBBH0336G01002	NBBH 2424	24	24	137 x 397 x 200	16.7
NBBH0336G01003	NBBH 2440	24	40	170 x 397 x 200	33.0
NBBH0336G01004	NBBH 2465	24	65	179 x 397 x 355	45.0
NBBH0336G01010	NBBH 24100	24	100	222 x 397 x 355	62.0
NBBH0336G01017	NBBH 24120	24	120	222 x 397 x 355	67.0

Other batteries or battery modules are available on request.

The battery modules are mounted on a mounting plate. They are fused with a fuse bridge. For battery modules or batteries, starting with a capacity of 17 Ah you must customize the fuse bridge yourself to fit the battery using the provided connections.

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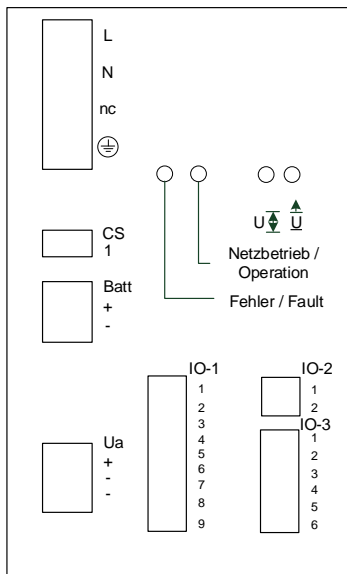


3.4 Connection

Establish the connection as per the designations of the connection terminals. Ensure correct polarity. Tighten unused connection screws.

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Terminals			Connection	
Designation	Max. tightening torque /Nm	Line cross section /mm ²		
L, N, PE(⊕)	0.6	0.5 – 2.5	Input voltage	
CS 1	0.5	0.2 – 2.5	AKKUTEC (master-slave mode)	
Batt+, Batt-	0.6	1.0 – 4.0	Batteries	
Ua+, Ua-	1.5	1.0 – 6.0	Consumer	
I/O-1 (1)	0.2	0.1 – 1.5	Temperature sensor / auxiliary voltage 48 V DC/100 mA)	
I/O-1 (2)			Temperature sensor	
I/O-1 (3)			UPS switch-off	48 V DC (16...80 V DC)
I/O-1(4)			Heavy charging	
IO-1 (5 = NC, 6 = NO, 7 = COM)			Signal contact Fault (Collective fault signal)	Max. contact load: 60 V DC/0.25 A (floating relay contact)
IO-1 (8 = COM, 9 = NO)	Signal contact Grid mode			
IO-2 (1, 2)	0.2	0.1 – 1.5	Operating and display panel	
IO-3 (1)	0.2	0.1 – 1.5	Auxiliary voltage (48 V DC/100 mA)	
IO-3 (2)	-	-	Option for future extension - Do not connect	
IO-3 (3, 4)	0.2	0.1 – 1.5	Signal contact Battery voltage above	Max. contact load: 60 V DC/0.25 A (floating relay contact)
IO-3 (5, 6)			Signal contact Battery voltage within	



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Terminals			Connection	
Designation	Max. tightening torque /Nm	Line cross section /mm ²		
L, N, PE(⊕)	0.6	0.5 – 2.5	Input voltage	
CS 1	0.5	0.2 – 2.5	AKKUTEC (master-slave mode)	
Batt+, Batt-	0.6	2.5 – 4.0	Batteries	
Ua+, Ua-	1.5	2.5 – 6.0	Consumer	
I/O-1 (1)	0.2	0.1 – 1.5	Temperature sensor / auxiliary voltage 12 V DC/100 mA)	
I/O-1 (2)			Temperature sensor	
I/O-1 (3)			UPS switch-off	12 V DC (8...50 V DC)
I/O-1(4)			Heavy charging	
IO-1 (5 = NC, 6 = NO, 7 = COM)			Signal contact Fault (Collective fault signal)	Max. contact load: 30 V DC/0.5 A (floating relay contact)
IO-1 (8 = COM, 9 = NO)	Signal contact Grid mode			
IO-2 (1, 2)	0.2	0.1 – 1.5	Operating and display panel	
IO-3 (1)	0.2	0.1 – 1.5	Auxiliary voltage (12 V DC/100 mA)	
IO-3 (2)	-	-	Option for future extension - Do not connect	
IO-3 (3, 4)	0.2	0.1 – 1.5	Signal contact Battery voltage above	Max. contact load: 30 V DC/0.5 A (floating relay contact)
IO-3 (5, 6)			Signal contact Battery voltage within	

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Dimension the line cross-section of the incoming feeders and outgoing feeders in accordance with EN 62368-1 Table G.5; see also the table above. Ensure that incoming feeders and outgoing feeders are properly fused.

Via the signal contacts the operating status of the device can be relayed to a higher-level unit. The signal contacts are coupled with the appropriate LEDs (see chapter 4.2 LEDs).

If the system has been erected in accordance with EN 62368-1 and the supply lines exit the room (building cabling), comply with Section 6.5.3 of EN 62368-1.



⚠ WARNING

The device is prepared for protection class I (protective earth). Always connect the protective earth. Failure to do so can result in accessible parts being energized if there is a fault. Danger of fatal electric shock.



ATTENTION

Before connecting, check the values of the input voltage with the values on the type plate to ensure that they correspond.



NOTICE

In the event of overload, the output current equals the total current of the on-grid device and the current of the batteries. To prevent overload, fuse the output appropriately for the rated current.

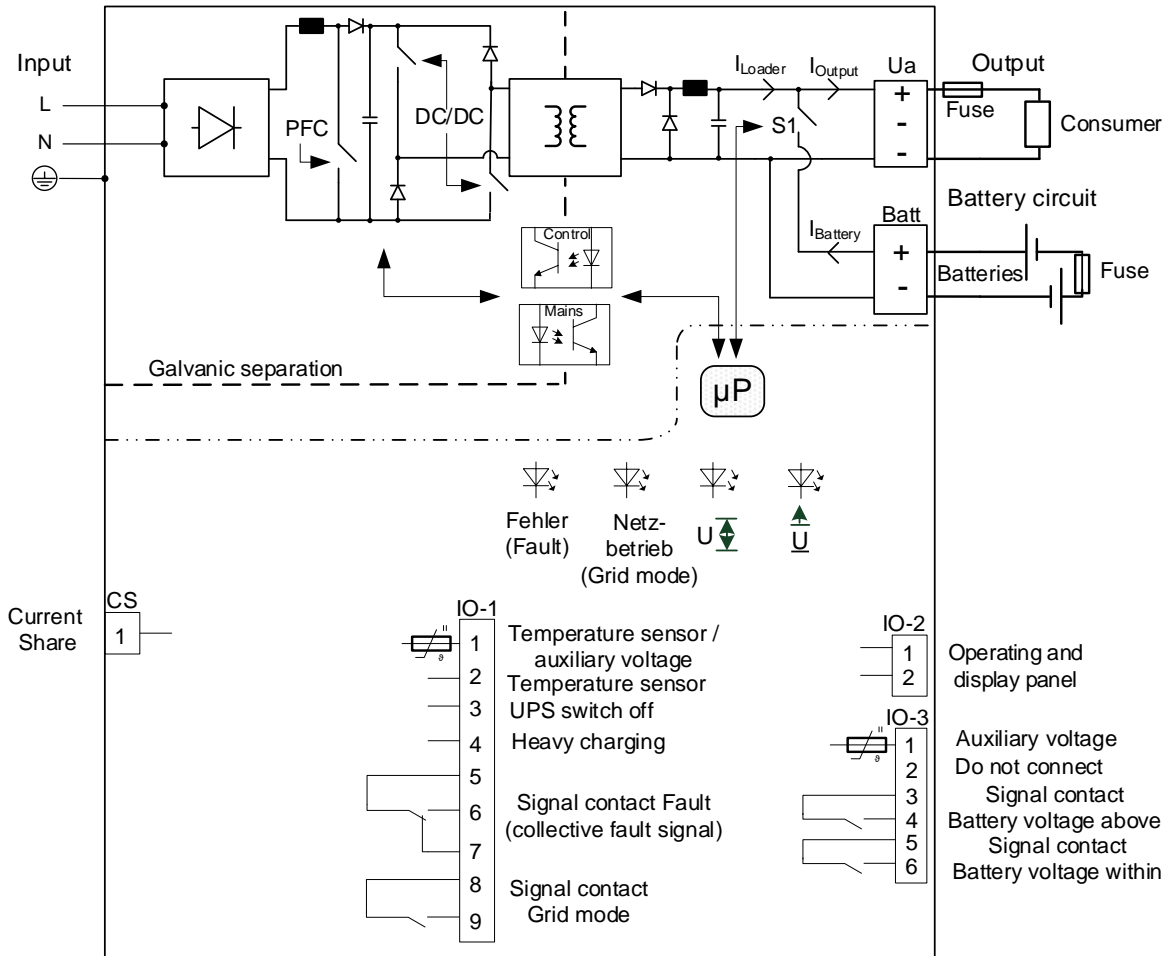
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3.5 Circuit diagram



At load shedding the battery circuit will be disconnected from the output by S1.

3.6 Connection for batteries

The device requires one (AKKUTEK 1220) or four (AKKUTEK 4810) 12 V batteries, which are available as a module or individually. Connect the individual batteries in series. For line protection reasons, install the fusing as close as possible to the battery set. When using batteries, ensure adequate air throughput and maintain a safety distance to sparking equipment as stipulated in EN 62485-2.

⚠ WARNING



Only use lead-acid rechargeable batteries. Never use different battery technologies. When connecting batteries, ensure that the rated voltage and the polarity are correct. Never reverse the polarity of the batteries. Never short-circuit batteries! Failure to comply with these instructions can result in severe burns due to arcing or burning parts.

⚠ WARNING



Protect, i.e. isolate the poles when connecting the batteries. If bridging occurs there is danger of burn injuries due to arcing or burning parts.

⚠ CAUTION



Hydrogen gas occurs when charging the batteries. Combined with atmospheric oxygen hydrogen gas can form explosive oxyhydrogen. Ensure adequate air circulation. If this instruction is not followed, deflagrations can occur.

ⓘ NOTICE



Never use different battery types or batteries from different manufacturers; never use used batteries and new batteries in the same system.

ⓘ NOTICE



Ensure that the batteries are securely fastened. Never operate batteries that are not fastened – danger of short-circuit!

3.7 Temperature sensor MTIA (option)



Line cross section / mm ²	Connection
0.5	AKKUTEK IO-1(1, 2)

The temperature sensor is activated automatically at connection. Additional setting of parameters or activation is not required. The polarity of the connecting line is discretionary. Place the sensor element above the battery or in the direct vicinity of the battery.

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4 Operation

4.1 Commissioning

Switch on the device by switching on the input voltage.

Shortly after switch-on, the output voltage will be enabled and the connected consumers will be supplied. Simultaneously the batteries will be charged. The charging time will be extended if higher output current is required when charging.

4.2 LEDs

LED	Status	Meaning
Fault (Fehler)	red	<ul style="list-style-type: none">• Buffer operation• Interrupted battery circuit• Battery with reversed polarity• Old battery• Excessive battery temperature (temperature sensor)
	off	<ul style="list-style-type: none">• No fault
Grid mode (Netzbetrieb)	green	<ul style="list-style-type: none">• Grid mode• Input voltage OK and• Internal temperature OK
	off	<ul style="list-style-type: none">• Insufficient input voltage or• Maximum internal temperature exceeded
Battery voltage within	green	<ul style="list-style-type: none">• AKKUTEK 1220: 10.8 V DC* < battery voltage < 14 V DC• AKKUTEK 4810: 43.2 V DC* < battery voltage < 55.8 V DC
	off	<ul style="list-style-type: none">• AKKUTEK 1220: Battery voltage < 10.8 V DC* (pre-warning load shedding) or Battery voltage > 14 V DC• AKKUTEK 4810: Battery voltage < 43.2 V DC* (pre-warning load shedding) or Battery voltage > 55.8 V DC
Battery voltage above	green	<ul style="list-style-type: none">• AKKUTEK 1220: Battery voltage > 14 V DC (heavy charging)• AKKUTEK 4810: Battery voltage > 55.8 V DC (heavy charging)
	off	<ul style="list-style-type: none">• AKKUTEK 1220: Battery voltage < 14 V DC• AKKUTEK 4810: Battery voltage < 55.8 V DC

*Basic settings

4.3 Monitoring the battery circuit

To ensure battery operation of the device, the battery circuit is tested cyclically at 60 s intervals. This test detects an interruption, i.e. high impedance of the battery circuit. If the **Grid mode LED** and the **Fault LED** are illuminated this indicates a defective or interrupted battery circuit.

4.4 Battery test

The capacity of the battery will be tested 1 h after switch on, after the input voltage returns and after buffer operation. After that, the battery is tested cyclically every 24 h.

The target output voltage will be reduced to 11 V DC (**AKKUTEK 1220**) or 44 V DC (**AKKUTEK 4810**) for 8 seconds. The load will now be fed by the battery. If the battery has load capacity the output voltage will not decrease.

If the output voltage drops below 11,4 V DC (**AKKUTEK 1220**) or 45,6 V DC (**AKKUTEK 4810**), the battery must be replaced. This is indicated by the **Fault LED** and the **Grid mode LED**.

Parameters can be assigned for test duration and target output voltage for the battery test. The larger the battery is relative to the load, the longer the test time that must be selected for a reliable test.

4.5 UPS switch-Off

To cancel buffer mode prematurely, it is possible to switch off the UPS. Apply a 12 V DC (**AKKUTEK 1220**) or 48 V DC (**AKKUTEK 4810**) control voltage on the terminal strip **IO-1** connection **3**. The input is not a floating input (i.e. it is not isolated).

4.6 Heavy charging

For heavy charging apply a 12 V DC (**AKKUTEK 1220**) or 48 V DC (**AKKUTEK 4810**) control voltage on the terminal strip **IO-1** connection **4**. The input is not a floating input (i.e. it is not isolated).



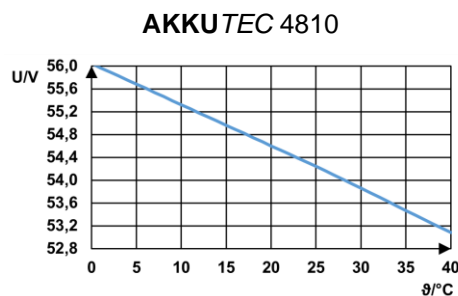
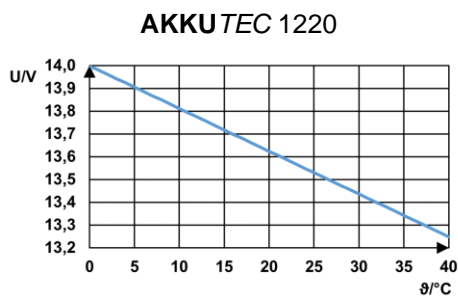
NOTICE

Heavy charging causes operation of the batteries in the gassing stage. Heavy charging must be time-limited.

4.7 Temperature sensor MTIA (option)

Without temperature sensor the charging plateau voltage of the device is selected such that charging of the battery within a temperature range of +15 °C to +40 °C is ensured.

For application case with frequent and significant temperature fluctuations as well as ambient temperatures below +15 °C, tracking of the charging plateau voltage should occur, to ensure optimized battery charging. The dependency of the charging plateau voltage on the ambient temperature runs approximately as presented below.



NOTICE

The ideal operating temperature of the batteries is +20 °C. Temperatures above +20 °C decrease the service life of the batteries by half per each 10 K.

5 Maintenance



NOTICE

Depending on the level of contamination, clean the enclosure at least once a year, for example, with a vacuum cleaner or a cleaning cloth. The ventilation openings in particular, must be free of contamination or other obstructions.



NOTICE

To determine the buffering capacity of the batteries in this system, check the batteries every 3 to 6 months (see chapter 5.1 *Checking the batteries*).

5.1 Checking the batteries

Switching off the input voltage transitions the device into buffer mode. When reaching the deep discharge limit, the device switches off automatically. Under rated conditions, the batteries must maintain the required buffer time.

5.2 Replacing the batteries

To replace the batteries, proceed as follows:

Battery removal:

1. Switch off the input voltage
2. Interrupt the buffer mode via UPS switch-off or remove the battery circuit fuse
3. **Grid mode LED** and **Fault LED** are not illuminated
4. Remove the electrical connections from the batteries
5. Detach the battery holder, firmly hold the batteries while so doing
6. Take out the batteries.

Battery installation:

1. Installation is executed as described for battery removal, but in the reverse sequence
2. Ensure correct polarity. If the polarity is incorrect, the batteries will not be charged and the **Fault LED** will be illuminated. If the polarity is correct, the **Fault LED** is not illuminated.

⚠ WARNING



Only use lead-acid rechargeable batteries. Never use different battery technologies. When connecting batteries, ensure that the rated voltage and the polarity are correct. Never reverse the polarity of the batteries. Never short-circuit batteries! Failure to comply with these instructions can result in severe burns due to arcing or burning parts.

⚠ WARNING



Protect, i.e. isolate the poles when connecting the batteries. If bridging occurs there is danger of burn injuries due to arcing or burning parts.

⚠ CAUTION



Prior to transport or storage, remove the battery circuit fuse to avoid short circuits. Failure to do so may result in burn injuries or material damage due to arcing or burning parts.

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NOTICE

Ensure that the batteries are securely fastened.
Never operate batteries that are not fastened – danger of short-circuit!



NOTICE

Never use different battery types or batteries from different manufacturers; never use used batteries and new batteries in the same system.

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6 Decommissioning

Execute decommissioning up to the 3rd point as described under Battery removal (see chapter 5.2 *Replacing the batteries*).



WARNING

Do not disconnect or establish electrical connections in operation. Failure to follow this instruction may result in electric shock and severe burn injuries due to arcing.

7 Disposal



NOTICE

This symbol indicates that the device must not be disposed via the normal household waste. Properly dispose of the devices as electrical scrap in accordance with the valid national and international regulations. Through this measure, materials will be separated and reused according to their characteristics and you are making a valuable contribution towards environmental protection.



NOTICE

Dispose of spent batteries in an eco-friendly manner; recycle batteries via a collection point.

8 Standards and regulations

Total device	2014/35/EU (Low Voltage Directive) 2011/65/EU with 2015/863/EU (RoHS) 1907/2006/EG (REACH) 2009/125/EC (Eco-Design) EN 61010-1 / EN 61010-2-201 EN 62368-1
EMC	2014/30/EU (EMC Directive) EN 55011 Limit Class B Group 1 EN 61000-6-2 EN 61000-6-4

- **EN 55011 Limit Value Class B:** "Class B devices are devices that are suitable for operation in the residential area and such areas that are directly connected to a low-voltage supply network that (also) supplies residential buildings."
(EN 55011, 5.2 Division in classes)
- **EN 55011 Group 1:** "Group 1 includes all devices... in which HF energy in the range from 9 kHz to 400 GHz is not intentionally...generated."
(EN 55011, 5.1 Division in groups)

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9 Technical data

9.1 AKKUTEK 1220

Input	
Rated input voltage range	110 - 240 V AC
Perm. input voltage tolerance	±10 %
Frequency	50 / 60 Hz ±3 Hz
Rated input current	1.4 A @ 230 V AC
Switch-on current	≤65 A/3 ms
Rated input power	313 W @ (U _e = 230 V AC, U _a = 13.4 V DC, I _a = 20 A)
Output	
Rated output voltage	12 V DC (SELV / PELV)
Output voltage (without temperature tracking)	9.9 - 13.4 V DC ±0.4%
Output voltage (with temperature tracking)	9.9 - 14,0 V DC ±0.4%
Output voltage (heavy charging)	14.3 V DC
Plateau charging voltage with/without temperature tracking	13.4 V DC ±0.4% / 13.25 - 14.0 V DC ±0.4%
Load shedding (deep discharge protection)	9.9 V DC ±04%
Rated output current	20 A
Charging current limit	21.5 A ±0.5 A
Internal consumption in buffer mode	135 mA
Power loss	48 W @ (U _e = 230 V AC, U _a = 13.4 V DC, I _a = 20 A)
Efficiency	84.7 % @ (U _e = 230 V AC, U _a = 13.4 V DC, I _a = 20 A)
Charging characteristic**	IU curve DIN 41773-1
Fusing	
Fusing of the battery circuit	Max. 25 A
Fusing – output	External
Recommended prefusing	Max. 10 A
General	
Protection rating of the enclosure	IP20
Overvoltage category	II
Pollution Degree	2
Battery type	Lead-acid battery*
Dimensions (H x W x D) standard device	241 mm x 101 mm x 234 mm
Weight of the standard device (without batteries)	2.9 kg
Operating temperature	0 °C - +40 °C
Storage temperature	0 °C - +50 °C
Relative humidity	≤95% non-condensing
Max. elevation above sea level	2000 m

*Basic parameter settings for VRLA lead-acid battery (AGM, SLA, gel battery)

**Parameters can be set for other battery types

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Input	
Rated input voltage	230 V AC
Perm. input voltage tolerance	±15%
Frequency	50 / 60 Hz ±3 Hz
Rated input current	2.6 A @ 230 V AC
Switch-on current	≤65 A/3 ms
Rated input power	598 W @ (U _e = 230 V AC, U _a = 53.6 V DC, I _a = 10 A)
Output	
Rated output voltage	48 V DC (SELV / PELV)
Output voltage (without temperature tracking)	39.6 - 53.6 V DC ±0.4%
Output voltage (with temperature tracking)	39.6 - 56.0 V DC ±0.4%
Output voltage (heavy charging)	57.2 V DC
Plateau charging voltage with/without temperature tracking	53.6 V DC ±0.4% / 53.0 - 56.0 V DC ±0.4%
Load shedding (deep discharge protection)	39.6 V DC ±0.4%
Rated output current	10 A
Charging current limit	10.75 A ±0.25 A
Internal consumption in buffer mode	135 mA
Power loss	62 W @ (U _e = 230 V AC, U _a = 53.6 V DC, I _a = 10 A)
Efficiency	89.7 % @ (U _e = 230 V AC, U _a = 53.6 V DC, I _a = 10 A)
Charging characteristic**	IU curve DIN 41773-1
Fusing	
Fusing of the battery circuit	Max. 10 A
Fusing – output	External
Recommended prefusing	Max. 10 A
General	
Protection rating of the enclosure	IP20
Overvoltage category	II
Pollution Degree	2
Battery type	Lead-acid battery*
Dimensions (H x W x D) standard device	241 mm x 101 mm x 234 mm
Weight of the standard device (without batteries)	2.9 kg
Operating temperature	0 °C - +40 °C
Storage temperature	0 °C - +50 °C
Relative humidity	≤95% non-condensing
Max. elevation above sea level	2000 m

*Basic parameter settings for VRLA lead-acid battery (AGM, SLA, gel battery)

**Parameters can be set for other battery types

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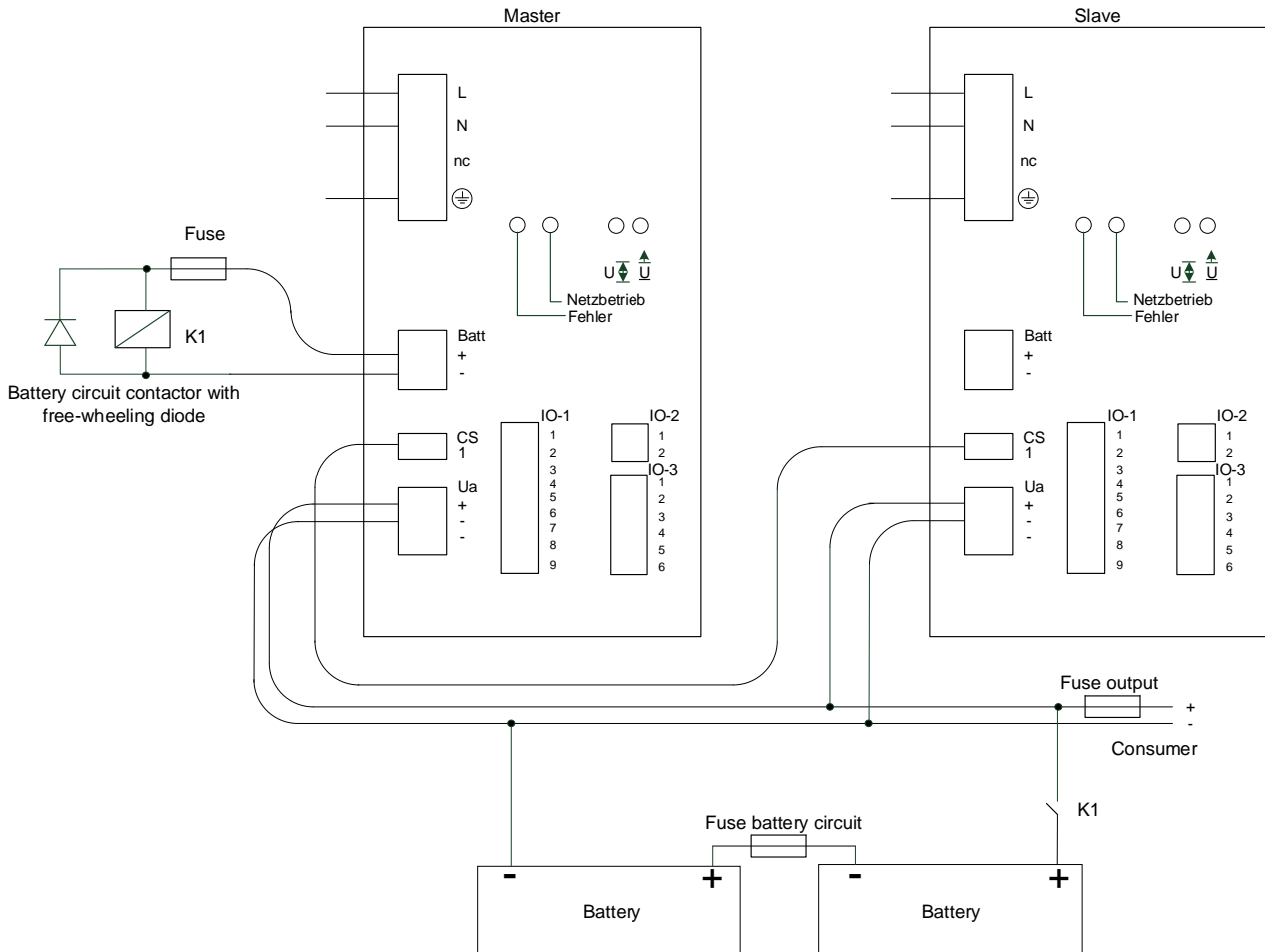
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10 Switching examples

10.1 Master/slave mode

For increased capacity in master/slave mode, multiple devices can be connected in parallel; one device is the master. Two master/slave systems can also be connected redundantly.



In master/slave mode ensure the following connections:

Terminal – master	Terminal – slave	Connection	Comment
Batt+, Batt-	-	Battery circuit contactor with free-wheeling diode	AKKUTEK 1220: 12 V DC battery circuit contactor AKKUTEK 4810: 96 V DC battery circuit contactor with switching current $I \geq 50$ A DC
CS (1)	CS (1)	Current share (current share bus)	Connection from master to slave
Ua+, Ua-	Ua+, Ua-	Consumer	Parallel connection master + slave
IO-1 (1, 2)	-	Temperature sensor	Only on master
IO-1 (5 = NC, 6 = NO, 7 = COM)	IO-1 (5 = NC, 6 = NO, 7 = COM)	Signal contact – Fault (collective fault signal)	Parallel connection master + slave
IO-1 (8 = COM, 9 = NO)	IO-1 (8 = COM, 9 = NO)	Signal contact – Grid mode	Series connection master + slave
IO-2 (1, 2)	IO-2 (1, 2)	Display and operating panel	Master + slave
IO-3 (3, 4)	-	Signal contact Battery voltage above	Only on master
IO-3 (5, 6)	-	Signal contact Battery voltage within	Only on master

A missing CS connection causes a load shift to the master. In this case the output voltage on the slave is 10,8 V DC (**AKKUTEK 1220**) or 43,2 V DC (**AKKUTEK 4810**), if the output voltage at the master collapses

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or the connection of Ua+ and Ua- between master and slave is disconnected.

On a master/slave system execute the UPS switch-off and heavy charging only on the master.

On the operating and display panel (*Options*), set device parameters for redundant operation. You can connect up to four devices simultaneously on the operating and display panel. Assign ID 1 for the master and ID 0, 2 and 3 for the slaves – if present.



NOTICE

In master/slave mode the device-internal reverse-polarity protection is not effective. Reversed battery polarity results in defect of the consumers and of the device!



NOTICE

In the event of overload, the output current equals the total current of the on-grid device and the current of the batteries. To prevent overload, fuse the output appropriately for the rated current.



NOTICE

To benefit from the effect of active current sharing, the output-side wiring must be symmetric. Comply with the specifications for line lengths and line cross sections.

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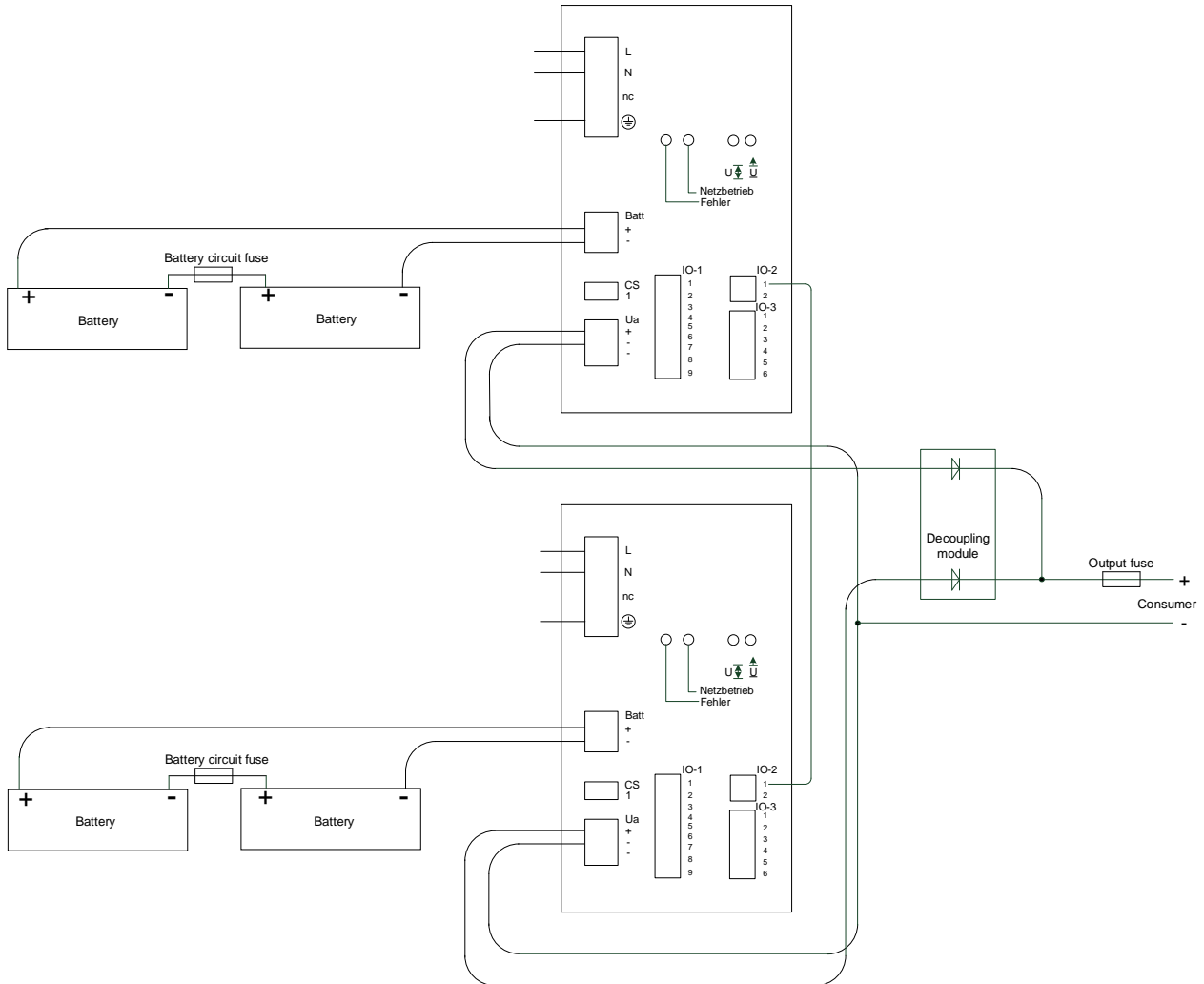
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10.2 Redundant operation

In redundant circuits, you can use two devices to maintain supply if a device fails.



In redundant operation you set the following connections:

Terminal	Connection	Comment
IO-1 (1, 2)	Temperature sensor	Each device separately
IO-1 (5 = NC, 6 = NO, 7 = COM)	Signal contact – Fault (Collective fault signal)	Parallel connection of both devices
IO-1 (8 = COM, 9 = NO)	Signal contact – Grid mode	Series connection of both devices
IO-2 (1)	IO-2 (1)	Series connection of both devices
IO-2 (2)	-	Do not connect
IO-3 (3, 4)	Signal contact Battery voltage above	Each device separately
IO-3 (5, 6)	Signal contact Battery voltage within	

On the operating and display panel (*Options*), set device parameters for redundant operation. Assign ID 0 and ID 1 such that you can identify the device with the ID.

UPS switch-off must be executed on both devices simultaneously.

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NOTICE

The terminal **IO-2 (2)** is connected to ground (-Ua) internally in the device. To prevent the occurrence of ground loops, the connections **2** from **IO-2** must not be interconnected! A connection can result in a defect of the device!



NOTICE

In the event of overload, the output current equals the total current of the on-grid device and the current of the batteries. To prevent overload, fuse the output appropriately for the rated current.

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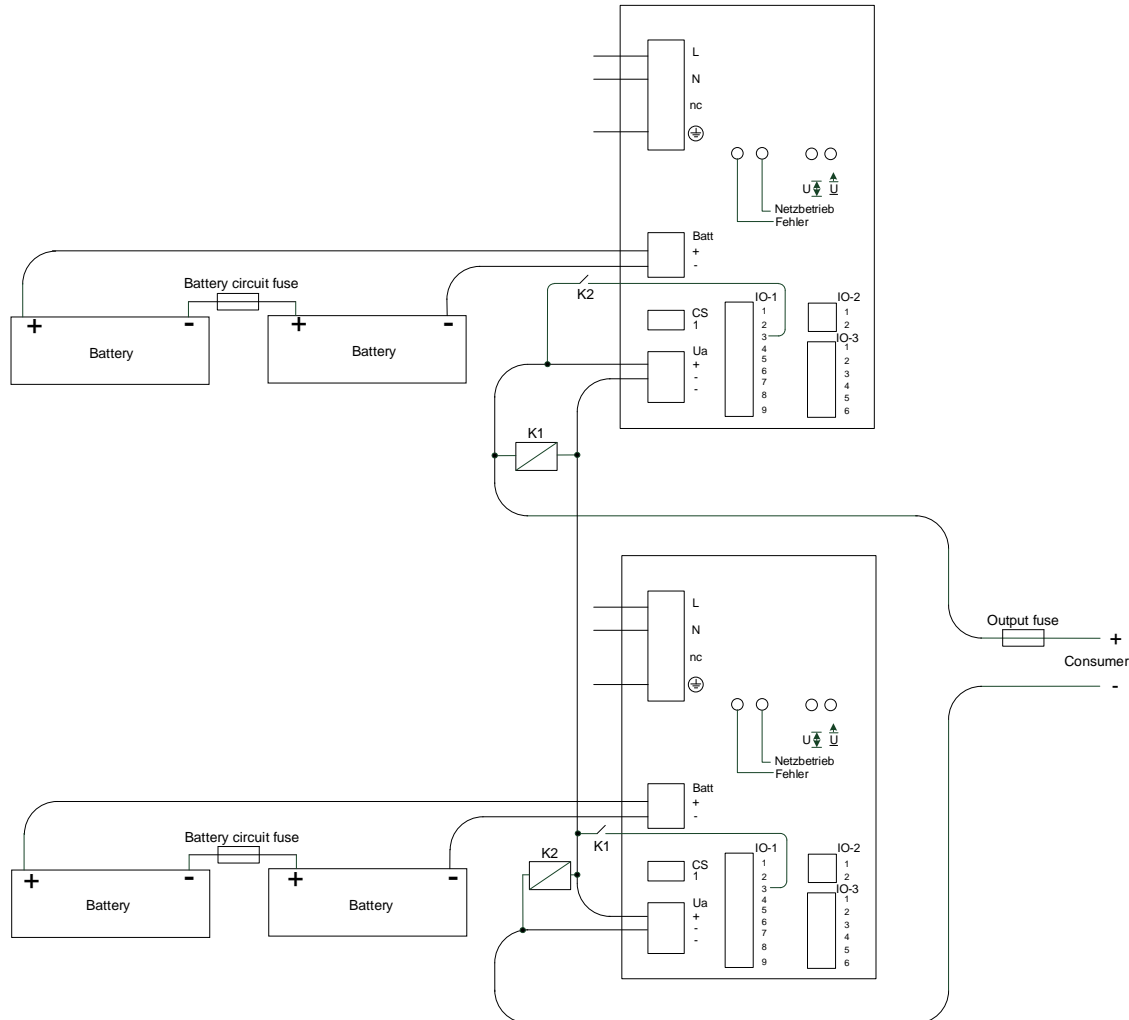
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10.3 Series circuit

The series circuit of maximum two devices makes an output voltage of 24 V DC (AKKUTEK 1220) or 96 V DC (AKKUTEK 4810) available.



In the series circuit you can set the following connections:

Terminal	Connection	Comment
IO-1 (1, 2)	Temperature sensor	Each device separately
IO-1 (3) / Ua	UPS switch-off	12 V DC / 48 V DC relay (break contact) to switch off
IO-1 (5 = NC, 6 = NO, 7 = COM)	Signal contact – Fault (Collective fault signal)	Parallel connection of both devices
IO-1 (8 = COM, 9 = NO)	Signal contact – Grid mode	Series connection of both devices
IO-2 (1, 2)	Operating and display panel	Each device separately
IO-3 (3, 4)	Signal contact Battery voltage above	Each device separately
IO-3 (5, 6)	Signal contact Battery voltage within	

Execute UPS switch-off and heavy charging on each device individually.

The DC control voltages must be galvanically isolated from each other.



NOTICE

In the event of overload, the output current equals the total current of the on-grid device and the current of the batteries. To prevent overload, fuse the output appropriately for the rated current.

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11 Options

Designation	Item number
Operating and display panel	PBDEL33G4M01
Decoupling module	59610.1
Fuse bridge	NBP40848G01003
Gateway	PMDV1710G01001
IPC switch module	RBSM0429G01001
Temperature sensor	MTIAL33G5M01
Interface cable	PSDP0324G01***
Fuse PCB	NBP20848G02005
Software TECBusManager	PSXX1810G01001
Connector set	-