

Operation Instructions

AKKUTECH 2403 VdS



DC-UPS

NBPA0844G01002

VdS Recognition Number G209168¹
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¹ VdS approval for the system is valid only when installed in an approved enclosure.

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1 General Information

1.1 General safety instructions

	NOTICE These Operating Instructions are intended for the target group of qualified electricians. Read the Operating Instructions before installing or using the device. Follow all instructions. Non-compliance may result in the loss of all warranty claims! Keep the Operating Instructions for future reference.
	WARNING Installation, commissioning, maintenance and decommissioning of the device may only be carried out by qualified electricians. Improper handling of the device or of batteries may result in electric shock, electric arcs and severe burns.
	WARNING Carry out all work on the device only in de-energized state. Observe the 5 safety rules according to EN 50110! Inlet and outlet lines must be adequately dimensioned and protected. Never open the housing. Modifications to the device are prohibited. Repairs are only to be carried out by the manufacturer! Failure to do so may result in electric shock and severe burns from electric arcs.
	CAUTION Use only under controlled environmental conditions. Observe the indications under 9 <i>Technical Data</i> . Failure to do so may result in failure of the device and damage to property.
	CAUTION Wear protective goggles and protective clothing when working on batteries. Observe the accident prevention regulations and EN 62485-2. Contact with electrolyte may cause skin irritation and burns.
	CAUTION The electrolyte in the battery is highly corrosive. During normal operation, contact with the electrolyte is practically impossible. Electrolyte can only escape through improper handling, e. g. through overcharging, at the valves or at the housing, as a result of mechanical damage. If you have come into contact with electrolyte, rinse the affected area with water and consult a doctor. Applicable regulations must be observed for the removal of leaked electrolyte. Contact with electrolyte may cause skin irritation and burns.
	CAUTION The batteries have a high dead weight. Use suitable transport equipment. Ensure secure fastening. Improper handling may result in personal injury and damage to property.
	NOTICE In the event of a fault, we recommend sending the device to the manufacturer.

1.2 Short description

The **AKKUTEK 2403 VdS** is a battery-buffered power supply and operates according to the stand-by principle in parallel. In the event of a mains failure, it guarantees safe delivery of DC voltage for a certain period of time without interruption.

The **AKKUTEK 2403 VdS** is characterized by the following properties:

- Primary clocked switching power supply with I/U loading characteristic
- Micro-controller supported battery management
- RS232-interface for monitoring and parameterization
- Temperature adjustment of the charging voltage by external sensor

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1.3 Intended use

The **AKKUTEC 2403 VdS** is designed and developed for the industrial and plant engineering sector. The installation of the **AKKUTEC 2403 VdS** is to be carried out exclusively by qualified electricians.

If the **AKKUTEC 2403 VdS** is operated outside of its intended use, the protection supported by the **AKKUTEC 2403 VdS** cannot be guaranteed.

1.4 Explanation of terms

Trickle charging:

Charging a battery for compensating its self-discharge rate in order to maintain the batteries in a fully charged condition.

Charge end voltage:

Highest voltage, which characterises a fully charged battery.

2 Transport and Storage

The devices may only be transported in their original packaging. During transport and storage, the ambient conditions must be observed (see 9 *Technical Data*). The device must be protected from moisture and direct sunlight.

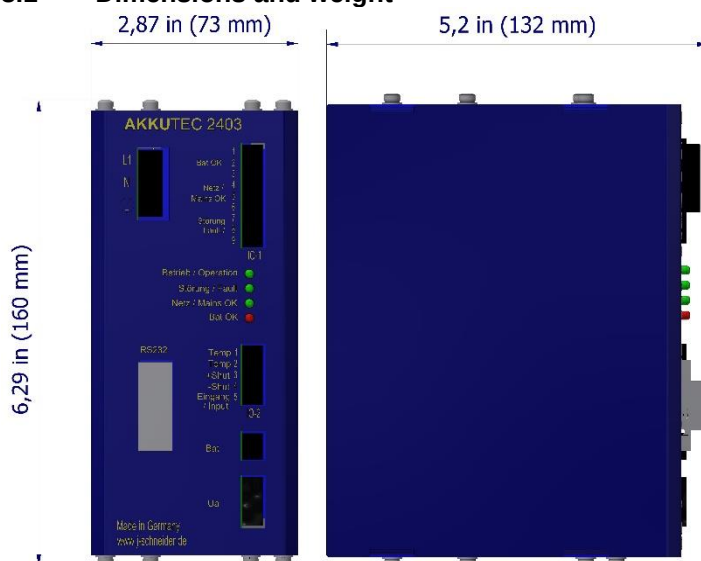


NOTICE

Batteries must be recharged at least every six months in case of longer storage. Batteries are delivered charged. Batteries are supplied in a fully charged condition.

3 Mounting and connection

3.1 Dimensions and weight



The **AKKUTEC 2403 VdS** without batteries has a weight of 2.21 lbs (1 kg).

3.2 Assembly

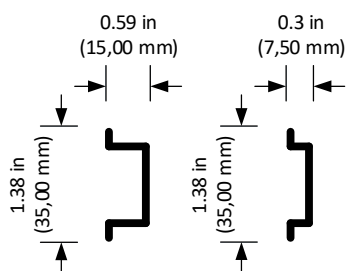
Install the **AKKUTEC 2403 VdS** in a way that the necessary air circulation is ensured. The distance between ventilation openings and adjacent components and devices must be at least 2.95 in (75 mm). There must be no heat sources below the **AKKUTEC 2403 VdS**. Consider the specified climatic conditions (see 9 *Technical Data*).

The housing has the protection class IP20. For use in a VdS-approved system, the **AKKUTEC 2403 VdS** must be mounted in an additional housing with the protection class IP30 or higher. In addition, the temperature sensor (*option*) must be installed.

When installing the **AKKUTEC 2403 VdS** as part of a fire alarm system, observe the applicable national and international standards.

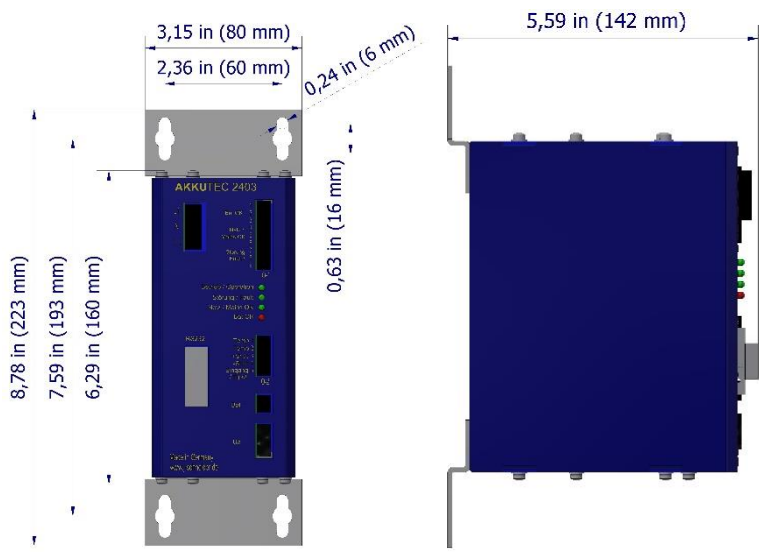
Operating Instructions

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Mount the **AKKUTEK 2403 VdS** on to DIN rail according to EN 60715 with the dimensions on the left.

For screw fastening, a mounting flange can be used (*option*). Always use all mounting points for mounting the device.



A mounting flange (*option*) is used for screw fastening. Always use all mounting points for mounting the device.



NOTICE

Cover the device during installation if drilling chips could get onto the device or into the interior of the device. Risk of short circuit.



NOTICE

The device is a built-in device and is designed for pollution degree 2. Operation is only permitted in dry rooms and in closed switch cabinets or enclosures. The control cabinets or enclosures used must meet the requirements for enclosures according to EN 62368-1. Observe the specifications for ventilation openings in the enclosure according to sections 6.4.8.3.3 and 6.4.8.3.4.

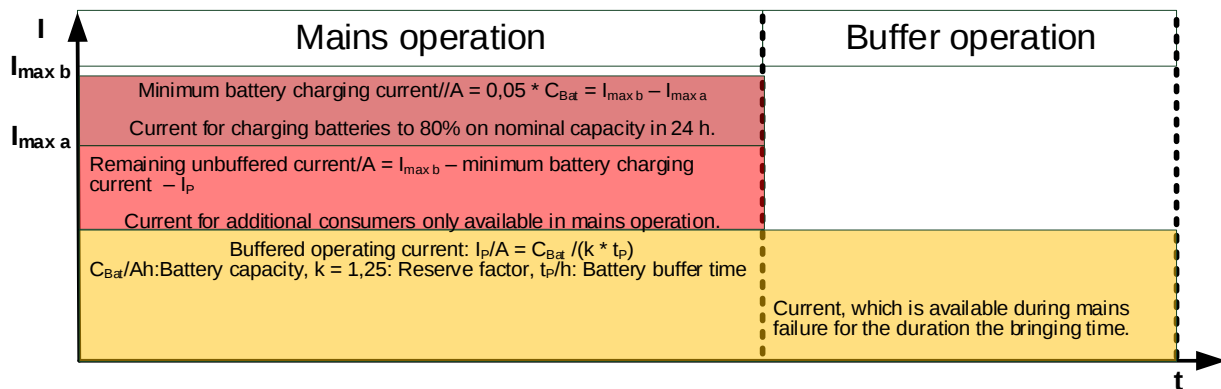
A warning notice "Warning of electrical voltage" must appear on the enclosure.
(ASR A1.3 W012) must be attached.

3.3 Battery selection

The **AKKUTEK 2403 VdS** shall be capable of charging the batteries to at least 80 % of their rated capacity in 24 hours and to 100 % of their rated capacity in 72 hours. Establish the rated capacity with the battery modules or batteries listed below. In buffer mode, they must provide the required buffer current in the bufferime.

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The remaining unbuffered current is available for any additional consumers exclusively in mains operation. In buffer mode, the additional consumers must be disconnected from the output circuit (see S2 in 3.7 *Circuit diagram*). Consider the self-current consumption in buffer mode.

Battery capacity/Ah	Maximum buffered operating current/A			Remaining unbuffered current/A			Maximum load current ($I_{max\ a}$)/A	Minimum battery charging current/A	Nominal current ($I_{max\ b}$)/A
	4h	30h	72h	4h	30h	72h			
7	1,40	0,19	0,08	1,25	2,46	2,57	2,65	0,35	3,0
12	2,40	0,32	0,13	0,00	2,08	2,27	2,40	0,60	
17	2,15	0,45	0,19	0,00	1,70	1,96	2,15	0,85	
24	1,80	0,64	0,27	0,00	1,16	1,53	1,80	1,20	
40	1,00	1,00	0,44	0,00	0,00	0,56	1,00	2,00	

The following battery modules and batteries are available for a VdS system:

Article number battery module	Series	Nominal voltage/V	Capacity/Ah	Fuse current/A	Dimensions H x W x D/in (mm)	Weight /lbs (kg)
NBBHL33G1M01	SB / SSB / SBV	24	7	5, 7.5, 15, 25	4.53 x 6.87 x 6.26 (115 x 174,5 x 159)	11.0 (5.0)
NBBHL33G1M02	SB / SSB / SBV	24	12	5, 7.5, 15, 25	4.53 x 9.47 x 6.26 (115 x 240,5 x 159)	18.3 (8.3)
NBBH0336G01001	SBL / SBV / SSBL / SBLV	24	17	Fuse bridge	6.69 x 6.10 x 7.17 (170 x 155 x 182)	26.0 (11.8)
NBBH0336G01002	SBL / SBV / SSBL / SBLV	24	24	Fuse bridge	5.39 x 15.63 x 7.87 (137 x 397 x 200)	41.4 (18.8)
NBBH0336G01003	SBL / SBV / SSBL / SBLV	24	40	Fuse bridge	6.69 x 15.63 x 7.87 (170 x 397 x 200)	60.4 (27.4)

Article number battery	Series	Nominal voltage/V	Capacity/Ah	Fuse current/A	Dimensions H x W x D/in (mm)	Weight /lbs (kg)
452011.36	SB / SSB / SBV	12	7	Fuse bridge	3.70 x 5.94 x 2.56 (94 x 151 x 65)	5.29 (2.4)
452011.22	SB / SSB / SBV	12	12	Fuse bridge	3.74 x 5.94 x 3.86 (95 x 151 x 98)	8.38 (3.8)
452011.2	SBL / SBV / SSBL / SBLV	12	17	Fuse bridge	6.57 x 7.13 x 3.03 (167 x 181 x 77)	12.57 (5.7)
452011.4	SBL / SBV / SSBL / SBLV	12	24	Fuse bridge	5.00 x 6.50 x 6.89 (127 x 165 x 175)	28.22 (12.8)
452011.8	SBL / SBV / SSBL / SBLV	12	40	Fuse bridge	6.69 x 7.76 x 6.5 (170 x 197 x 165)	28.22 (12.8)

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3.4 Connection

Before connection, check the values of the mains voltage for conformity with the values on the name plate. The type plate is located on the right side of the **AKKUTEC** 2412 VdS, viewed from the side with the customer connections. Establish the connection according to the terminal designations. Ensure correct polarity. Tighten unused connection screws.



⚠ WARNING

Carry out all work on the device only in de-energized state.

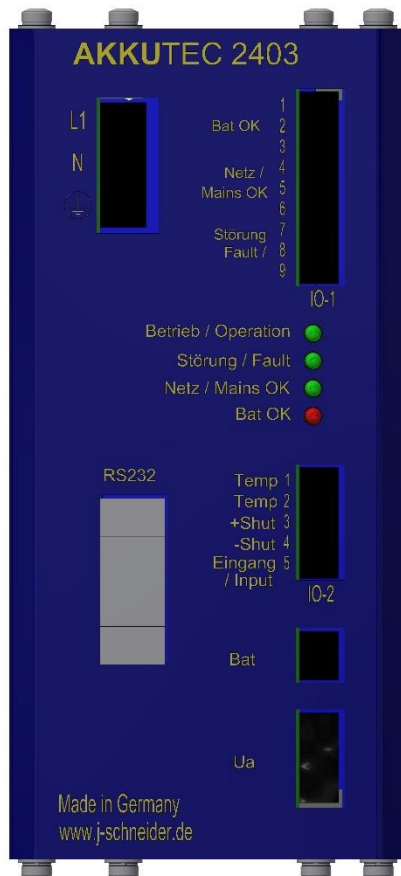
Observe the 5 safety rules according to EN 50110!

Failure to do so may result in electric shock resulting in death or severe burns from electric arcs.

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3.4.1 Device connections



Terminal	Maximum tightening torque/lbf in (Nm)	Conductor cross-section/AWG (mm²)	Connection	
L1, N, PE(⚡)	4.5 (0,5)	21 – 14 (0,5 - 2,5)	Mains voltage	
Bat OK (1 = COM, 2 = NO, 3 = NC)	3 (0,25)	28 – 16 (0,08 - 1,5)	Meldekontakt Bat OK	Maximum contact load: 30 V DC/0,5 A (potential-free relay contacts)
Netz/Mains OK (4 = COM, 5 = NO, 6 = NC)			Signal contact Netz/Mains OK	
Störung/Fault (7 = COM, 8 = NO, 9 = NC)			Signal contact general error	
RS232	9-polige D-SUB socket		Serial interface	
+Temp(1), -Temp(2)	3 (0,25)	28 – 16 (0,08 - 1,5)	Temperatursensor / Sicherungsplatine	
+Shut(3), -Shut(4)			Shut-Down	24 V DC/10 mA (massefreier Schalteingang)
Fuse Watch(5)			Sicherungsplatine	
Bat+, Bat-	3 (0,25)	21 – 16 (0,5 - 1,5)	Batteries / Sicherungsplatine	
Ua+, Ua-	3 (0,25)	21 – 16 (0,5 - 1,5)	Consumers / Sicherungsplatine	

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

The operating status of the **AKKUTEC 2403 VdS** can be forwarded to a higher-level unit via the signal contacts. The signalling contacts are coupled with the corresponding LEDs (see 4.2 LEDs).

	WARNING
	The device is prepared for protection class I (protective earthing). Be sure to connect the protective earth. In case of non-observance, accessible parts can carry voltage in the event of a fault. There is a danger of electric shock resulting in death.
	NOTICE
	In mains operation, in the event of an overload the output current consists of the maximum charging current and the current of the batteries. Protect the output circuit externally in order to avoid overload (see 9 Technical Data).

3.4.2 Interface RS232

A serial interface is available for monitoring the operating states and for parametrizing the **AKKUTEC 2403 VdS**. You can use the software **paraTEC VdS (option)**, which you can also use for communication with the **AKKUTEC 2403 VdS** via the gateway (option).

Interface standard	Asynchronous EIA/RS232 standard interface with D-SUB-9 pin socket
Hardware protocol	9600 baud, 8 data bits, no parity bit, 1 stop bit
Cable length	International standard EIA/RS232
Signal potential	Standard EIA/RS232, no potential separation, signal refers to 24 V DC
Pin assignment	TxD = Pin2, RxD = Pin3, Gnd = Pin5

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3.4.3 Connection of batteries

The **AKKUTEC 2403 VdS** requires two 12 V batteries, which are available as modules or individually. Connect the individual batteries in series. For line protection reasons, install the fuse as close as possible to the battery pack. For battery modules or batteries with a capacity of 17 Ah or above, the fuse bridge (*option*) must be installed with the supplied blade connections.

The **AKKUTEC 2403 VdS** meets the requirement of EN 62485-2, when using VRLA batteries and assembly according to that operating instructions.

	⚠ WARNING Protect or insulate the terminals when connecting the batteries. If bridging is used, there is a risk of burns due to electric arcs or glowing parts.
	⚠ WARNING The battery voltage must match the nominal voltage of the charging rectifiers. Never reverse the polarity of the batteries. Never short-circuit batteries! Failure to do so may result in severe burns due to electric arcs or glowing parts.
	⚠ CAUTION 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 batteries. Never short circuit batteries! Failure to do so may result in burns from electric arcs or glowing parts.
	⚠ CAUTION During the charging of batteries, hydrogen is produced, which can form a dangerous oxyhydrogen gas with atmospheric oxygen. Ensure sufficient air circulation. Non-observance may result in explosions.
	NOTICE Only use VdS-approved batteries. Never use different battery types or batteries of different manufacturers or used and new batteries in the same system.
	NOTICE Ensure that the batteries are properly fastened. Never install unmounted batteries in the system, as there is a risk of short circuits!

3.5 Temperature sensor (option)



Conductor cross-section/AWG (mm²)	Connection
21 (0.5)	AKKUTEC IO-2(1, 2)

The temperature sensor will be automatically activated by connecting it to the **AKKUTEC 2403 VdS**. An additional actuation or parametrisation is not required. The polarity of the connection line is arbitrary. Place the sensor element near and above the battery.

	NOTICE Connect in a VdS approved system the temperature sensor to the device!
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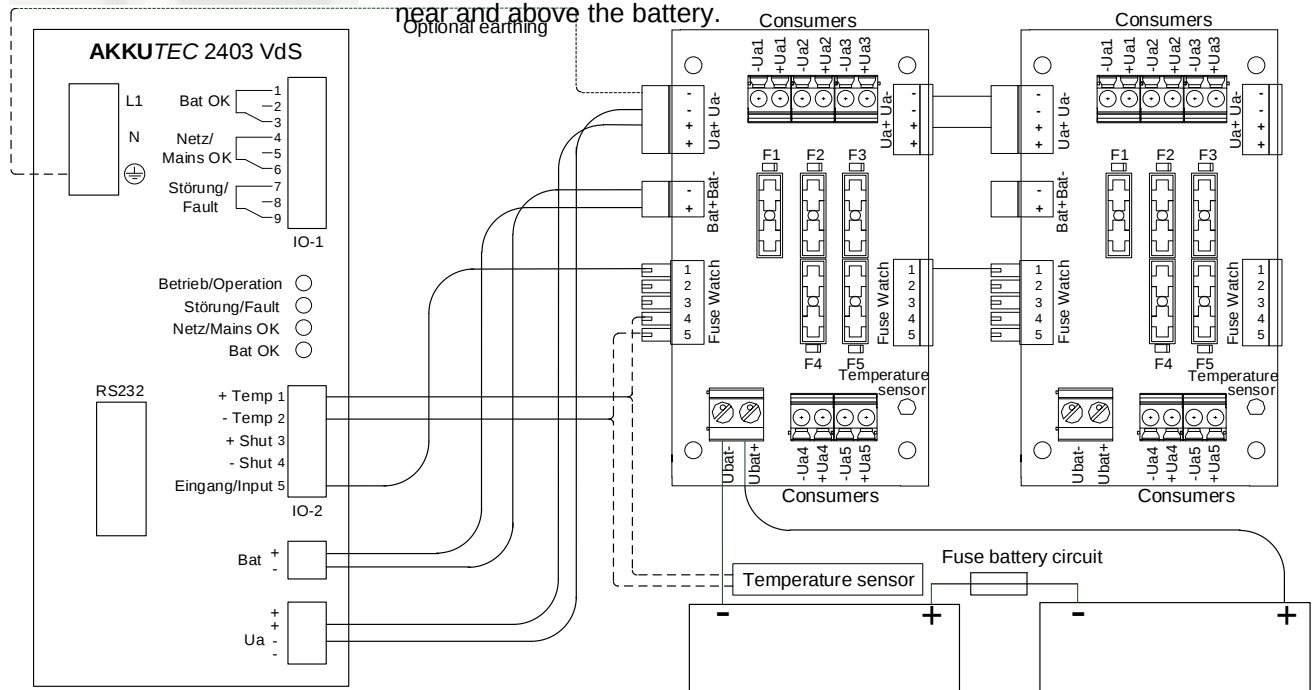
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Elektrotechnik

3.6 Fuse board FB 2405-5 (option)



Clamp	Maximum tightening torque/lbf in (Nm)	Conductor cross-section/AWG (mm²)	Connection
Fuse Watch(1)	3 (0.25)	28 - 16 (0.08 – 1.5)	AKKUTEC IO-2(5)
Fuse Watch(4, 5)	3 (0.25)	28 - 16 (0.08 – 1.5)	- / AKKUTEC IO-2(1, 2)
Bat+, Bat-	3 (0.25)	28 - 16 (0.08 – 1.5)	AKKUTEC Bat+, Bat-
Ua+, Ua-	3 (0.25)	28 - 16 (0.08 – 1.5)	AKKUTEC Ua+, Ua-
Ubat+, Ubat-	4.43 (0.5)	26 - 10 (1.5 - 4)	Batteries
+Ua1...5, -Ua1...5	4.43 (0.5)	26 - 12 (0.5 – 2.5)	Consumers

The fuse board provides five outputs for the consumers. Every output is fused by a 1 A fuse. Fuse boards can be plugged to each other. Mount the fuse board on to DIN-rail according to EN 60715 (see 3.1 *Dimensions and weight*). A temperature sensor is located on the fuse board, which can you use as an alternative to the temperature sensor MTIAQ33G3M0* (*option*). In this case install the fuse board in such a way, that the temperature sensor is placed near and above the battery.



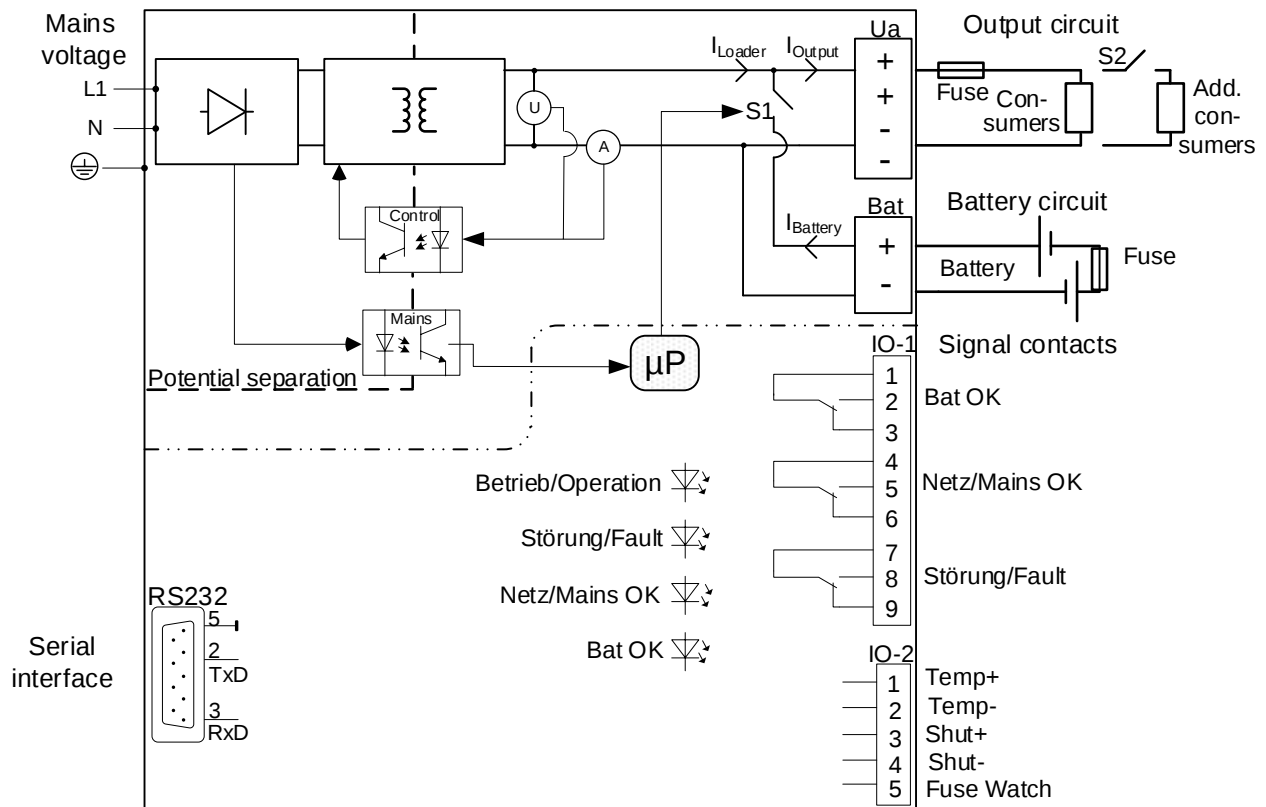
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3.7 Circuit diagram



3.8 Redundancy operation

You can use various **AKKUTECs** 2403 VdS in redundant circuits in order to maintain the supply in the event of mains failure. The outputs (**Ua+**) of the **AKKUTECs** 2403 VdS have to be decoupled. You can use the decoupling module (*option*).

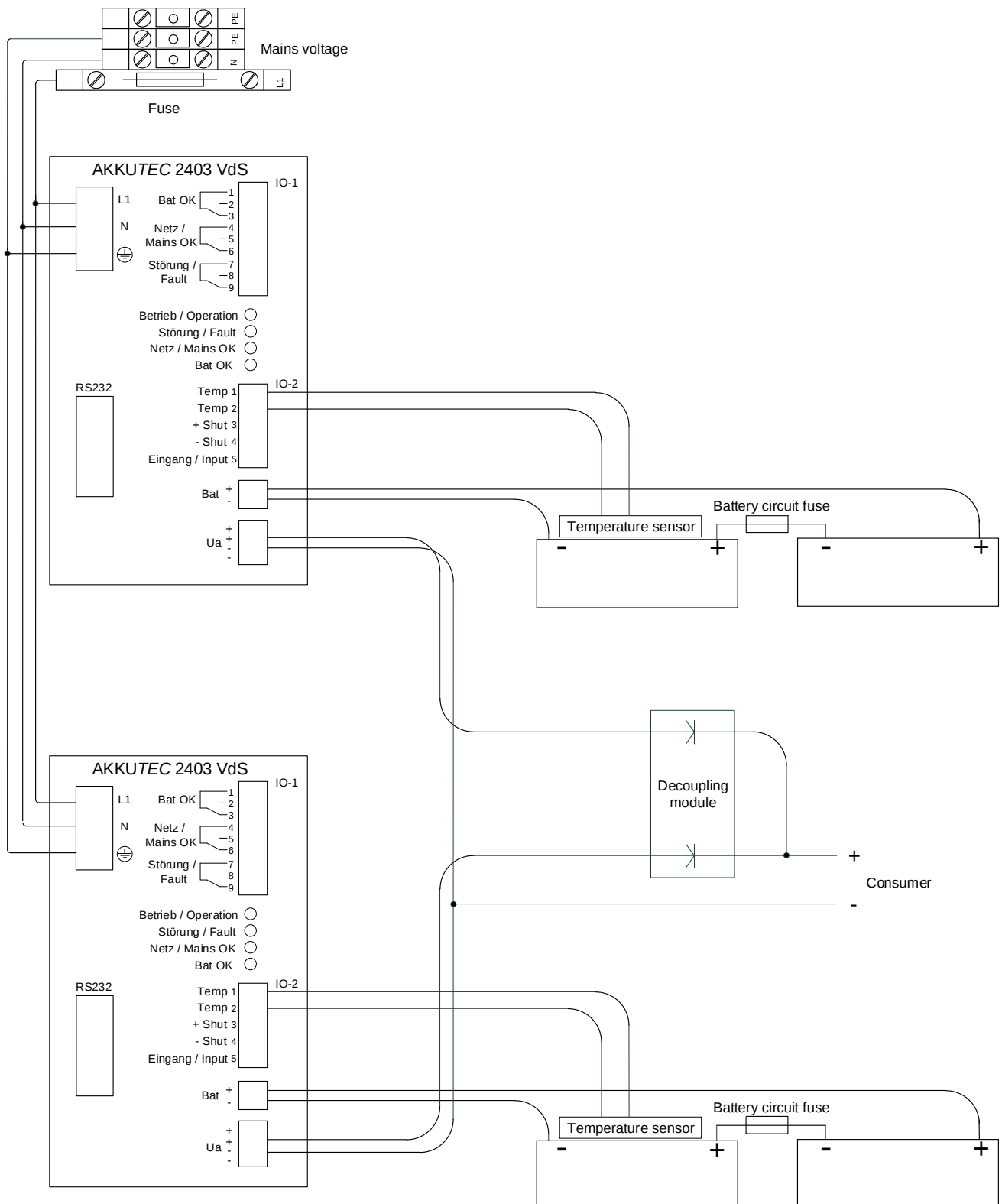
The following switching example shows the decoupling module with two redundant connected **AKKUTECs** 2403 VdS. The fuse bridge is not depicted in this switching example.

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NOTICE

We will gladly advise you on how to set up a system for redundancy operation.



NOTICE

The decoupling module is not approved by VdS.

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4 Operation

4.1 Commissioning

Switch on the AKKUTECHs 2403 VdS by switching on the mains voltage.

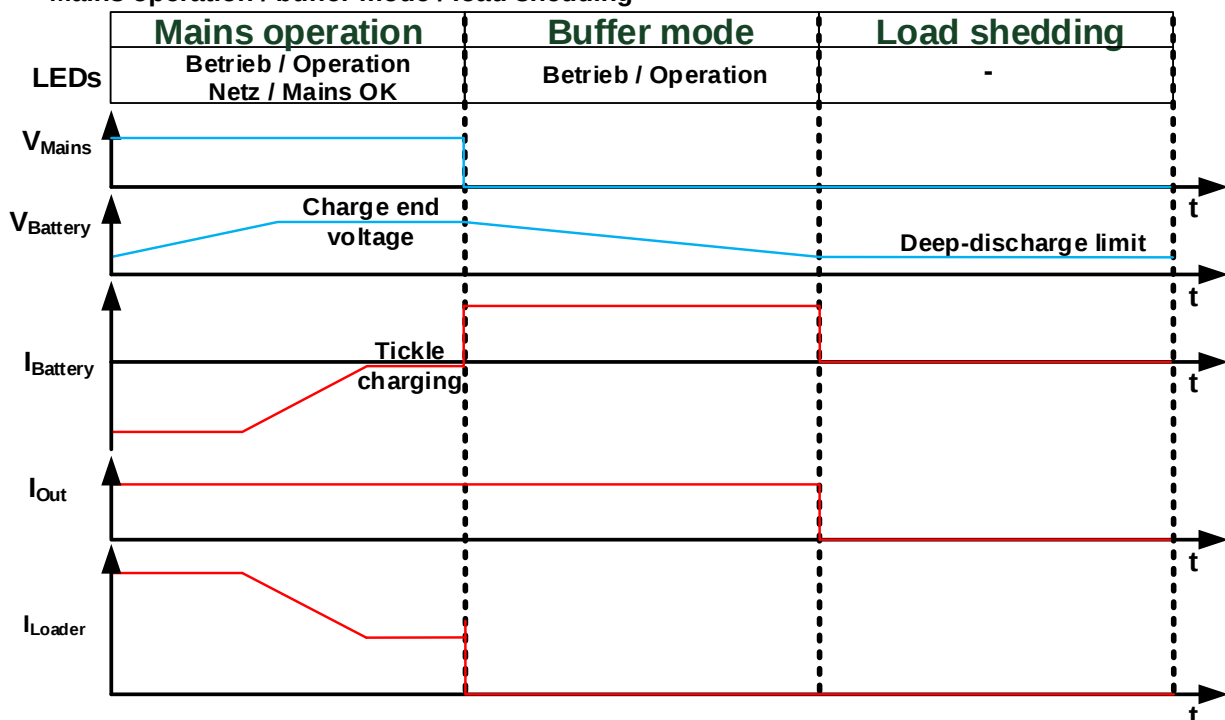
Shortly after mains connection, the output voltage is released and the connected consumers are supplied. The batteries are charged, too. Charging time becomes longer if a large load current is required during charging. The first battery circuit test takes place after 60 s.

4.2 LEDs

There are four LEDs on the housing for status indication:

Status indication	LED	Meaning
Betrieb / Operation	green	• Output voltage is applied
	off	• Output voltage is not applied
Störung / Fault	yellow	• Buffer mode • Interrupted battery circuit • Battery reversed • Battery aged • Fuse failure on the fuse board
	off	• No interference
Netz / Mains OK	green	• Input voltage ok • Internal temperature ok
	off	• Input voltage too low • Internal maximum temperature exceeded
Bat OK	green	• Battery voltage ok
	off	• Battery voltage < 21.6 V • Battery circuit interrupted • Batteries with polarity reversed • Internal battery resistance too high

4.3 Mains operation / buffer mode / load shedding



During load shedding the battery circuit is disconnected from output circuit by S1 (see 3.7 Circuit diagram).

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4.4 Battery circuit monitoring

In order to ensure battery operation of the **AKKUTEK 2403 VdS**, the battery circuit is tested cyclically at intervals of 60 s. This test can detect an interruption or high resistance of the battery circuit. A defective or interrupted battery circuit is indicated by the **Bat OK** LED going out and the **Fault** LED lighting up in mains operation.

4.5 Internal resistance measurement

An internal resistance measurement is performed every 10 min in mains operation. Severely aged batteries are detected by this. When the limit value is exceeded, the **Bat OK** LED goes out and the **Fault** LED lights up. Buffer time is limited when the limit value is reached.

The internal resistance is factory set to 175 mΩ for a battery capacity from 7 Ah to 40 Ah. With the software **paraTEC VdS (option)** you can parameterize the value of the internal resistance.



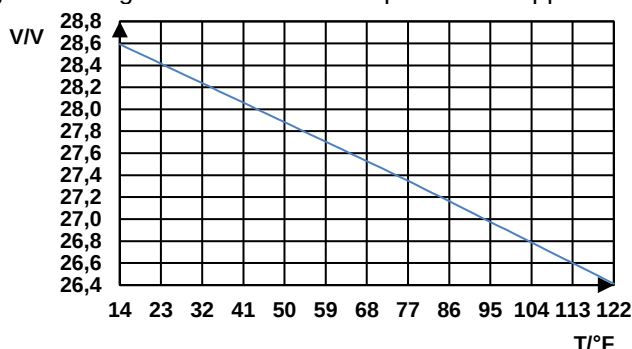
NOTICE

In order to determine the buffer ability of the batteries in the system, check the batteries every 3 to 6 month (5.1 Checking batteries).

4.6 Temperature sensor (option)

Without a temperature sensor, the charging end voltage of the **AKKUTEK 2403 VdS** is selected in such a way that charging of the batteries is guaranteed in a temperature range from 59 °F (+15 °C) to 104 °F (+40 °C).

In applications with frequent and strong temperature fluctuations as well as with ambient temperatures below 59 °F (+15 °C), the charging end voltage should be adjusted in order to ensure optimum battery charging. The dependence of the charging end voltage on the ambient temperature is approximately linear, as shown below.



The software **paraTEC VdS (option)** indicates a battery temperature of over 113 °F (+45 °C) at the battery.



NOTICE

The ideal operating temperature range of the batteries is 68 °F (+20 °C) ±9 °F (±5 K). Lower temperatures reduce the available capacity. Higher temperatures above 68 °F (+20 °C) shorten the service life by 50 % per 18 °F (10 K).

4.7 Fuse board FB 2405-05 (option)

If a fuse blows, the LED of the corresponding fuse on the fuse board goes out. The **Fault** LED indicates the failure of one or more fuses. The software **paraTEC VdS (option)** indicates a blown fuse.

4.8 Shutdown

In order not to discharge the batteries unnecessarily to the deep discharge limit, it is possible to interrupt the buffer operation prematurely. You can do this by applying a 24 V DC control voltage to the terminal strip **IO-2** connection **3 (+Shut)** and **4 (-Shut)**.

5 Maintenance



NOTICE

Clean the housing depending on its degree of contamination at least once a year, for example with a vacuum cleaner or a cleaning cloth. In particular, the ventilation openings must be free of dirt and other obstacles. Dirt must not get into the housing!

5.1 Checking batteries

By disconnecting the mains voltage, the **AKKUTEC 2403 VdS** will go to buffer mode. When the deep discharge limit is reached, the **AKKUTEC 2403 VdS** switches off automatically. The batteries must keep the required buffering time under nominal conditions.

5.2 Replacing the batteries

Replace the batteries at least every four years from the date of manufacture. Proceed as follows:

Battery removal:

1. Switch off the mains voltage
2. Interrupt the battery circuit by a shutdown or by removing the battery circuit fuse in order to avoid buffer operation.
3. The **Mains OK** LED and the **Fault** LED must go out.
4. Remove the electrical connections from the batteries.
5. Loosen the battery holder; hold the batteries in place during this
6. Remove the batteries.

Battery installation:

1. Installation is the same as described in *Battery removal*, but in reverse order.
2. Make sure the polarity is correct. In case of wrong polarity the batteries are not loaded, the **Mains OK** LED and the **Fault** LED light up.



⚠ WARNING

Carry out all work on the device only in de-energized state.
Observe the 5 safety rules according to EN 50110!
Failure to do so may result in electric shock resulting in death and burns from electric arcs.



⚠ WARNING

Protect or insulate the terminals when connecting the batteries. If bridging is used, there is a risk of severe burns due to electric arcs or glowing parts.



⚠ CAUTION

When connecting the batteries, make sure that the rated voltage and the polarity are correct.
Never reverse the polarity of batteries. Never short-circuit batteries!
Failure to do so may result in severe burns due to electric arcs or glowing parts..



NOTICE

Ensure a secure fastening of the batteries after reassembly.



NOTICE

Only use VdS-approved batteries. Never use different battery types or batteries of different manufacturers or used and new batteries in the same system.

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6 Decommissioning

Carry out the decommissioning procedure up to item 3 as described under *Battery removal*.



WARNING

It is forbidden to disconnect or establish electrical connections during operation!
Failure to do so may result in electric shock resulting in death or severe burns from electric arcs.

7 Disposal



NOTICE

The symbol indicates that the device must not be disposed of with normal household waste. Dispose of the device professionally as electrical scrap in accordance with the applicable national and international regulations. This ensures that materials are separated and recycled according to their properties; by this you make an important contribution to environmental protection.



NOTICE

Dispose the used batteries in an environmentally friendly manner!

8 Standards and regulations

Complete device	2014/35/EU (Low voltage directive) EN 50178 EN 54-4 + A1 + A2 EN 12101-10 + B1 VdS 2541 EV Type 1 Environmental class III VdS 2344 UL 508 / C22.2 No. 107.1
EMC	2014/30/EU (EMC directive) EN 62040-2 limit class C1 EN 50130-4 + A1 + A2 EN 55011+ A1 limit class B group 1 EN 61000-6-2 AC EN 61000-6-4 + A1
Optocoupler ensuring insulation between primary /secondary side	EN 60747-5-1, fulfilled SELV / PELV
Optocoupler ensuring insulation between primary /secondary side	EN 61558-2-16, fulfilled SELV / PELV

- **EN 55011 Limit class B:** "Class B devices are devices which are suitable for use in residential areas and in areas directly connected to a low-voltage supply network which supplies (also) residential buildings."
(EN 55011, page 16)
- **EN 55011 group 1:** "Group 1 includes all equipment... in which HF energy is not intentionally... generated in the radio frequency range 9 kHz to 400 GHz."
(EN 55011, page 16)

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9 Technical Data

Input	
Input voltage	115 V AC...230 V AC $\pm 15\%$ (98 V AC...265 V AC)
VdS tested	230 V AC $+10\%$ / -15% (196 V AC...253 V AC)
Frequency	47 Hz...63 Hz
Maximum input current	1,1 A @ 110 V AC / 0,5 A @ 230 V AC
Inrush current	≤ 35 A/2 ms
Nominal input power	96 W @ (Vin = 230 V AC, Vout = 27,35 V DC, Iout = 3 A, $\vartheta = 77^\circ\text{F}$ (+25 $^\circ\text{C}$))
Input power standby mode	5 W @ (Vin = 230 V AC, Vout = 27,35 V DC, $\vartheta = 77^\circ\text{F}$ (+25 $^\circ\text{C}$))
Output	
Nominal output voltage	24 V DC
Output voltage (with temperature tracking) VdS	20,9 V DC...28,6 V DC $\pm 0,4\%$
Output voltage (without temperature tracking) VdS	20,9 V DC...26,4 V DC $\pm 0,4\%$
Fully charged voltage (with temperature tracking)	26,4 V DC...28,6 V DC $\pm 0,4\%$
Fully charged voltage (without temperature tracking)	26,4 V DC $\pm 0,4\%$
Load shedding (Measure value with fuse board) VdS*	20,9 V DC
Overvoltage protection	30 V DC
Residual ripple	< 100 mVeff
Nominal output current	3 A
Self-current consumption (in buffer mode)	100 mA
Maximum power loss ,worst-case"	14 W
Efficiency	85,9 % @ (Vin = 230 V AC, Vout = 27,35 V DC, Iout = 3 A, $\vartheta = 77^\circ\text{F}$ (+25 $^\circ\text{C}$))
Charge characteristic	IU characteristic curve DIN 41773
Fuse	
Internal fuse	2 A (T), 250 V
Fuse battery circuit (external)	5 A (T, UL-248)
Fuse output circuit (external)	5 A (T, UL-248)
Overall	
Protection class of the housing	IP20
Overvoltage category	II
Pollution degree	2
Battery type	VRLA lead battery
Dimensions (H x W x D)	6.29 in x 2.87 in x 5.2 in (160 mm x 73 mm x 132 mm)
Weight (without batteries)	2.21 lbs (1 kg)
Operating temperature / storage temperature	14 $^\circ\text{F}$ (-10 $^\circ\text{C}$)...122 $^\circ\text{F}$ (+50 $^\circ\text{C}$)
Operating temperature VdS tested	23 $^\circ\text{F}$ (-5 $^\circ\text{C}$)...104 $^\circ\text{F}$ (+40 $^\circ\text{C}$)
Operating temperature UL tested	50 $^\circ\text{F}$ (+10 $^\circ\text{C}$)...104 $^\circ\text{F}$ (+40 $^\circ\text{C}$)
Relative humidity	$\leq 95\%$ no condensing
Maximum altitude (without power reduction)	6561.1 ft (2000 m)

*Measured at 100% load

10 Options

10.1 Decoupling module

The decoupling module decouples the outputs of two **AKKUTECs** 2403 VdS. It can be mounted on a DIN rail according to EN 60715. The decoupling module is available in 2 different variants:

- Limiting current @ 113 °F (+45 °C): 25 A / cut-off voltage: 100 V (article number 59610.1)
- Limiting current @ 113 °F (+45 °C): 50 A / cut-off voltage: 45 V (article number 59610.2).

10.2 Gateway (article number PMDV1710G01001)

The gateway connects by a network the **AKKUTEC** 2403 VdS to a PC. The software **paraTEC** VdS allows to perform monitoring and parametrization tasks on the **AKKUTEC** 2403 VdS.

10.3 Mounting flange (Article number NBP40812G01003)

Connecting element of the **AKKUTEC** 2403 VdS for screw mounting.

10.4 Temperature sensor

The temperature sensor ensures optimised battery charging in the event of strong temperature fluctuations and ambient temperatures below 59 °F (+15 °C).

The temperature sensor is available in 3 different lengths (observe the positioning on the battery):

- Temperature sensor 3.2 ft (1.00 m) long cable (Article number MTIAQ33G3M01)
- Temperature sensor 8.2 ft (2.50 m) long cable (Article number MTIAQ33G3M04)
- Temperature sensor 10.6 ft (3.25 m) long cable (Article number MTIAQ33G3M05).

A cable clamp with bore 0.169 in (4.3 mm) is included.

10.5 Fuse board FB 2405-05 (Article number NBP20849G02003)

Each fuse output is monitored separately. If the fuse blows, the corresponding LED on the fuse board goes out. The fuse failure is transmitted to the **AKKUTEC** 2403 VdS.

10.6 Software paraTEC VdS (Article number PSXX-1044G01001)

The software **paraTEC** VdS allows to perform PC-supported monitoring and parametrization tasks. For example, the threshold value for the internal resistance of the battery circuit can be adjusted.

10.7 Fuse bridge (Article number NBP40848G01003)

The fuse bridge is a line bridge with fuse holder in order to connect two batteries in series. Use a 5 A fuse. Connection tabs are included.