

Operation Instructions

“AKKUTEK 2402”

NBPA 2402-Q33G1 and

NBPR 2402-Q33G1

with battery sensor

MTIA – Q33G3M01

and

battery module

NBBH - Q33G1M01

device designation	comments	art. no.	nominal input voltage	nominal output voltage
AKKUTEK 2402-0	standard unit, single module	NBPAQ33G1M01	115-230V AC	24V DC
AKKUTEK 19-2402-07 AKKUTEK 19-2402-12	standard unit, 19" battery 7,2 Ah / 12 Ah terminals at the rear side	NBPRQ33G1M01 NBPRQ33G1M02	115-230V AC	24V DC



Safety Regulations

The assembly, start-up and maintenance may be done by trained personnel only. Mains connection must be realized according to DIN VDE 0100. An equipment for protection and safety to release the power supply must be foreseen. The unit is conform to protection class I and protection system IP20, the operation is only allowed in cabinets or in closed electrical branches! No components to be maintained by the user are integrated in the unit. The unit may only be opened by qualified personnel. In case of failure we recommend to send the unit back to the manufacturer .

The disregard of the safety regulations may cause perilous injuries. In case of exceeding the values given in the technical Data, the risk of damage of the unit occurs.

- ◆ The operation instruction must be read carefully before use respectively installation of the unit, the general information must be followed.
The disregard may cause the loss of all guarantee and warranty claims!
- ◆ The installation, start-up and maintenance may only be done by trained personnel!
- ◆ The valid VDE-regulations, especially DIN VDE 0100 and EN 60204 are to be respected!
The protective conductor must be connected (protective class I)
Supply and outgoing feeder must be calculated and fused in a sufficient way (values look at point 3.1)!
To release the power supply a separator for the mains and the battery circuit must be foreseen.
- ◆ The unit is a built-in device. The operation is allowed only in dry rooms.
- ◆ The allowed environmental temperature range is to be respected!
- ◆ Only the battery types specified for the unit are permitted to be used!
- ◆ Battery replacement is only to be made with the unit unpowered.
- ◆ In case of external buffer batteries the user must realize the battery fusing! The fusing element (overload and short-circuit protection) must be installed as near as possible to the battery set because of safety reasons!
- ◆ On the usage of batteries, sufficient air flow in accordance with VDE 0510, part 2 must be ensured.
- ◆ Never connect together new and used batteries, or batteries of different types, or from different manufacturers
- ◆ The unit may only be opened by qualified personnel
In case of failure we recommend to send the unit back to the manufacturer.

The disregard of the safety regulations may cause perilous injuries!

1. Short-description

The battery backed up DC power supply in the **AKKU TEC** range uses the standby-parallel principle of operation and, in conjunction with a lead accumulator, ensures that the DC power supply is reliably maintained in the case of a mains power failure. The back-up time depends on the state of charge of the battery and the discharge current. The power supply has the following features:

- battery charger system with I/U charging characteristic
- Micro-controller-based battery management

Temperature compensation for charging voltage by means of external sensor module (optional module).

2. Norms and Regulations

power- HF- transducer to ensure safe separation of primary and secondary	EN 61558 2-17 (VDE 0570 2-17)	
opto coupler zur Gewährleistung der sicheren Trennung Primär / Sekundär	VDE 0884	
emitted interference	EN 61000-3-2 and EN 61000-3-3 class A EN 55011 class B	
interference resistance: EN 61000-6-2	EN61000-4-2 (static discharge ESD)	(4kV)
	EN61000-4-3 (electromagnetic fields)	(10V/m)
	EN61000-4-4 (fast transients / Burst)	input (2kV) output (1kV)
	EN61000-4-5 (Surge)	mains (2 / 4kV) output (0,5kV)
	EN61000-4-6 (conducted stability)	10V, 150kHz – 80MHz
	EN61000-4-11 (voltage drops)	by-pass by battery
total unit	EN 50178 / EN 60950	

3.1. Technical Data

nominal input voltage	115/230V AC
input voltage rang	97,75-264,5V 115V – 15% - 230V + 15%
input frequency	47-63Hz
nominal input current	0,84A - 115V AC 0,42A – 230V AC
max. inrush current	30A / 2ms
output voltage (without battery) output voltage (with battery)	26,8V DC $\pm 0,4\%$ 19,8V – 26,8V DC $\pm 0,4\%$
final charging voltage (temp.-sensor optional)	26,8V DC $\pm 0,4\%$ without temp.-Sensor 27V at 25 °C with temp.-Sensor
charging characteristics	I/U DIN 41773-1
deep discharge protection and load rejection at	19,8V DC $\pm 0,4\%$
nominal output current	2A DC
constant current limitation	1,05...1,1 x I_{ANom}
battery type	Pb-battery, maintenance-free
efficiency $U_a=26,8V$ DC, $I_a= I_{ANom}$ and $U_e=230V$ AC	87%

max. power loss 'worst-case'	12W
earth leakage current	<3,5mA
fusing input	250V 2A T H (internal)
fusing DC- output circuit	3A T (external)
fusing battery circuit	3A T (external)
type of connection input 'mains'	spring type terminal max. 1,5mm ²
type of connection output 'Ua', 'Batt'	spring type terminal max. 1,5mm ²
type of connection messages	spring type terminal max. 1mm ²
protective system	IP 20 a. EN 60529
weight stand-alone unit 19" Version within batt.	0,55kg 7,0kg (7,2Ah) 9,6kg (12Ah)
storage temperature	0...50 °C
environmental temperature recommended for battery	0 - 45 °C 0 - 25 °C
dimensions	92,5 x 60 x 116mm (H x W x D)

3.2 Display and Message Outputs

mains OK ¹⁾	LED green, illuminates at: • mains operation: $U_E > U_{Emin}$	potentialfree relais-contact, two-way contact, max. contact load 30V DC/ 0,5A
battery OK ²⁾	LED green , expires at: • disconnection of battey circuit • battery voltage < 21,6 V (battery operation) • battery temperature > 45 °C LED green, blinks at: • battery low	potentialfree relais-contact, nomally open contact max. contact load 30V DC/ 0,5A

¹⁾ The message contact is coupled with the LED display
In case of illuminating LED the corresponding relay is tightened.

²⁾ In case of illuminating LED the corresponding relay is tightened.

In case of blinking or expired LED the relay contact is open.

3.3 Messages input

Shut - Down	Stop of the UPS - operation	gate input related to earth, switch level: 24V DC (6-45 V DC)
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4. Montage

The DC power supply must be built in in the way that the necessary cooling is guaranteed. A minimum distance from the cooling vents to neighbouring devices of $\geq 40\text{mm}$ must be observed. The device must be built in in the way that sufficient air circulation is ensured. The specified environmental temperature must not be exceeded. The max mounting height without power derating is 1000m above NN. During the installation the unit must be covered when drilling chips may fall on respectively into the unit. **(danger of short-circuit!)**

5. Connection

Before connecting the values of mains voltage, frequency and the battery must be compared with the values on the type plate. Connection according to the designation of the connection terminals. (look at circuit diagramm and terminal asignment).

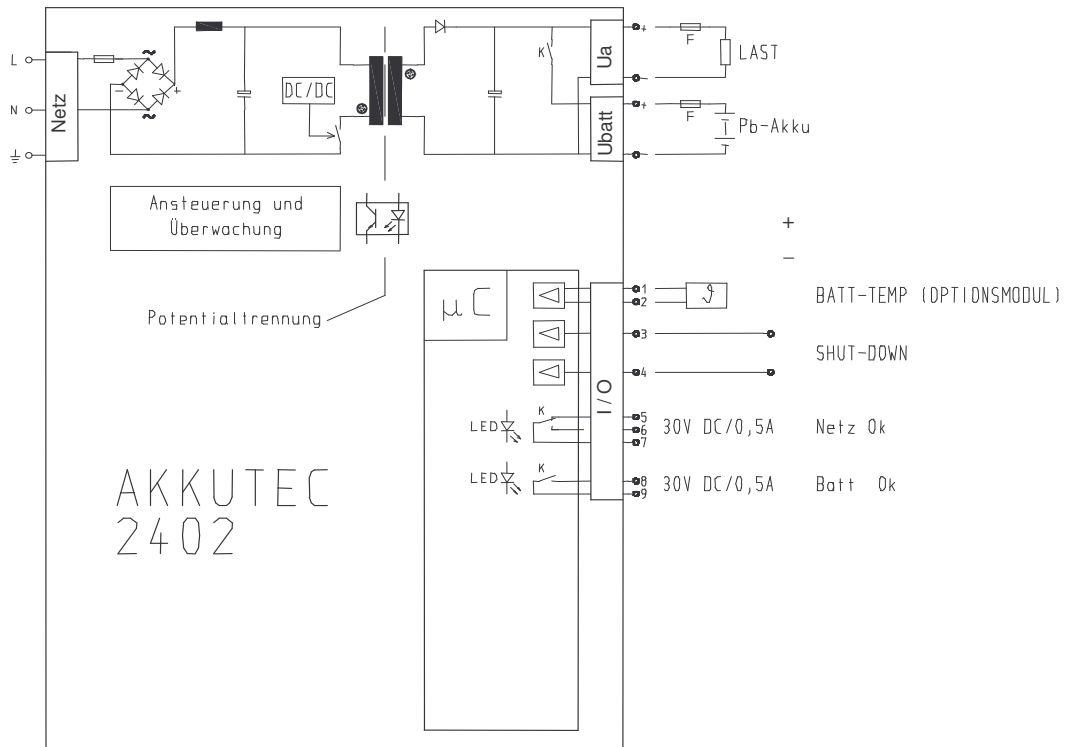
connection:	terminal:
mains connection	terminal connection 'mains' L, N, PE
DC-output (load)	terminal connection 'Ua' +, -
Pb-battery	terminal connection 'Batt' +, -
battery- temperature sensor (optional module)	terminal connection 'IO-1' 1, 2

connection:	terminal:
control input Shut-Down	terminal connection 'IO-1' 3 + / 4 -
mains OK	'IO-1'
mains present	6 / 7 (closed)
mains interruption	5 / 7 (closed)
Batt OK	8 / 9 (closed)



In the case of overload, the DC output current comprises the maximum charging rectifier current as well as the current from the battery. To prevent overload of the DC output circuit, the circuit is to be protected externally ! (Value see Section 3.1)

6. Circuit diagramm



7. Putting into operation

The unit is switched on by the application of the mains supply.



If the unit is built into systems, in which over voltages are required for the check (for example according to EN60204-1 / VDE0113 part1 19.4 voltage control), the unit must be separated from the test assembly before the voltage is switched on. (Original text EN60204-1 : components, which are not dimensioned for the testing voltage must be separated during the testing.)

**The battery voltage must match the nominal voltage of the AKKUTEK!
Never reverse the poles of the battery!
Never short circuit batteries! Risk of arc!
Check the connections for correctness prior to switching on for the first time
Only make electrical connections with the unit un-energized**

8. Operation

Approx. 2s after the switch on of the mains, the output voltage is released and the loads which are connected are supplied with power. The back up battery is also charged. This operating mode is indicated by the illumination of the green 'Netzbetrieb' (Mains Operation) LED.

By removing the mains voltage, or if the input voltage drops below the minimum, the **AKKUTEK** switches over to battery mode. The 'Netzbetrieb' (Mains Operation) LED is not illuminated in this case.

The illumination of an LED always results in the energysation of the corresponding signal relay. (See block diagram, point 6)

9.1 Control of battery circuit

To check the capability of the UPS to provide back up, the battery circuit is tested cyclically at intervals of 60s; the first test is performed 60s after mains switch on. By means of this test it is possible to identify an open circuit or the high resistivity of the battery circuit. A defective battery circuit is indicated by the expiry of the 'Batt ok' LED

9.2 Battery test

During mains operation, a cyclic battery test loads the battery whilst the voltage is measured. In this way it is possible to evaluate the quality of the battery. A seriously aged battery is indicated by the expiry of the LED "Batt. OK". About one hour of switching on the mains the first battery test is effected, each other after 24 hours.



By the processor controlled, automatic battery test the back-up capability of the battery is ensured.

To get detailed information concerning the capacity of the batteries in the present system, we suggest the control the batteries with the nominal load current at least one time each year. To realize this, battery operation must be enforced by mains switch-off and the back-up time until the automatic switch-off because of the deep-discharge protection must be measured. The effective battery capacity can be calculated from the back-up time and the nominal load. If the battery capacity should not be sufficient, the batteries must be changed.

The battery test is used to detect seriously aged batteries. To evaluate the backup capacity of the batteries with this system, it is imperative that a manual battery check is performed from time to time! (See point 11)

9.3 Shut-Down

To avoid the discharge of the battery until the deep discharge limitation, it is possible to abandon the battery operation with an external signal. This is effected by connecting a +24V DC control voltage at terminal 3 (+) and 4 (-) at the terminal strip 'IO'.

9.4 Temperature compensation (optional modul)

Lead batteries have a temperature coefficient of approx. -3mV per $^{\circ}\text{C}$ and cell. The **AKKUTECH** final charging voltage is selected such that battery charging is provided over a temperature range of $15\text{-}45^{\circ}\text{C}$.

In applications with frequent and large temperature variations, the charging voltage should be appropriately compensated to achieve optimal battery life. Also, particularly in the case of very low environmental temperature ($T_u < 15^{\circ}\text{C}$), compensation should be performed to ensure adequate battery charging.

By connecting the external temperature sensor module (option) to terminal strip 'IO-1' connection 1 and 2 (note poles!), temperature compensation is automatically activated. For an surrounding air temperature variation of $0\text{-}45^{\circ}\text{C}$, the final charging voltage (and thus also the output voltage) varies over a range of $27.85\text{ - }26.3\text{ V DC}$

Battery temperatures above 45°C are indicated by the expiring of the LED 'Batt OK'.



To obtain satisfactory battery life, the operating temperature of the batteries should not exceed 25°C . Higher temperatures lead to a reduction in the lifetime!

10. Taking out of operation

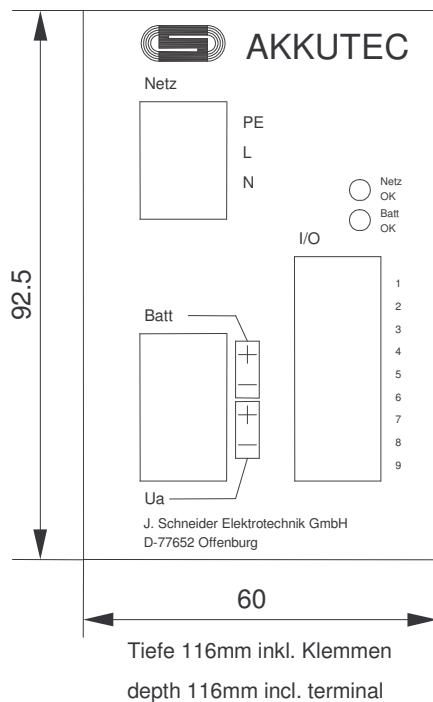
The unit is taken out of operation by removing the mains supply. To prevent subsequent backup from the batteries, the battery circuit must be opened by activating 'Shut-Down'. (See Section 9.3). The LEDs 'Netz OK' and 'Batt OK' must expire. (s. Punkt 9.3).



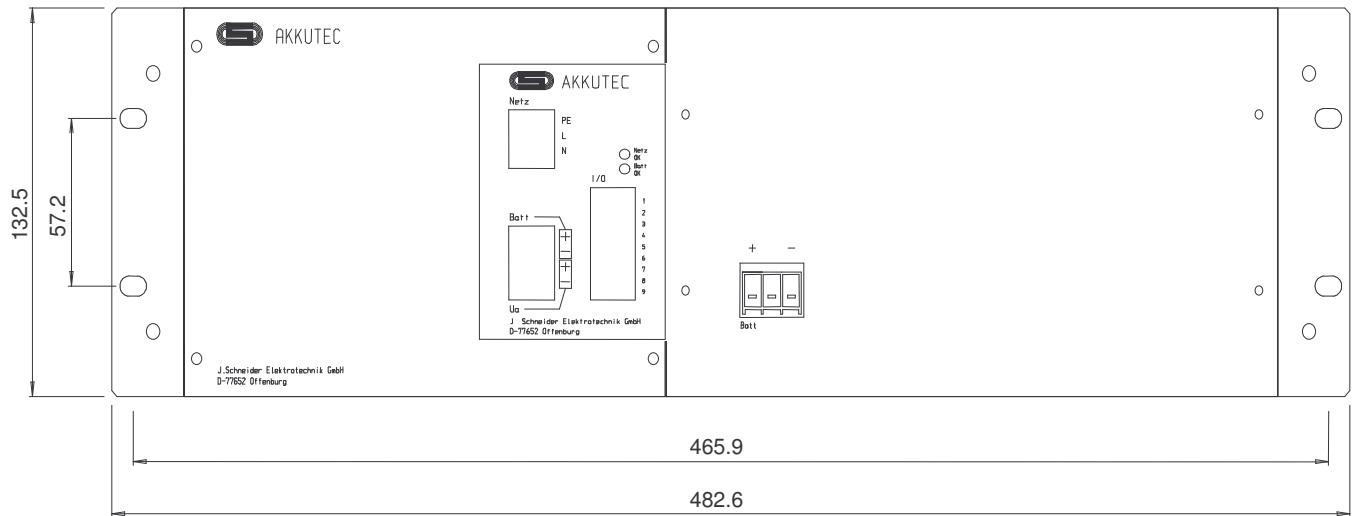
**Never undo electrical connections whilst the unit is in operation!
It also not permitted to make electrical connections whilst the unit is in operation!**

11. Installation drawings

snap fixation for 35 mm Normprofilschienen
DIN EN 50022 (NS 35 x 15 / 7,5mm)



mounting depth without terminals!



Einbautiefe : 244mm (ohne Griffe)
 Mounting depth : 244mm (without grips)

12. Maintenance

Inside the unit there are no parts which may be maintained by the user.

The unit is to be cleaned regularly, depending on the degree of soiling.

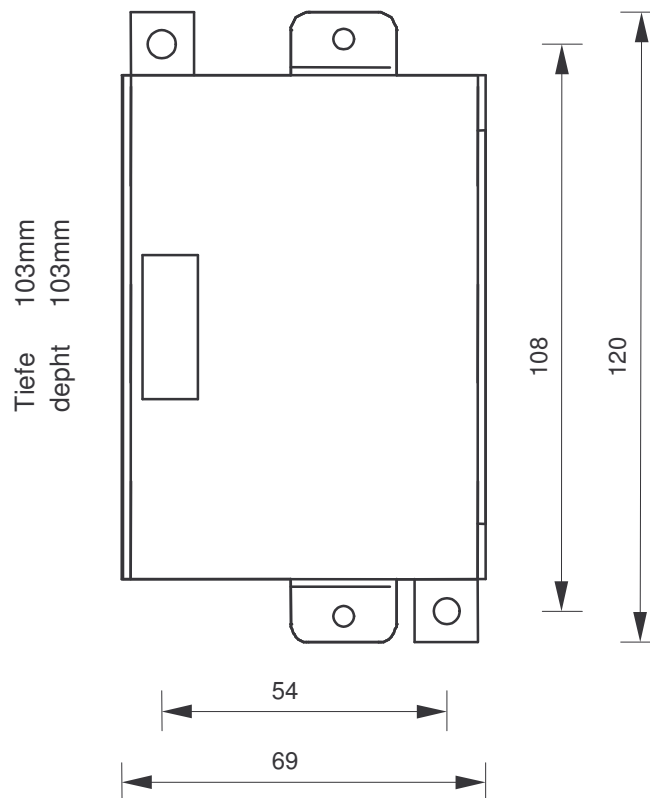
The batteries must be checked as described in section 9.2 and must eventually be exchanged.

Optional Module

Operational Instruction battery module

NBBH 2401

Article-no.: NBBHQ33G1M01

**Type of Battery:**

maintenance-free lead accumulators 24V / 1 Ah

Battery fusing:

3 A FK2

back-up time:

30 min at 2 A load

dimensions in mm:

(width x height x depth) : 69 x 120 x 103mm

installation:

on 35 mm Norm mounting rail

DIN EN 50022-35 x 15/7,5

installation:

with fixing attachments look at drawing

Optionsmodul

Operational instruction Temperature-sensor AKKUTEC 2402

MTIA – Q33G3M01



Safety regulations

- ◆ The operation instruction must be read carefully before use respectively installation of the unit, the general information must be followed.
The disregard may cause the loss of all guarantee and warranty claims!
- ◆ The installation, start-up and maintenance may only be done by trained personnel!
- ◆ The unit is a built-in device. The operation is allowed only in dry rooms.
- ◆ The connection or disconnection of electrical connection must only be realized in voltage-free state
- ◆ The unit may only be opened by qualified personnel
In case of failure we recommend to send the unit back to the manufacturer.

Short description

Lead batteries have a temperature coefficient of approximately $-3\text{mV per }^{\circ}\text{C}$ and cell in case of parallel operation. The final charging voltage is selected in such a way that the charge of the battery in a temperature range of $15\text{-}45^{\circ}\text{C}$ is ensured. In case of applications with often and strong temperature variations the charging voltage should be tracked to avoid a battery overcharging (danger of gas). In case of very low temperatures ($T_u < 15^{\circ}\text{C}$) a voltage tracking ensures sufficient charge of the batteries.

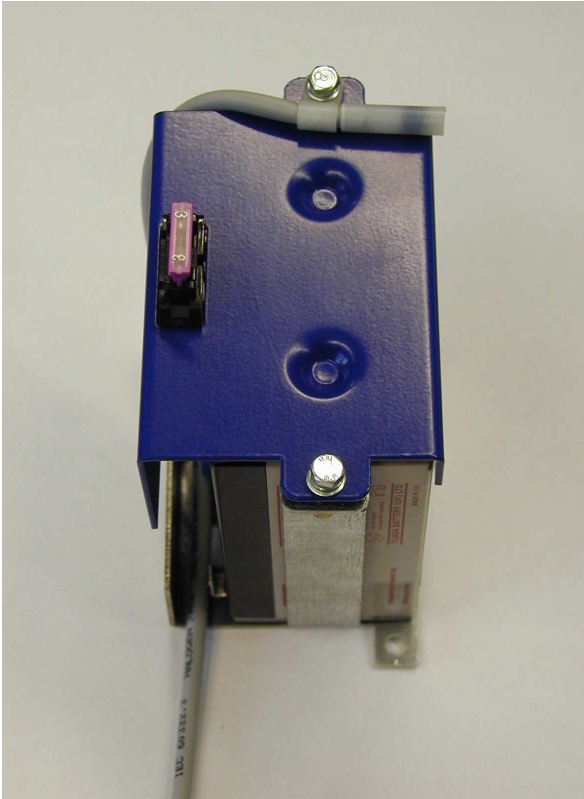
With the connection of the temperature sensor at the terminal strip 'IO-1' connection 1 and 2 the temperature tracking is automatically activated. Corresponding to the fluctuations of the environmental temperature of $0\text{-}45^{\circ}\text{C}$ the final charging voltage (as well as the output voltage) alternates in a range of $27,85 - 26,3 \text{ V DC}$. Battery temperatures above 45°C are indicated by the expiring of the "Batt OK" LED.

Scope of delivery

Temperature sensor with 1m connection cable $0,5 \text{ mm}^2$

Nylon-cable clip with 4,3 mm bore hole

Installation



The battery sensor should be installed near by the battery, as shown in the example of the battery module NBBH 2402 (look at picture). So the exact measurement of the environmental temperature of the battery is ensured.

Connection

The temperature sensor is connected at terminal 'IO-1' connection 1 and 2 of the AKKUTEC 2402. The polarization of the connection cable is variable. A maximum cable length of 3 m must be foreseen. The diameter of the cable should amount at least to 0,5mm².

Putting into operation

The temperature sensor is recognized automatically from the AKKUTEC after the connection to the mains and the charging voltage is automatically tracked according to the temperature. An additional parameterisation is not necessary.