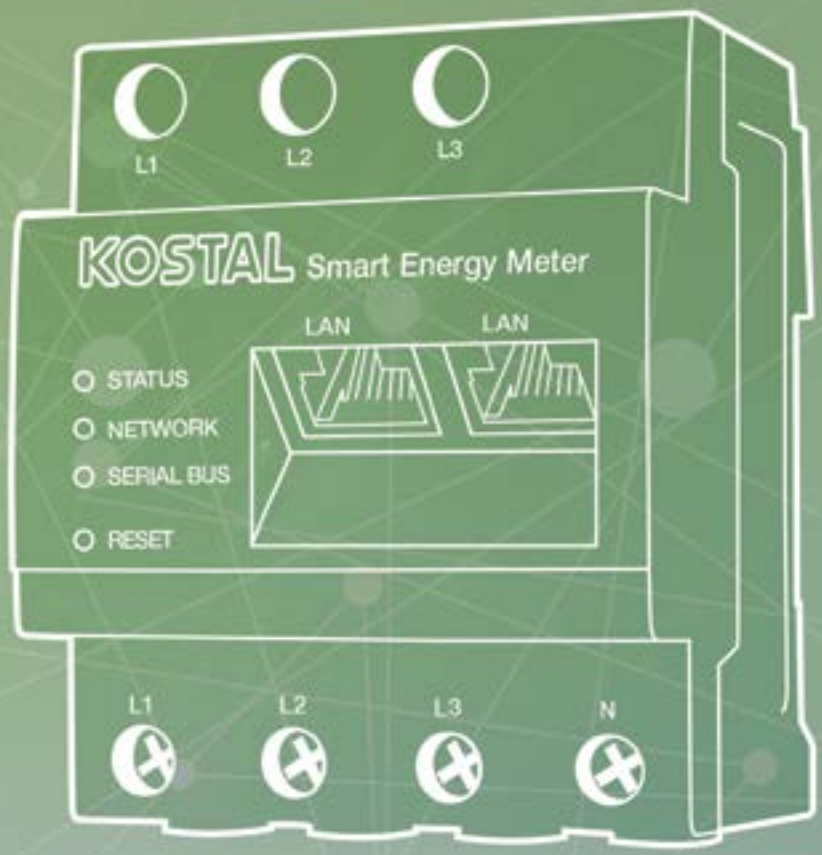
SOLAR ELECTRIC

KOSTAL




Smart connections.

# Operating instructions

## KOSTAL Smart Energy Meter

## Legal notice

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### Exclusion of liability

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### General note on gender equality

KOSTAL Solar Electric GmbH is aware of the importance of language with regard to the equality of women and men and always makes an effort to reflect this in the documentation. Nevertheless, for the sake of readability we are unable to use non-gender-specific terms throughout and use the masculine form instead.

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Valid from version: 1.2.0

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Thank you for choosing our KOSTAL Smart Energy Meter (KSEM) from KOSTAL Solar Electric GmbH! We hope you enjoy consistently high energy yields with your photovoltaic system.

If you have any technical questions, please call our service hotline:

- Germany and other countries [1]
  +49 (0)761 477 44 - 222
- Switzerland
  +41 32 5800 225
- France, Belgium, Luxembourg
  +33 16138 4117
- Greece
  +30 2310 477 555
- Italy
  +39 011 97 82 420
- Spain, Portugal [2]
  +34 961 824 927
- Turkey [3]
  +90 212 803 06 26

[1] Language: German, English

[2] Language: Spanish, English

[3] Language: English, Turkish

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# 1.1 Proper use

The KOSTAL Smart Energy Meter is a measuring device, which determines electrical measuring values and is available to the inverter via LAN or RS485. It is not an electricity meter for measuring active consumption in the sense of the EU Directive 2004/22/EC (MID) and it may only be used for internal purposes.

The data about your system's energy generation collected by the KOSTAL Smart Energy Meter may deviate from the data of the main energy meter.

According to its classification as overvoltage category III, the KOSTAL Smart Energy Meter may only be connected in the sub-distribution / circuit distribution on the consumer side behind the energy supply company's energy meter and is only suitable for indoor use.

The KOSTAL Smart Energy Meter is approved for use in EU member states. Only use the KOSTAL Smart Energy Meter in accordance with the details provided in the enclosed documentation.

Any other form of use may result in damage to property or personal injury. For reasons of safety, the product (including the software) must not be modified and components must not be fitted if they are not expressly recommended or sold by KOSTAL Solar Electric GmbH for this product. Any form of product use other than that described in the intended use section is not considered to be intended.

Operators are prohibited from undertaking unauthorised changes, conversions and repairs as well as opening the product.

The enclosed documentation forms part of the product and must be read, noted and kept accessible at all times.

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## Exclusion of liability

Any use that differs from that described in the “Proper use” chapter or goes beyond the stated intended purpose is considered inappropriate. The manufacturer accepts no liability for any damage resulting from this. Modifications to the energy meter are prohibited. The energy meter may only be used if it is safe to operate and is in a technically perfect condition. Any instance of misuse will result in the termination of the warranty, guarantee and general liability of the manufacturer.

Only a qualified electrician may open the device. The device must be installed by a trained electrician (according to DIN VDE 1000-10 or BGV A3 accident prevention regulations or an internationally comparable standard) who is responsible for observing the applicable standards and regulations.

Work that could affect the electrical power system of the relevant energy supply company at the site of the solar power feed-in, may only be carried out by qualified electricians expressly authorised (licensed) by the energy supply company. This includes changes to the factory-preset parameters. The installer must always observe the regulations of the energy supply company.

Factory settings may only be changed by qualified electrical installers or persons with at least comparable or higher technical qualifications, e.g. foremen, technicians or engineers. When doing so, all requirements are to be observed.

**IMPORTANT INFORMATION**

**The KOSTAL Smart Energy Meter may only be installed, maintained and repaired by a trained and qualified electrician.**

**The electrician is responsible for ensuring that the applicable standards and regulations are observed and implemented. Work that could affect the electrical power system of the relevant energy supply company at the site of the solar power feed-in, may only be carried out by qualified electricians expressly authorised (licensed) by the energy supply company.**

**This includes changes to the factory-preset parameters.**

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## Open Source licence

This product contains Open Source software, developed by third parties and licensed using vehicles including GPL and/or LGPL.

For more details of this, a list of the Open Source software used and the related licence texts, **Ch. 4.5** go to the Licences section on the website (Webserver) of the KOSTAL Smart Energy Meter.

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# 1.2 EU declarations of conformity

**KOSTAL Solar Electric GmbH** hereby declares that the KOSTAL Smart Energy Meter described in this document complies with the basic requirements and other relevant conditions of the directives listed below.

- Directive 2014/30/EU
  (on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC))
- Directive 2014/35/EU
  (on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits – in short: Low Voltage Directive)
- Directive 2011/65/EU (RoHS)
  on the restriction of the use of certain hazardous substances in electrical and electronic equipment

You will find a detailed EU Declaration of Conformity in the download area at:

www.kostal-solar-electric.com > Download > Accessories > KOSTAL Smart Energy Meter > Country > Certificates

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# 1.3 About this manual

Read this manual carefully in its entirety.

It contains important information on the installation and operation of the KOSTAL Smart Energy Meter. Pay particular attention to the instructions regarding safe usage. KOSTAL Solar Electric GmbH assumes no liability for damages arising from the non-observance of this manual.

This manual is an integral part of the product. It applies exclusively to the KOSTAL Smart Energy Meter from KOSTAL Solar Electric GmbH. Keep this manual and give it to the new owner should you pass it onto a new operator.

The installer and the operator must have unrestricted access to these instructions at all times. The installer must be familiar with this manual and follow all instructions.

The most recent version of the manual for your product is available in the download area at www.kostal-solar-electric.com.

## Target group

This manual is intended for trained and qualified electrical technicians who install, maintain and repair the KOSTAL Smart Energy Meter.

Information concerning your safety or that of the unit is specifically noted.

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## Navigation through the document

In order to enable navigation through this document, it contains clickable areas.

One of these is the navigation bar in the header of each page. By clicking here, you reach the overview pages of the individual chapters.

The table of contents can also be used in this way: From the index at the beginning of each chapter you can go to the indicated sub-chapter in one click.

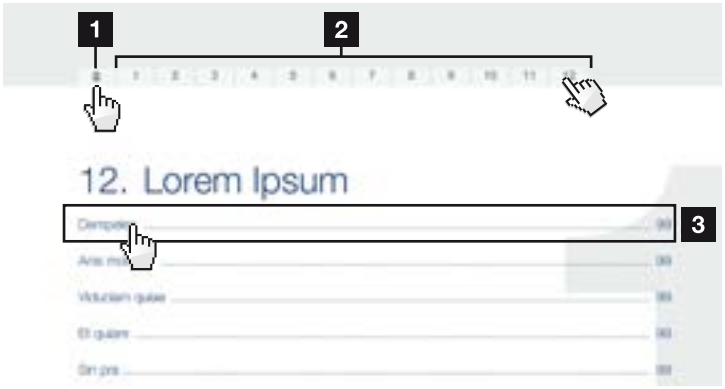



Fig. 1: Navigation through the document

1 Calling up the main table of contents
2 Navigation bar
3 Tables of contents

You can navigate to the referenced points in the document within the instruction text using the cross-references.

**Ch. 1**

**Fig. 1,It. 2**

Fig. 2: Examples of cross-references

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# 1.4 Notes in this manual

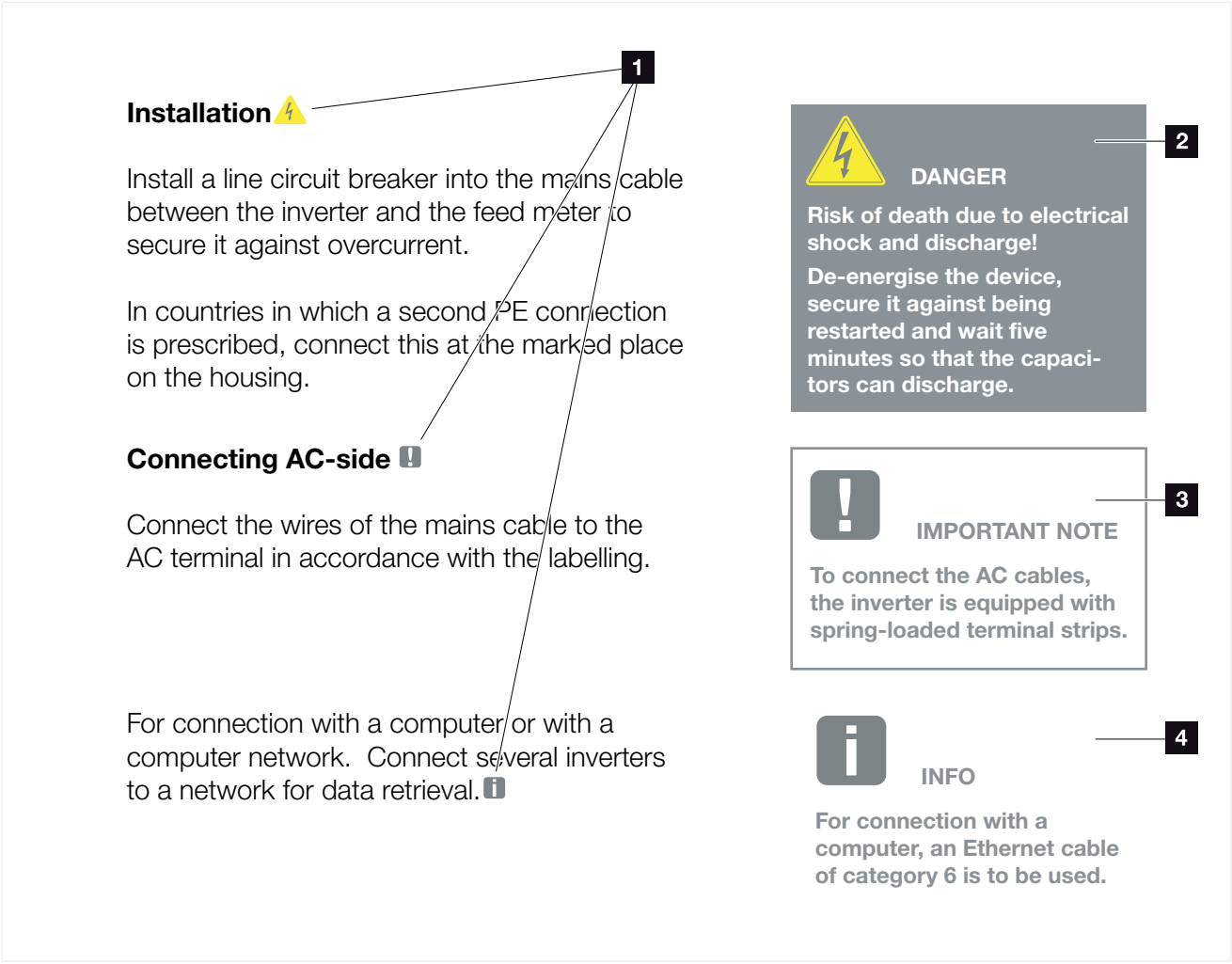



Fig. 3: Safety instructions in this manual

1 Reference icon within the instruction text
2 Warning
3 Information note
4 Other notes

Notes have been incorporated into the instruction text. A differentiation is made in this manual between warnings and information notes. All notes are identified in the text line with an icon.

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## Warnings

The warnings refer to life-threatening dangers. Serious injuries possibly resulting in death may occur.

Each warning consists of the following elements:

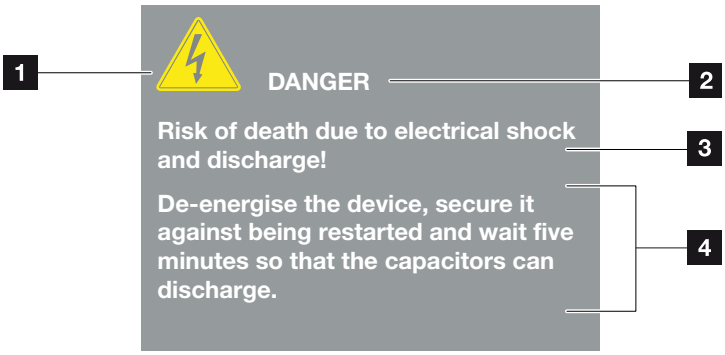



Fig. 4: Structure of the warnings

1. Warning symbol
2. Signal word
3. Type of danger
4. Corrective actions

### Warning symbols



Danger



Danger due to electrical shock and discharge

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## Signal words

Signal words are used to identify the severity of the danger.

**DANGER**
Indicates a direct hazard with a high level of risk, which, when it is not avoided, may result in death or serious injury.

**WARNING**
Indicates a hazard with a moderate level of risk, which, when it is not avoided, may result in death or serious injury.

**CAUTION**
Indicates a hazard with a low level of risk, which, when it is not avoided, may result in minor or slight injury or property damage.

## Information notes

Information notes contain important instructions for the installation and problem-free operation of the energy meter. These must be followed at all times. The information notes also point out that failure to observe can result in damage to property or financial damages.

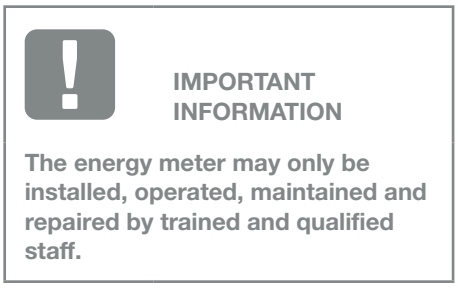



Fig. 5: Example of an information note

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### Symbols within the information notes

Important information

Damage to property possible

## Other notes

They contain additional information or tips.

**INFO**

This is additional information.

Fig. 6: Example of an information note

### Symbols within the additional notes

Information or tip

Enlarged view

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# 1.5 Symbols used

| Symbol | Meaning |
|---|---|
| **1., 2., 3. ...** | Sequential steps in a handling instruction |
| → | Effect of a handling instruction |
| ✓ | Final result of a handling instruction |
| | Cross-reference to other places in the document or to other documents |
| ■ | List |

Tab. 1: Symbols and icons used

## Abbreviations used

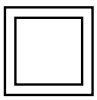
| Abbreviation | Explanation |
|---|---|
| Tab. | Table |
| Fig. | Figure |
| It. | Item |
| Ch. | Chapter |

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# 1.6 Labels on the energy meter



Signs and labels are applied to the housing of the energy meter. These signs and labels may not be altered or removed.

| Symbol | Explanation |
|---|---|
|  | Electrical installations require specialist skills |
|  | Housing with protective insulation (protective class II). |
|  | Device may not be disposed of with household waste.<br>Observe the local application of disposal requirements |
|  | CE marking<br>The product satisfies the applicable EU requirements |

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# 2. Device and system description

2.1 Using the KOSTAL Smart Energy Meter ..... 20

2.2 The KOSTAL Smart Energy Meter ..... 21

2.3 LED statuses ..... 22

2.4 Functions ..... 23

# 2.1 Using the KOSTAL Smart Energy Meter

The KOSTAL Smart Energy Meter (KSEM) is a measuring device, which determines electrical measuring values at the grid connection point and is available via LAN or RS485. It can be used in combination with various KOSTAL solar inverters and batteries.

This includes the following inverters:

- PLENTICORE plus
- PLENTICORE BI
- PIKO IQ
- PIKO MP plus
- PIKO 4.2-20
- PIKO EPC

These can be used in combination with the KOSTAL Smart Energy Meter for the following applications:

- reading the current home consumption and output power
- Power curtailment of inverters down to 0W
- If several PV systems in the same home network share a multiple-inverter connection, only one KOSTAL Smart Energy Meter is required at the grid connection point
- If using PIKO MP plus with a battery, the battery management, which controls the battery's charging / discharging, is taken over by the KOSTAL Smart Energy Meter,
- sending consumption data to the KOSTAL Solar Portal

# 2.2 The KOSTAL Smart Energy Meter

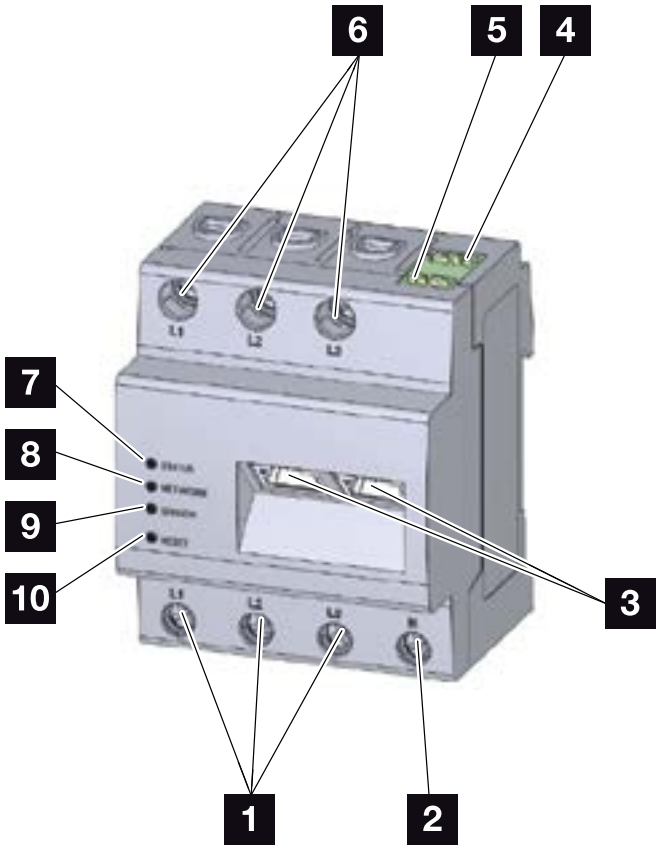



Fig. 7: Energy meter

1 Inputs for external wires L1, L2, L3
2 Neutral wire N
3 2 x LAN connection
4 RS485 connection (A)
Pre-configured for PIKO IQ/PLENTICORE
5 RS485 connection (B)
Pre-configured for PIKO MP plus
6 Outputs for external wires L1, L2, L3
7 Status LED
8 Network LED
9 Sensor LED for RS485 bus
10 Reset button

# 2.3 LED statuses

The LEDs inform the user of the status of the KOSTAL Smart Energy Meter.

The following statuses are indicated:

| Status LED | Colour | State | Description |
|---|---|---|---|
| | Orange | On (<10 s) | Device starts |
| | Green | Flashes slowly | |
| | Green | On | Device ready |
| | Green | Flashes quickly | Firmware update active |
| | Red | On | Error – see “Troubleshooting” section |
| | Red | Flashes | |
| | Orange | On (>10 s) | |
| | Orange | Flashes 2 x | Confirmation that the network settings or online interface password have been reset using the reset button |

| Network LED | Colour | State | Description |
|---|---|---|---|
| | - | Off | No connection |
| | Green | On | Network connection is being established |
| | Green | Flashes | Network connection is active |

| Serial bus LED | Colour | State | Description |
|---|---|---|---|
| | - | Off | No connection |
| | Green | Flashes quickly | Connection active |
| | Green | Flashes slowly | Scan process active |
| | Red | On | Error - overload at 9 V output VCC |
| | Orange | Flashes | Error – receiver not responding |

# 2.4 Functions

## Recording home consumption

Using the KOSTAL Smart Energy Meter enables the inverter to monitor the flow of energy in the home for 24 hours and to control it in an optimum manner.

The inverter takes precedence in control matters. The PV energy generated is used firstly for self-consumption (such as lighting, washing machine or TV). Only once self-consumption is covered can the energy generated above and beyond this be stored in a battery or fed into the public grid.

- Using energy meter (Modbus RTU) to record home consumption
- 24-hour measurement

## Multiple-inverter connection

With a multiple-inverter connection, there are several KOSTAL solar inverters in the same home network. By installing the KOSTAL Smart Energy Meter at the grid connection point, the flow of energy from all KOSTAL solar inverters present in the home network can be measured and regulated by the KOSTAL Smart Energy Meter using control information, e.g. for power limitation in order to limit the feed-in to the public grid. The benefit of this setup is that only one energy meter is required for all KOSTAL solar inverters in the home network.

- Simultaneous power curtailment of several KOSTAL solar inverters in the same home network
- Saving costs by using just one energy meter

## Battery management for PIKO MP plus with connected battery

The PIKO MP plus is not able to control a connected battery itself. In order to do this, the PIKO MP plus also needs the KOSTAL Smart Energy Meter and a battery activation code, both of which can be obtained from our KOSTAL Solar online shop. The KOSTAL Smart Energy Meter then handles battery management and transmits control information to the PIKO MP plus for this purpose.

## Communication between KOSTAL solar inverters and KOSTAL Smart Energy Meter

The KOSTAL Smart Energy Meter provides various interfaces for communication purposes. These establish a connection to other KOSTAL solar inverters, sensors or the Internet.

- LAN
  LAN connects the KOSTAL Smart Energy Meter to the local home network, via which it can then access other inverters or the Internet and Solar Portal.
- RS485/Modbus (RTU)
  Inverters or other devices approved by KOSTAL Solar Electric, via which information or control commands are communicated, are connected to the Modbus interface.

## The Webserver

The Webserver is the graphic interface in the browser (e.g. Firefox, Edge, Internet Explorer or Google Chrome) for querying and configuring the KOSTAL Smart Energy Meter.

The Webserver provides the following functions:

- Logging into the energy meter
- Querying the status
- Current yield values / consumption values
- Configuring the KOSTAL Smart Energy Meter (e.g. software updates, releasing options, incorporating PV systems for multiple-inverter connection etc.)
- RS485/Modbus (RTU)
  Inverters, batteries or other devices approved by KOSTAL Solar Electric, via which information or control commands are communicated, are connected to the Modbus interface.
- Release of extra options
  This function (which can be found by going to Inverter > Activation code) can be used to release additional options. This may include e.g. releasing battery management in the KOSTAL Smart Energy Meter to connect a battery to the PIKO MP plus.
- Calling up the error log file
- Backup for saving data and the configuration

For more information **Ch. 4**

## The data logger

A data logger is integrated in the KOSTAL Smart Energy Meter. The data logger is a data storage system, which collects and stores the error information. Such information is required by the service team in the event of an error.

For more information **Ch. 5.3**

## KOSTAL Solar Portal

The KOSTAL Solar Portal protects your investment in a PV system against yield loss, e.g. through active e-mail alerts of events.

You can log into the KOSTAL Solar Portal for free at **www.kostal-solar-portal.com**.

Functions include:

- Worldwide online access to the portal
- Graphic representation of the power and yield data
- Visualisation of data and thus being made aware of how to optimise self-consumption
- Notification of events by e-mail
- Data export
- Sensor evaluation
- Display and proof of a potential active power reduction by the grid operator
- Storage of log data for long-term and reliable monitoring of your PV system

You can find additional information about this product on our website **www.kostal-solar-electric.com** by going to Products > Tools and software > Monitoring.

# 3. Connection variants

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3.2 The KSEM with the PLENTICORE BI ..... 33

3.3 The KSEM with the PIKO IQ ..... 36

3.4 The KSEM with the PIKO MP plus ..... 39

3.5 The KSEM with the PIKO 4.2-20 / PIKO EPC ..... 46

3.6 Multiple-inverter connection of KOSTAL solar inverters ..... 49

3.7 Configuring settings in the Webserver ..... 54

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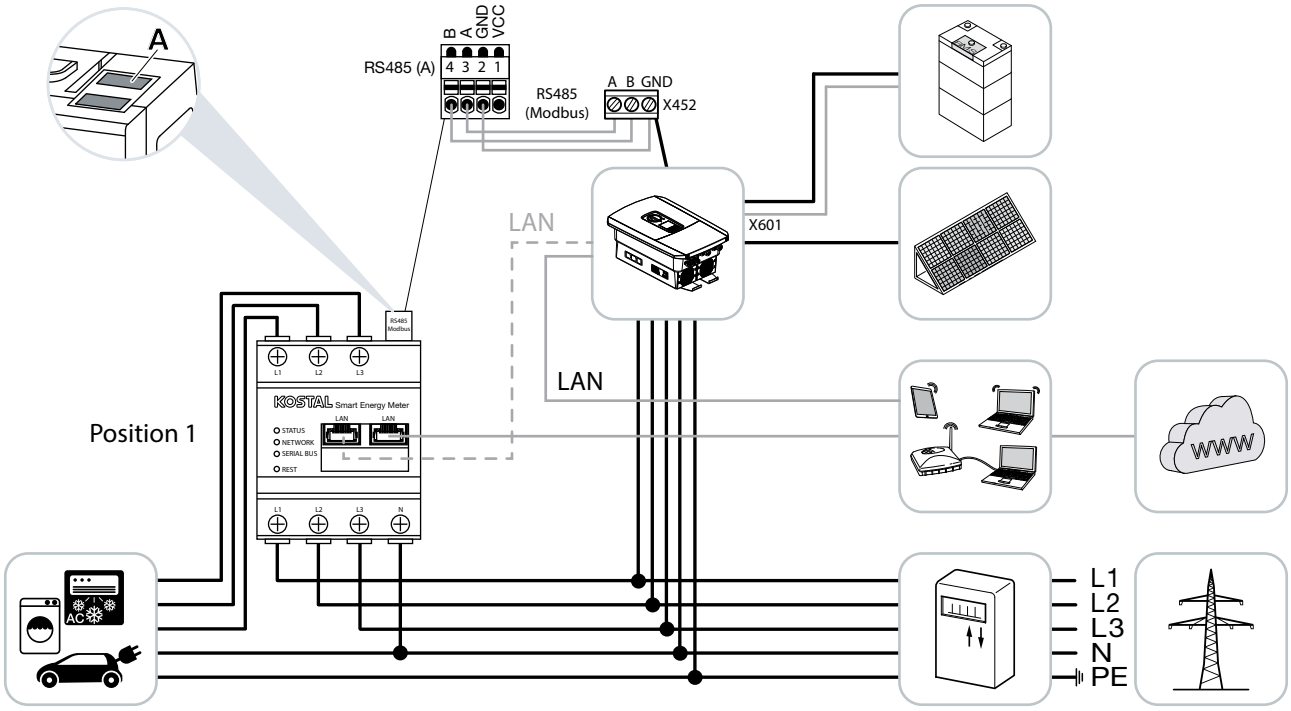
# 3.1 The KSEM with the PLENTICORE plus

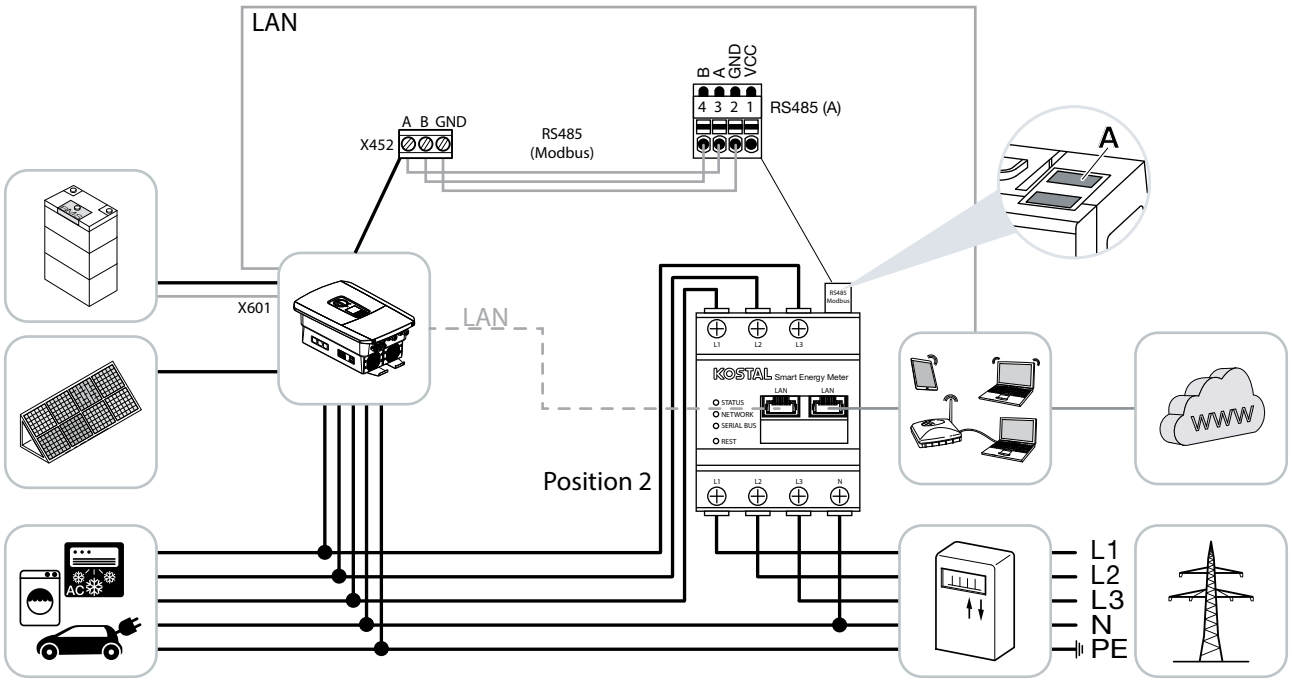
The KOSTAL Smart Energy Meter (KSEM) can be used in conjunction with the PLENTICORE plus in the following variants.

- 24-hour load / generation measurement (measuring the current home consumption and output power)
- DC energy storage (from your own PV system)
- Scope for storing from AC energy sources (e.g. from PV systems, wind turbines, combined heat and power units)
- Multiple-inverter connection (several KOSTAL solar inverters in the same home network: only one KOSTAL Smart Energy Meter is required). **Ch. 3.6**
- Dynamic active power control
- Provision of measurement data when using battery functionality in combination with PLENTICORE plus

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## PLENTICORE plus - load / generation measurement




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Install KOSTAL Smart Energy Meter as shown for home consumption (position 1) or at the grid connection point (position 2) in the home network.

Set up RS485 communication cable between inverter and KOSTAL Smart Energy Meter and connect.

Establish LAN connection from KOSTAL Smart Energy Meter and inverter to the Internet. As an option, the LAN connection from the inverter can also be connected directly to the KOSTAL Smart Energy Meter (switch function).

In this variant, the KOSTAL Smart Energy Meter runs as a slave and transmits data to the inverter.

The inverter does not have to be set up in the KOSTAL Smart Energy Meter because it is pre-configured to the Modbus RTU RS485 interface (A) as standard.

If changes are to be made to the settings, perform the following steps:

1. Call up online interface of KOSTAL Smart Energy Meter **Ch. 4.3**
2. Call up Modbus configuration under Modbus settings.
3. Select PIKO IQ/PLENTICORE from drop-down list

| Parameter | Value |
|---|---|
| Interface | RS485 A |
| Active slave | Yes |
| Presetting | PIKO IQ/PLENTICORE |
| Slave address | 1 |
| Baud rate | 38400 |
| Data bits | 8 |
| Parity | None |
| Stop bit | 2 |

4. Press “Save” button to accept settings.

✓ The inverter has been set up.

**INFO**

The installation position of the KOSTAL Smart Energy Meter is set in the inverter.

**INFO**

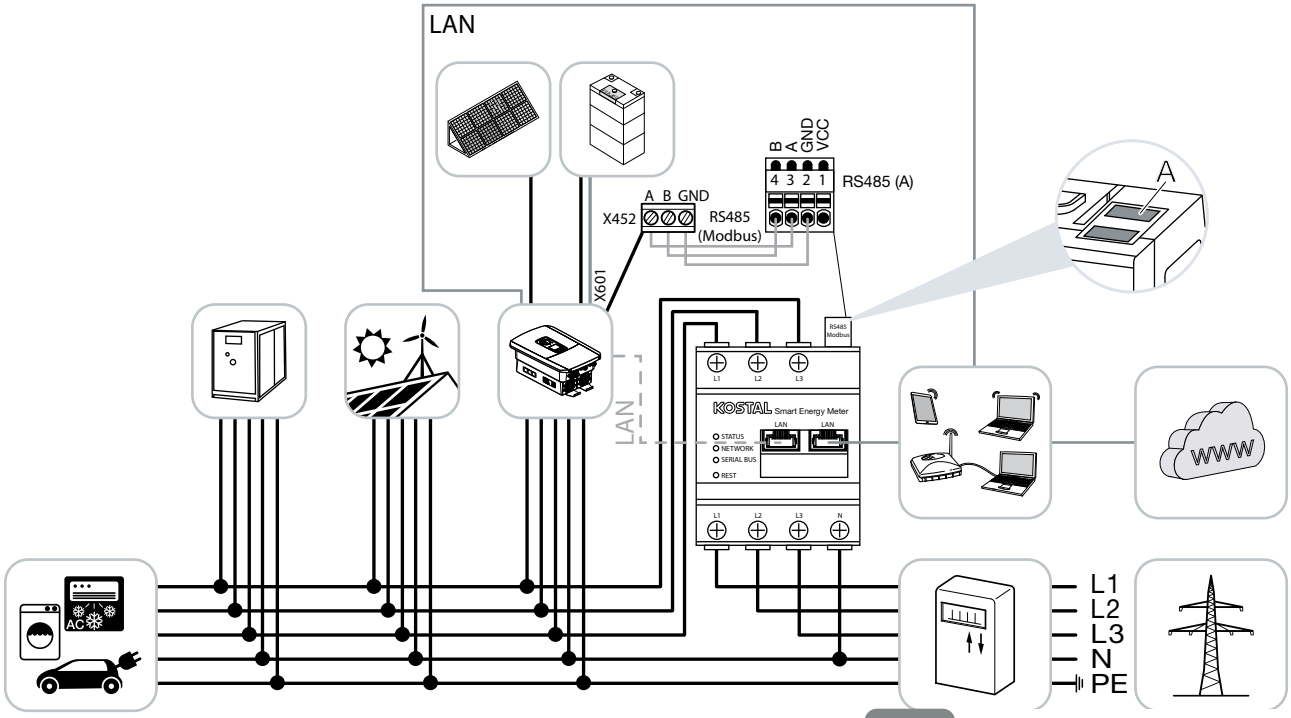
For details, see the inverter's operating manual and the KOSTAL Smart Energy Meter's installation instructions.

**INFO**

When an inverter is selected, the predefined default values are adopted. These can be adapted if necessary.

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## PLENTICORE plus - additional scope for storing AC energy sources




Install KOSTAL Smart Energy Meter as shown at the grid connection point (position 2) in the home network.

Set up RS485 communication cable between inverter and KOSTAL Smart Energy Meter and connect.

Establish LAN connection from KOSTAL Smart Energy Meter and inverter to the Internet. As an option, the LAN connection from the inverter can also be connected directly to the KOSTAL Smart Energy Meter (switch function).

In this variant, the KOSTAL Smart Energy Meter runs as a slave and transmits data to the inverter.

The inverter does not have to be set up in the KOSTAL Smart Energy Meter because it is pre-configured to the Modbus RTU RS485 interface (A) as standard.

**INFO**

The installation position of the KOSTAL Smart Energy Meter is set in the inverter.

**INFO**

For details, see the inverter's operating manual and the KOSTAL Smart Energy Meter's installation instructions.

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In the inverter, “Storage of excess AC energy from local generation” must be activated by going to Service menu > Energy management.

If changes are to be made to the settings, perform the following steps:

1. Call up online interface of KOSTAL Smart Energy Meter **Ch. 4.3**
2. Call up Modbus configuration under Modbus settings.
3. Select PIKO IQ/PLENTICORE from drop-down list.

| Parameter | Value |
|---|---|
| Interface | RS485 A |
| Active slave | Yes |
| Presetting | PIKO IQ/PLENTICORE |
| Slave address | 1 |
| Baud rate | 38400 |
| Data bits | 8 |
| Parity | None |
| Stop bit | 2 |

4. Press “Save” button to accept settings.
5. In the inverter, activate “Storage of excess AC energy from local generation” by going to Service menu > Energy management.

✓ The inverter has been set up.

**INFO**

For details, refer to the inverter’s operating manual. Setting on inverter only possible after logging in as an installer.

**INFO**

When an inverter is selected, the pre-defined default values are adopted. These can be adapted if necessary.

**INFO**

For details, refer to the inverter’s operating manual. Setting on inverter only possible after logging in as an installer.

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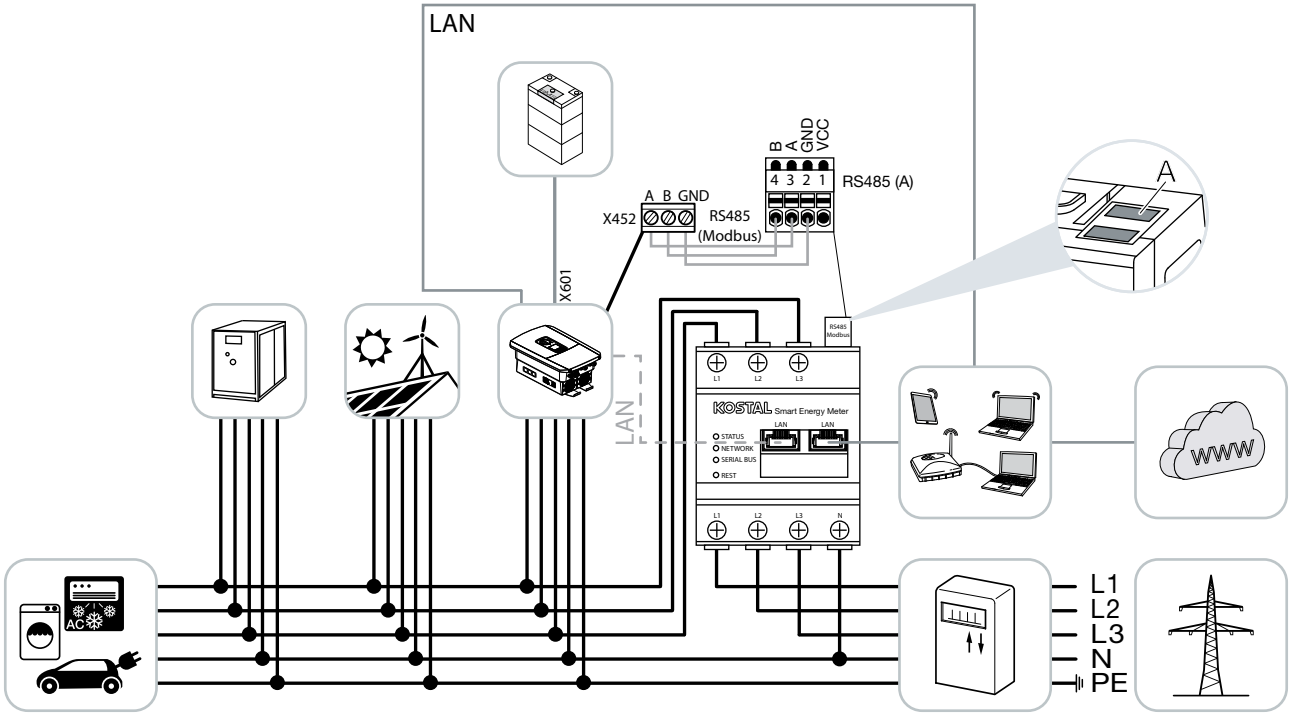
# 3.2 The KSEM with the PLENTICORE BI

The KOSTAL Smart Energy Meter (KSEM) can be used in conjunction with the PLENTICORE BI in the following variants.

- Scope for storing from AC energy sources (e.g. from PV systems, wind turbines, combined heat and power units)
- Provision of measurement data

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## PLENTICORE BI - scope for storing AC energy sources




Install KOSTAL Smart Energy Meter as shown at the grid connection point (position 2) in the home network.

Set up RS485 communication cable between inverter and KOSTAL Smart Energy Meter and connect.

Establish LAN connection from KOSTAL Smart Energy Meter and inverter to the Internet. As an option, the LAN connection from the inverter can also be connected directly to the KOSTAL Smart Energy Meter (switch function).

In this variant, the KOSTAL Smart Energy Meter runs as a slave and transmits data to the inverter.

The inverter does not have to be set up in the KOSTAL Smart Energy Meter because it is pre-configured to the Modbus RTU RS485 interface (A) as standard.

**INFO**

For details, see the inverter's operating manual and the KOSTAL Smart Energy Meter's installation instructions.

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If changes are to be made to the settings, perform the following steps:

1. Call up online interface of KOSTAL Smart Energy Meter **Ch. 4.3**
2. Call up Modbus configuration under Modbus settings.
3. Select PIKO IQ/PLENTICORE from drop-down list.

| Parameter | Value |
|---|---|
| Interface | RS485 A |
| Active slave | Yes |
| Presetting | PIKO IQ/PLENTICORE |
| Slave address | 1 |
| Baud rate | 38400 |
| Data bits | 8 |
| Parity | None |
| Stop bit | 2 |

4. Press “Save” button to accept settings.

✓ The inverter has been set up.

**INFO**

When an inverter is selected, the pre-defined default values are adopted. These can be adapted if necessary.

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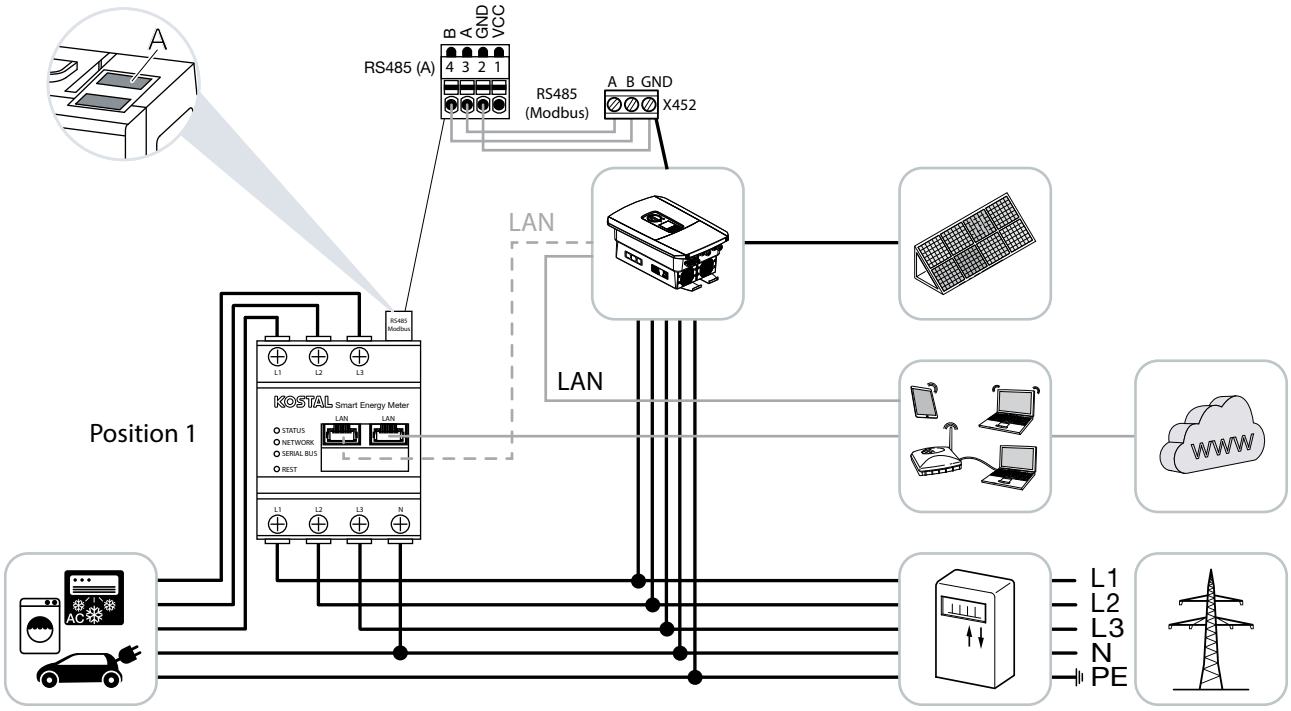
# 3.3 The KSEM with the PIKO IQ

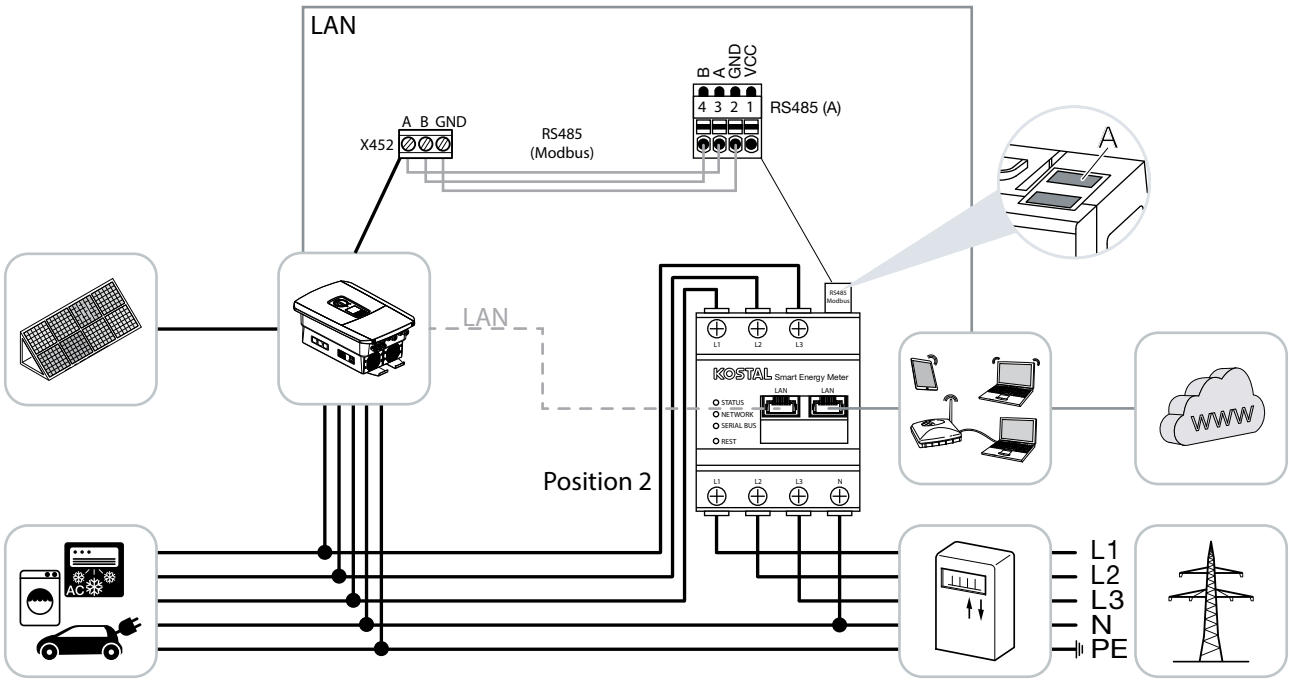
The KOSTAL Smart Energy Meter (KSEM) can be used in conjunction with the PIKO IQ in the following variants.

- 24-hour load / generation measurement (measuring the current home consumption and output power)
- Multiple-inverter connection (several KOSTAL solar inverters in the same home network, only one KOSTAL Smart Energy Meter is required) **Ch. 3.6**
- Dynamic active power control

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## PIKO IQ - load / generation measurement




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Install KOSTAL Smart Energy Meter as shown for home consumption (position 1) or at the grid connection point (position 2) in the home network.

Set up RS485 communication cable between inverter and KOSTAL Smart Energy Meter and connect.

Establish LAN connection from KOSTAL Smart Energy Meter and inverter to the Internet. As an option, the LAN connection from the inverter can also be connected directly to the KOSTAL Smart Energy Meter (switch function).

In this variant, the KOSTAL Smart Energy Meter runs as a slave and transmits data to the inverter.

The inverter does not have to be set up in the KOSTAL Smart Energy Meter because it is pre-configured to the Modbus RTU RS485 interface (A) as standard.

If changes are to be made to the settings, perform the following steps:

1. Call up online interface of KOSTAL Smart Energy Meter **Ch. 4.3**
2. Call up Modbus configuration under Modbus settings.
3. Select PIKO IQ/PLENTICORE from drop-down list

| Parameter | Value |
|---|---|
| Interface | RS485 A |
| Active slave | Yes |
| Presetting | PIKO IQ/PLENTICORE |
| Slave address | 1 |
| Baud rate | 38400 |
| Data bits | 8 |
| Parity | None |
| Stop bit | 2 |

4. Press “Save” button to accept settings.

✓ The inverter has been set up.

**INFO**

The position of the KOSTAL Smart Energy Meter is set in the inverter.

**INFO**

For details, see the inverter's operating manual and the KOSTAL Smart Energy Meter's installation instructions.

**INFO**

When an inverter is selected, the predefined default values are adopted. These can be adapted if necessary.

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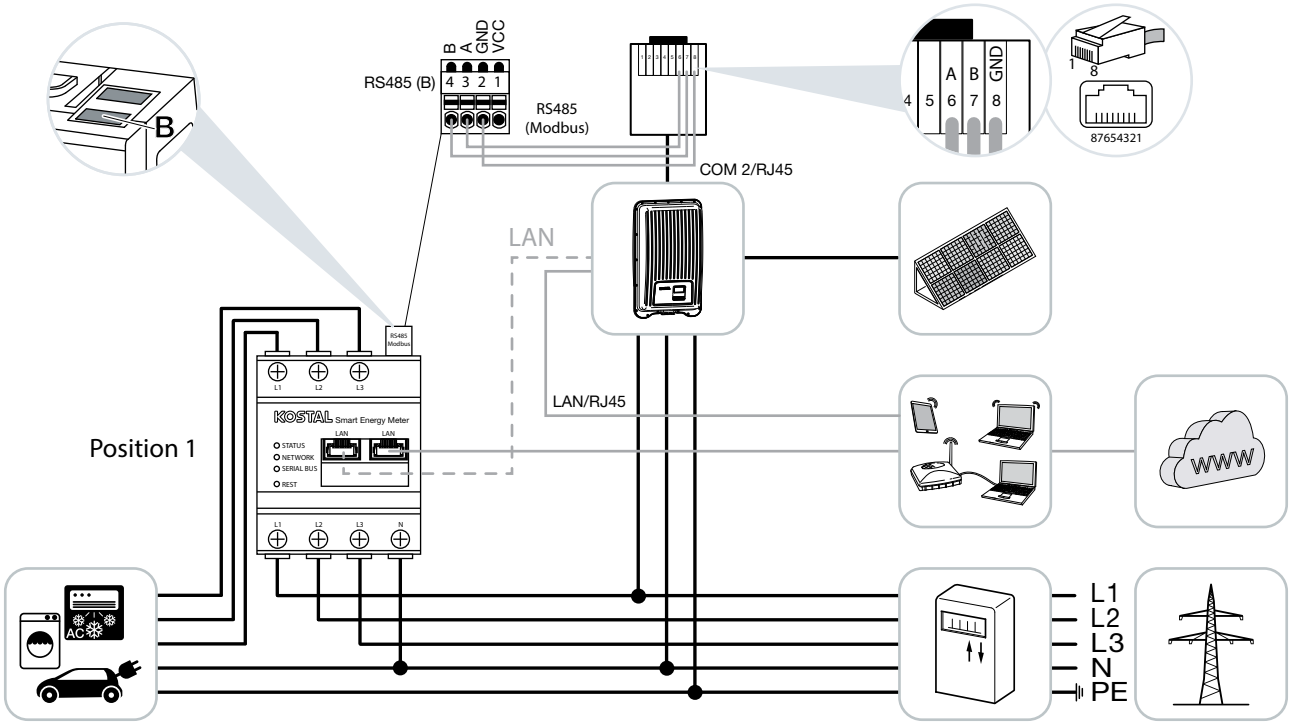
# 3.4 The KSEM with the PIKO MP plus

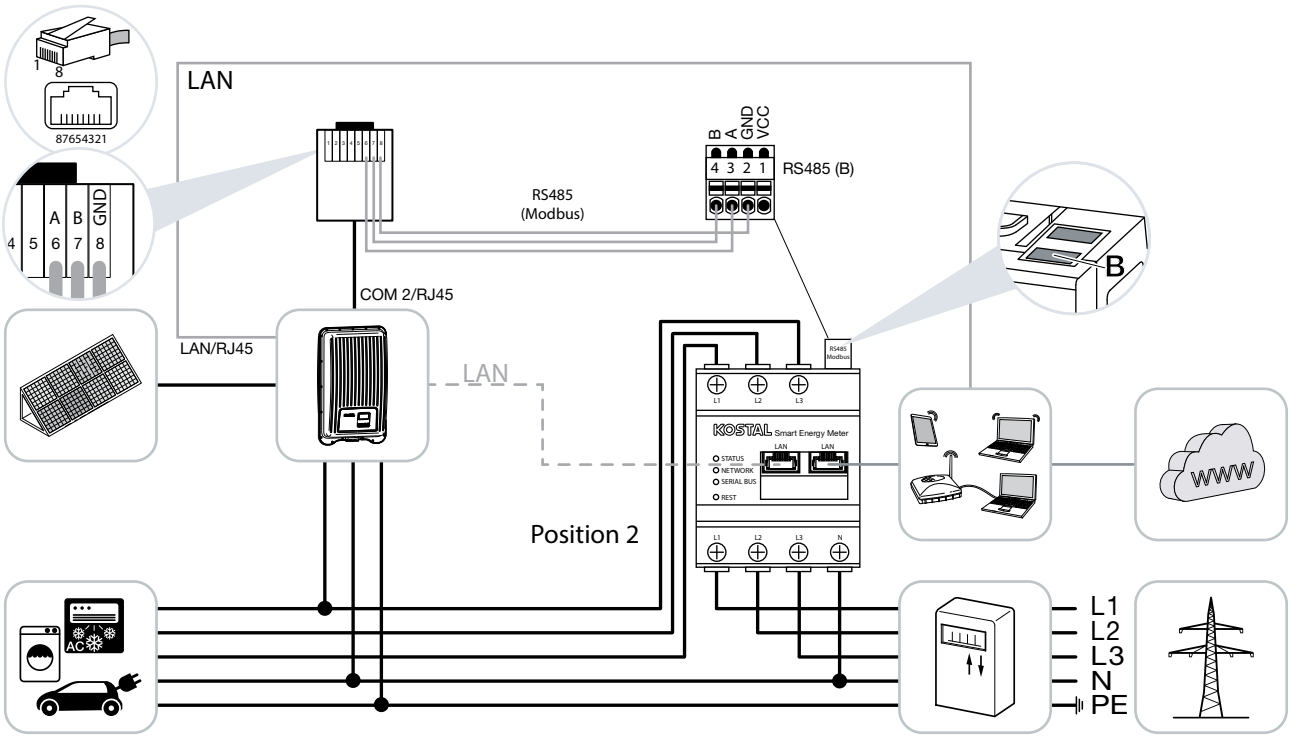
The KOSTAL Smart Energy Meter (KSEM) can be used in conjunction with the PIKO MP plus in the following variants.

- 24-hour load / generation measurement (measuring the current home consumption and output power)
- Multiple-inverter connection (several KOSTAL solar inverters in the same home network, only one KOSTAL Smart Energy Meter is required) **Ch. 3.6**
- Dynamic active power control
- Control (charge / discharge) a battery connected to the PIKO MP plus. **Page 42**
- Provision of measurement data during battery functionality.

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## PIKO MP plus - load / generation measurement




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Install KOSTAL Smart Energy Meter as shown for home consumption (position 1) or at the grid connection point (position 2) in the home network.

Set up RS485 communication cable between inverter and KOSTAL Smart Energy Meter and connect.

Establish LAN connection from KOSTAL Smart Energy Meter and inverter to the Internet. As an option, the LAN connection from the inverter can also be connected directly to the KOSTAL Smart Energy Meter (switch function).

In this variant, the KOSTAL Smart Energy Meter runs as a slave and transmits data to the inverter.

The inverter does not have to be set up in the KOSTAL Smart Energy Meter because it is pre-configured to the Modbus RTU RS485 interface (B) as standard.

If changes are to be made to the settings, perform the following steps:

1. Call up online interface of KOSTAL Smart Energy Meter **Ch. 4.3**
2. Call up Modbus configuration under Modbus settings.
3. Select PIKO MP plus from drop-down list

| Parameter | Value |
|---|---|
| Interface | RS485 B |
| Active slave | Yes |
| Presetting | PIKO MP plus |
| Slave address | 247 |
| Baud rate | 19200 |
| Data bits | 8 |
| Parity | Even |
| Stop bit | 1 |

4. Press “Save” button to accept settings.

✓ The inverter has been set up.

**INFO**

The installation position of the KOSTAL Smart Energy Meter is set in the inverter.

**INFO**

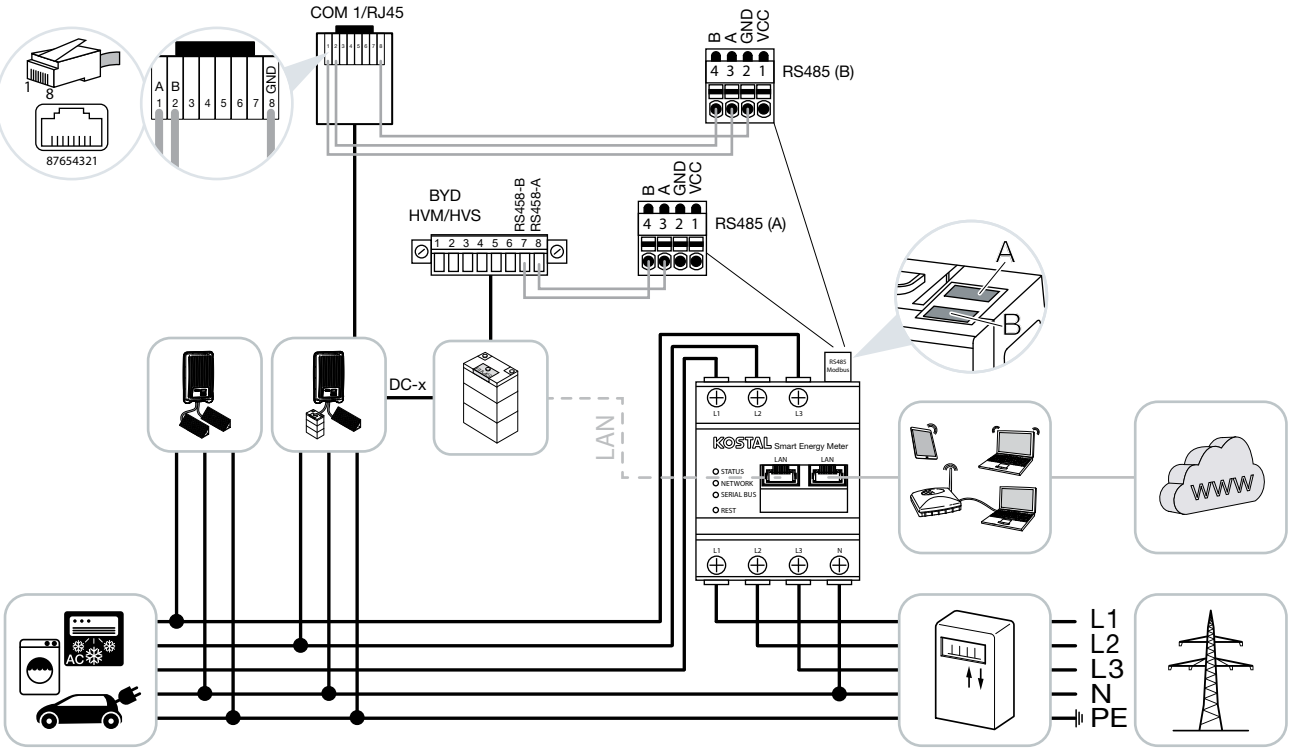
For details, see the inverter's operating manual and the KOSTAL Smart Energy Meter's installation instructions.

**INFO**

When an inverter is selected, the predefined default values are adopted. These can be adapted if necessary.

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## PIKO MP plus - battery control




Install KOSTAL Smart Energy Meter as shown at the grid connection point in the home network.

Set up RS485 communication cable between inverter and KOSTAL Smart Energy Meter RS485 (B) and connect.

Set up RS485 communication cable between battery and KOSTAL Smart Energy Meter RS485 (A) and connect.

Establish LAN connection from KOSTAL Smart Energy Meter, battery and inverter to the Internet. As an option, the LAN connection from the inverter or battery can also be connected directly to the KOSTAL Smart Energy Meter (switch function).

In this variant, the KOSTAL Smart Energy Meter runs as a master and transmits data to the inverter and battery.

**INFO**

The installation position of the KOSTAL Smart Energy Meter can no longer be set in the PIKO MP plus when battery management is activated in the KOSTAL Smart Energy Meter. It is absolutely essential that the KOSTAL Smart Energy Meter is fitted at the grid connection point.

**INFO**

For details, see the inverter's operating manual and the KOSTAL Smart Energy Meter's installation instructions.

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When setting up, note the following installation order:

- Switch off inverter by pressing DC switch
- Switch off battery using main switch
- Switch on battery using main switch
- Set up inverter and battery in KOSTAL Smart Energy Meter
- Switch on inverter by pressing DC switch

The PIKO MP plus and battery must be set up in the KOSTAL Smart Energy Meter.

Do this by performing the following steps:

1. Call up online interface of KOSTAL Smart Energy Meter **Ch. 4.3**
2. For a battery to be used with the PIKO MP plus, the function for this must be released in the KOSTAL Smart Energy Meter. To do this, release the battery management by going to Inverter > Activation code.
3. Then you can set up the devices. To do this, go to Inverter > Devices (manage the inverters used).
4. Use the plus symbol to add an inverter.

**INFO**

The battery must be assigned to a DC input in the PIKO MP plus. This is done in the PIKO MP plus by going to Settings > Service > Inputs > DCx > Battery.

**INFO**

If the battery is manually switched off for any reason, observe the following order for switching on:

- Switch off inverter
- Switch on battery
- Switch on inverter

**INFO**

Input of an activation code, e.g. to connect a battery. This first has to be purchased from the KOSTAL Solar online shop.

**INFO**

When an inverter is selected, the pre-defined default values are adopted. These can be adapted if necessary.

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| Parameter | Value |
|---|---|
| Type | Select PIKO MP plus. |
| Serial interface | Select the RS485 interface at which the PIKO MP plus is connected to the KOSTAL Smart Energy Meter. |
| Maximum output power | Enter the inverter's max. output power. This is required if a power limitation is set at the grid connection point and is to be calculated. |
| Battery management | Activate battery support. |
| Serial interface | Select the RS485 interface at which the battery's communication cable is connected to the KOSTAL Smart Energy Meter. |
| Max. depth of discharge | The maximum depth of discharge for the battery should be set here. Note the details provided by the battery manufacturer. |
| **Open advanced settings** | |
| RS485 address | Enter the inverter's RS485 address. This must be unique for each device and must not already exist. |

5. Press "OK" button to accept settings.

✓ The PIKO MP plus and battery have been set up in the KOSTAL Smart Energy Meter.

**INFO**

The preassigned interfaces have to be switched off beforehand. To do this, click on the corresponding interface in the note that appears.

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## Setting up a new battery with an existing PIKO MP plus

If just one battery is to be set up for an existing PIKO MP plus, this is done via the battery device type.

1. Use the plus symbol to add the battery.

| Parameter | Value |
|---|---|
| Type | Select battery. |
| Link with inverter | Select the PIKO MP plus to which the battery is connected. |
| Serial interface of battery | Select the RS485 interface at which the battery is connected to the KOSTAL Smart Energy Meter. |
| Max. depth of discharge | The maximum depth of discharge for the battery should be set here. Note the details provided by the battery manufacturer. |

2. Press “OK” button to accept settings.

✓ The battery has been set up in the KOSTAL Smart Energy Meter and linked to a PIKO MP plus. Finally, the battery still needs to be assigned to the correct DC input in the PIKO MP plus.

**INFO**

The battery must be assigned to a DC input in the PIKO MP plus. This is done in the PIKO MP plus by going to Settings > Service > Inputs > DCx > Battery.

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# 3.5 The KSEM with the PIKO 4.2-20 / PIKO EPC

The KOSTAL Smart Energy Meter (KSEM) can be used in conjunction with the PIKO 4.2-20 or PIKO EPC in the following variants.

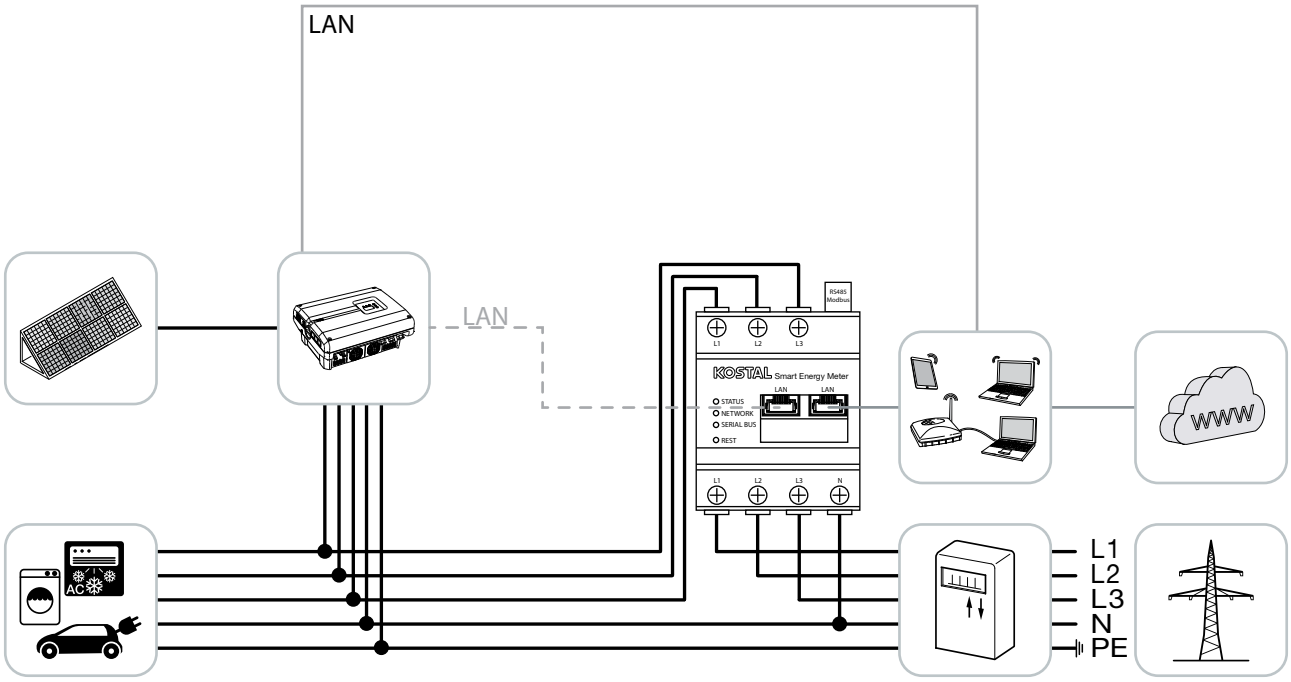
- 24-hour load / generation measurement (measuring the current home consumption and output power)
- Multiple-inverter connection (several KOSTAL solar inverters in the same home network, only one KOSTAL Smart Energy Meter is required) **Ch. 3.6**
- Dynamic active power control
- Sending measurement data to the KOSTAL Solar Portal

**INFO**

It is possible to use the KOSTAL Smart Energy Meter in conjunction with the PIKO 4.2-20 or PIKO EPC as of inverter FW5.0.

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## PIKO 4.2-20 / PIKO EPC - load / generation measurement




Install KOSTAL Smart Energy Meter as shown at the grid connection point in the home network.

Set up LAN communication cable between inverter and KOSTAL Smart Energy Meter and connect. As an option, the LAN connection from the inverter can also be connected directly to the KOSTAL Smart Energy Meter (switch function).

In this variant, the KOSTAL Smart Energy Meter runs as a master and controls the inverter (e.g. to limit power).

**INFO**

For details, see the inverter's operating manual and the KOSTAL Smart Energy Meter's installation instructions.

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Set up inverter in KOSTAL Smart Energy Meter. Do this by performing the following steps:

1. Call up online interface of KOSTAL Smart Energy Meter **Ch. 4.3**
2. Go to Inverter > Devices and use Plus (+) to add the PIKO 4.2-20 or PIKO EPC.

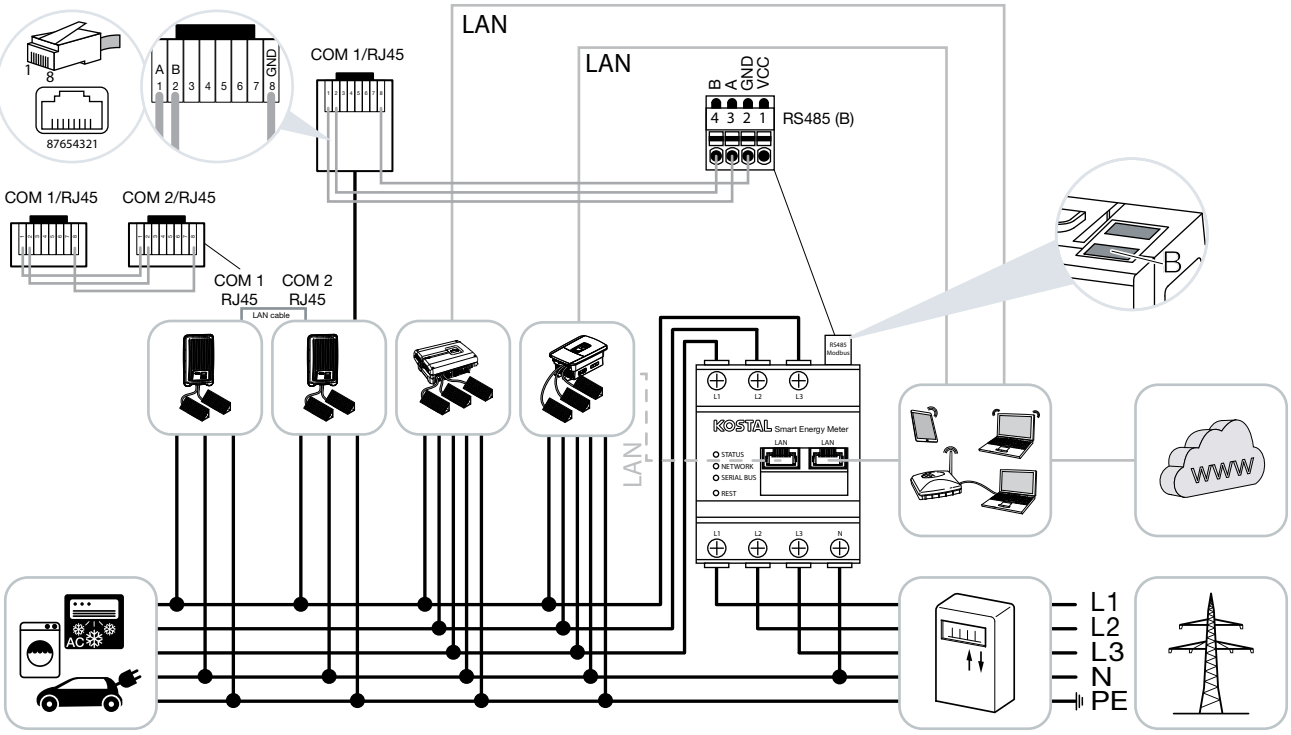
| Parameter | Value |
|---|---|
| Type | Select PIKO 4.2-20 / PIKO EPC |
| IP address | Enter the inverter's IP address. |
| Maximum output power | Enter the inverter's max. output power. This is required if a power limitation is set at the grid connection point and has to be calculated. |
| **Open advanced settings** | |
| RS485 address | Enter the inverter's RS485 address. This has to be unique for each device (255 by default). |

3. Press "OK" button to accept settings.

✓ The inverter has been set up.

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# 3.6 Multiple-inverter connection of KOSTAL solar inverters




With a multiple-inverter connection, there are several KOSTAL solar inverters in the same home network.

Only one KOSTAL Smart Energy Meter is required to monitor power and limit feed-in at the grid connection point. This is installed at the grid connection point in the home network as shown in the illustrations.

Depending on inverter type, the communication cable between the inverter and the KOSTAL Smart Energy Meter is either connected to the RS485 or LAN interface of the KOSTAL Smart Energy Meter.

- LAN interface connection:
  PIKO IQ/PLENTICORE
  PIKO 4.2-20 and PIKO EPC
- RS485 interface connection (B):
  PIKO MP plus

**INFO**

In this variant, the KOSTAL Smart Energy Meter runs as a master and transmits data to all KOSTAL solar inverters in the home network. For data visualisation, the KOSTAL Smart Energy Meter should also be set up as an inverter in the solar portal.

**INFO**

If using a multiple-inverter connection with a PLENTICORE plus, this is currently only possible without a battery. The smart battery control in the PLENTICORE plus should also be deactivated.

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Establish LAN connection from KOSTAL Smart Energy Meter and inverter to the Internet. As an option, the LAN connection from the inverter can also be connected directly to the KOSTAL Smart Energy Meter (switch function).

All KOSTAL solar inverters to be measured and controlled using the KOSTAL Smart Energy Meter must be set up in the KOSTAL Smart Energy Meter.

Do this by performing the following steps:

1. Call up online interface of KOSTAL Smart Energy Meter **Ch. 4.3**
2. Go to Inverter > Devices (manage the inverters used).
3. Use the plus symbol to add an inverter.

| Parameter | Value |
|---|---|
| Type | Select inverter or allow inverter to be detected automatically from the IP address. In this case, the values are read out from the inverter. |
| IP address or serial interface | Enter inverter's IP address or, for PIKO MP plus, select the RS485 interface they are connected to on the KOSTAL Smart Energy Meter. The IP address can be read out on the inverter. |
| Maximum output power | Enter the inverter's max. output power. This is required if a power limitation is set at the grid connection point and is to be calculated. |

**INFO**

For details, see the inverter's operating manual and the KOSTAL Smart Energy Meter's installation instructions.

**INFO**

When an inverter is selected, the predefined default values are adopted. These can be adapted if necessary.

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| Parameter | Value |
|---|---|
| **Open advanced settings** | |
| RS485 address<br>or<br>Unit ID | Enter the inverter's RS485 address. This must be unique for each device and must not already exist.<br>If using Unit ID, the default value 71 should be used. This is assigned in the inverter in the Modbus settings. |

4. Add more inverters using the same function. Ensure that the value for the Unit ID or RS485 address is different for each inverter.
5. Press "OK" button to accept settings.

✓ The inverters have been set up in the KOSTAL Smart Energy Meter.

For PIKO IQ/PLENTICORE, the Modbus protocol must be activated to enable communication between the KOSTAL Smart Energy Meter and KOSTAL solar inverter.

## Activating Modbus protocol

With PIKO IQ/PLENTICORE, the Modbus / SunSpec (TCP) protocol must be activated from the following menu item:

Settings > Modbus / SunSpec (TCP) > Activate Modbus.

No further settings are required with the PIKO 4.2-20, PIKO EPC and PIKO MP plus inverters.

**INFO**

More information can be found in the inverter's operating manual.

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## Setting up feed-in limitation

To set up a feed-in limitation (power limitation) at the grid connection point for the public grid, this function has to be set up in the KOSTAL Smart Energy Meter. More information can be found in **Ch. 4.8**

Do this by performing the following steps:

1. Call up online interface of KOSTAL Smart Energy Meter **Ch. 4.3**
2. Go to Inverter > “Power limitation”.
3. Enter feed-in capacity limit for entire system. Use the calculator to easily set this to a particular percentage (e.g. 70%).
4. Activate the power limitation.

✓ The feed-in limitation at the grid connection point has been set up for all inverters.

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## Configuring settling time for KOSTAL solar inverters

For the KOSTAL Smart Energy Meter to achieve a rapid type of control with a set feed-in limitation (power limitation) or zero feed-in, the settling time must be configured in the KOSTAL solar inverters. This configuration is undertaken as follows:

- For PIKO 4.2-20 and PIKO EPC, using the PARAKO user software
- For PIKO IQ and PLENTICORE, by going to Webserver > Service menu

1. In the Webserver, go to “Settling time” in the Service menu or PARAKO.
2. Set the settling time to 1s.
3. Under mode, select “Power gradient”.
4. For the requirements for high and low priority, enter the inverter’s maximum AC output.
5. Save the settings.

✓ The settling time has been set.

**INFO**

The setting is only needed when using two or more KOSTAL solar inverters and can only be configured by installers using a service code.

**INFO**

More information about the PARAKO parameterisation software for PIKO inverters can be found on our homepage in the download area for your product under operating manual applications.

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# 3.7 Configuring settings in the Webserver

After commissioning, further settings can be configured using the KOSTAL Smart Energy Meter's online interface.

To do this, use your PC or tablet to log into the KOSTAL Smart Energy Meter. You will find a detailed description in **Ch. 4**.

The following settings should be configured by the installer after the initial commissioning:

- Configure prescribed settings relating to the grid feed-in/power limitation specified by the energy supply company (e.g. for dynamic limitation for PIKO 4.2 - 20, PIKO EPC and for multiple-inverter connection of solar inverters) if this has not already been done in the inverter.
- Log into the KOSTAL Solar Portal. In this case, the measurement data is transmitted from the KOSTAL Smart Energy Meter to the portal
- Set date / time
- Update device firmware **Ch. 5.4**
- Change password of KOSTAL Smart Energy Meter. This can be done by going to "Profile" > "Change password" **Ch. 5.5**

**IMPORTANT INFORMATION**

To log in, you will need the password from the energy meter's type plate, which can be found on a separate instruction leaflet in the packaging.

**INFO**

You only need to log into the KOSTAL Solar Portal when using PIKO MP plus with a battery or using KOSTAL solar inverters in a multiple-inverter connection.

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# 4. Operation

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# 4.1 The Webserver




1 Language selection
2 Webserver login / logout, change password
3 Show / hide menu at side
4 Menus
5 Information about licences

The Webserver forms the graphic interface between the KOSTAL Smart Energy Meter and user.

Go to Login to log in to the KOSTAL Smart Energy Meter.

**INFO**

For the energy values to be displayed accurately, the KOSTAL Smart Energy Meter has to be installed at the grid connection point because otherwise not all consumers in the home network can be recorded.

**IMPORTANT INFORMATION**

To log in, you will need the password from the energy meter's type plate, which can be found on a separate instruction leaflet in the packaging.

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# 4.2 Preparing KOSTAL Smart Energy Meter

The KOSTAL Smart Energy Meter has to be connected to an existing local network in order for you to access it.

This requires the following steps:

1. Install the KOSTAL Smart Energy Meter in a distributor box on the top-hat rail according to the installation instructions provided and connect by cable.
2. Cover KOSTAL Smart Energy Meter with the cover or protection against accidental contact of the sub-distribution in the distributor box.
3. Connect network cable to KOSTAL Smart Energy Meter's grid connection (LAN port).
4. Connect the other end of the network cable to a router/switch.
5. Reconnect sub-distribution to power supply. Wait for the KOSTAL Smart Energy Meter's launch process to end.

✓ The KOSTAL Smart Energy Meter is connected to the network.

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# 4.3 Calling up user interface

The user interface is called up using a standard browser on a PC, tablet or mobile phone. To do this, enter host name or IP address of the KOSTAL Smart Energy Meter in your browser's address line. The factory-set host name is made up of the product name and serial number.

Example: KSEM-712345678

### Calling up online interface via network environment in Windows 10

In Windows, in File Explorer click on "Network" or call up "Devices and Printers" via a search.

An icon with the name of the KOSTAL Smart Energy Meter (e.g. KSEM--712345678) should be visible. Click on the KOSTAL Smart Energy Meter's icon. The standard browser opens with the KOSTAL Smart Energy Meter log-on page.

### Using HTTPS in the browser

To use the KOSTAL Smart Energy Meter with HTTPS in the browser, you have to enter "https://" rather than "http://" in the address line.

1. Enter the host name or IP address of the KOSTAL Smart Energy Meter in the browser's address line.
2. Press the ENTER key.

➔ The login window is opened.

3. Enter the password and press the ENTER key

✓ The KOSTAL Smart Energy Meter's user interface opens.

**INFO**

This function depends on the router settings and may not be available in larger administered networks under some circumstances.

**INFO**

The target network must also not be classified in the PC as "Public network" otherwise this function will be blocked by Windows.

**INFO**

Because the KOSTAL Smart Energy Meter's online interface is not a website registered on the Internet, the browser will display it as unsafe.

To call up the online interface anyway, the browser's warning must be ignored and a one-off or permanent exception added under "Advanced settings".

**IMPORTANT INFORMATION**

To log in, you will need the password from the energy meter's type plate, which can be found on a separate instruction leaflet in the packaging.

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# 4.4 Configuring settings

If a PIKO IQ or PLENTICORE is to be connected to the RS485 A interface or a PIKO MP plus is to be connected to the RS485 B interface, no further settings are required because these devices are already preconfigured for these interfaces upon delivery.

If you want to make changes to the settings on the KOSTAL Smart Energy Meter interfaces, you can select an inverter for the interface under the Modbus settings. The appropriate values are stored as standard. You can also adapt the values if necessary.

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# 4.5 The dashboard




1 Language selection
2 Webserver login / logout, change password
3 Show / hide menu at side
4 Call up menus
5 Display current energy flow
  Call up smart meter menu
6 Display current system information
  Call up device settings
7 Licence information

The dashboard provides the user with an overview of the current most important KOSTAL Smart Energy Meter data.

**INFO**

The value in the centre of the diagram shows the power in kW (active power). Viewed together with the arrow animations, the value either means feed-in or purchase. The values on the lines with arrows show the energy in kWh (active energy), which was fed in or purchased over the entire operating period.

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# 4.6 Menu - smart meter




1 Active power display (total of all phases)
2 Active energy display, shown by consumption or purchase per phase
3 Measuring values per phase
4 Enhanced mode, measuring values with apparent and reactive power/energy

The graphics provide the user with an overview of whether the entire system is purchasing or feeding in power at the present time.

All power and energy values are indicated separately as purchase (+) and feed-in (-).

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### Active power

The diagram shows totals for the power of the individual phases. The active power (P) is the amount of converted power actually used by the consumer. It is measured in watts.

### Active energy

The diagram and table show the power values for the entire system per phase as a total for consumption or feed-in. The active energy is the power generated over a certain period. It is stated in watt-hours.

### Measuring values per phase

The table shows all measuring values recorded by the system per phase. In enhanced mode, apparent and reactive power / energy are also displayed.

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# 4.7 Menu - tariff

## Overview




1. Switch between viewing feed-in and consumption (purchase)
2. Select time period (hour, day, week, month, year)
3. Diagram
4. Select time period (view depends on choice of time period view)
5. Call up tariff settings
6. Show and hide the energy/costs by selecting them via the key

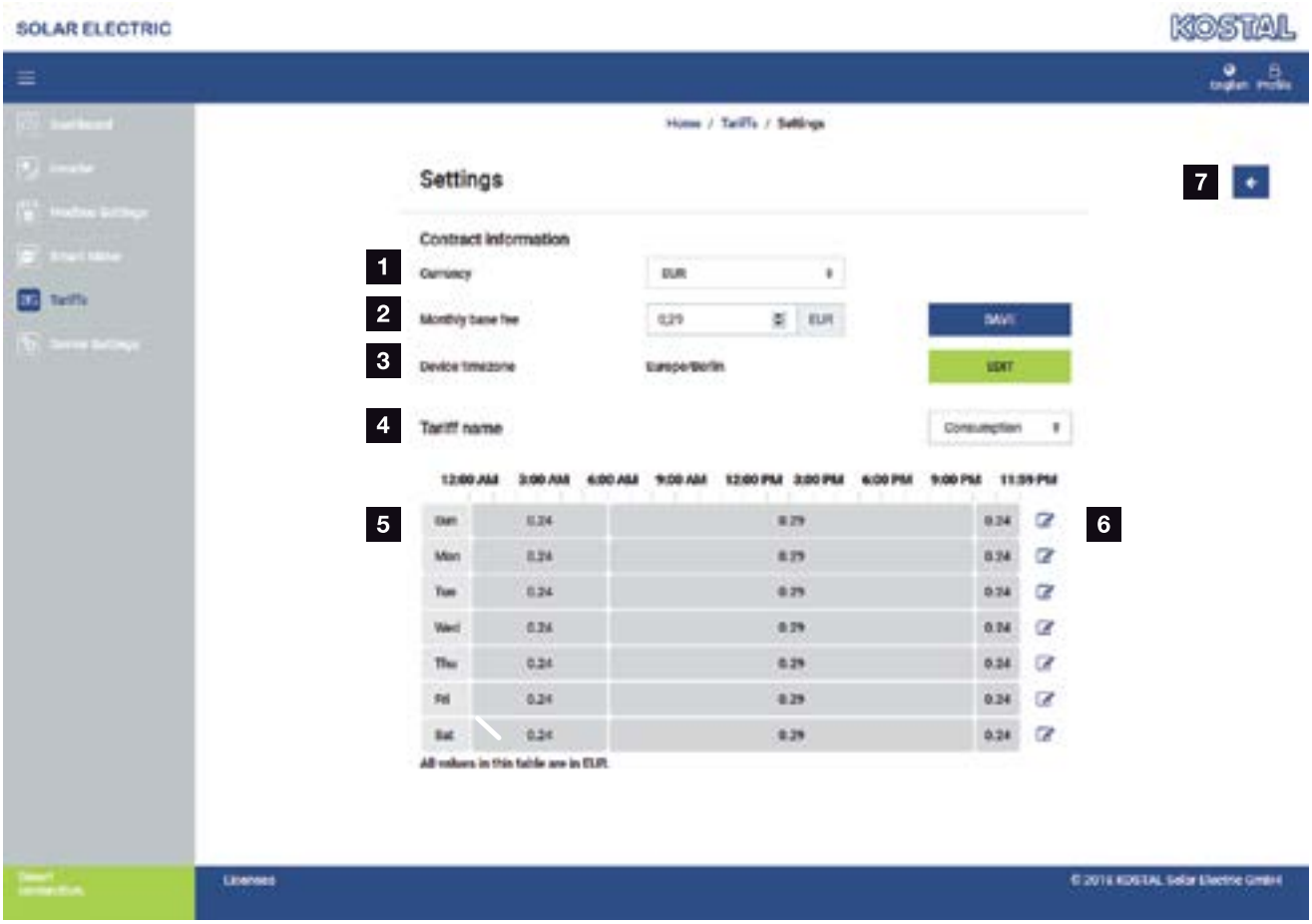
Consumption and tariff information for the feed-in and consumption. The tariffs for feed-in and consumption (purchase) are stated under the tariff setting.

**INFO**

The diagram also shows the energy in kWh and the costs in the configured currency.

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## Tariff input




1 Choice of currency
2 Enter monthly basic charge
3 Selection of time zone
4 Switch between feed-in / consumption tariff
5 View of tariff entered
6 Edit tariff
7 Go back to overview

Here you select the currency and set the monthly basic charge for the tariff. The energy rate for the tariff for feed-in or consumption (purchase) can be set using the pen symbol next to the tariff view.

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## Managing energy rates




1. Choice of days for which the tariff is to apply
2. Choice of time period for which the tariff is to apply
3. Energy rate (tariff) input
4. Create a new energy rate
5. Assign energy rate to the selected days/hours
6. Save settings

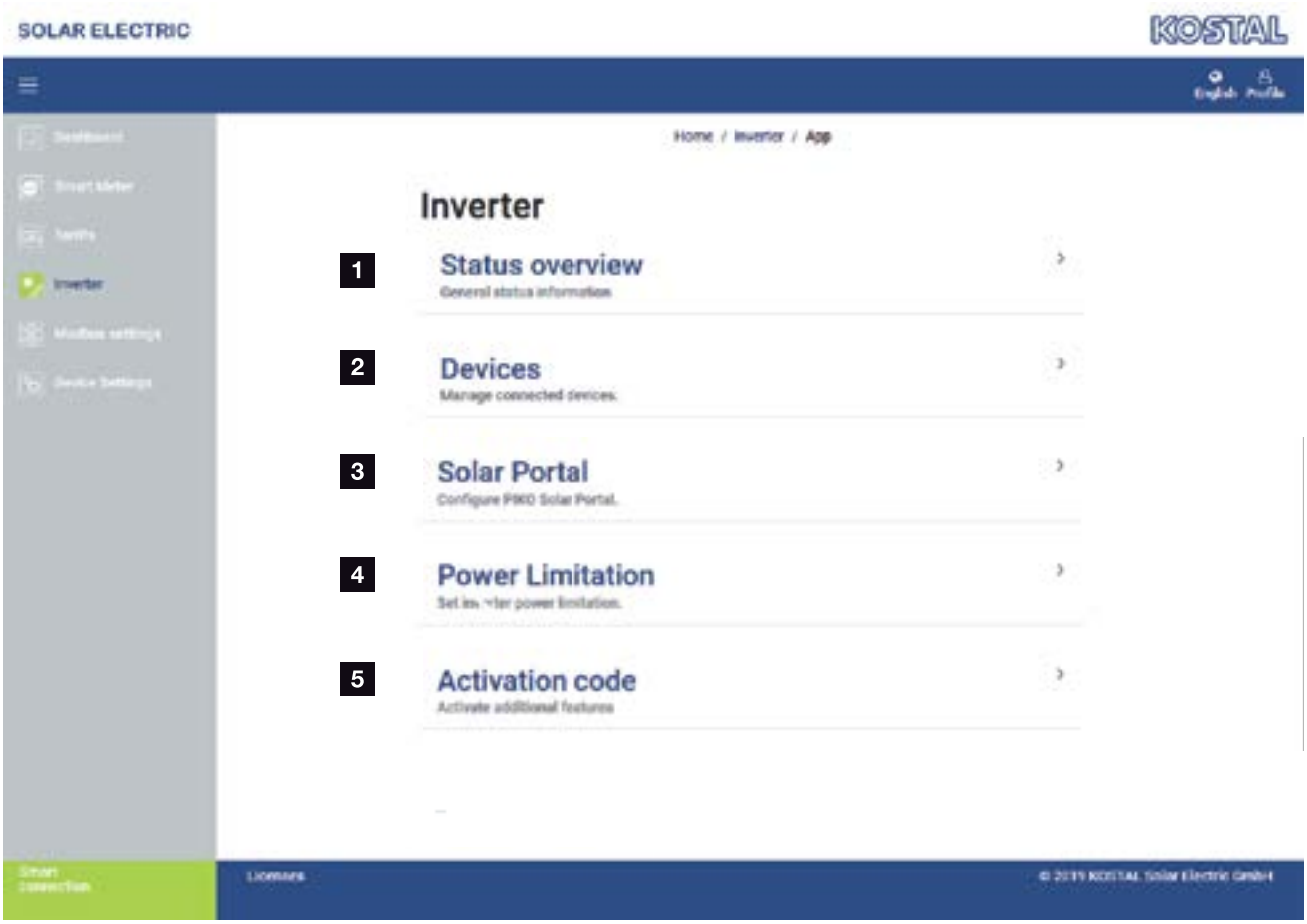
Start by entering an energy rate. Several rates can be created for feed-in and consumption. Then select the days and hours for which the energy rate is to apply and assign these using the “Assign” button. The colours indicate which energy rate/tariff applies to which time period.

**INFO**

If a created energy rate is not assigned a time window, it is automatically deleted after saving.

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# 4.8 Inverter menu




1. Inverter status overview
   Battery status overview (only for PIKO MP plus with battery)
2. Set up inverter/battery (e.g. for power limitation, multiple-inverter connection or battery use in combination with the PIKO MP plus) and display the inverter/batteries set up.
3. Activate/deactivate KOSTAL Solar Portal
4. Set up power limitation
5. Release additional functions via activation code

**INFO**

This function can be used to release additional options. This may include e.g. releasing battery management to connect a battery storage system together with the PIKO MP plus.

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The KOSTAL Smart Energy Meter is linked to the KOSTAL solar inverters to reduce the feed-in capacity of inverters if required or to control the battery when using the PIKO MP plus.

In addition to this, the KOSTAL Smart Energy Meter can be connected to the KOSTAL Solar Portal to transfer data from the KOSTAL Smart Energy Meter and inverter to the portal.

### Status overview menu

In the “Status overview” menu, the KOSTAL Smart Energy Meter provides general information about the devices.

### Devices menu

Connected inverters or batteries are set up and managed in the “Manage connected devices” menu.

New devices can be added using the Plus (+) button. The type of communication (TCP or RS485) used between the inverter and KOSTAL Smart Energy Meter is determined by the choice of inverter (e.g. PIKO IQ or PIKO MP plus).

If the battery management function is selected in addition to the PIKO MP plus, you can select the communication interface to the battery and a depth of discharge (SOC).

Different parameters have to be configured depending on the device type. If all relevant settings have been configured, detection of the inverter can be started by pressing the “OK” button.

**INFO**

Battery management is only displayed if the additional battery option has been activated for the PIKO MP plus using an activation code.

**INFO**

Only then is a device added to the KOSTAL Smart Energy Meter if the inverter was detected successfully.

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| Parameter | Explanation |
|---|---|
| Automatic selection | Allows the KOSTAL solar inverter to be automatically detected via the IP address entered. The IP address can be read off the inverter or retrieved via the inverter menu. |
| PIKO 4.2-20 / PIKO EPC | A PIKO 4.2-20 / EPC inverter is to be set up.<br>This type of inverter communicates using TCP (LAN).<br>The IP address has to be stated for the connection.<br>If there are several inverters, different RS485 addresses should be used. |
| PIKO MP plus | A PIKO MP plus inverter is to be set up.<br>This type of inverter communicates using the RS485 interface.<br>To connect the inverter, you will need to state the RS485 interface of the KOSTAL Smart Energy Meter to which the inverter was connected.<br>If there are several inverters, different RS485 addresses should be used.<br>**Battery management:**<br>If a battery is to be set up for the PIKO MP plus, you can activate battery support for this here.<br>You should then select the communication interface (RS485) of the KSEM to which the battery's communication cable is connected.<br>**Max. depth of discharge**<br>The maximum depth of discharge for the battery should be set here. Note the details provided by the battery manufacturer. |

**INFO**

Here the PIKO MP plus must only be set up with a multiple-inverter connection or using a battery system.

**INFO**

Battery management is only displayed if the additional battery option has been activated for the PIKO MP plus using an activation code.

If a battery is set up using this item, it is automatically connected to the inverter once confirmed.

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| Parameter | Explanation |
|---|---|
| PIKO IQ/PLENTICORE | A PIKO IQ/PLENTICORE inverter is to be set up.<br>This type of inverter communicates using TCP.<br>The IP address has to be stated for the connection.<br>If there are several inverters, different unit IDs should be used. |
| Battery | A battery is to be set up for a set-up PIKO MP plus.<br>The battery communicates using the RS485 interface.<br>To connect the battery, you will need to specify which RS485 interface of the KOSTAL Smart Energy Meter the battery's communication cable was connected to.<br>If there are several devices, different RS485 addresses should be used.<br>**Link with inverter**<br>Here select the inverter with which the battery is connected.<br>**Max. depth of discharge**<br>The maximum depth of discharge for the battery should be set here. Note the details provided by the battery manufacturer. |
| Maximum output power | It is essential that this value is set for every connected inverter.<br>The maximum output power is the maximum output which the inverter being configured is able to deliver.<br>The value for the max. output power only depends on the inverter type and design. The actual capacity of the connected solar modules is irrelevant for this setting. |

**INFO**

The PIKO IQ/PLENTICORE must be set up here when using a multiple-inverter connection.

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## Explanation of device overview

| Parameter | Explanation |
|---|---|
| Name | Indication of name which the user has given to the KOSTAL solar inverter.<br>The name is assigned via the inverter menu interface. |
| Type | Shows the type designation of the inverter/battery. |
| Address | Either the IP address or RS485 address of the inverter is shown. |
| Status | Indication of status of communication with the inverter. Two statuses are possible:<br>OK (√) indicates that communication with the inverter is working normally.<br>Error (!) means that communication with the inverter is interrupted. |
| Info (i) | Additional information, such as serial number, hardware and software versions can be retrieved via the Info symbol.<br>OK (√) indicates that communication with the inverter is working normally.<br>Other values are an error code.<br>**Also for batteries**<br>**Activate sleep mode:**<br>The battery is put into sleep mode. When in sleep mode, the battery cannot be discharged. The battery receives trickle charges provided there is no self-consumption from consumers in the home network. There is no longer any energy available from the battery.<br>**Deactivate sleep mode:**<br>The battery is switched back from sleep mode into active mode. |

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| Parameter | Explanation |
|---|---|
| Edit (pen symbol) | The edit symbol (✎) can be used to modify the configuration of a connected inverter/battery. Any modifications only take effect once confirmed with “OK”. |
| Delete (bin symbol) | The bin symbol can be used to delete an inverter from the KOSTAL Smart Energy Meter. |

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## Solar portal

The connection to the solar portal can be activated or deactivated in the “Configuration of KOSTAL Solar Portal” menu. Information about the connection status is also displayed.

The connection to the KOSTAL Solar Portal is only made or broken after clicking on the “Save” button.

| Parameter | Explanation |
|---|---|
| Last request | Time of last query to the solar portal. A “-” means that there haven't been any queries yet. |
| Last response | Time of portal’s last response. |
| Machine ID | An ID issued for the KOSTAL Smart Energy Meter by the solar portal. |
| Serial number | Serial number of the KOSTAL Smart Energy Meter |
| Article number | Article number of the KOSTAL Smart Energy Meter. |
| Activate solar portal | Activate or deactivate connection/ transfer to the solar portal. |

**INFO**

**In the solar portal, the items and serial numbers of the inverter must be stated for logging in.**

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## Power limitation

A feed-in limit for the entire system with a multiple-inverter connection measured by the KOSTAL Smart Energy Meter can be set in the “Manage feed-in capacity” menu.

The power limitation monitors the feed-in of the entire system. If the value set for the feed-in limit is exceeded, the KOSTAL Smart Energy Meter calculates the amount by which each connected inverter needs to reduce its output to avoid exceeding the feed-in limit. The “maximum output power” value set for each individual inverter provides the basis for calculating the amount by which each inverter needs to reduce its output.

- The feed-in check and communication with the inverters is started by selecting “Activate power limitation”.
- The maximum amount which may be fed in by the entire system is entered in the “Feed-in capacity limit” field. The feed-in capacity calculator can be used to simplify calculations.
- Under “Advanced”, the interval for communication between the KOSTAL Smart Energy Meter and inverters can be changed and a time period selected for calculating the mean value. This should only be done if problems arise.

**INFO**

**Note regarding power limitation with several inverters**

When limiting power, every connected inverter is reduced by the same amount (as a percentage) of its maximum output power.

If the connected inverters have different amounts of maximum output power, the power reduction for each inverter is individual.

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## Power limitation - Advanced settings

| Parameter | Explanation |
|---|---|
| Transmit interval | Transfer interval of set power limitation to inverters entered under “Inverter”. |
| Inverter time slot | Length of time period in which the inverter output data is collected to produce a moving mean. |
| KOSTAL Smart Energy Meter time slot | Length of time period in which the KOSTAL Smart Energy Meter performance data is collected to produce a moving mean. |

## Activation code

This function can be used to release additional options. This may include e.g. releasing battery management to connect a battery to the PIKO MP plus.

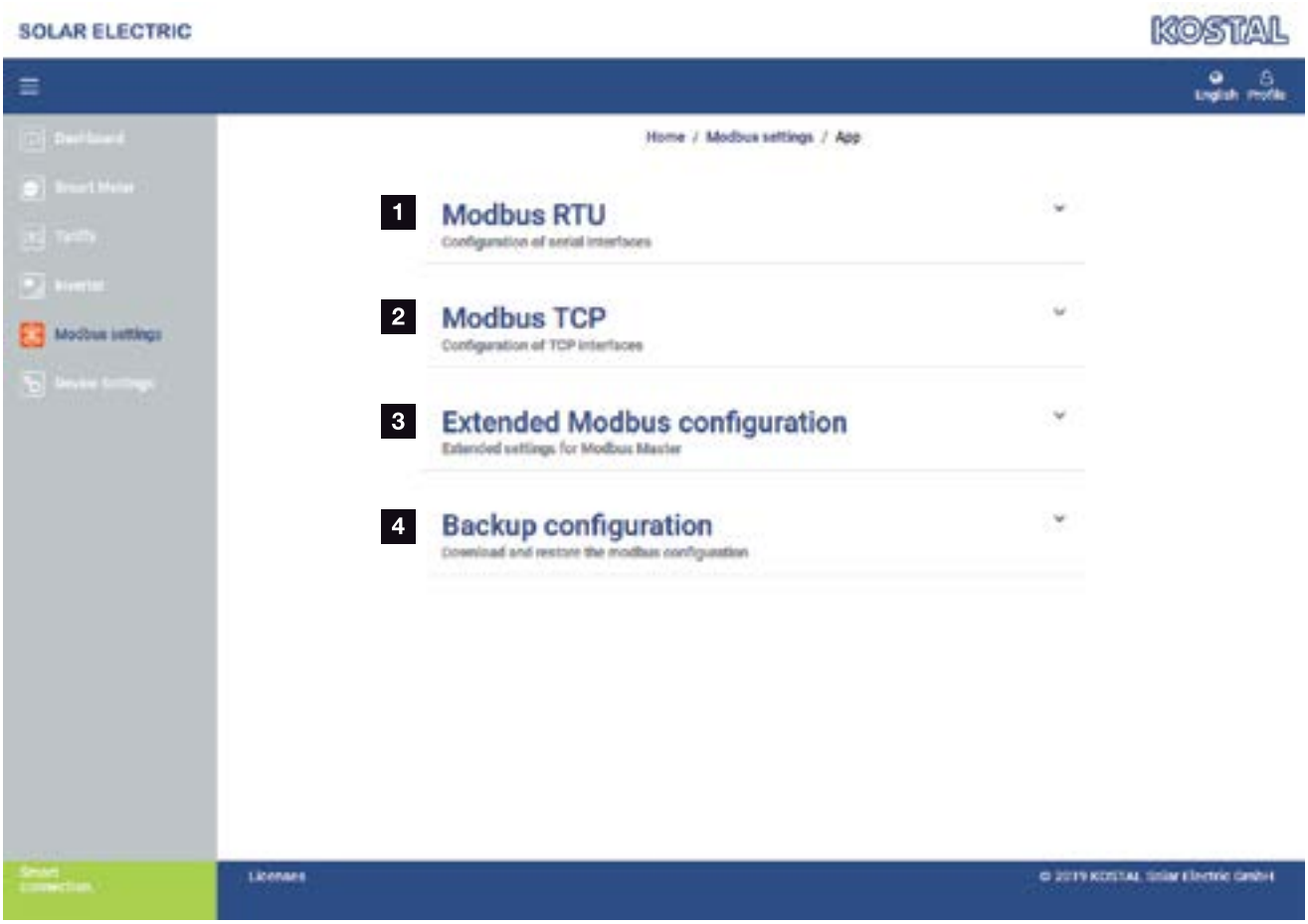
| Parameter | Explanation |
|---|---|
| Activation code | Input of an activation code, e.g. for battery management.<br>The activation code first has to be purchased from the KOSTAL Solar online shop. |
| Released extra options | Overview of options currently released in the KOSTAL Smart Energy Meter. |

**INFO**

Input of an activation code, e.g. to connect a battery. This first has to be purchased from the KOSTAL Solar online shop.

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# 4.9 Menu - Modbus settings




1. Set up the Modbus RTU (RS485) interface
   The RS485 A interface is preconfigured for the PIKO IQ/PLENTICORE and the RS485 B for the PIKO MP plus as standard
2. Set up the Modbus TCP interface
3. Advanced Modbus configuration
4. Download / restore the Modbus configuration

Select the devices which are connected to the RS485 Modbus RTU interfaces or activate the Modbus TCP functionality if the devices use the Ethernet (LAN) for communication purposes. In this case, Modbus TCP communication must also be activated in the inverter.

**INFO**

You will find a detailed description of the Modbus log and how it works in the Modbus specification (e.g. see www.modbus.org). Modbus TCP forms part of the IEC 61158 standard.

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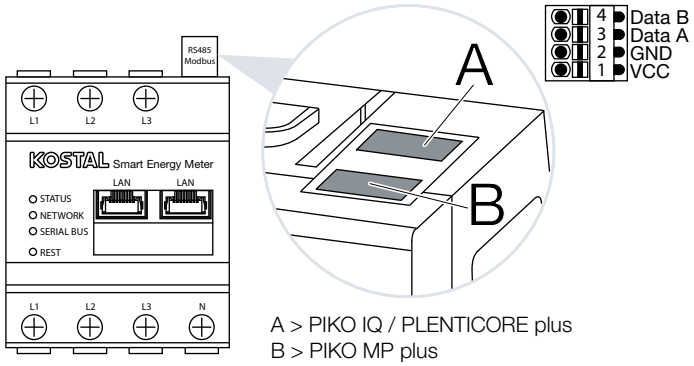
## Modbus RTU

KOSTAL solar inverters, but also other devices, can be connected to the Modbus RTU RS485 interface.

In the “Modbus RTU slave” mode, the KOSTAL Smart Energy Meter provides the measurement data via the RS485 interface. In the “Modbus RTU Master” mode on the other hand, measurement data is sent and written to other slave devices in order to control them. The Modus master is only available with user-defined settings.

Both RS485 interfaces A and B can be configured individually.

When an inverter is selected for RS485 interface A or B, all fields are populated with predefined values. These can be adapted if necessary.




A > PIKO IQ / PLENTICORE plus
B > PIKO MP plus

Fig. 8: RS485 interfaces

**INFO**

You will find details of how to connect the communication cable from the inverter to the RS485 socket in the KOSTAL Smart Energy Meter's installation instructions.

Depending on the cable length and number of participants on the bus, we would recommend terminating the bus at both ends with a 120 Ohm resistor. Termination reduces reflections in the connection. Under certain circumstances, this may be absolutely essential for application reliability.

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## Settings for Modbus RTU via RS485

| Parameter | Explanation |
|---|---|
| Interface | **RS485 (A)**<br>Pre-configured for PIKO IQ/ PLENTICORE<br>**RS485 (B)**<br>Pre-configured for PIKO MP plus |
| Enable interface | **Activated**<br>The Modbus slave functionality on the respective RS485 interface is activated. Data can only be retrieved from the KOSTAL Smart Energy Meter via the interface once the interface has been activated and the settings have been saved.<br>**Deactivated**<br>The Modbus interface is deactivated. |
| Presetting | Selection of connected device. When a device is selected, all fields are filled with predefined values. These can be adapted if necessary. |
| Mode | **Slave (default value) / master**<br>The interface operates either as a Modbus master (data is sent and written to slave devices) or as a Modbus slave (only data which can be accessed from other devices is made available). |
| Slave address | Sets the address of the Energy Manager in the Modbus.<br>The value may be between 1 and 247. |
| Baud rate | Sets the connection's baud rate. |
| Data bits | Sets the number of data bits. |
| Parity | Sets the connection's parity. |
| Stop bits | Sets the number of stop bits. |

**INFO**

If using a PIKO MP plus with connected battery, the interface has to be deactivated here. You are asked whether you want to do this when setting up the battery via devices.

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## Modbus TCP

KOSTAL solar inverters can be connected to the Modbus TCP (LAN) interface, e.g. for a multiple-inverter connection, but so too can other devices, which evaluate the KOSTAL Smart Energy Meter's data or are controlled by the meter.

### Modus - master

In "Master" mode, the KOSTAL Smart Energy Meter sends and writes information to the registers of the configured slaves. These are added by entering the slave IP address (e.g. inverter IP address and port).

| Parameter | Explanation |
|---|---|
| Slave address | Sets the address of a TCP slave. This can be specified in the form of an IP address or URL. |
| Port | Sets the TCP port to the port on which the slave is anticipating Modbus communication. |
| x | Deletes the line |
| Add | Adds a line |

Up to 10 TCP slaves can be configured.

**INFO**

The internal current value registers and the internal energy value registers can be transmitted and written. The KSEM/RM PnP registers and the SunSpec registers are not transmitted via the Modbus TCP master. You will find information about the respective registers in the "KOSTAL Smart Energy Meter - Interface Description MODBUS" documentation in the download area for the KOSTAL Smart Energy Meter.

### Modus - slave

In the "Slave" mode, the Energy Manager provides its measurement data via the LAN interface (TCP/IP). The Modbus TCP communication functionality must also be activated in the inverter.

| Parameter | Explanation |
|---|---|
| Enable TCP Slave | **Activated**<br>The Modbus slave functionality on the Ethernet (LAN) interface is activated. Data can only be retrieved from the KOSTAL Smart Energy Meter via the interface once the interface has been activated and the settings have been saved.<br>**Deactivated**<br>The Modbus interface is deactivated. |

**INFO**

For the KOSTAL Smart Energy Meter to be able to receive data via the TCP interface, the inverter must also transfer this data via this interface.

For the PIKO IQ/PLENTICORE, this has to be activated e.g. in the Webserver by going to Settings > Modbus / SunSpec TCP (see inverter's operating manual).

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## Advanced Modbus configuration

Here, further settings can be selected for the Modbus master functionality. These settings apply to all configured Modbus masters.

### Transmit interval

Here, you can set an interval, at which the measurement data is to be transmitted from the KOSTAL Smart Energy Meter. The Energy Manager usually transmits its measurement data via the Modbus master as soon as it is available. If the interval is activated, the data is transmitted at a regular interval instead, regardless of when it is available. Only the current measuring values at the transmit time are ever communicated. Mean values are not produced for the interval.

| Parameter | Explanation |
|---|---|
| Activate fixed transmit interval | **Activated**<br>KOSTAL Smart Energy Meter data is transmitted at a fixed transmit interval. Selection of interval from pull-down menu.<br>**Deactivated**<br>KOSTAL Smart Energy Meter data is transmitted after each measurement cycle (200ms or 500ms). |
| Measuring values | **Current measurement cycle**<br>Current measuring values transmitted at transmit time.<br>**Mean values for transmit interval**<br>Calculates and transmits a mean value for all measurement cycles within the set transmit interval. |

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## Register configuration

Groups of registers can be selected here, which are to be written in master mode. The system load of the KOSTAL Smart Energy Meter can therefore be reduced if all of the registers are not required. This may be necessary if lots of devices are connected to the KOSTAL Smart Energy Meter.

The arrow on the right can be used to drop down a detailed list of registers, which are contained in the respective groups.

The following registers can be activated or deactivated:

| Parameter | Explanation |
|---|---|
| Current values total | The current values for the entire system (registers 0–27) |
| Current values phases | The current values itemised by phase (registers 40-145) |
| Energy values total | The energy values for the entire system (registers 512-551) |
| Energy values phases | The energy values itemised by phase (registers 592-791) |

**INFO**

You will find information about the respective registers in the “KOSTAL Smart Energy Meter - Interface Description MODBUS” documentation in the download area for the KOSTAL Smart Energy Meter.

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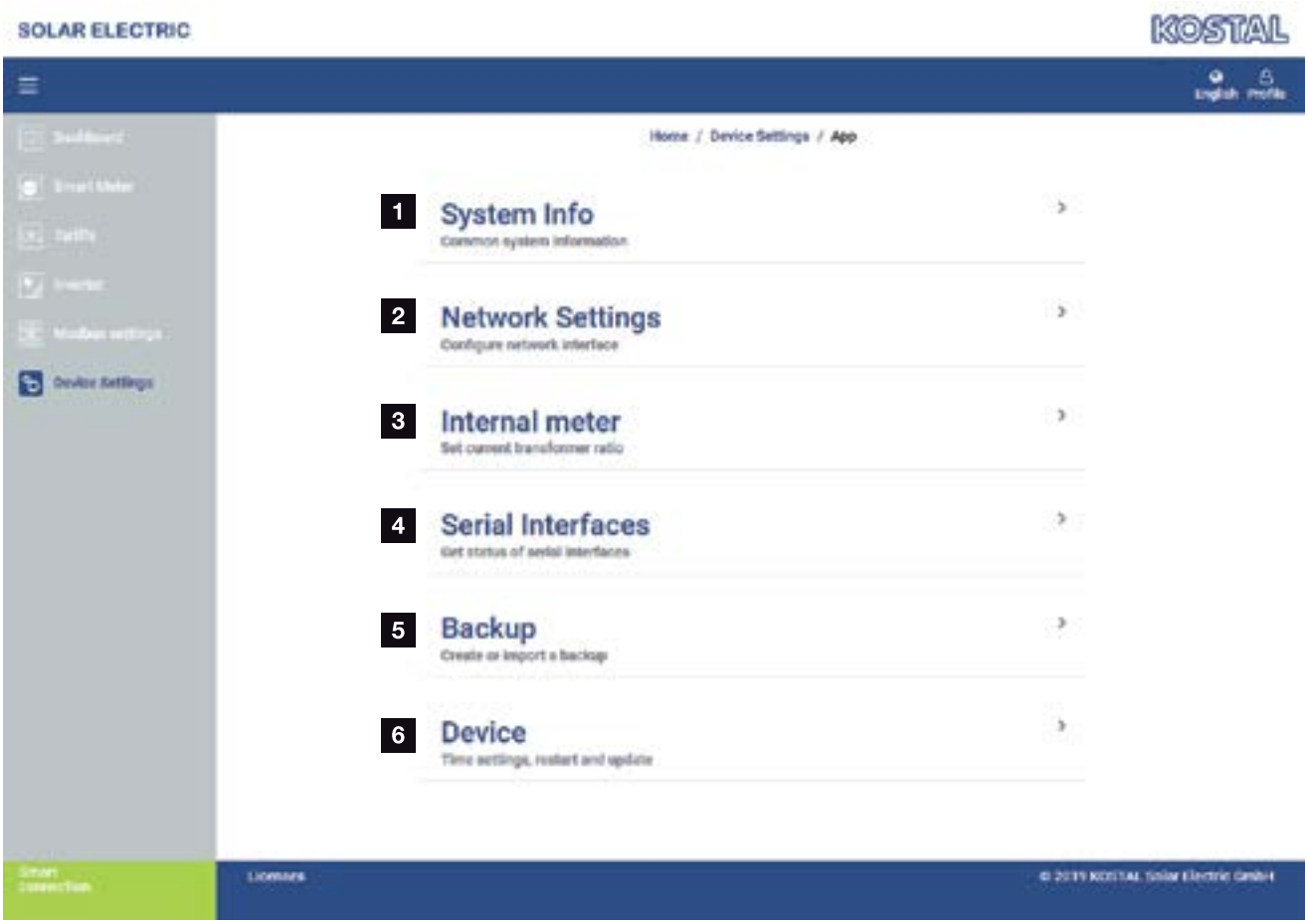
## Backup configuration

This item can be used to import or export the entire configuration of the Modbus configuration.

- Exporting the configuration allows the configuration currently saved to be downloaded as a file.
- Importing the configuration allows the configuration to be adopted from a previously exported file.

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# 4.10 Menu - device settings




1. Shows general system information
2. Configuration of network interface
3. If your device is connected to a transformer, the transformer ratio can be specified here
4. Shows the status of the serial interface
5. Create or import a backup
6. Device can be used for time settings, a restart, to import updates or produce system logs

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## System information

General system information as well as information about the current status of the system.

| Parameter | Explanation |
|---|---|
| Product name | Indication of product name |
| Version | Version of the firmware installed |
| Serial number | Serial number of device |
| CPU usage | Current CPU load |
| RAM usage | Current RAM usage |
| Host name | Device name in network.<br>Ex factory, this is set as KSEM-serial number designation.<br>The name can be modified under the network settings. |
| IP address | IP address of the KOSTAL Smart Energy Meter, which was issued manually or by a DHCP server. |
| MAC address | MAC address of the KOSTAL Smart Energy Meter |

**INFO**

More information about the network settings can be accessed via the (i) next to the IP address.

A window opens containing the current settings for subnet mask, standard gateway and DNS server.

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## Network settings

Changes to the IP settings can be undertaken here.

| Parameter | Explanation |
|---|---|
| Host name | The host name is the device's unique designation in the network.<br>Any name can be chosen and may contain upper-case letters, lower-case letters, numbers and hyphens. |
| DHCP | When DHCP is activated, the device automatically obtains an IP address, e.g. from a router. No further settings are needed in this case.<br>If a static IP address is to be set, DHCP must be deactivated and the "Advanced settings" opened. A static IP address, subnet mask, standard gateway and DNS server can be configured here.<br>If UPnP is activated, the device is automatically detected by PCs in the same network and displayed in the network environment. This makes it easier for the user to find the device in the network if he or she doesn't know the IP address. |

**INFO**

Please note that improper settings may result in the user interface no longer being available.

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## Internal power meter

The KOSTAL Smart Energy Meter can directly measure up to 63 A per external wire. External transformers are used for higher currents. If your device is connected to a transformer, this can be set here.

To do this, activate “Use transformer” and set the transformer ratio. Common transformer ratios are provided in the drop-down list. If the ratio is not included in the list, click on “Other” and enter it manually. The primary current may be in a range of 1 to 5000 and the secondary current in a range of between 1 and 5.

## Serial interface

Status information about the serial interfaces. This may either be assigned freely or by a particular application, the name of which is displayed here. The serial interface is configured in the respective menus (e.g. Modbus settings or inverter)

**INFO**

You will find a description of the electrical connection for transformers with an indirect measurement in the KOSTAL Smart Energy Meter's installation manual.

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## Backup

Produce a password-protected backup to save the data and settings of the KOSTAL Smart Energy Meter.

| Parameter | Explanation |
|---|---|
| Create | This function can be used to save the system settings and data captured. As an option, the Password field can be used to issue a password to protect the data backup.<br>While the backup file is being produced, the system does not take any measurements and there is a temporary interruption in communication.<br>Press the “Create” button to start the backup process. Once the backup process is complete, a backup file (Backup.bak) can be downloaded from the browser. |
| Import a backup | A backup file can be selected using the Browse button.<br>Clicking on Import opens the dialogue for importing a backup file.<br>The password for the backup file can be entered here (if issued). Pressing the "Import" button starts the process.<br>Please observe the information provided in the dialogue. All data and configurations are reset to those applicable at the time when the backup was created. Any data and configurations generated after this time are lost.<br>Once the backup file has been successfully imported, the device restarts. |

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## Device

Configure general settings on the KOSTAL Smart Energy Meter.

| Parameter | Explanation |
|---|---|
| Date and time | Set date and time of device.<br>**Your time zone**<br>Set the time zone so that calendar-based adjustments, such as changes between summer and winter time, can be taken into account by the system.<br>**NTP**<br>If the KOSTAL Smart Energy Meter is permanently connected to the Internet via a network, we would recommend activating the “NTP” option. The time is then automatically obtained from the Internet via a server. Under the advanced settings, you can also set an alternative NTP server.<br>**Set time**<br>The KOSTAL Smart Energy Meter runs internally with the UTC time only. This is converted into your local time zone for display purposes. If the KOSTAL Smart Energy Meter is not connected to the Internet, or if automatic time synchronisation is not to be used, the time can also be set manually. The current system time and your current browser time are displayed on the interface for this purpose. Click on “Set time” to synchronise the two times. Your browser time is automatically converted into UTC and set as the KOSTAL Smart Energy Meter’s system time. |
| Reset - device restart | Click on “Restart” to restart the device. This may take several minutes. The online interface then has to be reloaded. |

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| Parameter | Explanation |
|---|---|
| Reset - reset device to state in which it was delivered | Clicking on “Reset” resets the device to state in which it was delivered. The default password then applies again. To log in again, you will need the password from the energy meter’s type plate, which can be found on a separate instruction leaflet in the packaging. |
| Update device firmware | This menu item can be used to load new device firmware for the KOSTAL Smart Energy Meter **Ch. 5.4.** |
| System logs | This menu item can be used to download system log data as a text file for certain time periods **Ch. 5.3.** |

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# 5. Faults / maintenance

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# 5.1 Functions of the Reset button

### Restarting KOSTAL Smart Energy Meter

Press and hold the RESET button for more than 6 seconds with a sharp object.

The device will then start.

### Resetting the online interface password

Press the Reset button as follows:

- once for a lengthy period (between 3 and 5 seconds) and then
- once briefly (half a second).

The gap between the two should be no more than one second. If the command was detected correctly, the status LED flashes orange twice. The online interface password is reset to what it was upon delivery (see type plate on device).

**IMPORTANT INFORMATION**

To log in, you will need the password from the energy meter's type plate, which can be found on the separate instruction leaflet in the packaging.

### Resetting the network settings

Press the Reset button as follows:

- once briefly (half a second) and then
- once for a lengthy period (between 3 and 5 seconds).

The gap between the two should be no more than one second. If the command was detected correctly, the status LED flashes orange twice. One result of resetting the network settings is that the DHCP is activated.

### Resetting KOSTAL Smart Energy Meter to state in which it was delivered

Call up the Webserver. The device is reset by going to Device settings > Device > Reset device to state in which it was delivered and clicking on "Reset".

**IMPORTANT INFORMATION**

After resetting, the default password applies again. To log in again, you will need the password from the energy meter's type plate, which can be found on a separate instruction leaflet in the packaging.

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# 5.2 Error messages / displays

### Status LED is not lighting up

The KOSTAL Smart Energy Meter is not connected to the power supply.

- Ensure that at least the external wire L1 and neutral wire N are connected to the KOSTAL Smart Energy Meter.

### Status LED is lighting up or flashing red

There is an error.

- Restart KOSTAL Smart Energy Meter.
  Use a pointed object to press the Reset button for at least 6 s.
- Please contact your service technician or installer.

### Network LED is not lighting up or the KOSTAL Smart Energy Meter is not being found in the network

The network cable is not correctly connected to the grid connection.

- Ensure that the network cable is correctly connected to the grid connection.

The KOSTAL Smart Energy Meter is not in the same local network.

- Connect KOSTAL Smart Energy Meter with the same router / switch.

### Serial bus LED is lighting up red or flashing orange

In the user interface check whether there are any error messages about communication with the receiver.

- If necessary, check cabling to receiver.

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### KOSTAL Smart Energy Meter is providing unrealistic measuring values

The KOSTAL Smart Energy Meter has been installed the wrong way round.

- Recheck how L1 to L3 are connected.
- The transformers are not configured. Go to Device settings > Transformer ratio, activate transformer and set the correct transformer ratio.

### User interface cannot be called up using the KOSTAL Smart Energy Meter's IP address or name

- Contact the network administrator.

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# 5.3 Exporting log data

For service purposes, the log files can be downloaded from the KOSTAL Smart Energy Meter. The log data is then used by the service team for error rectification.

Do this by performing the following steps:

1. Call up online interface of KOSTAL Smart Energy Meter **Ch. 4.3**
2. Go to “Device settings” > “Device” > “System logs”.
3. Select the time under “Logs since”.
4. Press the “Download” button to start the download.
5. Save the data to your PC.

✓ The download is complete. Now you can make the data available to the service team.

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# 5.4 Updating device firmware

This menu item can be used to load a new device firmware for the KOSTAL Smart Energy Meter.

Do this by performing the following steps:

1. Download the current firmware from our website by going to Download > Accessories > KOSTAL Smart Energy Meter.
2. Use the “Browse” button to select the file on your PC.
3. Press "Update" to start the update.
4. Once a prompt has been accepted, the new firmware is uploaded and installed on the KOSTAL Smart Energy Meter.

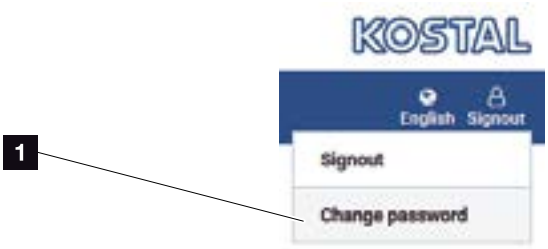
➔ Finally the KOSTAL Smart Energy Meter is restarted. This process may take several minutes. The website then has to be reloaded.

✓ The software is installed.

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# 5.5 Change password

The password can be changed by going to the following menu item.




1 Change password

1. Call up “Change password” under the “Log out” menu item.
2. Start by entering the current password.
3. Enter the new password. This must contain at least 8 letters and a mixture of upper- and lower-case letters.
4. Enter the password again under “Confirm”.
5. Confirm the input by selecting “Send”.

✓ You have changed your password.

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