Kontron Solar hy-switch

Accessory replacement power box for inverter

Operating manual

Important safety instructions

These instructions are an integral part of the product and must therefore be read carefully, observed and kept accessible at all times.

Legal provisions

Definitions of product names

For reasons of readability, the product “hy-switch” is referred to as a “component” in this operating manual.

Trademarks

Table of contents

1. General information

1.1. Notes on the instruction

WARNING

Danger due to improper handling of the component!

You must have read and understood the operating instructions so that you can install and use the component safely.

Co-applicable documents

When installing, please observe all assembly and installation instructions for parts and components of the system. These instructions are included with the respective parts of the system and additional components.

Storage

The instructions and all accompanying documents must be kept accessible at all times and available when required.

German original version

This document was created in several languages. The German version is the original version. All other language versions are translations of the original version.

1.2. Design features

1.2.1. Symbols used

 General hazard symbol	 Earthing – protective conductor
 Electrical voltage	
	Only a qualified electrician may carry out marked work!

DANGER

Immediate danger

Failure to observe this warning will result in immediate death or serious injuries.

WARNING

Possible danger

Failure to heed this warning may result in death or serious injuries.

CAUTIOUS

Low risk hazard

Failure to observe this warning will result in minor to moderate injuries.

CAUTIOUS

Hazard with risk of property damage

Failure to observe this warning will result in property damage.

1.2.2. Display of additional information

NOTE

Useful information and tips

IInformation that is important for a specific topic or objective but is not security-relevant.

1.2.3. Presentation of instructions for action

↻ Requirement for instructions

1 Perform action
   1. Further course of action
      ⇨ Intermediate result of the action step
» Final result

1.3. Target group

All activities described in the document may only be carried out by specialists with the following qualifications:

- Knowledge of the functionality and operation of an inverter.
- Training in dealing with hazards and risks when installing and operating electrical components, devices and systems.
- Training for the installation and commissioning of electrical devices and systems.
- Knowledge of the applicable standards and guidelines.
- Knowledge and observation of this document with all safety instructions.

1.4. Identification of the product by type plate

For service and other facility-specific requirements, you will find the type plate with the following data on the left side panel of the product:

- Product name
- Part number
- Technical data
- Serial number
- Disposal instructions, CE marking

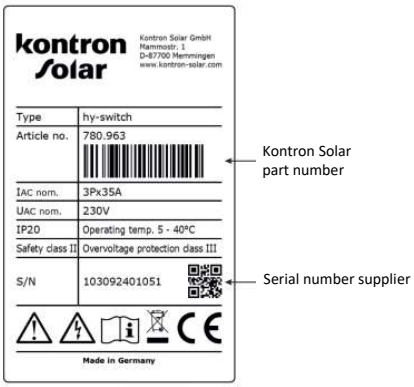


Fig. 1: Type plate

2. Safety

NOTE

Before using the product for the first time, please read this safety information carefully.

DANGER

Even after the component has been disconnected and switched off, life-threatening voltages are still present at the connections and cables in the housing!

Severe injuries or death from touching the cables and/or terminals/busbars on components.

> Follow all safety regulations and the currently valid technical connection conditions of the responsible energy supply company.
> The component may only be opened and serviced by a qualified electrician.
> Switch off the mains voltage by deactivating the external fuse elements.
> Check that there is no voltage using a suitable voltage tester.
> Keep the component closed during operation.

The electrician is responsible for compliance with existing standards and regulations. The following applies:

- Keep unauthorized persons away from the component or system.
- Ensure operational safety through proper grounding, conductor dimensioning and appropriate short-circuit protection.
- Observe the safety instructions on the product and in this operating manual.
- Before carrying out visual inspections and maintenance work, switch off all voltage sources and secure them against accidental switching on.

– When measuring the current-carrying components, please note:
    - Do not touch electrical connection points
    - Remove jewelry from wrists and fingers
    - Determine the safe operational condition of the test equipment used.

– Changes in the component's environment must comply with applicable national standards.

2.1. Intended use

The component is intended for indoor use and may only be used in countries for which it is approved or for which it is released by Kontron Solar GmbH and the grid operator.

The component may only be operated with a permanent connection to the public power grid. The grid type selection must correspond to the location and the grid type.

The requirements of the network operator must be implemented for the grid connection. Furthermore, the authorization for the grid connection may be subject to approval by the responsible authorities.

The enclosed instructions are part of the component. The instructions must be read, followed and kept accessible at all times.

The nameplate must be permanently attached to the component.

2.2. Non-intended use

Any other or additional use is considered improper.

These include:

– Use without the SolBrid hybrid inverter
– Mobile use
– Use in potentially explosive areas
– Outdoor use
– Operation outside the manufacturer's specifications
– Modification of the component

3. Component description

3.1. Functionality

The hy-switch is a complementary component to the SolBrid hybrid inverter. It cannot function without the SolBrid.

The hy-switch can temporarily form an island network together with the inverter if the public power supply fails. To do this, the inverter disconnects all poles from the grid and together with the hy-switch forms an island network for the local installation and then automatically starts its backup power operation.

The hy-switch is connected to the distribution board in front of the inverter via all poles (L1, L2, L3, N, PE).

3.2. Structure of the component

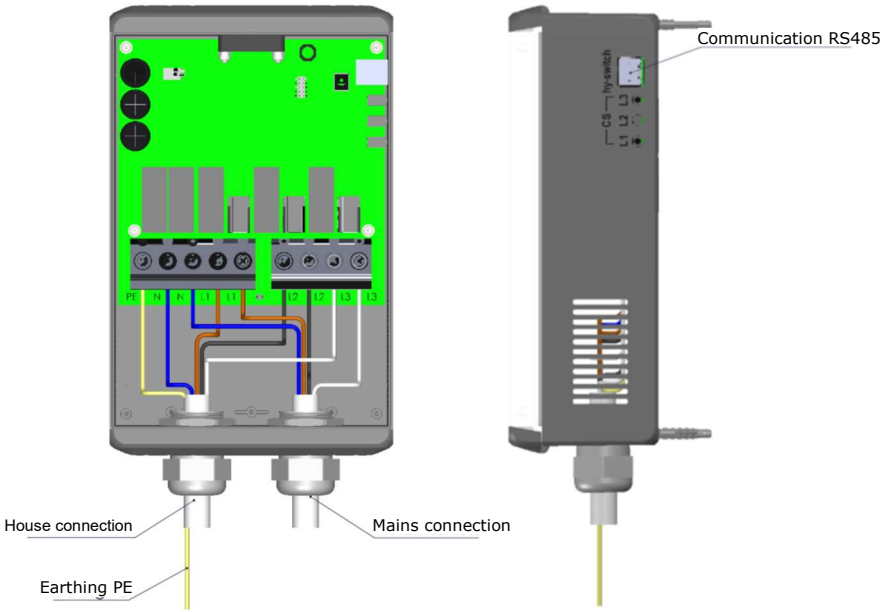


Fig. 2: Structure of the component with external connections

4. Technical data

4.1. Electrical data

Replacement power box	**hy-switch**
Max. separation voltage	264,5 V
Max. separation current	50 A
Rated operating voltage	230 V
Max. continuous load current	35 A
Max. continuous power	24 kW
Relay switching time	<= 20 ms
Separation	All-polar
Measurement accuracy	
Performance measurement	3%
Measuring speed	Real time
Installation	
Maximum length of communication cable	20 m
Max. AC cable cross section	16 mm²
Communication port	1 x RJ45 (RS485)
General data	
Protection class (IEC 62109-1)	II
Guarantee	2 years
Dimensions (W x H x D)	170 x 270 x 92 mm
Weight	1,2 kg
Supported devices	
Inverter	SolBrid hybrid inverter

Tab. 1: Technical data

4.2. Environmental data

	hy-switch
Ambient temperature	+5 °C + 40 °C
Protection class (IEC 60529)	IP20
Humidity range (non-condensing) [%]	0 … 90 %

Tab. 1: Environmental data

5. Delivery and transport

Every product leaves our factory in perfect electrical and mechanical condition. Appropriate packaging ensures safe transport. The transport company is responsible for any transport damage that occurs.

5.1. Scope of delivery

Check delivery scope

1. Examine component thoroughly.
2. Immediately complain to the transport company:
   - Damage to the packaging that suggests damage to components.
   - obvious damage to component.
3. Report the damage immediately to the transport company.
4. The damage report must be submitted in writing to the transport company within 6 days of receipt of the component.

   We will be happy to assist you if necessary.

Scope of delivery

1x Component in closed housing
1x Mounting kit consisting of
    4x Dowel
    4x Screws
1x Operating manual

5.2. Transport component

To ensure safe transport of the product, please use the original packaging (cardboard box).

Packaging:	Folding cardboard
Packaging size:	400 x 245 x 100 mm
Total weight	approx. 1,5 kg

CAUTIOUS

Danger due to impact, risk of component breakage!

> Pack components securely for transport.
> Do not subject the component to shock.

6. Assembly and preparation

6.1. Unpack component

CAUTIOUS

Property damage caused by condensation!

Incorrect storage can cause condensation to form in the component and impair its function (e.g. due to storage outside of the environmental conditions or a short-term change of location from a cold to a warm environment).

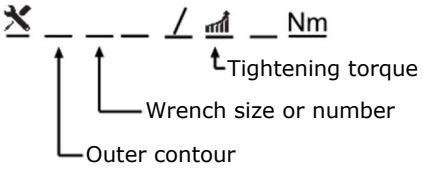
1. Open the box carefully, taking care not to damage the component when using sharp objects.
2. Remove operating instructions and assembly bag.
3. Remove component from the box.
4. Place protective packaging back into the box.

» Proceed with assembling the component.

6.2. Installation tool

The abbreviations given in the table below are used in all assembly/installation/maintenance and disassembly instructions for the tools to be used and the tightening torques.

Abbreviations (en)	Contour of the connecting element
W	External hexagon
A	Hexagon socket
T	Torx
S	Slot



6.3. Assemble component

Choose a location

The hy-switch is installed near the house connection or energy sub-distribution board. Please note the environmental data under 4.2.

During installation, a distance of at least 15 cm must be maintained on all sides. The additional space required for the connection area of the AC cables below the hy-switch must be provided. The permissible bending radii of the cables must be observed.

NOTE

Access by maintenance personnel in case of service.

Additional costs resulting from unfavorable structural or assembly conditions will be charged to the customer.

Attach component

1. Insert the screwdriver [S_1,0] into the central recess between the cover plate and the plastic hinge and carefully separate the two.
2. Carefully store the cover plate until installation is complete.
3. Attach the four dowels with hole dimensions 153mm x 247mm to the mounting wall (see Fig. 3).

» Component is to be mounted on the wall next to the control box/cabinet.

CAUTIOUS

Avoid damage caused by hard impacts!

Hard impacts or uneven surfaces can cause damage to the component.

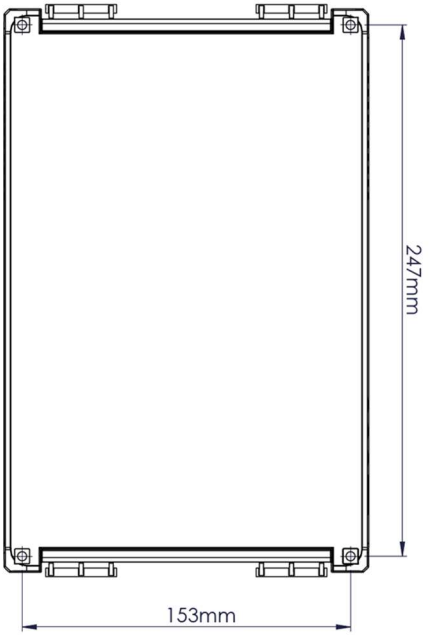


Fig. 3: Hole spacing for fastening

7. Installation

7.1. General

DANGER

Severe injuries or death due to contact with the cables, busbars or terminals of the component or the control cabinet!

- Follow all safety regulations and the currently valid technical connection conditions of the responsible energy supply company.
- The component may only be opened and serviced by a qualified electrician.
- Switch off the mains voltage by deactivating the external fuse elements.
- Do not touch the cables and/or terminals/busbars when switching on and off.
- Keep the component closed during operation.

WARNING

To avoid the risk of fire,

never cover the component completely or partially when in operation.

NOTE

Select the cable cross-section, fuse type and fuse value according to the following conditions:

Country-specific installation standards; performance class of the component; cable length; type of cable laying; local temperatures.

7.2. Integration options

The current sensors may be loaded with a maximum of 35 A.

Only consumers that are installed behind the component on the grid connection side and in the same area as the local installation of the SolBrid hybrid inverter can be entitled to battery backup power.

Nr.	Description
0	Selective circuit breaker
1	Meter EVU (bidirectional meter)
2	hy-switch
3	Switchable line protection (4p 20A)
4	Meter EVU for generation (optional)
5	Residual current circuit breaker
6	Hybrid inverter (SolBrid)
7	Circuit breaker
8	Consumer

Installation of emergency power supply

Integration according to network types:

The component is suitable for integration into various network types. The cabling from the component in the local installation must always be 5-core.

Note: The hy-switch belongs to protection class II. The PE cable has the sole function of forming the star point for the emergency power operation.

Schematic representation of the different network types with the hy-switch & SolBrid in emergency power operation:

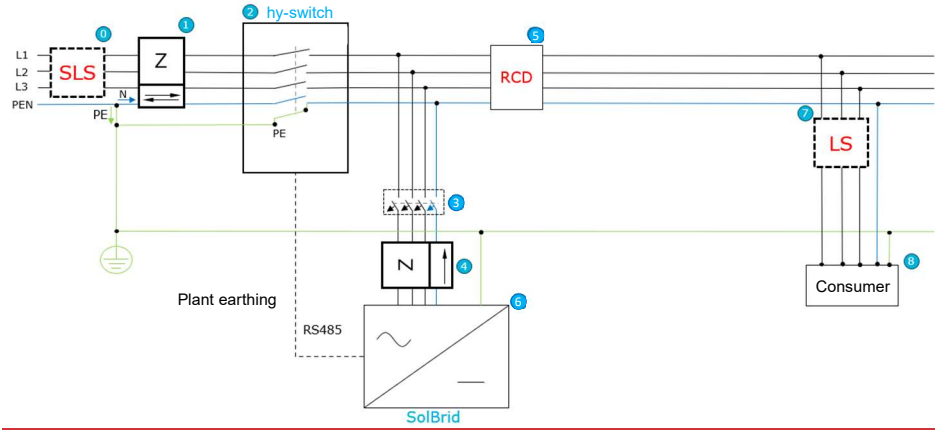


Fig. 4: Integration into TN-C-S network

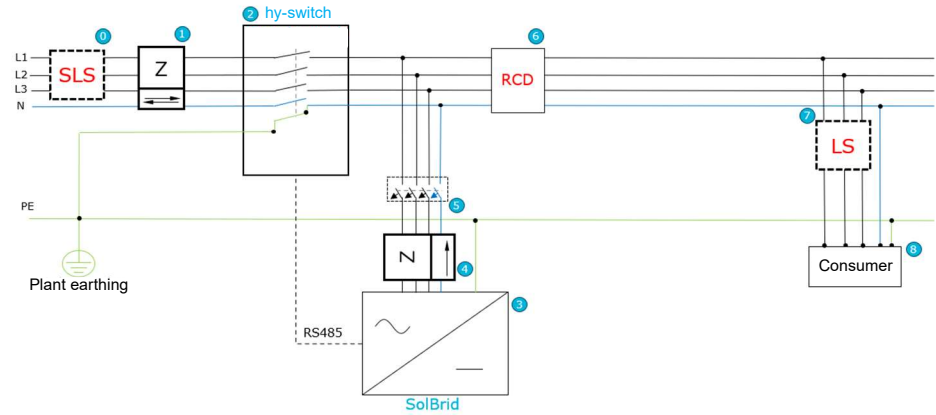


Fig. 5: Integration into TN-S network

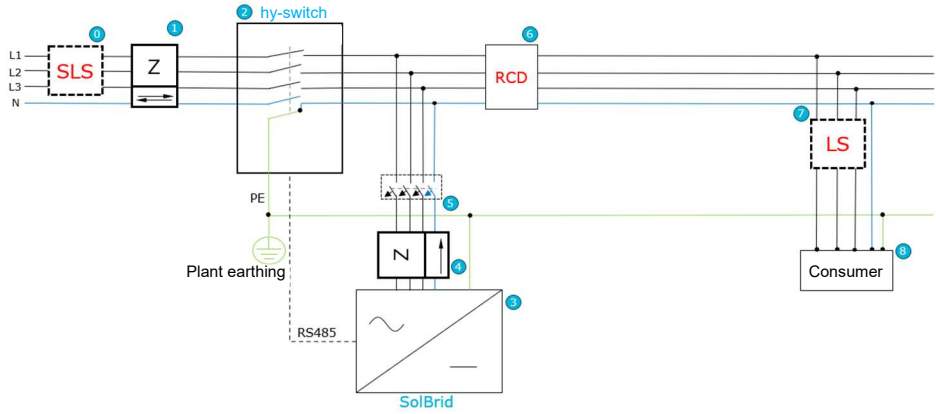


Fig. 6: Integration into TT network

7.3. Connection to the power grid

DANGER

Severe injuries or death from contact with live parts!

- > Circuits on which work is to be carried out must be de-energized.
- > All inverters and all local generators must be switched off.
- > Switch off the power supply.

WARNING

To avoid the risk of fire or electric shock, make sure that,

the wiring is in good condition and not undersized. Never install defective or inferior cables. Cable connections may only be connected or disconnected when the power is off.

NOTE

Fuse protection of max. 50 A required

A fuse of max. 50 A is required in the component's connection cable. Higher currents can damage the component.

The selectivity between the fuses in the house must be ensured according to local regulations.

Electrician

The integration of the component into the local installation must be chosen correctly. Typically, it is installed behind the energy supplier's meter and

before the first load outlet. The integration options shown in 7.2 must be observed.

↻ Component is permanently mounted (see chapter 7.3).

1. The connection point for integrating the component into the local installation must be determined.
2. All inverters, all local generators and the grid connection must be switched off.
3. The connection points for the component must be created in the control cabinet.
4. Observe the required cable cross-sections.
5. The cable must be inserted into the component and into the control cabinet.
6. All wires of the cable must be stripped appropriately.
7. The wiring of the component must be carried out at the cable terminals with [🛠 S_2,5] (see Fig.):
    1. Insert the cables through the cable gland.
    2. Connect PE.
    3. Connect the house network (consumer) to "off-grid" (3p+N) and connect it to the corresponding connection point in the control cabinet.
    4. Connect the home network (consumer) connection to "grid" (3p+N) and connect it to the corresponding connection point in the control cabinet.
    5. Close the cable gland carefully [🛠 W_36].
8. Check that the phases are connected to the component in the correct order.
9. Check that all cables are firmly seated.
10. Hold the cover plate on the assembled housing and carefully snap the upper and lower plastic hinges into place. The component must now be securely closed.
11. Switch the power connection back on.

» Component is mounted on the wall next to the control box/cabinet.

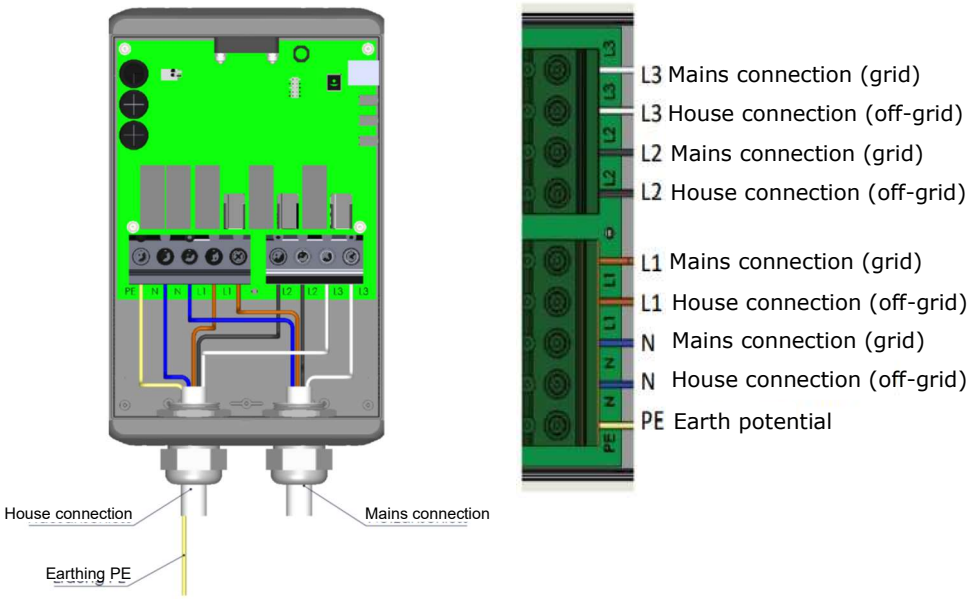


Fig. 7: Mains connection with cable feedthrough and assignment

7.4. Communication with the SolBrid hybrid inverter

Electrician

The communication cable requires RJ45 connectors on both sides and must be a shielded cable "e.g. CAT 5E S/FTP" or better. The length depends on the installation location, but should not be more than 20 m. Cross-over connections cannot be used.

1. The connection of the SolBrid "Switch" must be connected to the communication connection of the hy-switch.

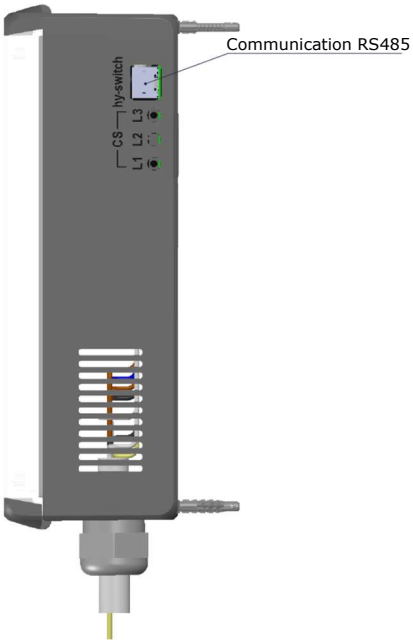


Fig. 8: Communication cable (RJ45)

7.5. Installation

Electrician

The component is set to switch the grid and off-grid side of the connections in the delivery state. The component is activated when the SolBrid hybrid inverter is started.

The component is ready for operation when the green LED on the circuit board lights up.

8. Operation

The component does not have a direct user interface. A status LED on the component's board indicates the operating status together with the hybrid inverter during operation.

Operating status display

Green = component is ready for operation => communication & supply to the inverter available

Red = there is a fault => supply is available but communication is not working

Off = no/insufficient power supply

9. Maintenance and troubleshooting

DANGER

Dangerous voltage due to two operating voltages!

Severe injuries or death from contact with the wires and/or terminals/busbars in the component.

9.1. Visual inspection

Check the product and the connected cables annually for externally visible damage. If there is any damage, notify your installer. Repairs may only be carried out by a qualified electrician.

The ventilation openings of the component must not be covered during operation.

9.2. Cleanig

The outside of the housing can be cleaned with a dry cloth.

DANGER

Danger to life due to liquid penetration!

Only clean the outside of the component. Only use dry objects to clean the component.

CAUTIOUS

Damage to the housing parts when using cleaning supplies!

If the component is dirty, clean the housing and the housing cover only with a dry cloth.

NOTE

The cleaning intervals must be adapted to the environmental conditions of the installation site.

9.3. Errors

Electrician

The component does not have a direct user interface. A status LED on the component's board indicates the operating status together with the hybrid inverter during operation.

Operating status display

Red = There is a fault

Cause/Solution:

1. Check the wiring to the SolBrid hybrid inverter.

    a. Is the cable damaged?
    b. Are the connectors correctly installed?
    c. Cable type: use shielded cable e.g. CAT 5E S/FTP or better.
    d. Is the cable length no more than 20 m?

If available, try another communication cable.

Check that the component is correctly connected to the power supply and grounded.

Off = no/insufficient power supply

The SolBrid hybrid inverter supplies power to the component via the communication cable.

Cause/Solution:

1. The SolBrid Hybrid Inverter is not operating.
2. The communication cable to the SolBrid Hybrid Inverter is broken.

9.4. Shutdown for troubleshooting

Electrician

DANGER

Even after the component has been disconnected and switched off, life-threatening voltages remain present at the connections and cables in the housing!

Severe injuries or death due to contact with the cables and/or terminals/busbars in the component.
The component may only be opened and serviced by a qualified electrician approved by the supply network operator.

> Follow all safety regulations and the currently valid technical connection conditions of the responsible energy supply company.

Shutdown sequence

1. Turn off the SolBrid Hybrid inverter.
2. Disconnect the communication cable to the SolBrid Hybrid inverter.

a. Carefully press the retaining tab on the RJ45 connector downwards.
b. Remove RJ45 plug from socket.

3. Switch off the mains voltage by deactivating the external fuse elements.

9.5. Manual reset of the mains relays

Electrician

In exceptional cases, it may be necessary to reset the mains relays so that the power supply to the local installation can be restored via the public power grid. If this is necessary, proceed as follows:

↻ Switching off all voltages (see chapter 9.4).

1. Disconnect the power supply to the entire local installation.
2. Insert the screwdriver [S_1,0] into the central recess between the cover plate and the upper plastic hinge and carefully separate the two.
3. Fold down the cover.
4. Check that there is no voltage using a suitable voltage tester.
5. Apply a voltage of 9-12 V to the socket XS500 using a suitable power supply unit.
   Polarity: Outside with a diameter of 5.41 mm "minus".
   Inside with a diameter of 2.49 mm "plus" (power supply not included).
6. Press button S500 (press for longer than 3 seconds).

» Switch relays.

7. Remove the voltage source from the socket XS500.
8. Place the cover plate upwards and snap the plastic hinge back into place.

» Component is closed again.

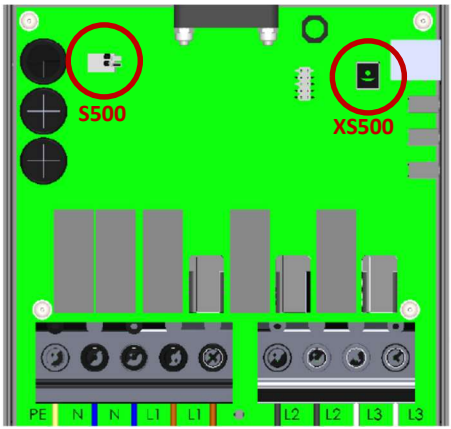


Fig. 9 Resetting the relays

10. Decommissioning and dismantling

10.1. Switch off component

see chapter 9.4 Shutdown for troubleshooting

10.2. Uninstall component

Electrician

DANGER

Even after the component has been disconnected and switched off, life-threatening voltages remain present at the connections and cables in the housing!

Severe injuries or death due to contact with the cables and/or terminals/busbars in the component.
The component may only be opened and serviced by a qualified electrician approved by the supply network operator.

> Follow all safety regulations and the currently valid technical connection conditions of the responsible energy supply company.

1. Make sure that the component is de-energized.
2. Insert the screwdriver [S_1,0] into the central recess between the cover plate and the hinge and separate the two.
3. Disconnect the wires from the terminals [S_2,5], PE last.
4. Open the two cable glands [W_36].
5. Pull the cables out downwards.
6. Carry out any necessary work in the control cabinet in which the component was integrated.

The component is now electrically isolated.

10.3. Dismantle component

↻ Component must be electrically uninstalled beforehand (see chapter 10.2).

1. Unscrew the component from the wall using the four screws [A_2,5].
2. Hold the cover plate on the housing and carefully snap the upper and lower plastic hinges into place.

10.4. Pack component

↻ Component is dismantled (see chapter 10.3).

1. If possible, always pack the component in the original packaging. If this is no longer available, an equivalent cardboard box can be used as an alternative.
2. The cardboard box must be completely sealable and suitable for the weight and size of the product.

10.5. Store component

↻ Component is packed (see chapter 10.4).

The component must be stored in a dry place, according to the ambient temperature range, which can be found in the environmental data [see chapter 4.2].

11. Disposal

CAUTIOUS

Environmental damage if not disposed properly!

Both the component and the associated transport packaging are made largely from recyclable raw materials.

Defective components and accessories do not belong in the household waste. Make sure that the old device and any accessories are disposed of properly.

Packaging: Make sure that the transport packaging is disposed of properly.

12. Service and warranty

To solve technical problems, the seller of the system should always be informed. If no solution is found, the Kontron Solar GmbH service department should be contacted.

To ensure quick processing of the ticket, the following information should be provided:

1. Serial number of the device.
2. Specify the component that is probably the cause of the problem.
3. Error display of the LEDs, error description, abnormalities.
4. What has already been done to analyze the error?

The current warranty conditions of Kontron Solar GmbH can be found in the download area at www.kontron-solar.com.

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