SENTRON

Multi channel current measuring system
7KT PAC1200

System Manual

siemens.com/lowvoltage

Edition 03/2016
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.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚠️ DANGER</td>
<td>indicates that death or severe personal injury will result if proper precautions are not taken.</td>
</tr>
<tr>
<td>⚠️ WARNING</td>
<td>indicates that death or severe personal injury may result if proper precautions are not taken.</td>
</tr>
<tr>
<td>⚠️ CAUTION</td>
<td>indicates that minor personal injury can result if proper precautions are not taken.</td>
</tr>
<tr>
<td>⚠️ NOTICE</td>
<td>indicates that property damage can result if proper precautions are not taken.</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
</table>
| ⚠️ 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. |

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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 .................................................................................................................................................. 7
  1.1 Introduction ..................................................................................................................................... 7

2 Safety notes ............................................................................................................................................... 9
  2.1 Safety instructions ............................................................................................................................. 9

3 Product description ................................................................................................................................ 13
  3.1 Products of the system ..................................................................................................................... 13
  3.2 Functions .......................................................................................................................................... 15
  3.3 Application area ............................................................................................................................... 20
  3.4 Diagnostics options .......................................................................................................................... 21
  3.5 System environment ......................................................................................................................... 22

4 Connection ............................................................................................................................................ 23
  4.1 Cables .............................................................................................................................................. 24

5 Operator control (software) .................................................................................................................... 25
  5.1 Browser-based web application ........................................................................................................ 25
    5.1.1 System environment .................................................................................................................. 25
    5.1.2 Function overview ..................................................................................................................... 26
    5.1.3 Home page ................................................................................................................................ 27
    5.1.4 Statistics .................................................................................................................................... 28
    5.1.5 Current values ............................................................................................................................ 29
    5.1.6 Installment ................................................................................................................................ 30
    5.1.7 Energy stopwatch ......................................................................................................................... 32
    5.1.8 Settings ...................................................................................................................................... 33
      5.1.8.1 Start ...................................................................................................................................... 33
      5.1.8.2 Device ................................................................................................................................... 34
      5.1.8.3 Sensors .................................................................................................................................. 34
      5.1.8.4 Network Settings .................................................................................................................... 37
      5.1.8.5 Data export ............................................................................................................................. 38
      5.1.8.6 Firmware update ..................................................................................................................... 41
      5.1.8.7 Tariff settings .......................................................................................................................... 41
      5.1.8.8 Budget settings ......................................................................................................................... 42
      5.1.8.9 Reset .................................................................................................................................... 43
    5.2 Application for mobile devices ......................................................................................................... 43
      5.2.1 Getting started ............................................................................................................................ 43
      5.2.2 Home ...................................................................................................................................... 44
      5.2.3 Statistics .................................................................................................................................. 46
      5.2.4 Current values ........................................................................................................................... 49
# Table of contents

6  **Service and maintenance** .................................................................................................................................................. 51  
   6.1  Error messages .............................................................................................................................................................. 51  
   6.2  Disposal ........................................................................................................................................................................... 52  

7  **Technical data** ................................................................................................................................................................. 53  
   7.1  Dimension drawings .......................................................................................................................................................... 56  
   7.1.1  Dimensions of the Data Manager ............................................................................................................................... 56  
   7.1.2  Dimensions of the sensor bar ..................................................................................................................................... 57  
   7.1.3  Dimensions of the sensors on the sensor bar ............................................................................................................... 59  

A  **Appendix** ........................................................................................................................................................................... 61  
   A.1  FAQs .................................................................................................................................................................................. 61  

B  **ESD guidelines** ................................................................................................................................................................. 63  
   B.1  Electrostatic sensitive devices (ESD) ............................................................................................................................ 63  

**Glossary** ................................................................................................................................................................................. 65  

**Index** ................................................................................................................................................................................... 67
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 must only be carried out by persons with the following electrical training/qualifications:

- Training in the installation and 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"
Introduction

1.1 Introduction
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

**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.

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**Note**

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

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**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 counter 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 sensor bar 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: 2010
  Safety requirements for electrical equipment for measurement, control and laboratory use
- EN 61326-1: 2013
  Electrical equipment for measurement, control and laboratory use - EMC requirements
  Information technology equipment - Safety
  Switches for household and similar fixed electrical installations
  Switches for household and similar fixed electrical installations - Part 2-1: Special requirements
  Switches for household and similar fixed electrical installations - Part 1: General requirements
  EMC - Part 3-2: Limit values for harmonic currents
- EN 61000-3-3:2013
  EMC - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems
- EN 301 489-1:2011 V1.9.2
  ERM, EMC - Part 1: Common technical requirements
Safety notes

2.1 Safety instructions
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
- Sensor bar
- Sensors
### 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 measuring transformer for extending the measuring range (e.g. 100 ... 600 A)
- Standard 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 full 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 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 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.

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

Limits

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

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 $P_{[1,2,3]}$ 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* ⑥ Sensor LED ⑱ LAN connection
② Input L3 ⑦ Network LED ⑲ Connector for RS 485 expansions
③ Input L2 ④ Input L1* ⑤ Reset button
⑧ Status LED ⑨ Output L1 ⑩ Output L2 ⑪ Output L3

* 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 ±1 % of the full-scale value, and the accuracy of the voltage measurement of the Data Manager is ±0.5 % of the full-scale value.

The overall accuracy of the Data Manager is ±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.

1. Connections for sensors
2. Bus for RS485 and power supply
3. Status LED
Sensor

1. Securing mechanism for connecting the individual sensors in the sensor bar
2. Cable entry for the power cable
3. Connections for the sensor bar
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

Image 3-1 Application example
3.4 Diagnostics options

Status indication via LEDs of the Data Manager

Status: Indicates readiness

<table>
<thead>
<tr>
<th>Status</th>
<th>Readiness for operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Device switched off</td>
</tr>
<tr>
<td>Orange</td>
<td>Voltage boot active</td>
</tr>
<tr>
<td>Green, slow flashing</td>
<td>Linux is booting</td>
</tr>
<tr>
<td>Green, rapid flashing</td>
<td>Firmware update in progress</td>
</tr>
<tr>
<td>Green, continuous</td>
<td>Device ON</td>
</tr>
</tbody>
</table>

Network: Indicates connection with the supply system / indicates supply system activity

<table>
<thead>
<tr>
<th>Status</th>
<th>Readiness for operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>LAN has no link</td>
</tr>
<tr>
<td>Green on</td>
<td>LAN has link</td>
</tr>
<tr>
<td>Flashing green</td>
<td>Network traffic</td>
</tr>
</tbody>
</table>

Sensor: Indicates sensor readiness

<table>
<thead>
<tr>
<th>Status</th>
<th>Readiness for operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No sensor connected</td>
</tr>
<tr>
<td>Green, continuous</td>
<td>All sensors online and in measuring mode</td>
</tr>
</tbody>
</table>

Status indication via LEDs of the sensor bar

<table>
<thead>
<tr>
<th>Status</th>
<th>Readiness for operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green, continuous</td>
<td>Connected</td>
</tr>
<tr>
<td>Flashing green</td>
<td>Sensors scanned</td>
</tr>
</tbody>
</table>
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 Data Manager is connected by LAN (if necessary via an additional router) to the PC running the Siemens-specific Sentron software.

In communication via LAN, the Data Manager is the Modbus / TCP slave, while the PC with the Sentron software is the Modbus / TCP master. 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 master, and the connected sensor bars are the Modbus slaves.
Connection

TN system

IT system
4.1 Cables

Power supply

The Data Manager is supplied with energy via phase L1, in other words, the phase 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 measuring 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. On the top of the EM is the connection for the RS485 connector.

Connection of additional devices (e.g. printer)

The RS 485 interface of the Data Manager is used for connecting the sensor bar. This is done using the connector. The connector can be seen on the right on the Data Manager.
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 minimum versions of the 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:

<table>
<thead>
<tr>
<th>Settings</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Settings</td>
<td>Settings for the network and the time server</td>
</tr>
<tr>
<td>Data backup</td>
<td>Create or restore data backups</td>
</tr>
<tr>
<td>Firmware update</td>
<td>Perform firmware update</td>
</tr>
<tr>
<td>Reset</td>
<td>Restart system, reset configuration, restore delivery state (Reset)</td>
</tr>
<tr>
<td>Device settings</td>
<td>Set the date and time, password, transformer ratio, language and country</td>
</tr>
<tr>
<td>Sensor settings</td>
<td>Adding, deleting, replacing or grouping sensors</td>
</tr>
<tr>
<td>Modbus settings</td>
<td>Activating or deactivating Modbus</td>
</tr>
</tbody>
</table>
Required settings for commissioning

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

![Image 5-1 Home](image)

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.

![Image 5-2 Statistics](image-url)
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
  - Current
  - Voltage
  - Power factor of the individual phases
- Meter reading

Image 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.

Image 5-4  Installment - Day
5.1 Browser-based web application
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.

Image 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.

![Image 5-7 Settings - Start page](image.png)
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.

![Image 5-8 Device settings](image)

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. The power factor is set individually to increase the accuracy of the calculated active power. 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.
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.
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 Timeserver settings, you can determine whether the Data Manager obtains the time automatically from the network via the server. This is only possible if the Data Manager is connected to the network.

Image 5-11 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
- Time frame: If the period extends back more than one week, representation in increments of 15 minutes is no longer possible.
5.1 Browser-based web application

Image 5-12  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.

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.

5.1.8.7 Tariff settings

Edit tariff

The following values can be processed under Tariff:

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

Image 5-15 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.

5.2 Application for mobile devices

5.2.1 Getting started

As well as the browser-based web application, there is also an application for mobile devices. The application can only be used to monitor and not to configure. The web application must be used for configuration.

Configurations set in the browser-based web application synchronize with the mobile application.

To use the application for mobile devices, it must first be installed on the desired devices. The procedure depends on the device used.

**Android device**

The mobile device must be connected to a PC. The installation file can then be downloaded to the tablet or smartphone and installed.

**iOS device**

Requirements for the iOS device:

- iPhone version 4S or higher
- iPad 2 or higher

"iTunes" software is required for installing the application on an iOS device. The "UDID" of the device can be read out via iTunes.
Start of the application

If the application is started following successful installation, an automatic search is made for available multi-channel current measuring systems.

The found systems are listed on a Start screen.

The system to be monitored can now be selected from this list.

5.2.2 Home

After a multichannel system has been selected, the Home page with the current energy consumption appears.
Further information on available on the Home page:

- Date and time
- Navigation to:
  - Statistics
  - Current values
  - Installment
  - Energy stopwatch
- Closing of the selected multichannel current measuring system: Display returns to the selection of the detected systems.
- "Swipe" to the left / right to change between hourly, daily, weekly, monthly and annual consumption.
5.2 Application for mobile devices

5.2.3 Statistics

The Statistics view offers the following evaluations:

- Overall consumption
- Individual system consumption
- Individual consumption
- Consumption of the individual sensors

Consumption (top right) can be shown in:

- €
- kWh

Possible display intervals:

- Hour
- Day
- Week
- Month
- Year
Overall consumption

Overall consumption is visualized using a bar chart.
Individual system consumption

Individual system consumption is displayed in the form of a pie chart. The sensors selected in the Sensor settings are displayed here in a direct comparison.

Individual consumption

In the case of individual consumption, all selected sensors are represented underneath each other in a horizontal bar chart.

In this way, the individual sensors can be compared at a glance. This in turn means that differences in consumption of the individual sensors can be quickly detected.

All sensors connected to the Data Manager, as well as in the web interface, can, of course, also be looked at individually.

This is represented in the form of a bar chart.
5.2.4 Current values

The current values are represented in real time, exactly as in the browser-based web application.

It is possible to stop the recording here. The latest current (power) values are also shown in the current values.

Image 5-17  Current values - Overall consumption
Another method of accessing the Data Manager via the application is to use the energy stopwatch. This can be started and stopped again.
6.1 Error messages

The Status LED does not light up
   Problem: The Data Manager is not supplied with power.
   Solution: 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.
   Problem: There is a fault.
   Solution: Restart Data Manager.
   Solution: Contact Service.

The network LED does not light up, or the Data Manager is not found in the network.
   Problem: The network cable is not correctly connected to the network connection.
   Solution: Ensure that the network cable is correctly connected to the network connection.

   Problem: The Data Manager is not located in the same local network.
   Solution: Connect the Data Manager with the same router / switch, or change the IP address
               in the PC.

The Energy Manager supplies unrealistic measured values.
   Problem: The Data Manager has been installed incorrectly.
   Solution: Check connection of L1 to L3 again.
The user interface cannot be accessed via http://siemens-dm-testraum.local/.

The domain name is unable to be resolved.
The resolution of the host name requires at least one DNS service on the network.

Call up the user interface using the current IP address of the Data Manager. To do so, call up the user interface of the router, and read the IP address of the Data Manager (see router instructions).


Contact the Network Administrator.

6.2 Disposal

The Data Manager must be disposed of in accordance with the locally applicable regulations for the disposal of electronic waste.
Technical data

Process data
- ARM9 processor with 450 MHz
- DDR2 RAM with 128 MB
- eMMC Flash 4GB

Operating system
- Embedded Linux with integrated TCP/IP stack

Interfaces (standard)
- LAN (10 / 100 Mbits)
- RS 485 (half-duplex, max. 115200 bit/s) for data transmission via Modbus RTU

Voltage and current inputs

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>230 / 400 V AC</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>230 V ± 10 %</td>
</tr>
<tr>
<td>Frequency</td>
<td>50 Hz ± 5 %, 110 V 60 Hz on request</td>
</tr>
</tbody>
</table>

Intrinsic consumption

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage circuit</td>
<td>&lt; 0.01 VA per phase</td>
</tr>
<tr>
<td>Current circuit</td>
<td>&lt; 2 VA per phase</td>
</tr>
<tr>
<td>Overall device</td>
<td>&lt; 5 W without activated WLAN</td>
</tr>
<tr>
<td>Rated current</td>
<td>5 A</td>
</tr>
<tr>
<td>Current limit</td>
<td>63 A</td>
</tr>
<tr>
<td>Starting current</td>
<td>&lt; 25 mA</td>
</tr>
</tbody>
</table>

Mounting

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductor cross-section</td>
<td>10 ... 25 mm² (mechanically from 1.5 ... 25 mm²)</td>
</tr>
<tr>
<td>Torque for screw terminals</td>
<td>2.0 Nm</td>
</tr>
</tbody>
</table>
**Measuring accuracy**

Accuracy class in accordance with IEC 61557-12, relative to the measured value of the Data Manager

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>± 0.5 %</td>
</tr>
<tr>
<td>Current</td>
<td>± 0.5 %</td>
</tr>
<tr>
<td>Active power</td>
<td>± 1.0 %</td>
</tr>
<tr>
<td>Apparent power</td>
<td>± 1.0 %</td>
</tr>
<tr>
<td>Reactive power</td>
<td>± 1.0 %</td>
</tr>
<tr>
<td>Power factor (p.f.)</td>
<td>± 1.0 %</td>
</tr>
</tbody>
</table>

Related to IEC IEC 62053-22 or -23 (typically)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active energy</td>
<td>Class 1</td>
</tr>
<tr>
<td>Reactive energy</td>
<td>Class 1</td>
</tr>
</tbody>
</table>

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

**EMC**

**ESD (IEC 61000-4-2)**
- 4 kV contact discharge
- 8 kV air discharge

**RF irradiation**
- 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 55022)**
- 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

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Modbus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>RS485 half-duplex</td>
</tr>
<tr>
<td>Data transmission rate</td>
<td>19200 or 115200 kbits</td>
</tr>
<tr>
<td>Connectors</td>
<td>4-pin male connector 2.54 mm, enclosure</td>
</tr>
<tr>
<td>Proprietary</td>
<td></td>
</tr>
<tr>
<td>RS 485 driver</td>
<td>Slew-rate limited, CS-Sensor MAX13412</td>
</tr>
<tr>
<td>Electrical isolation</td>
<td>No</td>
</tr>
<tr>
<td>Power supplies for sensors</td>
<td>Yes (280 mA)</td>
</tr>
<tr>
<td>Voltage (min, max, typ.)</td>
<td>min. 8 V, max. 10 V, typ. 9 V</td>
</tr>
<tr>
<td>Short-circuit protection of power supply</td>
<td>Yes</td>
</tr>
<tr>
<td>Position of connectors</td>
<td>Top right, behind the control cabinet masking frame</td>
</tr>
</tbody>
</table>

Connector assignments

<table>
<thead>
<tr>
<th>Pin direct</th>
<th>Pin indirect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>Supply voltage 9 V</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>RS485-B</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>RS485-A</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Ground</td>
</tr>
</tbody>
</table>
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 Dimension drawings

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
7.1 Dimension drawings
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

If the sensor bar is removed for replacement and then re-installed, how long does it take until the system continues as usual?
Differs according to system configuration.

In which languages can the system be configured?
The languages English and German are currently provided. Other languages are possible following verification.

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.
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**

<table>
<thead>
<tr>
<th><strong>CAUTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrostatic sensitive devices</strong></td>
</tr>
<tr>
<td>Electronic modules contain components that can be destroyed by electrostatic discharge. These modules can be easily destroyed or damaged by improper handling.</td>
</tr>
<tr>
<td>• You must discharge your body electrostatically immediately before touching an electronic component. To do this, touch a conductive, grounded object, e.g., a bare metal part of a switch cabinet or the water pipe.</td>
</tr>
<tr>
<td>• Always hold the component by the plastic enclosure.</td>
</tr>
<tr>
<td>• 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.</td>
</tr>
<tr>
<td>• Always place electrostatic sensitive devices on conductive bases.</td>
</tr>
<tr>
<td>• Always store and transport electronic modules or components in ESD-safe conductive packaging, e.g. metallized plastic or metal containers. Leave the component in its packaging until installation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>NOTICE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Storage and transport</strong></td>
</tr>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

The diagrams below illustrate the required ESD protective measures for electrostatic sensitive devices.
B.1 Electrostatic sensitive devices (ESD)

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

(1) ESD seat
(2) ESD standing position
(3) ESD seat and ESD standing position
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
Additional devices
Connection, 24
Android device
Requirements, 43
Application
Current values, 49
Individual system consumption, 48
Introduction, 43, 44
Overall consumption, 47
Start, 44
Statistics, 46
Applications, 14, 20

B
Browser application
Budget settings, 42
Current values, 29
Data export, 38
Device settings, 34
Energy stopwatch, 32
Function overview, 26
Getting started, 27
Installment, 30
Network Settings, 37
Reset, 43
Sensor settings, 35
Settings, 33
Statistics, 28
System environment, 25
Tariff settings, 41
Budget
Settings, 42

C
Conductive floor, 64
Connection, 23, 24
  Additional devices, 24
Cubicle ground connection, 64
Current values, 29
  Application, 49

D
Data export
  Settings, 38
Data Manager
  Dimensions, 56
  Introduction, 15
  Overview, 16
Device
  Settings, 34
Diagnostics option
  LEDs, 21
  Network LED, 21
  Sensor LED, 21
  Status LED, 21
Dimensions
  Data Manager, 56
  Sensor bar, 57
Discharge, 63
Disposal, 52

E
Electrostatic sensitive devices, 63
EMC, 54
Energy stopwatch, 32
Error messages, 51
  LED, 51
ESD bracelet, 64
ESD footwear, 64
ESD guidelines, 63
ESD protective measures, 63
ESD seat, 64
ESD smock, 64
ESD standing position, 64
ESD table, 64

F
Firmware update, 41

I
Individual system consumption
  Application, 48
Index

Installment, 30
Interfaces, 53
Intrinsic consumption, 53
Introduction
  Application, 43
iOS device
  Requirements, 43

L
Limits, 15

N
Network
  Settings, 37

O
Operating system, 53
Overall consumption
  Application, 47

P
Power supply, 24
Process data, 53

R
Requirements
  Android device, 43
  iOS device, 43
Reset
  Settings, 43

S
Sensor
  Overview, 19
  Settings, 35
Sensor bar
  Dimensions, 57
  Overview, 18
Settings
  Background information, 33
  Browser application, 33
  Budget, 42
  Data export, 38
  Device, 34
  Network, 37
  Reset, 43
  Sensor, 35
  Start-up, 26
  System environment, 25
  Tariff, 41
Start-up
  Settings, 26
Statistics, 28
  Application, 46
Storage, 63
System environment, 22
  Browser application, 25
  Settings, 25

T
Tariff
  Settings, 41
Technical specifications, 53
  Interfaces, 53
  Intrinsic consumption, 53
  Measuring accuracy, 54
  Mounting, 53
  Operating system, 53
  Process data, 53
  RS 485 interface, 55
  Voltage and current inputs, 53
Transport, 63

V
Voltage and current inputs, 53
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Always at your disposal: our extensive support
www.siemens.com/lowvoltage/support