



**DC-UPS**  
*NBPAQ33G1M19*

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| Device designation | Notes                             | Art.No.      | Nominal input voltage | Nominal output voltage |
|--------------------|-----------------------------------|--------------|-----------------------|------------------------|
| AKKUTEK 4801-0     | Standard unit, stand alone module | NBPAQ33G1M19 | 115 -230V AC          | 48V DC                 |

### 1. General

The battery-backed DC power supply ensures that the DC voltage supply is maintained safely in the event of a power failure. Any other use is expressly excluded.

The operating instructions must be read before use or installation, the specifications must be observed! Commissioning and maintenance may only be carried out by qualified personnel.

Non-observance or unauthorised modifications may invalidate all warranty and guarantee claims.

#### 1.1 General safety notes

|                                                                                     |                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <p><b>NOTE</b></p> <p>The operating instructions must be read prior to installation or use of the unit. The instructions must be observed. All warranty claims could be lost in case of non-observance!</p>                                                                                                                                     |
|    | <p><b>DANGER</b></p> <p>Only specialised electricians are authorized to commission and maintain the unit. Improper handling with voltage procedures or lead accumulators can lead to electric shock and severe burns.</p>                                                                                                                       |
|  | <p><b>DANGER</b></p> <p>All work on the unit may only be performed in de-energized state!<br/>The five safety rules must be observed.<br/>Input and output lines must be sufficiently dimensioned and fused!<br/>Never open the housing. Repair may only be done by the manufacturer!<br/>Non-observance can lead to fatal electric shocks.</p> |
|  | <p><b>CAUTION</b></p> <p>For use in a controlled environment refer to chapter 10 Technical Data for environmental conditions.</p>                                                                                                                                                                                                               |
|  | <p><b>NOTE</b></p> <p>In case of malfunction we recommend to send the unit to the manufacturer</p>                                                                                                                                                                                                                                              |

Operation is only permitted in dry rooms and in closed switch cabinets. The unit is designed for pollution degree 2. The applicable VDE regulations, in particular VDE 0100 and EN 60204 must be observed. Inlet and outlet cables must be adequately dimensioned and must be secured.

To disconnect the device from the power supply on the output side, the device must be disconnected from the system voltage and the internal energy storage device must be discharged!

### 1.2 Short description

The battery-buffered DC power supply of the AKKUTEC series operates according to the standby parallel principle and, in conjunction with a lead accumulator, ensures that the DC voltage supply is safely maintained in the event of a power failure. The buffer time depends on the charge state of the accumulator and the discharge current

The power supply has the following characteristics:

- Battery charger with I/U-charging characteristics
- Micro controller-supported battery management
- Temperature tracking of the charge voltage by external sensor module (option)

### 1.3 Intended Use

The **AKKUTEC** is designed and developed for the industrial and plant engineering sector. The installation of the **AKKUTEC** is to be carried out exclusively by qualified electricians.

If the **AKKUTEC** is operated outside of its intended use, the protection supported by the **AKKUTEC** cannot be guaranteed

## 2 Transportation and storage

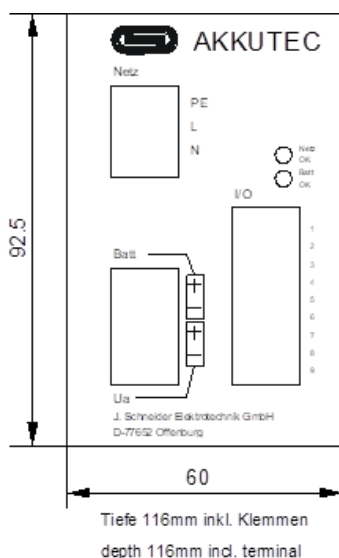
The transportation of the unit may only be carried out in the original packaging. During transportation and storage the environmental conditions must be observed (see section 10 Technical Data). The units must be protected against humidity and direct sunlight.

## 3 Installation and connection

### 3.1 Installation

The DC power supply must be installed in a way that the necessary cooling is guaranteed. A minimum distance of  $\geq 40\text{mm}$  must be kept to neighbouring units or assemblies in the area of the ventilation slots.

The installation must always be performed in a way that sufficient air circulation through the unit is ensured. The specified ambient temperature must not be exceeded. The maximum mounting height without load reduction amounts to 2000 m above sea level. During installation the unit must be covered if swarf could fall onto or into the unit.



#### NOTE

The unit is a built-in unit. It may only be operated in closed switch cabinets or enclosures. The unit is designed for pollution degree 2. The switch cabinets or enclosures used must meet the requirements for enclosures according to EN 62368-1. Observe the specifications for ventilation openings in the enclosure in accordance with sections 6.4.8.3.3 and 6.4.8.3.4. A warning notice "Warning of electrical voltage" (ASR A1.3 W012) must be attached to the enclosure.

Only use lead batteries. Never use other battery technologies.

When connecting the batteries, make sure that the nominal voltage and polarity match. Never reverse the polarity of the batteries. Never short circuit batteries!

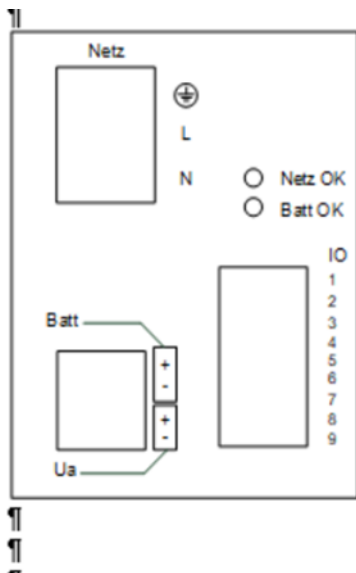
Failure to do so may result in burns from electric arcs or glowing parts.

# User manual

## AKKUTEK 4801

### 3.2 Connection

Before connection, check that the values of the DC supply correspond to the values on the type plate. Make the connection according to the designation of the terminals (see terminal assignment). Tighten unused connection screws.



| Terminals                                                                                  |                           |                                          | Connection                                                                        |                                                 |
|--------------------------------------------------------------------------------------------|---------------------------|------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------|
| Designation                                                                                | Max. tightening torque/Nm | Min. cable cross section/mm <sup>2</sup> |                                                                                   |                                                 |
| L, N, PE  | Push-in spring connection | 0,5                                      | Input voltage                                                                     |                                                 |
| Batt+, Batt-                                                                               | Push-in spring connection | 0,5                                      | Batteries                                                                         |                                                 |
| Ua+, Ua-                                                                                   | Push-in spring connection | 0,5                                      | Load                                                                              |                                                 |
| IO-1 (1;2)                                                                                 | Push-in spring connection | 0,2                                      | Temperature sensor                                                                |                                                 |
| IO-1 (3;4)                                                                                 |                           |                                          | UPS-Switch off                                                                    | 24 V DC / 10 mA                                 |
| IO-1 (5=NC; 6=NO, 7=COM)                                                                   |                           |                                          | Message contact mains OK (mains present 6/7 closed Mains interruption 5/7 closed) | 60 V DC / 0,15 A (potential-free relay contact) |
| IO-1 (8=COM, 9=NO)                                                                         |                           |                                          | Message contact Batt OK                                                           |                                                 |

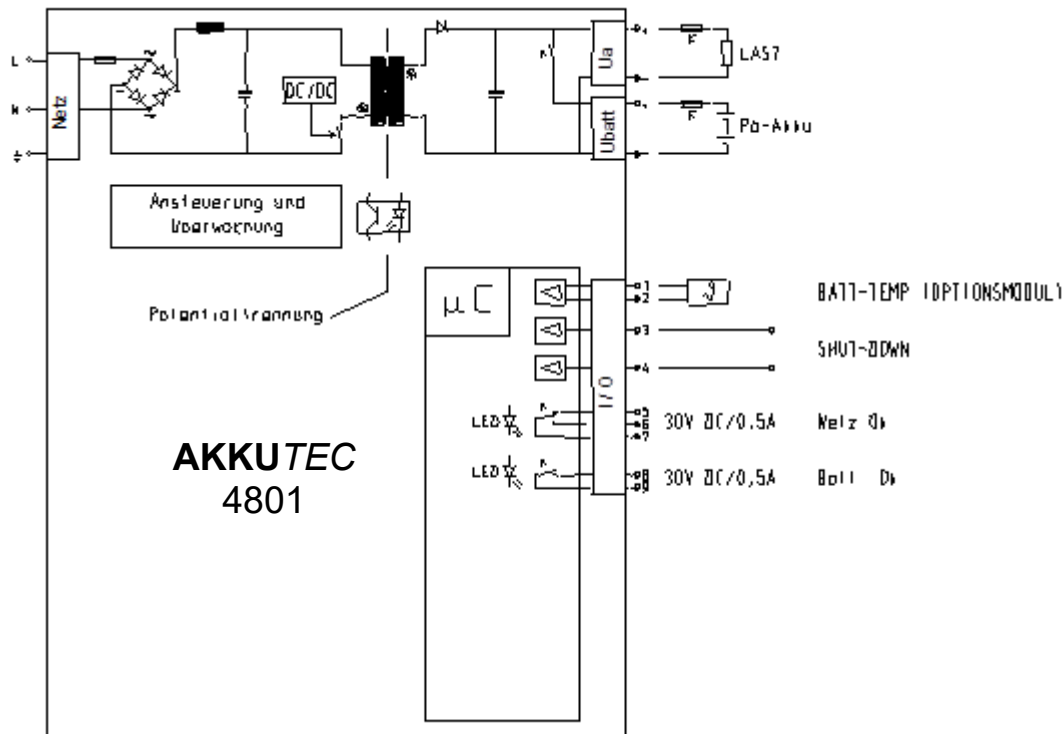
Dimension the cable cross section of the supply and output cables according to EN 62368-1 table G.5; see also table above.



#### REFERENCE

In case of overload, the DC output current is composed of the maximum charging rectifier current and the battery current. To prevent an overload of the DC output circuit, it must be protected externally! (value see point 3.1)

### 3.3 Circuit diagram



### 4 Putting into operation

The power supply is switched on by the activation of the mains voltage.

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>REFERENCE</b><br>If devices are installed in systems in which overvoltages are required for testing (e.g. according to EN60204-1 / VDE0113 part 1 19.4 voltage test), the device must be disconnected from the test setup before applying voltage.<br>(Original text EN60204-1: Components that are not designed for this test voltage must be disconnected during the test) |
|  | <b>REFERENCE</b><br>Only use lead batteries. Never use other battery technologies.<br>When connecting the batteries, ensure that the nominal voltage and polarity are correct. Never reverse the polarity of batteries. Never short circuit batteries!<br>Failure to do so may result in burns from electric arcs or glowing parts.                                             |

#### 4.1 Display and messages

|                           |                                                                                                                                                                                             |                                                                          |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Mains OK <sup>1)</sup>    | LED green illuminates at:<br>• Mains operation, $U_E$ ok                                                                                                                                    | Potential-free relay contact, changer, max. contact load 60V DC / 0,15 A |
| Batterie OK <sup>2)</sup> | LED green, goes out at:<br>• Battery circuit interruption<br>• Battery voltage < 43,2 V (Battery operation)<br>• Battery temperature > 45 °C<br>LED green, is blinking at:<br>• Battery low | Potential-free relay contact, closer, max. contact load 60V DC / 0,15 A  |

<sup>1)</sup> The message contact is coupled with a LED display  
when the LED is lit, the corresponding relay is energised

<sup>2)</sup> when the LED is lit, the corresponding relay is energised.  
when the LED is blinking or is not illuminated, the relay contact is relay contact is open.)

#### 4.2 Message Inputs

|           |                           |                                                               |
|-----------|---------------------------|---------------------------------------------------------------|
| Shut-Down | Abortion of UPS operation | Potential free switch input, switch level: 60V DC (6-60 V DC) |
|-----------|---------------------------|---------------------------------------------------------------|

#### 4.3 Response values of signals and functions

|                                             |                                                                                                                                                                                                                                                                                        |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature tracking<br>Ladeschlussspannung | <b>Actif</b> , when optional module is connected<br>55,6 V at °C<br>54 V at 25 °C<br>53,6 V at 45°C (corresponds to - 2,833 mV per cell and °C)                                                                                                                                        |
| Battery OK                                  | Battery low (battery operation)<br>$U_B \geq 45,2 \text{ V}$ LED illuminates / contact open<br>$U_B \leq 43,2 \text{ V}$ LED does not illuminate / contact closed                                                                                                                      |
| Battery circuit test                        | 1 x per minute for one second<br>- LED green Batt Ok: does not shine at negative battery circuit test<br>- contact (Batt OK): closed at negative battery circuit test                                                                                                                  |
| Battery test                                | 1 hour after mains switch on, each 24 hours at mains operation for 8 seconds<br>- LED green batt Ok: does not shine at negative battery test<br>- contact (Batt OK) : closed at negative battery test<br>- battery test negative : voltage < 44,6 V DC<br>( lowering voltage 44 V DC ) |
| Battery overtemperature                     | when temperature sensor is connected Temp. > 45°C<br>- LED green Batt Ok: does not shine at battery temperature > 45°C<br>- contact (Batt OK): closed at battery temperature > 45°C                                                                                                    |

### 5 Operation

Approx. 2 seconds after switching on the mains, the output voltage is released and the connected loads are supplied. The buffer battery is also charged. This operating mode is indicated by the green LED 'Mains OK' lighting up.

By switching off the mains voltage or by falling below the minimum input voltage, the **AKKUTEK** switches to battery operation. The green LED 'Mains OK' goes out.

When an LED lights up, the corresponding signalling relay is always energised (see circuit diagram point 3.3

#### 5.1 Monitoring Battery Circuit

To ensure the buffering capability of the UPS, the battery circuit is tested cyclically at intervals of 60s, the first test being 60s after mains connection. This test can detect an interruption or high resistance of the battery circuit. A faulty battery circuit is indicated by the green 'Batt OK' LED going out.

#### 5.2 Battery test

A cyclic battery test during mains operation puts a load on the battery while simultaneously measuring the voltage. This allows a statement to be made about the battery quality. A very old battery is indicated by the flashing green LED 'Batt OK'. The first battery test is carried out approx. 1 hour after connection to the mains supply, every further test after 24 hours.



**The processor-controlled, automatic battery test ensures the buffer capacity of the battery.**

In order to make an exact statement about the capacity of the batteries in the present system, we recommend that the batteries are additionally checked at least once a year at the nominal load current. For this purpose, battery operation must be forced by disconnecting the mains supply and the bridging time until the batteries switch off automatically when the deep discharge threshold is reached must be included. The actual battery capacity can be calculated from the bridging time and nominal load. If the capacity of the batteries is not sufficient for the necessary bridging time, the batteries must be replaced.

#### 5.3 Shut down

In order to avoid unnecessary discharging of the buffer battery to the deep discharge limit, it is possible to prematurely interrupt battery operation. This is done by applying a +48V DC control voltage to terminals 3 (+) and 4 (-) of the terminal strip 'IO-1'.

#### 5.4 Temperature tracking (optional)

Lead-acid batteries have a temperature coefficient of approx. - 3 mV per °C and cell in standby parallel operation. The final charge voltage is selected to ensure that the batteries can be charged within a temperature range of 15-45°C.

In applications with frequent and strong temperature fluctuations the charging voltage should be adjusted accordingly to avoid overcharging the batteries (risk of gassing!). Similarly, especially at very low ambient temperatures ( $T_u < 15^{\circ}\text{C}$ ), the charge voltage should be adjusted to ensure adequate battery charging.

By connecting the external temperature sensor module (option) to the terminal strip 'IO-1' connection 1 and 2, temperature tracking is automatically activated. The polarity of the connecting cable is not affected. The final charge voltage (and thus also the output voltage) varies within a range of 55,6 – 53,6 V DC according to the ambient temperature fluctuation of 0-45°C.

Battery temperatures above 45°C are indicated by the 'Batt OK' LED going out.



**NOTE**

To ensure a satisfying life duration of the lead accumulators, the operating temperature of the lead accumulators should not exceed 25°C. Higher temperatures lead to a drastic decrease of the life duration resp. service life!

### 6 Service

There are no user-serviceable parts inside the unit.

The unit must be cleaned regularly depending on the degree of soiling.

The batteries must be checked as described in section 5.2 and replaced if necessary.

### 7 Decommissioning

The decommissioning is performed by the removing of the mains voltage. In order to avoid subsequent buffering, the accumulator circuit must be interrupted by activating the **Shut-Down**-signal or by removing the accumulator fuse.

The LEDs "**Mains-OK**" and "**Batt OK**" must go out in this case.



#### **NOTE**

During operation the disconnection or connection of electrical connections is not allowed! In case of non-observance danger of arcs, which may lead to severe burns!

### 8 Disposal



This symbol indicates, that the product must not be disposed with normal house waste. Please dispose it professionally as electronic scrap. So the materials are separated and recycled according to their characteristics. This is a big contribution to protecting the environment.

### 9 Norms and Regulations

|                                                                         |                                                                                       |
|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Power HF transformer to ensure safe separation of primary and secondary | EN 61558 2-17 (VDE 0570 2-17)                                                         |
| Optocoupler to ensure safe isolation primary/secondary                  | VDE 0884                                                                              |
| EMC                                                                     | EN 55011 / 1998 Klasse B<br>EN 61000-3-2 und EN 61000-3-3 Klasse A<br>EN 50082-2 1995 |
| Total unit                                                              | EN 50178 / EN 62368-1 / EN 61010-1 / EN 61010-2-201                                   |

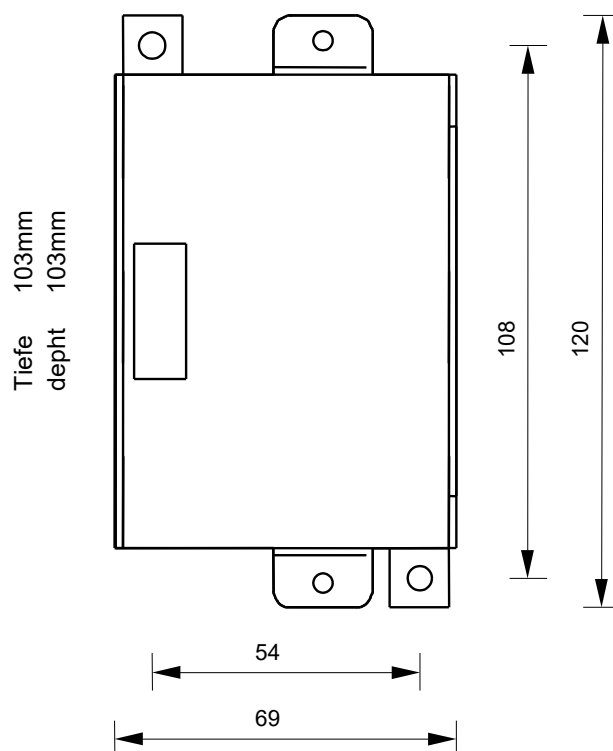
### 10 Technical Data

|                                                            |                                                                 |
|------------------------------------------------------------|-----------------------------------------------------------------|
| Input                                                      |                                                                 |
| Input voltage                                              | 115...230 V AC $\pm 15\%$ (98...265 V AC)                       |
| Frequency                                                  | 47...63 Hz                                                      |
| Input current                                              | 0,85 A @ 230 V AC                                               |
| Inrush current                                             | $\leq 30$ A/2 ms                                                |
| Nominal input power                                        | 46 W<br>@ ( $U_e = 230$ V AC, $U_a = 26,8$ V DC, $I_a = 1,1$ A) |
| Output                                                     |                                                                 |
| Nominal output voltage                                     | 48 V DC                                                         |
| Output voltage (without temperature tracking)              | 39,6...53,6 V DC $\pm 0,4\%$                                    |
| Output voltage (with temperature tracking)                 | 39,6...55,6 V DC $\pm 0,4\%$                                    |
| Final charging voltage (with/without temperature tracking) | 53,6 V DC $\pm 0,4\%$ / 53,6...55,6 V DC $\pm 0,4\%$            |
| Load shedding                                              | 39,6 V DC $\pm 0,4\%$                                           |
| Nominal output current                                     | 1,1 A                                                           |
| Self consumption current (in back-up operation)            | 12 W                                                            |
| Max power loss "worst case"                                | 87 %<br>@ ( $U_e = 230$ V AC, $U_a = 26,8$ V DC, $I_a = 1,1$ A) |
| Efficiency                                                 | 48 V DC                                                         |
| Charging characteristics                                   | IU-characteristics DIN 41773-1                                  |
| Fusing                                                     |                                                                 |
| Internal device protection                                 | 2 A (T), 250 V                                                  |
| Fusing battery circuit (external)                          | 3 A (T), 250 V                                                  |
| Fusing output (external)                                   | 3 A (T), 250 V                                                  |
| Pre-fusing                                                 | 5 A (T), 250 V                                                  |
| In General                                                 |                                                                 |
| Protective system housing                                  | IP20                                                            |
| Overvoltage category                                       | II                                                              |
| Degree of pollution                                        | 2                                                               |
| Battery type                                               | Lead accumulator*                                               |
| dimensions (H x S x D) standard unit                       | 92,5 mm x 60 mm x 116 mm                                        |
| weight standard unit (without batteries)                   | 0,6 kg                                                          |
| Operational temperature                                    | 0 °C ... +45 °C                                                 |
| Operational temperature (UL tested)                        | +10 °C ... +40 °C                                               |
| Storage temperature                                        | 0 °C ... +50 °C                                                 |
| Relative humidity                                          | $\leq 95\%$ non-condensing                                      |
| Max. height above sea level (without power reduction)      | 2000 m                                                          |

### 11 Accessories

#### 11.1 Battery module NBBH 1201

Art. Nr NBBHQ33G1M03



**Battery type:**

Maintenance-free lead accumulators 12V / 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 standard profil rails

DIN EN 50022-35 x 15/7,5

**installation:**

via fixing straps see view drawing

### 11.2 Temperature sensor MTIAQ33G3M01 AKKUTEK 2403

#### 11.2.1 Safety reglutaion

- The operating instructions must be read before using or installing the device, and the information given must be observed!  
Non-observance may result in the loss of all warranty and guarantee claims!
  - Installation, commissioning and maintenance may only be carried out by qualified personnel
  - The unit is a built-in unit. Operation is only permitted in dry rooms (IP20)
  - The permissible ambient temperature range must be observed!
  - Electrical connections must only be made or disconnected in a de-energised state
  - The unit may only be opened by qualified personnel
- In the event of a fault, we recommend that you send the unit to the manufacturer

#### 11.2.2 Short description

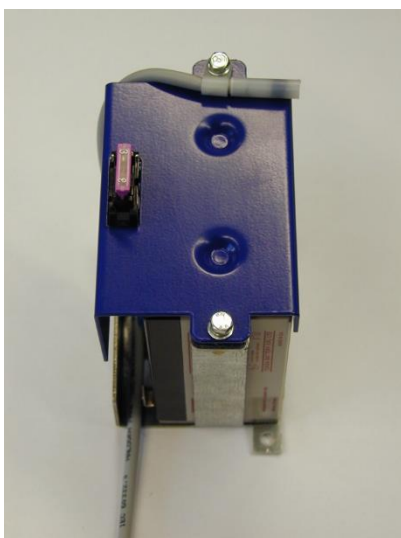
Lead-acid batteries have a temperature coefficient of approx. -3 mV per °C and cell in standby parallel operation. The final charge voltage is selected to ensure that the batteries can be charged within a temperature range of 15-45°C. In applications with frequent and strong temperature fluctuations the charging voltage should be adjusted accordingly to avoid overcharging the batteries (danger of gassing!). Similarly, especially at very low ambient temperatures ( $T_u < 15^\circ\text{C}$ ), the charge voltage should be adjusted to ensure sufficient battery charging.

By connecting the temperature sensor to the terminal strip 'IO-1' connection 1 and 2 the temperature tracking is automatically activated. The final charge voltage (and thus also the output voltage) varies within a range of 27.85 - 26.3 V DC according to the ambient temperature fluctuations of 0-45°C. Battery temperatures above 45°C are indicated by the 'Batt OK' LED going out

#### 11.2.3 Scope of delivery

Temperature sensor with 1m connection cable 0,5 mm<sup>2</sup>  
Nylon cable clamb with 4,3 mm hole

#### 11.2.4 Installation



The battery sensor should be mounted near the battery, as in the example of the battery module NBBH 2402 (see picture). This ensures accurate measurement of the ambient temperature of the battery

### 11.2.5 Connection

The temperature sensor is connected to the terminal 'IO-1' connection 1 and 2 of **AKKUTEC** 2403. The polarity of the connecting cable is arbitrary. A maximum cable length of 3m must be observed. The cable cross section should be at least 0.5mm<sup>2</sup>.

### 11.2.6 Putting into operation

The temperature sensor is automatically recognised by **AKKUTEC** after the mains is switched on and the charging voltage is adjusted according to the temperature. Additional parameterisation or actuation of a device switch is not necessary..