User Manual
AKKU*TEC* 2405 / 1208* / 4803* USB

DC-UPS

*NBPA0616G01****

Device designation	Notes	Art.No.	Nominal input voltage	Nominal output voltage
AKKU*TEC* 2405-0 USB	Standard device, stand-alone device	NBPA0616G01101	115-230V AC	24V DC
AKKU*TEC* 1208-0 USB	Standard device, stand-alone device	NBPA0616G01006	115-230V AC	12V DC
AKKU*TEC* 4803-0 USB	Standard device, stand-alone device	NBPA0616G01005	115-230V AC	48V DC

*= **AKKU***TEC* 1208 and 4803 without UL

1 General

The accumulator buffered DC supply guarantees a safe backup of the DC supply in case of a mains failure. Every other use is strictly excluded.
The operating instructions must be read prior to use or installation; all instructions have to be considered! Commissioning and maintenance may only be performed by qualified specialist personnel.
All warranty and guarantee claims could be lost in case of non-observance or unauthorised modifications!

1.1 General safety notes

	**NOTE** 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!
	**DANGER** 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.
	**DANGER** All work on the unit may only be performed in de-energized state! The five safety rules must be observed. Input and output lines must be sufficiently dimensioned and fused! Never open the housing. Repair may only be done by the manufacturer! Non-observance can lead to fatal electric shocks.
	**CAUTION** For use in a controlled environment refer to chapter 12 for environmental conditions.
	**NOTE** In case of malfunction we recommend to send the unit to the manufacturer

The unit has been developed for protection class I and has the degree of protection IP20. Operation is only admissible in dry rooms. The operation is only allowed in closed housings. This device is designed for pollution degree 2. The applicable VDE regulations, in particular VDE 0100 and EN 60204, must be observed!
The admissible ambient temperature range must be observed!
The DC output circuit must be fused externally in order to avoid overload! (See section 3.2)
The two energy sources (mains and lead accumulator) must be separated in order to de-energize the unit on the output side!
Only the lead accumulator types specified for the unit must be used! The change of lead accumulators must only be performed when the unit is de-energized!. If external buffer accumulators are used, accumulator safeguarding must be performed by the user! For safety reasons, the safeguarding element (overload and short circuit protection) must be arranged in close proximity to the accumulator set! If lead accumulators are used, sufficient air flow must be provided according to VDE 0510-485-2.
Never interconnect new and used lead accumulators, or lead accumulators of different types or from different manufacturers.
Used lead accumulators must be disposed carefully.

1.2 Short description

The battery backed 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 accumulator and the discharge current.

The power supply has the following features:

- battery charger system with I/U charging characteristics
- micro controller-based battery management
- Temperature compensation for charging voltage by means of external sensor module (optional module).
- USB interface with appropriate driver unit and *TEC***Control** Software of J. Schneider, message contacts may be controlled and a shut down/re-start can be effected.

1.3 Intended Use

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

If the **C-***TEC* is operated outside of its intended use, the protection supported by the **C-***TEC* cannot be guaranteed.

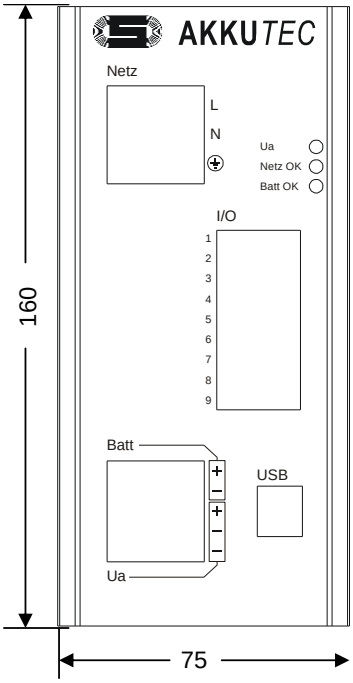
2 Transportation and storage

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 12). The units must be protected against humidity and direct sunlight. If lead accumulators are included, they must be recharged at least each half year in case of longer storage.

3 Installation and Connection

3.1 Installation

The DC power supply is to be installed in the way that the necessary cooling is provided. A minimum separation of ≥40mm to neighbouring equipment or assemblies in the area of the ventilation openings must be observed. The installation is always to be made in the way that sufficient air circulation through the unit is ensured.
The temperature of the cooling air at the bottom of the unit may not exceed the value provided in the technical data. The maximum mounting heights without load reduction is about 1000 m above N.N. During installation, the unit must be covered in such a way that no swarf from drilling can fall on or in the unit. (**Risk of short circuit!**)

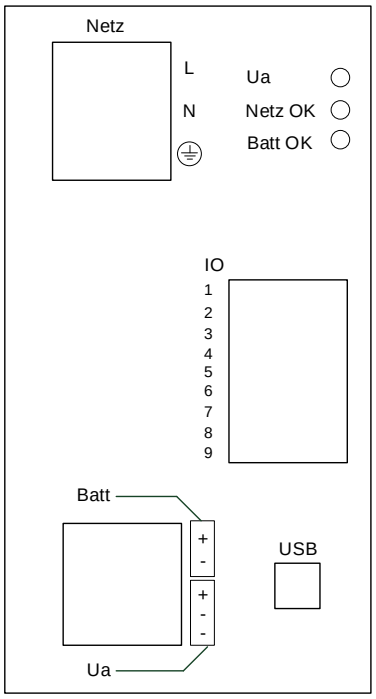


Tiefe: 150mm
Depth: 150mm

	NOTE If swarf could fall onto or into the unit, it must be covered during installation. (Danger of **short-circuit!)**
	NOTE The unit is a built-in unit. Operation is only permissible in closed cabinets or housings. The unit is designed for pollution degree 2. 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" (ASR A1.3 W012) must be affixed to the enclosure

3.2 Connection

Prior to connection, the values for the mains voltage and frequency as well as the values of the battery must be checked against the values on the rating plate. Connection in accordance with the labels on the connecting terminals. (See principle circuit diagram and terminal assignments).



Terminals			Connection	
Designation	**Max. tightening torquet/Nm**	**Min. cable cross section/mm²**		
L, N, PE(⏚)	Spring clamb terminal	0,5	Input voltage	
Batt+, Batt-	Spring clamb terminal	1	Batteries	
Ua+, Ua-	Spring clamb terminal	1	Loads	
IO-1 (1, 2)	Spring clamb terminal	0,2	Temperature sensor	
IO-1 (3, 4)			Shut-Down	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)	Potential-free relay contact: 2405 / 1208 30 V DC/0,5 A 4803 48 V DC/0,25 A
IO-1 (8 = COM, 9 = NO)			Message contact Batt OK	
USB	USB-B-socket		USB-interface	

In the case of overload, the DC output current comprises the maximum current charging rectifier current as well as the battery current. To prevent overload of the DC output circuit, the circuit is to be protected externally ! (Value see Section 12)

Only use lead batteries. Never use other battery technologies.

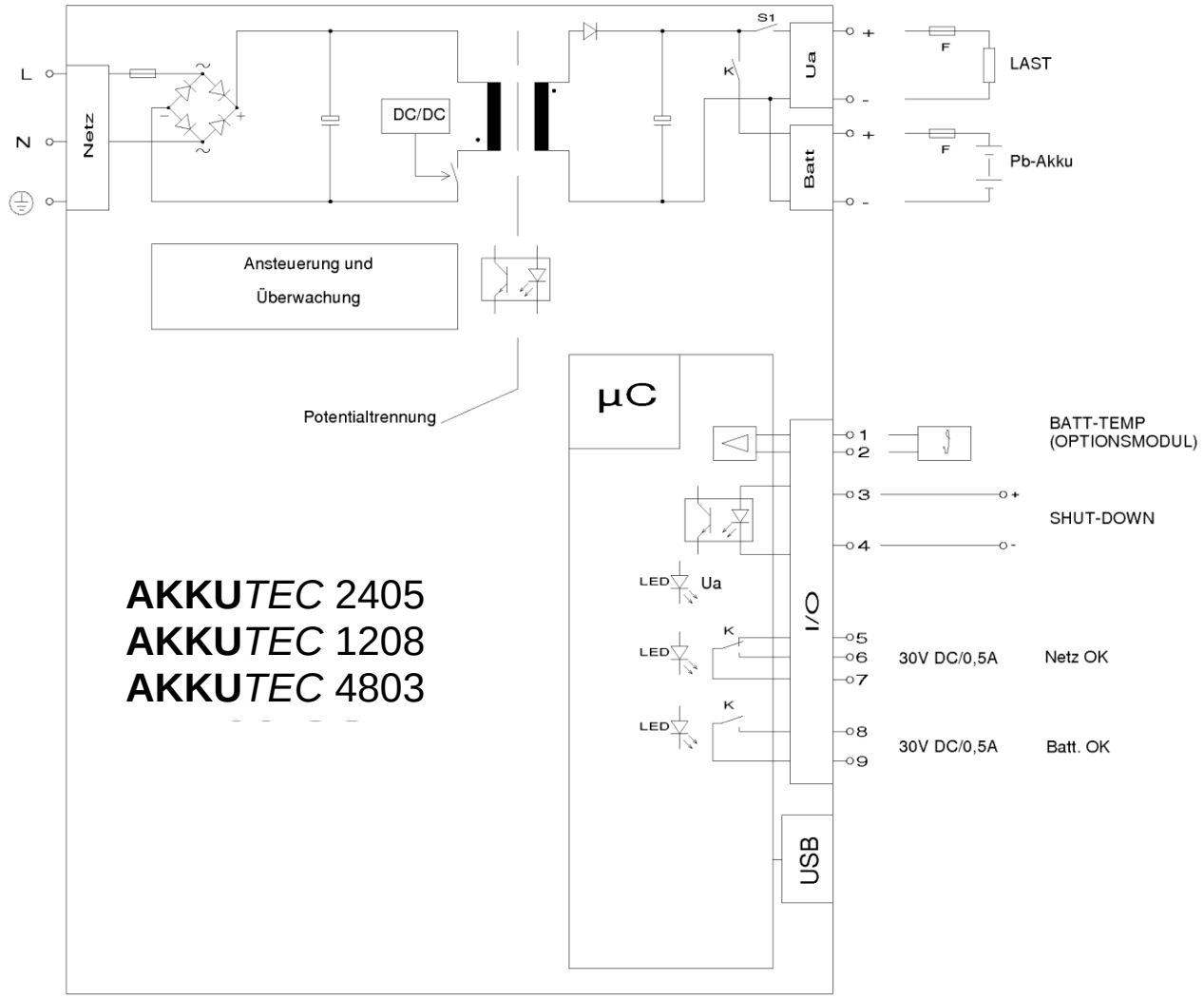
When connecting the batteries, make sure that the nominal voltage and polarity match. Never reverse the polarity of batteries. Never short circuit batteries!

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

If the external power supply is installed as a part of a fire alarm system, the following regulations must be observed in their currently valid version:

DIN 14675	“Fire detection and fire alarm systems – Design and operation”
DIN VDE-0833, part 1 + 2	“Alarm systems for fire, intrusion and hold up“
DIN VDE-0800	“Construction and operation of telecommunication facilities including information processing facilities”
DIN VDE-0165	“Construction of electrical systems in areas with risk of explosion”
VDE 0100	“Installation of power circuits with nominal voltages up to 1000 V”
EN 60204	“Safety of machinery - Electrical equipment of machines“

4 Circuit Diagram



5 Putting into operation

The unit is switched on by the switch on of the mains voltage.

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

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

5.1 LED's and Messages

Ua	LED green, voltage is present at the output Ua		
mains OK [1]	LED green, illuminates at: • mains operation UE>U_{Emin}	Potential- free relay contact, change-over, max. contact load 2405/1208: 30V DC/ 0,5A 4803: 48V DC/ 0,25A	message with virtual Com-Port to USB: DCD enabled
Batt OK [2]	LED green , goes out at: • battery circuit interruption • battery voltage 2405: < 21.6 V 1208: < 10.8 V 4803: < 43.2 V (battery operation) • battery temperature > 45 °C LED green, is blinking at: • battery low • battery damaged	Potential-free relay contact, nomally open, max. contact load 3 2405/1208: 30V DC/ 0,5A 4803: 48V DC/ 0,25A	message with virtual Com-Port to USB: CTS enabled

[1] The message contact is coupled with a LED display. If the LED illuminates, the corresponding relay is enabled

[2] If the LED illuminates, the relay is active, the contact is closed. If the LED is blinking or not illuminated, the relay contact is open.

5.2 Message inputs

Shut-Down	Abort of the UPS operation respectively switch off at mains operation	Gate input referring to earth, switch level: 24V DC (6-45 V DC)	Shutdown via virtual Com-Port to USB: set RTS

5.3 USB-connection

This standard-USB-connection has potential separation from the mains and the DC-output. It can be connected to a PC with a normal USB cable. If a suitable driver is installed on the PC, the typical windows USB-plug-and-play software starts, after the connection. After the installation the **AKKU***TEC* can be adressed with the means of a virtual COM_Port (Com1 – Com255). The Com-Port can be chosen in the driver adjustments.
With the Schneider-Software *TEC***Control** it is possible to:

- work up mains interruptions, for example start an external program (delayed).
- work up battery messages, for example shut-down the PC (delayed)
- It is also possible to analyse the RS232-signals CTS (Batt OK) and DCD (mains OK) by oneself and then for example to send back a shut-down signal with RTS to the **AKKU***TEC*

6 Operation

Approx. 2s after the switch on of the mains, the output voltage is enabled and the loads connected are supplied with power. The back up battery is also charged. This operating mode is indicated by the illumination of the green LED 'Netz ok' (mains operation).
When the output voltage increases the LED Ua, which is coupled to the output, illuminates. This LED illuminates as long as voltage is present at the output, as well when the voltage is provided by the battery or another external supply.
If the mains voltage is switched off or if the voltage drops under the minimum input voltage the **AKKU***TEC* switches over to battery operation. The green LED 'Netz ok' (mains operation) goes out.
The illumination of this LED always results in the energisation of the corresponding signal relay 'Netz OK' (mains operation). (See circuit diagram, Section 4)

7 Battery

7.1 Battery circuit monitoring

After switch-on of the unit, at first the LED 'Batt OK' illuminates. The corresponding message relay is enabled, the contact is closed. To ensure the back-up capability, the battery circuit is tested cyclically each 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 impedance of the battery circuit.

A defective battery circuit is indicated by the expiring of the green LED 'Batt OK". The corresponding message relay is inactive, the contact is opened. Possible causes: battery not connected, current circuit interrupted, battery defective, external fusing at the battery circuit defective

7.2 Battery test

During mains operation, a cyclic battery test loads the battery whilest 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 blinking of the green LED 'Batt OK' . Approximately 1 hour after mains switch-on the first battery test is made, each other after 24 hours.

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

To evaluate the capacity of the batteries we recommend additionally to check the batteries with the nominal load current at least one time each year. Therefore battery operation is enforced by mains switch off and the back-up time is measured until automatic switch off (deep discharge limitation). The actual battery capacity can be evaluated from the back-up time and the nominal load current. If the capacity of the batteries is not sufficient for the necessary back-up time, the batteries must be exchanged.

7.3 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 +12V/+24V DC control voltage at terminal Shut-Down 3 (+) and 4 (-) at the terminal strip 'IO'. Additionally a shut-down signal can be given over the serial interface via USB (RTS signal of the virtual RS232, for example with the J. Schneider *TEC***CONTROL** Windows Software).

7.4 Temperature tracking (optional module)

Lead batteries have a temperature coefficient of approx. -3mV per °C and cell. Without temperature tracking, final charging voltage is selected such that battery charging is provided over a temperature range of 15-45°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 (Tu < 15°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 0-45°C, the final charging voltage (and thus also the output voltage) varies over a range of 27.85 - 26.3 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!

8 Putting 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 7.3) or by removing the battery fuse. The LEDs 'Netz OK' and 'Batt OK' must expire (see Section 7.3).

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

9 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 7.2 and must eventually be exchanged.

10 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.

NOTE
Used lead accumulators must be disposed of properly!

11 Norms and regulations

power- HF- transmitter to ensure a safe separation primary / secondary	EN 61558 2-17 (VDE 0570 2-17)
opto coupler to ensure a safe separation primary / secondary	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 EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6 EN61000-4-11
total unit	EN 50178 / EN 62368-1 / EN 61010-1 / EN 61010-2-201
AKKU*TEC* 2405	UL508 / C22.2

12 Technical Data

12.1 AKKU*TEC* 2405

Input	
Input voltage	115…230 V AC ±15 % (98…264 V AC)
Frequency	47…63 Hz
Nominal input current	1,4 A @ 115 V AC / 0,7 A @ 230 V AC
Inrush current	≤ 35 A/2 ms
Nominal input power	153 W @ (Ue = 230 V AC, Ua = 26,8 V DC, Ia = 5 A)
Output	
Nominal output voltage	24 V DC
Output voltage (without temperature tracking)	19,8…26,8 V DC ±0,4 %
Output voltage (with temperature tracking)	19,8…27,0 V DC ±0,4 %
Final charging voltage without / with temperature tracking	26,8 V DC ±0,4 % / 26,8…27,0 V DC ±0,4 %
Load shedding	19,8 V DC ±0,4 %
Nominal output current	5 A
Current self-consumption (in back-up operation)	115 mA
Power loss	20 W@ (Ue = 230 V AC, Ua = 26,8 V DC, Ia = 5 A)
efficiency	87,1 % @ (Ue = 230 V AC, Ua = 26,8 V DC, Ia = 5 A)
Charging characteristics	IU-characteristics DIN 41773-1
Fusing	
Per-fusing (internal)	2,5 A (T), 250 V
Fusing battery circuit (external)	FKS / FK2 7,5 A / 6,3 A T
Fusing output (external)	FKS / FK2 7,5 A / 6,3 A T
In general	
Protective system of the housing	IP20
Over voltage category	II
Degree of pollution	2
Battery type	Lead accumulator*
dimensions (H x W x D) standard unit	160 mm x 75 mm x 150 mm
weight standard unit (without batteries)	1,5 kg
Operational temperature UL tested	0 °C…+45 °C +10 °C…+45 °C
Storage temperature	0 °C … +50 °C
Relative humidity	≤95 % non-condensing
Max. height above sea level (without load reduction)	2000 m

*basic parameterization for VRLA lead accumulator (AGM, SLA)

12.2 AKKU*TEC* 1208

Input	
Input voltage	115…230 V AC ±15 % (98…264 V AC)
Frequency	47…63 Hz
Nominal input current	1,1 A @ 115 V AC / 0,6 A @ 230 V AC
Inrush current	≤ 35 A/2 ms
Nominal input power	126 W @ (Ue = 230 V AC, Ua = 13,4 V DC, Ia = 7,5 A)
Output	
Nominal output voltage	12 V DC
Output voltage (without temperature tracking)	9,9…13,4 V DC ±0,4 %
Output voltage (with temperature tracking)	9,9…13,5 V DC ±0,4 %
Final charging voltage without / with temperature tracking	13,4 V DC ±0,4 % / 13,4…13,5 V DC ±0,4
Load shedding	9,9 V DC ±0,4 %
Nominal output current	7,5 A
Current self-consumption (in back-up operation)	95 mA
Power loss	20 W@ (Ue = 230 V AC, Ua = 13,4 V DC, Ia = 7,5 A)
efficiency	84,0 % @ (Ue = 230 V AC, Ua = 13,4 V DC, Ia = 7,5 A)
Charging characteristics	IU-characteristics DIN 41773-1
Fusing	
Per-fusing (internal)	2,5 A (T), 250 V
Fusing battery circuit (external)	FKS / FK2 10 A / 10 A T
Fusing output (external)	FKS / FK2 10 A / 10 A T
In general	
Protective system of the housing	IP20
Over voltage category	II
Degree of pollution	2
Battery type	Lead accumulator*
dimensions (H x W x D) standard unit	160 mm x 75 mm x 150 mm
weight standard unit (without batteries)	1,5 kg
Operational temperature	0 °C…+45 °C
Storage temperature	0 °C … +50 °C
Relative humidity	≤95 % non-condensing
Max. height above sea level (without load reduction)	2000 m

*basic parameterization for VRLA lead accumulator (AGM, SLA)

12.3 AKKU*TEC* 4803

Input	
Input voltage	115…230 V AC ±15 % (98…264 V AC)
Frequency	47…63 Hz
Nominal input current	1,4 A @ 115 V AC / 0,7 A @ 230 V AC
Inrush current	≤ 35 A/2 ms
Nominal input power	153 W @ (Ue = 230 V AC, Ua = 53,6 V DC, Ia = 2,5 A)
Output	
Nominal output voltage	48 V DC
Output voltage (without temperature tracking)	39,6…53,6 V DC ±0,4 %
Output voltage (with temperature tracking)	39,6…54,0 V DC ±0,4 %
Final charging voltage without / with temperature tracking	53,6 V DC ±0,4 % / 53,6…54,0 V DC ±0,4
Load shedding	39,6 V DC ±0,4 %
Nominal output current	2,5 A
Current self-consumption (in back-up operation)	65 mA
Power loss	19 W@ (Ue = 230 V AC, Ua = 53,6 V DC, Ia = 2,5 A)
efficiency	87,5 % @ (Ue = 230 V AC, Ua = 53,6 V DC, Ia = 2,5 A)
Charging characteristics	IU-characteristics DIN 41773-1
Fusing	
Per-fusing (internal)	2,5 A (T), 250 V
Fusing battery circuit (external)	FKS / FK2 5 A / 5 A T
Fusing output (external)	FKS / FK2 5 A / 5 A T
In general	
Protective system of the housing	IP20
Over voltage category	II
Degree of pollution	2
Battery type	Lead accumulator*
dimensions (H x W x D) standard unit	160 mm x 75 mm x 150 mm
weight standard unit (without batteries)	1,5 kg
Operational temperature	0 °C…+45 °C
Storage temperature	0 °C … +50 °C
Relative humidity	≤95 % non-condensing
Max. height above sea level (without load reduction)	2000 m

*basic parameterization for VRLA lead accumulator (AGM, SLA)

13 Accessories

In application cases with frequent and strong temperature variations, the charging voltage should be adjusted in order to avoid accumulator overload (danger of gassing!). In the same way, a temperature adjustment should be ensured in particular in case of very low ambient temperatures (Tu < 15 °C) in order to ensure sufficient accumulator charge.

- Temperature sensor MTIAQ33G3M01

Decoupling diode set, consisting of one double Schottky diode on a potential-free radiator with cover against direct touch and with hat rail clip.

- KGEK002S003M45
- KGEK002S003M92