Instruction Manual

- Operator

KACO blueplanet 10.0 TL3

- no PSD, without AFCI
- no PSD, internal AFCI
- KACO PSD, internal AFCI
- KACO PSD without AFCI
- KACO PSD, internal AFCI, OCPD on the AC side

KACO new energy.

Operating Instructions

Contents

1 General Notes

1.1 About this documentation

WARNING

Improper handling of the inverter can be hazardous

› IMPORTANT SAFETY INSTRUCTIONS.

› You must read and understand the operating instructions before you can install and use the inverter safely.

This manual is intended for us and canadian inverter model and shall be followed during installation and maintenance.

Model type - US Version	**Spezial feature**
KACO blueplanet 10.0 TL3 M2 WM OD USKA	No PSD, without AFCI
KACO blueplanet 10.0 TL3 M2 WM OD USK8	NO PSD, internal AFCI
KACO blueplanet 10.0 TL3 M2 WM OD USK9	KACO PSD, internal AFCI
KACO blueplanet 10.0 TL3 M2 WM OD USK3	KACO PSD box, without AFCI
KACO blueplanet 10.0 TL3 M2 WM OD USKE	KACO PSD, internal AFCI, AC-fuses
Model type - Canadian Version	
KACO blueplanet 10.0 TL3 M2 WM OD CAPA	No PSD, without AFCI
KACO blueplanet 10.0 TL3 M2 WM OD CAP8	No PSD, internal AFCI
KACO blueplanet 10.0 TL3 M2 WM OD CAP9	KACO PSD, internal AFCI
KACO blueplanet 10.0 TL3 M2 WM OD CAP3	KACO PSD box, without AFCI
KACO blueplanet 10.0 TL3 M2 WM OD CAPE	KACO PSD, internal AFCI, AC-fuses

table 1: inverter types us/canadian

1.1.1 Other Applicable Documents

During installation, observe all assembly and installation instructions for components and other parts of the system. These instructions are delivered together with the respective components and other parts of the system.

Some of the documents which are required for registering and approving your photovoltaic (PV) system are included with the operating instructions.

1.1.2 Retention of documents

SAVE THESE INSTRUCTIONS. These instructions and other documents must be stored near the system and be available whenever they are needed.

1.2 Design features

1.2.1 Symbols used in this document

General hazard symbol

Risk of fire or explosion

High voltage

Risk of burns

Authorised electrician — The tasks indicated with this symbol may only be carried out by an authorised electrician.

1.2.2 Description of safety instructions

DANGER

Imminent danger

Failure to observe this warning will lead directly to serious bodily injury or death.

WARNING

Potential danger

Failure to observe this warning may lead to serious bodily injury or death.

CAUTION

Low-risk hazard

Failure to observe this warning will lead to minor or moderate bodily injury.

CAUTION

Hazard with risk of property damage

Failure to observe this warning will lead to property damage.

1.2.3 Description of additional information

NOTICE

Useful information and notes

1.2.4 Description of action instructions

a) One-step actions or actions that can be carried out in any sequence:

Action instructions

↻ Prerequisite(s) for your action(s) (optional if they have been performed earlier)

☞ Carry out action.

☞ (Additional actions, if applicable)

» Result of your action(s) (optional)

b) Multi-step action instructions that must be carried out in a fixed sequence:

Action instructions

↻ Prerequisite(s) for your actions (optional if they have been performed earlier)

1. Carry out action.
2. Carry out action.
3. (Additional actions, if applicable)

» Result of your actions (optional)

2 Safety

DANGER

Lethal voltages are still present in the terminals and leads of the inverter even after the inverter has been switched off and disconnected. Lethal voltages are still present from the PV array, and PV System Disconnect´s touch safe fuse holders

With the PSD disconnected from both AC and DC sources, the inverter terminals are open, and can be removed and replaced with no voltage present.

Severe injuries or death if the leads and/or terminals in the inverter are touched when voltage is present.

Only authorised electricians who are approved by the supply grid operator may open, install and maintain the inverter.

› Keep the inverter closed when the unit is in operation.

› Do not touch the leads and/or terminals when switching the unit on and off.

Do not make any modifications to the inverter..

NOTICE

KACO new energy will not accept any costs of production, installation costs, which may arise due to detected arc and its consequences.

KACO new energy is not liable for fire that may occur in spite of the integrated arc detection / interruption (e.g. due to a parallel arc).

The electrician is responsible for observing all existing standards and regulations.

- Keep unauthorized persons away from the inverter and PV system.
- Be sure to observe IEC 60364-7-712:2002 (“Requirements for special installations or locations – solar photovoltaic (PV) power supply systems”) in particular.
- Ensure operational safety by providing proper grounding, conductor dimensioning and appropriate protection against short circuiting.
- Observe the safety instructions on the inverter and in these operating instructions.
- Switch off all voltage sources and secure them against being inadvertently switched back on before performing visual inspections and maintenance.
- When taking measurements while the inverter is live:
  - Do not touch the electrical connections.
  - Remove all jewellery from your wrists and fingers.
  - Ensure that the testing equipment is in safe operating condition.
- Stand on an insulated surface when working on the inverter while it is switched on.
- Modifications to the surroundings of the inverter must comply with the applicable national and local standards.
- When working on the PV array, it is also necessary to switch off the DC voltage with the DC disconnector in addition to disconnecting the PV array from the grid.

2.1 Intended use

The inverter converts clean renewable DC energy into AC energy for export (feed-in) into the utility.

The 10.0 TL3 M2 WM OD US__ designed, tested, and listed to the UL 1741, CSA-C22.2 No. 107.1.01 and the NFPA 70.

The 10.0 TL3 M2 WM OD US__ and 10.0 TL3 M2 WM OD CA__ was designed, tested, and listed to the CSA-C22.2 No. 107.1.01 and the NFPA 70.

WARNING

Potential danger

› Only authorized personnel who are qualified for the VAC and VDC voltage ratings should install or
› maintain this equipment. Lethal hazards exist which may result in serious injury.

Operate the inverter only with a permanent connection to the public power grid.

Any other or additional use is not considered the intended use. This includes:

- Mobile use
- Use in rooms where there is a risk of explosion
- Use in rooms where the humidity is higher than 95%
- Operation outside of the specification intended by the manufacturer

2.2 Protection features

For your safety, the following monitoring and protective functions are integrated into the KACO blueplanet 10.0 TL3 inverter:

- Overvoltage conductors/varistors to protect the power semiconductors from high-energy transients on the grid and PV array side
- Temperature monitoring of the heat sink
- EMC filters to protect the inverter from high-frequency grid interference
- Grid-side grounded varistors to protect the inverter against surge pulses
- Islanding detection according to VDE 0126-1-1 and IEEE 1547
- Arc-fault circuit interrupter (AFCI) according of the National Electrical Code Section 690.11

2.3 Standards and regulations

The product line has been evaluated, and certified by nationally recognized test laboratories to the following safety features and regulatory compliance:

	10.0 TL3 M2 WM OD US__	10.0 TL3 M2 WM OD CA__
UL 1741-1:1999 Rev. May 2007	X	-
CSA 22.2 No. 107-1:2001 Rev 2006	X	X
IEEE Std. 1547-2003	X	X
IEEE Std. 1547.1-2005	X	X
FCC Part 15 Class B	X	X
NFPA 70	X	X
UL1699B	X	
UL1699B + TILM-07		X
Directive concerning Electromagnetic Compatibility with Class B (Council Directive 2004/108/EC)	X	X
Low Voltage Directive (Council Directive 2006/95/EC)	X	X

The blueplanet inverter has complete on-board overcurrent, over-temperature and anti-islanding protection.

3 Configuration and Operation

3.1 Controls

The inverter has a backlit LCD as well as three status LEDs. The inverter is operated using six keys.

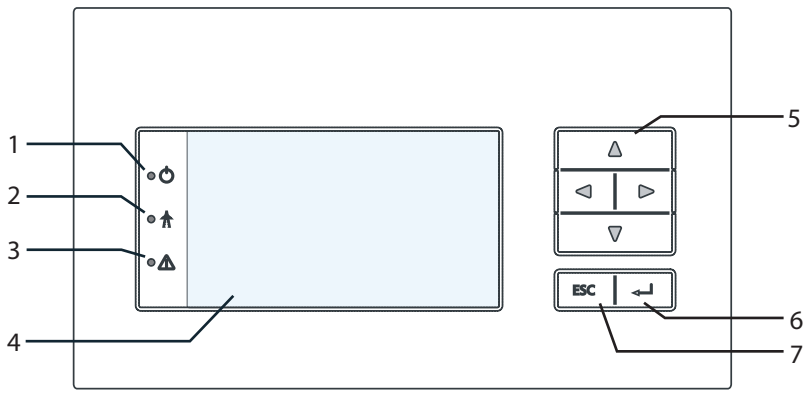


Figure 18: Control panel

Key			
1	"Operating" LED	5	4-way key
2	"Feed-in" LED	6	"Enter" key
3	"Fault" LED	7	"ESC" key
4	LCD		

3.1.1 LED indicators

The three LEDs on the front of the inverter show the different operating states.
The LEDs can take on the following states:

●	LED illuminated	✺	LED flashing	○	LED not illuminated

The LED indicators show the following operating states:

Operating state	LEDs	Display	Description
Start	● ⏻		The green "Operating" LED is illuminated if an AC voltage is present, independently of the DC voltage.
Feed-in start	● ⏻ ● ⏚	Power fed into the grid or measured values	The green "Operating" LED is illuminated. The green "Feed-in" LED is illuminated after the country-specific waiting period*. The inverter is ready to feed in, i.e. is on the grid. You can hear the line relay switch on.
Feed-in operation	● ⏻ ● ⏚	Power fed into the grid or measured values	The green "Operating" LED is illuminated. The green "Feed-in" LED is illuminated. The "Feed-in" icon appears on the desktop. The inverter feeds into the grid.

* The waiting period ensures that the PV array voltage continuously remains above the power delivery limit of 250 V.

Operating state	LEDs	Display	Description
Non-feed-in operation		Status message	The display shows the corresponding message.
Voltage		Fault message	The display shows the corresponding message. The red “Fault” LED is illuminated.

3.1.2 Graphical display

The graphical display shows measured values and data and allows the configuration of the inverter using a graphical menu. In normal operation, the backlighting is switched off. As soon as you press one of the control keys, the backlight is activated. If no key is pressed for an adjustable period of time, it switches off again. You can also permanently activate or deactivate the backlighting. In sleep mode, the inverter deactivates the display regardless of the selected setting.

NOTICE

Depending on the tolerances of the measuring elements, the measured and displayed values are not always the actual values. However, the measuring elements ensure maximum solar yield. Due to these tolerances, the daily yields shown on the display may deviate from the values on the grid operator’s feed-in meter by up to 15%.

After being switched on and after the initial start-up is complete, the inverter displays the start screen (the desktop). If you are in the menu and do not touch the control keys for two minutes, the inverter returns to the desktop.
For information about initial start-up, see section 8.3 on Page 34 in installation instruction manual.

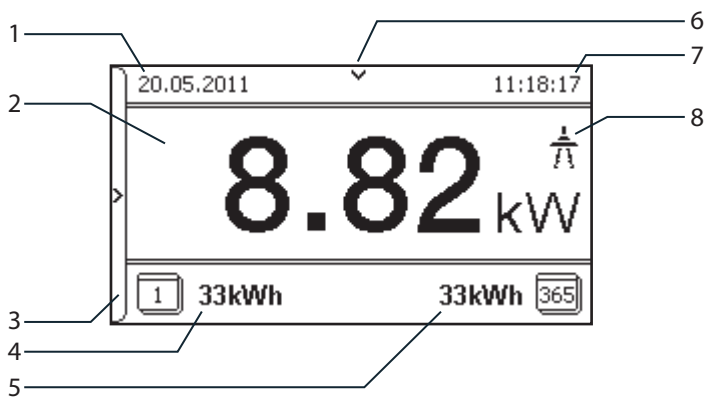


Figure 19: Desktop

Key			
1	Current date	6	Status bar
2	Current power	7	Current time
3	Menu indicator	8	Feed-in indicator
4	Daily yield		
5	Annual yield		

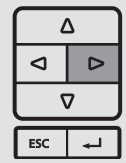
3.1.3 Control keys

You operate the inverter using the 4-way key and the OK and ESC control keys.

3.1.3.1 Desktop / Inverter menu

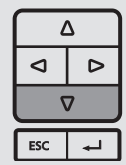
Opening the menu

↻ The inverter is operating.
↻ The LCD is showing the desktop.
☞ Press the right arrow key.
» The menu opens up over the desktop from left to right.



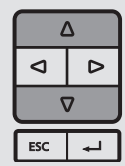
Displaying the daily output

↻ The inverter is operating.
↻ The LCD is showing the desktop.
☞ Press the down arrow key.
» The LCD displays the daily yield in a diagram.
☞ To return to the desktop, press any key.



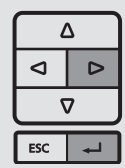
Selecting a menu item

↻ You have left the desktop. The inverter displays the menu.
☞ Use the up and down arrow keys.



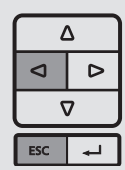
Opening a menu item or a setting

☞ Use the right arrow key and the OK key.



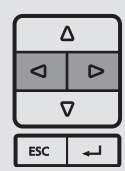
Jump to the next higher menu level/discard changes

☞ Press the left arrow key or the ESC key.



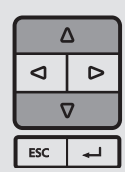
Selecting an option

☞ Use the right and left arrow keys.



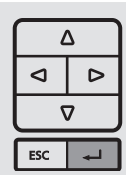
Changing an option/the value of an input field

☞ Use the keys with the up and down arrows.



Saving changed settings

☞ Press the OK key.



3.2 Menu structure

3.2.1 Display on the LCD

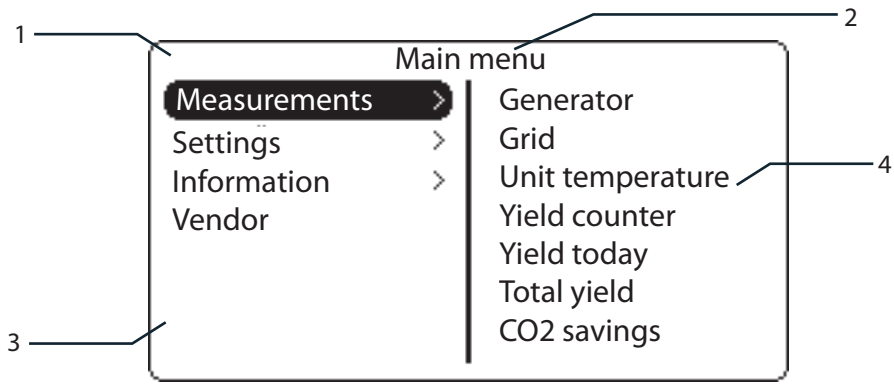


Figure 20: Main menu

Key			
1	Display of the menu level (0, 1, 2, 3)	3	Active menu (example: main menu)
2	Designation of the active menu	4	Menu items of the next lower menu level

3.2.2 Menu structure

Icons used:

0 1 2 3	Menu level (0, 1, 2, 3)		Password-protected menu
	Display menu	↳	Submenu available
	Option menu		

Menu level	Display/settings		Action in this menu/meaning
Desktop	**Desktop**	↳	☞ Press the right arrow key.
0 1 2 3	**"Measurements" menu**	↳	☞ Open the menu: Press the right arrow key or the OK key.
0 1 2 3	**Generator**		Displays the DC-side voltage, amperage and power.
0 1 2 3	**Grid**		Displays the AC-side voltage, amperage and power dependent on the grid grid monitoring selection. (See Parameter menu "**Grid mon. 3-ph.")**
0 1 2 3	**Unit temperature**		Displays the temperature in the inverter housing.
0 1 2 3	**Yield counter**		Displays the yield in kWh. ☞ Reset the counter using the "Reset" key.
0 1 2 3	**Yield today**		Displays the yield of the current day up to now.
0 1 2 3	**Total yield**		Displays the total yield up to now.
0 1 2 3	**CO2 savings**		Displays the calculated CO_2 savings (in kg).

Menu level	Display/settings		Action in this menu/meaning
0 1 2 3	**Oper. hours counter**		Displays the duration of operation in hours. ☞ Reset the counter using the “Reset” key.
0 1 2 3	**Oper. time today**		Displays the duration of operation on the current day.
0 1 2 3	**Total op. time**		Displays the total operating time.
0 1 2 3	**Log data view**	↳	☞ Open the menu: Press the right arrow key or the OK key.
0 1 2 3	**Daily view**		Displays the recorded operating data graphically. 1. Select the measured value to be displayed. Supported measured values: • Grid power P(grid) • DC power per string P(PV) 1-2 • DC voltage per string U(PV) 1-2 • Unit temperature 2. Select a date. 3. Press the OK key. » The display shows the selected data. ☞ Press any key to return to the previous menu.
0 1 2 3	**Monthly view**		Displays the recorded operating data graphically. 1. Select a date. 2. Press the OK key. » The display shows the selected data. ☞ Press any key to return to the previous menu.
0 1 2 3	**Yearly view**		Displays the recorded operating data graphically. 1. Select a date. 2. Press the OK key. » The display shows the selected data. ☞ Press any key to return to the previous menu.
0 1 2 3	**Save to USB**		In this menu, you can export the saved operating data to a connected USB storage device. ↻ You have connected a USB storage device to the inverter. 1. Select the data to be exported (year, month or day) with the 4-way key. 2. Press the OK key. » The inverter writes the data to the USB storage device.
0 1 2 3	**“Settings” menu**	↳	☞ Open the menu: Press the right arrow key or the OK key.
0 1 2 3	**Language**		☞ Select the desired language for the user interface.
0 1 2 3	**Define total yield**		You set the total yield to a freely selectable value, for example, when you have received a replacement unit and want to continue the recording from the present value. ☞ Select the “Save” button and confirm with the OK button.

Menu level	Display/settings		Action in this menu/meaning
0 1 2 3	**Interface**		☞ If the inverter is a terminal unit: Activate termination (“Bus termination” menu item) ☞ Assign a unique RS485 bus address to the inverter (“proLOG address” menu item). The address must not coincide with that of another inverter or a proLOG unit.
0 1 2 3	**S0 pulse rate**		☞ Set the pulse rate of the S0 connection.
0 1 2 3	**Logging interval**		☞ Set the time between two log data recordings.
0 1 2 3	**Log data backup**		The inverter supports the backing up of all recorded yield data to a connected USB storage device. ☞ Activate or deactivate log data backup.
0 1 2 3	**Display**		☞ Configure the contrast setting for the display. ☞ Set the length of time without user input after which the backlighting of the LCD switches off. ☞ Alternatively: Permanently activate or deactivate backlighting by selecting “On” or “Off”.
0 1 2 3	**Date & time**		☞ Set the time and date. **NOTICE:** For self-diagnostic purposes, the inverter carries out a daily restart at midnight. To avoid having a restart occur during feed-in operation and to always obtain reliable log data, ensure that the time is correctly set.
0 1 2 3	**Ethernet**		☞ Assign a unique IP address. ☞ Assign a subnet mask. ☞ Assign a gateway.
0 1 2 3	**Webserver**		☞ Activate or deactivate the integrated webserver.
0 1 2 3	**“Parameters” menu**	↳	☞ Press the right arrow key or the OK key. **NOTICE:** The inverter does not display the “Parameters” menu in the standard configuration. To display the menu: 1. Open the menu. 2. Simultaneously hold down the up and down keys for several seconds.
0 1 2 3	**Country**		1. Input the four-character password via the 4-way key. The password is unit-specific. 2. Confirm the entry with the OK key. 3. Set the desired country setting. NOTICE: This option influences the country-specific operating settings of the inverter. Please consult KACO service for further information.
0 1 2 3	**Grid type/ guideline**		☞ If available, select the type of grid applicable to the use of the inverter. **NOTICE:** Communication timeout select other country.
0 1 2 3	**Overvoltage shutd.**		☞ Specify the shutdown threshold for fast and slow overvoltage shutdown. ☞ Set period from occurrence of the fault to shutdown of the inverter.
0 1 2 3	**Undervoltage shutd.**		☞ Specify the shutdown threshold for fast and slow undervoltage shutdown. ☞ Set period from occurrence of the fault to shutdown of the inverter.

Menu level	Display/settings		Action in this menu/meaning
0 1 2 3	**Overfreq. shutd.**		☞ Set limit value for overfrequency shutdown.
0 1 2 3	**Underfreq. shutd.**		☞ Set limit value for fast and slow underfrequency shutdown.
0 1 2 3	**DC connection**		Offers the possibility to adjust the PV-Connection according Connection samples on chapter 7.3.2.3 and 7.3.2.4 in electricians manual. **NOTICE:** The selection of "Automatic" recognizes standard or parallel connection of PV-array. Disable the "Automatic" in case of malfunction.
0 1 2 3	**Grid mon. 3-ph.**		☞ If available, select a 3-phase grid monitoring. **NOTICE:** 3-phase grid monitoring is initial disabled.
0 1 2 3	**DC starting volt.**		The inverter begins feed-in as soon as this PV voltage is present. ☞ Set the starting voltage.
0 1 2 3	**Const. volt. ctrl**		Offers the possibility of deactivating the MPP seek mode in order to operate the inverter with a constant DC voltage. ☞ Activate or deactivate MPP seek mode. ☞ Set value for constant voltage control (200 - 800 V). **NOTICE:** The possible input power is reduced at voltages lower than 350 voltage. The input current is limited to 18.6 A per input.
0 1 2 3	**Power limitation**		The output power of the inverter can be set permanently to a lower value than the maximum output power by the internal power limiting. This may be necessary in order to limit the maximum power rating of the system at the grid connection point, upon the grid operator's request. The value can be protected from the very first output limitation entry. After setting a limitation, the value can only be changed by entering a device-specific password. 1. Activate password protection if necessary. 2. Specify the activation status. 3. Specify the limit value for maximum feed-in power. 4. Confirm the entry with the OK button.
0 1 2 3	**Iso.resistor**		☞ Set threshold value (in 1 kOhm steps) at which the insulation monitor reports a fault.
0 1 2 3	**"Information" menu**	↳	☞ Open the menu: Press the right arrow key or the OK key.
0 1 2 3	**Inverter type**		Displays the type designation of the inverter.
0 1 2 3	**AFCI module**	 ↳	Displays quantity of monitored trackers, parameter version and status information. **NOTICE:** In case of Arc fault it is necessary to check PV-system and confirm to clear the operation stop.
0 1 2 3	**SW version**		Displays the installed software version.
0 1 2 3	**Serial number**		Displays the serial number of the inverter.
0 1 2 3	**Display country**		Displays the selected country setting. Optional: Displays the grid type if a grid type has been selected.
0 1 2 3	**"Vendor" menu**	↳	» The display shows information about the unit manufacturer.

3.3 Monitoring the inverter

The inverter has an integrated web server. This makes it possible to monitor and record the operating state and yield of your PV system.

You can display the recorded data via:

- The integrated LCD
- The integrated web server using an Internet-capable device connected to the Ethernet interface of the inverter

You can read the recorded data using a storage medium connected to the USB interface of the inverter, e.g. a USB stick.

3.3.1 USB interface

Use an external USB storage device to read operating data saved in the inverter.

3.3.1.1 Reading log data

NOTICE

The USB interface is approved solely for usage with USB flash memories ("USB sticks"). The maximum available current is 100 mA. If a device with a higher power requirement is used, the power supply for the USB interface automatically shuts down to protect the inverter from damage.

Reading log data

1. Connect a suitable USB storage device to the USB interface on the underside of the inverter.
2. Open the "Log data view" menu.
3. Select the "Save to USB" item.
4. Select the desired log data using the 4-way key.
5. Press the OK key.

» The inverter saves the selected log data to the USB storage device.

3.3.2 Web server

The inverter has an integrated web server. After configuration of the network and activation of the web server in the configuration menu, you can open the web server from an Internet browser. The language version of the web site delivered by the browser is dynamically adapted, based on the pre-set language preferences in your Internet browser. If your Internet browser requests a language that is unknown to the inverter, the web server uses the menu language set in the inverter.

3.3.2.1 Setting up the web server

Configuring the Ethernet interface

↻ You have connected the inverter to your network.

1. Open the Settings/Ethernet menu.
2. Assign a unique IP address.
3. Assign a subnet mask.
4. Assign a gateway.
5. Save your settings.

3.3.2.2 Using the web server

To avoid problems with incompatibility, use the most recent version of your Internet browser.

NOTICE

You can also access the web server of the inverter via the Internet. To do this, additional settings of your network configuration, particularly your Internet router, are required.

Note that communication with the inverter is carried out over an unsecured connection, particularly in the case of a connection over the Internet.

Calling up the web server

↻ Configure the Ethernet interface.

↻ Connect the Ethernet interface.

1. Open an Internet browser.
2. In the address field of the Internet browser, enter the IP address of the inverter and call up the site.

» The Internet browser displays the start screen of the web server.

After it has been called up, the web server displays information about the inverter as well as the current yield data. The web server supports the display of the following measurement data and yield data:

- Feed-in power
- Status
- Grid power
- Grid voltage
- Generator power
- Generator voltage
- Unit temperature

In order to display and export yield data, proceed as follows:

Select the display period

1. Call up the web server.
2. Select the display period by choosing one of the keys: day view, month view, year view or overall view.

Filtering display data (day view only)

1. Call up the web server.
2. Select the day view.
3. To show or hide measured values, select or deselect the corresponding checkboxes in the “Select display” area.

Exporting data

1. Filter the display data if necessary.
2. Select the display period if applicable (day, month, year or overall view).
3. Click the “Export data” key.
4. Save the file.

NOTICE

Regardless of the display data selected in the “Select display” area, an export file always contains all measurement data and yield data available for the selected period.

3.4 Performing a software update

You can update the software of the inverter to a new version via the integrated USB interface. Us a FAT32-formatted USB stick to do this. Do not use any storage media, such as an external hard disk, with an external power supply.

NOTICE

Ensure that the power supply of the AC and DC sides is active. It is only possible to update all components of the inverter to the most current software version in this operating state.

CAUTION

Damage to the inverter

The update can fail if the power supply is interrupted during the update process.
Parts of the software or of the inverter itself can then be damaged.

» Do not interrupt the DC and AC power supply during the update process.

» Do not remove the USB stick during the update process.

Preparing for the software update

1. Download the software update file from the KACO web site and store it on your hard disk.
2. Extract the update file (.ZIP) completely onto the USB stick.

» Perform software update.

Perform software update.

↻ Prepare for the software update.

↻ Ensure supply of DC and AC power.

1. Connect USB stick to the inverter.

» The message “Configuration found. Would you like to load it?” appears on the display.

2. If you would like to perform the update, select the “Yes” button.

» The inverter begins the update.

The update can take several minutes. The “Operating” LED flashes during the update process. The inverter may restart several times. The update is completely loaded when the display screen shows the desktop.

The inverter then returns to feed-in mode. You can check the success of the update in the menu:

Display software version

☞ Open the Information/SW version menu

» The inverter will display the versions and checksums of the currently loaded software.

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