MADE IN GERMANY

INSTALLATION INSTRUCTIONS

SAX Power **Home 5.8kWh**

SAX Power **Home Plus 7.7kWh**

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This document is intended for qualified electricians. The procedures described in this document must only be carried out by authorised electricians!

This document describes the installation of the SAX Power HOME-1-6-5-230 and HOME-2-6-4-230, as well as the SAX Power HOME Plus-1-8-5-230 and HOME Plus-2-8-4-230.

Please follow the instructions in this document carefully!

Preliminary information
- Please read this document carefully before installation.
- Keep this document in your records.

This document relates to the following products
"SAX Power Home", types HOME-1-6-5-230 and HOME-2-6-4-230
"SAX Power Home Plus", types HOME Plus-1-8-5-230 and HOME Plus-2-8-4-230

Publisher:
SAX Power GmbH
Oberer Luß 12, 89155 Erbach
Germany

E-Mail: info@SAX-power.net, sales@SAX-power.net
Telephone: +49 (0) 7305 95891-1

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1 General information

Please check the delivered unit thoroughly! If there is any damage to the packaging or the unit itself, please document this and contact SAX Power GmbH immediately!

This document serves as a manual for the SAX Power Home (models HOME-1-6-5-230 and HOME-2-6-4-230) and the SAX Power Home Plus (models HOME Plus-1-8-5-230 and HOME Plus-2-8-4-230).
Please read this document in full before commissioning the unit and keep it in a safe place.

In the following, the 'SAX Power Home (Plus)' is also referred to as the "storage unit". To simplify the presentation of the SAX Power Home and SAX Power Home Plus systems, two values are given for various specifications in this document. The higher value corresponds to the SAX Power Home Plus.

1.1 Meaning of the symbols used in this handbook

Danger! Failure to follow the safety instructions may result in death or serious injury.

Warning! Failure to follow the safety instructions may result in personal injury or damage to property.

Useful information.

2 Safety

The SAX Power Home (Plus) stores electrical energy.

Any use of the device other than that described in this manual is considered improper. SAX Power GmbH accepts no liability for damage resulting from failure to follow the instructions or to observe the safety and warning notices.

Please therefore observe the following safety instructions carefully:

2.1 General safety requirements

1. **Installation:**
   Installation must only be carried out by a certified electrician.
   The storage unit must not be put into operation until installation is complete.

2. **Intended use:**
   Use the storage unit only in a suitable, permanently installed location (see Chapter 2.3). Any modifications to or opening of the unit are prohibited and will invalidate any warranty or guarantee claims.

3. **Hazardous substances:**
   The use of lithium iron phosphate (LFP) cells means that the risk of fire is minimal. However, in the event of a fire, irritating substances may be released.

2.2 Requirements for the qualified installer

The storage unit must only be installed and commissioned by a qualified electrician in accordance with the standard DIN VDE 1000-10 VDE 1000-10:2021-06 "Requirements for persons working in the field of electrical engineering". The storage unit must be registered with the relevant network operator.

2.3 Intended use

The storage unit must only be installed indoors in locations suitable for this purpose. The following conditions must be met:

- **Environment:** Protected from water and foreign objects (<2 mm in diameter).
- **Temperatures:**
  Operation: +5°C to +35°C.
- **Storage/transport:** -10°C to +40°C.
- **Humidity:** Max. 80% relative humidity.
- **No direct sunlight.**
- **Clearances:** 150 mm clearance in all directions (see Chapter 5).
- **Hazardous areas:** Do not use in potentially explosive atmospheres or in areas with corrosive gases.

Please note the following:

- Do not open the casing – danger to life!
- Only switch off the battery for up to 6 months when it is at least 50% charged (avoid deep discharge).
- Operate only when in perfect working order.
- Do not carry out any repairs or modifications yourself.
- Do not block the ventilation openings.
- Under no circumstances bypass or alter the safety devices.
- Do not alter the power and data connections. Troubleshoot faults in accordance with the chapter 'Operational messages, problems and solutions'.
- Always lift the storage unit with at least two people.

2.4 What to do in the event of contact with electrolyte

- **Skin contact:** Wash the affected area thoroughly with water immediately and remove any contaminated clothing.
- **Eye contact:** Rinse the eyes immediately with plenty of water.
- **Inhalation of vapours:** Leave the area and breathe fresh air.
- **Medical assistance:** Seek medical attention immediately if you experience any symptoms.

2.5 What to do in the event of a fire

LFP cells are considered to be very safe. However, mechanical damage or fires in the surrounding area can still cause the battery cells to catch fire. Should a fire break out, please take the following action:

1. **Safety distance:**
   Keep your distance, as toxic fumes are produced and explosions may occur.
1. **Evacuation:**
   Leave the room and, if possible, close the door to prevent the spread of toxic fumes.
2. **Emergency call:**
   Call the fire brigade and inform them of the battery fire.
3. **Power cut-off:**
   Switch off the storage unit at the main switch. Also switch off the grid fuse in the building.

If it is not possible to switch it off, use fire-extinguishing agents to contain the fire.

2.6 Fire-extinguishing agents

- Use CO_2 or ABC powder for battery fires.
- Maintain a safe distance.
- Water can be used to cool neighbouring cells.

2.7 Technical details of LFP cells

The battery consists of 120 LFP cells, organised into 24 strings, each comprising 5 cells in series (16V DC). It operates at a grid voltage of 230V AC.

2.8 Disposal instructions

Old or damaged batteries are classified as hazardous waste and must not be disposed of with ordinary household waste. Please note the following:

1. **Proper disposal:**
   Have the batteries disposed of by an authorised disposal company.

   Please observe the regulations in force in your region regarding the disposal of lithium-ion batteries.

2. **Contact points:**
   Please contact your retailer, the manufacturer or a certified battery collection point for further information on disposal.

3. **Environmental awareness:**
   Improper disposal may pose risks to the environment and human health. Please ensure that the batteries are disposed of in an environmentally responsible manner.

Four steps to installation

1. Mounting the storage unit
Page 16

2. Smart meter installation
Page 21

3. Storage unit connection
Page 33

4. Storage unit commissioning
Page 45

3 Contents of the package

3.1 SAX Power Home (Plus)

Included in the delivery:

1. SAX Power Home 5.8 kWh.
2. Wall bracket with 2 screws for positioning the storage unit.
3. MSTB 2.5/4-ST terminal block.
4. 2 St. Wieland plugs.
5. Quick installation guide.
6. Handles (SAX Power Home Plus only).

Smart meter, if applicable (depending on the configuration)

6

1

2

3

4

5

3.2 SAX Power ADL400 Smart Meter Installation

Included in the delivery:

1. 1 ADL400 smart meter.

Fig. 2: Smart meter, front view (ADL400)

3.3 SAX Power ADW200 Smart Meter Installation

Included in the delivery:

2. 2 x 3 folding current transformers.
3. 1 ADW200 smart meter.
4. 2 MSTB 2.5/12-ST terminal blocks.

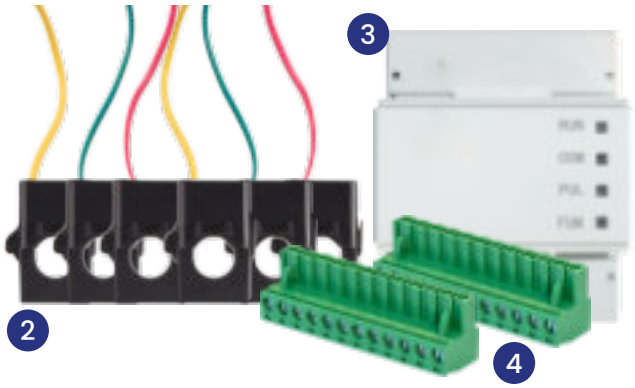


Fig. 3: Contents of the ADW200 package. 2 smart meters, front view (ADL400)

The cables required for the correct connection of the storage unit are not included in the scope of delivery. You can order the necessary cables via SAX Power's authorised partners. A 3P B10 circuit breaker is also required for the ADW200.
The cable cross-sections required for connecting the storage unit must be determined by the qualified technician carrying out the work.
When using more than one storage unit in a network, the smart meter and its accessories are contained in packaging box "A".

4 External view, display and ports

The display is an energy-saving e-paper display; when switched off, the last state remains permanently visible on the display. The display shows the charge status, the storage unit's IP address, the grid power and the charging or discharging power of the storage unit.

When used in conjunction with the ADW200, it is also possible to display the output of the PV inverter. This is achieved via an AC-side measurement using additional current transformers.

Fig. 4: Right-hand side view

Fig. 5 Front view of the SAX Power Home (Plus) with e-paper display

Fig. 6: Left-hand side view

Fig. 7 Bottom view of the storage unit

Fig. 8 Rear view showing the hanging rail

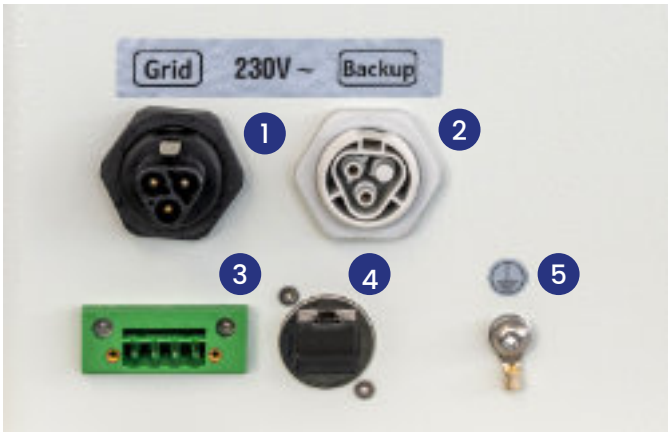


Fig. 9 Storage unit from below (slots)

Fig. 10 Main switch

Fig. 11 Type plate in German

Storage connections:

1. Grid connection.
2. Emergency power connection.
3. RS485 interface and digital input for shutdown by the network operator (optional).
4. LAN connection (RJ45).
5. Connection point for additional earthing.
6. Main switch.
7. Type plate DE.

4.1 Block diagram of the storage unit

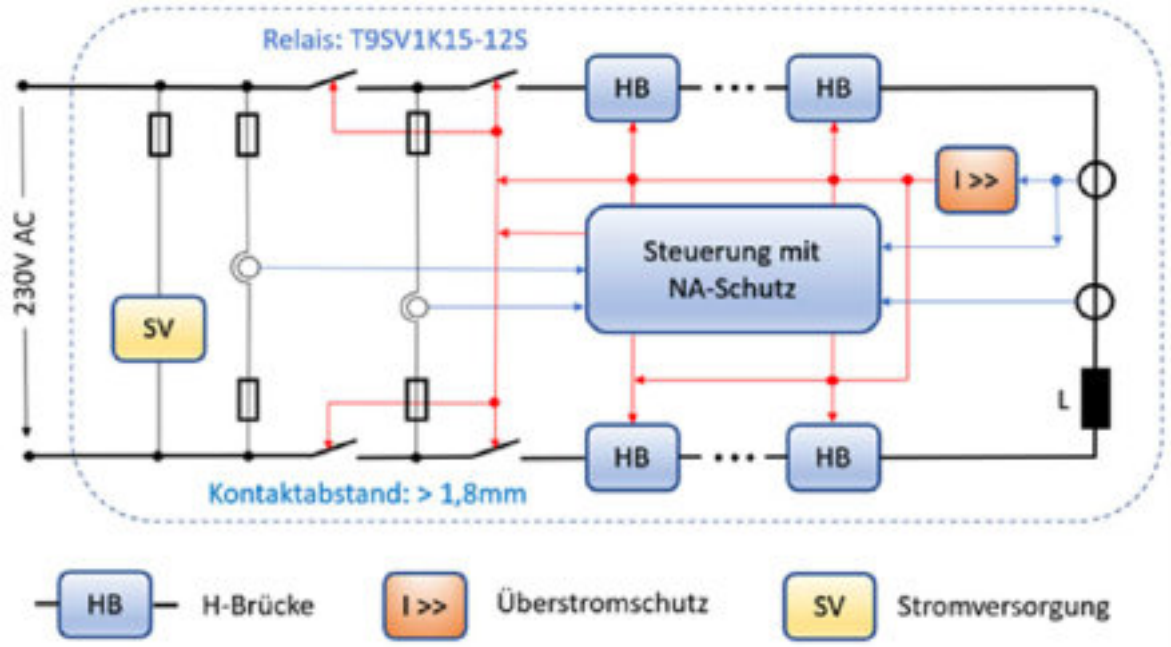


Fig. 12 Internal wiring of the storage unit

5 Installation

The SAX Power Home (Plus) can be wall-mounted provided the wall has the necessary load-bearing capacity.
As an alternative to wall mounting, SAX Power offers floor stands. The 5.8 kWh model accommodates 3 storage units, whilst the 7.7 kWh model accommodates 2.

5.1 Wall mounting of storage unit

Total weight: 55kg / 69kg
Please check the load-bearing capacity of the wall before installation. For wall mounting, you will need 5 screws and wall plugs (not included). The screws and wall plugs must be selected according to the type of wall.

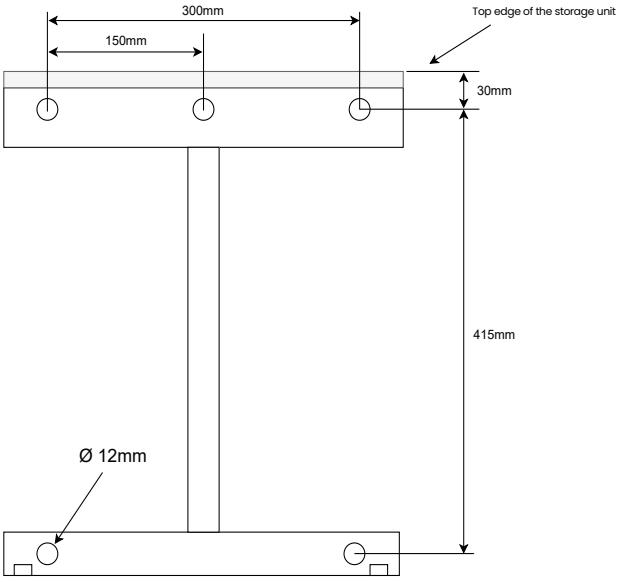


Fig. 13.1 Hole spacing for SAX Power Home 5.8 kWh

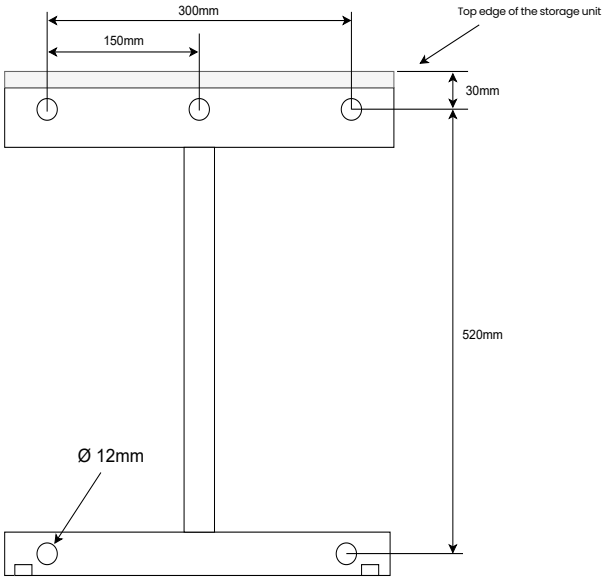


Fig. 13.2 Hole spacing for SAX Power Home Plus 7.7 kWh

1. Align the wall bracket using a spirit level and observe the mounting clearances (Fig. 13.3).

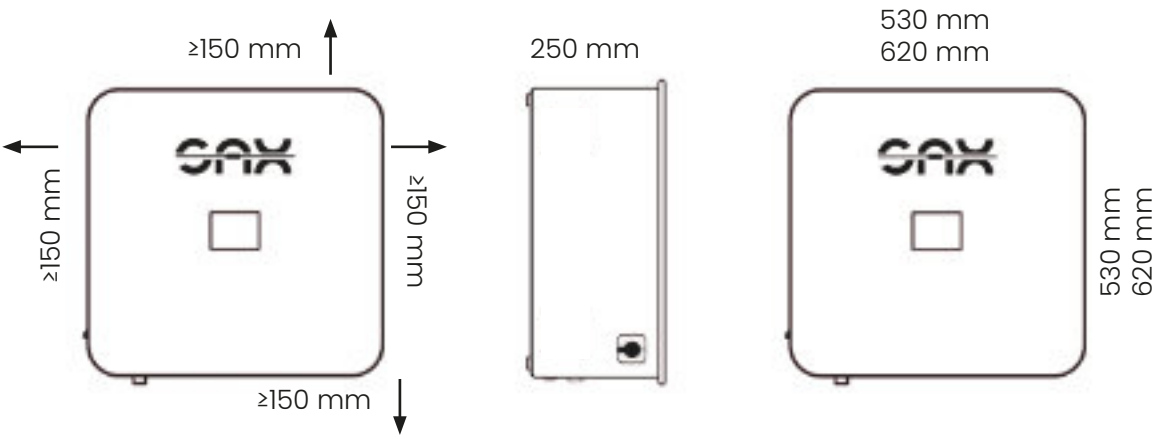


Fig. 13.3 Clearance requirements and storage dimensions

2. Mark out the holes and drill them.

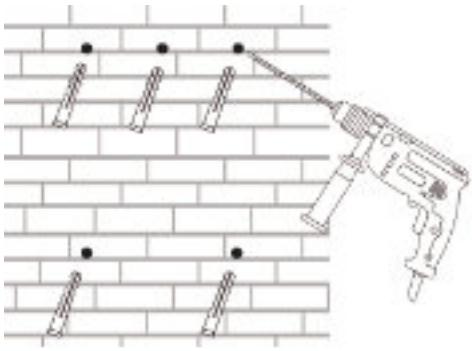


Fig. 14 Wall drilling pattern

3. Secure the wall bracket using suitable wall plugs and screws.

Fig. 16 Securing the wall bracket

4. Ensure that the screws are fully tightened.

5. Hook the storage unit into the wall bracket.

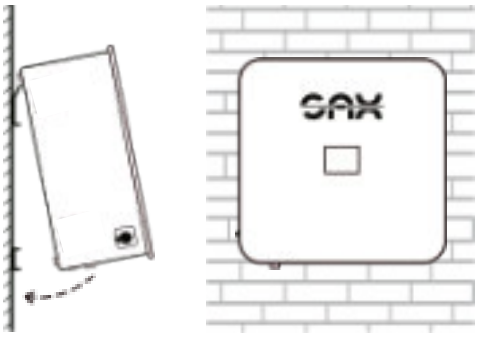


Fig. 15: Attachment procedure

6. Unscrew the screw until the reservoir is secured in place by the bracket (Figs. 17 & 18).

Fig. 17 Tensioning the storage unit

Fig. 18 Fully braced storage unit

Note:
The tension in the spoke is adjusted by unscrewing the bolt.

5.2 Fitting the storage unit to the stand

1. Fit the tubes to the base plate.
1. Fit the cross-braces for the storage bracket to the tubes of the stand.
2. Screw the tubes to the wall (this prevents the base from tipping over).
3. Fit the safety screws to the underside of the bracket and screw them in fully.
4. With two people, hook the storage unit onto the base.
5. Unscrew the screw until the storage unit is secured to the bracket. (see section 5.1).

Fig. 19 Three 5.8 kWh storage units mounted on the base

Fig. 20 Empty base unit (5.8 kWh)

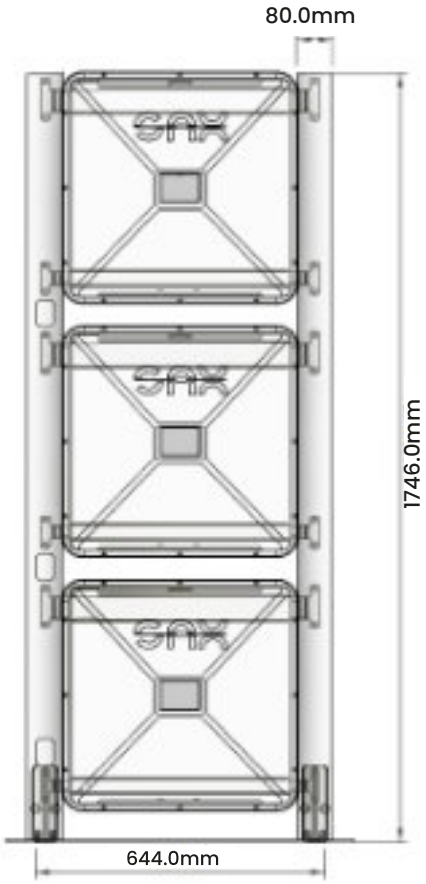


Fig. 21 Dimensions of the base (5.8 kWh)

1. Cross struts
2. Security screws
3. Tubes
4. Cable outlet: Cables can be neatly routed down to the floor through this opening inside the base
5. Base plate

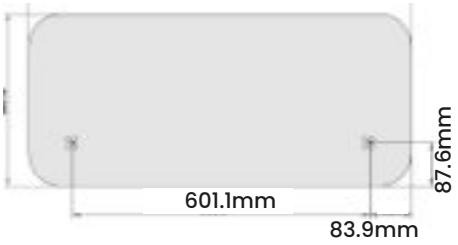


Fig. 22 Dimensions of the base plate

Caution: Ensure the base plate is correctly aligned.
Align the drill holes in the base plate with the rear of the storage unit.

The following applies to the SAX Power Home Plus:

1. Fit the tubes to the base plate.
2. Fit the cross-braces for the storage tank bracket to the tubes of the base.
3. Screw the tubes to the wall (this prevents the stand from tipping over).
4. Fit the safety screws to the underside of the bracket.
5. With two people, hook the storage unit onto the stand.
6. Unscrew the screw until the storage unit is secured to the bracket. (see Section 5.1).

Fig. 23 Two 7.7 kWh storage units mounted on a stand

Fig. 24 Empty stand (7.7 kWh)

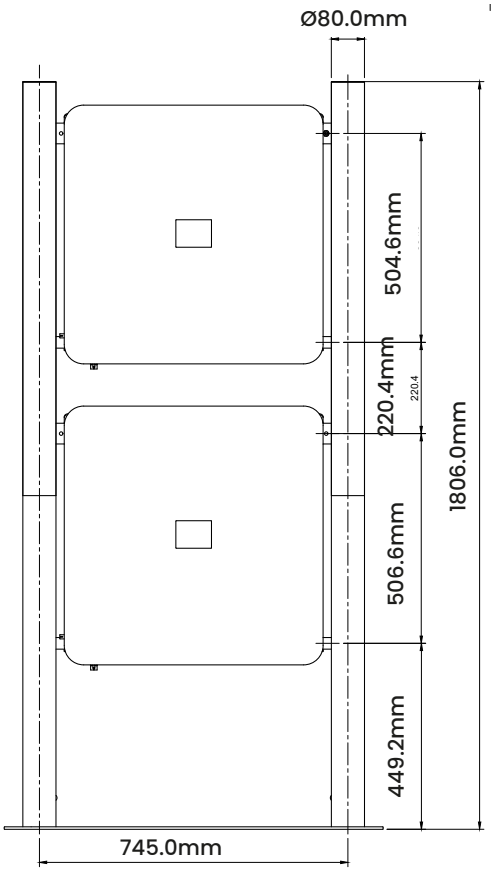


Fig. 25 Dimensions of the stand (7.7 kWh)

1. Cross-braces
2. Security screws
3. Tubes
4. Cable outlet at the rear: cables can be neatly routed down to the floor inside the base here.
5. Base plate

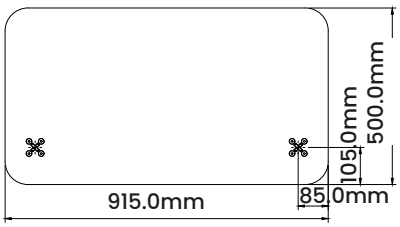


Fig. 26 Dimensions of the base plate

Caution: Ensure the base plate is correctly aligned.
Align the drill holes in the base plate with the rear of the storage unit.

6 Installing the smart meter

6.1 Measurement concepts

All statutory safety regulations, VDE regulations and the applicable technical connection conditions (TAB) of the relevant distribution network operator must be complied with.

Depending on the desired metering concept, the smart meter is installed behind the relevant meter in the customer's network. By default, the storage unit is controlled in such a way as to minimise power consumption at this point.

Possible measurement approaches are shown below:

Example 1: Measurement concept 4 (one distributed energy resource)

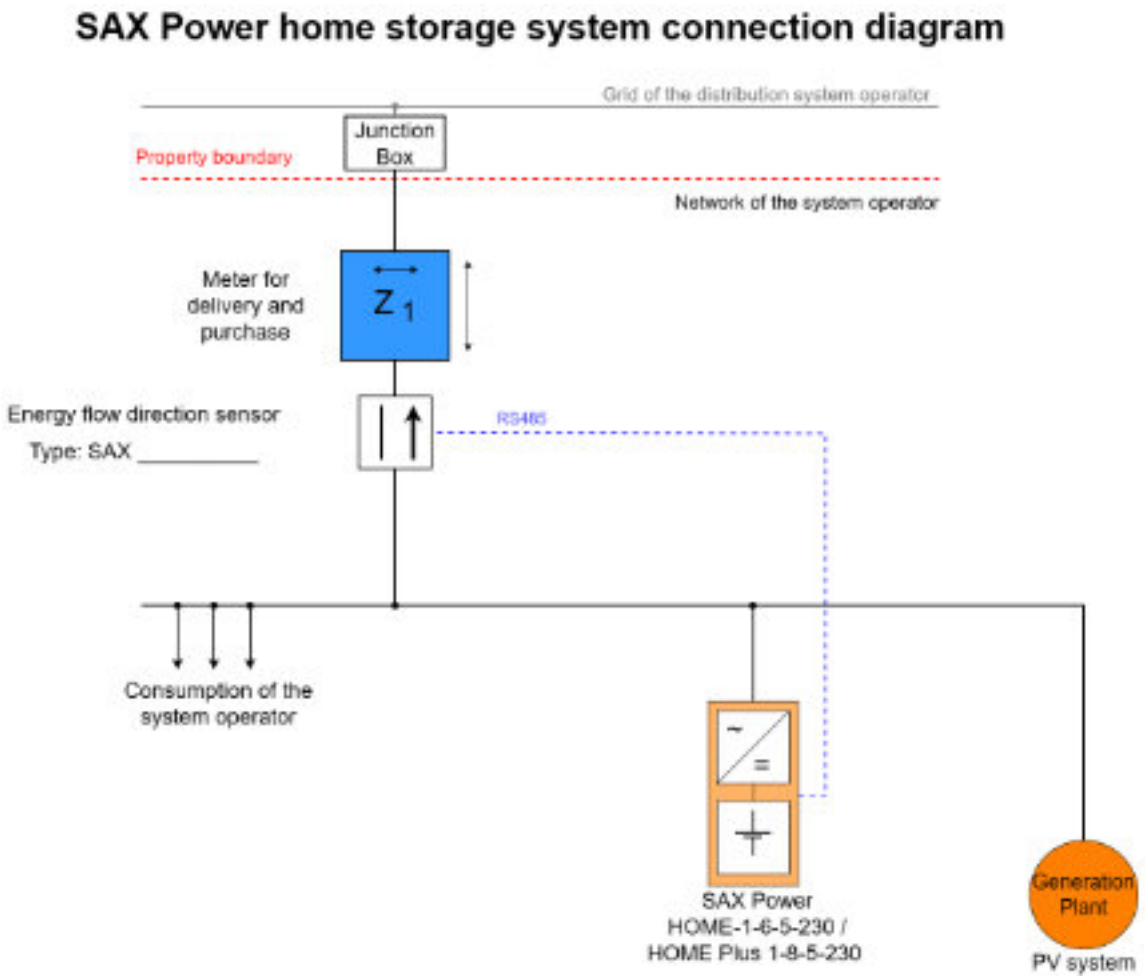


Fig. 27 Measurement concept (one distributed energy resource)

Example 2: Measurement concept 4 (two storage units)

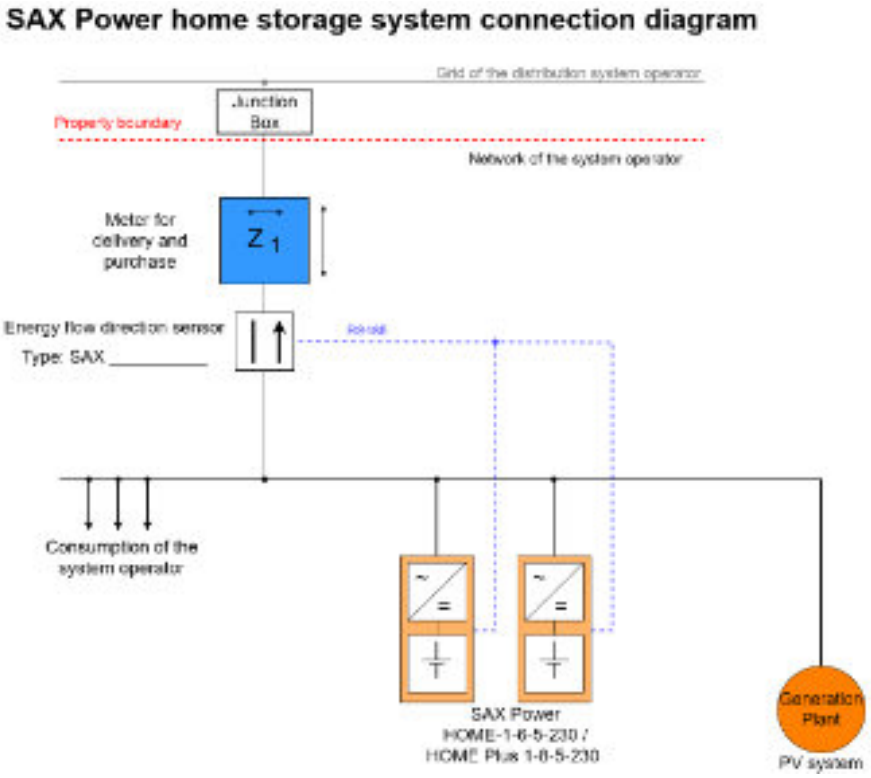


Fig. 28 Measurement concept (two storage units, one distributed energy resource)

Example 3: Measurement concept 4 (three storage units)

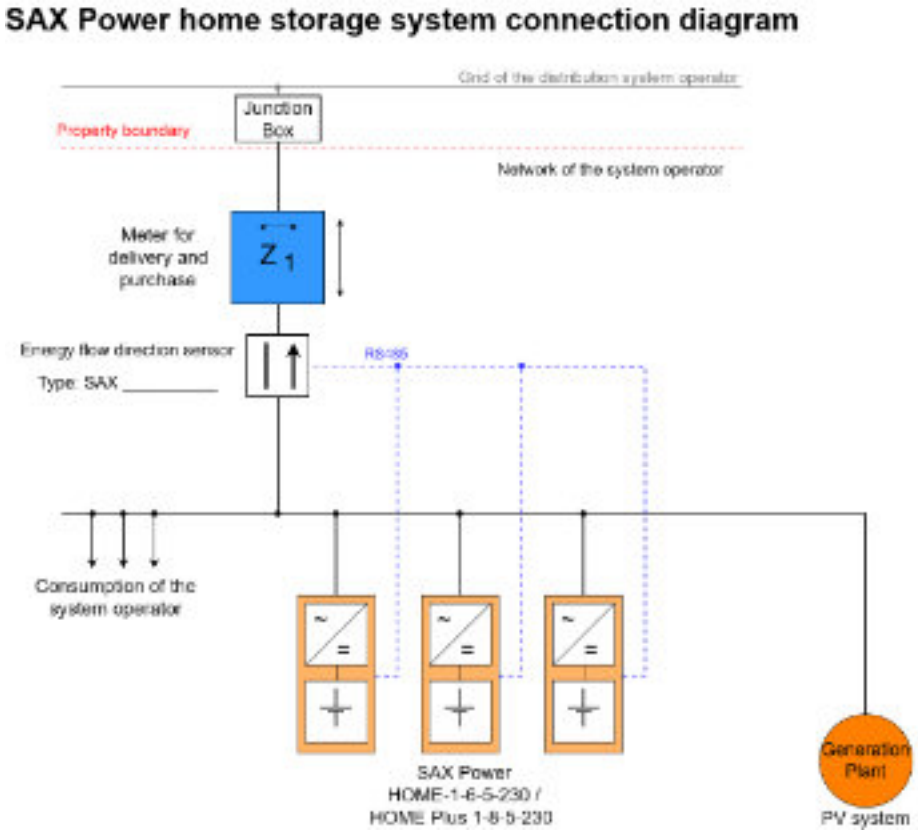


Fig. 29 Measurement concept (three storage units)

Example 4: Measurement concept (two distributed energy resources using different energy sources)

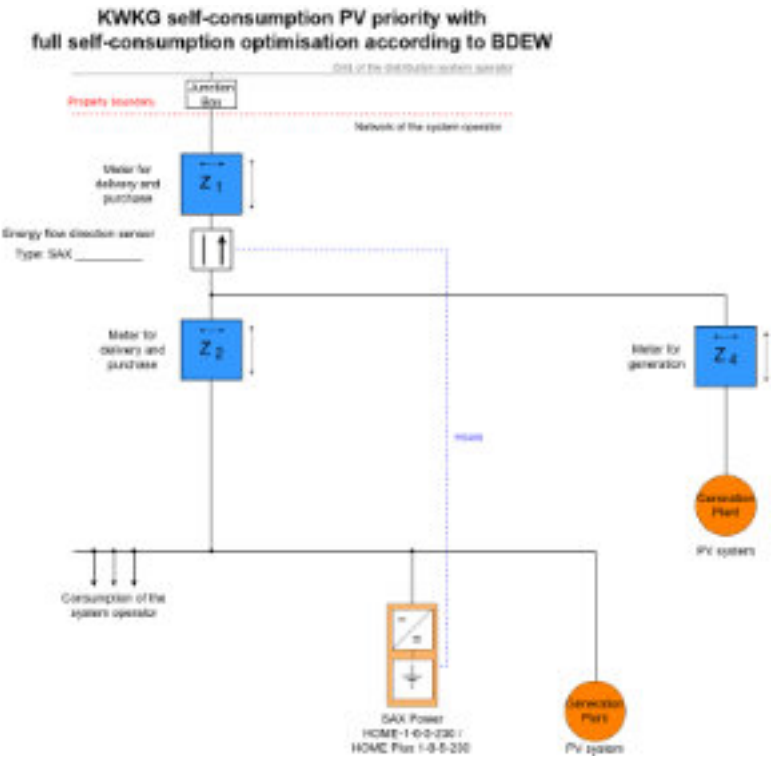


Fig. 30 Measurement concept (two distributed energy resources)

Example 5: Measurement concept (two distributed energy resources using different energy sources)

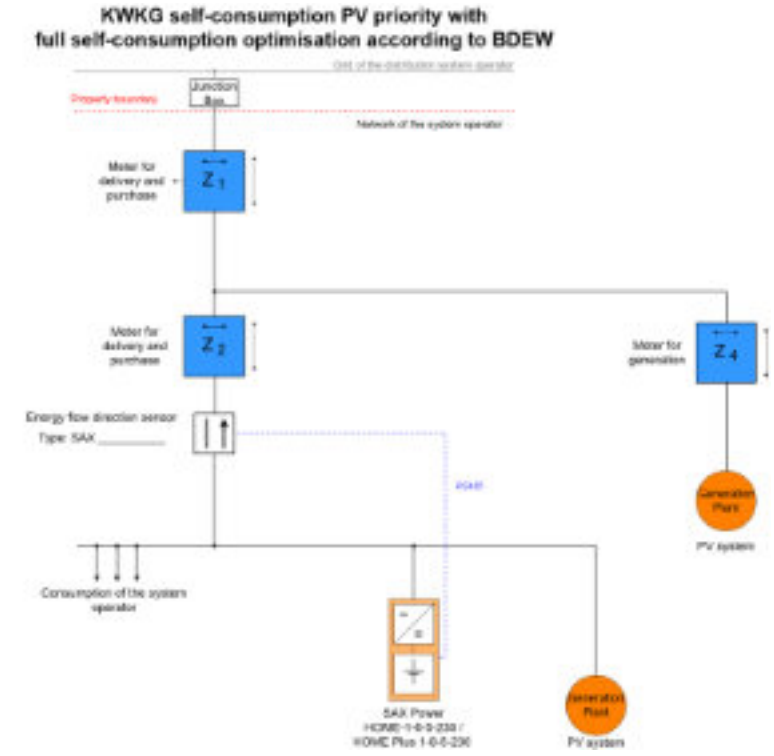


Fig. 31 Measurement concept (two distributed energy resources)

6.2 SAX Power Smart Meter ADL400

The ADL400 is a smart meter (energy flow direction sensor) for three-phase power measurement (direct measurement).
Communication takes place via an RS485 connection using Modbus RTU (9600 8N1).
The ADL400 is used in standard installations:

Fig. 32 ADL400: Front view

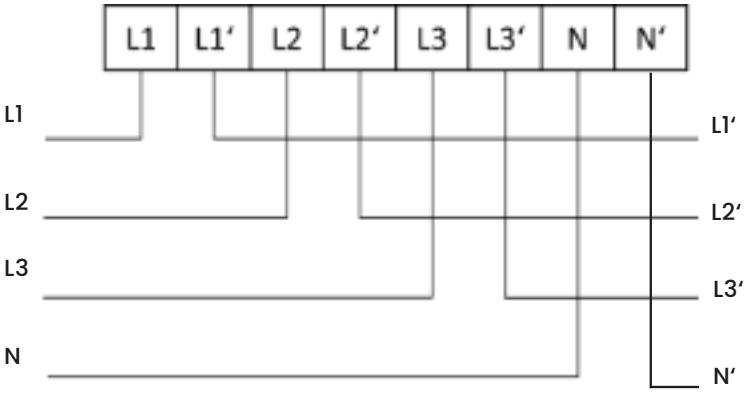
Fig. 33 ADL400: Bottom view

Fig. 34 ADL400: Top view

6.3 Installation

Fit the smart meter onto the top-hat rail (TH 35mm, 4TE) in the distribution board

1. Connect the L1, L2, L3 and N terminals.
2. Tighten all screws.



6.4 Communication

During initial commissioning, the storage unit carries out a smart meter test. This involves feeding power into the grid to determine the polarity of the measurement. The installation orientation of the smart meter is therefore not strictly prescribed, but it must not be changed once initial commissioning has been completed.

Pins 21 and 22 are used for the RS485 connection.
Ensure the correct polarity when connecting the cable to the storage unit!

To prevent the signal cables from accidentally coming into contact with grid voltage when connecting them to the ADL400, a sticker is included with the ADL400. This serves as protection against accidental contact and must be affixed over the screw holes on the grid connection terminals before connecting the signal cables.

Fig. 36 ADL400 correctly connected

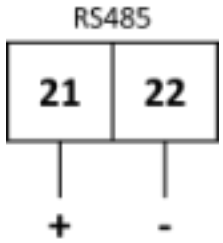


Fig. 37 Correct RS485 polarity

Note:
Proper and professional installation is the responsibility of the qualified technician carrying out the work. SAX Power GmbH accepts no liability whatsoever for damage resulting from improper installation. When using a bus cable with a braided screen, care must be taken to ensure, by means of heat-shrink tubing or similar methods, that the screen cannot come into contact with live conductors.

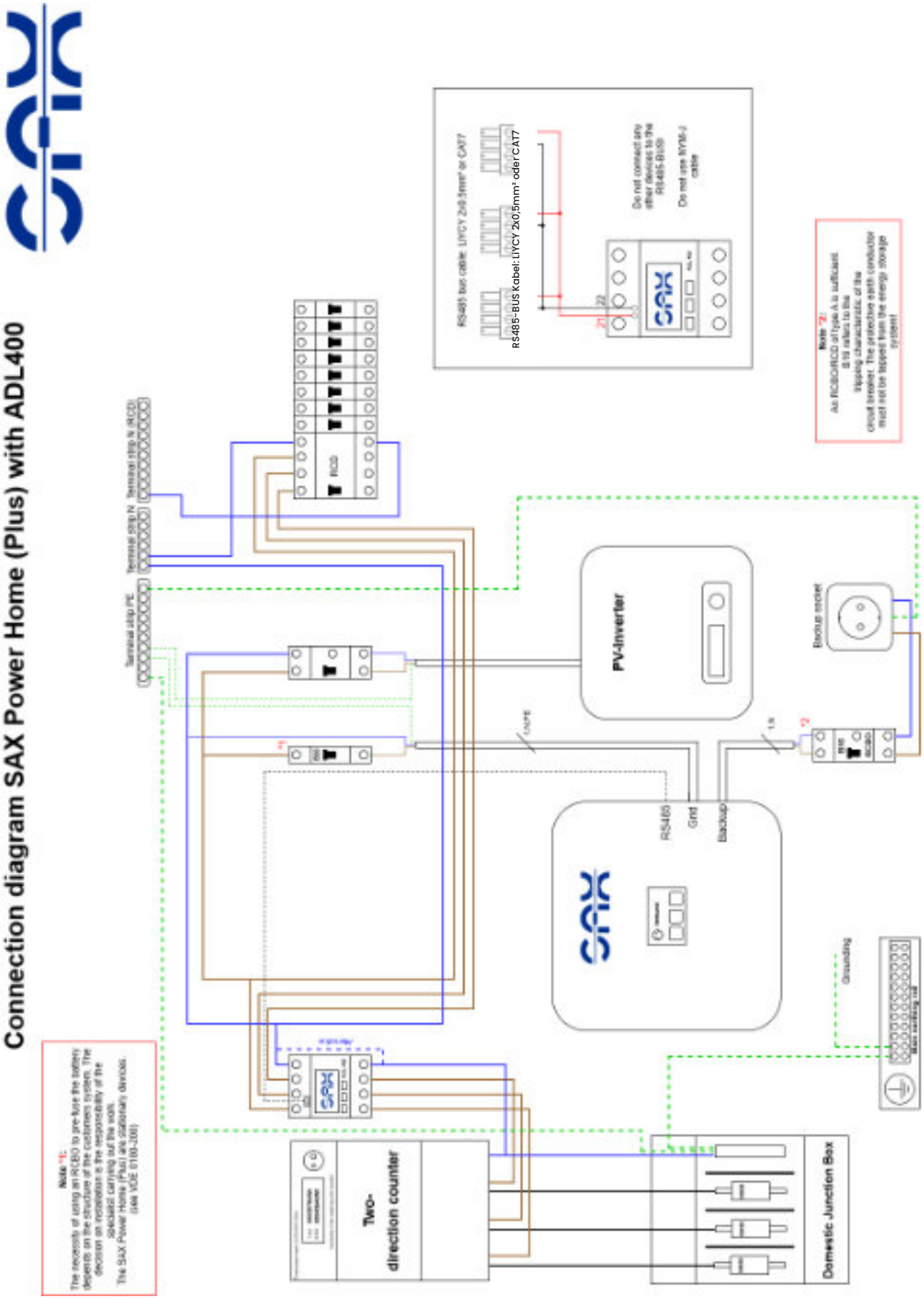


Fig. 38 Connection diagram with ADL400 (standard installation)

6.4 SAX Power Smart Meter ADW200

The ADW200 is a smart meter designed for three-phase power measurement.

Current is measured using clamp-on current transformers up to 100A. (Maximum cable cross-section: 70mm². Internal diameter: 16mm)

RUN: Power is connected. If "RUN" is not flashing slowly: check the SM connection (L, N).
COM: Flashes when the storage unit is accessing data. If "Com" is not flashing: check the RS-485 connection!
PUL: Not used.
FUN: Not used.

Fig. 39 ADW200: Front view

CH1: Current transformer – grid measurement.
CH2: Current transformer – generation plant measurement.
CH3: Not used.
CH4: Not used.

POWER/RS485: Connection for LORA module.

Warning:
No network connection.
Connecting may damage the network hardware and storage devices!

Abb. 40 ADW200: Unteransicht

14: N (measurement)
13: L3 (measurement)
12: L2 (measurement)
11: L1 (measurement)

2: N (supply)
1: L (supply)

22: RS485 (-)
21: RS485 (+)

Fig. 41 ADW200: Top view

Installation

Fit the ADW200 smart meter onto the top-hat rail (35 mm DIN).

Abb. 42 AWD200 montiert auf Hutschiene (DIN 35 mm)

Connections

1. Connect the wires to terminals 11–14 for voltage measurement and to terminals 1–2 for the auxiliary power supply. (Maximum cross-sectional area: 2.5 mm²)

Note:
Please note that one terminal is left unassigned between terminals 11 and 14.

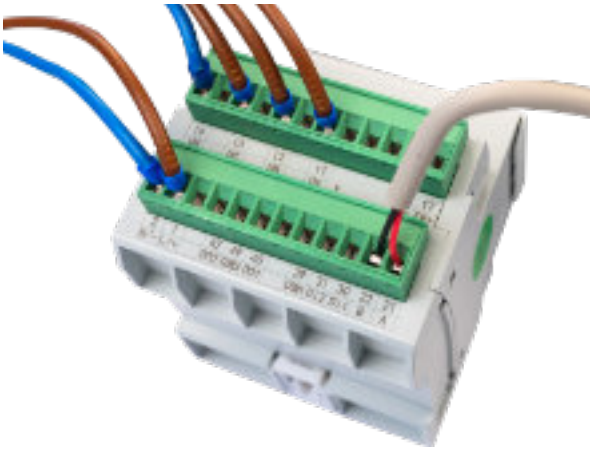


Fig. 43 Connection overview (RS485, voltage measurement, power supply) ADW200

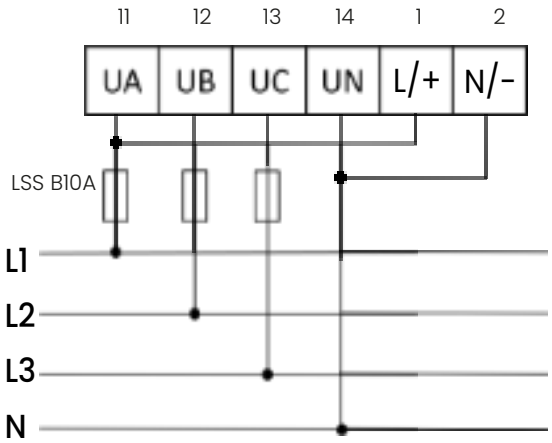


Fig. 44 Wiring diagram for voltage measurement and power supply

During initial commissioning, the storage system carries out a smart meter test. During this test, the sign of the measurement is determined by feeding power into the grid. The direction in which the current transformers are installed is therefore not strictly prescribed. However, the direction of the arrow must be the same on all transformers. It must not be changed once initial commissioning has been completed.

1.1 If required: Extension of the current transformers
The connection cable for the current transformers used for measurement on the grid or at the generation plant may be extended under certain conditions.

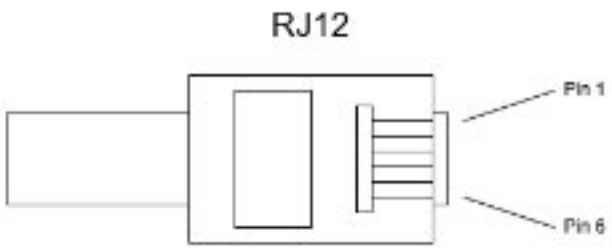
For short extensions < 5 metres:
- RJ12 modular cable extension, type RJ12 6P6C.

Extensions > 5 metres up to a maximum of 100 metres:

- CAT7 S/FTP installation cable.
- Extension is possible via a soldered connection, LSA cut-to-length terminals or spring-loaded terminals (Wago terminals).
- The assignment of the converters and the correct polarity must be strictly observed.
- A separate twisted pair must be used for each converter.
- The pinout of the converters' RJ12 plugs is shown in the diagram below.
- If a UAE socket is used, it must not be configured according to TIA-568A/B. The twisted pairs must be connected side by side as shown in the diagram.

Fig. 45 Extending measuring lead 5 to a maximum of 100 metres

Assignment of ADW200 folding transformer



Pin	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
Color RJ12	Brown	White	Black	Orange	Red	Yellow
Assignment	I_C	I_C*	I_B	I_B*	I_A	I_A*
Recommended CAT7	Orange	Orange/ White	Green	Green/ White	Blue	Blue/ White

Fig. 46: Fold-out converter layout (ADW200)

2. Connect the folding current transformer to phases L1 (yellow), L2 (green) and L3 (red). Connect to CH1. Ensure the colours and arrow directions are correct!

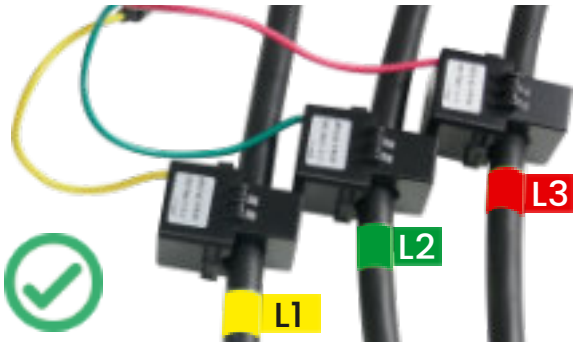


Fig. 47 All transducers are aligned in the same direction

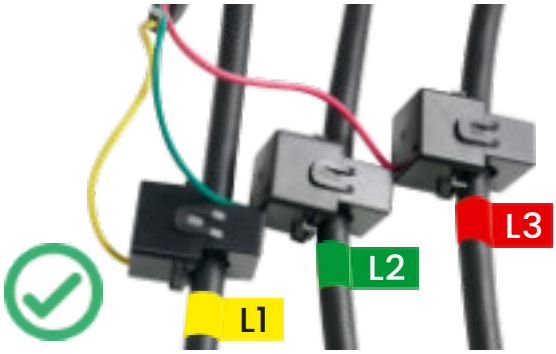


Fig. 48 All transducers are oriented in the same direction

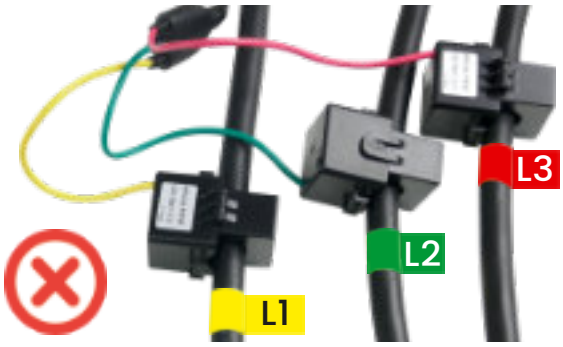


Fig. 49 Incorrect orientation of the L2 clamshell current transformer

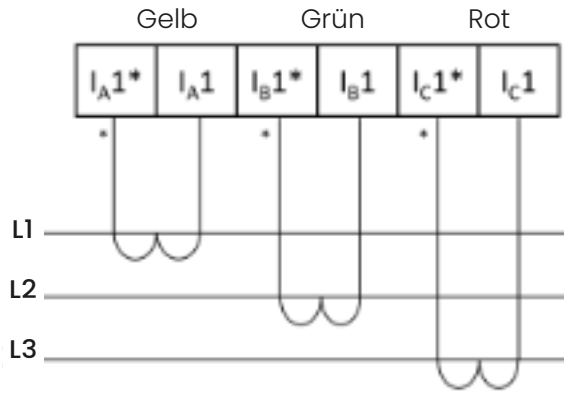


Fig. 50 Wiring diagram for a hinged current transformer

3. Fit a hinged current transformer for each phase of the distributed energy resource (Ensure the correct colour coding! Phase L1 (yellow), L2 (green) or L3 (red)). Plug the transformers' signal cables into CH2.

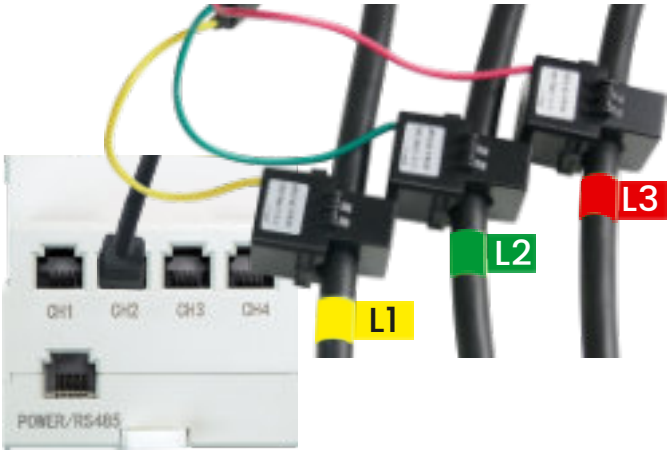


Fig. 51 Connection of the folding current transformers to the AC side of the generation plant

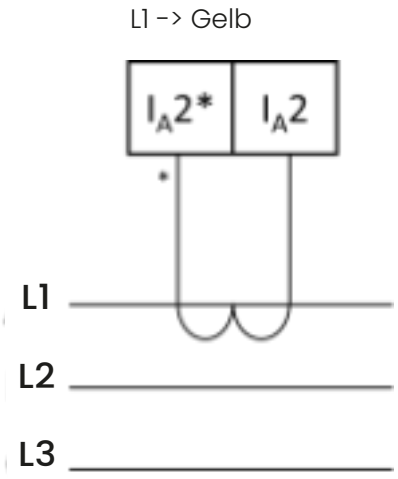


Fig. 52 Measurement diagram for a folding current transformer in the case of a single-phase inverter connected to L1

Attention:
Ensure the correct colour matching! Ensure the connections are secure! (Colour matching as described in point 2 for the second phase)

Communication

Cable connection to the SAX Power storage unit:
Pins 21 and 22 are used for the RS485 connection. (See Fig. 37)

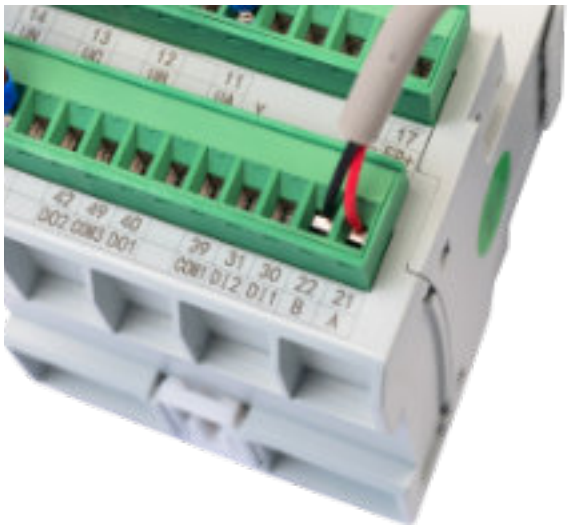


Fig. 53 RS485 pin configuration on the ADW200 smart meter

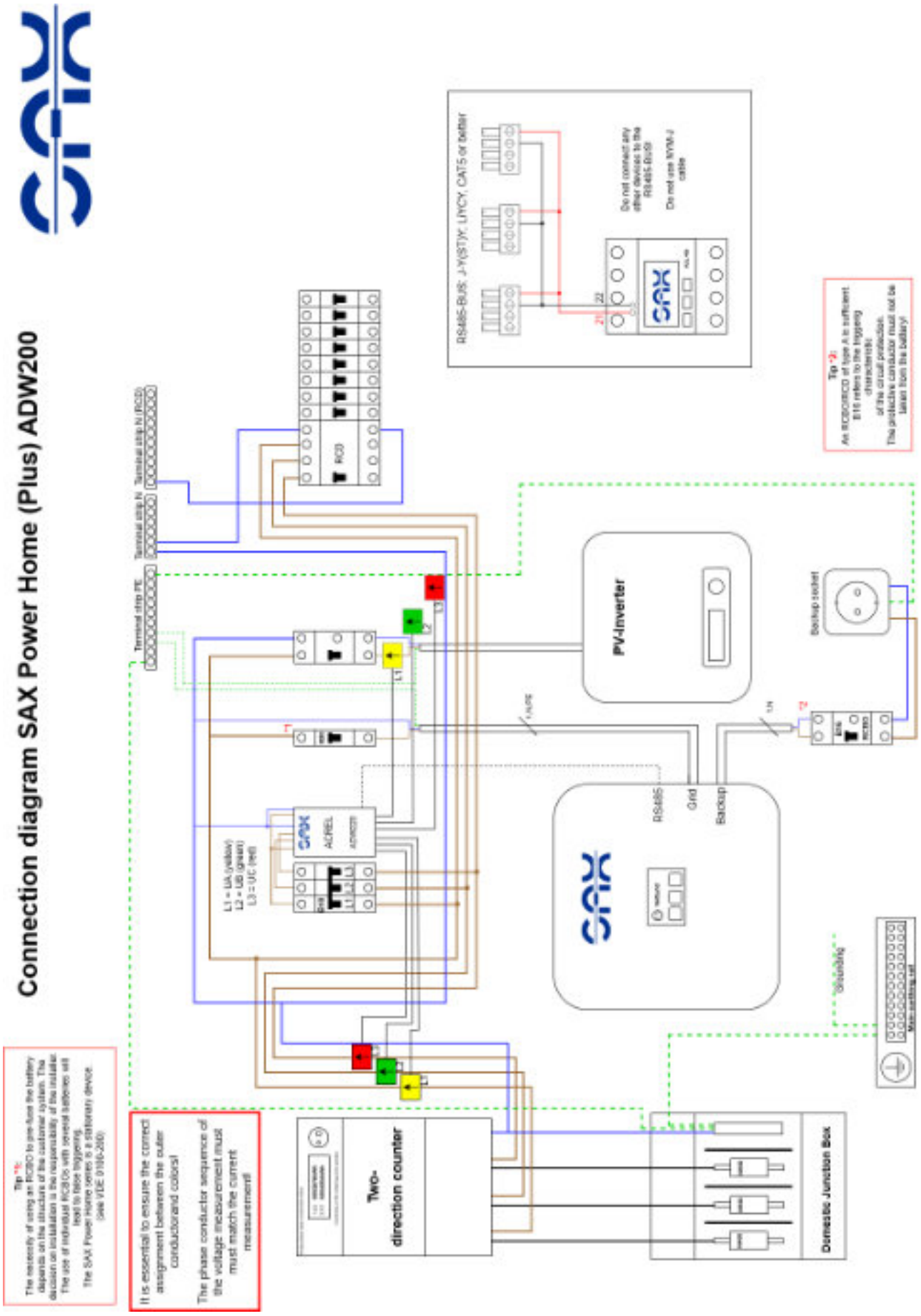


Fig. 54 Connection diagram with ADW200

7 Connecting the SAX Power Home (Plus)

7.1 Stromanschluss herstellen

The connection from the domestic supply to the SAX Power Home (Plus) must be rated for a current load of 20A. This usually requires a 3 x 2.5 mm² cable with a Wieland connector (for the grid connection), as well as, where necessary, a further 3 x 2.5 mm² cable with a Wieland connector for the emergency power connection (The cables are not included in the scope of delivery). Recommended cable types: YSLY-JZ 3G2.5, H07RN-F 3G2.5 or H05VV-F 3G2.5. The use of NYM-J is not recommended.

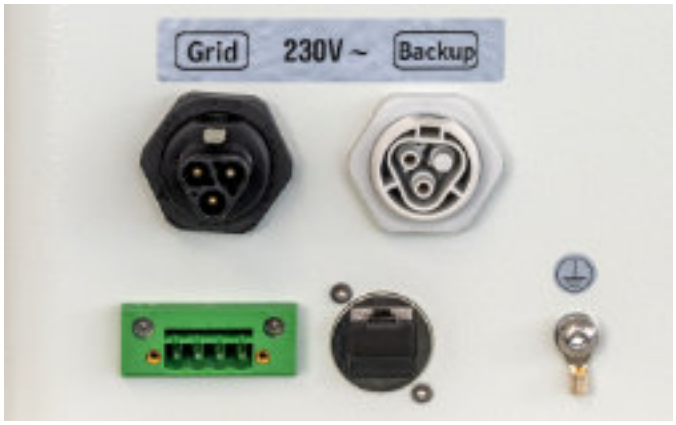


Fig. 55 Connections

1. Connect the grid supply to L1, N and PE in the distribution board.
2. Carry out and record all necessary measurements in accordance with VDE 0100 at the grid connection.
3. Connect the grid supply cable to the grid connection on the SAX Power Home (Plus).
4. If a second or third SAX Power Home (Plus) storage unit is to be connected, connect the second storage unit to L2, N and PE; connect the third to L3, N and PE.

7.2 Setting up an internet connection

Each storage unit must be connected to the internet via the LAN port.

1. Connect the LAN cable to a free port on the router.
2. Connect the LAN cable to the storage device.

Note:

- The storage device operates as a DHCP client and obtains its IP address automatically. This requires an active DHCP server on the network (usually the Wi-Fi router). Manual address allocation must be carried out via a DHCP reservation in the router.
- The internet connection must be a wired connection. If Wi-Fi repeaters, powerline adapters ('DLAN') or similar devices are used, any connection issues are not covered by SAX-Power Support.
- Ports 80 and 5700 are used for communication.

By connecting the storage unit to the internet, you benefit from the following advantages

- Operating data can be viewed via the web portal.
- Remote diagnostics by SAX Power Support are possible.
- Important software updates can be carried out.
- The SAX Power manufacturer's warranty requires an internet connection.

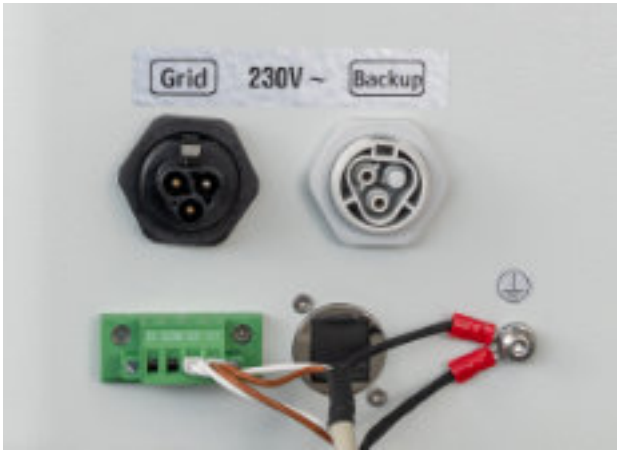


Fig. 56 Wired storage unit

7.3 Establishing communication links

1. Two conductors from a communication cable (e.g. J-Y(ST)Y 2 x 2 x 0.8; EIB Y-(ST)Y 2 x 2 x 0.8; LiYCY; CAT5) are required. Use ferrule sleeves for flexible cables.
2. Connect output 21 of the smart meter to terminal 21 on the storage unit, and connect output 22 of the smart meter to terminal 22 on the storage unit.
3. Tighten the screws on both terminal blocks. (Smart meter and storage unit)

   If using multiple storage units, connect them as follows (Fig. 57):

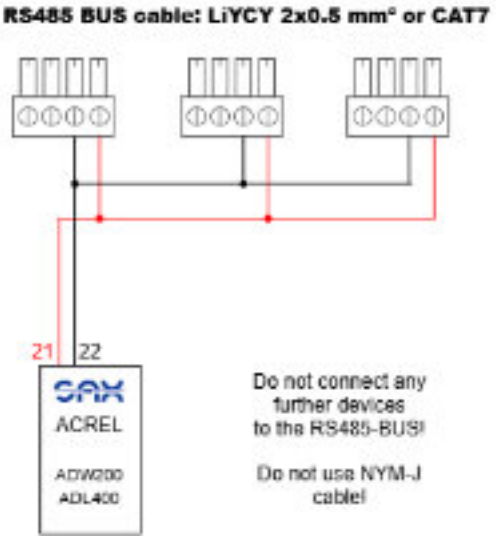


Fig. 57 RS485 parallel connection in a multi-phase system

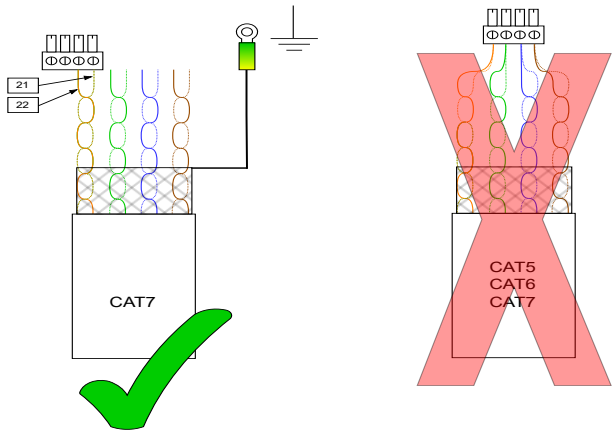


Fig. 58 Communication line pinout

Note:

- The shielding braid must be correctly connected to the storage unit housing and to the PE busbar of the distribution board, and earthed (shielding connected at both ends).
- When using a communication cable with more than two conductors, it is important to use a pair of conductors from the cable. (See Fig. 58)

7.4 Connecting several SAX Power Home (Plus) units together

Der SAX Power Home (Plus) ist modular erweiterbar auf bis zu 3 Geräte. Jeder Speicher wird einphasig angeschlossen (See "7.1 Connecting the power supply").

Several storage units are connected to one another as follows:

Fig. 59 Three SAX Power Home (Plus) units connected in series

1. Establish an RS485 connection between the storage units. To do this, connect terminals 21 and 22 of the storage units in parallel using terminal blocks.
2. Each storage unit is connected to a phase of the domestic grid supply.
3. Each storage unit must be connected to the internet via the LAN port.

Fig. 60 RS485 connection for the master and first slave storage unit in a network of 3 SAX Power Home (Plus) units

Fig. 61 RS485 connection for a single storage unit or the last storage unit in a network

8 Introduction: Emergency power, standby power and black start

When the emergency power function is activated, the battery maintains a capacity reserve of 9% at all times for emergency power operation. This can be utilised following a grid power failure, even without the black start option. If this residual capacity is exhausted or the storage system is shut down at the emergency power output due to an overload or short circuit, the storage system can only be switched on again once grid voltage is available once more or the black start option has been installed.

Consequently, with the help of the black start option, even a completely switched-off system can be brought back into operation to ensure the house remains supplied with power, even during prolonged grid power cuts.

8.1 Distinction: emergency power and backup power

The batteries maintain a 9 % reserve capacity. In the event of a grid power failure, the connected emergency power socket will continue to be supplied with power. If a grid transfer switch is installed, the entire house can continue to be supplied with power.

Emergency power supply:

Option 1: Black start option not fitted.
The storage system supplies the loads until its capacity is exhausted. In the event of an overload, the storage system cannot be restarted.

Option 2: Black start option fitted.
The storage system supplies the loads until its capacity is exhausted. In the event of an overload, the storage system can be restarted using the black start button.

Recharging the storage system via the generation plant is not possible in either case!

Back-up power:

Option 1: Black start option not installed.
The storage system initially supplies the loads directly from the generation plant. If the generation plant's output is insufficient, the storage system supplies the loads until its capacity is exhausted. The storage system is then shut down and cannot be restarted, even if the generation plant is once again able to supply power. Nor can the storage system be restarted in the event of an overload.

Option 2: Black start option is installed.
The storage system initially supplies the loads directly from the generation plant. If the generation plant's output is insufficient, the storage system continues to supply the loads until its capacity is exhausted. The storage system is then switched off and can be restarted via the black start button as soon as the generation plant is once again supplying sufficient power to meet the connected loads' requirements.

This utilises the residual capacity in the storage system, which, even at a charge level of 0 per cent, is still sufficient to start and synchronise the generation plant's inverter.

In the event of an overload, the storage system can be restarted using the black start button.

In both cases, it is possible to recharge the storage system via the generation plant, provided that all other requirements are met!

8.2 Verhalten bei Netzausfall

If the grid supply fails, the battery will continue to supply power to the emergency power output. If a manual grid transfer switch is fitted, it must now be set to the "Emergency" position. If an automatic transfer switch is fitted, it will switch automatically to the "Emergency" position once the preset waiting time has elapsed.

8.3 What to do when power is restored

Once grid power is restored, this is noticeable in the case of a manual grid transfer switch due to the emergency power supply to the storage unit repeatedly switching off and on. This is due to the standard-compliant relay test being carried out when grid power is restored. The manual emergency power transfer switch can be returned to the "Grid" position.

When using an automatic transfer switch, the system will automatically switch back to the "Network" position after grid power is restored and the set waiting time has elapsed, without any sporadic interruptions. On most models, including the Chint G NXZB-63H, the waiting period is indicated by a flashing red LED.

8.4 Operating the storage unit when using the black start function

To restart the shut-down storage unit using the black start function, the following steps must be carried out:

- No grid voltage is present: the black start button is not lit.
- Set the storage unit's main switch to the 'On' position.
- Hold down the black start button until the button begins to light up. Depending on the reason for the previous shutdown, this may take up to 30 seconds.
- The battery now supplies power to the emergency power output.
- If there are several batteries: Repeat for all batteries.
- The batteries display the error message 'Island' or 'U<<'. This indicates a power supply failure and is part of normal operation.

8.5 Emergency power supply

The SAX Power Home (Plus) provides an IT network during emergency power operation. There is no connection between the neutral conductor and the protective conductor.

To ensure the emergency power supply complies with standards, in accordance with DIN VDE 0100-410, Section 411.6, monitoring of the insulation resistance to the protective conductor is required. The required switching elements must be arranged in accordance with the documentation provided by the manufacturer of the insulation monitoring device.

The insulation monitoring device must be connected to the signalling contacts of the CHINT NXZB-63H/4CT grid isolator recommended by SAX Power. The corresponding schematic diagram can be found in the documentation for this grid isolator. Connection to the signalling contacts is necessary to ensure that the insulation monitoring device is active exclusively during emergency power operation. Otherwise, following a switchover back to the TN-S/TN-C-S network, an insula-

tion fault would be signalled continuously by the insulation monitoring device due to the connection between the neutral conductor and the protective conductor.

As the emergency power supply is designed as an IT system, the installed residual current device (RCD) does not trip upon the first insulation fault. Shutdown only occurs when a second insulation fault occurs, in accordance with the protective measures for IT systems. For this reason, the tripping current of the RCD in emergency power mode cannot be tested using the measurement method between a live conductor and the protective conductor that is standard in TN systems.

Provided that the storage unit's emergency power mode has been enabled, only up to 9 per cent of capacity is discharged during grid-connected normal operation. A safety socket fitted to the emergency power output must always be protected by a circuit breaker. When the storage unit feeds its full output into the domestic grid supply, this current is added to the storage unit's upstream protection. Consequently, without proper upstream protection, a current of up to 40 A may be drawn. **There is an acute risk of fire here!**

8.6 General conditions for emergency power switchover

In order to implement an emergency power switch-over in a house, the following general conditions must first be checked:

8.6.1 What type of grid is in place?

If the house is supplied by a TT or TN-S system, the switchover can be carried out without any problems. In the case of a TN-C system, it is essential to ensure that

- The PEN conductor is split only once and is not recombined.
- No sub-distribution boards in the house are supplied via the TN-C system.
- The PEN conductor is not switched under any circumstances.

8.7 Usable Power

This is an emergency power supply. Therefore, it cannot always be guaranteed to power heavy loads!

Examples:
- High-power induction hobs.
- Air compressors.
- Power tools with high starting current.
- High-capacity refrigeration units (heat pumps, cold cells)

Single-phase emergency power supply
If a single-phase emergency power supply system is installed, no three-phase loads may be operated on the emergency power supply system. To prevent the neutral conductor from becoming overloaded in the case of loads with a 5-pole supply cable (e.g. hob, cooker), a circuit breaker with neutral conductor monitoring must be used. A 4-pole circuit breaker is not necessarily sufficient for this purpose!

It is essential to ensure the correct designation is used. A 3P+N type circuit breaker only enables complete disconnection from the grid, but does not monitor the neutral conductor!

When using two SAX Power Home (Plus) storage units, two phases are available in the same way; however, two phases must still be bridged together. Two SAX Power Home (Plus) storage units connected in parallel then provide two phases, each phase-shifted by 120°.

8.8 Three-phase emergency power supply

If there are three-phase loads in the house that are also to be supplied by the emergency power supply, this can only be achieved using three SAX Power Home (Plus) storage units. This provides a system with 230 V/400 V, a phase shift of 120°, and a clockwise rotating field.

8.9 Load-bearing capacity

A system comprising SAX Power home batteries can be loaded as follows during emergency power operation:

- 1 battery: 4.6 kVA, single-phase (230 V, 20 A).
- 2 storage units: 9.2 kVA, 2-phase (230 V/400 V, 20 A), with storage unit B phase-shifted by 120° relative to storage unit A.
- 3 storage units: 13.8 kVA, three-phase (230 V/400 V, 20 A), 120° phase shift, clockwise rotating field with phase sequence A-B-C.

8.10 Selecting the network switch

To implement the grid changeover, a suitable changeover switch must be selected.
In doing so, care must be taken to ensure that the changeover switch meets the following rquirements:

- 4-pole changeover.
- The neutral conductor is connected before and disconnected after the other phases.
- Sufficient current-carrying capacity in accordance with the distribution board's upstream fuse (40A or 63A).
- Mechanical interlock between the grid and emergency positions (no simple contactor switching!).

If manual switching is sufficient, a simple top-hat rail-mounted switch can be installed directly in the distribution board.

Examples:

- Sontheimer ULO63/4T/NS/Z101/F976.
- ABB OT63F4C.

Automatic switching can be achieved using an ATS (Automatic Transfer Switch). However, it is important to note that this involves significantly greater installation effort, as automatic transfer switches are considerably larger and usually cannot be fitted inside the distribution board. In such cases, an external control cabinet with a mounting plate may be required. The grid supply and return cables must then be routed into the control cabinet with a sufficient cross-sectional area (min. 10 mm²). Furthermore, to ensure the system remains user-friendly for non-specialists, adequate protection against accidental contact must be provided within the control cabinet.

8.11 Switching elements and configuration

The layout of the switching components can be found in the circuit diagrams provided.

When using several SAX Power Home (Plus) storage units, a multi-pole circuit breaker must be used. Fusing a multi-phase system with individual RCBOs for each storage unit will result in false tripping and damage.

Should the customer's installation require the use of an RCD upstream of the storage units, selectivity must be maintained. Failure to do so will result in false tripping and/or damage to property.

When using an ADW-type smart meter, please note that the smart meter's power supply must not be supplied by the emergency power source. The connection for metering must therefore be made before the switchover.

8.12 Inselfähigkeit und Ersatzstrombetrieb

The storage system is capable of off-grid operation. If a PV inverter or other generation system is used in off-grid mode, additional points must be observed to prevent damage to end users, the inverter or the storage system.

To prevent overproduction in the emergency power supply network, the storage system dynamically regulates the output frequency via the inverter's P(f) characteristic curve. Through this frequency control, the inverter will reduce the feed-in power and limit the maximum charging power.

The following points must be observed:
- If you have a storage unit with a serial number 1002300xxx, please contact customer service to enquire about the hardware version and thus compatibility.
- As with the loads, a 3-phase inverter requires the use of 3 storage units.
- The load should be as symmetrical as possible.
- The generation output in the emergency power supply network must be limited to a maximum of 5 kVA per phase.

Attention:
A prerequisite for off-grid operation is the availability of a P(f) characteristic curve in the configured grid connection standard for the inverter. This is available, amongst others, in the following standards:

AR-N-4105
TOR Generator Type A
NIN 2020 & VSE standard

Inverters configured in accordance with VDE 0126-1-1-2006 or earlier are not suitable for off-grid operation.

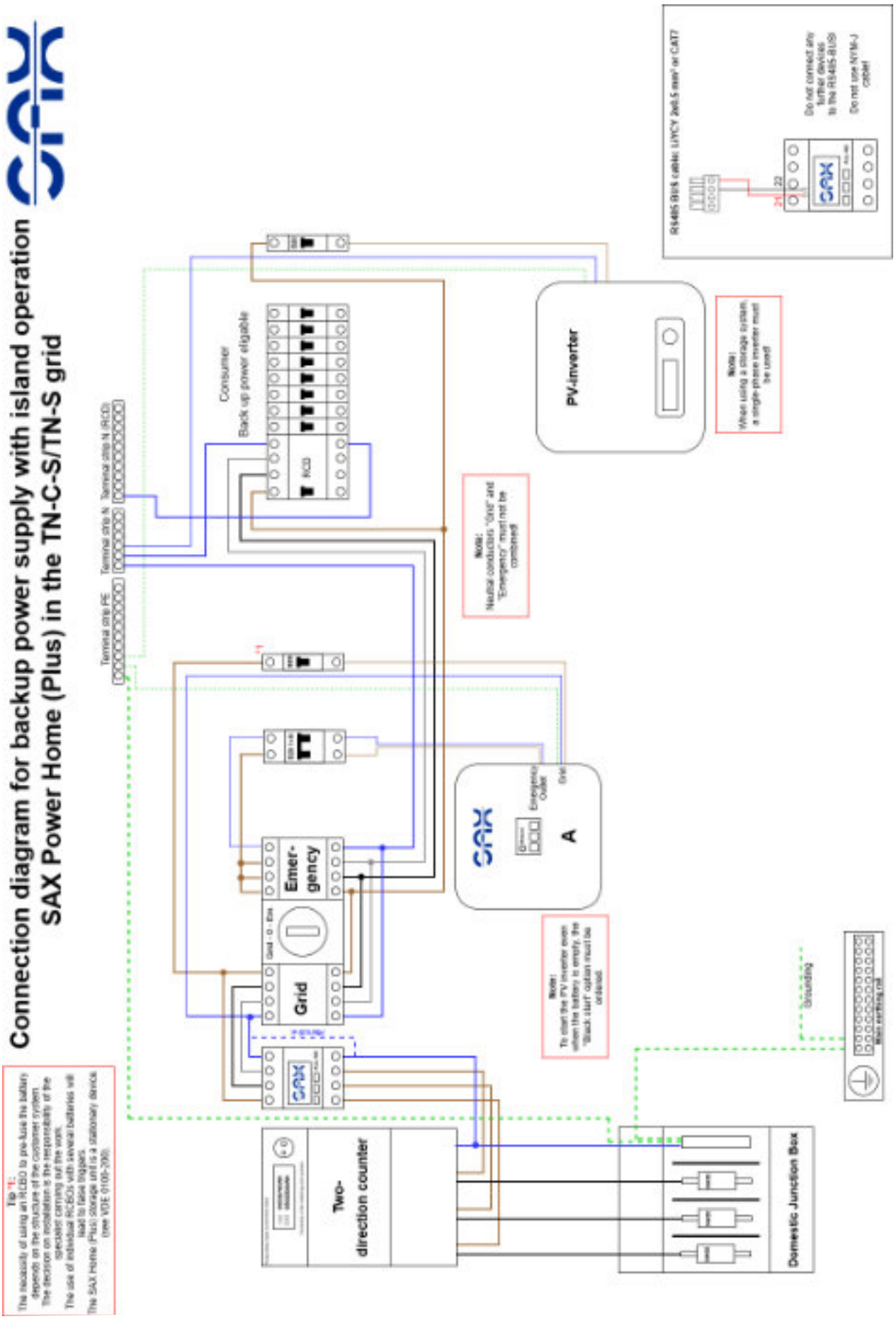


Fig. 62 Wiring diagram for a backup power supply with stand-alone operation in a TN-C-S/TN-S network

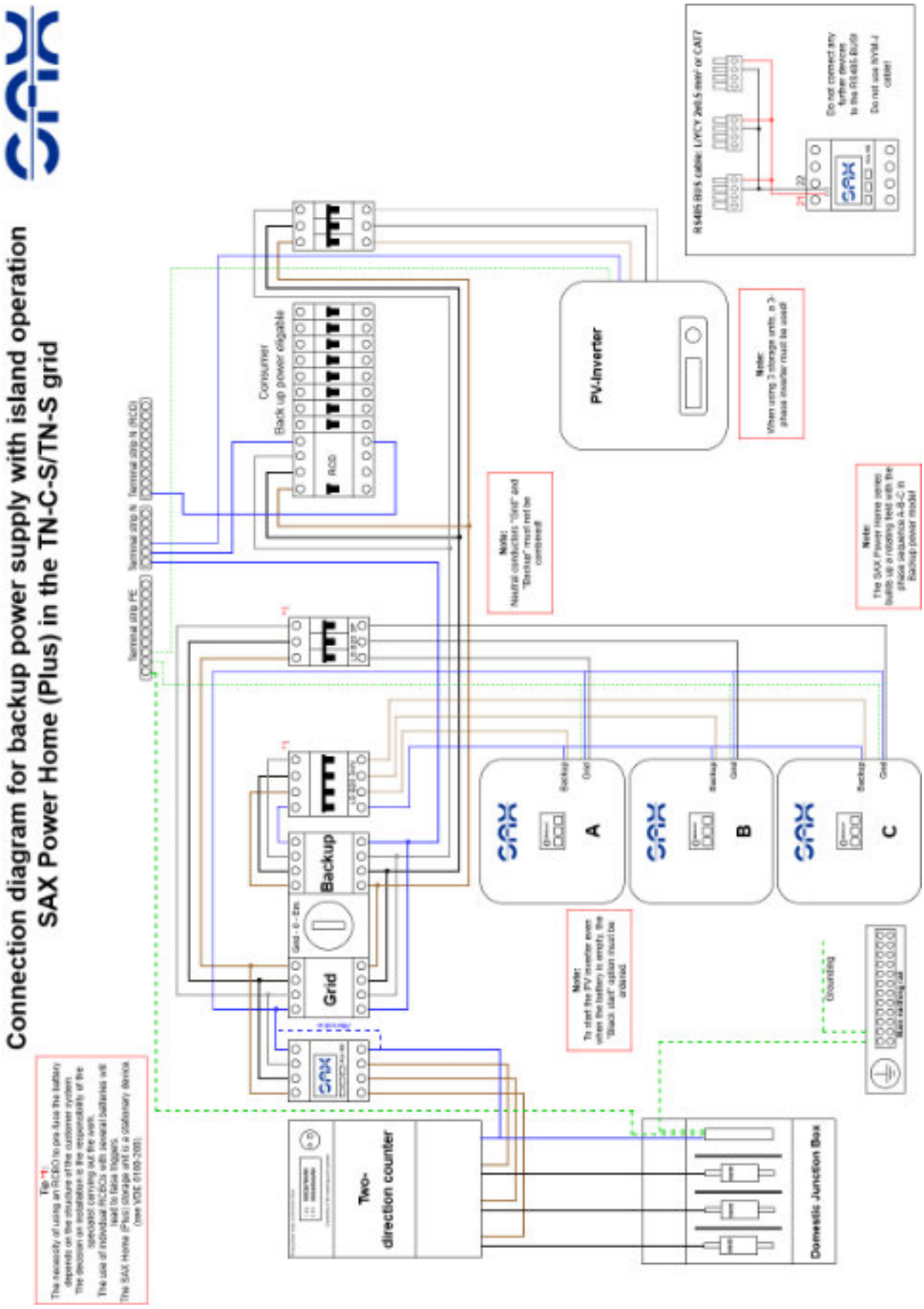


Fig. 63 Wiring diagram for a backup power supply with stand-alone operation in a TN-C-S/TN-S network

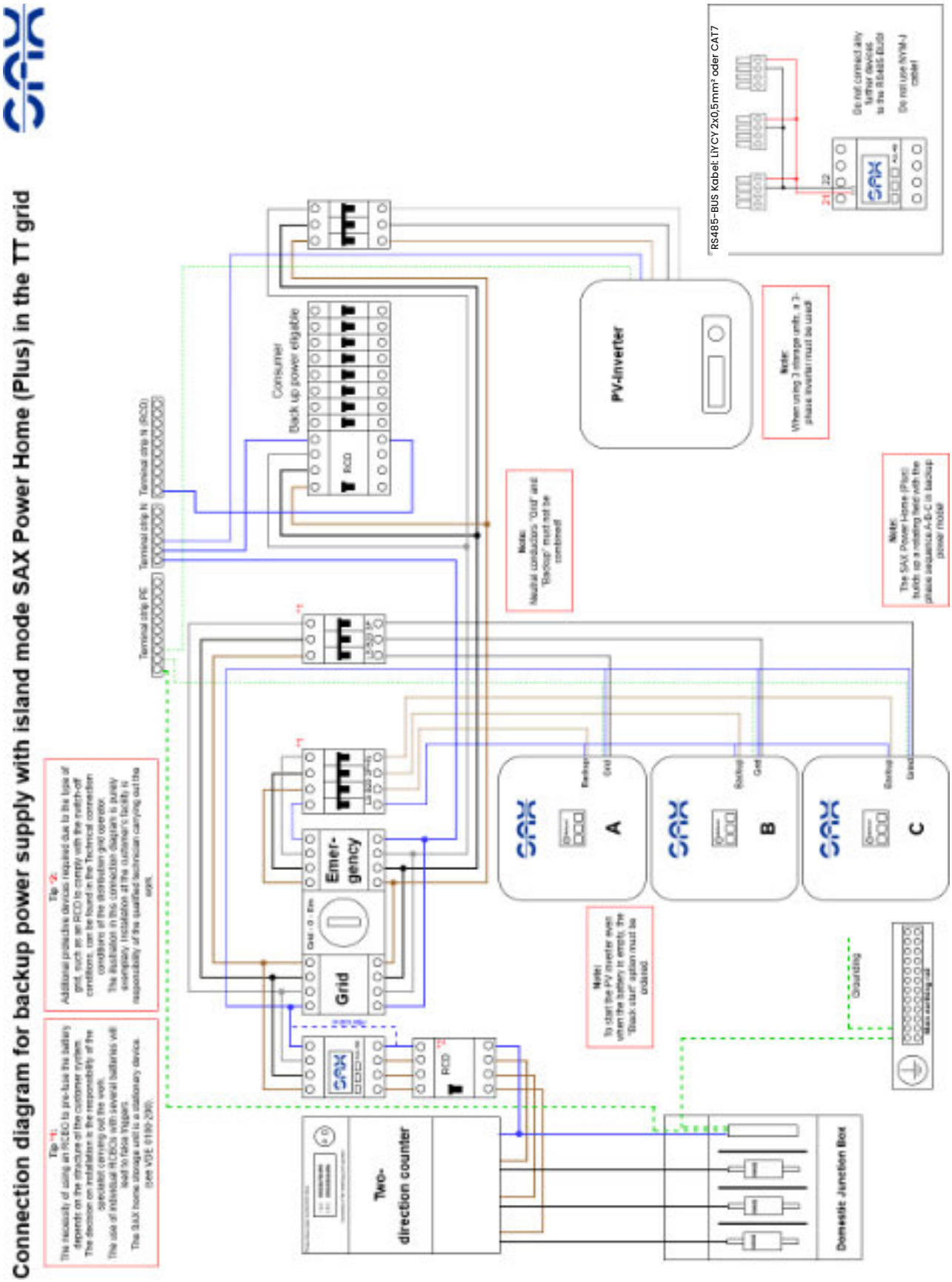


Fig. 64 Wiring diagram for a backup power supply with stand-alone operation in the TT network

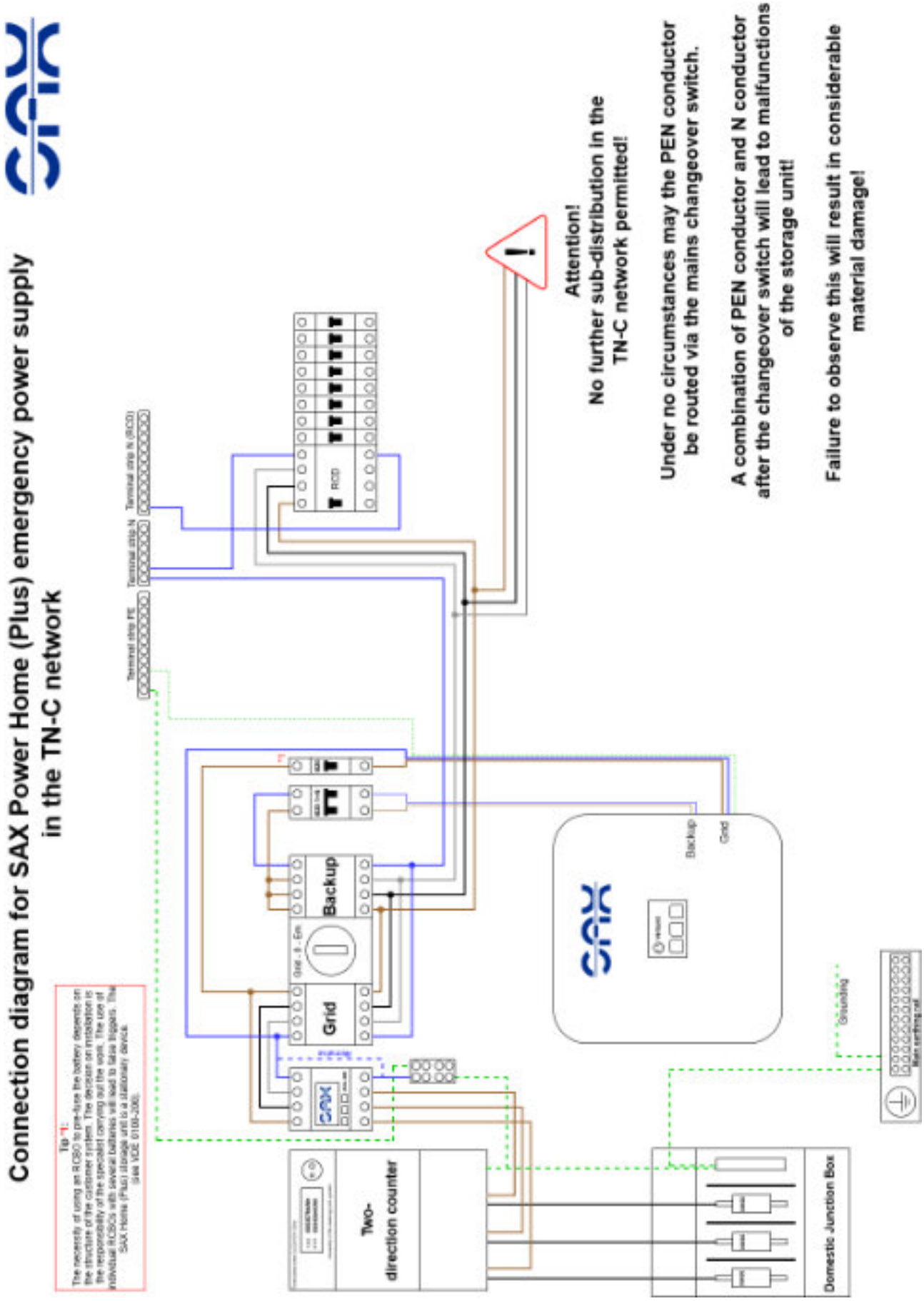


Fig. 65 Wiring diagram for a backup power supply with stand-alone operation in a TN-C network

9 Commissioning

Prerequisites for commissioning:
The smart meter has been installed correctly (correct connection of the clamshell current transformers on the ADW200), the storage unit has been fitted, and the following connections

- Grid connection
- Emergency power connection (if applicable)
- Network connection (see Chapter 7.2: Setting up an internet connection)
- Smart meter connection (see Section 7.3: Establishing a Communication Connection)

have been established correctly.

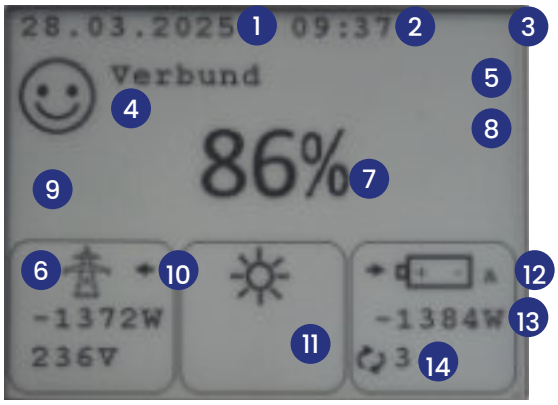


Fig. 66 Display following successful installation

1. Current date
2. Current time
3. Connection status to the web server, no status (LAN = OK)
4. Storage unit status display
5. Advanced status display, no status
6. Network error display (see error code list)
7. Charge level display
8. Device error display, no status (see error code list)
9. Storage unit's IP address
10. ->Power consumption from the public grid
    <-Surplus power fed into the public grid
11. Generation plant display (ADW200 only)
12. Grid phase display
13. ->Charging power
    <-Discharging power
14. Charging cycles

9.1 Step-by-step guide to initial commissioning:

1. Carry out and record all necessary measurements in accordance with VDE 0100 at the grid connection.
2. Switch on the fuse; the display will update.
3. Switch on the meter to the left of the main switch.
4. The start-up procedure begins; the message "Wait 60 seconds" appears.
5. The meter carries out a relay test (loud clicking noise).

6. The meter switches on.
7. The meter starts an "SM test" (smart meter test).
8. If the smart meter test is successful, 'Grid' appears.

Please note: Once the SM test has been carried out, the installation orientation of the smart meter must not be changed!

8. Take note of any error messages on the display; in the event of an error, see the chapter "Operational messages, problems and solutions".
9. Set up the web app.

Subsequent self-tests to check that the storage unit is functioning correctly:

- Switch off the generation system.
- Switch on a load in the house (>2 kW) and check in the web app whether the storage output increases by >2 kW.
- The grid power should stabilise at a value between -100 W and +100 W.
- If the UPS is active and an emergency power socket is fitted, connect the appliance to the emergency power outlet
- and reset the storage unit's circuit breaker. The appliance must continue to run!

Calibration instructions:
The calibration charge serves to optimise the state-of-charge display, balance the cell voltages and increase the usable capacity. If the battery is not taken to its limits (0% and 100%) for a prolonged period, a calibration cycle with a power of 1000W is triggered. This status is indicated by the message 'Calibrate battery' on the display. Furthermore, the dashboard will show a charge or discharge of exactly 1000W.
Note: If the firmware version is out of date, the calibration message may not appear on the display!

10 User dashboard

You can monitor the storage system via a web interface and an app. The storage system is connected to the SAX Power GmbH web server via the internet. The appearance of the app and the web interface may differ slightly, but this does not affect their functionality.

Go to the following address in the browser on your PC or laptop: **https://app.sax-power.net/login** or download the app from the major app stores.

Download on the App Store

GET IT ON Google Play

10.1 Registering in the user app

1. When logging in for the first time, click on "Create account" (see Fig. 67). Enter your email address and the registration code provided on the accompanying sheet, then choose a personal password.

2. Click on "Register" (see Fig. 69). You have now created an account and can log in using your email address and password.

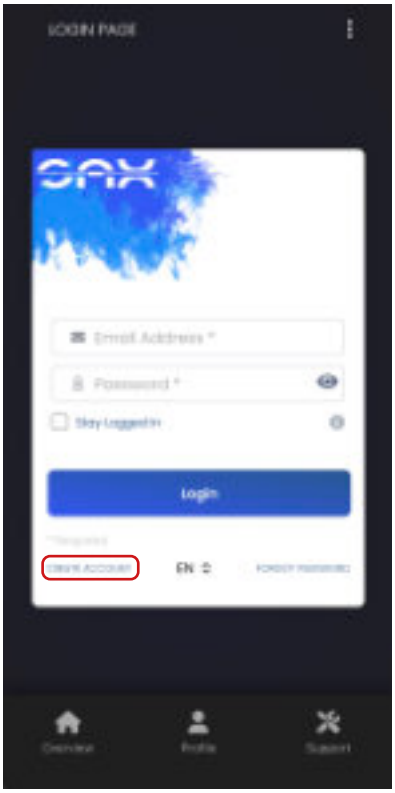


Fig. 67 Create an account

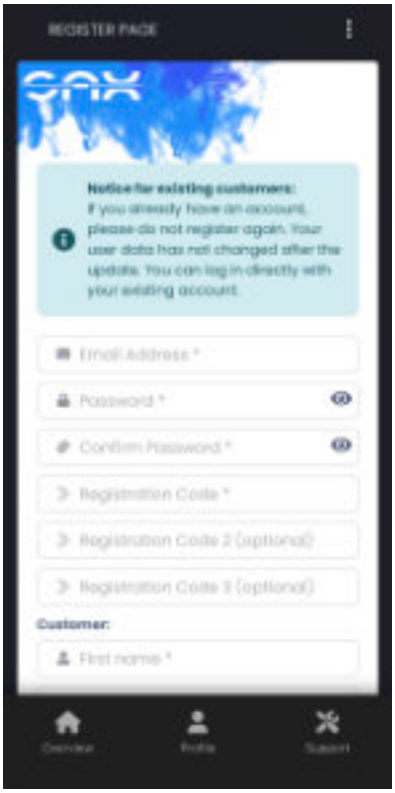


Fig. 68 Registering data

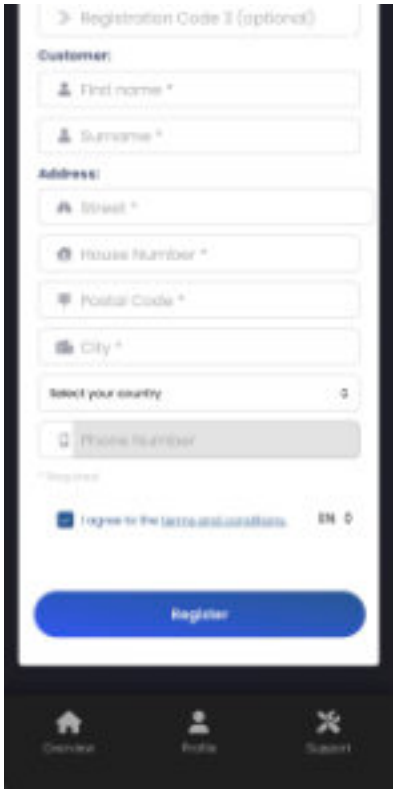


Fig. 69 Registration

10.2 Operation via the SAX Power Dashboard (1)

1. General settings

Here you can configure: language, light and dark mode, notifications for new updates, and logging out via the SAX logo

2. Storage selection

Create groups (only for multi-phase configurations), edit the groups & assign storage units.

3. Serial number

4. Battery power

- negative sign = storage unit is charging
+ positive sign = storage unit is discharging

5. PV Production

Only available when using a SmartMeter ADW 200

6. Overview/Dashboard

Overview of all graphs and stored values for individual groups or storage units.

7. Updates

8. Storage unit settings

Configuration: please ensure that the relevant storage unit is switched off. The rotary knob is located on the left-hand side of the housing. The storage unit selected in point 2 is auto matically selected when this menu item is called up. The readout process may take up to one minute. If no settings load afterwards, the storage unit is currently inaccessible. In this case, check the storage unit selection or storage status (18). For all further steps, please follow the on-screen instructions.

9. Account settings

Complete the details to receive the invitation code, which is required for the installer. Any number of storage units can be added.

10.3 Operation via the SAX Power Dashboard (2)

10. Grid power

- negative sign = power fed into the grid,
+ positive sign = power drawn from the grid

11. State of Charge (SOC)

12. Line graph: Grid and storage power

(with ADW200) Overview of the graphs for generation power, state of charge and grid volt age. All line charts can be displayed overlapping. Below the chart, you can click to move one day forwards or backwards. Any day can be selected in the calendar. The charts show a daily view only!

13. Grid energy

Viewable by week/month/year/interval

14. Production

Viewable by week/month/year/interval

15. Graphical representation of energy flow directions

Full graphical representation is only possible with the SmartMeter ADW200

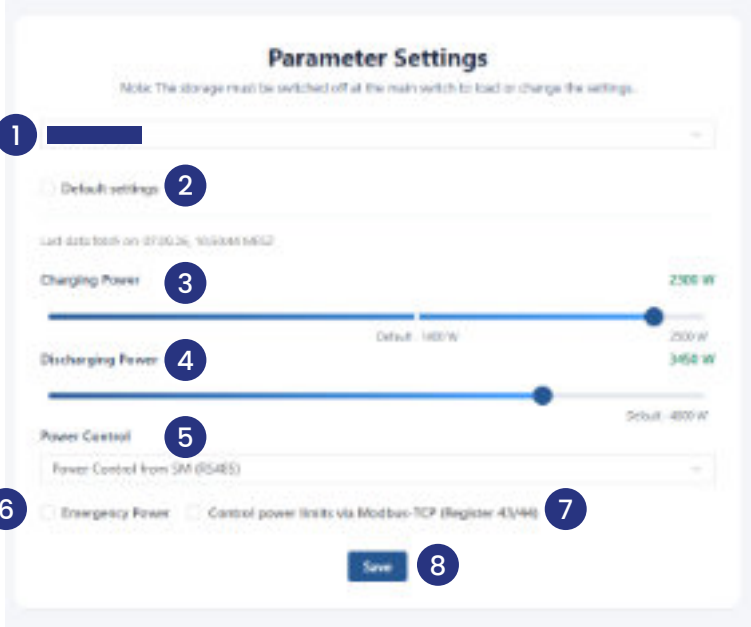
16. Button for storage information

Display of all configured storage parameters

17. Storage messages

Clicking on a message allows you to view the associated descriptions

10.4 Parameter settings for the SAX Power user dashboard



When the system is switched off, you can adjust a number of parameters on your storage unit:

1. Selecting the serial number
2. Resetting to factory settings
3. Slider for maximum charging power
4. Slider for maximum discharging power
5. Setting the storage control
6. Activating emergency power
7. Activating Modbus TCP registers 43/44 (setting power limits via Modbus TCP)
8. Saving the storage unit parameters

11 Installer Dashboard (Installer Hub)

In the Installer Portal, you can create an overview of all the storage systems you have installed. This gives you all the information at a glance, enabling you to respond to your customers' enquiries and requests. The appearance of the app and the web interface may differ slightly, but this does not affect their functionality.

Go to **https://installer-app.sax-power.net** in your PC or laptop's browser, or download the app from the major app stores.

Download on the App Store

GET IT ON Google Play

11.1 Als Installateur registrieren

1. When logging in for the first time, click on "Create account" (see Fig. 72). Enter the required details and your customer number, which you will receive from your contact at SAX, and choose a personal password.

2. Click on "Register" (see Fig. 74). You have now created an account and can log in using your email address and password. Please note the email address confirmation procedure described in section 11.3.

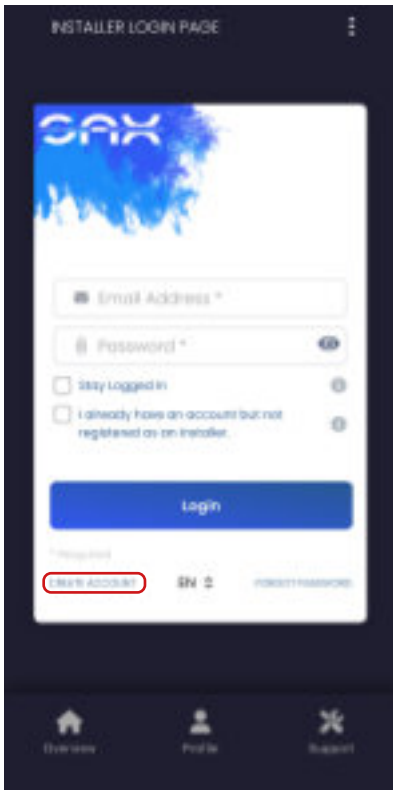


Fig. 72 Create an account

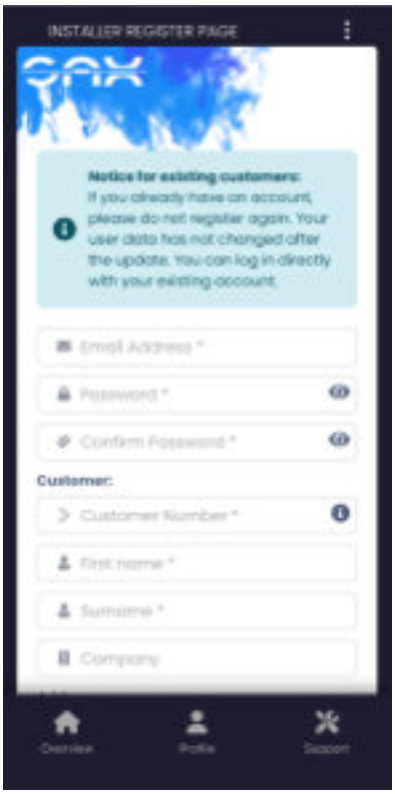


Fig. 73 Registering data

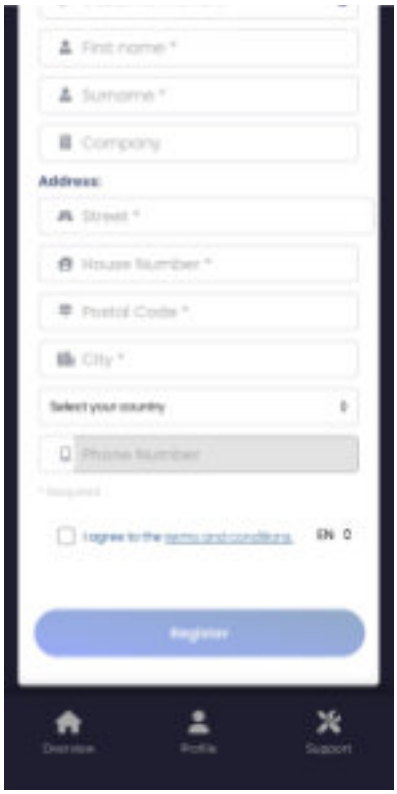


Fig. 74 Registration

11.2 Convert a user account to an installer account

1. Tick the box "I already have an account but am not registered as an installer" (see Fig. 75). Enter your email address, password and customer number, which you received from your contact at SAX Power.

2. Click on "Become an installer" (see Fig. 76). You have now converted your account and can log in using your email address and password.

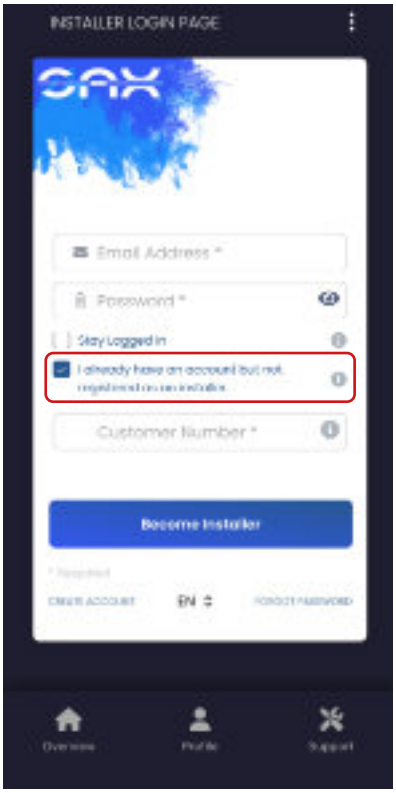


Fig. 75 Convert account

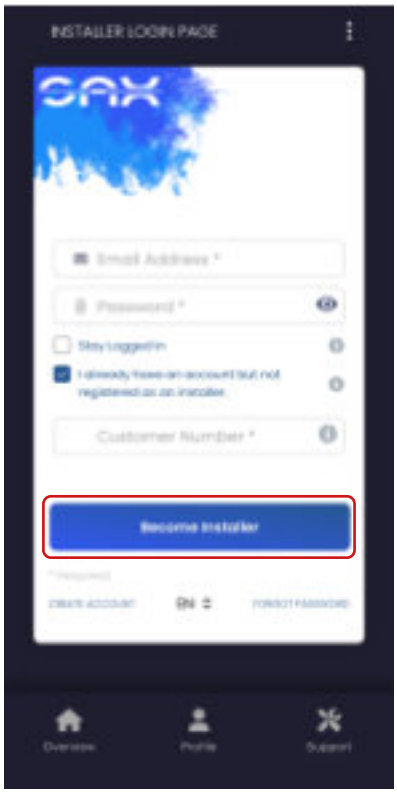


Fig. 76 Become an installer

11.3 Confirm email address

To create an overview of all the storage units you have installed in the Installer Portal, you must verify your account using your email address. To do this, complete all the fields as described in section 11.1.
You will receive an email at your email address (see Fig. 77). Please also check your spam folder. Click on "Confirm email". You will then see the confirmation window (see Fig. 78).

Fig. 77 Confirm email

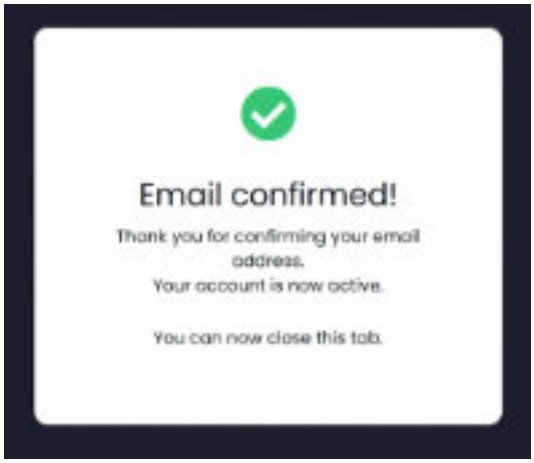
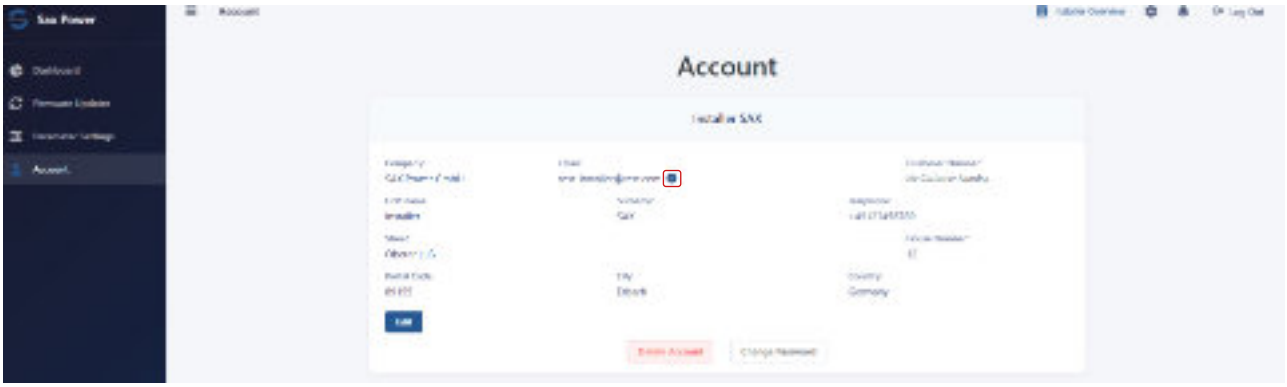


Fig. 78 Email confirmed

In the dashboard (see Fig. 79), a blue tick appears next to your email address



11.4 Bedienung über SAX Power Installer Hub

1. Settings
   From left to right: general settings (language, light/dark mode), notifications for new updates, SAX symbol for logging out
2. Company name
3. Overview
4. Search field
5. Updates
6. Customer
   Clicking on the customer's name displays the customer's details
7. Serial number
   Clicking on the serial number displays the customer's storage overview
8. Phase, phase allocation of storage units
9. Status
10. Online
11. Messages
    Clicking on a message displays an information text
12. Charge level
13. Comment
    Click on the pen icon to add notes
14. Parameter settings
15. Account
16. Create new customer
    Invitation code required from the customer.

11.5 Parameter Settings for Installers

When the system is switched off, you can change a number of parameters for your customers' storage units:

1. Selection of the serial number
2. Reset to factory settings
3. Slider for maximum charging power
4. Slider for maximum discharging power
5. Setting the smart meter type
6. Phase setting
7. Setting the smart meter address
   Default settings:
   1 = ADL 400
   2 = ADW 200
8. Setting the storage control
9. Activating the plug-in (16A limit)
10. Activation of emergency power
11. Activation of smart meter test (only required when replacing or installing a new smart meter)
12. Activation of Modbus TCP registers 43/44 (setting power limits via Modbus TCP)
13. Saving the parameters of the storage unit.

12 Supported protocols

This chapter is relevant for customers who wish to configure the storage unit within their smart home installation, i.e. to read data from the storage unit via an external device. Modbus is an industry standard that enables other devices to easily integrate with and communicate with the SAX Power Home (Plus). This allows systems from different manufacturers to be combined without any problems. Setpoints for active power and limit values for active power can be specified for the storage unit. Furthermore, the state of charge (SOC) and the current power output of the storage unit can be read. The protocols used by the storage unit are described below.

12.1 Modbus TCP Control

Instructions for using the Modbus TCP interface
The storage unit provides a Modbus TCP interface for communication. This allows you not only to read data, but also to write data to the storage unit.

Prerequisites
- Network access: The storage unit must be connected to the local network.
- IP address: The storage unit's IP address must be known.
- Modbus client software: A suitable programme or tool for communication via Modbus TCP is required. (e.g. Modbus Poll, custom control software, etc.)

Establishing a connection
1. Network connection: Ensure that the storage unit is on the same network segment as your computer or control system.
2. Configuring the Modbus client
- Enter the storage unit's IP address.
- Select port 502 (the standard port for Modbus-TCP).
- Configure the query parameters in accordance with the following table.

Various unit IDs are available for control via Modbus-TCP. The corresponding register lists apply depending on the ID used.

Note:
In Modbus-TCP, a distinction is made between internal addresses and protocol addresses. If the read/write function is already specified in the client, the internal register address must be used. The register offset for function 03 (Read Holding Registers) is 40001. Therefore, to access protocol address 40042, internal register address 41 must be read.

12.2 Modbus TCP Basic Mode

Two Modbus operating modes are available for integration into energy management systems: Basic Mode (Unit ID 64) and Extended Mode (Unit ID 100, see Chapter 12.4). In Basic Mode, the storage unit continuously awaits control commands via Modbus; switching between smart meter control and setpoint control is not provided for here – Sunspec Mode is available for this purpose.

In Basic Mode, no control takes place via the SAX Power Smart Meter. The storage unit operates exclusively on the basis of the specified setpoints.

- Values such as SOC, the storage unit's instantaneous power and power at the grid connection point can be read out.
- Setpoints must be specified continuously for the storage unit to operate.
- The power gradient of the setpoint control is 0.27 %/s as set at the factory.

The Unit ID in Basic Mode is always 0x40 (64).

Write commands must be repeated periodically. It is recommended that this be done at least every 5 minutes, but no more frequently than every 5 seconds.

12.3 Unit ID 64: Values – SAX Power Home (Plus)

Protocol adress	Internal adress	Description	Unit	Unit-ID	Note	Data type	Access type
40042	41	Setpoint power P	Watt	64		unit16	Write
40043	42	Setpoint cos(Phi)	-	64		unit16	Write
40044	43	Power limit for discharge	Watt	64	(1)	unit16	Write
40045	44	Power limit for the load	Watt	64	(1)	unit16	Write
40046	45	Switch state of the battery unit	-	64	(2)	unit16	Read/ Write
40047	46	Storage SOC (measured value)	per cent	64		unit16	Read
40048	47	Power P of the storage unit (measured value)	Watt	64		unit16	Read
40049	48	Smart meter performance	Watt	64		unit16	Read

(1) Note: 43 and 44 are only available once they have been enabled.
(2) Note: There are two commands for "Write": "Off" 01 and "On" 02.
There are three commands for "Read": "Off" 01, "On" 02 and "Connected" 03.

12.4 SAX Power Home/Home Plus Modbus-TCP Documentation (SUNSPEC-Mode)

Availability
The interface described here is available from firmware combination Master V64 and Gateway V56 onwards! The software version can be found on the display. If no version is shown, the version is older than Master V64/Gateway V56. Please contact SAX Power Customer Services for an update.

Interface parameters
The device's IP address is shown on the display. The IP address is always obtained via DHCP. It is recommended that you set up a DHCP reservation in your router.
Port: 502
Unit ID: 100

General usage instructions
- It is recommended that you access the interface no more frequently than every 500 ms
- Whilst the e-paper display is undergoing a refresh cycle, the interface is temporarily unavailable (1–3 s). This may therefore result in timeouts on the client during this period.
- PV output can only be read using the ADW200 smart meter.

- In the case of a network comprising several storage units, it is recommended that only the master storage unit (A) be read. As soon as there is more than one storage unit in the system, the values are automatically transferred from the slave storage units to the master storage unit and made available there as well.

Well-known values
These values do not change at runtime. However, future software updates may result in changes to these values. It is therefore recommended that these be read out as well.

SUNSPEC scale factors
Registers of type "sunsf" help to interpret the values of the associated registers correctly. They should be regarded as powers of 10. Thus, for a scale factor of -3, the read-out value is multiplied by 10^(-3) = 0.001

Note: This interface is subject to change. The documentation may be amended or expanded without prior notice. Please ensure you always use the latest version.

Model-specific notes
Model 123: Immediate Controls
To specify a power output for the storage unit that is independent of the smart meter's zero-regulation, the control mode must first be switched to 'Setpoint'. A power level can then be specified as a percentage of the maximum available rated power. Once the specified time-out period has elapsed (300 seconds, unless explicitly specified otherwise via the time-out register), the system reverts to smart meter control.

12.5 Register table

Adress	Description	Data type	Note	Well Known	Unit	R/W
40000	SunSpecID	uint16		21365		R
40001	SunSpecID	uint16		28243		R
40002	SunSpec Model ID	uint16	Sunspec Model Common	1		R
40003	Length	uint16		15		R
40004	Manufacturer	str (encoded uint16)		21313	SA	R
40005	Manufacturer	str (encoded uint16)			XP	R
40006	Manufacturer	str (encoded uint16)			OW	R
40007	Manufacturer	str (encoded uint16)			ER	R
40008	Device model	str (encoded uint16)			HO	R
40009	Device model	str (encoded uint16)			ME	R
40010	Device model	str (encoded uint16)	0: SAX Power Home PL: SAX Power Home Plus		PL/-	R

Adresse	Beschreibung	Datentyp	Hinweis	Well Known	Einheit	R/W
40011	Version Master	uint16	Softwareversion Master			R
40012	Version Gateway	uint16	Softwareversion Gateway			R
40013	Serial number	uint16	Battery storage serial number			R
40014	Serial number	uint16 (Low Byte)	Battery storage serial number			R
40015	Model Identifier	uint16	Sunspec Model 3Ph Inverter (Values from the storage electronics)	103		R
40016	Model lenght	uint16	Number of the following registers	32		R
40017	Total AC power (storage)	uint16				R
40018	AC Power Storage A	uint16			A	R
40019	AC Power Storage B	uint16			A	R
40020	AC Power Storage C	uint16			A	R
40021	AC current scale factor	int16 (sunsf)		-2		R
40022	Voltage across capacitors L1–L2	uint16			V	R
40023	Voltage across capacitors L2–L3	uint16			V	R
40024	Voltage across capacitors L3–L1	uint16			V	R
40025	Voltage Storage A	uint16			V	R
40026	Voltage Storage B	uint16			V	R
40027	Voltage Storage C	uint16			V	R
40028	Voltage scale factor	int16 (sunsf)		-1		R
40029	Active power Storage Total	int16			W	R
40030	Power scale factor	int16 (sunsf)		0		R
40031	Grid frequency	uint16			Hz	R
40032	Scale factor for grid frequency	int16 (sunsf)		-2		R
40033	Reactive power storage total	uint16			VA	R
40034	Scale factor for apparent power	int16 (sunsf)		0		R
40035	Reactive power storage total	int16			Var	R
40036	Reactive power scale factor	int16 (sunsf)		0		R
40037	Power factor storage total	int16				R
40038	Scale factor power factor	int16 (sunsf)		-3		R

Adress	Description	Data type	Note	Well Known	Unit	R/W
40039	Reserve			0		R
40040	Reserve			0		R
40041	Maximum cell temperature	int16			°C	R
40042	Temperature scale factor	int16 (sunsf)		0		R
40043	State	int16 (sunsf)	1: Off 2: Standby 3: Standby time 4: On 7: SM error			R
40044	Event	uint16	0: Normal operation 4: Island fault 8: f>> (NA) 9: f<< (NA) 10: U>> (NA) 11: U<< (NA) 15: Hardware fault			R
40045	PV capacity	uint16	Measured using ADW200		W	R
40046	PV output scaling factor	int16 (sunsf)		1		R
40047	Sunspec Model ID	uint16	Immediate Controls	123		R
40048	Sunspec Length	uint16	Number of the following registers	7		R
40049	Power target as a percentage of maximum power	int16	-100* SF up to +100 * SF Pay attention to the note!		%	R/W
40050	Timeout for the performance target in seconds	uint16	But no more than 300 seconds		S	R/W
40051	Control mode	uint16	1: Setpoint 0: Smart meter zero control			R/W
40052	Scale factor for power specification	int16 (sunsf)	100 -> 10000 = 100%	-2		R
40053	Reference value for maximum power	uint16_t	Reference point for 100% power	4600/ 9200/ 13800		R
40054	Sunspec Model ID	uint16	Model: WYE Connect 3Ph Meter ABC (SM-Werte)	203		R
40055	Sunspec Length	uint16	Number of the following registers	41		R
40056	Total AC current (grid)	uint16			A	R
40057	AC current grid L1	uint16			A	R
40058	AC current grid L2	uint16			A	R
40059	AC current grid L3	uint16		-1		R

Adress	Description	Data type	Note	Well Known	Unit	R/W
40060	Current scale factor	int16 (sunsf)		-1		R
40061	Average grid voltage L-N	uint16			V	R
40062	Grid voltage L1	uint16			V	R
40063	Grid voltage L2	uint16			V	R
40064	Grid voltage L3	uint16			V	R
40065	Average voltage L-L	uint16			V	R
40066	Grid voltage L1-L2	uint16			V	R
40067	Grid voltage L2-L3	uint16			V	R
40068	Grid voltage L2-L3	uint16			V	R
40069	Voltage scale factor	int16 (sunsf)		-1		R
40070	Grid frequency	uint16			Hz	R
40071	Scale factor frequency	int16 (sunsf)		-2		R
40072	Total active power grid	int16			W	R
40073	Grid power L1	int16			W	R
40074	Grid power L2	int16			W	R
40075	Grid power L3	int16			W	R
40076	Scale factor for grid power	int16 (sunsf)		1		R
40077	Total apparent power grid	uint16			VA	R
40078	Reactive power grid L1	uint16			VA	R
40079	Reactive power grid L2	uint16			VA	R
40080	Reactive power grid L3	uint16			VA	R
40081	Scale Factor Apparent Power grid	int16 (sunsf)		1		R
40082	Total reactive power grid	int16			Var	R
40083	Reactive power grid L1	int16			Var	R
40084	Reactive power grid L2	int16			Var	R

Adress	Description	Data type	Note	Well Known	Unit	R/W
40085	Reactive power grid L3	int16				R
40086	Reactive power scaling factor grid	int16 (sunsf)		1		R
40087	Power factor grid total	int16				R
40088	Power factor L1	int16				R
40089	Power factor L2	int16				R
40090	Power factor L3	int16				R
40091	Scale factor Power factor	int16 (sunsf)		-3		R
40092	Reserve	uint16				R
40093	Reserve	uint16				R
40094	Reserve	int16 (sunsf)		3		R
40095	Sunspec Model ID	uint16	Battery Base Model (Battery cell values)	802		R
40096	Sunspec Length	uint16	Number of the following registers	20		R
40097	Storage system capacity	uint16			Wh	R
40098	Available charging capacity of the storage system	uint16			W	R
40099	Available discharge capacity of the storage system	uint16			W	R
40100	Maximum SoC	uint16			%	R
40101	Minimum SoC	uint16			%	R
40102	Current SoC	uint16			%	R
40103	Depth of discharge	uint16			%	R
40104	Reserve	uint16				R
40105	Reserve	uint16				R
40106	Battery charge level	uint16	0: no power 1: power supplied			R
40107	Reserve	uint16				R

Adress	Description	Data type	Note	Well Known	Unit	R/W
40108	Event	uint16	0: Normal operation 3: Over-temperature 4: Under-temperature			R
40109	Average cell voltage	uint16			mV	R
40110	Capacitance scale factor	int16 (sunsf)		0		R
40111	Scale factor for charging/discharging power	int16 (sunsf)		0		R
40112	Scalefactor SoC	int16 (sunsf)		0		R
40113	Reserve	int16 (sunsf)		0		R
40114	Cell voltage scale factor	int16 (sunsf)		0		R

Disclaimer

We reserve the right to make changes to this interface. The documentation may be amended or expanded without prior notice. Please ensure you always use the latest version.

13 Decommissioning

To take the system out of service, simply switch off the main switch. When switched off, the battery pack is below the safety voltage (20V).

Attention:
Only switch off the battery pack for an extended period if the remaining charge is **at least 50%!** This is necessary to protect the battery cells from deep discharge. Switch the storage unit on **at least once every 6 months** to prevent the battery cells from becoming deeply discharged.

14 Technical Data

14.1 SAX Power Home System Data

Battery type	LiFePO4
Cell data	3.2V; 15Ah
Usable Capacity	5.2kWh
Modularly expandable	up to 17.3kWh (3 storage unit)
Nominal voltage	230V AC 1 Phase
Discharge power nominal	4.6kWA
Nominal current	20A
Weight	52kg
Storage dimentions	530mm x 530mm x 250mm
Standby power /consumption	approx. 4W

14.2 SAX Power Home Operating Data

All-in-One	Integrated inverter funktion
Conversion efficiency	98.6%
Emergency and back up power	yes
Communication	Modbus-RTU, Modbus-TCP/UDP
Communication ports	RS485, RJ45 (LAN)
Battery warranty	10 years with 80% residual capacity
Ambient temperature (operating)	+5°C - +35°C
Ambient temperature (storage, transport)	-10°C - +40°C
Dust and water protection	IP 30
Certification	DE, AT, CH, FR, BE, PL VDE-AR-N 4105, UN 38.3
Protection class	1 (Protective earthing)

14.1 SAX Power Home Plus System Data

Battery type	LiFePO4
Cell data	3.2V; 20Ah
Usable Capacity	7.0kWh
Modularly expandable	up to 23kWh (3 storage unit)
Nominal voltage	230V AC 1 Phase
Discharge power nominal	4.6kWA
Nominal current	20A
Weight	69kg
Storage dimentions	620mm x 620mm x 250mm
Standby power /consumption	approx. 4W

14.2 SAX Power Home Plus Operating Data

All-in-One	Integrated inverter funktion
Conversion efficiency	98.6%
Emergency and back up power	yes
Communication	Modbus-RTU, Modbus-TCP/UDP
Communication ports	RS485, RJ45 (LAN)
Battery warranty	10 years with 80% residual capacity
Ambient temperature (operating)	+5°C - +35°C
Ambient temperature (storage, transport)	-10°C - +40°C
Dust and water protection	IP 30
Certification	DE, AT, CH, FR, BE, PL VDE-AR-N 4105, UN 38.3
Protection class	1 (Protective earthing)

14.5 SAX Power Smartmeter ADL400

Rated voltage	3 x 230/400V
Consumption	<10VA (1-phase)
Impedance	>2MΩ
Input current	3 x 10(80)A
Electricity - Consumption	<1VA
Accuracy	±0.2%
Clock accuracy	≤0,5s/d
Pulse bandwidth	80 ± 20ms
Communication – Connection	RS485
Communication – Protocol	Modbus-RTU
Operating temperature range	-25°C ~ +55°C
Storing temperature range	-40°C ~ +70°C
Humidity	≤95% (no condensation)
Height	<2000m

14.6 SAX Power Smartmeter ADW200

Rated voltage	3 x 230/400V
Reference frequency	50Hz
Consumption	<10VA (1-phase)
Input current	3 x 20(100)A
Electricity - Consumption	<2VA
Communication – Connection	RS485
Communication – Protocol	Modbus RTU, DL/T 645-07
Operating temperature range	-25°C ~ +55°C
Storage temperature range	-40°C ~ +70°C
Humidity	≤95% (no condensation)
Height	<2000m

15 Operational reports, problems and solutions

Common installation problems:

Problem	Possible cause	Solution
No connection to the web server	DHCP server not configured correctly	Configure the DHCP server so that there are enough IP addresses available.

Messages are displayed using abbreviations on the screen and on the web server. Their meanings, together with the corresponding actions to be taken, are described in the following table:

	Abbreviation	Meaning and behaviour	Possible measures
1	Off	The storage unit is switched off.	Operating status report – no action required
2	On	The storage unit is switched on.	Operating status report, no action required
3	Network	The storage unit is switched on and connected to the grid.	Operating status report, no action required
4	Standby	The storage unit is in standby mode and switches on when the solar system feeds power into the grid.	Operating status report, no action required
5	Wait 60s	Waiting for stable network conditions	Operating status report, no action required
6	SM Test	Automatic testing of the smart meter	Operating status report, no action required
7	U>>	Grid voltage too high. The second overvoltage stage has tripped. The storage unit switches off.	Checking the grid connection and grid voltage The storage unit switches on automatically once the grid voltage is back within the permissible range.
8	U>	Grid voltage too high. The first overvoltage stage has tripped. The storage unit switches off.	Checking the grid connection and grid voltage The storage unit switches back on automatically once the grid voltage returns to within the permissible range.
9	U<<	Grid voltage too low. The second undervoltage stage has tripped. The storage unit switches off.	Checking the grid connection and grid voltage The storage unit will switch back on automatically once the grid voltage returns to within the permitted range.

10	U<	Grid voltage too low. The first undervoltage stage has tripped. The storage unit switches off.	Checking the grid connection and grid voltage The storage unit switches back on automatically once the grid voltage returns to the permitted range.
11	f >	Grid frequency too high The storage unit switches off.	Checking the grid voltage The storage unit switches back on automatically once the grid frequency returns to within the permissible range.
12	f <	Grid frequency too low The storage unit switches off.	Checking the grid voltage The storage unit switches back on automatically once the grid frequency returns to the permissible range.
13	Island	The storage unit is disconnected from the grid. The storage unit switches off.	Checking the grid connection and switches. The storage unit switches back on automatically once the grid voltage returns to within the permissible range.
14	HW!	Hardware fault in the storage unit The storage unit shuts down or can no longer be switched on.	Switch the grid switch off and then on again. If this message persists, contact the supplier.
15	MR!	Communication error with the gateway The storage unit remains in operation. The information shown on the display and the web server is incorrect.	Switch the main switch off and then on again. If this message persists, contact the supplier. The storage unit can continue to operate. The connection to the web server and display is disrupted. Measurements and messages may be displayed incorrectly.
16	MT!	Communication error with the gateway The storage unit remains in operation. The information shown on the display and web server is incorrect.	Switch the main switch off and then on again. If this message persists, contact the supplier. The storage unit can continue to operate. The connection to the web server and display is disrupted. Measurements and messages may be displayed incorrectly.

17	SM1!	Communication error with the smart meter The storage unit switches off or can no longer be switched on.	Check the connection cables to the smart meter and the storage unit. If the operating mode "Power control based on an RS485 setpoint" is selected, this error will occur if the storage unit does not receive a power setpoint for 10 seconds. Errors may be due to the communication link or the Modbus protocol.
18	SM2!	Incorrect operation of the smart meter The storage unit switches off following an automatic test.	Check the connections on the voltage and current measuring instruments. The phase assign-ment for the voltage and current measurements may be incorrect. The hinged current transformers may not be closed properly. Once the fault has been rectified, the storage unit can be switched on again using the main switch.
19	I >	Storage unit overload Storage shuts down.	The storage unit will switch back on automatically once the grid voltage returns to within the permissible range. If the fault persists after three attempts to switch back on, the storage unit will no longer switch on automatically. Switch off the storage unit using the main switch, locate and rectify any short circuit or overload, and then switch it back on.
20	I >>	Short circuit The storage unit switches off.	The storage unit will switch back on automatically once the grid voltage returns to within the permissible range. If the fault persists after three attempts to switch back on, the storage unit will no longer switch on automatically. Switch off the storage unit using the main switch, locate and rectify any short circuit or overload, and then switch it back on.
21	I!	Error in current measurement The storage unit switches off.	Switch the main switch off and then on again. If this message persists, contact the supplier.

22	U!	Errors in voltage measurement The storage unit switches off or can no longer be switched on.	Switch the main switch off and then on again. If this message persists, contact the supplier.
23	Rel!	Fault in a coupling switch The fault occurs after an automatic test during switch-on. The storage unit can no longer be switched on.	Switch the main switch off and then on again. If this message persists, contact the supplier.
24	Bat	Battery voltage too high or too low Battery temperature too high The storage unit switches off or can no longer be switched on.	Switch off the storage unit using the main switch, wait 30 seconds, connect it to the grid and switch it back on. If this message persists, contact the supplier.