KACO new energy.

Grid standby operation

blueplanet hybrid 10.0 TL3

Application note

for electricians

1 General information

NOTE
Observe the operating instructions for the device, this manual and the application note for the *hy-sys* software for standby power operation. For standby power operation, an earthing point is required that remains functional in the event of a grid failure.

In this application note, the product "blueplanet hybrid 10.0 TL3" is referred to as the device for ease of reading.

2 Intended use

The blueplanet hy-switch (hy-switch) serves as an all-pole disconnection point from the public grid for standby power operation in the house installation. The grid disconnection takes place via bistable relays.
The switching position must be checked after the changeover to reliably ensure all-pole disconnection. Only then can the standalone grid be connected by the blueplanet hybrid inverter.

3 Safety

DANGER

Touching the live connections will result in severe injury or death!

Installation and commissioning must only be carried out by suitably qualified technicians.

The following measures are mandatory for safe operation:

- ☑ an automatic circuit breaker with 20 A (4-pole) must be installed in the connection line of the device to the house grid in order to be able to safely disconnect and protect the device.
- ☑ an RCD type B with 30 mA must be used. The installation must be carried out professionally and the function must be checked before commissioning (see Figure 1).
- ☑ Before working on the AC side, the device must be switched off (see operating instructions) and disconnected by the circuit breaker. For safety reasons, a **waiting time of 2 minutes** must be observed.
- ☑ The PE connection of the *hy-switch* must be connected to the house earthing. It must be ensured that the storage system has a safe connection to earth even when disconnected from the public power grid.
- ☑ Any existing shielding of the communication cable between the unit and the *hy-switch* must be interrupted on the *hy-switch* side.
  For this purpose, use an RJ-45 plug without connection to the shielding on the *hy-switch* side.
- ☑ The serial number of the unit must be 101191142297 or higher.
  Note: If this is not the case, please contact our KACO Customer Service Centre.
- ☑ In the house distribution, professional indications of an additional generating systems with automatic start-up must be attached!

4 Requirements

The following requirements must be observed for operation:

- ☑ Do not operate the device with other generators in the same grid, especially in standby mode.
- ☑ Each phase can be loaded with max. 17 A, whereby the total power in standby power operation should not exceed 10 kW.
- ☑ In case of overload in at least one phase, the device switches off the voltage on all three phases after 5 seconds. Reconnection is only possible after manual confirmation of the error on the unit.
- ☑ In standby power mode, the residual current monitor (RCD) in the device is without function. Therefore, an external residual current monitor type B 30 mA must be used.

Danger to life! The cables between the device and the residual current monitor are not protected against leakage currents!

- ☑ The installation of the electrical system must be carried out in such a way that the electrical equipment on the track is only accessible to qualified personnel.
- ☑ Check and document the function of the residual current monitoring.
- ☑ The *hy-switch* must be properly connected to earth. The earthing must also be functional in the event of a power failure.
- ☑ When selecting automatic circuit breakers for loads, attention must be paid to the tripping current, as the maximum short-circuit current is limited to 17 A. The use of circuit breakers only makes sense up to 6.3 A. The stronger loads are protected by the integrated overload cut-off in the device.
  Note: When switching on large inductive loads (e.g. motors), non-standard flicker can occur.
- ☑ When switching larger loads, short-term overvoltages of up to 450 V peak can occur. If there are sensitive consumers in the grid, a suitable overvoltage device is necessary or the loads must be protected with a suitable grid filter.
- ☑ A maximum direct current component of 1 A is permissible in standby power operation.
- ☑ The voltage in the standalone grid (standby power operation) is regulated to 230V_{eff}. The frequency can be selected between 50 and 65 Hz.
- ☑ Complete shutdown of the system is only possible with the SET button on the device.
  Danger to life! Dangerous voltages can build up at connections even in fault condition!
  To switch off, the SET button must be pressed for >10 s until the switch-off symbol appears on the display.
- ☑ The batteries cannot be recharged during standby power operation without PV. Therefore, make sure that the batteries never get into a deep discharge. The PV yield must compensate for the decrease in energy from the batteries on a daily basis. Please also consider the self-consumption of the unit.

5 Installation and use

5.1 Installation in the TN-C-S grid

Basically, a TN-C-S grid is required to use the standby power mode. From the *hy-switch* onwards, PE and N must no longer be brought together. The *hy-switch* must be properly connected to earth.
The earthing must also be functional in the event of a grid failure, cf *Figure 1*

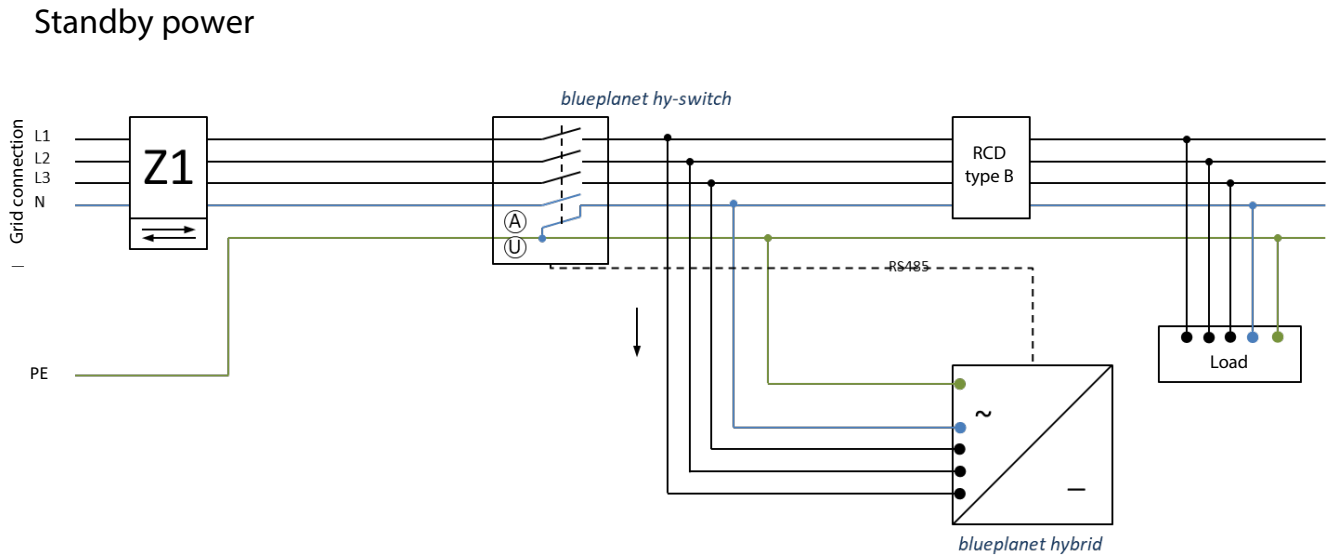

Figure 1. Connection diagram of the device for standby power operation

5.2 Installation with TN-C-S distribution in sub-distribution

In existing house installations, it is possible that N and PE are connected in the house grid, e.g. with 4-wire cabling (PEN) or PE/N bridges. In this case, the inverter will display error E250 during the switchover to standby power operation, as it cannot measure the correct relay position.

Solution: There must be no continuous connection from the N(grid) on the grid side to the N(offgrid) on the house grid side. The *hy-switch* must be able to switch this connection. Often there is a connection via the PE to N connections on the grid and house grid side. The connection on the house grid side must be resolved by an alternative installation. Please also note the correct dimensioning of the PEN.
Figure 2 shows one possibility of installation with PEN use in the house installation.

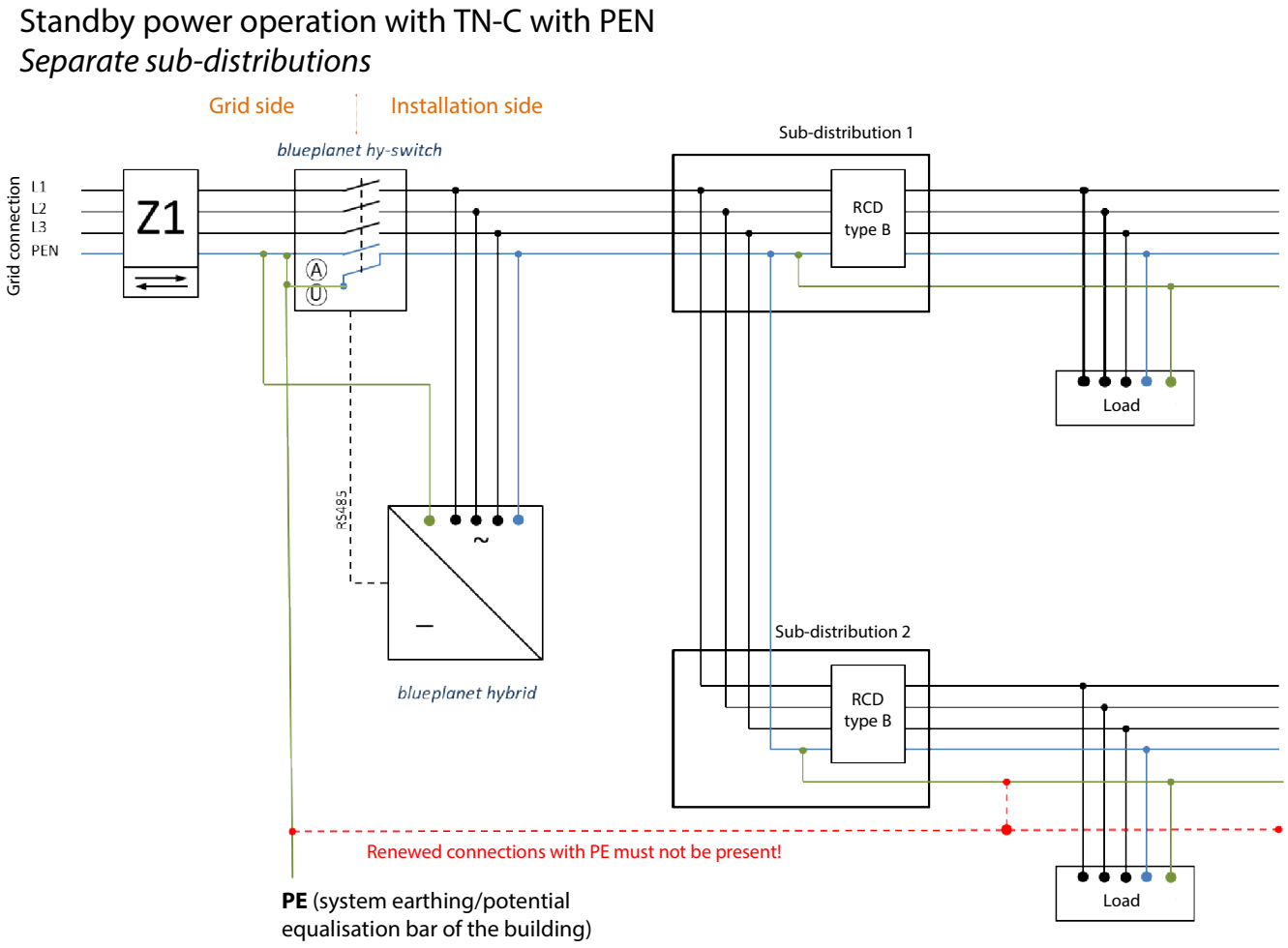

Figure 2. Standard installation standby power (sketch)

Note: Checking the connection of the grid side N(grid) to the house grid side N(offgrid) is already possible during the installation of the hy-switch, as these wires can be measured at the hy-switch in a de-energised state without additional effort.

5.3 Condition and setting

The following conditions apply:

- A battery must be connected.
- The device must be connected to the grid (AC) during configuration to check the phase position.
- The phase position must be correct on the device and on the hy-switch.
- PV power must be present during configuration because the device will restart.
- The SOC must be at least 10% for switching to standby power operation.

Furthermore, the following settings must be entered:

NOTE

The software can be used for grid parallel operation and temporary standalone mode (standby power operation). Switching can occur automatically.

✓ The corresponding setting must be entered in the **hy-sys** user software from version 7.

☞ Unpack the firmware package, e.g. 7.12.10.4.11, on your computer.
☞ Open the hy-sys software.
☞ Log in to the hy-sys software as an installer.

☞ Update the software on your device on the Update tab in the following order:
1) COM (blueplanet hybrid 10.0 TL3 COM 7_10.edu)
2) CONTROLLER (blueplanet hybrid 10.0 TL3 Controller 7_12.edu)
3) HY-SWITCH (blueplanet hy-switch 7_4.edu)

☞ Load the certificate for standby power operation onto the unit.
The certificate is loaded onto the device in the *User Settings* tab under *Activation Certificate* .

Note: The certificate for standby power operation is device-specific. If you do not have a certificate file, please contact KACO Service and have your proof of purchase ready.

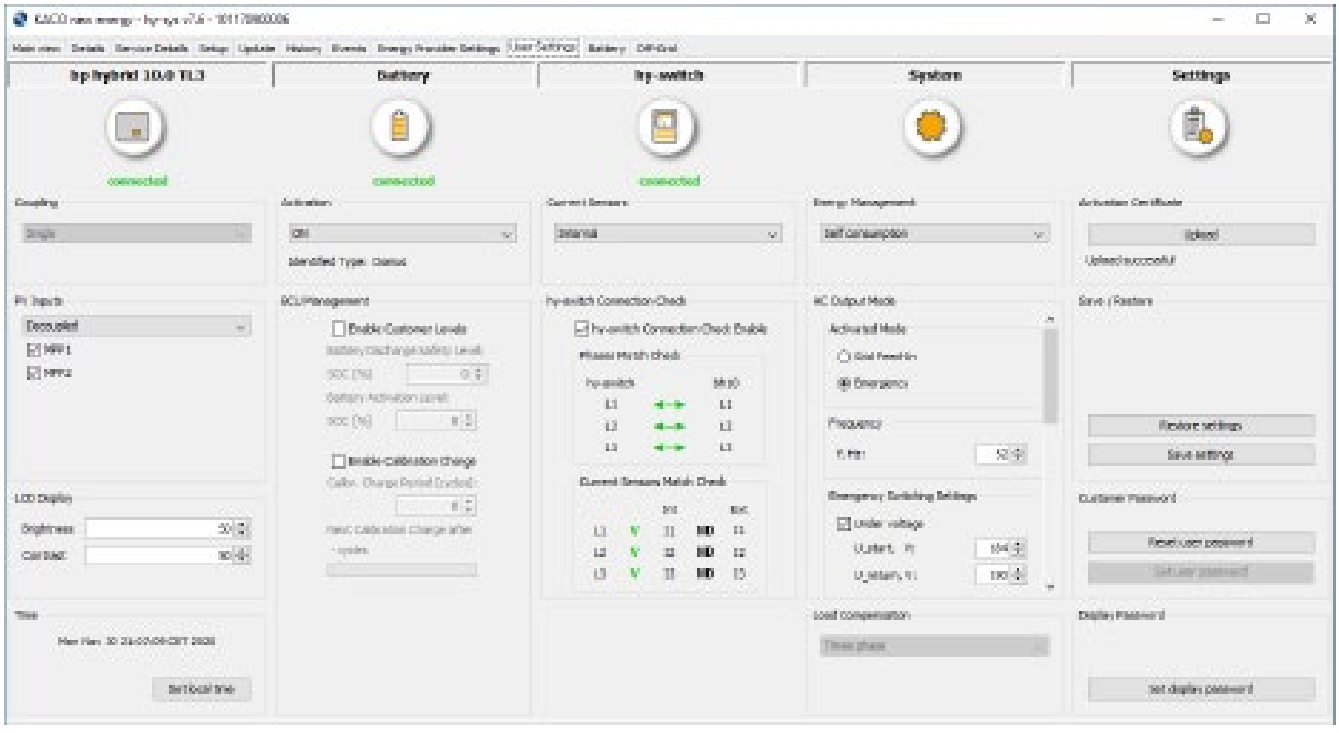

Figure 3. TAB User Settings: Right Upload of the certificate, centre Check function for the phase position

☞ Check the version of the certificate.

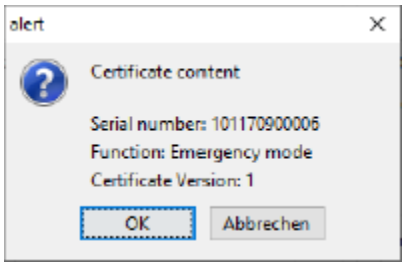

Figure 4. Hint window: Certificate version

☞ Check the phase position. If successful, the phases are displayed in ascending order and with the green connection arrow.

Note: If the phase sequence is incorrect, shut down the device and disconnect everything from the power supply before working on the installation.

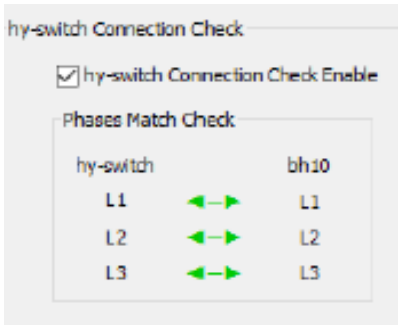

Figure 5. Blueplanet hy-switch connection test

☞ When activating the standby power mode, the Emergency option must be selected under **AC Output Mode**. In the basic setting, this will be activated when the voltage falls below 79% of the nominal voltage.
☞ The *detection time* defines the duration for tolerating a grid error and can remain set to 1 s.
☞ The selection of Automatically start Off-Grid (automatic switchover to standby power operation in the event of a grid failure) and Automatically return to Grid can be used.
Important In the event of a grid failure, the device automatically sets up a standalone network.

Note: Currently, switching times (voltage-free) of approx. 40 s (to off-grid) and 10 s (switching back to the grid) are to be expected. If the unit cannot establish an island grid within 3 minutes, the start of standby power operation must be confirmed manually on the operating display of the device.

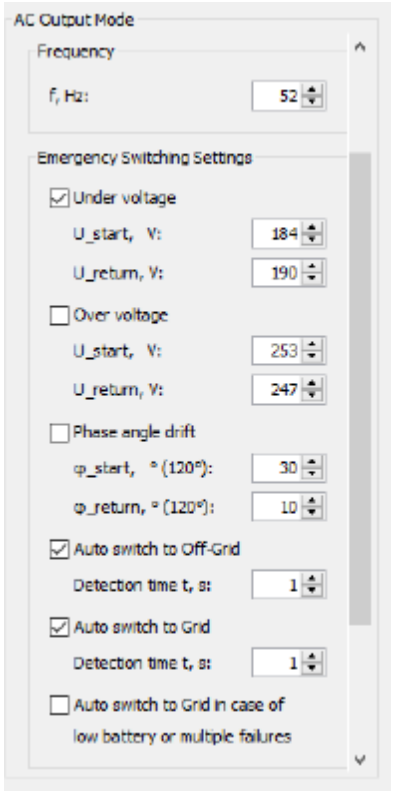

Figure 6. Settings in AC Output Mode

Note: In rare cases, the device may shut down in standby power mode. If no PV power is available, the immediate reconnection of the public grid is only possible manually.
To carry out this manual switch-back, please refer to the operating instructions of the *blueplanet hy-switch*. Have a grid-independent 9-12 V power source with a hollow plug connection with Ø 2.5 mm x Ø 5.5 mm ready.

6 Installation verification for standby power operation

Product description	**blueplanet hybrid 10.0 TL3** **blueplanet hy-switch**

I/We confirm that the devices listed above have been properly installed in compliance with the manufacturer's instructions and the respective laws and standards valid on the installation date, in particular:

- ✓ Automatic circuit breaker with 20 A (4-pole) in unit supply line.
- ✓ Installation of an RCD type B (30 mA) is required for standby power operation.
- ✓ The protective earthing must be functional even if the public grid is disconnected.
- ✓ The shielding of the communication cable between the device and the *blueplanet hy-switch* must be disconnected on the *blueplanet hy-switch* side.
- ✓ Reference to generating device with automatic start-up in house distribution

System operator:	
Name	
First name	
Company	
Street address	
Country / Postcode	
City	
System site: (if different)	
Street address	
Country / Postcode	
City	
Serial numbers / installation date:	
Serial numbers blueplanet hybrid 10.0 TL3	Installation date / commissioning
Serial numbers blueplanet hy-switch	Installation date / commissioning
Installer:	
Company	
Authorised representative (first name/last name)	
Street address	
Country / Postcode	
Telephone	
E-mail	

City Date Signature Company stamp

3014696-03-220805

KACO new energy.

Werner-von-Siemens-Allee 1 · 74172 Neckarsulm · Germany · Tel. +49 7132 896-0 · info@kaco-newenergy.de ·
www.kaco-newenergy.com