



System Manual

SENTRON

Multi channel current measuring system

7KT PAC1200

PAC

Measuring Devices 7KT PAC1200 multichannel current measuring system

System Manual

Introduction

1

Safety notes

2

Product description

3

Connection

4

Operator control (software)

5

Service and maintenance

6

Technical data

7

Appendix

A

ESD guidelines

B

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Table of contents

1	Introduction	5
1.1	Introduction.....	5
1.2	Technical Support	5
1.3	Change documentation	5
2	Safety notes	7
2.1	Safety instructions	7
2.2	Cybersecurity information	10
2.3	Open Source Software	10
3	Product description.....	13
3.1	Products of the system.....	13
3.2	Functions.....	15
3.3	Application area.....	18
3.4	Diagnostics options.....	20
3.5	System environment.....	21
4	Connection.....	23
4.1	Cables	24
5	Operator control (software)	27
5.1	Browser-based web application	27
5.1.1	System environment	27
5.1.2	Function overview	28
5.1.3	Home page.....	29
5.1.4	Statistics	29
5.1.5	Current values	30
5.1.6	Installment	31
5.1.7	Energy stopwatch	33
5.1.8	Settings	35
5.1.8.1	Start	35
5.1.8.2	Device	35
5.1.8.3	Sensors.....	36
5.1.8.4	Network Settings	38
5.1.8.5	Data export	39
5.1.8.6	Firmware update.....	41
5.1.8.7	Tariff settings	42
5.1.8.8	Budget settings.....	43
5.1.8.9	Reset	44
6	Service and maintenance	45
6.1	Error messages	45

6.2	Technical Support	45
6.3	Cybersecurity	45
6.3.1	Introduction.....	46
6.3.2	Further information on the defense-in-depth strategy.....	46
6.3.3	Application environment.....	46
6.3.4	Firmware update.....	46
6.3.5	Communication protocols	47
6.3.6	Removing the device from service	47
6.3.7	Guideline for secure operation and commissioning.....	47
6.3.8	Vulnerability monitoring	48
6.3.9	Reporting cybersecurity vulnerabilities	49
6.3.10	Password	49
7	Technical data	51
7.1	Dimension drawings	54
7.1.1	Dimensions of the Data Manager	54
7.1.2	Dimensions of the sensor bar	55
7.1.3	Dimensions of the sensors on the sensor bar	57
A	Appendix.....	59
A.1	FAQs.....	59
A.2	Modbus register list	59
A.3	Internal registers.....	60
A.4	Sensor registers	71
B	ESD guidelines	73
B.1	Electrostatic sensitive devices (ESD)	73
	Glossary	75
	Index	77

Introduction

1.1 Introduction

The component parts of the 7KT PAC1200 multichannel current measuring system are described in this document

- Data Manager
- Sensor bar
- Sensors

The configuration is also described via the web server.

Target group

The tasks described in this document may only be carried out by electrically skilled personnel with the following qualifications:

- Training in the installation und commissioning of electrical devices
- Training in electrical hazards and local safety regulations
- Knowledge of the relevant standards and guidelines

Further documents

You can find further details in the following documents:

- Operating Instructions 7KT PAC1200 multichannel current measuring system (<https://support.industry.siemens.com/cs/ww/en/view/109483797>)

1.2 Technical Support

You can find further support on the Internet at:

TechnicalSupport (<https://www.siemens.com/support-request>)

1.3 Change documentation

Document identification number	Revisions
2514374102_RS-AA_005	Additional information on the topic of cybersecurity

Safety notes

2.1 Safety instructions

The safety instructions that have to be followed when using the 7KT PAC1200 multichannel current measuring system are given below.

DANGER

Hazardous voltage. Will cause death or serious injury.

Turn off and lock out all power supplying this device before working on it. Installation and maintenance work on this device must be carried out by authorized persons with the appropriate electrical training only.

CAUTION

Damage to, or destruction of, the Data Manager. Material damage.

Observe the prescribed minimum clearances between the network cable and the installation components that carry mains voltage, or use suitable insulation.

Always lay the data and power lines separately or in separate pipelines. Observe EN 50174-2 here.

NOTICE

Overvoltage. Material damage.

If network cables are laid in the outdoor area, overvoltages can arise as a result of lightning strikes, for example.

The network cable must be safeguarded with suitable overvoltage protection.

NOTICE

Damage to the sensor bar through transient overvoltages. Material damage.

Install additional overvoltage arresters in accordance with SPD Type 1 (primary protection) and SPD Type 2 (medium protection) upstream of the Data Manager.

Ensure that the Data Manager that supplies the sensor bar with voltage can be disconnected, for example, with a miniature circuit breaker. This must be labeled as a circuit breaker for the Data Manager, and it must be easily accessible.

NOTICE

Short-circuit hazard

Ensure appropriate strain relief for all cables connected to the device.

NOTICE

Device can be irreparably damaged

When performing an insulation test of the entire installation with AC or DC, disconnect the device before starting the test.

NOTICE

Damage to, or destruction of, the Data Manager. Material damage.

Do not connect an ISDN cable to the Data Manager's network connection.

Use the multichannel current measuring system in dry environments only and keep away from liquids.

Note

Install the multichannel current measuring system in the control cabinet only, and ensure that the connection areas for the line conductor and the neutral conductor are located behind a cover or touch protection barrier.

Do not operate the Data Manager beyond the limits specified in the technical data.

The enclosures or electrical distribution boards must only be accessible using a key or tool to restrict access to authorized personnel. Disconnect the electrical distribution board before installation work or maintenance work, and protect it from being unintentionally switched on again.

Note

You can find the open-source software included in this product, and the corresponding open-source software license conditions, in the `Readme_OSS`.

1. Please protect access to the interface by a password so that only authorized persons are able to access the Data Manager and change settings.

2. Supported protocols:

Dynamic Host Configuration Protocol (DHCP) Universal Plug and Play (UPnP), Network Time Protocol (NTP), File Transfer Protocol (FTP), Simple File Transfer Protocol (SFTP), E-Mail, MODBUS TCP

Data Manager

For safety reasons, it is forbidden to modify the product, including the software, or to install components that are not expressly recommended or marketed for this product.

Any use of the product other than the intended use described is considered improper use.

Impermissible modification, conversions, repairs, or opening of the product are forbidden. The enclosed documentation is a component part of the product and must be read, observed, and kept available at all times.

In accordance with its classification in overvoltage category III, the Data Manager may only be connected in the subdistribution board or circuit distribution board on the load side

downstream of the energy meter of the power supply company. It is suitable only for use in the indoor area, and it is approved for use in the member states of the EU. Use the Data Manager only in accordance with the information given in the enclosed documentation. Any other use can result in material damage and personal injury.

The Data Manager is not an electricity meter for active-power consumption in the sense of EU Directive 2004/22/EC (MID). It must only be used for internal accounting purposes. The data collected by the Data Manager about power generation in your plant can differ from the data of the main energy counter.

Sensor bar

The sensor bar may only be operated when installed in the distribution box and the protective covers are in place. The sensor bar is approved for use in dry indoor areas only.

Use the sensor bar only in accordance with the information given in the enclosed documentation. Any other use can result in material damage and personal injury.

For safety reasons, changes to the sensor bar are forbidden unless expressly approved for the product by Siemens AG. Any use of the product other than the intended use described is considered improper use. Impermissible modification, conversions, repairs, or opening of the product are forbidden. The enclosed documentation is a component part of the product and must be read, observed, and kept available at all times.



CAUTION

Overvoltage. Material damage.

Only safety extra low voltages may be connected to the sensor bar.

Laws and directives

The following standards apply for this system:

- EN 61010-1
Safety requirements for electrical equipment for measurement, control and laboratory use
- EN 61326-1
Electrical equipment for measurement, control and laboratory use - EMC requirements
- EN 60950-1
Information technology equipment - Safety
- EN 50428
Switches for household and similar fixed electrical installations
- EN 61000-3-2
EMC - Part 3-2: Limit values for harmonic currents
- EN 61000-3-3
EMC - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems

2.2 Cybersecurity information

Siemens provides products and solutions with industrial cybersecurity functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial cybersecurity concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial cybersecurity measures that may be implemented, please visit (<https://www.siemens.com/global/en/products/automation/topic-areas/industrial-cybersecurity.html>).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Cybersecurity RSS Feed at (<https://www.siemens.com/cert>):

2.3 Open Source Software

This product, solution or service ("Product") contains third-party software components. These components are Open Source Software licensed under a license approved by the Open Source Initiative (<https://www.opensource.org>) or similar licenses as determined by SIEMENS ("OSS") and/or commercial or freeware software components. With respect to the OSS components, the applicable OSS license conditions prevail over any other terms and conditions covering the Product. The OSS portions of this Product are provided royalty-free and can be used at no charge.

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Siemens AG
Smart Infrastructure
Electrical Products
Technical Support
Postfach 10 09 53
93009 Regensburg
Germany

You will find Technical Support under (<https://www.siemens.com/support-request>).

Keyword: Open Source Request (please specify Product name and version, if applicable)

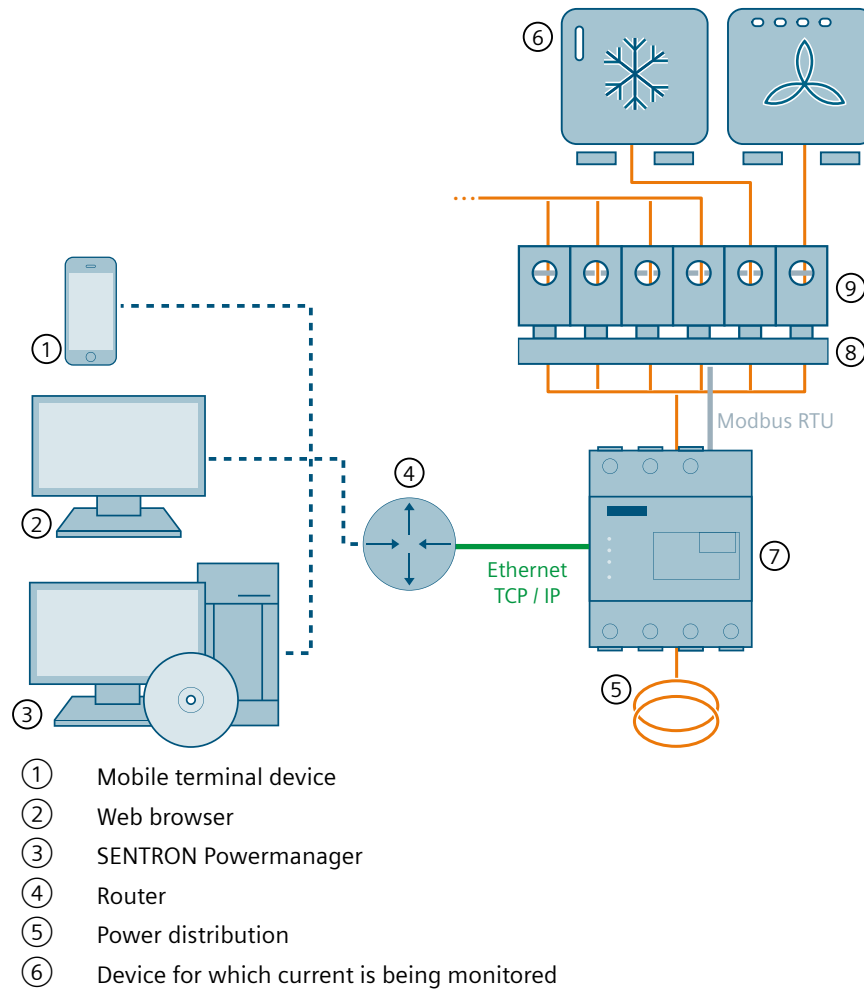
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Product description

3.1 Products of the system



The 7KT PAC1200 multichannel current measuring system is part of the energy management portfolio.

The system comprises several components that are described in this chapter:

- Data manager (⑦)
- Sensor bar (⑧)
- Sensors (⑨)

Highlights

- Fully integrated smart meter
- 3-phase active power and reactive power energy measurement
- Measurement of energy as balancing counter
- Direct connection up to 63 A
- Optional use with external instrument transformer for extending the measuring range (e.g. 100 ... 600 A)
- DIN-rail mounting (4 MW)
- Operator input / configuration: Web interface
- Support of up to 96 sensors for single-phase measurement

Applications

The 7KT PAC1200 multichannel current measuring system monitors and displays the energy consumption of up to 96 outgoing feeders. The Data Manager can supply up to eight sensor bars. The maximum configuration would thus be 8 sensor bars with 12 sensors each.

Value provided by the system

The system makes energy consumption and the resulting costs transparent for a given installation.

The system can be adapted to individual needs and application scenarios. In addition, single sensors can be named individually and compared with each other.

The system can also be configured flexibly as the number of sensor bars can be varied.

Up to eight different, selectable consumption sources can be compared with each other.

The measured values can be displayed via a Web browser. Both current values and statistical values can be displayed here. Display is possible in an application for mobile terminal devices, as a desktop application, or in SENTRON Powermanager.

Statistical values can be collected over different time periods and exported via a CSV file.

Data Manager

The Data Manager is a measuring instrument that determines electrical measured values at the connection point and makes them available via LAN or RS485.

The data collected by the Data Manager about power generation in your plant can differ from the data of the main energy counter.

In accordance with its classification in overvoltage category III, the Data Manager may only be connected in the subdistribution board or circuit distribution board on the load side downstream of the energy meter of the power supply company. It is suitable only for use in the indoor area, and it is approved for use in the member states of the EU. Use the Data Manager only in accordance with the information given in the enclosed documentation. Any other use can result in material damage and personal injury.

3.2 Functions

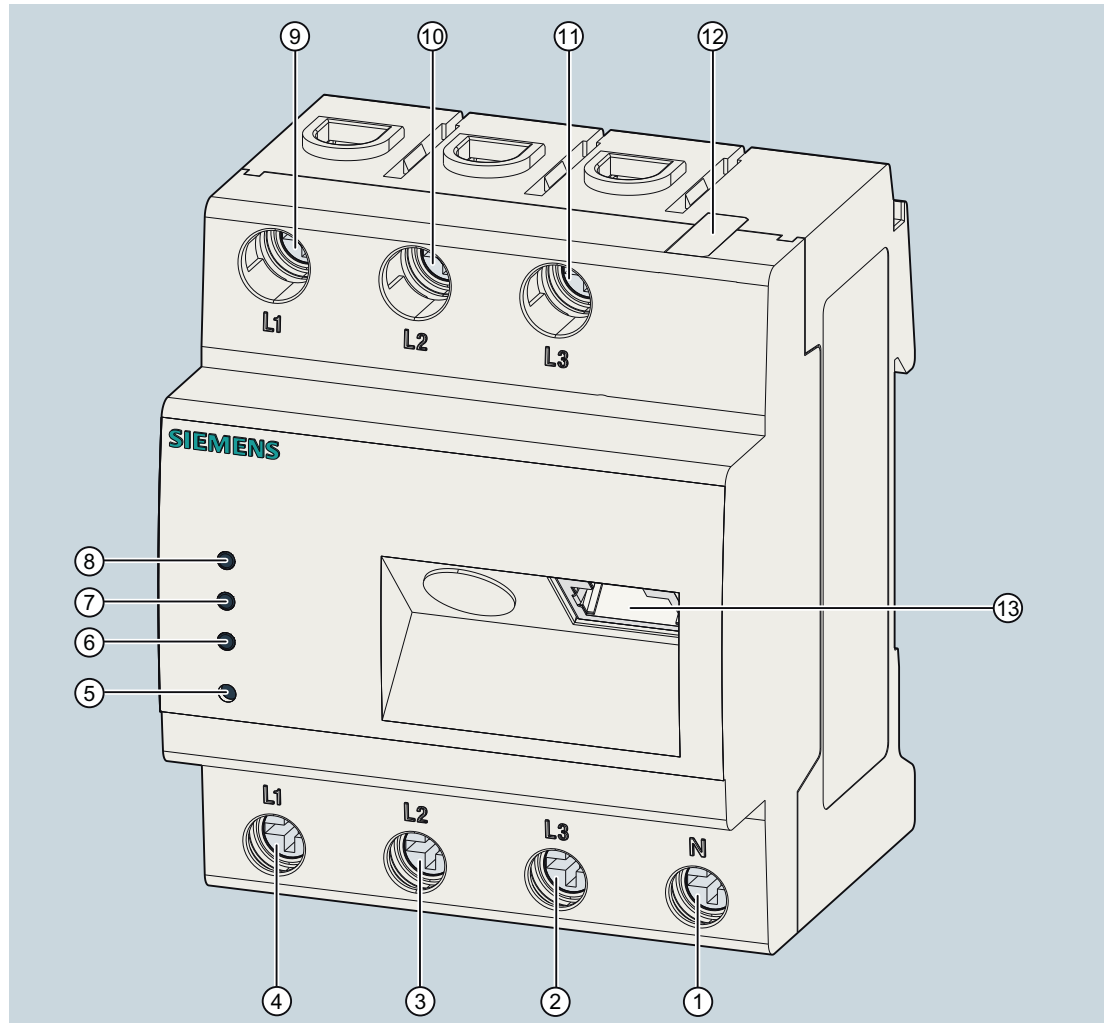
How the individual components of the system function is defined below.

The current sensor of the Data Manager is a current transformer in the ratio 1:1000.

The Data Manager reads out the connected sensor bar at fixed regular intervals and calculates the active power, the reactive power and the apparent power using the internally measured voltage $U[1,2,3]$ of the respective phase $PI[1,2,3]$ as well as the power factor ($\cos \phi$).

Data Manager

The Data Manager is a measuring instrument that determines electrical measured values at the connection point and makes them available via LAN.



- | | |
|----------------|-----------------------------------|
| ① Input N* | ⑧ Status LED |
| ② Input L3 | ⑨ Output L1 |
| ③ Input L2 | ⑩ Output L2 |
| ④ Input L1* | ⑪ Output L3 |
| ⑤ Reset button | ⑫ Connector for RS 485 expansions |
| ⑥ Sensor LED | ⑬ LAN connection |
| ⑦ Network LED | |

* Must be connected

The connections L1, L2, L3 can be found both on the upper and lower sections, plus an additional connection for N. On the front, you will find the connection for the LAN cable. The connection for the RS485 connector is at the top of the Data Manager.

On the left, you see 3 LEDs (Status, Network and Sensor) that indicate the status of the Data Manager.

Under the LEDs is the Reset button that causes restart or resetting of the device.

The accuracy of current measurement by the current sensors is $\pm 1\%$ of the full-scale value, and the accuracy of the voltage measurement of the Data Manager is $\pm 0.5\%$ of the full-scale value.

The overall accuracy of the Data Manager is $\pm 2\%$ of the full-scale value.

There are 3 LEDs on the device. These indicate the operating status. The Status LED indicates operational readiness, the Network LED indicates the connection with the network, and the Sensor LED indicates sensor readiness.

The energy is measured simultaneously on all 3 phases (L1, L2, L3).

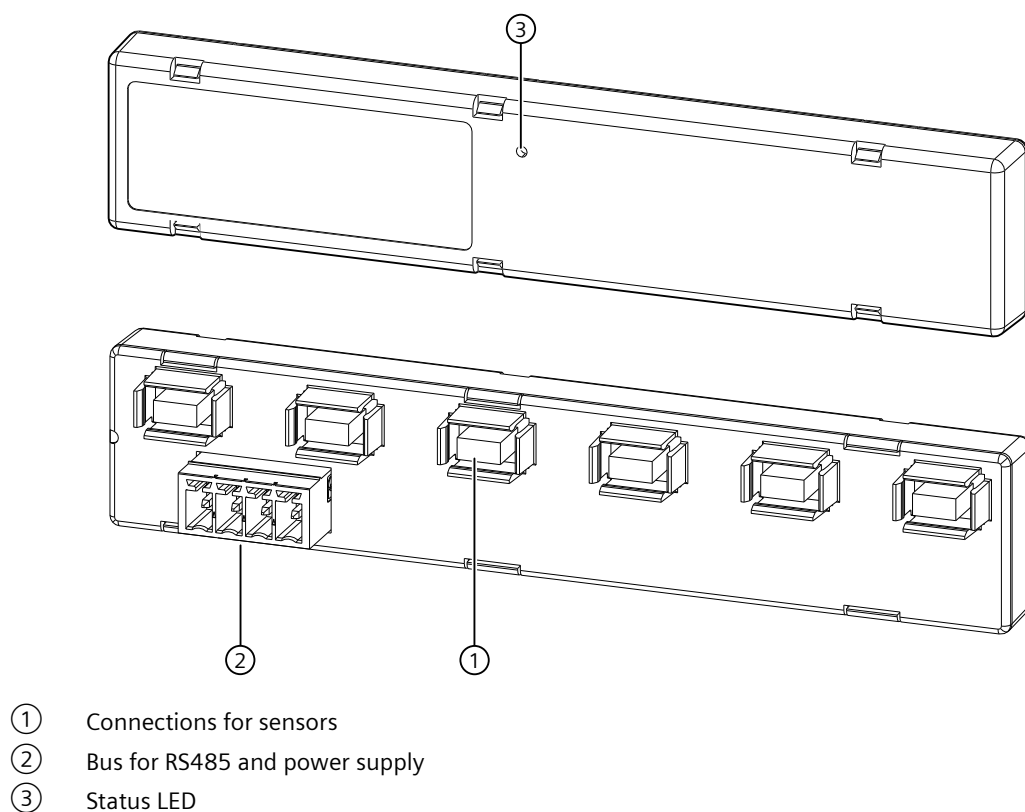
Note**Ensure correct phase assignment.**

The correct phase assignment enables calculation of the current values of the sensor despite varying voltage in the individual phases.

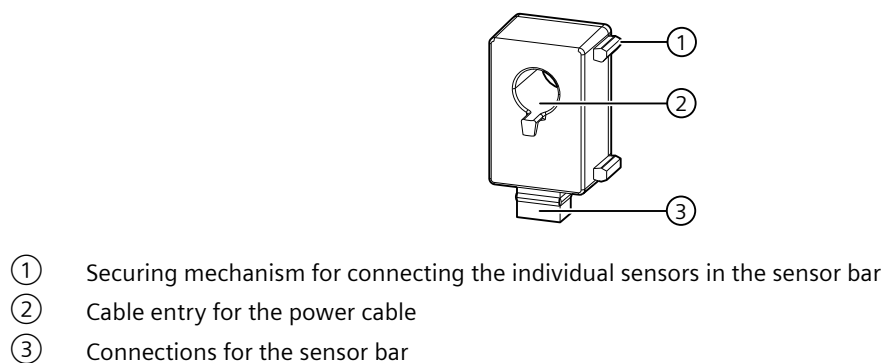
Sensor bar

Currents in AC power systems can be measured with the sensor bar. The measured data are forwarded to the Data Manager via the RS485 bus and evaluated. The Data Manager also supplies the 9 V to the sensor bar.

The sensor bar is offered in four variants, with three, six, nine or twelve slots respectively for the current sensors. The current sensors are located directly on the miniature circuit breakers and they register the latest current values. The conductors to be measured are run through the ring-shaped opening in the current sensors to the connections of the miniature circuit breaker. Up to eight sensor bars can be connected to one Data Manager. With the sensor bar with twelve current sensors, the currents of up to 96 conductors can be measured and transferred to the Data Manager. Every sensor bar has a unique Modbus address in the range between 1 and 247.



Sensor



3.3 Application area

The system is used primarily in the following areas:

- Small businesses
- Halls

- Residential buildings
- Supermarkets
- Data centers
- Office buildings

Application example of a brewery

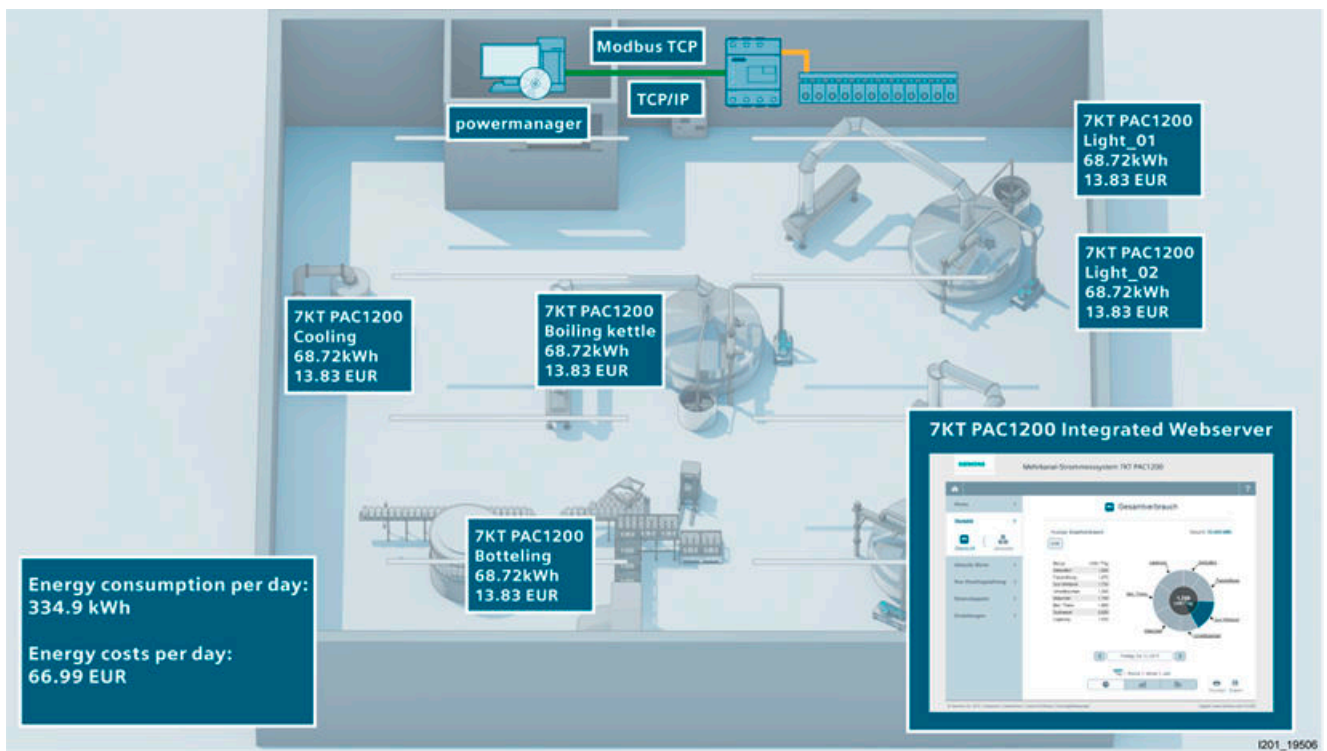


Figure 3-1 Application example

3.4 Diagnostics options

Status indication via LEDs of the Data Manager

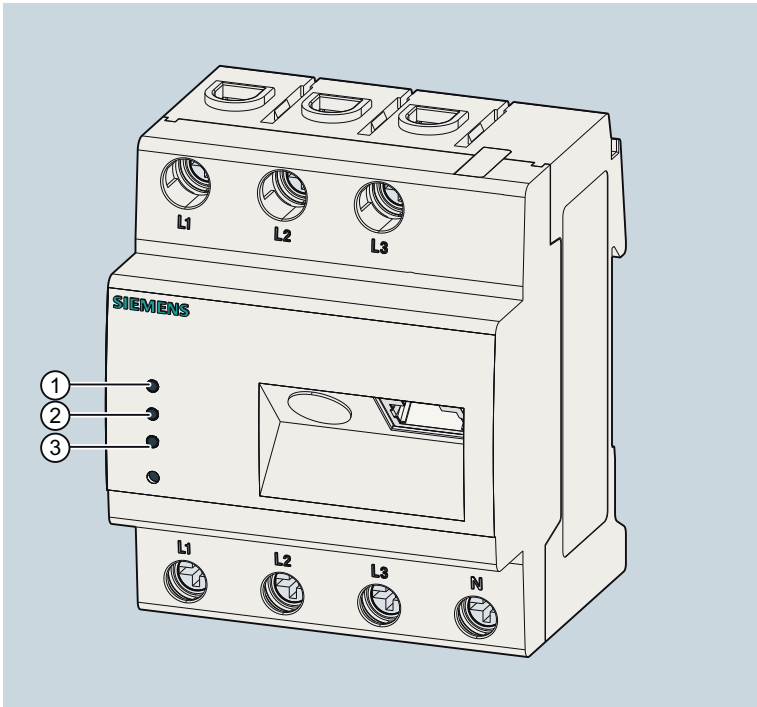


Table 3-1 ① Status: Indicates readiness

Status	Readiness for operation
Off	Device switched off
Orange	Voltage boot active
Green, slow flashing	Linux is booting
Green, rapid flashing	Firmware update in progress
Green, continuous	Device ON

Table 3-2 ② Network: Indicates connection with the supply system / indicates supply system activity

Status	Readiness for operation
Off	LAN has no link
Green on	LAN has link
Flashing green	Network traffic

Table 3-3 ③ Sensor: Indicates sensor readiness

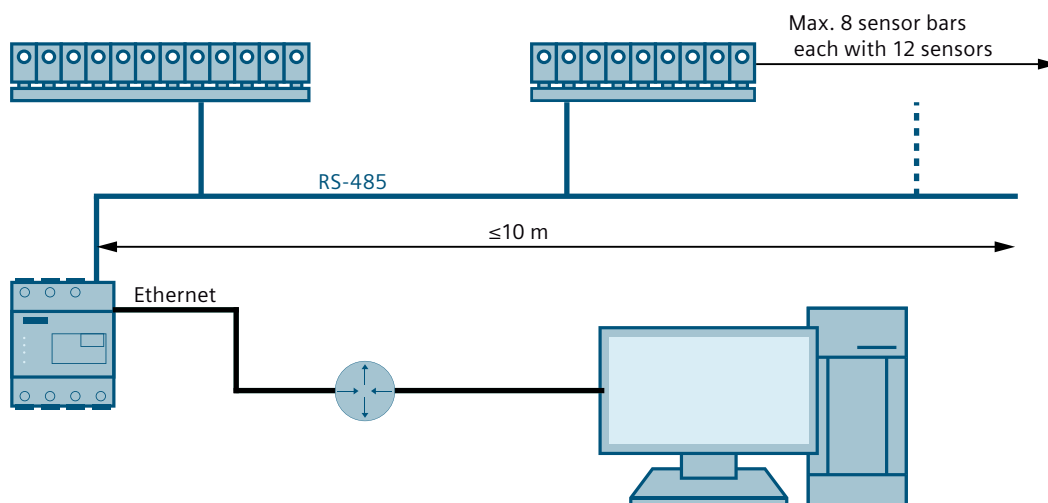
Status	Readiness for operation
Off	No sensor connected
Green, continuous	All sensors online and in measuring mode

Status indication via LEDs of the sensor bar

Status	Readiness for operation
Blue, continuous	Connected
Blue, flashing	Sensors scanned

3.5 System environment

The Data Manager is installed in the fuse cabinet where it is connected after the main fuse in the subdistribution board. The device must be connected to all three phases of the power system at the time of installation so that the overall energy consumption can be correctly measured.



The sensor bar is connected via RS485. The sensor bar and the connected sensors are located on the individual fuses in the fuse cabinet. Up to 8 sensor bars with 12 sensors each can be connected, giving a total of 96 sensors in the maximum configuration. The length of cable between the Data Manager and a maximum of 8 sensor bars must not exceed 10 meters.

The Data Manager is connected via LAN – possibly using an additional router – to the PC that is running the Siemens-specific SENTRON Powermanager software.

3.5 System environment

In communication via LAN, the Data Manager is the Modbus TCP client and the PC with the SENTRON software is the Modbus TCP server. The data are sent continuously to the higher-level management system while a connection is present.

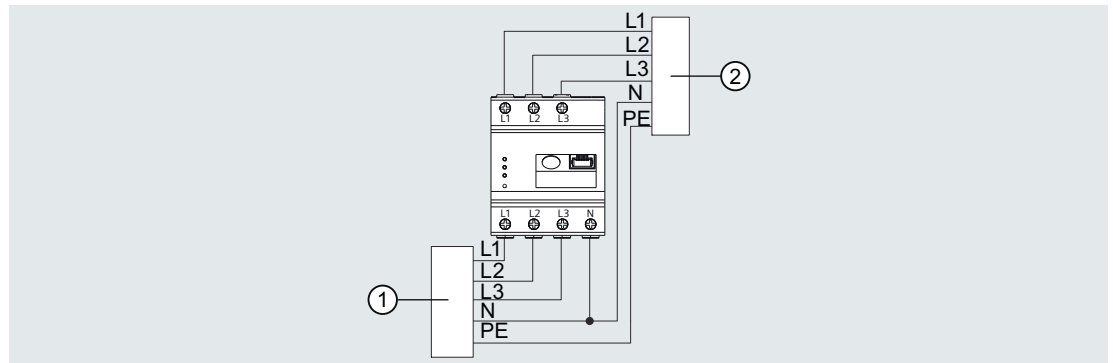
Note

A continuous data connection to the SENTRON software is required. If the data connection is interrupted, no data are buffered on the Data Manager.

In communication via RS485, the product is the Modbus RTU server and the connected sensor bar is the Modbus client.

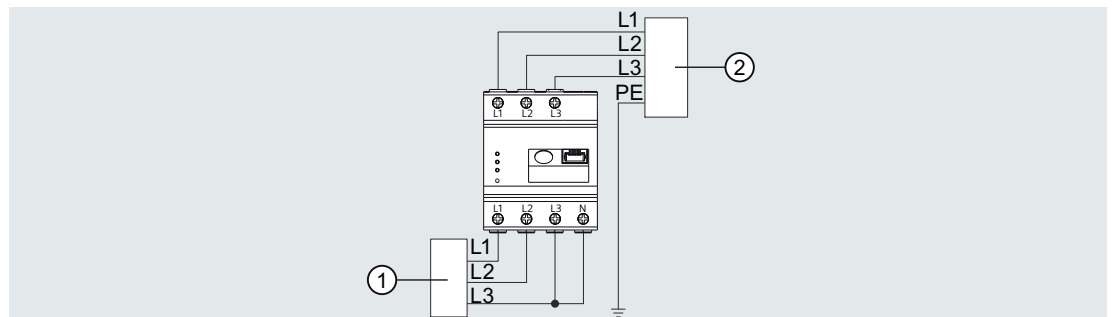
Connection

TN system



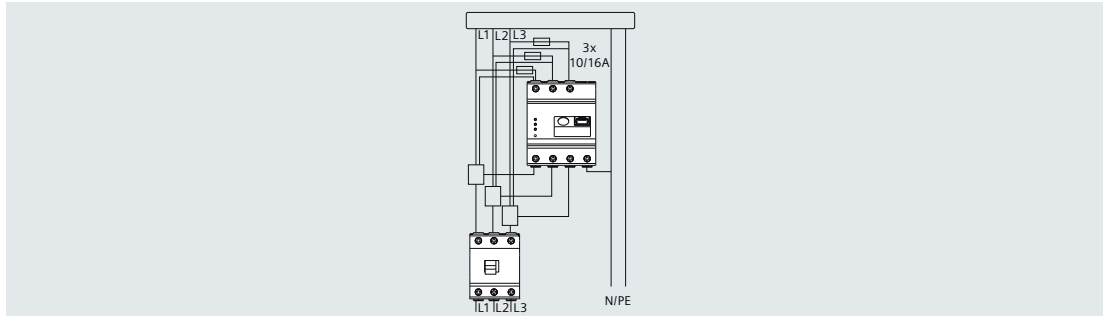
- ① Line connection/ infeed
- ② Loads

IT system

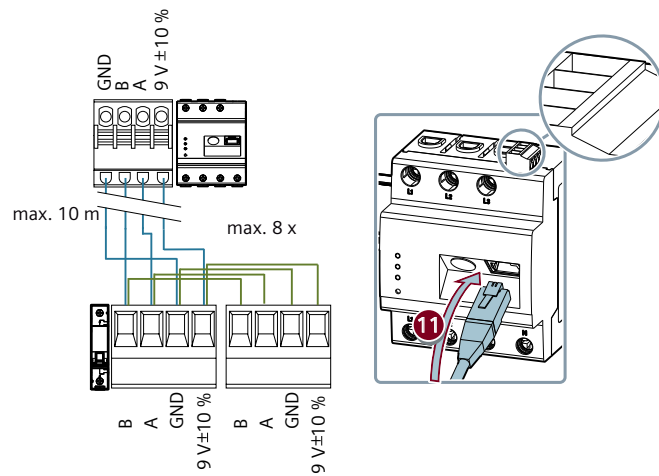


- ① Line connection/ infeed
- ② Loads

Transformer



Overall connection



4.1 Cables

Power supply

The Data Manager is supplied with energy via phase L1 and neutral conductor N, i.e. these terminals must always be connected.

The Data Manager has a 63 A direct connection. For applications with other requirements, external current transformers can be additionally connected to the Data Manager.

The corresponding transformer ratio can be set in the web browser so that the accuracy is not impaired.

When using external current transformers, the respective measurement accuracy must be taken into account. The Data Manager displays the current values extremely precisely at a current transformer ratio of 600:5.

Connections

Above, you will find the connections L1, L2, L3; below also, plus an additional connection for N. In the middle, you will find the connection for the LAN cable. The connection for the RS485 connector is at the top of the Data Manager.

Note: if the communication cable is incorrectly connected, the Data Manager switches to a protection mode and does not perform any measurements. To trigger a reset, you must briefly disconnect the Data Manager from the auxiliary power.

Operator control (software)

5.1 Browser-based web application

5.1.1 System environment

The web interface is designed for use on browser-based terminal devices (PC and notebook). Smartphone and tablet access to the web interface are also possible via WLAN.

The web interface is optimized for a resolution of 1024x768 (WxH).

The following versions of commercially available web browsers are supported:

- Microsoft Internet Explorer from version: 8
- Mozilla Firefox from version: 17
- Google Chrome from version: 21
- Apple Safari from version: 6

Settings via the system environment

The following settings can be made via the web interface:

Network Settings	Settings for the network and the time server
Data backup	Create or restore data backups
Firmware update	Perform firmware update
Reset	Restart system, reset configuration, restore delivery state (Reset)
Password reset	2x reset
Device settings	Set the date and time, password, transformer ratio, language and country
Sensor settings	Adding, deleting, replacing or grouping sensors
Modbus settings	Activating or deactivating Modbus

Required settings for commissioning

- Time of day
- Language
- Network Settings
- Country
- Currency
- Tariff settings
- Budget

5.1 Browser-based web application

- Where applicable: Transformer ratio
- Modbus settings and sensor management (connection, labeling, phase assignment, and grouping of the individual sensors).

5.1.2 Function overview

The browser-based web application offers the following functions:

- Statistics
- Current values
- Installment
- Energy stopwatch
- Settings

5.1.3 Home page

The web interface is called up by entering the IP address in the address line of the browser. The following page opens:

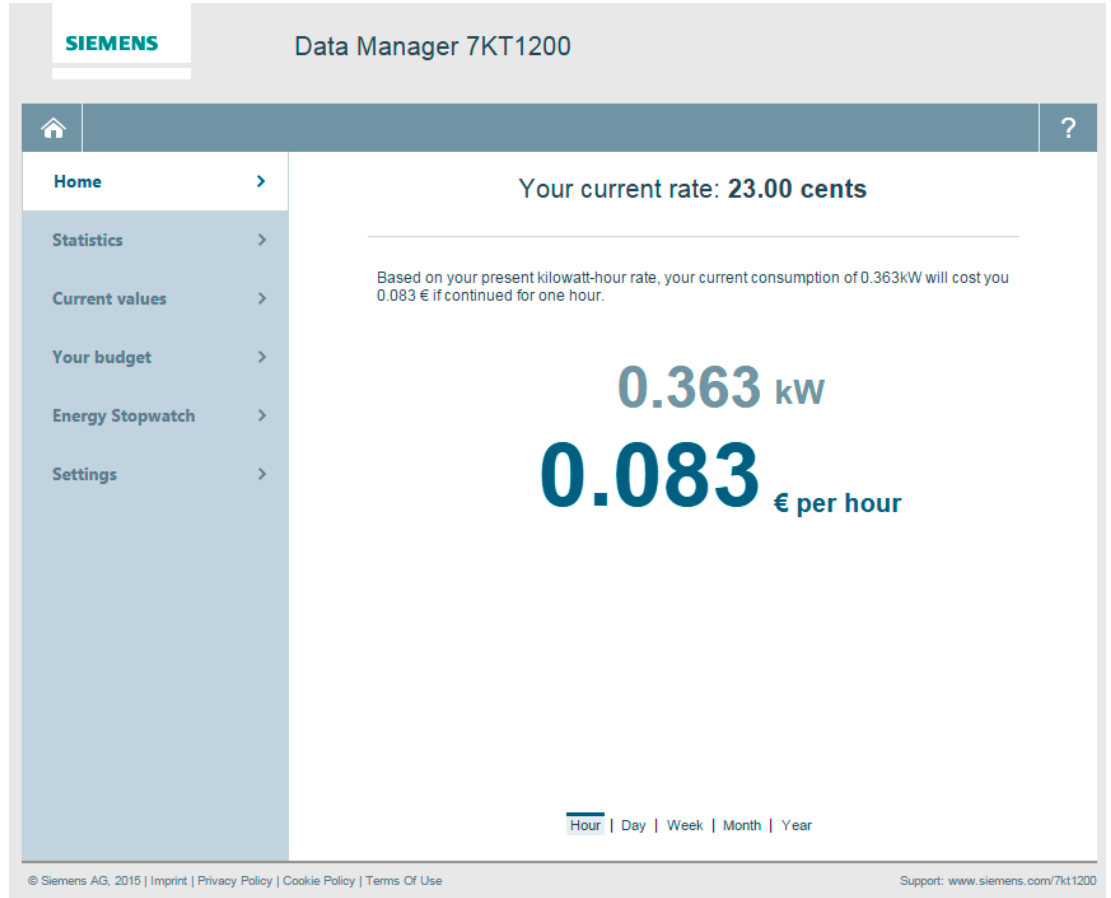


Figure 5-1 Home

The Start page shows the instantaneous consumption at the specified rate on the day. Depending on the configuration, consumption can be displayed per hour, per day, per week, per month, and per year. If the product has not yet been operation for a year, projections are displayed.

On the left-hand side is a navigation bar via which you can access different sub-menus.

Additional product information can be called up via the Support link on the bottom right.

5.1.4 Statistics

The statistics show the overall consumption of the selected sensors.

Consumption can be shown both in euros and in kWh. The results can be displayed in the form of a pie chart or a bar chart, depending on selection.

The periods that can be selected are as follows:

- Days
- Week
- Months
- Year

Both the overall consumption and the individual consumption of a sensor can be displayed.

It is also possible to generate a history so that any deviations can be investigated. A date can be selected for this using the button below the chart.

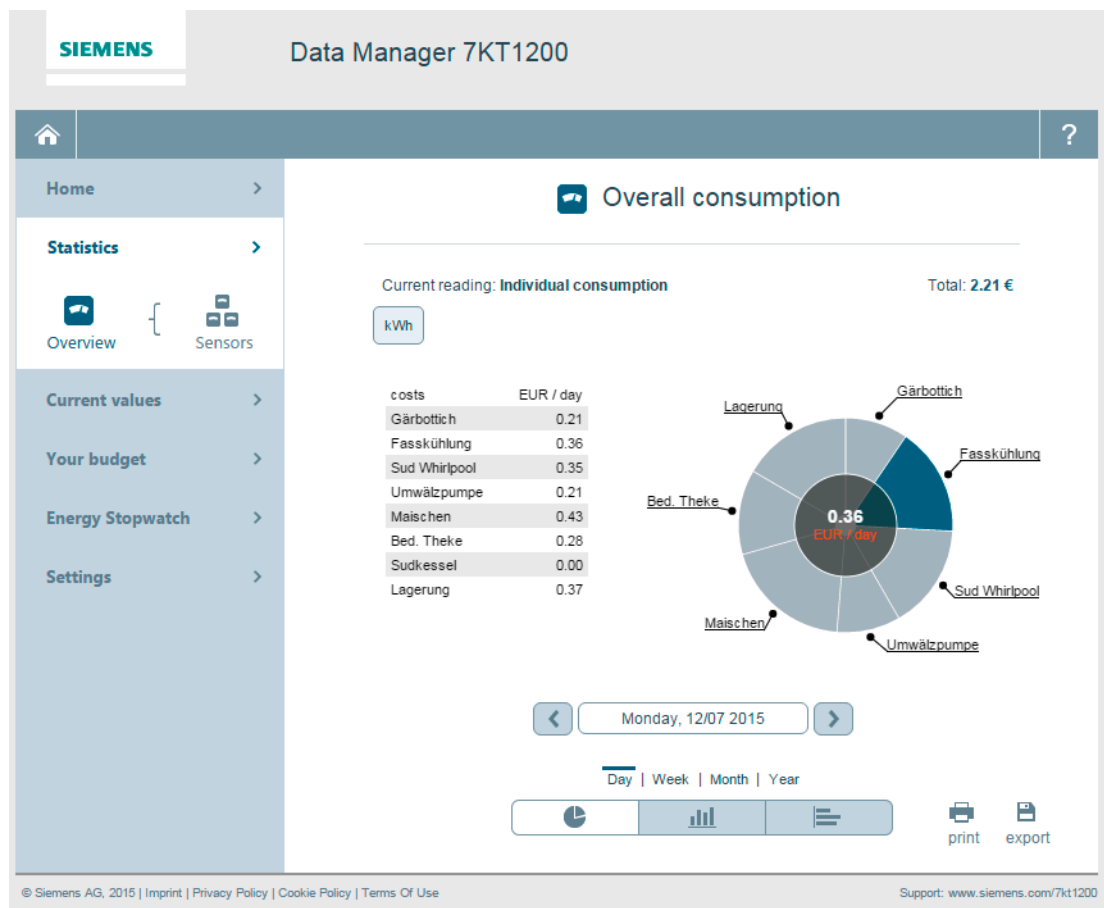


Figure 5-2 Statistics

5.1.5 Current values

Under the navigation item "Current values" you can see how high the consumption is at a particular moment in time. The "Current" value indicates this consumption. "Min / Max" indicates the minimum and maximum consumption.

The kW values consumed at a certain time are shown in a curve diagram. Here also, either the overall consumption or the consumption of an individual sensor can be displayed.

It is also possible to switch between various modes in this view.

- History
- Current values: for individual sensors
- Meter reading

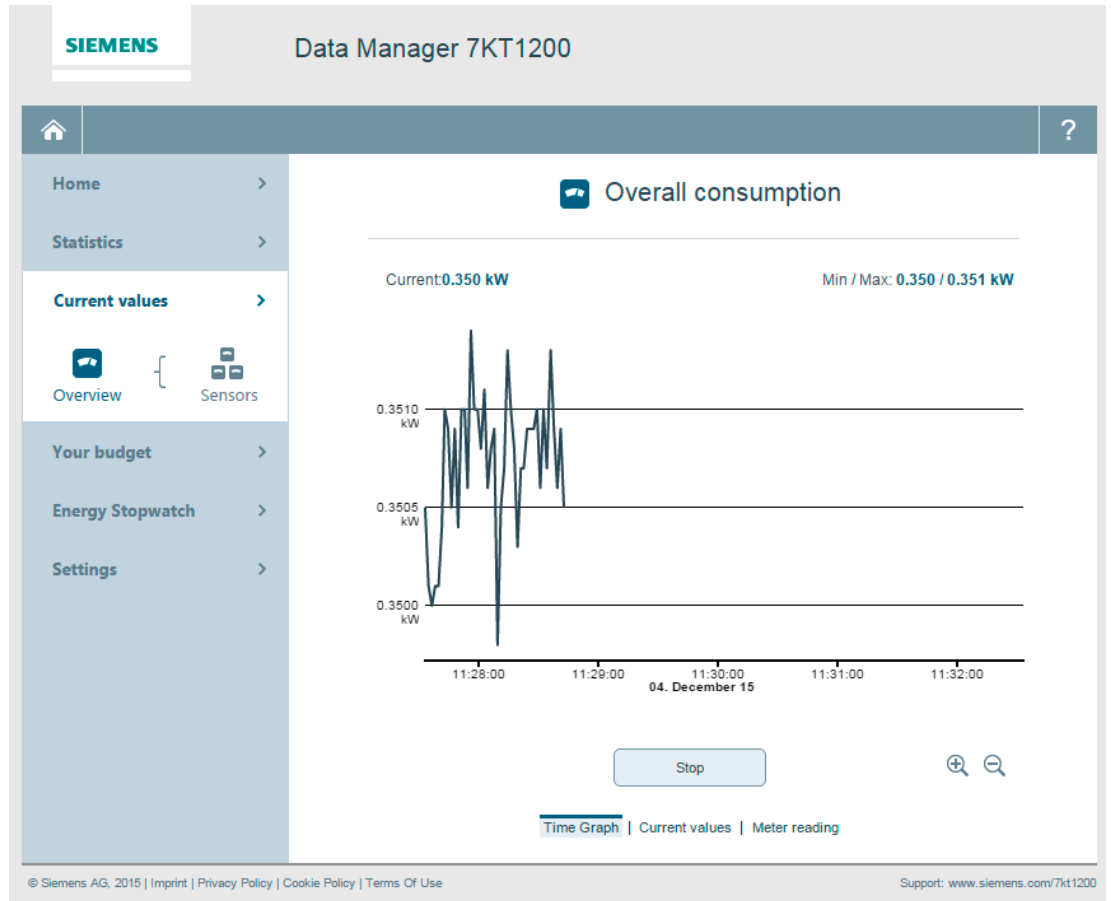


Figure 5-3 Current values

5.1.6 Installment

The installment is calculated from the specified budget over a specified time period and from the monthly base fee.

If the budget is exceeded, the final amount appears against a red background and a warning is issued on the Home page. If annual budget is selected, a table and a graphic appear with the monthly consumption.

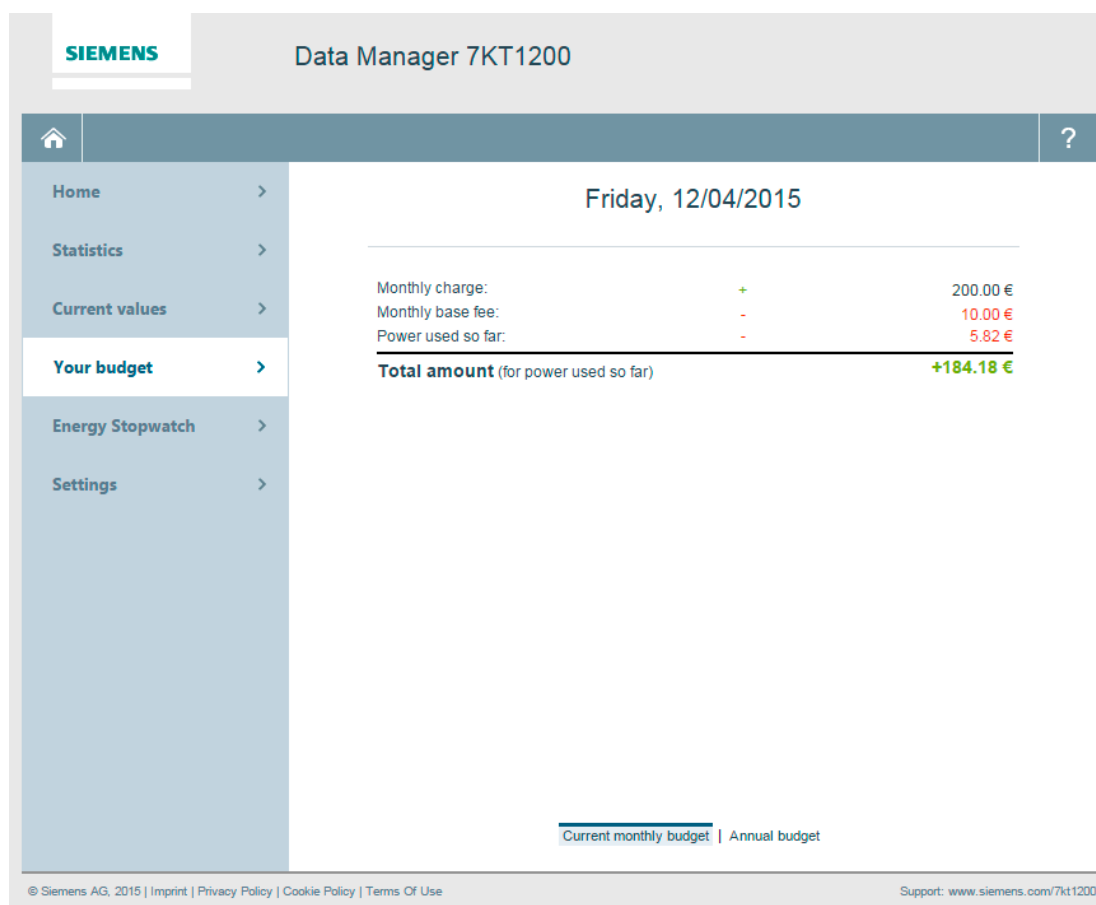


Figure 5-4 Installment - Day

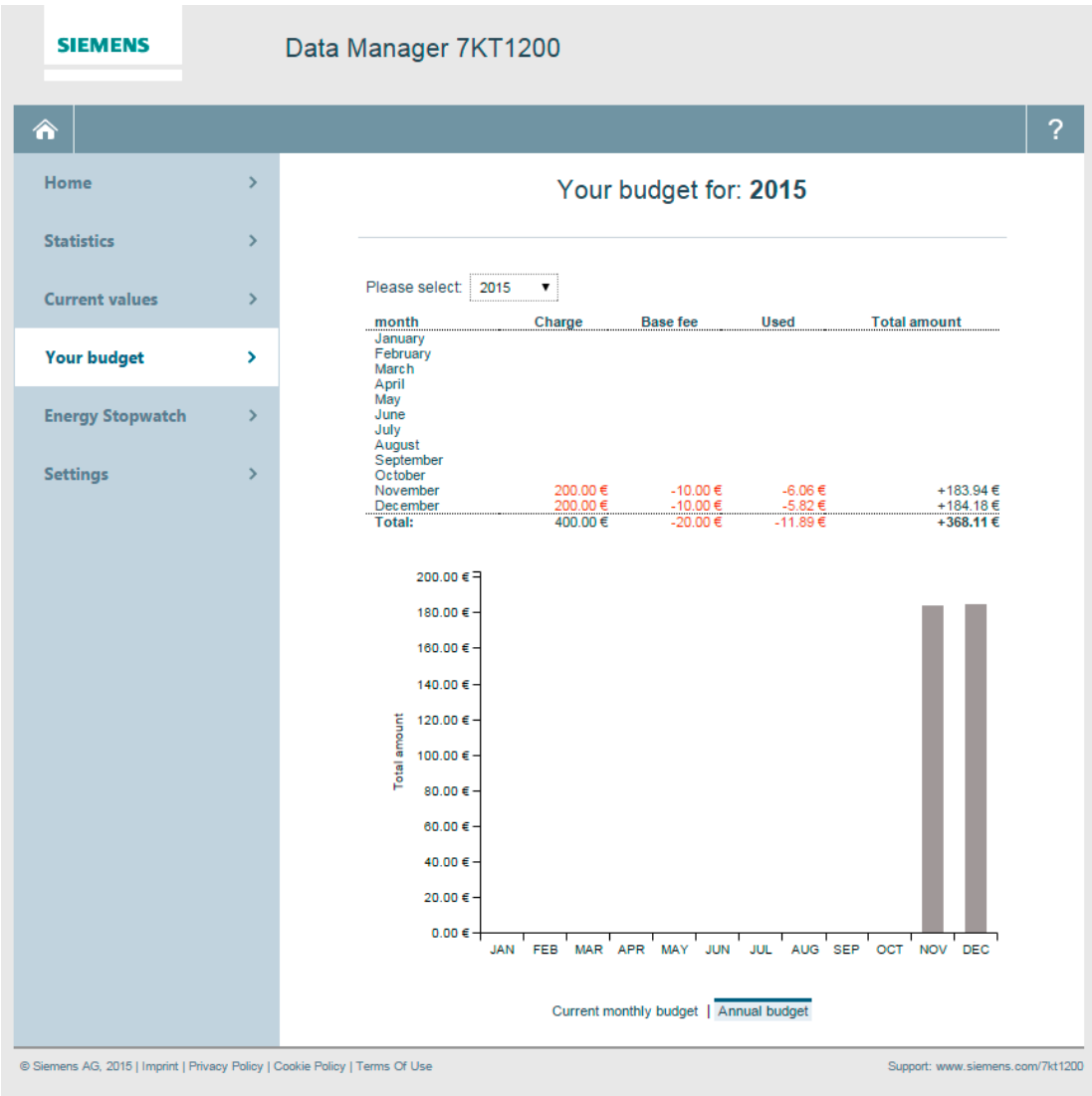


Figure 5-5 Installment - Year

5.1.7 Energy stopwatch

Consumption over a specific period can be checked with the current stopwatch.
These measurements can be saved for comparison purposes.

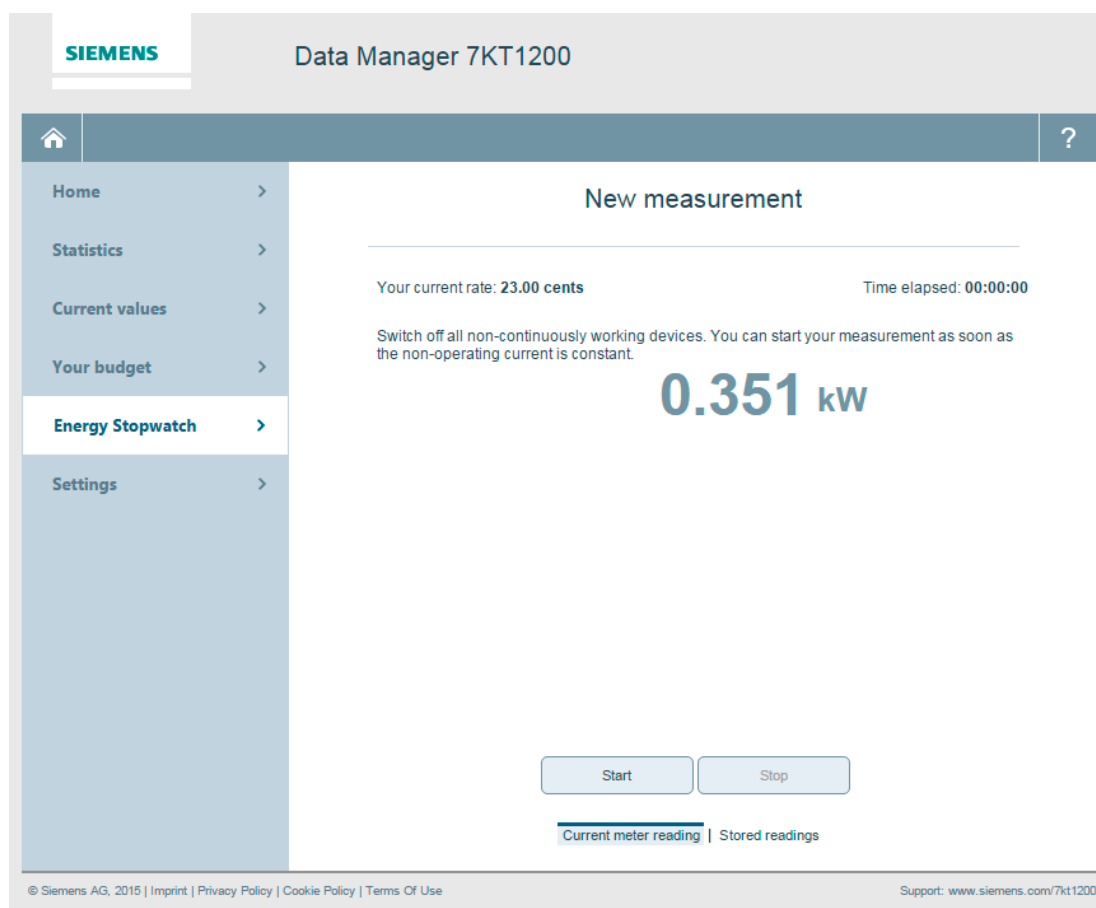


Figure 5-6 Energy stopwatch

5.1.8 Settings

5.1.8.1 Start

On the Settings homepage, you will find an overview of the serial number, firmware version, and LAN MAC address of the device.

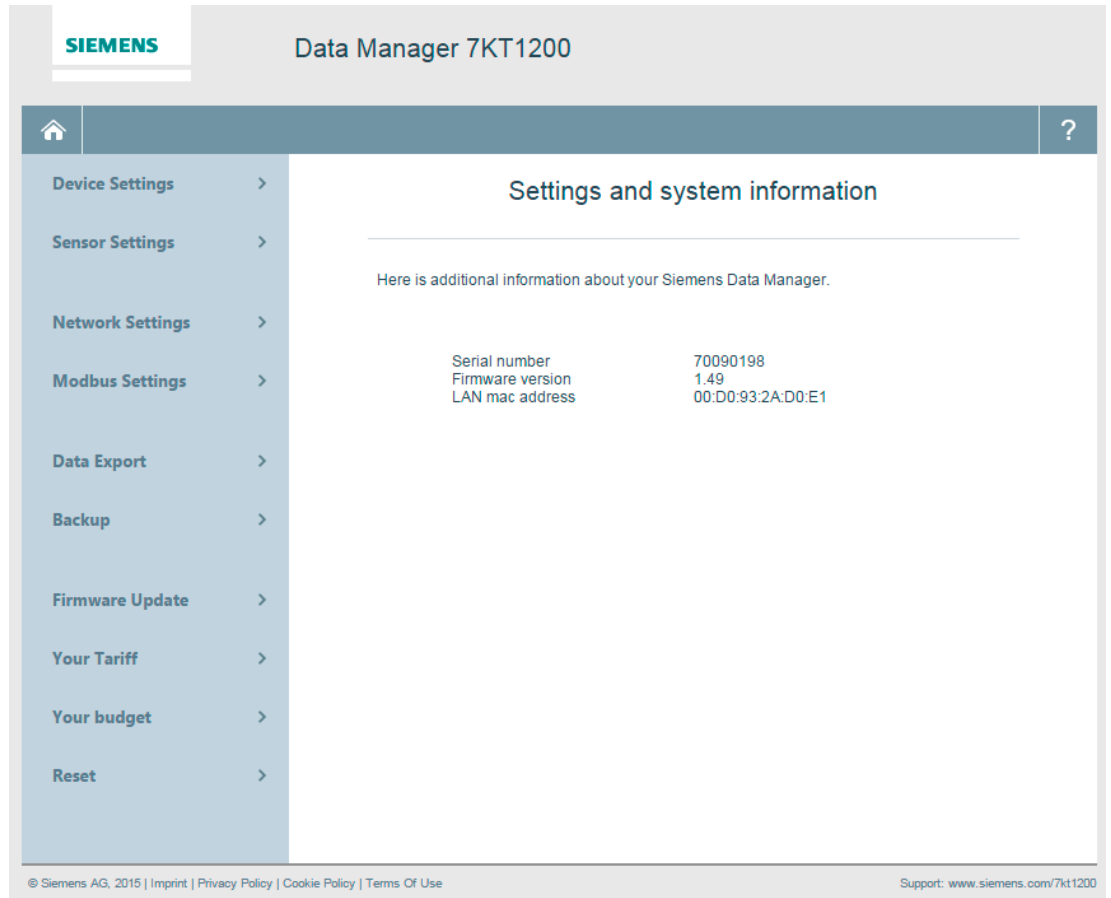


Figure 5-7 Settings - Start page

5.1.8.2 Device

In the menu item Device Settings, the following settings can be made:

- Language
- Location
- Date
- Time of day
- Transformer ratio
- Password

These settings appear on initial commissioning of the Data Manager.

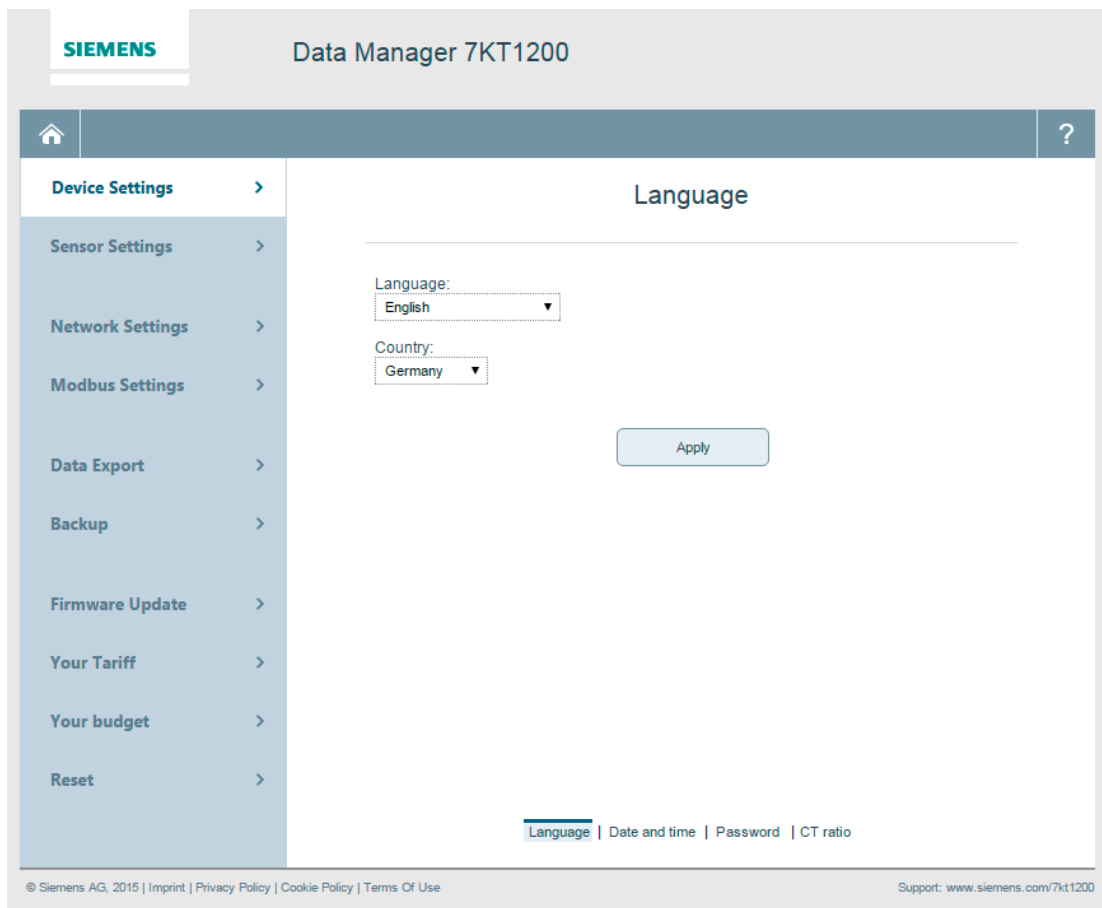


Figure 5-8 Device settings

5.1.8.3 Sensors

Under Sensor settings you will find two views:

- Sensor settings
- Current values

Sensor settings

In the Sensor settings, you can search for sensor bars connected to the Data Manager by clicking the button "Rescan sensor bus".

As soon as the sensor bars are detected, they appear in the left-hand column.

The number of sensor bars is detected automatically. The sensors can be assigned individual names, and they must be assigned to individual phases. In special applications, the power factor can also be defined manually. If a sensor is not connected, there is also no need for any phase assignment.

An eye symbol on the far right shows which sensors are to be compared with each other statistically. This can be adapted individually. Up to eight sensors can be compared with each

other, regardless of whether they are located on the same sensor bar or not. The sensors that are to be compared with each other need only be connected to the same Data Manager.

Sensor bars

ID	Icon	SNR
1		-12 SNR: 37.0B.D3.8D.86.15
2		-12 SNR: C5.0B.79.EB.E1.3F
3		-12 SNR: 76.8D.A7.39.C3.5D
4		-12 SNR: 25.CB.30.90.2F.6B
5		-12 SNR: 0F.57.B6.67.A6.71
6		-12 SNR: 8B.90.4D.92.7F.91
7		-12 SNR: 99.50.AE.8F.D6.EF
8		-12 SNR: 2A.D6.70.5D.F4.8D

[Rescan sensor bus](#)

Settings

Sensor name	Power factor	Phase purchase	✓	🔍
Kühlung	0.75	L1	✓	🔍
Sensor2	Auto	L2	✓	🔍
Sensor3	Auto	L3	✓	🔍
Sensor4	Auto	L1	✓	🔍
Sensor5	Auto	L2	✓	🔍
Sensor6	Auto	L3	✓	🔍
Sensor7	Auto	L1	✓	🔍
Sensor8	Auto	L2	✓	🔍
Sensor9	Auto	L3	✓	
Sensor10	Auto	L1	✓	
Sensor11	Auto	L2	✓	
Sensor12	Auto	L3	✓	

Selection for diagram – Total consumption

[Kühlung](#) [Sensor2](#) [Sensor3](#) [Sensor4](#) [Sensor5](#) [Sensor6](#) [Sensor7](#) [Sensor8](#)

[Sensor Settings](#) | [Current values](#)

Current values

Under "Current values", the following live values of the sensors can be read out:

- Current
- Voltage
- Power factors of the different phases
- Current values of the individual sensors

"0" values against a red background indicate sensors through which no power is currently flowing. "-" values with a red background indicate sensors for which no phase assignment has been carried out. In this way, it is immediately apparent if there is a fault, or if the sensors are not active. This view hugely reduces the search effort for errors, especially with up to 96 connected sensors.

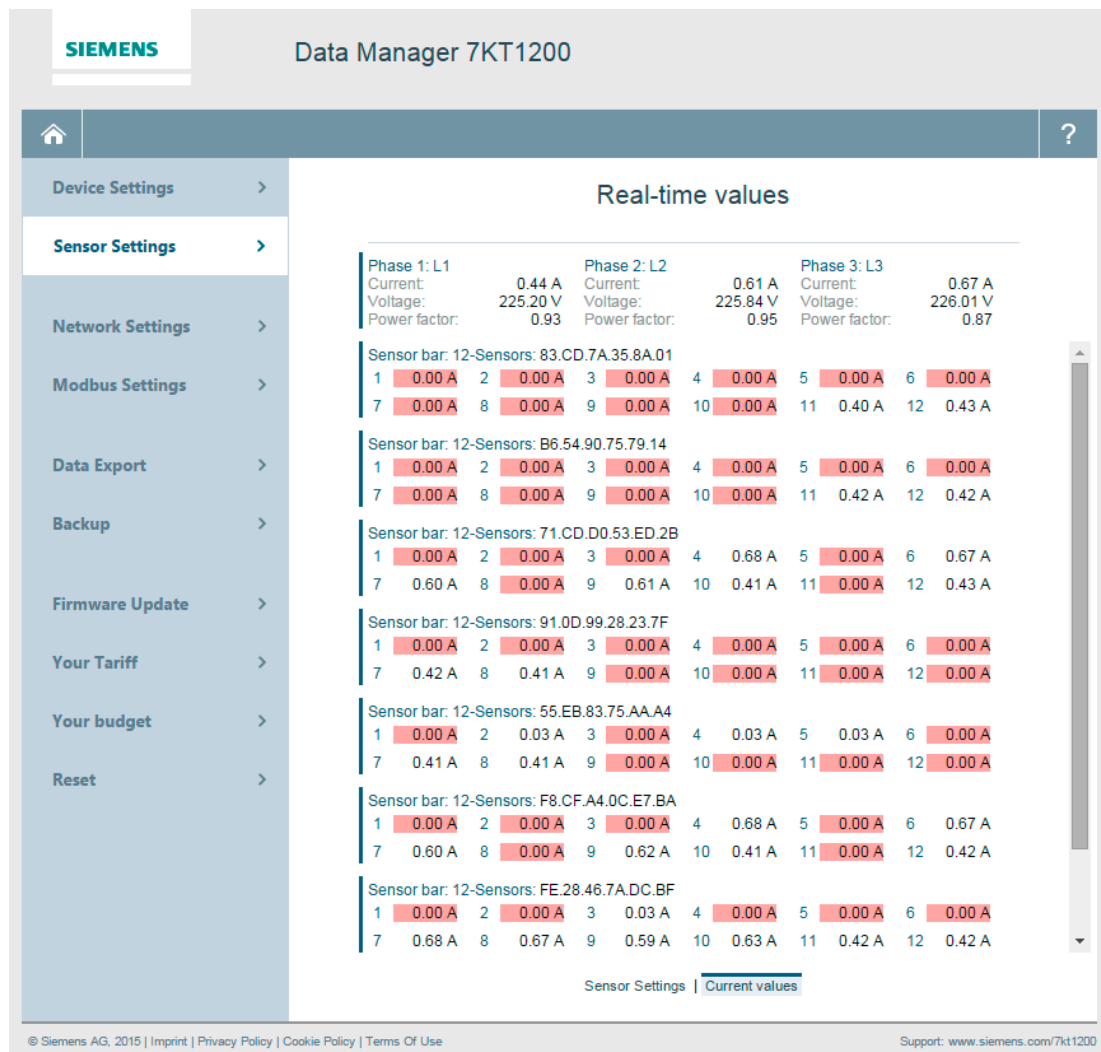


Figure 5-9 Sensor settings - Current values

Note

Note the ID number on the sensor bar.

5.1.8.4 Network Settings

In the Network Settings, a static IP address can be assigned manually. The Data Manager is supplied with a fixed IP address (192.168.1.200).

The Data Manager can also be assigned an individual name here. In the time server settings, you can determine whether the Data Manager obtains the time automatically from the network via the local server whenever the Data Manager is connected to the local network. This is only possible if the Data Manager is connected to the network.

SIEMENS Data Manager 7KT1200

Home ?

Device Settings >

Sensor Settings >

Network Settings >

Modbus Settings >

Data Export >

Backup >

Firmware Update >

Your Tariff >

Your budget >

Reset >

Network Settings

Here you can make changes to the IP settings. WARNING! Inappropriate settings may cause the user interface to become inaccessible!

IP configuration: static

IP address: 192.168.1.200

Subnet mask: 255.255.255.0

Default gateway: 192.168.1.1

DNS server:

Assign an individual device name here, so your device can be identified in the network.

Hostname: siemens-dm-7kt1200

Apply

Network Settings | Timeserver settings

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Support: www.siemens.com/7kt1200

Figure 5-10 Network Settings

5.1.8.5 Data export

Data transfer is configured via the Modbus settings. All measured values are transferred through this connection. As a bidirectional counter, the Data Manager measures active power [W], reactive power [var], apparent power [VA] and power factor per phase and in total, current [A] and voltage [V] per phase, and the network frequency [Hz].

The Data Manager provides a Modbus TCP server that uses the standard port 502 for incoming connection enquiries. This port and the IP address must be configured to establish a connection with the Data Manager.

Data export

In the case of data export, a CSV file is exported. This contains the instantaneous overall consumption and the consumption of the individual sensors in € and kWh. To enable recording of the values of the individual sensors in the CSV file, data transmission via Modbus must be activated, and the individual phases must be assigned to the sensors. If these settings are not made, only the overall consumption is recorded.

The following settings can be made in the "Data Export" dialog:

- Sensors that must appear in the CSV file
- Resolution: 15 min., 1 hour, 1 day and 1 week
Values for 15 min for max. 1 year
Values 1 day for max. 10 years
- Time frame: If the period extends back more than one week, representation in increments of 15 minutes is no longer possible.

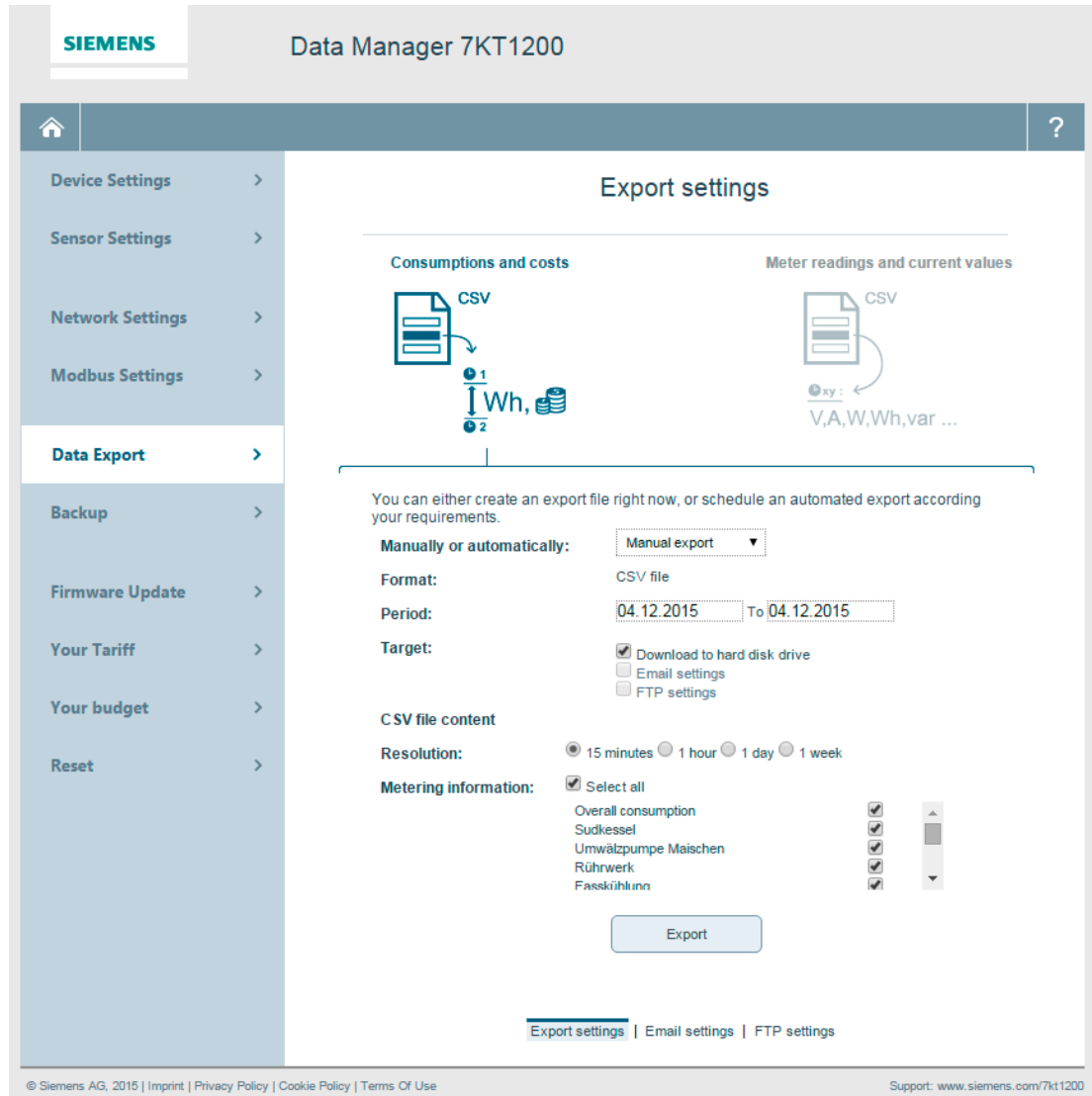


Figure 5-11 Data export

Data export with counter statuses and instantaneous values

As well as the data export described above, there is the option of exporting a CSV file with the meter statuses and instantaneous values.

This export variant is automated, in other words, data are exported, saved and sent by email, or stored on an FTP server over a specified period.

Here too, there is the option of activating data logging, which results in a CSV file being saved to the hard disk at a specific resolution. In this file, you will find total power, overall consumption, current, voltage, and power factor. These data are also included, divided according to the different phases and the individual sensors.

Figure 5-12 Data export with counter statuses and instantaneous values

The settings made and the meter statuses can be downloaded and saved at any time by means of data backup. This data backup can be restored.

5.1.8.6 Firmware update

Current updates can be installed on the Data Manager in the "Firmware Update" menu.

Before this can take place, a data backup must be carried out.

The firmware update can then be installed. The Data Manager restarts automatically following installation, and changes to the Start page. Firmware updates can be found in Industry Online Support (<https://support.industry.siemens.com/cs/ww/en/ps/21681>).

5.1.8.7 Tariff settings

Edit tariff

The following values can be processed under Tariff:

The following currencies can be selected: EUR, US dollar, CHF

- Currency in which the tariff is to be presented
- Tariff name
- Monthly basic charge including value added tax
- Current rate

The screenshot shows the Siemens Data Manager 7KT1200 web interface. The top header includes the Siemens logo and the title 'Data Manager 7KT1200'. A navigation menu on the left lists various settings: Device Settings, Sensor Settings, Network Settings, Modbus Settings, Data Export, Backup, Firmware Update, Your Tariff (highlighted), Your budget, and Reset. The main content area is titled 'Your tariff: Demo Tarif'. It contains the following fields and values:

- Currency: EUR (dropdown menu)
- Your tariff: Demo Tarif (text input)
- Monthly base fee: 10.00 € (numeric input with currency symbol)
- Your current rate: 23.00 cents/kWh (numeric input with unit)

A note below the rate field states: *) The amount includes VAT. A 'Save' button is located below the input fields. At the bottom right of the main area, there are links for 'Edit tariff' and 'Adjust tariff'. The footer contains copyright information: © Siemens AG, 2015 | Imprint | Privacy Policy | Cookie Policy | Terms Of Use, and a support link: Support: www.siemens.com/7kt1200.

Figure 5-13 Tariff settings

Adjust tariff

Under "Adjust tariff", the tariff can be changed at a particular time.

5.1.8.8 Budget settings

Two values can be entered for budget settings:

- Available budget
- Period during which the budget is to be used

When calculating the installment, the budget is distributed evenly across the number of months.

The screenshot displays the Siemens Data Manager 7KT1200 web application. The top header features the Siemens logo and the title 'Data Manager 7KT1200'. A navigation menu on the left includes options like 'Device Settings', 'Sensor Settings', 'Network Settings', 'Modbus Settings', 'Data Export', 'Backup', 'Firmware Update', 'Your Tariff', 'Your budget' (which is highlighted), and 'Reset'. The main content area is titled 'Your budget' and contains two input fields: 'Amount:*' with a value of '200.00' and a Euro symbol, and 'Period:' with a dropdown menu set to '1 month'. Below these fields is a note: '*) The amount includes VAT'. An 'Apply' button is positioned at the bottom right of the form. The footer of the page contains copyright information: '© Siemens AG, 2015 | Imprint | Privacy Policy | Cookie Policy | Terms Of Use' and a support link: 'Support: www.siemens.com/7kt1200'.

Figure 5-14 Budget settings

5.1.8.9 Reset

There are three options under the menu item "Reset":

- **Restart device:** Settings and other data are retained.
- **Reset configurations:** Network and sensor settings are deleted, but the configuration of the Modbus data transfer is retained.
- **Reset device to the delivery state:** All configurations and settings, as well as counter statuses, are deleted.

Service and maintenance

6.1 Error messages

Behavior	Problem	Solution
The status LED does not light up	The Data Manager is not supplied with power.	Ensure that at least the line conductor L1 and the neutral conductor N are connected to the Data Manager.
The status LED lights up or flashes red.	There is a fault.	Restart Data Manager. Contact Service.
The network LED does not light up, or the Data Manager is not found in the network.	The network LED does not light up, or the Data Manager is not found in the network.	Ensure that the network cable is correctly connected to the network connection.
	The Data Manager is not located in the same local network.	Connect the Data Manager with the same router / switch, or change the IP address in the PC.
The Data Manager is outputting unrealistic measured values.	The Data Manager has been installed incorrectly.	Check connection of L1 to L3 again.

6.2 Technical Support

You can find further support on the Internet at:

TechnicalSupport (<https://www.siemens.com/support-request>)

Disposal of waste electronic equipment



Waste electronic equipment must not be disposed of as unsorted municipal waste, e.g. household waste. When disposing of waste electronic equipment, the current local national/ international regulations must be observed.

6.3 Cybersecurity

Note

Network environments

The device is to be used only in secure network environments.

6.3.1 Introduction

This document is intended to support users in the setup of cybersecure networks and to operate the products described in this document in a cybersecure manner.

6.3.2 Further information on the defense-in-depth strategy

In order to protect technical infrastructures, systems, machines and networks against cyber threats, it is essential to implement and consistently support a holistic, state-of-the-art IT security concept. Siemens products and solutions constitute just one element of such a concept.

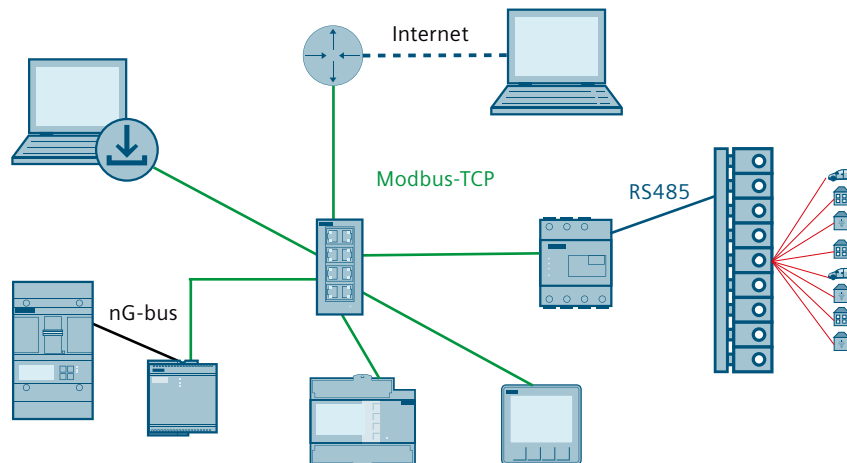
You can find more information on the Industrial Cybersecurity web page <https://www.siemens.com/industrialsecurity> (<https://www.siemens.com/global/en/products/automation/topic-areas/industrial-cybersecurity.html>).

6.3.3 Application environment

In order to be able to operate devices in a cybersecure manner, it is necessary to combine the devices/applications to form a cybersecure network.

Use the following link to view an Application example (<https://support.industry.siemens.com/cs/ww/en/view/109804583>) illustrating the basic structure of a network and a possible cybersecurity configuration.

The Data Manager is an intelligent meter used primarily for industrial applications. The layout diagram below illustrates an application example and the integration of the 7KT PAC1200 measuring system into an existing system with other Siemens products.



6.3.4 Firmware update

Signed firmware is used in order to ensure that the device complies with cybersecurity requirements.

The device supports firmware updates.

You can find the available firmware versions under: 7KT PAC1200 measuring devices - Industry Support Siemens (<https://support.industry.siemens.com/cs/ww/en/ps/21681>).

6.3.5 Communication protocols

Service	Protocol	Port	Properties
Web	HTTP	80	• Not configurable • Cannot be switched off
Modbus TCP	Modbus	502	• Configurable • Can be switched off
File Transfer	FTP / SFTP	No default port defined	• Configurable • Can be switched off
Email	SMTP	25 (default port)	• Configurable • Can be switched off
Network Time	NTP	123	• Port is not configurable • Can be switched off

6.3.6 Removing the device from service

Reset the device to the factory settings before removing it from service to prevent the possible disclosure of confidential data.

Resetting to the factory settings clears the following data:

- Device name
- IP addresses
- Ports
- Access data
- Other configurations

Once it has had all confidential data removed from it, the device can be disposed of in accordance with the current local regulations.

6.3.7 Guideline for secure operation and commissioning

The following points are designed to help the user to keep the device in operation without disturbances even in the event of cyberattacks.

- **Restrict physical access**
Ensure that only authorized personnel have physical access to the device. This can be implemented by means of access restrictions such as a lockable room or control cabinet.

- **Restrict physical network access**
Ensure that only authorized persons have access to the communication network.
- **Install the latest firmware version**
Set up a patch management process that ensures that the latest firmware is installed. All known bugs and security vulnerabilities are fixed in the latest firmware. It offers greater security against cyberattacks. Updates may only be carried out from a cybersecure terminal device.
The latest firmware version may only be installed from the Siemens Industry Online Portal (SIOS) (<https://sieportal.siemens.com/su/bkshZ>).
- **Set up a backup and restore process**
Use the integrated web server properties to create a backup of the project file. Keep the backups in a safe place and keep the backups up to date. Draw up a recovery plan for emergencies to restore operation of the device as quickly as possible after an incident.
- **Change the default settings**
Change all default settings, such as IP addresses and/or passwords/PINs
- **Only use secure passwords**
Do not use "12345678", "12password34" or other passwords that are easy to guess. Keep your passwords secret. Do not share your password with anyone. Change the default passwords of all relevant devices and users whenever a password is required. Only use secure passwords.
- **Enable security functions**
Enable all the cybersecurity functions of the device, such as password protection.
- **Disable/delete/uninstall all services, users and applications that are not required**
All services that are not required must be disabled. If, for example, the Modbus TCP server is not used, disable it by selecting port 0. Delete or disable all users that are not required and uninstall unnecessary software from the operating system.
- **Personnel policies**
Members of personnel must be conscious of their responsibilities with respect to cybersecurity. We therefore recommend that employees undergo annual cybersecurity awareness training.

6.3.8 Vulnerability monitoring

You can read about potential vulnerabilities in Siemens products on the public and freely accessible web page Siemens CERT/RSS (<https://www.siemens.com/cert>).

Siemens provides information about known vulnerabilities relating to Siemens products on this web page. Siemens Security Advisories (SSAs) are published for this purpose.

Each SSA contains a description of the vulnerability and its solution.

6.3.9 Reporting cybersecurity vulnerabilities

You can contact us at any time with security-related queries about the Siemens portfolio or the Siemens infrastructure. This is especially important if you would like to report a security issue. Please note that we can only process emails in English or German.

You can find our contact details on the internet under Siemens CERT/RSS (<https://www.siemens.com/cert>).

Email: productcert@siemens.com

6.3.10 Password

Please protect access to the interface by a password so that only authorized persons are able to access the Data Manager and change settings.

Technical data

Interfaces (standard)

- LAN (10 / 100 Mbps)
- RS485 for data transfer by means of Modbus RTU

Voltage and current inputs

Rated voltage	110/230 V
Operating voltage	230 V $\pm 10\%$
Frequency	50/60 Hz $\pm 5\%$

Intrinsic consumption

Voltage circuit	<0.01 VA per phase
Current circuit	<2 VA per phase
Overall device	<5 W
Rated current	5 A
Current limit	63 A
Starting current	<25 mA

Mounting

Conductor cross-section	10 ... 25 mm ² (mechanically from 1.5 ... 25 mm ²)
Torque for screw terminals	2.0 Nm

Measurement accuracy

	Data Manager
Voltage	$\pm 0.5\%$
Current	$\pm 0.5\%$
Active power	$\pm 1.0\%$
Apparent power	$\pm 1.0\%$
Reactive power	$\pm 1.0\%$
Power factor (p.f.)	$\pm 1.0\%$

Active energy	Class 1
Reactive energy	Class 1

When using external current transformers, the respective measurement accuracy must be taken into account.

EMC

ESD (IEC 61000-4-2)

- 4 kV contact-mode discharge
- 8 kV air discharge

RF radiation

- 3 V / m

Burst (IEC 61000-4-4)

- Network: ± 4 kV
- Ethernet: ± 2 kV

Surge (IEC 61000-4-5)

- Phase-phase: 1 kV
- Phase-ground: 2 kV
- Ethernet: ± 2 kV

Conducted interference (IEC 61000-4-6)

- 150 kHz ... 80 MHz
- RMS value: 3 V

RF irradiation (EN 55032)

- Class B

Operating conditions

- Ambient temperature: -25 °C ... +45 °C
- Storage temperature: -25 °C ... +70 °C
- Relative humidity:
 - Up to 75 % annual average
 - Up to 95 % on up to 30 days / year

Mechanical data

- Material enclosure: Glass-fiber reinforced polyamide
- Glow-wire test: According to IEC 695-2-1

- Protection class / type: II / IP20
- Weight / size: 0.3 kg / 88x70x65 mm

RS485 interface

Protocol	Modbus
Type	RS485 half-duplex
Data transfer rate	19200 or 115200 kbits
Connectors	4-pin connector 2.54 mm, enclosure Proprietary
RS 485 driver	Slew-rate limited, CS-Sensor MAX13412
Electrical isolation	No
Power supply for sensors	Yes (280 mA)
Voltage (min, max, typ.)	min. 8 V, max. 10 V, typ. 9 V
Short-circuit protection of power supply	Yes

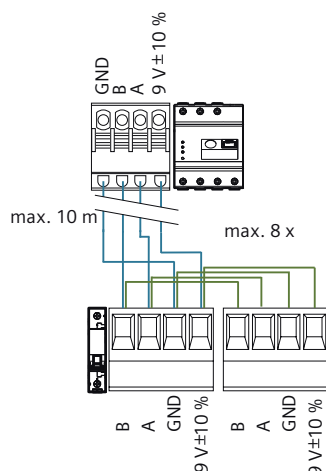


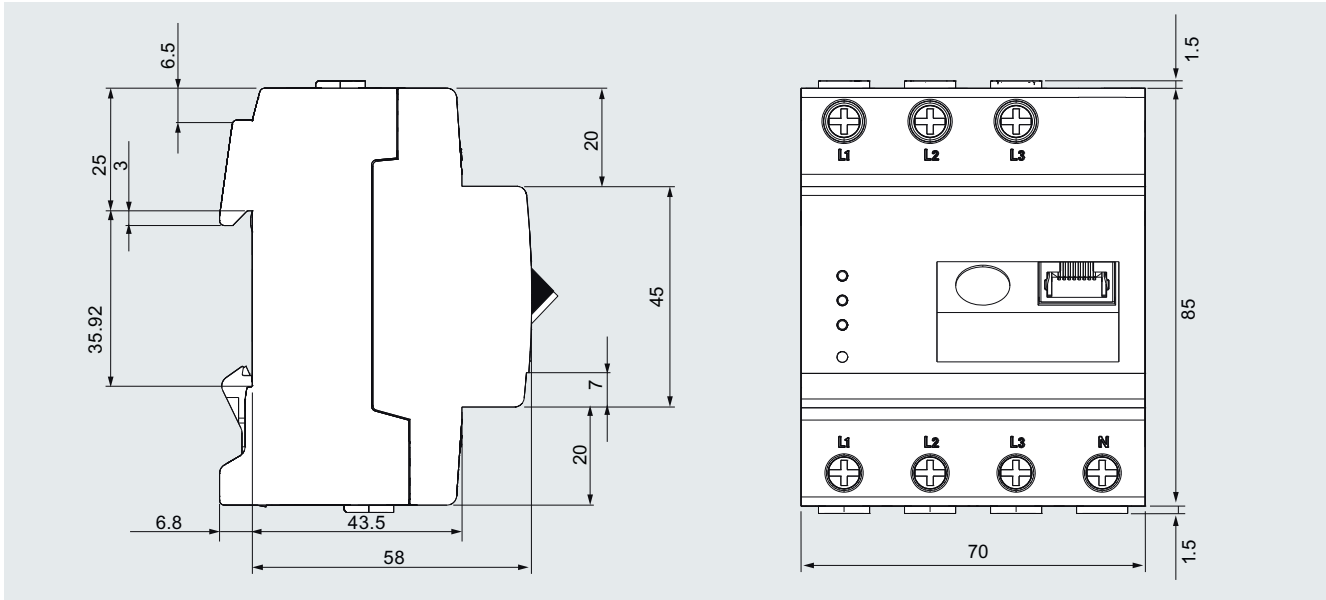
Table 7-1 Connector assignments

Pin direct	Pin indirect	Description
1	4	Supply voltage 9 V
2	3	RS485-B
3	2	RS485-A
4	1	Ground

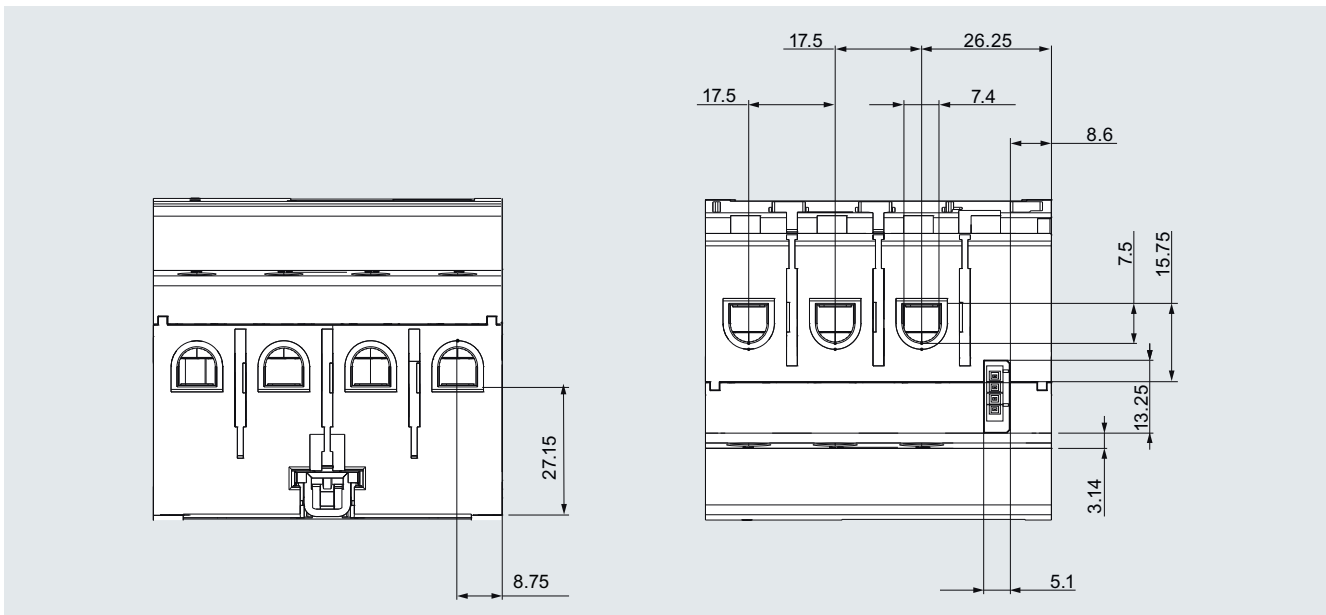
7.1 Dimension drawings

7.1.1 Dimensions of the Data Manager

View from the right and from the front

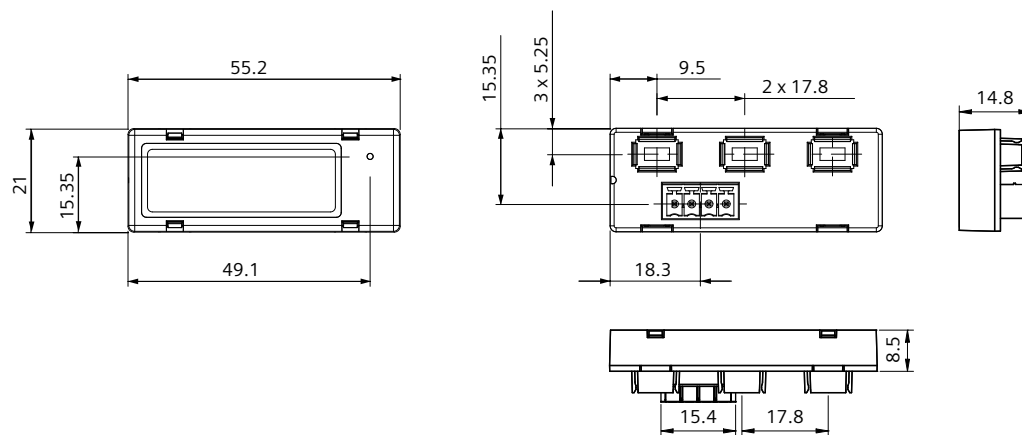


View from above and from below

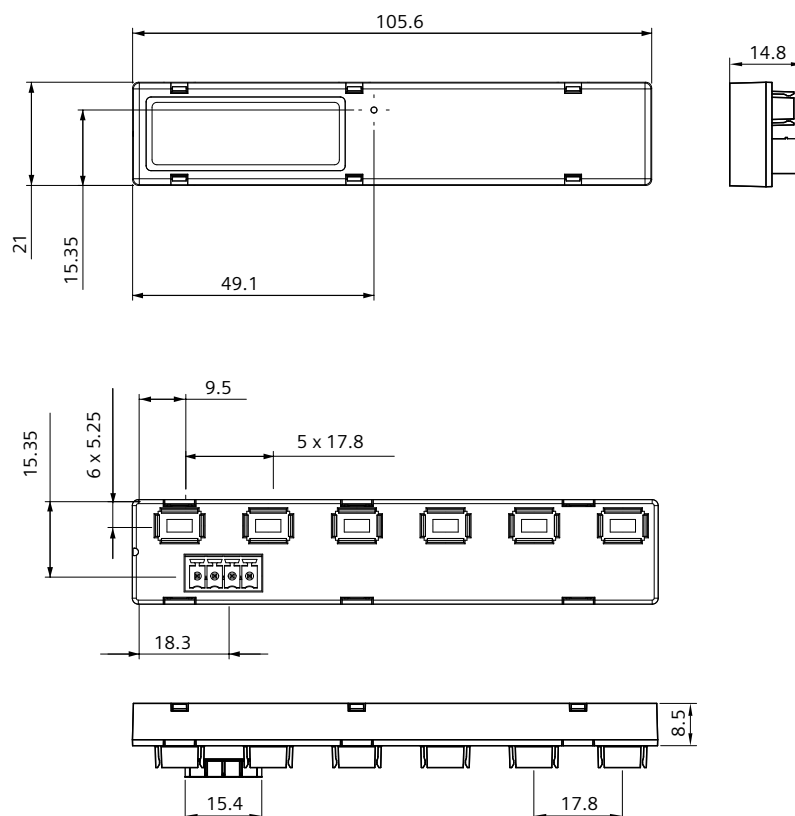


7.1.2 Dimensions of the sensor bar

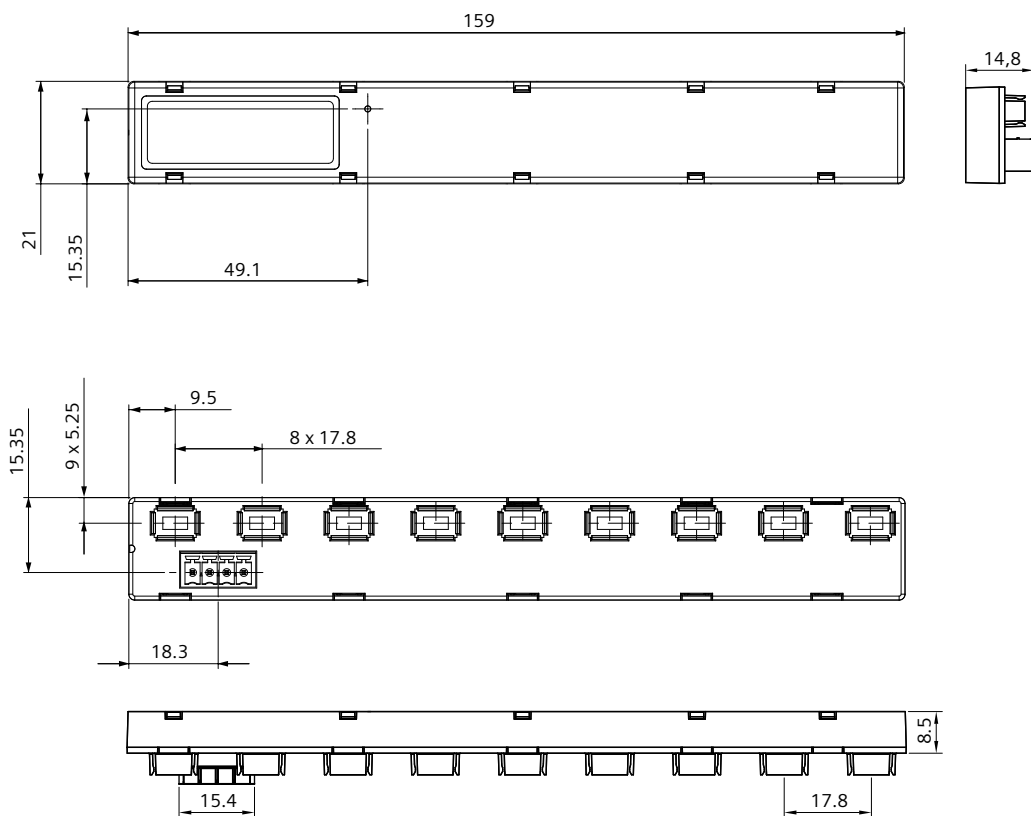
Sensor bar with three sensor slots



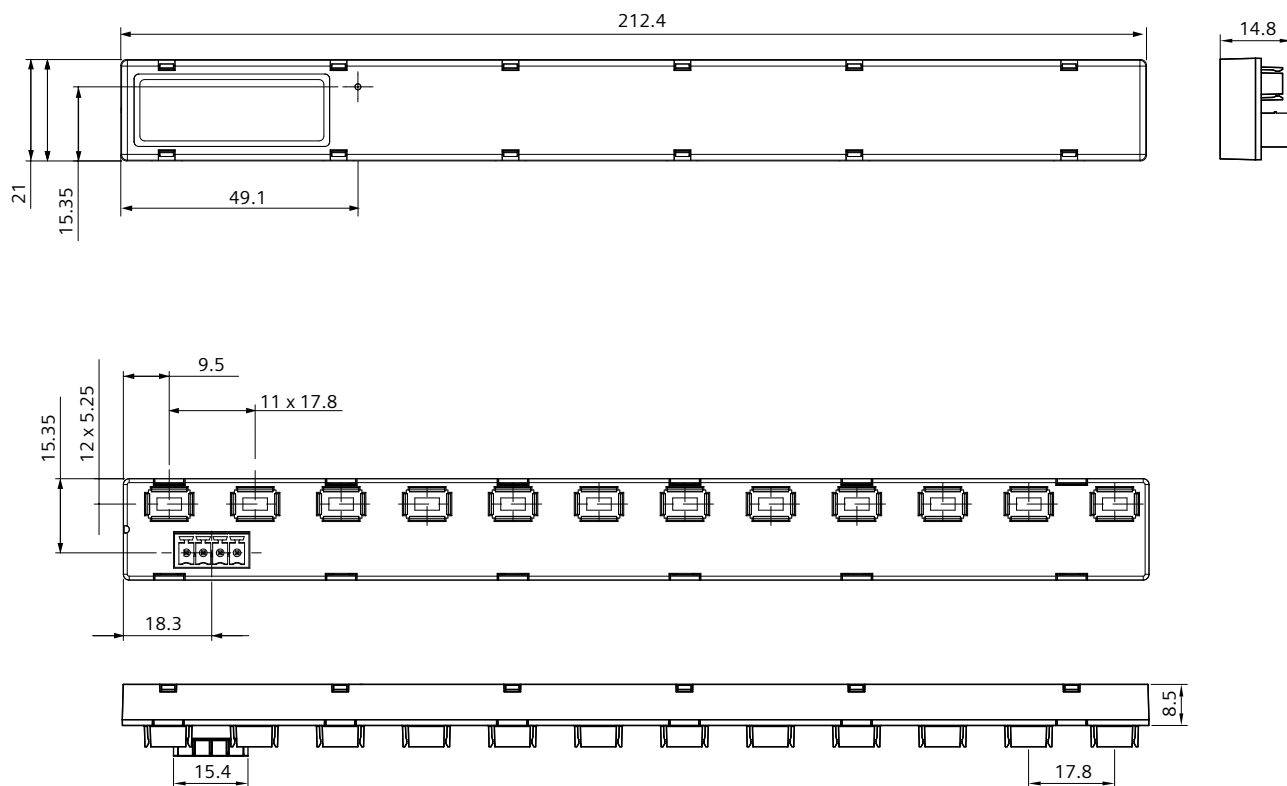
Sensor bar with six sensor slots



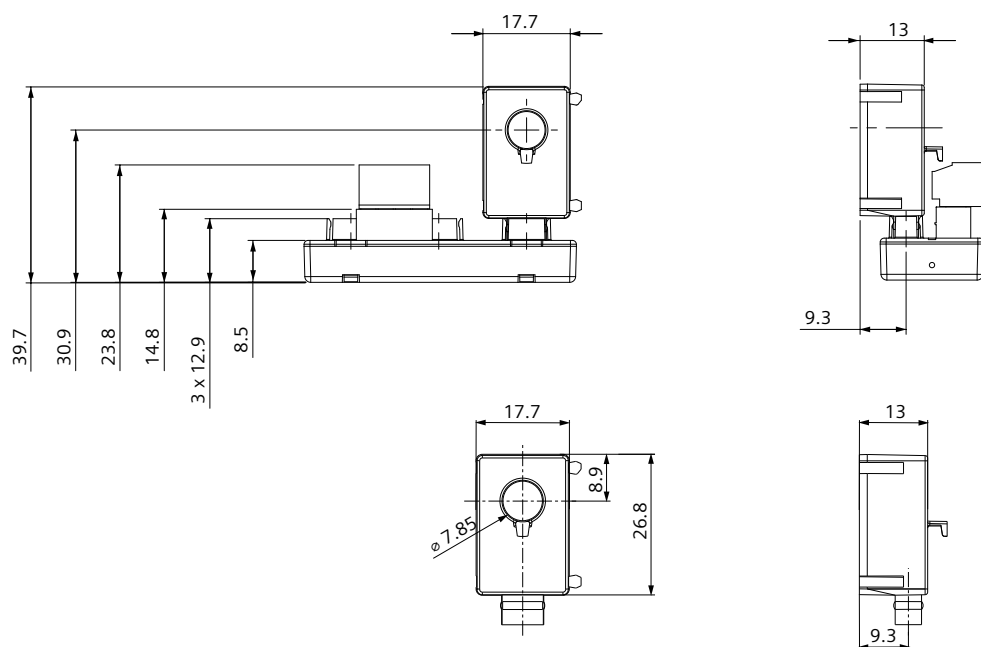
Sensor bar with nine sensor slots



Sensor bar with twelve sensor slots



7.1.3 Dimensions of the sensors on the sensor bar



Appendix

A.1 FAQs

What is the measuring accuracy of the overall system?

Data Manager 1 %, overall system 2 %

At which intervals are the sensor values transferred to Siemens Data Manager?

< 1 second

In which languages can the system be configured?

In German and English.

Is the actual current communicated by the sensors or only a ratio?

The current is measured (in amperes).

Is mixed operation of 40 A and 63 A sensors possible in the case of the sensor bar?

It is possible.

A.2 Modbus register list

Register overview

Start address (decimal)	End address (decimal)	Start address (hexadecimal)	End address (hexadecimal)	Size	Description
0	145	0x0000	0x0091	146	See 4.1 Internal, immediate registers
512	791	0x0200	0x0317	280	See 4.2 Internal energy registers (meters)
8192	8243	0x2000	0x02033	52	See 4-3 PnP registers
40000	40177	0x9C40	0x9CF1	1788	See 4.4 SunSpec registers
61440	65183	0xF000	0xFEFF	3840	See 4.5 Sensor registers

A.3 Internal registers

Internal, immediate registers

Start address (decimal)	End address (decimal)	Start address (hexadecimal)	End address (hexadecimal)	Size	R/W	Function codes	Type	Units	OBIS code	Description
0	1	0x0000	0x0001	2	RO	0x03	Unit 32	0.1 W	1-0:1.4.0*255	Active power +
2	3	0x0002	0x0003	2	RO	0x03	Unit 32	0.1 W	1-0:2.4.0*255	Active power -
4	5	0x0004	0x0005	2	RO	0x03	Unit 32	0.1 var	1-0:3.4.0*255	Reactive power +
6	7	0x0006	0x0007	2	RO	0x03	Unit 32	0.1 var	1-0:4.4.0*255	Reactive power -
8	9	0x0008	0x0009	2	RO	0x03	—	—	—	(reserved)
10	11	0x000A	0x000B	2	RO	0x03	—	—	—	(reserved)
12	13	0x000C	0x000D	2	RO	0x03	—	—	—	(reserved)
14	15	0x000E	0x000F	2	RO	0x03	—	—	—	(reserved)
16	17	0x0010	0x0011	2	RO	0x03	Unit 32	0.1 VA	1-0:9.4.0*255	Apparent power +
18	19	0x0012	0x0013	2	RO	0x03	Unit 32	0.1 VA	1-0:10.4.0*255	Apparent power -
20	21	0x0014	0x0015	2	RO	0x03	—	—	—	(reserved)
22	23	0x0016	0x0017	2	RO	0x03	—	—	—	(reserved)
24	25	0x0018	0x0019	2	RO	0x03	Unit 32	0.001 (no unit)	1-0:13.4.0*255	Power factor
26	27	0x001A	0x001B	2	RO	0x03	Unit 32	0.001 Hz	1-0:14.4.0*255	Line frequency
28	29	0x001C	0x001D	2	RO	0x03	—	—	—	(reserved)
30	31	0x001E	0x001F	2	RO	0x03	—	—	—	(reserved)
32	33	0x0020	0x0021	2	RO	0x03	—	—	—	(reserved)
34	35	0x0022	0x0023	2	RO	0x03	—	—	—	(reserved)
36	37	0x0024	0x0025	2	RO	0x03	—	—	—	(reserved)
38	39	0x0026	0x0027	2	RO	0x03	—	—	—	(reserved)
40	41	0x0028	0x0029	2	RO	0x03	Unit 32	0.1 W	1-0:21.4.0*255	Active power + (L1)
42	43	0x002A	0x002B	2	RO	0x03	Unit 32	0.1 W	1-0:22.4.0*255	Active power - (L1)
44	45	0x002C	0x002D	2	RO	0x03	Unit 32	0.1 var	1-0:23.4.0*255	Reactive power + (L1)

46	47	0x002E	0x002F	2	RO	0x03	Unit 32	0.1 var	1-0:24.4.0*255	Reactive power - (L1)
48	49	0x0030	0x0031	2	RO	0x03	—	—	—	(reserved)
50	51	0x0032	0x0033	2	RO	0x03	—	—	—	(reserved)
52	53	0x0034	0x0035	2	RO	0x03	—	—	—	(reserved)
54	55	0x0036	0x0037	2	RO	0x03	—	—	—	(reserved)
56	57	0x0038	0x0039	2	RO	0x03	Unit 32	0.1 VA	1-0:29.4.0*255	Active power + (L1)
58	59	0x003A	0x003B	2	RO	0x03	Unit 32	0.1 VA	1-0:30.4.0*255	Active power - (L1)
60	61	0x003C	0x003D	2	RO	0x03	Unit 32	0.001 A	1-0:31.4.0*255	Current (L1)
62	63	0x003E	0x003F	2	RO	0x03	Unit 32	0.001 V	1-0:32.4.0*255	Current potential (L1)
64	65	0x0040	0x0041	2	RO	0x03	Unit 32	0.001 (no unit)	1-0:33.4.0*255	Power factor (L1)
66	67	0x0042	0x0043	2	RO	0x03	—	—	—	(reserved)
68	69	0x0044	0x0045	2	RO	0x03	—	—	—	(reserved)
70	71	0x0046	0x0047	2	RO	0x03	—	—	—	(reserved)
72	73	0x0048	0x0049	2	RO	0x03	—	—	—	(reserved)
74	75	0x004A	0x004B	2	RO	0x03	—	—	—	(reserved)
76	77	0x004C	0x004D	2	RO	0x03	—	—	—	(reserved)
78	79	0x004E	0x004F	2	RO	0x03	—	—	—	(reserved)
80	81	0x0050	0x0051	2	RO	0x03	Unit 32	0.1 W	1-0:41.4.0*255	Active power + (L2)
82	83	0x0052	0x0053	2	RO	0x03	Unit 32	0.1 W	1-0:42.4.0*255	Active power - (L2)
84	85	0x0054	0x0055	2	RO	0x03	Unit 32	0.1 var	1-0:43.4.0*255	Reactive power + (L2)
86	87	0x0056	0x0057	2	RO	0x03	Unit 32	0.1 var	1-0:44.4.0*255	Reactive power - (L2)
88	89	0x0058	0x0059	2	RO	0x03	—	—	—	(reserved)
90	91	0x005A	0x005B	2	RO	0x03	—	—	—	(reserved)
92	93	0x005C	0x005D	2	RO	0x03	—	—	—	(reserved)
94	95	0x005E	0x005F	2	RO	0x03	—	—	—	(reserved)
96	97	0x0060	0x0061	2	RO	0x03	Unit 32	0.1 VA	1-0:49.4.0*255	Active power + (L2)
98	99	0x0062	0x0063	2	RO	0x03	Unit 32	0.1 VA	1-0:50.4.0*255	Active power - (L2)
100	101	0x0064	0x0065	2	RO	0x03	Unit 32	0.001 A	1-0:51.4.0*255	Current (L2)
102	103	0x0066	0x0067	2	RO	0x03	Unit 32	0.001 V	1-0:52.4.0*255	Current potential (L2)
104	105	0x0068	0x0069	2	RO	0x03	Unit 32	0.001 (no unit)	1-0:53.4.0*255	Power factor (L2)
106	107	0x006A	0x006B	2	RO	0x03	—	—	—	(reserved)
108	109	0x006C	0x006D	2	RO	0x03	—	—	—	(reserved)
110	111	0x006E	0x006F	2	RO	0x03	—	—	—	(reserved)
112	113	0x0070	0x0071	2	RO	0x03	—	—	—	(reserved)

A.3 Internal registers

114	115	0x0072	0x0073	2	RO	0x03	—	—	—	(reserved)
116	117	0x0074	0x0075	2	RO	0x03	—	—	—	(reserved)
118	119	0x0076	0x0077	2	RO	0x03	—	—	—	(reserved)
120	121	0x0078	0x0079	2	RO	0x03	Unit 32	0.1 W	1-0:61.4.0*255	Active power + (L3)
122	123	0x007A	0x007B	2	RO	0x03	Unit 32	0.1 W	1-0:62.4.0*255	Active power - (L3)
124	125	0x007C	0x007D	2	RO	0x03	Unit 32	0.1 var	1-0:63.4.0*255	Reactive power + (L3)
126	127	0x007E	0x007F	2	RO	0x03	Unit 32	0.1 var	1-0:64.4.0*255	Reactive power - (L3)
128	129	0x0080	0x0081	2	RO	0x03	—	—	—	(reserved)
130	131	0x0082	0x0083	2	RO	0x03	—	—	—	(reserved)
132	133	0x0084	0x0085	2	RO	0x03	—	—	—	(reserved)
134	135	0x0086	0x0087	2	RO	0x03	—	—	—	(reserved)
136	137	0x0088	0x0089	2	RO	0x03	Unit 32	0.1 VA	1-0:69.4.0*255	Active power + (L3)
138	139	0x008A	0x008B	2	RO	0x03	Unit 32	0.1 VA	1-0:70.4.0*255	Active power - (L3)
140	141	0x008C	0x008D	2	RO	0x03	Unit 32	0.001 A	1-0:71.4.0*255	Current (L3)
142	143	0x008E	0x008F	2	RO	0x03	Unit 32	0.001 V	1-0:72.4.0*255	Current potential (L3)
144	145	0x0090	0x0091	2	RO	0x03	Unit 32	0.001 (no unit)	1-0:73.4.0*255	Power factor (L3)

Internal energy registers (meters)

Start address (decimal)	End address (decimal)	Start address (hexadecimal)	End address (hexadecimal)	Size	R/W	Function codes	Type	Units	OBIS code	Description
512	515	0x0200	0x0203	4	RO	0x03	Unit 64	0.1 Wh	1-0:1.8.0*255	Active power +
516	519	0x0204	0x0207	4	RO	0x03	Unit 64	0.1 Wh	1-0:2.8.0*255	Active power -
520	523	0x0208	0x020B	4	RO	0x03	Unit 64	0.1 varh	1-0:3.8.0*255	Reactive power +
524	527	0x020C	0x020F	4	RO	0x03	Unit 64	0.1 varh	1-0:4.8.0*255	Reactive power -
528	531	0x0210	0x0213	4	RO	0x03	—	—	—	(reserved)
532	535	0x0214	0x0217	4	RO	0x03	—	—	—	(reserved)
536	539	0x0218	0x021B	4	RO	0x03	—	—	—	(reserved)
540	543	0x021C	0x021F	4	RO	0x03	—	—	—	(reserved)
544	547	0x0220	0x0223	4	RO	0x03	Unit 64	0.1 VAh	1-0:9.8.0*255	Apparent power +
548	551	0x0224	0x0227	4	RO	0x03	Unit 64	0.1 VAh	1-0:10.8.0*255	Apparent power -

552	555	0x0228	0x022B	4	RO	0x03	—	—	—	(reserved)
556	559	0x022C	0x022F	4	RO	0x03	—	—	—	(reserved)
560	563	0x0230	0x0233	4	RO	0x03	—	—	—	(reserved)
564	567	0x0234	0x0237	4	RO	0x03	—	—	—	(reserved)
568	571	0x0238	0x023B	4	RO	0x03	—	—	—	(reserved)
572	575	0x023C	0x023F	4	RO	0x03	—	—	—	(reserved)
576	579	0x0240	0x0243	4	RO	0x03	—	—	—	(reserved)
580	583	0x0244	0x0247	4	RO	0x03	—	—	—	(reserved)
584	587	0x0248	0x024B	4	RO	0x03	—	—	—	(reserved)
588	591	0x024C	0x024F	4	RO	0x03	—	—	—	(reserved)
592	595	0x0250	0x0253	4	RO	0x03	Unit 64	0.1 Wh	1-0:21.8.0*255	Active power + (L1)
596	599	0x0254	0x0257	4	RO	0x03	Unit 64	0.1 Wh	1-0:22.8.0*255	Active power - (L1)
600	603	0x0258	0x025B	4	RO	0x03	Unit 64	0.1 varh	1-0:23.8.0*255	Reactive power + (L1)
604	607	0x025C	0x025F	4	RO	0x03	Unit 64	0.1 varh	1-0:24.8.0*255	Reactive power - (L1)
608	611	0x0260	0x0263	4	RO	0x03	—	—	—	(reserved)
612	615	0x0264	0x0267	4	RO	0x03	—	—	—	(reserved)
616	619	0x0268	0x026B	4	RO	0x03	—	—	—	(reserved)
620	623	0x026C	0x026F	4	RO	0x03	—	—	—	(reserved)
624	627	0x0270	0x0273	4	RO	0x03	Unit 64	0.1 VAh	1-0:29.8.0*255	Apparent power + (L1)
628	631	0x0274	0x0277	4	RO	0x03	Unit 64	0.1 VAh	1-0:30.8.0*255	Apparent power - (L1)
632	635	0x0278	0x027B	4	RO	0x03	—	—	—	(reserved)
636	639	0x027C	0x027F	4	RO	0x03	—	—	—	(reserved)
640	643	0x0280	0x0283	4	RO	0x03	—	—	—	(reserved)
644	647	0x0284	0x0287	4	RO	0x03	—	—	—	(reserved)
648	651	0x0288	0x028B	4	RO	0x03	—	—	—	(reserved)
652	655	0x028C	0x028F	4	RO	0x03	—	—	—	(reserved)
656	659	0x0290	0x0293	4	RO	0x03	—	—	—	(reserved)
660	663	0x0294	0x0297	4	RO	0x03	—	—	—	(reserved)
664	667	0x0298	0x029B	4	RO	0x03	—	—	—	(reserved)
668	671	0x029C	0x029F	4	RO	0x03	—	—	—	(reserved)
672	675	0x02A0	0x02A3	4	RO	0x03	Unit 64	0.1 Wh	1-0:41.8.0*255	Active power + (L2)
676	679	0x02A4	0x02A7	4	RO	0x03	Unit 64	0.1 Wh	1-0:42.8.0*255	Active power - (L2)
680	683	0x02A8	0x02AB	4	RO	0x03	Unit 64	0.1 varh	1-0:43.8.0*255	Reactive power + (L2)
684	687	0x02AC	0x02AF	4	RO	0x03	Unit 64	0.1 varh	1-0:44.8.0*255	Reactive power - (L2)
688	691	0x02B0	0x02B3	4	RO	0x03	—	—	—	(reserved)
692	695	0x02B4	0x02B7	4	RO	0x03	—	—	—	(reserved)

696	699	0x02B8	0x02BB	4	RO	0x03	—	—	—	(reserved)
700	703	0x02BC	0x02BF	4	RO	0x03	—	—	—	(reserved)
704	707	0x02C0	0x02C3	4	RO	0x03	Unit 64	0.1 VAh	1-0:49.8.0*255	Apparent power + (L2)
708	711	0x02C4	0x02C7	4	RO	0x03	Unit 64	0.1 VAh	1-0:50.8.0*255	Apparent power - (L2)
712	715	0x02C8	0x02CB	4	RO	0x03	—	—	—	(reserved)
716	719	0x02CC	0x02CF	4	RO	0x03	—	—	—	(reserved)
720	723	0x02D0	0x02D3	4	RO	0x03	—	—	—	(reserved)
724	727	0x02D4	0x02D7	4	RO	0x03	—	—	—	(reserved)
728	731	0x02D8	0x02DB	4	RO	0x03	—	—	—	(reserved)
732	735	0x02DC	0x02DF	4	RO	0x03	—	—	—	(reserved)
736	739	0x02E0	0x02E3	4	RO	0x03	—	—	—	(reserved)
740	743	0x02E4	0x02E7	4	RO	0x03	—	—	—	(reserved)
744	747	0x02E8	0x02EB	4	RO	0x03	—	—	—	(reserved)
748	751	0x02EC	0x02EF	4	RO	0x03	—	—	—	(reserved)
752	755	0x02F0	0x02F3	4	RO	0x03	Unit 64	0.1 Wh	1-0:61.8.0*255	Active power + (L3)
756	759	0x02F4	0x02F7	4	RO	0x03	Unit 64	0.1 Wh	1-0:62.8.0*255	Active power - (L3)
760	763	0x02F8	0x02FB	4	RO	0x03	Unit 64	0.1 varh	1-0:63.8.0*255	Reactive power + (L3)
764	767	0x02FC	0x02FF	4	RO	0x03	Unit 64	0.1 varh	1-0:64.8.0*255	Reactive power - (L3)
768	771	0x0300	0x0303	4	RO	0x03	—	—	—	(reserved)
772	775	0x0304	0x0307	4	RO	0x03	—	—	—	(reserved)
776	779	0x0308	0x030B	4	RO	0x03	—	—	—	(reserved)
780	783	0x030C	0x030F	4	RO	0x03	—	—	—	(reserved)
784	787	0x0310	0x0313	4	RO	0x03	Unit 64	0.1 VAh	1-0:69.8.0*255	Apparent power + (L3)
788	791	0x0314	0x0317	4	RO	0x03	Unit 64	0.1 VAh	1-0:70.8.0*255	Apparent power - (L3)

PnP registers

Start address (decimal)	End address (decimal)	Start address (hexadecimal)	End address (hexadecimal)	Size	R/W	Function codes	Type	Name	Default value/example	Description
8192	8192	0x2000	0x2000	1	RO	0x03	Unit 16	Manufacturer's ID	0x5233	Fixed value to identify each device

8193	8193	0x2001	0x2001	1	RO	0x03	Unit 16	Product ID	0x4842	Indicates that the device is a Data Manager
8194	8194	0x2002	0x2002	1	RO	0x03	Unit 16	Product version	Example: 0x0200 (= 2.00)	(Hardware) revision of the Data Manager
8195	8195	0x2003	0x2003	1	RO	0x03	Unit 16	Firmware version	Example: 0x020D = 525 = 2.13	Firmware revision of the Data Manager
8196	8211	0x2004	0x2013	16	RO	0x03	Series (32)	Seller's name		Contains the manufacturer's name as a series, padded with NUL bytes or blanks
8212	8227	0x2014	0x2023	16	RO	0x03	Series (32)	Product name		Contains the product name as a series, padded with NUL bytes or blanks
8228	8243	0x2024	0x2033	16	RO	0x03	Series (32)	Serial number	Example: - 3.03809E+13	Contains the serial number of the device

SunSpec registers

Start address (decimal)	End address (decimal)	Size	R/W	Function codes	Name	Type	Units	Scaling factor	Description	Value range/ OBIS mapping
40000	40001	2	RO	0x03	C_SunSpec_ID	Unit 32	N/A	N/A	SunSpec Modbus Map. Indicates that it is valid.	0x53756e53
40002	40002	1	RO	0x03	C_SunSpec_DID	Unit 16	N/A	N/A	SunSpec common model block	0x0001
40003	40003	1	RO	0x03	C_SunSpec_Length	Unit 16	registers	N/A	Length of the common model	65
40004	40019	16	RO	0x03	C_Manufacturer	Series (32)	N/A	N/A	Manufacturer's name:	Siemens AG
40020	40035	16	RO	0x03	C_Model	Series (32)	N/A	N/A	Model name	PAC1200

40036	40043	8	RO	0x03	C_Options	Series (16)	N/A	N/A	Manufacturer-specific value	—
40044	40051	8	RO	0x03	C_Version	Series (16)	N/A	N/A	Manufacturer-specific value	—
40052	40067	16	RO	0x03	C_Serial-Number	Series (16)	N/A	N/A	Manufacturer-specific value	—
40068	40068	1	RO	0x03	C_DeviceAddress	Unit 16	N/A	N/A	Modbus ID (Modbus address). Indicates that it is valid.	247
40069	40069	1	RO	0x03	C_SunSpec_DID	Unit 16	N/A	N/A	SunSpec meter model block	203
40070	40070	1	RO	0x03	C_SunSpec_Length	Unit 16	registers	N/A	Length of the meter model	105
40071	40071	1	RO	0x03	M_AC_Current	Unit 16	A	M_AC_Current_SF	AC current (total of active phases)	0x8000
40072	40072	1	RO	0x03	M_AC_Current_A	Unit 16	A	M_AC_Current_SF	Phase A AC current	1-0:31.4.0*255
40073	40073	1	RO	0x03	M_AC_Current_B	Unit 16	A	M_AC_Current_SF	Phase B AC current	1-0:51.4.0*255
40074	40074	1	RO	0x03	M_AC_Current_C	Unit 16	A	M_AC_Current_SF	Phase C AC current	1-0:71.4.0*255
40075	40075	1	RO	0x03	M_AC_Current_SF	Unit 16	N/A	N/A	AC current scaling factor**	-2
40076	40076	1	RO	0x03	M_AC_Voltage_LN	Unit 16	V	M_AC_Voltage_SF	Line to neutral AC voltage (average of the active phases)	0x8000
40077	40077	1	RO	0x03	M_AC_Voltage_AN	Unit 16	V	M_AC_Voltage_SF	Phase A to neutral AC voltage	1-0:32.4.0*255
40078	40078	1	RO	0x03	M_AC_Voltage_BN	Unit 16	V	M_AC_Voltage_SF	Phase B to neutral AC voltage	1-0:52.4.0*255
40079	40079		RO	0x03	M_AC_Voltage_CN	Unit 16	V	M_AC_Voltage_SF	Phase C to neutral AC voltage	1-0:72.4.0*255
40080	40080	1	RO	0x03	M_AC_Voltage_LL	Unit 16	V	M_AC_Voltage_SF	Line to line AC voltage (average of the active phases)	0x8000
40081	40081	1	RO	0x03	M_AC_Voltage_AB	Unit 16	V	M_AC_Voltage_SF	Phase A to phase B AC current potential	0x8000
40082	40082	1	RO	0x03	M_AC_Voltage_BC	Unit 16	V	M_AC_Voltage_SF	Phase B to phase C AC current potential	0x8000
40083	40083	1	RO	0x03	M_AC_Voltage_CA	Unit 16	V	M_AC_Voltage_SF	Phase C to phase A AC current potential	0x8000
40084	40084	1	RO	0x03	M_AC_Voltage_SF	Unit 16	N/A	N/A	AC current potential scaling factor**	-2

40085	40085	1	RO	0x03	M_AC_Freq	Unit 16	Hz	M_AC_Freq_SF	AC frequency	1-0:14.4.0*255
40086	40086	1	RO	0x03	M_AC_Freq_SF	Unit 16	N/A	N/A	AC frequency scaling factor**	-2
40087	40087	1	RO	0x03	M_AC_Power	Unit 16	W	M_AC_Power_SF	Total active power (total of active phases)	> 0 $\triangleq$ 1-0:1.4.0*255 < 0 $\triangleq$ 1-0:2.4.0*255
40088	40088	1	RO	0x03	M_AC_Power_A	Unit 16	W	M_AC_Power_SF	Phase A AC total active power	> 0 $\triangleq$ 1-0:21.4.0*255 < 0 $\triangleq$ 1-0:22.4.0*255
40089	40089	1	RO	0x03	M_AC_Power_B	Unit 16	W	M_AC_Power_SF	Phase B AC total active power	> 0 $\triangleq$ 1-0:41.4.0*255 < 0 $\triangleq$ 1-0:42.4.0*255
40090	40090	1	RO	0x03	M_AC_Power_C	Unit 16	W	M_AC_Power_SF	Phase C AC total active power	> 0 $\triangleq$ 1-0:61.4.0*255 < 0 $\triangleq$ 1-0:62.4.0*255
40091	40091	1	RO	0x03	M_AC_Power_SF	Unit 16	N/A	N/A	AC active power scaling factor**	1
40092	40092	1	RO	0x03	M_AC_VA	Unit 16	VA	M_AC_VA_SF	Total AC apparent power (total of active phases)	> 0 $\triangleq$ 1-0:9.4.0*255 < 0 $\triangleq$ 1-0:10.4.0*255
40093	40093	1	RO	0x03	M_AC_VA_A	Unit 16	VA	M_AC_VA_SF	Phase A AC apparent power	> 0 $\triangleq$ 1-0:29.4.0*255 < 0 $\triangleq$ 1-0:30.4.0*255
40094	40094	1	RO	0x03	M_AC_VA_B	Unit 16	VA	M_AC_VA_SF	Phase B AC apparent power	> 0 $\triangleq$ 1-0:49.4.0*255 < 0 $\triangleq$ 1-0:50.4.0*255
40095	40095	1	RO	0x03	M_AC_VA_C	Unit 16	VA	M_AC_VA_SF	Phase C AC apparent power	> 0 $\triangleq$ 1-0:69.4.0*255 < 0 $\triangleq$ 1-0:70.4.0*255

40096	40096	1	RO	0x03	M_AC_VA_SF	Unit 16	N/A	N/A	AC apparent power scaling factor**	1
40097	40097	1	RO	0x03	M_AC_VA_R	Unit 16	var	M_AC_VA_R_SF	Total AC reactive power (total of active phases)	$< 0 \triangleq$ 1-0:4.4.0*255
40098	40098	1	RO	0x03	M_AC_VA_R_A	Unit 16	var	M_AC_VA_R_SF	Phase A AC reactive power	$> 0 \triangleq$ 1-0:23.4.0*255 $< 0 \triangleq$ 1-0:24.4.0*255
40099	40099	1	RO	0x03	M_AC_VA_R_B	Unit 16	var	M_AC_VA_R_SF	Phase B AC reactive power	$> 0 \triangleq$ 1-0:43.4.0*255 $< 0 \triangleq$ 1-0:44.4.0*255
40100	40100	1	RO	0x03	M_AC_VA_R_C	Unit 16	var	M_AC_VA_R_SF	Phase C AC reactive power	$> 0 \triangleq$ 1-0:63.4.0*255 $< 0 \triangleq$ 1-0:64.4.0*255
40101	40101	1	RO	0x03	M_AC_VA_R_SF	Unit 16	N/A	N/A	AC reactive power scaling factor**	1
40102	40102	1	RO	0x03	M_AC_PF	Unit 16	%	M_AC_PF_SF	Average power factor (total of active phases)	1-0:13.4.0*255 -1000...+1000
40103	40103	1	RO	0x03	M_AC_PF_A	Unit 16	%	M_AC_PF_SF	Phase A power factor	1-0:33.4.0*255 -1000...+1000
40104	40104	1	RO	0x03	M_AC_PF_B	Unit 16	%	M_AC_PF_SF	Phase B power factor	1-0:53.4.0*255 -1000...+1000
40105	40105	1	RO	0x03	M_AC_PF_C	Unit 16	%	M_AC_PF_SF	Phase C power factor	1-0:73.4.0*255 -1000...+1000
40106	40106	1	RO	0x03	M_AC_PF_SF	Unit 16	N/A	N/A	AC power factor scaling factor**	-3
40107	40108	2	RO	0x03	M_Exported	Unit 32	Wh	M_Energy_W_SF	Total, exported real energy	1-0:2.8.0*255
40109	40110	2	RO	0x03	M_Exported_A	Unit 32	Wh	M_Energy_W_SF	Phase A exported, real energy	1-0:22.8.0*255
40111	40112	2	RO	0x03	M_Exported_B	Unit 32	Wh	M_Energy_W_SF	Phase B exported, real energy	1-0:42.8.0*255
40113	40114	2	RO	0x03	M_Exported_C	Unit 32	Wh	M_Energy_W_SF	Phase C exported, real energy	1-0:62.8.0*255

40115	40116	2	RO	0x03	M_Imported	Unit 32	Wh	M_Energy_W_SF	Total, imported real energy	1-0:1.8.0*255
40117	40118	2	RO	0x03	M_Imported_A	Unit 32	Wh	M_Energy_W_SF	Phase A imported, real energy	1-0:21.8.0*255
40119	40120	2	RO	0x03	M_Imported_B	Unit 32	Wh	M_Energy_W_SF	Phase B imported, real energy	1-0:41.8.0*255
40121	40122	2	RO	0x03	M_Imported_C	Unit 32	Wh	M_Energy_W_SF	Phase C imported, real energy	1-0:61.8.0*255
40123	40123	1	RO	0x03	M_Energy_W_SF	Unit 16	N/A	N/A	Real energy scaling factor**	0
40124	40125	2	RO	0x03	M_Exported_VA	Unit 32	VAh	M_Energy_VA_SF	Total exported apparent energy	1-0:10.8.0*255
40126	40127	2	RO	0x03	M_Exported_VA_A	Unit 32	VAh	M_Energy_VA_SF	Phase A exported apparent energy	1-0:30.8.0*255
40128	40129	2	RO	0x03	M_Exported_VA_B	Unit 32	VAh	M_Energy_VA_SF	Phase B exported apparent energy	1-0:50.8.0*255
40130	40131	2	RO	0x03	M_Exported_VA_C	Unit 32	VAh	M_Energy_VA_SF	Phase C exported apparent energy	1-0:70.8.0*255
40132	40133	2	RO	0x03	M_Imported_VA	Unit 32	VAh	M_Energy_VA_SF	Total, imported apparent energy	1-0:9.8.0*255
40134	40135	2	RO	0x03	M_Imported_VA_A	Unit 32	VAh	M_Energy_VA_SF	Phase A imported apparent energy	1-0:29.8.0*255
40136	40137	2	RO	0x03	M_Imported_VA_B	Unit 32	VAh	M_Energy_VA_SF	Phase B imported apparent energy	1-0:49.8.0*255
40138	40139	2	RO	0x03	M_Imported_VA_C	Unit 32	VAh	M_Energy_VA_SF	Phase C imported apparent energy	1-0:69.8.0*255
40140	40140	1	RO	0x03	M_Energy_VA_SF	Unit 16	N/A	N/A	Apparent energy scaling factor**	0
40141	40142	2	RO	0x03	M_Import_VARh_Q1	Unit 32	VARh	M_Energy_VAR_SF	Quadrant 1: total, imported reactive energy	0x80000000
40143	40144	2	RO	0x03	M_Import_VARh_Q1A	Unit 32	VARh	M_Energy_VAR_SF	Phase A - quadrant 1: imported reactive energy	0x80000000
40145	40146	2	RO	0x03	M_Import_VARh_Q1B	Unit 32	VARh	M_Energy_VAR_SF	Phase B - quadrant 1: imported reactive energy	0x80000000
40147	40148	2	RO	0x03	M_Import_VARh_Q1C	Unit 32	VARh	M_Energy_VAR_SF	Phase C - quadrant 1: imported reactive energy	0x80000000
40149	40150	2	RO	0x03	M_Import_VARh_Q2	Unit 32	VARh	M_Energy_VAR_SF	Quadrant 2: total, imported reactive energy	0x80000000

40151	40152	2	RO	0x03	M_Import_VARh_Q2A	Unit 32	VARh	M_Energy_VAR_SF	Phase A - quadrant 2: imported reactive energy	0x80000000
40153	40154	2	RO	0x03	M_Import_VARh_Q2B	Unit 32	VARh	M_Energy_VAR_SF	Phase B - quadrant 2: imported reactive energy	0x80000000
40155	40156	2	RO	0x03	M_Import_VARh_Q2C	Unit 32	VARh	M_Energy_VAR_SF	Phase C - quadrant 2: imported reactive energy	0x80000000
40157	40158	2	RO	0x03	M_Export_VARh_Q3	Unit 32	VARh	M_Energy_VAR_SF	Quadrant 3: total, imported reactive energy	0x80000000
40159	40160	2	RO	0x03	M_Export_VARh_Q3A	Unit 32	VARh	M_Energy_VAR_SF	Phase A - quadrant 3: imported reactive energy	0x80000000
40161	40162	2	RO	0x03	M_Export_VARh_Q3B	Unit 32	VARh	M_Energy_VAR_SF	Phase B - quadrant 3: imported reactive energy	0x80000000
40163	40164	2	RO	0x03	M_Export_VARh_Q3C	Unit 32	VARh	M_Energy_VAR_SF	Phase C - quadrant 3: imported reactive energy	0x80000000
40165	40166	2	RO	0x03	M_Export_VARh_Q4	Unit 32	VARh	M_Energy_VAR_SF	Quadrant 4: total, imported reactive energy	0x80000000
40167	40168	2	RO	0x03	M_Export_VARh_Q4A	Unit 32	VARh	M_Energy_VAR_SF	Phase A - quadrant 4: imported reactive energy	0x80000000
40169	40170	2	RO	0x03	M_Export_VARh_Q4B	Unit 32	VARh	M_Energy_VAR_SF	Phase B - quadrant 4: imported reactive energy	0x80000000
40171	40172	2	RO	0x03	M_Export_VARh_Q4C	Unit 32	VARh	M_Energy_VAR_SF	Phase C - quadrant 4: imported reactive energy	0x80000000
40173	40173	1	RO	0x03	M_Energy_VAR_SF	Unit 16	N/A	N/A	Reactive energy scaling factor**	0
40174	40175	2	RO	0x03	M_Events	Unit 32	N/A	N/A	Event flags - indicates that it is valid	0
40176	40176	1	RO	0x03	C_SunSpec_DID	Unit 16	N/A	N/A	SunSpec end model block	0xffff
40177	40177	1	RO	0x03	C_SunSpec_Length	Unit 16	registers	N/A	Length of end model	0

A.4 Sensor registers

Overview

Start address (decimal)	End address (decimal)	Start address (hexadecimal)	End address (hexadecimal)	Size	Description
61440	61479	0xF000	0xF027	40	Sensor 1
61480	61519	0xF028	0xF04F	40	Sensor 2
...	...	...	...	...	...
65240	65279	0xFED8	0xFEFF	40	Sensor 96

Sensor registers

Start address (decimal)	End address (decimal)	Start address (hexadecimal)	End address (hexadecimal)	Size	R/W	Function codes	Type	Units	OBIS code	Description	Source type
61440	61443	0xF000	0xF003	4	RO	0x10	—	—	—	(re-served)	—
61444	61447	0xF004	0xF007	4	RO	0x10	Unit 64	—	0-x:96.1.1*255	Serial number +sensor index	configured
61448	61448	0xF008	0xF008	1	RO	0x03	Unit 16	—	—	Phase (1, 2, 3)	configured
61449	61452	0xF009	0xF00C	4	RO	0x03	Unit 64	1 Wh	1-x:1.8.0*255	Active power +	calculated
61453	61456	0xF00D	0xF010	4	RO	0x03	—	—	—	(re-served)	—
61457	61460	0xF011	0xF014	4	RO	0x03	Unit 64	1 VAh	1-x:9.8.0*255	Appa- rent en- ergy +	cal- culated
61461	61464	0xF015	0xF018	4	RO	0x03	—	—	—	(re-served)	—
61465	61466	0xF019	0xF01A	2	RO	0x03	Unit 32	0.001 W	1-x:1.4.0*255	Active power +	cal- culated
61467	61468	0xF01B	0xF01C	2	RO	0x03	—	—	—	(re-served)	—
61469	61470	0xF01D	0xF01E	2	RO	0x03	Unit 32	0.001 VA	1-x:9.4.0*255	Appa- rent en- ergy +	cal- culated
61471	61472	0xF01F	0xF020	2	RO	0x03	—	—	—	(re-served)	—

A.4 Sensor registers

61473	61474	0xF021	0xF022	2	RO	0x03	Unit 32	0.001 A	1-x:11.4.0*255	Current	Sensor
61475	61476	0xF023	0xF024	2	RO	0x03	Unit 32	0.001 V	1-x:12.4.0*255	Current potential	Internal
61477	61478	0xF025	0xF026	2	RO	0x03	Unit 32	0.001	1-x:13.4.0*255	Power factor	Internal
61479	61479	0xF027	0xF027	1	RO	0x03	—	—	—	(re-served)	—

ESD guidelines

B.1 Electrostatic sensitive devices (ESD)

ESD components are destroyed by voltage and energy far below the limits of human perception. Voltages of this kind occur as soon as a device or an assembly is touched by a person who is not electrostatically discharged. ESD components which have been subject to such voltage are usually not recognized immediately as being defective, because the malfunction does not occur until after a longer period of operation.

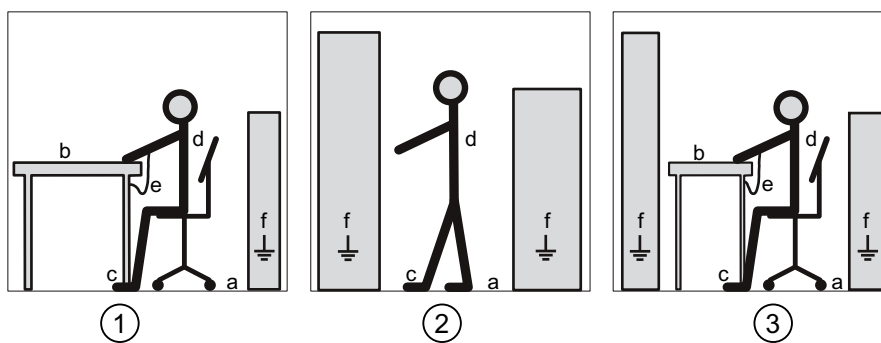
ESD Guidelines

NOTICE
Electrostatic sensitive devices Electronic modules contain components that can be damaged by electrostatic discharge as a result of improper handling. • You must discharge your body electrostatically immediately before touching an electronic module. To do this, touch a conductive, grounded object, e.g., a bare metal part of a switch cabinet or the water pipe. • Always hold the component by the plastic enclosure. • Electronic modules should not be brought into contact with electrically insulating materials such as plastic film, plastic parts, insulating table supports or clothing made of synthetic fibers. • Always place electrostatic sensitive devices on conductive bases. • Always store and transport electronic modules or components in ESD-safe conductive packaging, e.g. metalized plastic or metal containers. Leave the component in its packaging until installation.

NOTICE
Storage and transport If you have to store or transport the component in non-conductive packaging, you must first pack the component in ESD-safe, conductive material, e.g., conductive foam rubber, ESD bag.

The diagrams below illustrate the required ESD protective measures for electrostatic sensitive devices.

B.1 Electrostatic sensitive devices (ESD)



- (1) ESD seat
- (2) ESD standing position
- (3) ESD seat and ESD standing position

Protective measures

- a Conductive floor
- b ESD table
- c ESD footwear
- d ESD smock
- e ESD bracelet
- f Cubicle ground connection

Glossary

Application

Application software or computer program that executes a useful function for the user.

Balancing counter

The balancing counter calculates the total of energy flows of all three phases, and registers this total according to the direction of the energy flow.

CSV file

This file format describes the structure of a text file for saving or exchanging simply structured data. Spreadsheet programs such as Microsoft Excel can read in or export CSV files.

IT system

Separation of all active parts from ground, or connection between a point and ground via an impedance in the distribution system. Direct grounding of the exposed conductive part of the electrical installation, regardless of existing grounding of a point in the supply system.

Modbus

One master and several slaves can be connected using Modbus. There are two versions, one for the serial interface and one for Ethernet. Every bus node must have a unique address. Any node may send messages over the bus. This is usually initiated by the master, and an addressed slave replies

Index

A

Applications, 14, 18

B

Browser application

- Budget settings, 43

- Current values, 30

- Data export, 39

- Device settings, 35

- Energy stopwatch, 33

- Function overview, 28

- Getting started, 29

- Installment, 31

- Network Settings, 38

- Reset, 44

- Sensor settings, 36

- Settings, 35

- Statistics, 29

- System environment, 27

- Tariff settings, 42

Budget

- Settings, 43

C

Connection, 23, 25

Current values, 30

D

Data export

- Settings, 39

Data Manager

- Dimensions, 54

- Introduction, 14

- Overview, 16

Device

- Settings, 35

Diagnostics option

- LEDs, 20

- Network LED, 20

- Sensor LED, 21

- Status LED, 20

Dimensions

- Data Manager, 54

E

EMC, 52

Energy stopwatch, 33

F

Firmware update, 41

I

Installment, 31

Intrinsic consumption, 51

N

Network

- Settings, 38

P

Power supply, 24

Process data, 51

R

Reset

- Settings, 44

S

Sensor

- Overview, 18

- Settings, 36

Sensor bar

- Overview, 17

Settings

- Background information, 35

- Browser application, 35

- Budget, 43

- Data export, 39

- Device, 35

- Network, 38

- Reset, 44
- Sensor, 36
- Start-up, 27
- System environment, 27
- Tariff, 42
- Start-up
 - Settings, 27
- Statistics, 29
- System environment
 - Browser application, 27
 - Settings, 27

T

- Tariff
 - Settings, 42
- Technical specifications, 51
 - Intrinsic consumption, 51
 - Measurement accuracy, 51
 - Mounting, 51
 - Process data, 51
 - RS 485 interface, 53
 - Voltage and current inputs, 51

V

- Voltage and current inputs, 51

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