



DC-USV

NBPA0812G01***
VdS-Nummer G209169
0786-CPD-20873

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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!

This power supply is only a built-in unit with VdS certification. For a proper VdS installation the external power supply must be installed in a housing with protective system IP30 or better. Furthermore the temperature sensor which is optionally available must be installed for temperature tracking

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 11 Technical Data 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! (see section 7.2). 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, part 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 accumulator buffered DC supply works according to the standby parallel principle and guarantees, in connection with a lead accumulator and for a certain time interval, a safe upkeep of the DC supply in case of a mains failure. The overall output current is split up between consumer supply and lead accumulator charge.

The power supply is characterized by the following properties:

- Switching power supply with I/U charging characteristic
- aktiv power factor correction (PFC)
- Micro-controller supported lead accumulator management
- RS232 for monitoring and parameterization
- Temperature adjustment of the charging voltage by an external sensor

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 11 Technical Data). 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

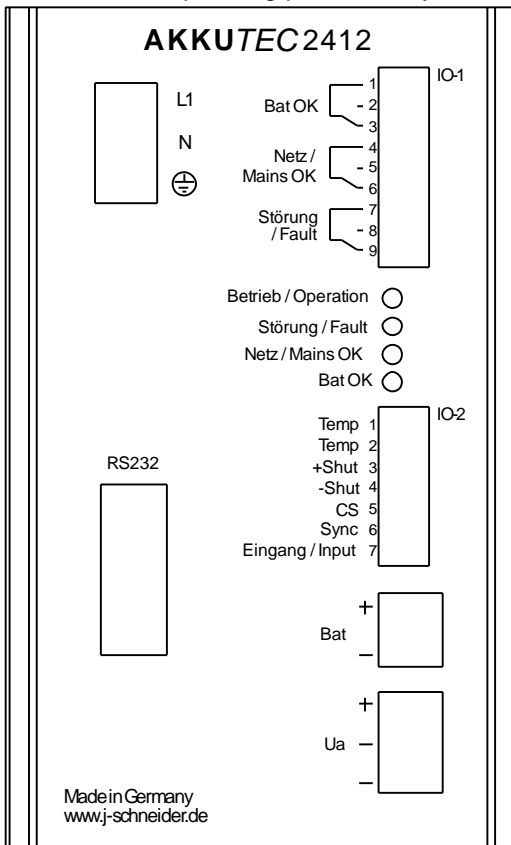
3.1 Installation

The unit must be installed in a way that the necessary cooling is guaranteed. A minimum distance of $\geq 75\text{mm}$ 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. All fixing points must always be used for fixing the unit.

The specific environmental temperature must not be exceeded. The maximum mounting height without load reduction amounts to 2000 m above sea level.

The power supply features protective system IP20, but the VdS guidelines recommend protective system IP30. To fulfill this requirement, the power supply must be installed additionally in a housing or wall housing with the corresponding protective system.



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

Mounting height: 155.0mm
 mounting width: 95.0mm
 mounting depth: 183.0mm (without terminals)

3.2 Connection

Prior to connection, the DC voltage supply values must be checked for compliance with the values given on the label. Connect according to the designations of the connection terminals (see terminal assignment, section 3.7 Circuit diagram). Not used connection screws must be tightened.

NOTE



The external energy supply must be connected to a power circuit with its own, individually identified fuse (16A). From that fusing, there must be only one more fusing up to the low voltage side supply point on the electric mains (service entrance box). The interruption of the power circuit to the external energy supply caused by switching off other equipment must be excluded.

NOTE



In case of overload, the DC output current is composed of the maximum charge rectifier current and the lead accumulator current. The DC output circuit must be fused externally in order to avoid overload!

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 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”
Guideline VdS-2095	“VdS Guidelines for automatic fire detection and alarm systems, Planning and Installation”
VDE 0100	“Installation of power circuits with nominal voltages up to 1000 V”
EN 60204	“Safety of machinery - Electrical equipment of machines”



DANGER

The unit is prepared for degree of protection I (protective earthing). It is obligatory to connect to operational earth. In case of non-observance, touchable parts may be live. Danger of fatal electric shocks.

3.3 Connection lead accumulator

Capacity	Max. load current during charging (I _{maxA})	Rated current of the power supply (I _{maxB})
2x lead accumulator 12 V / 26 Ah	10.70 A	12 A
2x lead accumulator 12 V / 38 Ah	10.10 A	
2x lead accumulator 12 V / 40 Ah	10.00 A	
2x lead accumulator 12 V / 45 Ah	9.75 A	
2x lead accumulator 12 V / 65 Ah	8.75 A	
4x lead accumulator 12 V / 65 Ah	5.50 A	
2x lead accumulator 12 V / 85 Ah	7.75 A	
4x lead accumulator 12 V / 85 Ah	3.50 A	

The lead accumulators are connected to the accumulator cables of the external power supply. The lead accumulators are connected to the terminals “+Bat” and ”-Bat”. If two 12 V lead accumulators are present, they must be connected in series (plus pole of one accumulator to minus pole of the other).

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 itself! If lead accumulators are used, sufficient air flow must be provided according to VDE 0510, part 2.



NOTE

Only use VdS approved lead accumulators. Never use different lead accumulator types, nor lead accumulators of different manufacturers, nor old and new accumulators together.



CAUTION

Protect, i. e. insulate the poles when connecting lead accumulators. In case of short-circuits there is the danger of severe burns by arcs or hot parts.



CAUTION

Hydrogen is generated during the charge of lead accumulators, forming dangerous oxyhydrogen. Ensure proper ventilation.



CAUTION

The lead accumulator voltage must correspond to the rated voltage of the charge rectifier! Never confuse the polarity of lead accumulators and never short-circuit lead accumulators! In case of non-observance there is the danger of severe burns by arcs or hot parts.



NOTE

The lead accumulators must be fixed properly.
Never install unsecured lead accumulators into the unit; danger of **short-circuits!**



NOTE

If the **AKKUTEK** is connected in parallel (Master/Slave-operation) the 24 V accumulator lines must be connected to each other. It is not at all permissible to connect an accumulator line at the master and the other accumulator line only at the slave.
A connection from the plus to the corresponding negative pole is absolutely necessary.



NOTE

Used lead accumulators must be disposed

3.4 Connection of mains voltage

The input voltage of the external energy supply must correspond to the mains voltage at the distribution. The mains voltage must be disconnected and secured against unintended powering up.

The voltage-free mains cable must be connected to the mains connection terminal provided for this, taking into account the phase. Mains connection must be performed to the terminals "L1", "N" and PE (⊕).

It is obligatory to connect to operational earth.

3.5 Connection load

When connecting the load, the polarity "+" and "-" must be considered.

If the mains voltage is disconnected, and if the minimum input voltage is fallen short of, the external energy supply changes over to buffer operation.

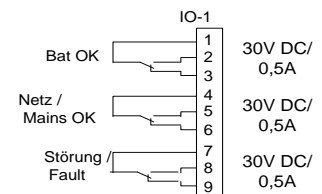


NOTE

In case of overload, the DC output current is composed of the maximum charge rectifier current and the lead accumulator current. The DC output circuit must be fused externally in order to avoid overload!

3.6 Signal contacts

The status of the external energy supply can be forwarded to a superior central unit via signal contacts. The relay contacts are linked to the LED's with the same name. Thus, the illumination of an LED effects the corresponding relay.



3.7 Circuit diagram

Connection	Terminal	Signal contact	Terminal
Mains connection	L, N, PE	Mains operation	IO-1: COM=4; NO=5; NC=6
DC output(load)	+Ua, -Ua	Bat-OK	IO-1: COM=1; NO=2; NC=3
Lead accumulator	+Bat, - Bat	General fault signal	IO-1: COM=7; NO=8; NC=9
Temperature sensor (Optional)	IO-2: 1,2	Sync (only at parallel connection)	IO-2: 6
Control input Shut-Down	IO-2: 3,4		
Control input safety monitoring	IO-2: 7		
Current-share-bus (only at connection in parallel)	IO-2: 5		

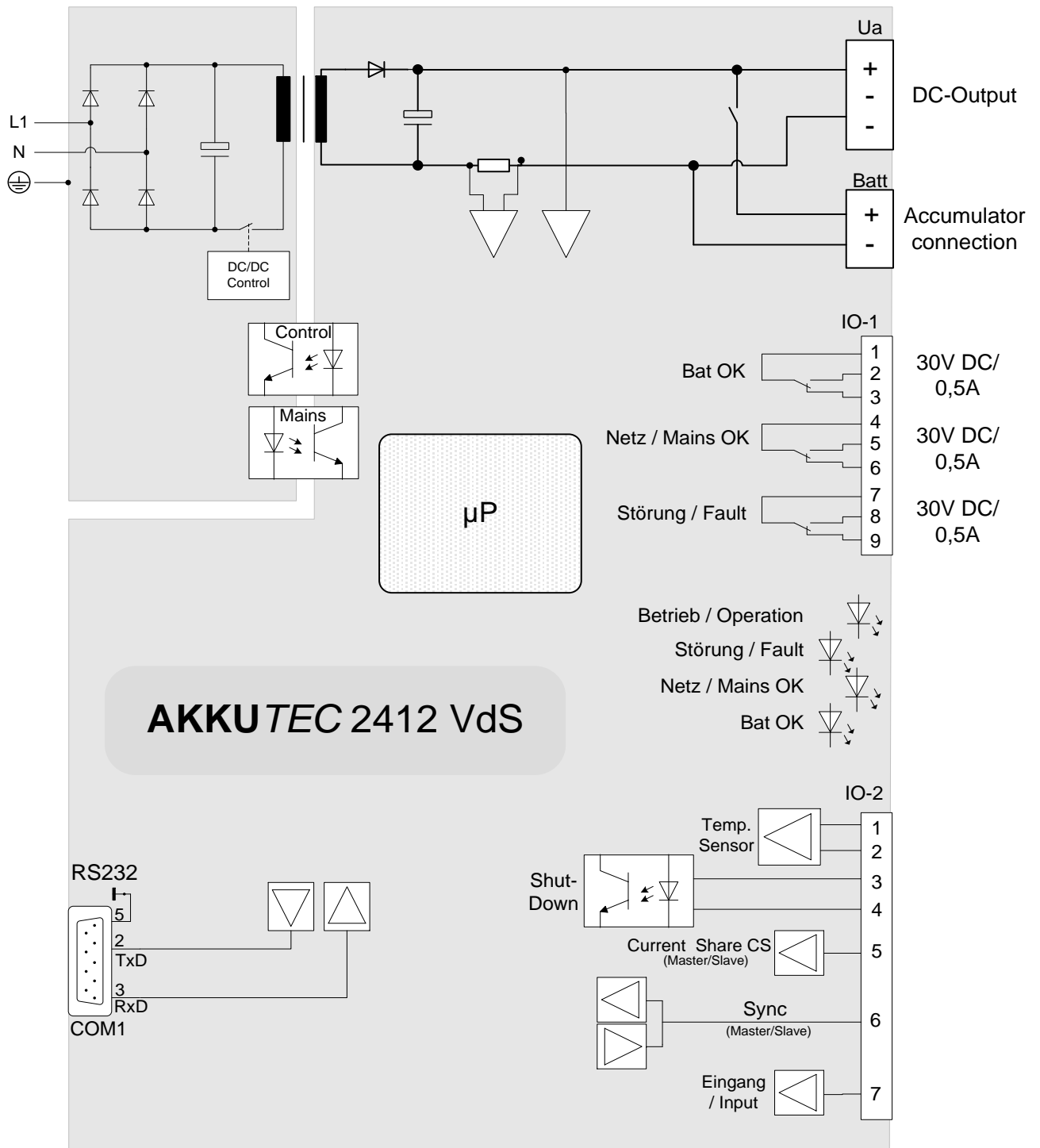
(The LED's are linked to the message contacts with the corresponding names.)

User manual

AKKUTEK 2412 VdS



J. Schneider
Elektrotechnik



User manual

AKKUTEK 2412 VdS

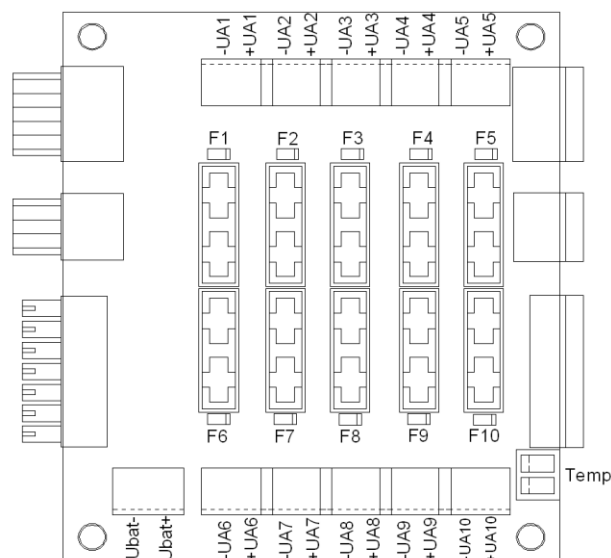


J. Schneider
Elektrotechnik

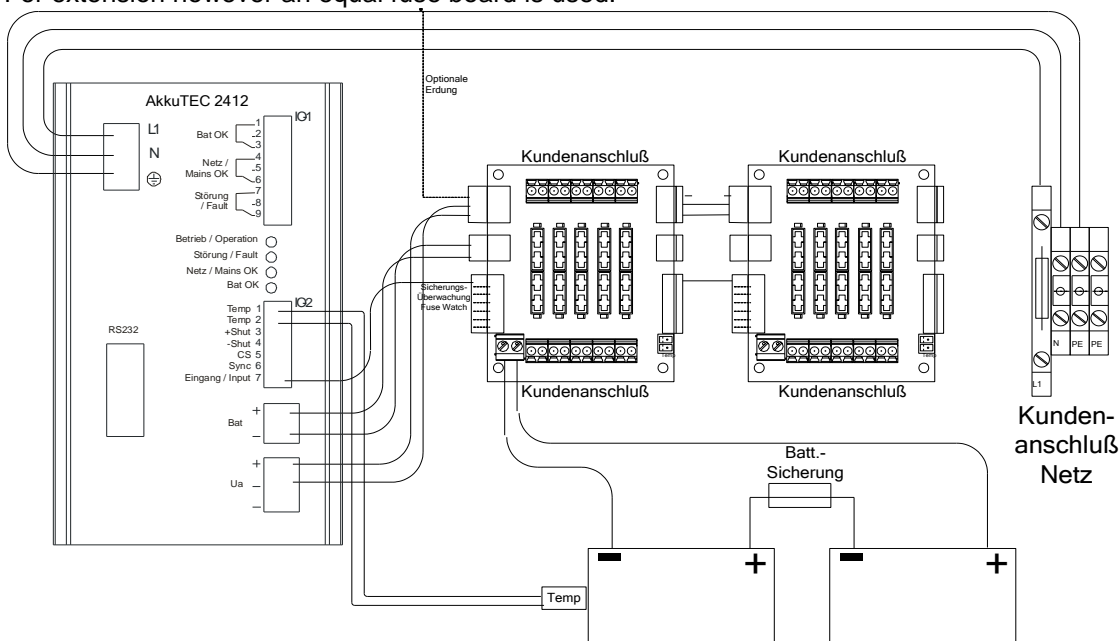
Fuse board

Fuse boards can be plugged in directly into the power supply or separately mounted on T-rail. Each output is separately monitored. In case of fuse blow, the corresponding LED goes out and a general error signalizes the fuse blow to the **AKKUTEK**. The **AKKUTEK** transmits the error if it is adjusted correspondingly. The fuse boards are modular and expandable.

Connection	Terminal
+UA1 / -UA1 ... +UA10 / -UA10	Output terminals 1...10 Fuse F1 ... F10
Ubat+ / Ubat-	Accumulator terminal
Temp	Temperature sensor



Remark: With the new generation of the fuse board (NBP21248G10001) only one type exists. For extension however an equal fuse board is used.



4 Start-Up

The power supply is switched on by the activation of the mains voltage (230 V AC).



DANGER

Check the correctness of the connections prior to the first activation!

Establish electrical connections only in de-energized status!

In case of non-observance, touching live parts can result in death or serious injury.

Two seconds after connection to the mains the connected consumers are supplied. The charge of the lead accumulators is carried out as well. The charging time is increased if simultaneously to the charging current a high load current is needed, too.

The first lead accumulator test is performed after 60 seconds.

4.1 Display and messages

Four LEDs are installed to indicate the the status of the unit:

Display	Significance
operation	LED green illuminates: - as long as the output voltage is present.
mains-OK	LED green illuminates: - at mains operation $U_E > U_{Emin}$ - and $T_{int} < T_{intmax}$
Bat-OK	LED green: - illuminates: at $U_{Bat} > 21.6 \text{ V DC}$ - goes out: - at $U_{Bat} < 21.6 \text{ V DC}$ - if the accumulator circuit is interrupted (test interval 1 min) - if the lead accumulators are reverse poled - if the Ri accumulator internal resistance is too high (test interval 10 min.)
Error	LED yellow illuminates: - at back-up operation - if the accumulator circuit is interrupted - if the lead accumulator is reverse poled - if the accumulator internal resistance is too high - in case of a fuse blow on the fuse board (if activated)

(The LED's are coupled to the signal contacts which have the corresponding names.)

5 Operation

5.1 Mains operation

Mains operation is indicated with the illumination of the green LED **Mains-OK** and the green LED **Operation**.

5.2 Back-up operation

By removing the mains voltage respectively by the underrun of the minimum input voltage, the unit switches over to back-up operation. The back-up operation is indicated with the illumination of the LED **Operation**. The LED **Mains-OK** does not illuminate.

5.3 Deep discharge protection

Deeply discharged lead accumulators can cause irreversible damage. The final discharge voltage specified by the manufacturer must never be underrun. In case of a mains failure, the external energy supply continuously monitors the discharge of the lead accumulators. If the final discharge voltage is reached, the consumers are automatically disconnected from the lead accumulators by load rejection.

5.4 Accumulator circuit monitoring

In order to ensure the buffer capacity of the external energy supply, the accumulator circuit is tested in cycles of 60 seconds; the first test is performed 60 seconds after connection to the mains. This test allows the detection of a possible interruption resp. high resistivity of the accumulator circuit.

In mains operation, a defective accumulator circuit is indicated by the LED **Bat-OK** going out, and the illumination of the LED **Error**.

5.5 Accumulator test

A cyclic lead accumulator test which is performed during mains operation each 10 minutes, stresses the battery with simultaneous voltage measurement. This allows to give a statement about the internal resistance of the accumulator.

A severely aged lead accumulator is indicated by the LED **Bat-OK** going out and the illumination of the LED **Error** in mains operation.

NOTE



The lead accumulator test serves to detect severely aged lead accumulators. In order to be able to make a statement about the buffering ability of the lead accumulators in the present system, a manual check of the lead accumulators is necessary in regular intervals! (See section 7)

When the **AKKUTEK 2412 VdS** is delivered it is configured for three different accumulator dimensions. Herewith the limiting value for the measurement of the internal resistance is adjusted as follows:

- | | | |
|----|--------------------------------------|--------|
| 1: | 7 Ah -18 Ah | 225 mΩ |
| 2: | 26 Ah -85 Ah | 175 mΩ |
| 3: | >65 Ah and at Master/Slave operation | 125 mΩ |

NOTE



The Windows-Software **paraTEC VdS** is available for the configuration of **AKKUTEK** for special requirements.

Special characteristics: Voltage, current, temperature monitoring, adaptation of internal resistance threshold for different lead accumulator sizes, activation/deactivation for external fuse board.

5.6 Temperature tracking (optional)

Lead accumulators have a temperature coefficient of approximately - 3 mV per °C and per cell.

For the usage without temperature sensor the final charging voltage of the external power supply is selected in the way that charging the lead accumulators is ensured in a temperature range of 15 °C to 40 °C.

In applications with frequent and strong temperature variations, the charging voltage should be adjusted in order to obtain maximum life duration of the lead accumulators. A temperature adjustment should be ensured as well in particular in case of very low ambient temperatures ($T_u < 15\text{ °C}$) in order to ensure sufficient lead accumulator charge. The temperature tracking is activated automatically by connecting the external temperature sensor (optional module) to terminal **1** and **2** of the terminal strip **IO-2**. Depending on the ambient temperature variation of -10 to 50 °C, the deep discharge voltage (and thus, also the output voltage) varies in a range of 28.6 V to 26.4 V DC (27.36 V at 25 °C).

A lead accumulator temperature above 45 °C is registered by the power supply and forwarded to the monitoring software **paraTEC**. The power supply however does not monitor this condition.

NOTE



To ensure a satisfying life duration of the lead accumulators, the operating temperature of the lead accumulators should not exceed 20 °C. Higher temperatures lead to a drastic decrease of the life duration resp. service life!

NOTE



Die VdS-regulation instructs a temperature tracking. For VdS conform operation a temperature sensor must be connected to the power supply!

5.7 Shut-Down

Buffer operation can be interrupted early in order to avoid a discharge of the lead accumulator up to the deep discharge limit. This can be done by connecting a +24 V DC control voltage to the terminal **3 (+Shut)** and **4 (-Shut)** of the terminal strip **IO-2**.

5.8 Acoustic alarm transmitter (optional)

An alarm transmitter with VdS approval is available for emitting an acoustic warning signal if a general error occurs.

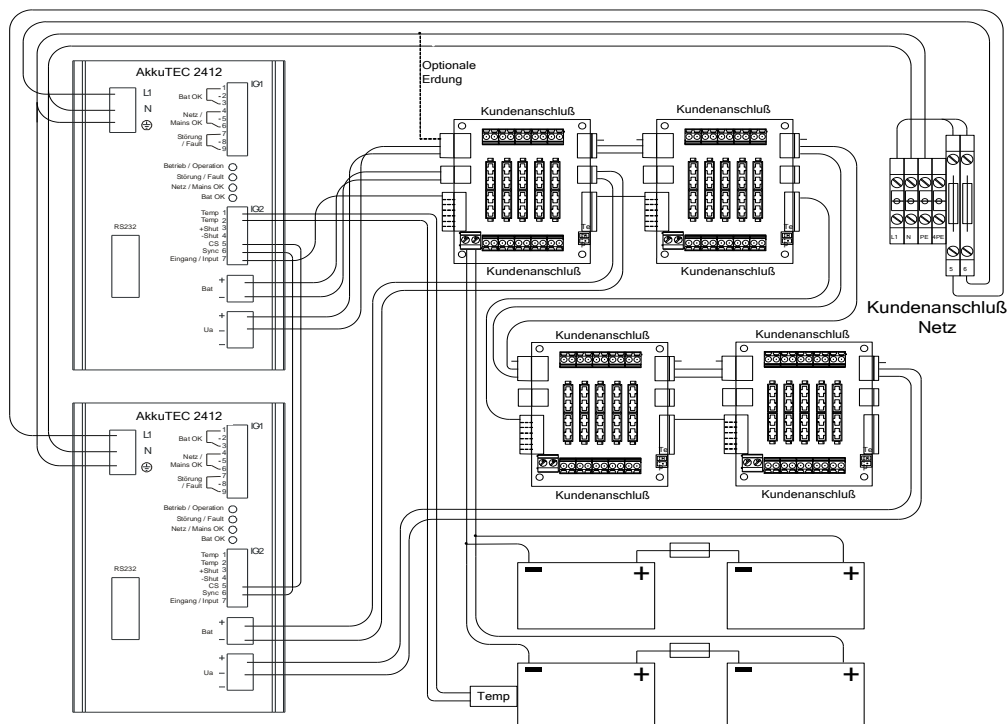
6 Master/Slave-operation at parallel connection

This operational mode is only valid in case of parallel connection of two power supplies to double the total power rating.

6.1 Connection at Master/ Slave-operation

To increase the power rating respectively for redundant operation it is possible to connect two power supplies in parallel.

- The temperature tracking is only carried out by the Master.
Master: IO-2:1,2
- The fuse monitoring is also only carried out by the Master.
Master IO-2:7 to fuse board
- The Sync-connection is necessary for the functions of the accumulator test. A lack of the signal results in a wrong measurement of the internal resistance of the accumulator.
Master IO-2:6 to Slave: IO-2:6
- The CS (Current-Share-Bus) is used to share the load between both power supplies. A lack of this signal results in the overload of the Master unit.
Master IO-2:5 to Slave IO-2:5
- The signal contact mains operation is active at both power supplies active. They must be connected in series, to detect a mains failure of both units.
Master IO-1:4,5,6 and Slave IO-1:4,5,6
- The signal contact **Bat-OK** is only active at the Master
Only Master IO-1:1,2,3
- The signal contact General Fault is active at both power supplies. They must be connected in series.
Master IO-1:7,8,9 and Slave IO-1:7,8,9



6.2 Signalisation at Master/Slave-operation:

The signal contacts for mains failure of the Master and the Slave must be connected in series to detect an error signal from both units.

At the Slave the signal and the signal contact **Bat OK** are not active. (neither on the contact **Fault**, the master takes over this function completely). If one unit switches off because of overvoltage at the output, it is signaled with the signal contact **Mains-OK** (at Master and Slave). Afterwards the mains voltage must be switched off for a short time. (storing protection function).

6.3 Shutdown at Master/Slave-operation

The Shutdown is carried out at the Master as described in section 3.7, the mains voltage must be switched off before.

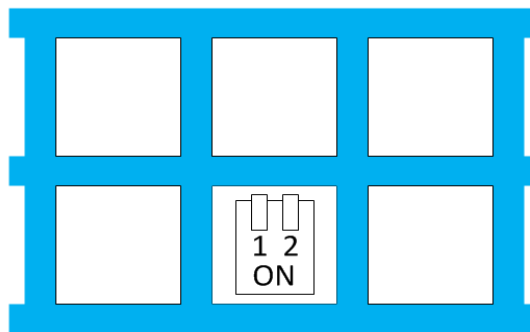
6.4 Configuration Master/Slave

Configuration for Master-operation:

All power supplies also the replacement devices which are delivered from the factory are preset as Master. Complete switch cabinets with Master/Slave configuration are adjusted correctly in the factory. If a Slave must be replaced, the replacement unit must be adjusted as Slave.

Configuration for Slave-operation:

The unit must be completely switched off. On the upper side of the unit a double dip switch can be seen through the grid. Press the dip with the indication **2** in the direction of the board. (ON). Verification for example by the switch on of the unit outside the system. The output voltage amounts to approximately 22 V.



NOTE

During operation Master and Slave must be connected via ground at any time (Ua- or Bat-). A separation of the wiring during operation is not allowed.
A lack of the signal **Sync** results in wrong measurement of the internal resistance of the accumulator, the LED **Fault** illuminates herewith at the Slave.
A lack of the signal **CS** results in the overload of the Master, then the Slave only supplies approximately 22 V.
All load and all accumulator lines must be connected in parallel each with and connected with separate lines at both **AKKUTEK**-units.

7 Servicing

In order to ensure the buffering ability of the power supply, the lead accumulators should be tested for their buffering capability in regular intervals of 3 to 6 months.

The housing must be cleaned at least once per year depending on the degree of contamination.

7.1 Testing the lead accumulators

Start a forced buffer operation by disconnecting the mains. The lead accumulators must keep the required autonomy time under nominal conditions. When the deep charge limit is reached, the external energy supply switches off automatically.

7.2 Exchanging the lead accumulators

If not stated otherwise in the VdS approval certification, the lead accumulators must be exchanged once every four years after the manufacturing date. Removal and installation of the lead accumulators may only be performed by qualified personnel.

It must be performed as follows:

Removal of lead accumulators:

- Perform the putting out of operation as described in section **Fehler! Verweisquelle konnte nicht gefunden werden.**
- Remove electrical connections from the lead accumulators (2-Pol CombiCon, Ubat)
- Loosen the accumulator bracket, retain lead accumulator at the same time.
- Remove lead accumulators

Installation of lead accumulators:

- The installation is performed as described above only in reverse order.
- Take care to ensure correct polarity. In case of a reverse polarity of the lead accumulator, the functions "lead accumulator charge" and "Accumulator release during mains failure" remain blocked, the simultaneous illumination of the LED-**Mains-OK** and the LED-**Error** will indicate the reverse polarity.



CAUTION

Take care to ensure the correct nominal voltage and the correct polarity when installing the lead accumulators.
In case of non-observance there is the danger of severe burns by arcs.



CAUTION

Protect, i. e. insulate the poles when connecting lead accumulators. In case of short-circuits there is the danger of severe burns by arcs or hot parts.



NOTE

Ensure the correct fixing of the lead accumulators after re-installation!



NOTE

Only use VdS approved lead accumulators. Never use different lead accumulator types, nor lead accumulators of different manufacturers, nor old and new accumulators together.

8 Decommissioning

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

The LED **Mains-OK** and the **Error** 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!

9 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!

10 Norms and regulations

Power supplies for fire alarm systems are subject to rigorous regulations; the power supply unit of the fire alarm system is tested according to the European Product Standards EN 54-4 and VdS 2541. The power supply is **VdS approved** and is listed under No.: G209169.

EMV	EN 55011, limit value class B EN 62040-2, limit value class C1 EN 61000-6-2 EN 61000-6-4 EN 50130-4+A1+A2
Overall unit	2014/30/EU+A1+A2 EN 50178 EN 54-4+A1+A2 EN 12101-10+B1 VdS 2541 VdS 2344
Optocoupler for guaranteeing a safe primary / secondary separation	EN 60747-5-1, fulfills SELV / PELV
Power HF-transmitter to ensure the safe separation of primary and secondary.	EN 61558 2-16, fulfills SELV / PELV

11 Technical Data

Nominal input voltage	230 V AC ($\pm 15\%$)
Input voltage range for charging operation	195.5 V ... 264.5 V
Nominal frequency	47 Hz ... 63 Hz
Power consumption	380 VA
Self current consumption	75 mA @ 24 V
Max. nominal input current	1.8 A
Max. inrush current	35 A / 2 ms
Max. nominal output current	12 A
Nominal output voltage (in mains operation)	24 V DC
Output voltage range (with temperature tracking)	26.4 V ... 28.6 V DC $\pm 0.4\%$
Charging characteristics	I/U DIN41773
Charging end voltage (without Temp.-Sensor)	26.4 V DC $\pm 0.4\%$
Deep discharge protection and load shedding	20.4 V DC $\pm 0.4\%$
Max power loss ,worst-case'	40 W
Efficiency	89% @ ($U_e=230$ V; $U_a=26.4$ V DC; $I_a=I_{Nenn}$)
Voltage ripple	< 150 mV eff.
Internal device protection	2.5 A (T), 250 V
Fuse DC-output circuit (external)	15 A (T, UL-248)
Fuse DC-Battery circuit (external)	15 A (T, UL-248)
Connection in parallel	Yes
Connection in series	Yes
Max. signal contact load (Mains-OK ¹)	30 V/ 0.5 A potential-free relay-contact
Max. signal contact load (Bat-OK ¹)	30 V/ 0.5 A potential-free relay-contact
Max. signal contact load (General Fault ¹)	30 V/ 0.5 A potentialfreier Relais-Kontakt
Max. signal voltage range (Shut-Down)	24 V DC (6-45 V DC) floating switching input
Accumulator type	Pb-accumulator, maintenance-free, max. 170 Ah
Back-up time	Accumulator specific
Protective system	IP20
Operating temperature	-10 °C ... 50 °C
Storage temperature	-10 °C ... 50 °C
Rel. Humidity	$\leq 95\%$ no condensation
Max. installation altitude	2000 m above sea level
Dimensions (HxWxD)	155 mm, 95 mm, 183 mm
Weight	1.5 Kg

12 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 ($T_u < 15\text{ °C}$) in order to ensure sufficient accumulator charge.

- Temperature sensor MTIAQ33G3M01
- Temperature sensor MTIAQ33G3M04
- Temperature sensor MTIAQ33G3M05

Every fuse output is monitored separately. If a fuse blows, the corresponding LED goes out. A blown fuse is notified to the AkkuTEC or the PLS with collective message.

- Fuse board NBP1248G10001

Decoupling diode set including a double Schottky diode on a potential-free cooler with cover against direct touch and top hat rail clamb.

- KGEK002S003M45
- KGEK002S003M92

For fire alarm systems, the power supply can be equipped with an additional signal generator.

- Signal generator PA100

Software for PC-aided monitoring and parametrization functions

- Windows .NET Framework Software **paraTEC** VdS