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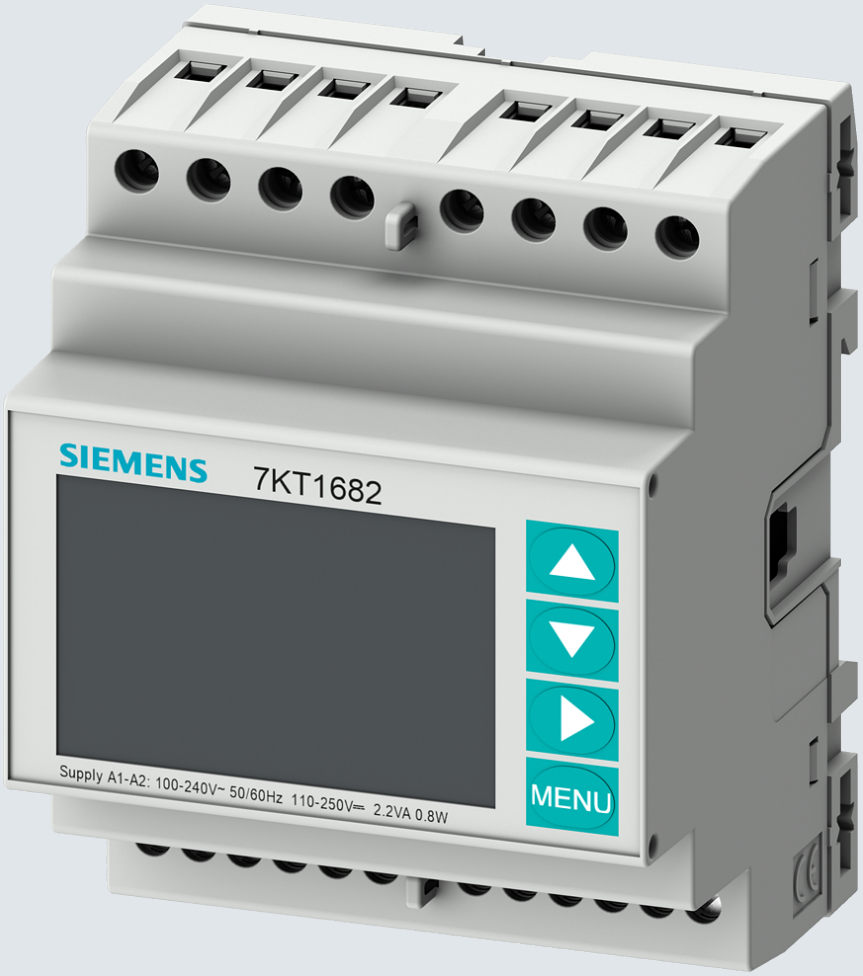

Manual

SENTRON

Measuring Devices

Multimeter 7KT PAC1600

Edition 08/2018

siemens.de/powermonitoring

SIEMENS

SENTRON

Measuring devices 7KT multimeter

Manual

08/2018

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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

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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.

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Table of contents

Introduction

1

1.1 Components of the product

The package includes:

- Operating instructions
- 7KT PAC1600 multimeter

Available accessories

- Software powerconfig (https://support.industry.siemens.com/cs/ww/en/view/63452759)
- Software powermanager (https://support.industry.siemens.com/cs/ww/en/view/109746290)

1.2 Latest information

Up-to-the-minute information

You can find further support on the Internet at: (http://www.siemens.com/lowvoltage/technical-assistance)

1.3 Advanced training courses

Find out about training courses on offer on the following link.

Training for Industry (https://www.siemens.de/sitrain-lowvoltage)

This is where you can choose from

- Web-based training courses (online, informative, free)
- Classroom training courses (course attendance, comprehensive, subject to fee).

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This product, solution or service ("Product") contains third-party software components listed in this document. These components are Open Source Software licensed under a license approved by the Open Source Initiative (www.opensource.org (http://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
Energy Management
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Technical Support
Postfach 10 09 53
93009 Regensburg
Germany

www.siemens.com/lowvoltage/support-request
(https://support.industry.siemens.com/cs/us/en/ps)

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

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1.5 Qualified personnel

Some of the following tasks are carried out when hazardous voltage is present. For this reason, they must only be carried out by qualified personnel who are familiar with the safety regulations and precautions and who follow the safety regulations and precautions.

- Wear the prescribed protective clothing.
- Observe the general equipment regulations and safety regulations for working with high-voltage installations (e.g. DIN VDE, NFPA 70E), as well as national or international regulations.
- Ensure that the limits given in the technical data are not exceeded, not even during commissioning or testing.
- Short circuit the secondary connections of intermediate current transformers at the transformers before interrupting the current lines to the device.
- Test the polarity and the phase assignment of the instrument transformers.
- Before connecting the device, ensure that the system voltage matches the voltage specified on the type plate.
- Before commissioning, ensure that all connections have been made correctly.
- Before power is applied to the device for the first time, you must place it in the operating room for a period of at least two hours. This allows it to reach temperature balance and avoids humidity and condensation.

Safety instructions

2

2.1 Safety instructions

⚠ DANGER

Risk of death due to electric shock and arc flashover!

For the 5 A device, it is only possible to measure the current via external current transformers. When using the current transformers, the circuit is not protected by a fuse.

- Switch off and lock out all power supplying this equipment before working on the device.
- Never open the secondary circuit of the current transformers under load.
- Short-circuit the secondary current terminals of the current transformer before removing this device.
- Always follow the safety instructions for the current transformers used.

⚠ DANGER

Risk of death due to hazardous voltage!

Before starting work, disconnect the system and the device from the power supply.

⚠ WARNING

Possible risk of death due to damaged device!

Using devices when they are damaged may result in death, serious injury, or property damage.

- Do not install damaged devices.
- Do not start up damaged devices.

NOTICE

Equipment damage due to lack of fusing

Non-fused voltage measuring inputs may lead to device and equipment damage.

Always protect the device with an IEC approved fuse or with an IEC approved miniature circuit breaker.

NOTICE
Device damage due to condensation Humidity may cause condensation on the device if temperature balance has not been reached. Condensation may damage the device when it is connected to the power supply. Do not connect the device to the power supply until temperature balance has been reached. To achieve temperature balance, place the device in the operating room for a period of at least two hours.

Note

RS 485 termination recommended

In order to avoid reflection on the bus cable, we recommend fitting a 120 Ω terminating resistor at the beginning and end of the bus cable.

To establish Modbus RTU communication, the communication parameters must be known. These include baud rate and format. Furthermore, you must have entered the slave address in the device.

Note

Risk of manipulation!

In order to reduce the risk of manipulation occurring on the device, it is recommended that the protective mechanisms available in the device are activated.

Default passwords for the protective mechanisms:

- Use 1000 for user rights without write access.
- Use 2000 for extended rights with write access.

Use a lead seal on the cover for security.

Safety-related symbols on the device

Symbol	Meaning
	Risk of electric shock
	Electrical installation demands technical competence

2.2 Security information

Siemens provides products and solutions with industrial security 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 security concept. Siemens' products and solutions only form 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 security measures that may be implemented, please visit internet (http://www.siemens.com/industrialsecurity)

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 Security RSS Feed (http://www.siemens.com/industrialsecurity).

Description

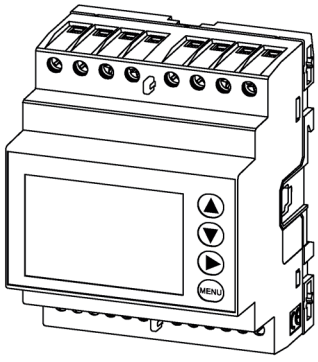
3

3.1 Performance features

The 7KT1681 and 7KT1682 multimeters are designed such that they combine maximum operating comfort with a wide range of advanced functions, and this despite the extremely restricted dimensions of the modular enclosure (only 4U).

The backlit LCD offers intuitive operation of the clearly laid out user interface.

The 7KT1682 additionally features an insulated RS 485 communications interface with Modbus protocol support.

Multimeter		Description
	7KT1681	Universal meter without S0 interface
	7KT1682	Universal meter with Modbus RTU

Measurement

The 7KT1681 and 7KT1682 multimeters measure all the relevant electrical variables in an AC system.

Interfaces

Optional interfaces depending on device version:

- RS 485 interface
- Digital input
- Digital output

Memory

Adjusted device parameters are permanently stored in the device memory.

3.2 Measuring inputs

3.2.1 Current measurement

NOTICE
Device damage due to DC current
The device is not suitable for measuring DC current.
Only measure AC current with the device.

Design of the device

The devices are designed for a rated current of 1 A or 5 A for connecting standard current transformers.

Ampacity of current measuring inputs

The current measuring inputs can be continuously loaded as follows:

- With 1.2 A at a rated current of 1 A
- With 6 A at a rated current of 5 A

3.2.2 Voltage measurement

NOTICE
Device damage due to DC current
The device is not suitable for measuring DC current.
Only measure AC current with the device.

Design of the device

The device is designed for:

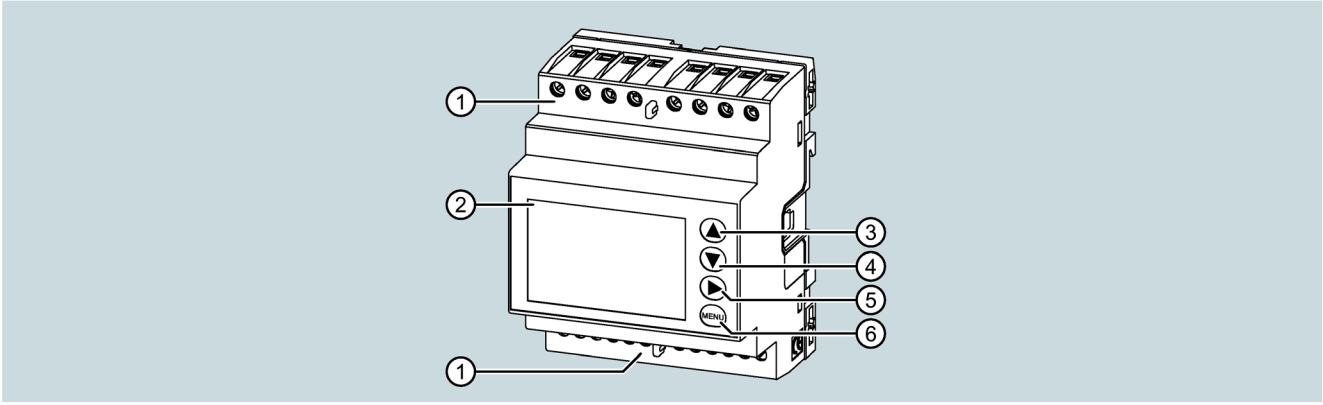
- Direct measurement on the grid
- Nominal voltage 364 V/600 V

Measuring input voltages

The device is designed for the following measuring input voltages:

- For measuring input voltages up to 415 V phase-to-neutral
- For measuring input voltages up to 720 V phase-to-phase

3.3 7KT PAC1600 multimeter



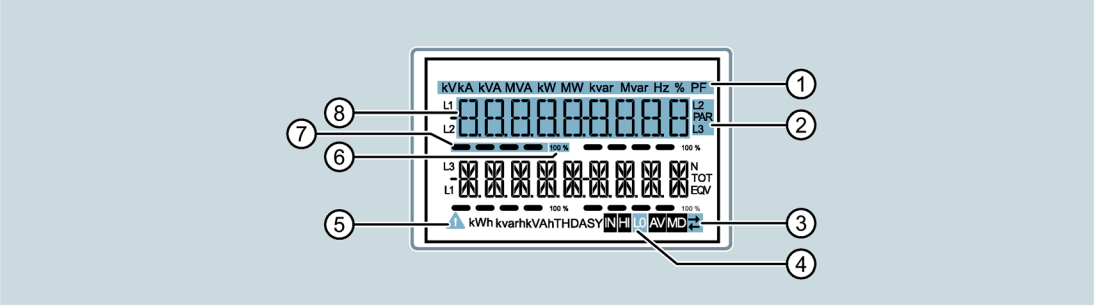
①	Sealing cover	
②	Display	
③	Arrow key for scrolling, selecting and changing	
④	Arrow key for scrolling, selecting and changing	You will find information on operation in chapter Keypad functions (Page 16) ff.
⑤	Arrow key for scrolling, confirming and switching over	
⑥	Menu key	

Basic properties

- Three-phase digital multimeter
- 4U modular enclosure (72 mm) for DIN rail
- Backlit LCD
- 2 versions:
  - 7KT1681: Standard version
  - 7KT1682: With built-in RS 485 interface
- 4 navigation keys for functions and settings
- Extremely accurate measurement of demand (TRMS)
- Wide selection of available measurements, including voltage, current, THD and harmonics analysis

- Wide-range auxiliary power supply unit (100 V AC … 240 V AC)
- Two-level password protection for settings
- Backup copy of original settings
- Texts available in six languages

Display indications



① Measured variable display
② Selected phase
③ Subpage: Measurement type
④ Communication active
⑤ Alarm icon
⑥ End-of-scale value
⑦ Bar diagram
⑧ Unit of measured variables

3.3.1 Keypad functions

Menu key

The Menu key is used for opening and closing the display and setup menus.

Arrow keys ▲, ▼ and ▶

Arrow keys ▲ and ▼ are used for

- Scrolling between screens
- Selecting available options on the display
- Changing (increasing/decreasing) settings

The arrow key ▶ is used for

- Scrolling to subpages
- Confirming selected options
- Switching between display modes

Access the main menu

1. Press the Menu key.

The main menu is displayed with the available options:

- **SET**: Access the setup menu
- **CMD**: Access the command menu
- **PAS**: Password entry

The selected option flashes.

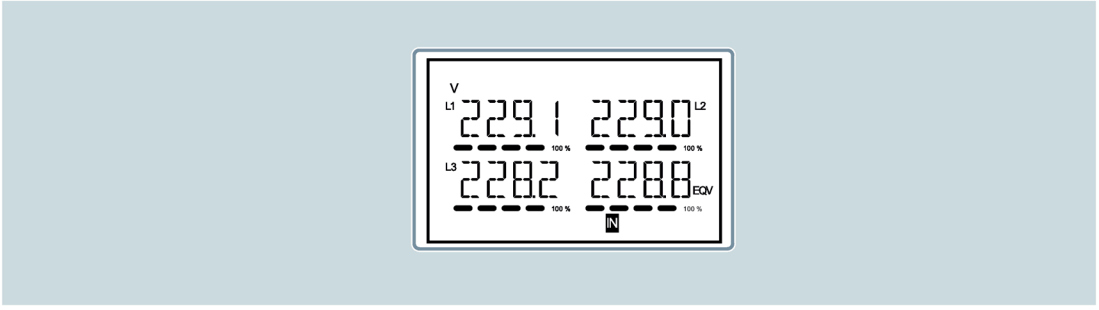
The text for the selection scrolls in the alphanumeric display.

Set password

If the password needs to be set, the menu opens with the **PAS** option already selected.

1. Press ▲ or ▼ to select an option.
2. Confirm with ▶.
3. Press the Menu key to return to the measurement display.

3.3.2 Selection of measured values



Use the keys ▲ and ▼ to scroll through the measurement display pages. The current page is indicated by the unit in the upper left section of the display.

Some measurements may not be displayed on the device depending on programming and the connection. If you have programmed for a system without a neutral conductor, for example, the measurements for the neutral conductor will not be displayed.

The ▶ key permits access to subpages on every page (e.g. to display the maximum and minimum values for the selected measurement). The currently displayed subpage is displayed on the bottom right by one of the following symbols:

- **IN**: Instantaneous value
  Current instantaneous value of measurement, which is displayed as a default on every change of page.
- **HI**: Highest peak
  Highest value measured by the energy meter for the selected measurement Peak values are also stored and retained when the power supply is switched off. A special command exists for resetting the stored peak values. You can find more information on this in chapter Command menu (Page 36).
- **LO**: Lowest value
  Measured by the energy meter from the time when voltage was present. You can reset this value with the same command that is used for HI values. You can find more information on this in chapter Command menu (Page 36).
- **AV**: Average value
  Time-integrated (average) value of measurement. You can find more information on parameter "M04 Integration" in chapter Parameter tables (Page 28).
- **MD**: Max. demand values
  This is stored in non-volatile memory and can be reset using a special command.

Programming functions

- You can select the page and the subpage to which the display automatically returns after a defined time without having to press a key.
- You can program the multimeter such that the display always shows the most recently selected page.
- You can find information on setting up these functions under parameter P02 Utility in chapter Parameter setting (setup) from the front panel (Page 23).

3.3.3 Display

Note

The **lines printed in bold** in the table may not be displayed if the function or parameter which controls them is not activated.

Example:

If no alarm is programmed, the corresponding page is not visible.

Pages and subpages are selected with the following keys:

- Select pages with ▲ / ▼
- Select subpages with ▶

No.	Pages	Subpages
1	Active energy, active power	–
2	Active energy meter import kWh+(SYS) PAR kWh+(SYS) TOT	• SYS • TAR-1 • TAR-2
3	**Active energy meter export** **kWh-(SYS) PAR** **kWh-(SYS) TOT**	• **SYS** • **TAR-1** • **TAR-2**
4	Reactive energy meter import kvarh+(SYS) PAR kvarh+(SYS) TOT	• SYS • TAR-1 • TAR-2
5	**Reactive energy meter export** **kvarh-(SYS) PAR** **kvarh-(SYS) TOT**	• **SYS** • **TAR-1** • **TAR-2**
6	Apparent energy meter kVAh(SYS) PAR kVAh(SYS) TOT	• SYS • TAR-1 • TAR-2
7	**Energy meter (L1)** **kWh+(L1) PAR** **kWh+(L1) TOT**	• **SYS** • **TAR-1** • **TAR-2**
8	**Energy meter (L2)** **kWh+(L2) PAR** **kWh+(L2) TOT**	• **SYS** • **TAR-1** • **TAR-2**
9	**Energy meter (L3)** **kWh+(L3) PAR** **kWh+(L3) TOT**	• **SYS** • **TAR-1** • **TAR-2**
10	**Energy meter (L1)** **kWh-(L1) PAR** **kWh-(L1) TOT**	• **SYS** • **TAR-1** • **TAR-2**
11	**Energy meter (L2)** **kWh-(L2) PAR** **kWh-(L2) TOT**	• **SYS** • **TAR-1** • **TAR-2**
12	**Energy meter (L3)** **kWh-(L3) PAR** **kWh-(L3) TOT**	• **SYS** • **TAR-1** • **TAR-2**
13	**Energy meter (L1)** **kvarh+(L1) PAR** **kvarh+(L1) TOT**	• **SYS** • **TAR-1** • **TAR-2**

No.	Pages	Subpages
14	Energy meter (L2) kvarh+(L2) PAR kvarh+(L2) TOT	• SYS • TAR-1 • TAR-2
15	Energy meter (L3) kvarh+(L3) PAR kvarh+(L3) TOT	• SYS • TAR-1 • TAR-2
16	Energy meter (L1) kvarh-(L1) PAR kvarh-(L1) TOT	• SYS • TAR-1 • TAR-2
17	Energy meter (L2) kvarh-(L2) PAR kvarh-(L2) TOT	• SYS • TAR-1 • TAR-2
18	Energy meter (L3) kvarh-(L3) PAR kvarh-(L3) TOT	• SYS • TAR-1 • TAR-2
19	Energy meter (L1) kVAh(L1) PAR kVAh(L1) TOT	• SYS • TAR-1 • TAR-2
20	Energy meter (L2) kVAh(L2) PAR kVAh(L2) TOT	• SYS • TAR-1 • TAR-2
21	Energy meter (L3) kVAh(L3) PAR kVAh(L3) TOT	• SYS • TAR-1 • TAR-2
22	Voltage L - L V(L1-L2), V(L2-L3), V(L3-L1), V(LL)demand	• HI • LO • AV
23	Voltage L - N V(L1-N), V(L2-N), V(L3-N), V(L-N)demand	• HI • LO • AV
24	Current I(L1), I(L2), I(L3), I(N)	• HI • LO • AV • MD
25	Active power P(L1), P(L2), P(L3), P(TOT)	• HI • LO • AV • MD

No.	Pages	Subpages
26	Reactive power Q(L1), Q(L2), Q(L3), Q(TOT)	• HI • LO • AV • MD
27	Apparent power S(L1), S(L2), S(L3), S(TOT)	• HI • LO • AV • MD
28	Power factor PF(L1), PF(L2), PF(L3), PF(demand)	• HI • LO • AV
29	**Active power unbalance** **L1-L2, L2-L3, L3-L1**	• **HI** • **LO** • **AV**
30	Frequency Hz	• HI • LO • AV
31	**Voltage unbalance L - L** **ASY(VLL)**	• **HI** • **LO** • **AV**
32	**Voltage unbalance L - N** **ASY(VLN)**	• **HI** • **LO** • **AV**
33	**Current unbalance** **ASY(I)**	• **HI** • **LO** • **AV**
34	**Voltage THD L - L** **THD-V(L1-L2), THD-V(L2-L3), THD-V(L3-L1)**	• **HI** • **LO** • **AV**
35	**Voltage THD L - N** **THD-V(L1), THD-V(L2), THD-V(L3)**	• **HI** • **LO** • **AV**
36	**Current THD** **THD-I(L1), THD-I(L2) THD-I(L3)**	• **HI** • **LO** • **AV**

No.	Pages	Subpages
37	**Hour counter** **hhhhhh-mm-ss**	• **TOT** • **PAR-1** • **PAR-2** • **PAR-3** • **PAR-4**
38	**Limit threshold** **LIM1–LIM2–LIM3–LIM4**	–
39	**Alarms** **ALA1–ALA2–ALA3–ALA4**	–
40	**Tariff selection** **(tAr-1 and tAr-2)**	–
41	Device information MODEL, REV SW, SER. No.	–

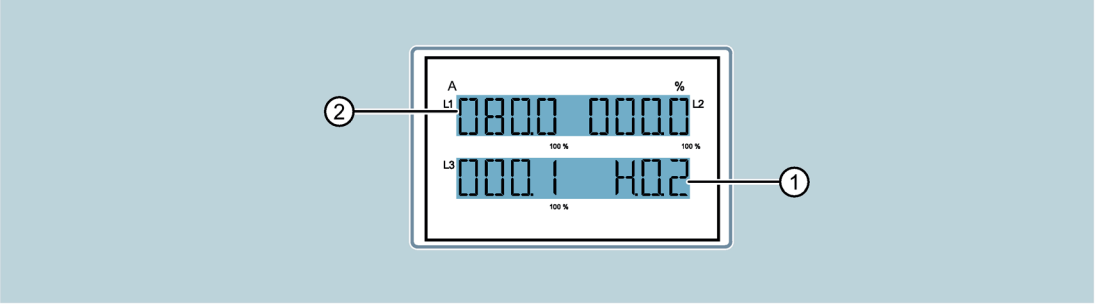
3.3.4 Harmonic displays

The 7KT1681 and the 7KT1682 provide phase analysis up to the 15th harmonic for the following measured variables:

- Phase-to-phase voltages
- Phase-to-neutral voltages
- Currents

To activate the harmonic analysis, set parameter P02.12 = THD/HAR.

With P02.12 = THD, the device only shows the THD of the above measurements.



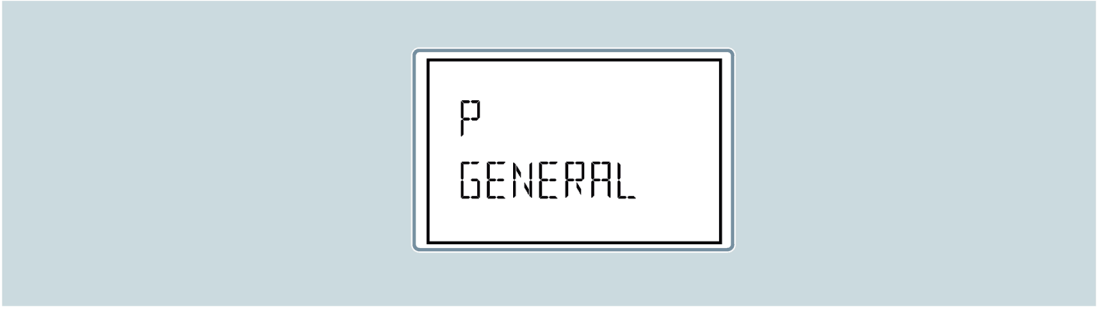
① Harmonic
② Harmonic current percentage

3.4 Parameterization

3.4.1 Parameter setting (setup) from the front panel

1. Press the Menu key in the standard measurement display to call the main menu.
2. Select **SET** and press ▶ to call the Settings menu.

   The display shows the first menu level **P01** on the top left with selection **01** flashing.



3. Use the keys ▲ or ▼ to select the required menu (e.g. P01, P02, P03).

   During the selection, the alphanumeric display shows a brief description of the currently selected menu.

Code	Menu	Description
P01	GENERAL	Specification of the system
P02	OTHER	Language, brightness, display, etc.
P03	PASSWORD	Password activation
P04	INTEGRATION	Integration times
P05	HOUR COUNTER	Hour counter settings
P07	COMMUNICATION	Communication settings
P08	LIMIT THRESHOLDS	Limit values
P09	ALARMS	Alarm messages

4. Press ▶ to access the selected menu.

5. Select the submenu and the serial parameter number as appropriate.

   Use the keys as follows:

   – ⓜ: Back
   – ▼: Decrease
   – ▲: Increase
   – ▶: Next

6. After setting the required parameter number, use the ▶ key to switch to edit mode. The parameter appears in the alphanumeric display.

   Use the keys as follows:

   – Press ▲ or ▼: To change the parameter within the permissible range.
   – Press ▼ and ▶ simultaneously: To set the minimum possible value.
   – Press ▲ and ▶ simultaneously: To set the maximum possible value.
   – Press ▲ and ▼ simultaneously: To restore the factory default value.

   The required value is selected.

7. Press ⓜ to save the parameter.

   The display returns to the previous menu level (parameter selection).

8. Press ⓜ repeatedly to leave and save the parameters.

Note

Alternatively, you can hold down ⓜ for 3 seconds during programming to save the changes and exit parameter settings directly.

The device is rebooted.

Note

If you do not press any key for a period of 2 minutes, the system exits the setup menu and returns to the standard display without saving the parameters.

Note

The devices allow you to create a backup copy of the data which can be edited using the keys in EEPROM. You can write this data back into RAM if required.

You can find more information on backing up and restoring this data in chapter Command menu (Page 36).

3.4.2 Energy measurements

There are 3 special pages for energy meters:

- Active energy
- Reactive energy
- Apparent energy

Each page shows the total value and the partial value. You can find information about resetting in chapter Command menu (Page 36).

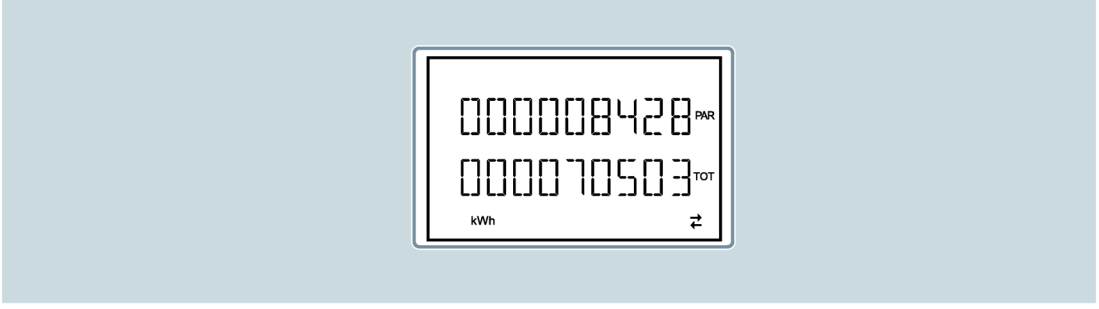
Continuous display of measurement

If the unit is displayed continuously, this means that the measuring device is set for imported (positive) energy.

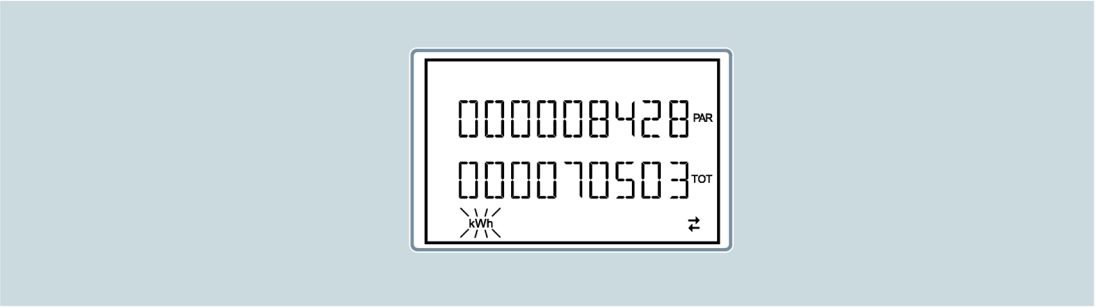
To activate the display for exported (negative) energies, set parameter P02.09 to ON.

These energies are highlighted by flashing of the unit and by a negative sign.

Imported active energy



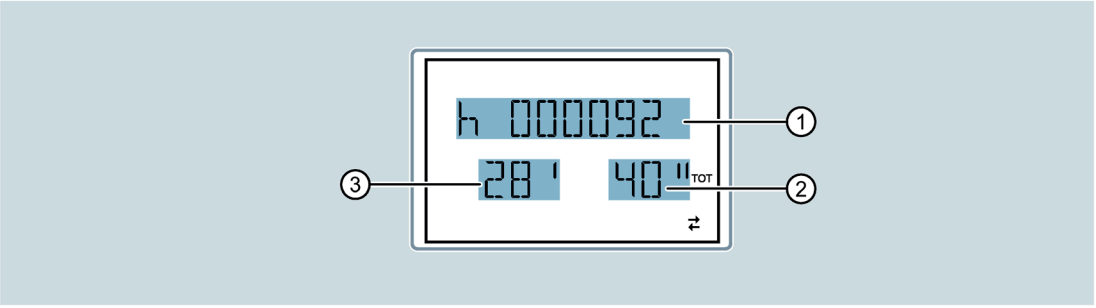
Exported active energy



If the display of energy for the individual phases is activated (P02.10 = ON), the display shows three independent additional pages (1 page per phase), including total and partial energy.

3.4.3 Hour counter

When the hour counter is activated, the multimeter displays the hour counter page in the following format:

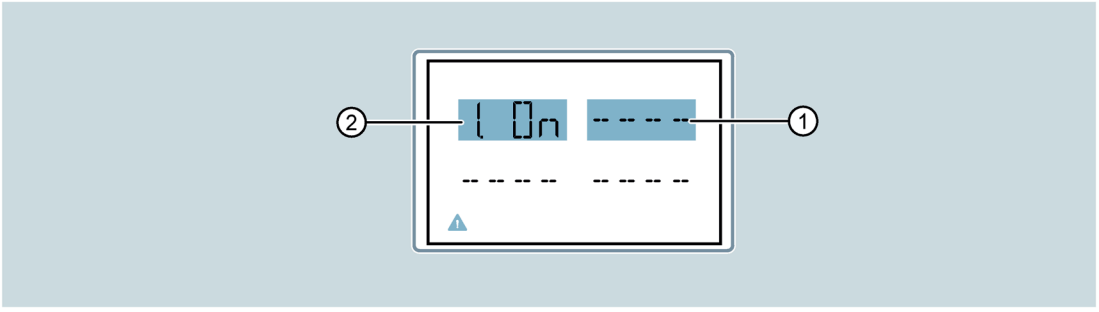


① Hours
② Seconds
③ Minutes

You can find more information on menu P05 Hour counter in chapter Parameter tables (Page 28).

3.4.4 Limit threshold status display

If limit thresholds are activated, the device displays the page with the corresponding status and the following format:



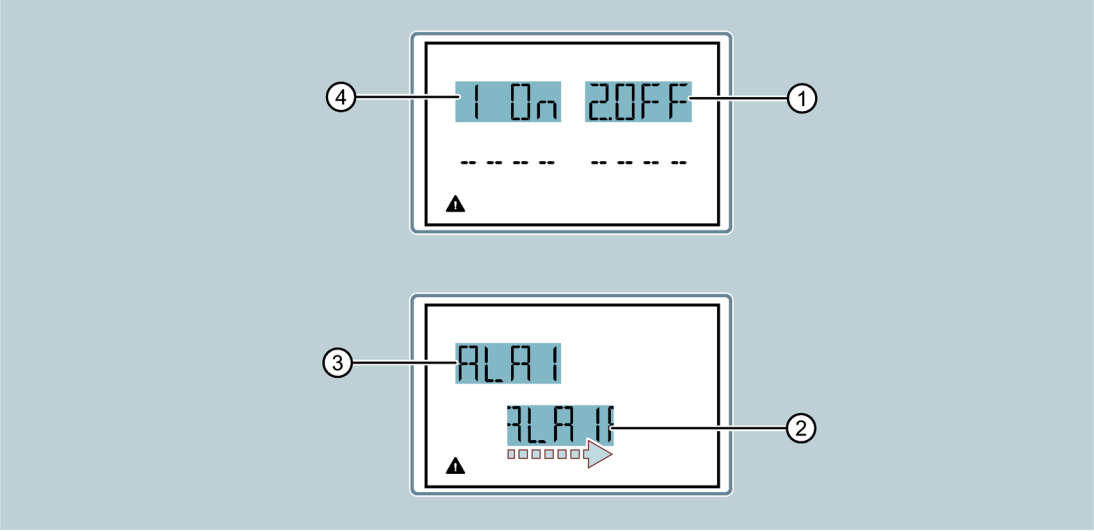
① Limit thresholds deactivated
④ Limit thresholds activated

- If the limit threshold is activated, **ON** flashes.
- If the function is deactivated, **OFF** is displayed continuously.
- If you have not programmed a limit threshold, dashes appear on the display.

You can find more information on menu P08 Limit thresholds in chapter Parameter tables (Page 28).

3.4.5 Alarm display

If alarms are activated, the multimeter displays the page with the corresponding status and the following format:



① Alarm deactivated
② Alarm text activated
③ Alarm code activated
④ Alarm activated

- If the alarm is activated, **ON** flashes with the triangle symbol.
- If the alarm is deactivated, **OFF** is displayed continuously.
- If no alarm is programmed, dashes are displayed. After approx. 3 s, the scrolling text for the alarm programmed in parameter P09.n.05 appears.
- If several alarms are active, the alarm text changes on the display.
- You can use parameter P02.14 for the Utility menu to make the backlighting of the display flash in the event of an alarm. This makes it more obvious that a fault has occurred.
- Depending on the settings of parameter P09.n.03, alarms are either reset automatically when the alarm conditions are no longer fulfilled or they need to be reset by you manually via the command menu (C.07).

You can find more information on parameters P09 in chapter Parameter setting (setup) from the front panel (Page 23).

You can find more information on parameters P09 and C.07 in chapter Command menu (Page 36).

3.4.6 Parameter tables

The tables show all the available programming parameters with the possible setting range, the factory setting and a description of the parameter function.

The description of the parameters visible on the display can deviate from the details in the table in some cases due to the restricted number of available characters. The parameter code is the most reliable means of reference.

M01 General

		Unit	Default	Range
P01.01	Primary current of the current transformer	A	5	1 … 10000
P01.02	Secondary current of the current transformer	A	5	1 … 5
P01.03	Nominal voltage	V	400	50 … 500000
P01.04	Rated power	–	OFF	• OFF • ON
P01.05	Nominal voltage of primary winding of voltage transformer	V	100	50 … 500000
P01.06	Nominal voltage of secondary winding of voltage transformer	V	100	50 … 500
P01.07	Wiring configuration	–	L1-L2-L3-N	• L1-L2-L3-N • L1-L2-L3 • L1-L2-L3-N BIL • L1-L2-L3 BIL • L1-N-L2 • L1-N

P01.04
- ON: Voltage transformers are used.
- OFF: The next two parameters will be ignored.

P01.07 Set in accordance with the selected connection diagram.

M02 Utility

		Unit	Default	Range
P02.01	Language	–	English	• English • Italiano • Francais • Espanol • Portuguese • Deutsch
P02.02	High backlight level	%	100	0 … 100
P02.03	Low backlight level		30	0 … 50
P02.04	Low backlight delay	s		5 … 600
P02.05	Default page return		60	• OFF • 10 … 600
P02.06	Default page	–	VL-L	• VL-L • VL-N • …
P02.07	Default subpage		INST	• INST • HI • LO • AVG • MD
P02.08	Display update time	s	0.5	0.1 … 5.0
P02.09	Exported energy measure	–	OFF	• OFF • ON
P02.10	Phase energy measure			
P02.11	U/I asymmetry measure			
P02.12	THD harmonic measure			• OFF • THD • THD/HAR
P02.13	Power unbalance measure-ment			• OFF • ON
P02.14	Backlight flash when in alarm			

P02.05
- OFF: Display always shows the most recently selected menu page.
- Value set: The display returns to the page set using P02.06 after this time has elapsed.

P02.06 Number of the page that is automatically displayed as soon as time P02.05 has elapsed since a key was pressed.

P02.07 Type of page to which the display returns after P02.05 has elapsed.

P02.09 Permits the measurement and display of exported energies.

P02.10 Permits the measurement and display of energies according to individual phases.

P02.11 Permits the measurement and display of voltage and current unbalances.

P02.12 Activates the measurement and display of voltage and current THDs (% harmonic distortion) and display of the harmonics for current and voltage (2 ... 15).

P02.13 Permits the calculation and display of phase shift.

P02.14 In the event of an alarm, the display backlighting flashes to annunciate the fault.

M03 Password

		Unit	Default	Range
P03.01	Enable password	–	OFF	• OFF • ON
P03.02	User-level password		1000	0 … 9999
P03.03	Administrator password		2000	

P03.01 When OFF is set, the password setting is deactivated and access to settings and the command menu is unrestricted. You can find more information in chapter Command menu (Page 36).

P03.02 Sets the user password.

P03.03 Sets the password for extended access privileges.

M04 Integration

		Unit	Default	Range
P04.01	Demand values	–	Shift	• Fixed • Shift • Bus (7KT1682)
P04.02	Power demand values	min	15	1 … 60
P04.03	Current demand values			
P04.04	Voltage demand values		1	
P04.05	Frequency demand values			

P04.01 Selection of calculation mode

- Fixed: The instantaneous measurements are integrated for the set time. Every time this set time elapses, the integrated measurement is updated with the result of the most recent integration.
- Shift: The instantaneous measurements are integrated for a time = 1/15 of the set time. Every time this interval elapses, the oldest value is replaced by the newly calculated value and the integrated measurement is updated. A time shift window with the 15 most recent calculated values which correspond to the set time is taken into account here.
- Bus: As a fixed mode; however, the integration intervals are defined by means of synchronization messages sent on the serial bus.

P04.02 Demand value for active, reactive and apparent power

P04.03 Current integration time

P04.04 Voltage integration time

P04.05 Frequency integration time

M05 Hour counter

		Unit	Default	Range
P05.01	Activate total hour counter	–	ON	• OFF • ON
P05.02	Activate partial hour counter			• OFF • ON • LIMx
P05.03	Channel number (n)		1	1 … 4

P05.01 OFF (hour counter deactivated): The device does not display the page for hour counter measurement.

P05.02
- OFF: The partial hour counter is not incremented.
- ON: Partial hour counter is incremented when the device is measuring energy.
- If the partial hour counter is linked to one of the internal variables (LIMn), the partial hour counter is only incremented if this condition is true.

P05.03 Channel number(n) of an internal variable which was used in the previous parameter.

Example:

If the partial hour counter needs to count the time while one measurement is above a threshold that was defined by LIM3, program LIMx in the previous parameter and enter "3" in this parameter.

M07 Communication for 7KT1682 only

		Unit	Default	Range
P07.01	Address	–	01	01 … 255
P07.02	Baud rate	bps	9600	• 1200 • 2400 • 4800 • 9600 • 19200 • 38400 • 57600 • 115200
P07.03	Data format	–	8 bit - n	• 8 bit, no parity • 8 bit, odd • 8 bit, even • 7 bit, odd • 7 bit, even
P07.04	Stop bits		1	1 … 2
P07.05	Protocol		Modbus RTU	• Modbus RTU • Modbus ASCII

P07.03 Data format. 7-bit settings only available for the ASCII protocol.

P07.04 Number of stop bits

P07.05 Selection of communication protocol

M08 Limit thresholds (LIMn, n = 1 to 4)

Note

This menu is divided into 4 sections for limit thresholds LIM 1 ... 4.

		Unit	Default	Range
P08.n.01	Reference measure	–	OFF	OFF … (measures)
P08.n.02	Function		Max	• Max • Min • Max + Min
P08.n.03	Upper threshold		0	−9999 … +9999
P08.n.04	Multiplier		x1	x0.01 … x10k
P08.n.05	Delay	s	0	0.0 … 1000.0
P08.n.06	Lower threshold	–		−9999 … +9999
P08.n.07	Multiplier		x1	x0.01 … x10k
P08.n.08	Delay	s	0	0.0 … 1000.0
P08.n.09	Status	–	OFF	• OFF • ON
P08.n.10	Reset mode			

P08.n.01 Defines the multimeter measurement to which the limit threshold applies.

P08.n.02 Defines the function of the limit threshold.

- Max = LIMn active if the measurement exceeds P08. P08.n.03 is the reset threshold.
- Min = LIMn active if the measurement falls below P08. P08.n.06 is the reset threshold.
- Min + Max = LIMn active if the measurement exceeds P08.n.03 or falls below P08.n.06.

P08.n.03, P08.n.04 Defines the upper threshold resulting from the multiplication of the value P08.n.03 by P08.n.04.

P08.n.05 Triggering delay for upper threshold.

P08.n.06, P08.n.07, P08.n.08 As above, but relating to the lower threshold.

P08.n.09 Permits inversion of the status of limit threshold LIMn.

P08.n.10
- ON: You must manually save and reset the threshold value.
- OFF: The threshold value is saved and reset automatically.

M09 Alarms (ALAn, n = 1 … 4)

Note

This menu is divided into 4 sections for alarms ALA1 ... 4.

		Default	Range
P09.n.01	Alarm source	OFF	• OFF • LIMx
P09.n.02	Channel number (n)	1	1 … 4
P09.n.03	Reset mode	OFF	• OFF • ON
P09.n.04	Priority	Low	• Low • High
P09.n.05	Text	ALAn	(Freely definable text for alarm. Max. 16 characters)

P09.n.01 Signal which triggers the alarm when a threshold value (LIMx) is exceeded.

P09.n.02 Channel number (n), with reference to the previous parameter.

P09.n.03
- ON: You must manually save and reset the alarm.
- OFF: The alarm is saved and reset automatically.

P09.n.04
- High: In the event of an alarm, the display automatically switches to the alarm page and displays the alarm icon.
- Low: In the event of an alarm, the "Information" icon is displayed; the display does not change.

3.4.7 Command menu

The command menu allows you to perform occasional operations (e.g. to reset measured variables and counters).

After entering the password for the extended level, you can also use the command menu to perform automatic operations which are useful for the configuration of the device.

The following functions are available in the command menu, separated according to the required access level.

Code	Command	Access level	Description
C.01	RESET HI-LO	User level/administrator	Resets the HI and LO values of all measurements.
C.02	RESET MAX DEMAND		Resets the maximum demand values for all measurements.
C.03	RESET PAR.ENERGY		Resets the partial energy meters.
C.04	RESET PAR.HOURS		Resets the partial hour counters.
C.07	RESET ALARMS		Resets alarms.
C.08	RESET LIMITS		Resets limit values
C.11	RESET TOT.ENERGY (Not with MID devices)	Administrator	Resets the total and partial energy meters.
C.12	RESET TOT.HOURS		Resets the total hour counter.
C.13	SETUP TO DEFAULT		Restores all the factory settings for the device.
C.14	BACKUP SETUP		Saves a backup copy of all setup parameters.
C.15	RESTORE SETUP		Loads the settings from the backup copy.
C.16	WIRING TEST		Runs the test to check whether the device is connected correctly. You can find more information in chapter Wiring test (Page 37).

1. Select the required command.
2. Press ▶ to execute the command.
3. Press ▶ again to execute the command.
4. Press MENU to cancel execution of the command.
5. Press MENU to exit the command menu.

3.5 Wiring test

The wiring test checks whether the multimeter has been installed correctly.

Requirements

In order to run the wiring test, the multimeter must be connected to an active system and the following conditions must be fulfilled:

- Three-phase system with all phases (V > 50 V AC PH-N)
- Minimum current flow in each phase (> 1% of current transformer)
- Positive flow of energies (normal system in which the inductive load draws power from the supply)

Run wiring test

1. Call up the command menu. You can find more information in chapter Command menu (Page 36).
2. Select command C.16 as described in the instructions in chapter Command menu (Page 36).
3. Check the following points:
   - Reading of the three voltages
   - Phase sequence
   - Voltage unbalance
   - Reverse polarity of one or more current transformers
   - Mismatch between voltage/current phases

If the test is not successful, the display indicates the reason why it has failed.

3.6 Supporting software

3.6.1 powermanager

You can use the powermanager energy management software to acquire, monitor, evaluate, display and archive the energy data of the measuring device.

powermanager functions

- Tree view of the customer's system (project tree)
- Measured value display with pre-defined user views
- Alarm management

- Demand curve
- Reporting, different report types (e.g. cost center report)
- Load monitoring of reaction plans
- Power peak analysis (available as of powermanager V3.0 SP1)
- Support of distributed plants (systems)
- Archiving system
- User administration

3.6.2 powerconfig

The powerconfig software is the combined commissioning and service tool for communication-capable measuring devices and circuit breakers from the SENTRON family.

The PC-based tool facilitates parameterization of the devices and saves a great deal of time, particularly when several devices need to be set up.

You can use powerconfig to parameterize and operate the measuring devices via communications interfaces, and to document and monitor measured values.

powerconfig functions

- The software combines the following functions:
  - Parameterization
  - Documentation
  - Operation
  - Monitoring
- User-friendly documentation of settings and measured values
- Clear presentation of the available parameters including plausibility testing of the input values
- Display of the available device statuses and measured values in standardized views
- Project-oriented storage of device data
- Consistent operation and usability
- Support of the various communication interfaces (Modbus RTU, Modbus TCP, PROFIBUS, PROFINET)
- Updating of device firmware (device-dependent)
- Loading of language packs (device-dependent)

Note

You launch the Online Help in powerconfig by pressing the F1 key.

Installation/removal

4

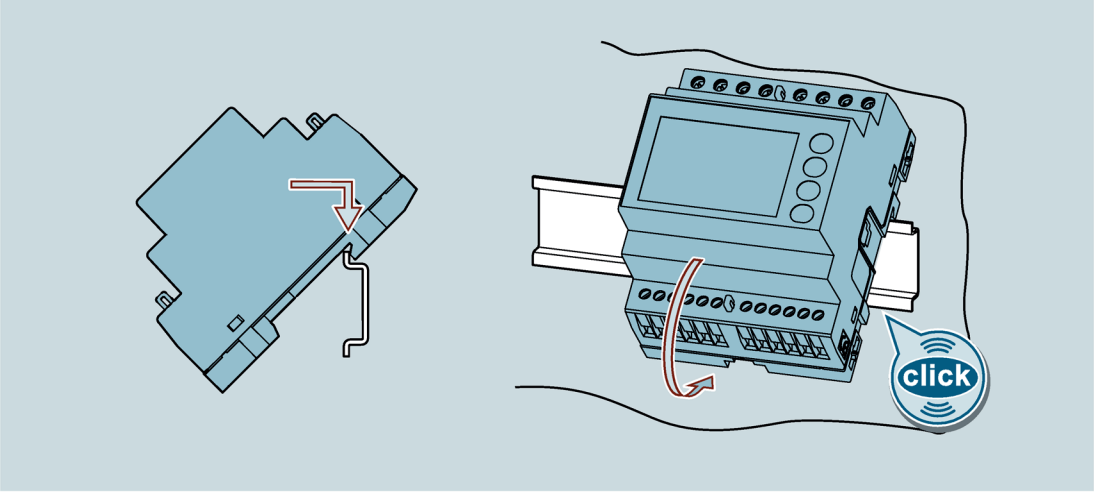
4.1 Installation location

WARNING
Possible risk of death due to damaged device! Using devices when they are damaged may result in death, serious injury, or property damage. • Do not install damaged devices. • Never start up damaged devices.

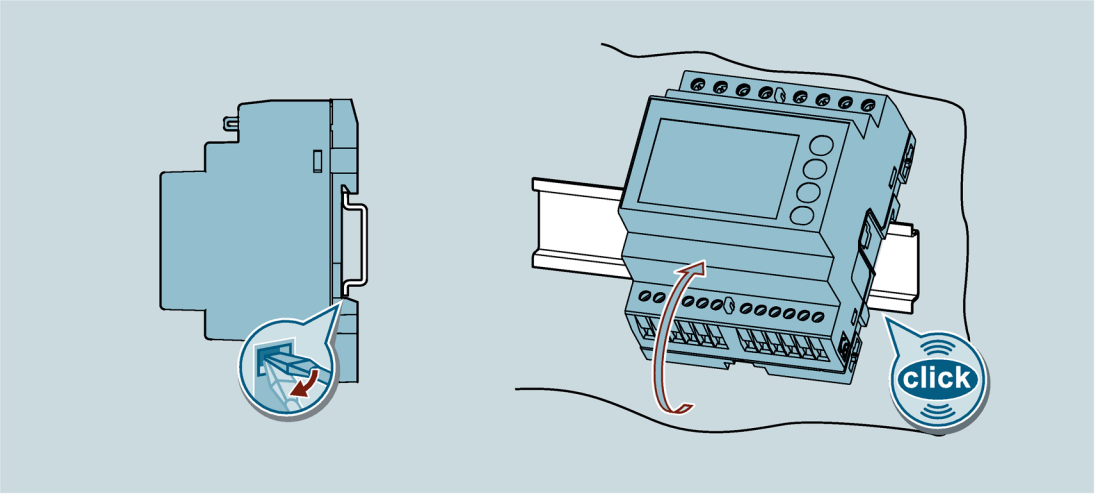
NOTICE
Device damage due to condensation! Sudden fluctuations in temperature can lead to condensation. Condensation can affect the function of the device. Store the device in the operating room for at least two hours before commencing installation.

The device is mounted on a TH35 rail (complying with EN 60715) and is intended for installation in permanently installed systems within closed rooms.

4.2 Installation



4.3 Removal



Connecting

5

Safety instructions

DANGER

Risk of death due to hazardous voltage!

Before starting work, disconnect the system and the device from the power supply.

DANGER

Risk of death due to electric shock and arc flashover!

For the 5 A device, it is only possible to measure the current via external current transformers. When using the current transformers, the circuit is not protected by a fuse.

- Switch off and lock out all power supplying this equipment before working on the device.
- Never open the secondary circuit of the current transformer under load.
- Short-circuit the secondary current terminals of the current transformer before removing this device.
- Always follow the safety instructions for the current transformers used.

WARNING

Possible risk of death due to damaged device!

Using devices when they are damaged may result in death, serious injury, or property damage.

- Do not install damaged devices.
- Never start up damaged devices.

NOTICE

Equipment damage due to lack of fusing

Non-fused voltage measuring inputs may lead to device and equipment damage.

Always protect the device with an IEC approved fuse or with an IEC approved miniature circuit breaker.

Note

RS 485 termination recommended

In order to avoid reflection on the bus cable, we recommend fitting a 120 Ω terminating resistor at the beginning and end of the bus cable.

To establish Modbus RTU communication, the communication parameters must be known. These include baud rate and format. Furthermore, you must have entered the slave address in the device.

Qualified personnel

Some of the following tasks are carried out when hazardous voltage is present. For this reason, they must only be carried out by qualified personnel who are familiar with the safety regulations and precautions and who follow the safety regulations and precautions.

- Wear the prescribed protective clothing.
- Observe the general equipment regulations and safety regulations for working with high-voltage installations (e.g. DIN VDE, NFPA 70E), as well as national and international regulations.
- Ensure that the limits given in the technical data are not exceeded, not even during commissioning or testing.
- Short circuit the secondary connections of intermediate current transformers at the transformers before interrupting the current lines to the device.
- Test the polarity and the phase assignment of the instrument transformers.
- Before connecting the device, ensure that the system voltage matches the voltage specified on the type plate.
- Before commissioning, ensure that all connections have been made correctly.
- Before power is applied to the device for the first time, have it placed in the operating room for a period of at least two hours. This allows it to reach temperature balance and avoids humidity and condensation.

5.1 Connection examples

Note

Recommended fuses

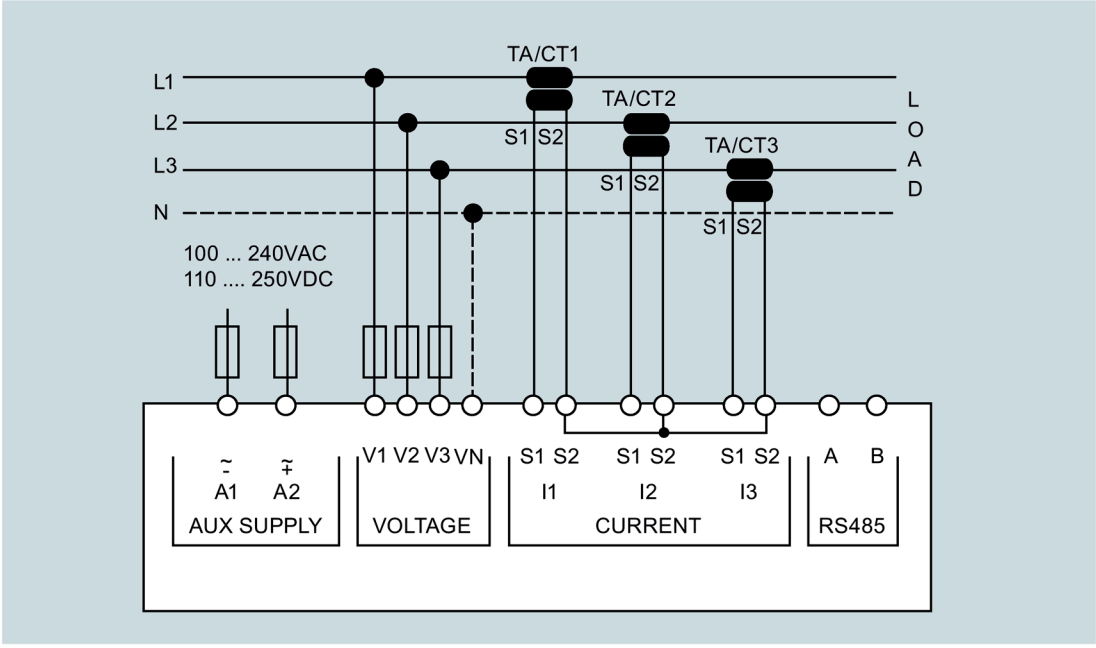
Auxiliary energy and measuring input voltage: F1A (fast-acting)

Note

S2 terminals are internally interconnected.

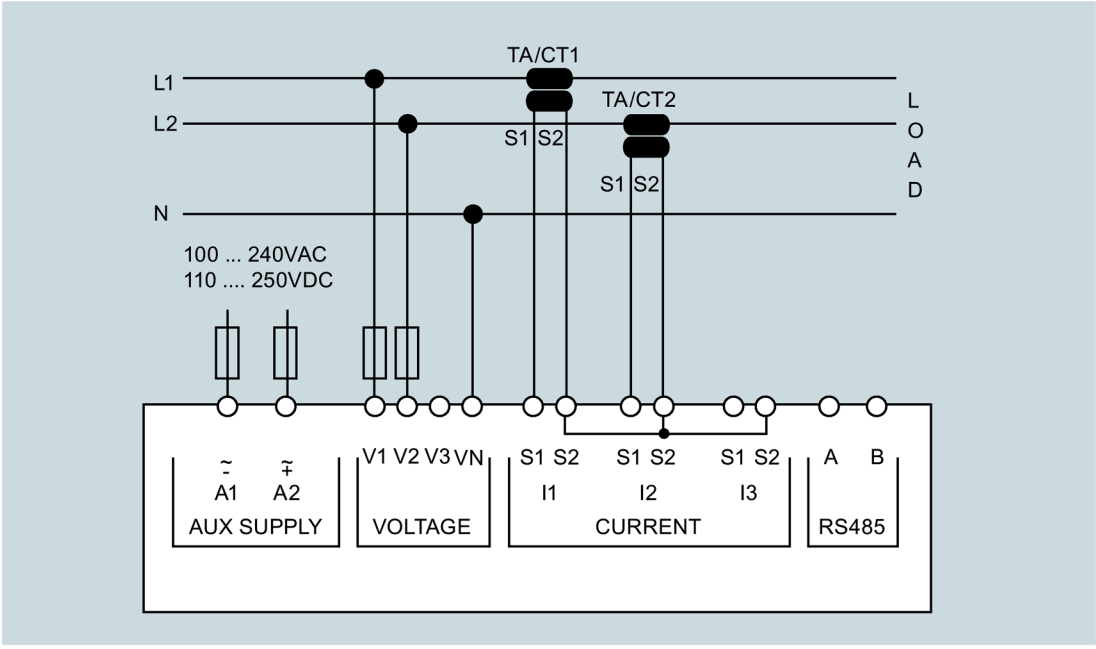
Three-phase connection with or without neutral conductor

P01.07 = L1-L2-L3-N or L1-L2-L3



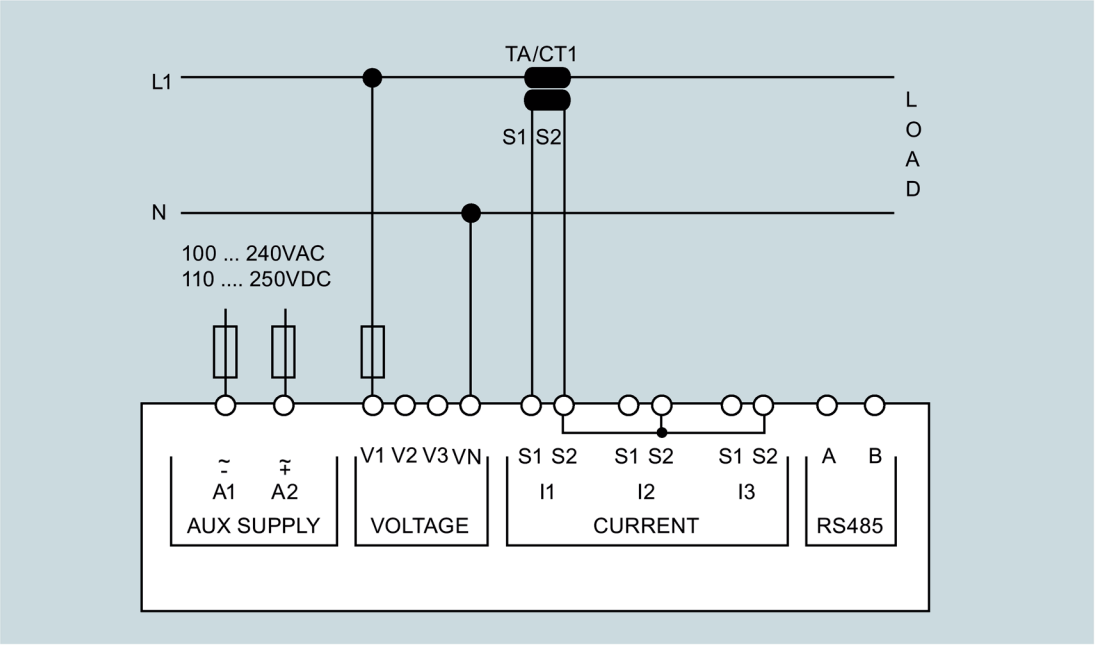
Two-phase connection

P01.07 = L1-N-L2



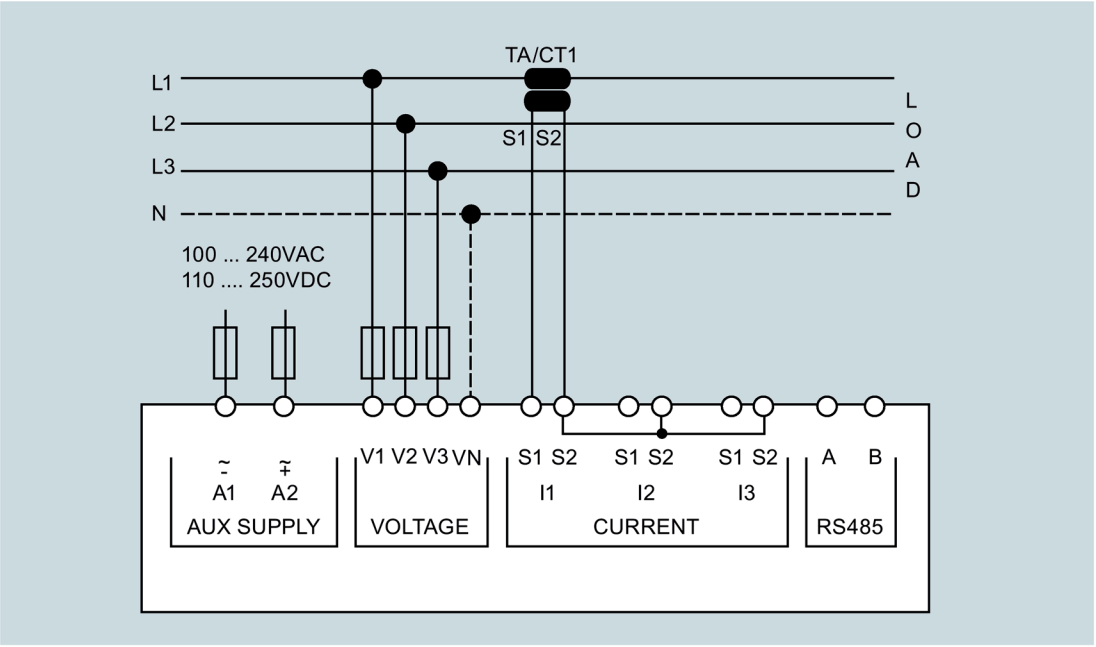
Single-phase connection

P01.07 = L1-N



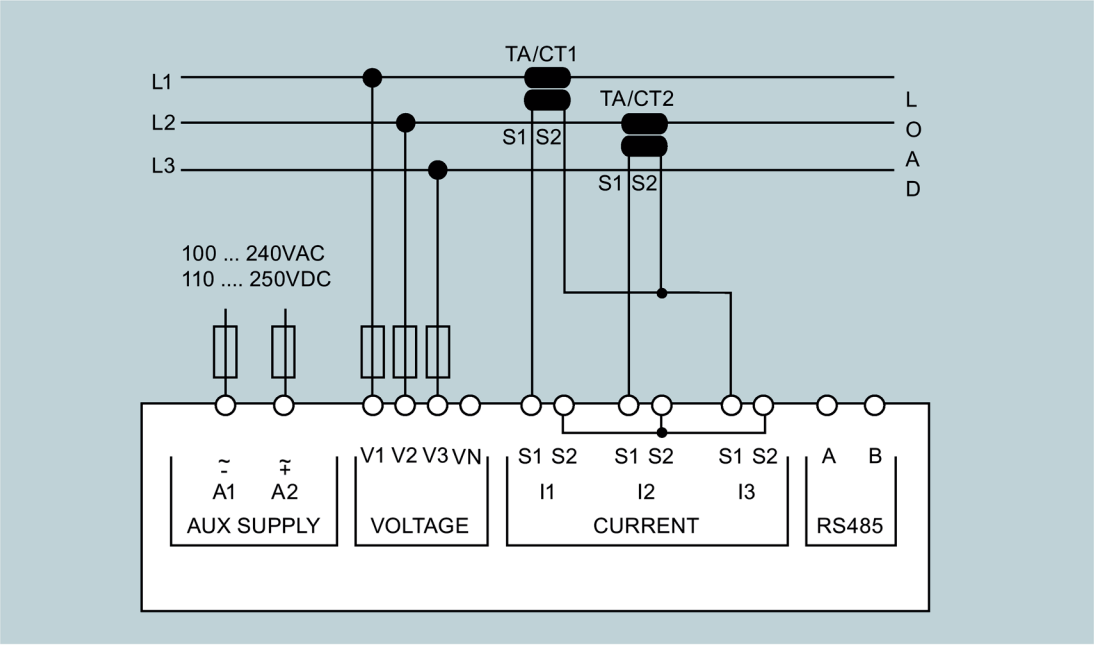
Three-phase connection of the same load with or without neutral conductor

P01.07 = L1-L2-L3-N-BIL or L1-L2-L3-BIL



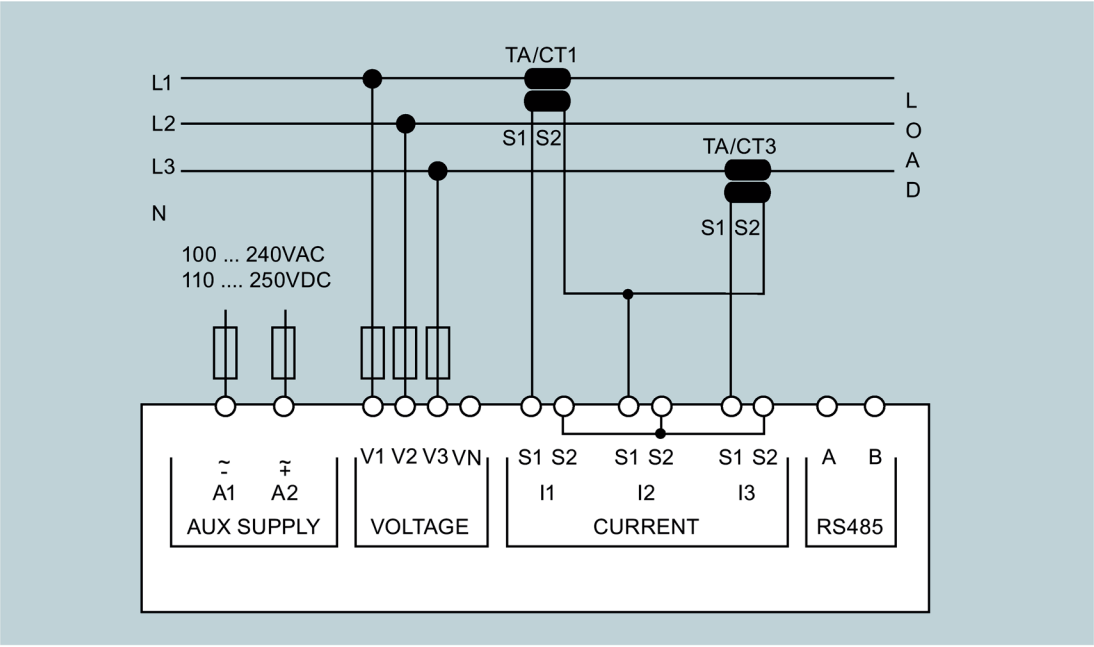
Three-phase connection without neutral conductor (ARON circuit, current transformer in L1 and L2)

P01.07 = L1-L2-L3



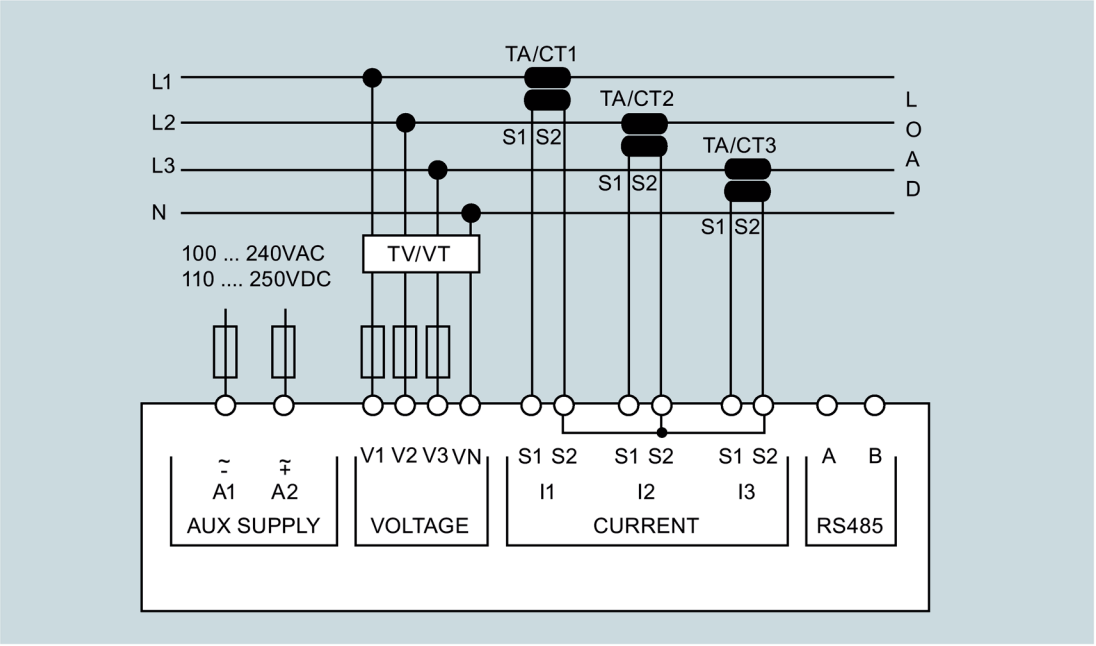
Three-phase connection without neutral conductor (ARON circuit, current transformer in L1 and L3)

P01.07 = L1-L2-L3



Three-phase connection with neutral conductor via voltage transformer

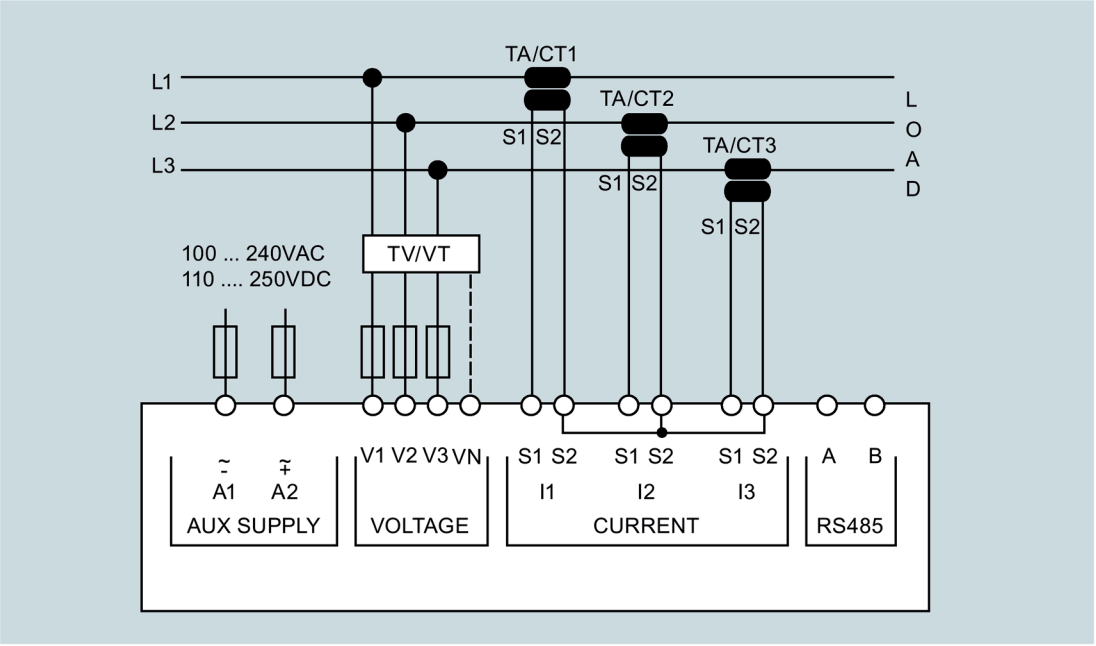
P01.07 = L1-L2-L3-N



Three-phase connection without neutral conductor via voltage transformer

Set P01.04, P01.05 and P01.06

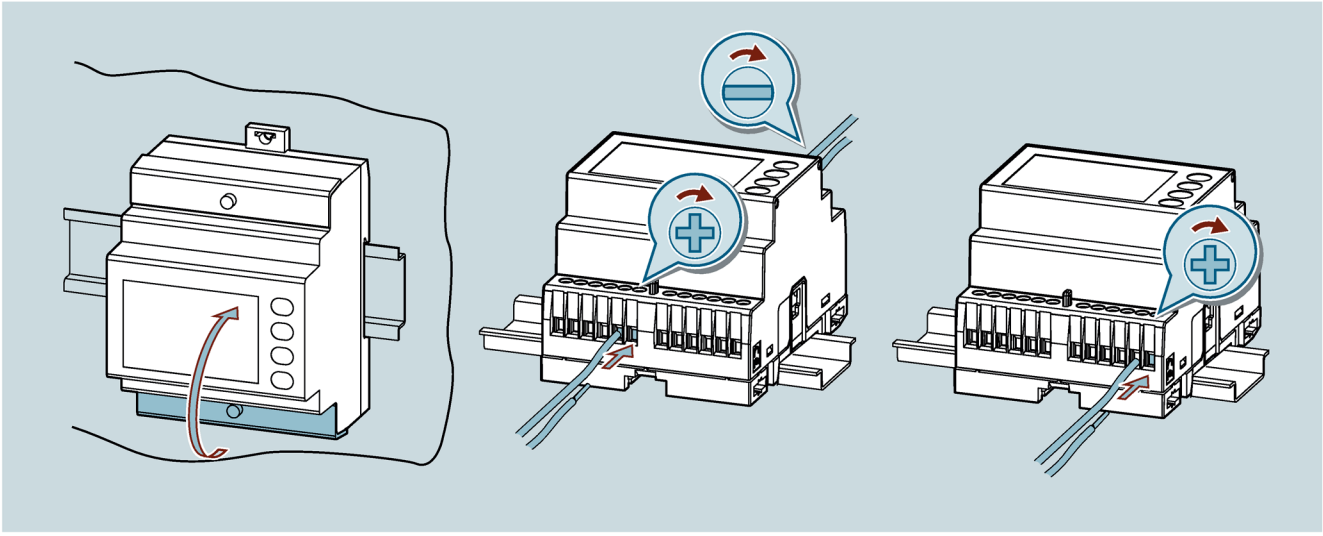
P01.07 = L1-L2-L3



5.2 Connecting the device

NOTICE
Irreparable damage to the device The wrong system connection can cause irreparable damage to the device. Before connecting the device, ensure that the local power supply conditions match the specifications on the type plate.

Procedure



Circuit diagram

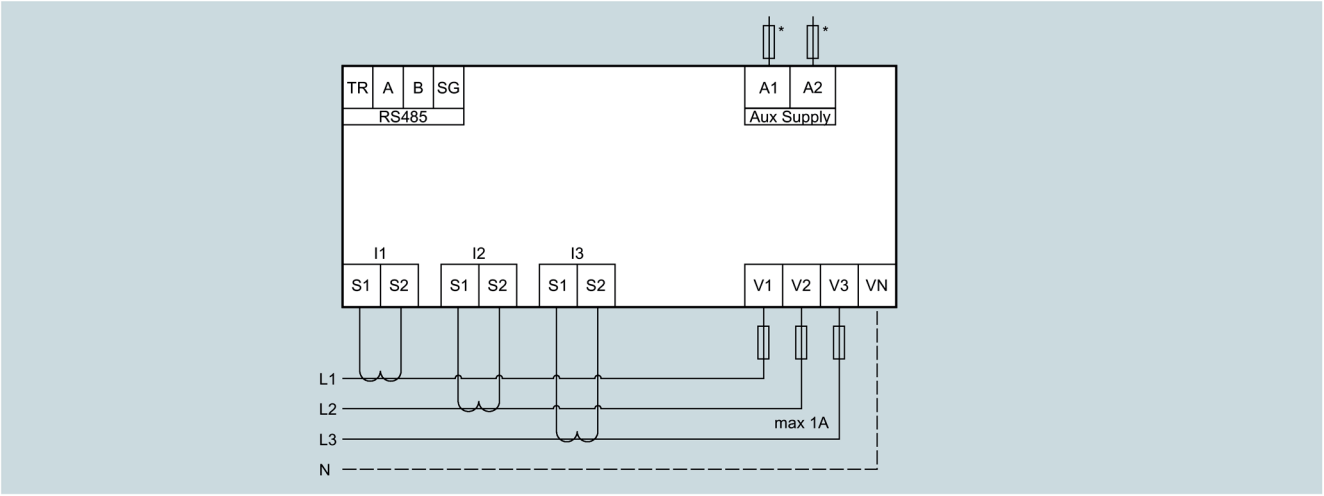


Figure 5-1 * Only necessary with phase L

Parameterization

You can find information on parameterization in the chapter Parameter setting (setup) from the front panel (Page 23).

Commissioning

6

6.1 Overview

Prerequisites

- The device has been installed.
- The device has been connected in accordance with the possible connection methods.

Steps for starting up the device

NOTICE
Risk of malfunction or device failure! Incorrect connection can result in malfunctions and failure of the device. • Before connecting the device, ensure that the local power supply conditions match the specifications on the type plate. • Before starting up the device, check that all connections are correct.

Note

Before performing an insulation test of the entire installation with AC or DC, you must disconnect the device from the line voltage.

1. Apply the measuring voltage. You can find more information on this in chapter Connecting (Page 41).
2. Parameterize the device. You can find more information on this in chapter Parameterizing with powerconfig (Page 50).
3. Check the measured values.

6.2 Applying the measuring voltage

DANGER

Risk of death due to excessively high voltage!

Death, serious injury, or property damage may result if the nominal voltage ranges are exceeded.

Always observe the limits specified in the technical data and on the type plate.

The device is supplied with power via the measuring voltage.

Please consult chapter Technical data (Page 63) or the type plate for the type and level of the possible supply voltage.

You can find more information in chapter Connecting (Page 41).

6.3 Parameterizing with powerconfig

You can download the powerconfig configuration software from the Industry Online Support website via the link (https://support.industry.siemens.com/cs/ww/en/view/63452759).

Information on how to use powerconfig can be found in the Online Help of the configuration software or by contacting Technical Support.

You launch the Online Help in powerconfig by pressing the F1 key.

Requirements

In order to configure measuring devices with an RS 485 interface, you must connect the measuring voltage and set up communication with the device.

Establishing connection to the device

To establish a connection to the device, proceed as follows:

1. Connect the device to the PC.
2. Open the powerconfig configuration software.
3. Click the **Search for accessible devices** button on the toolbar or press the F11 key.

   The "Search for accessible devices" window appears.
4. In the "Search for accessible devices" window, click the **Serial** tab if you want to access the device via an RS 485 interface.

   The "Serial" view appears.
5. Select PAC1600 in the **Search for device** option.

6. Enter the communication parameters:
   - COM port
   - Address
   - Baud rate
   - Format
   - Protocol
7. Click the **Start search** button.

   The "Result" window displays all the devices found.
8. Select the required device.
9. Click the **Create devices** button.

   The selected device is added.
10. In the **Views** menu, select the submenu "Parameters".

    The "Parameters" window is displayed.
11. In the "Properties" window, click the **Load to PC** button.

    The configuration is loaded from the device to the PC.

Parameterizing the device

You can enter and change parameters in offline mode.

To switch between online and offline mode, click **Activate online view** in the **Options** menu or press the F12 key.

Set the required basic parameters.

Make use of the Online Help in powerconfig.

In order to load the parameters to the device, proceed as follows:

1. Integrate the device in powerconfig.
2. In the **Views** menu, select the submenu **Parameters** or alternatively press the "Ctrl" and "Pos1" keys simultaneously.

   The "Parameters" window is displayed.
3. In the "Parameters" window, click the **Load to PC** button.

   The set parameters are loaded to the device.
4. Check the device parameters and adjust them if necessary.

   Note

   You can only change parameters in offline mode.

   You can find more information on parameterization in the powerconfig Online Help.
5. In the "Parameters" window, click the "Load to device" button.

   The set parameters are loaded to the device.

6.4 Modbus address register for devices with Modbus interface

6.4.1 Modbus measured variables with the function codes 03 and 04

Address	Number of registers	Measured variable	Unit	Format
0002H	2	L1 phase voltage	V/100	Unsigned long
0004H	2	L2 phase voltage		
0006H	2	L3 phase voltage		
0008H	2	L1 current	A/10000	
000AH	2	L2 current		
000CH	2	L3 current		
000EH	2	L1-L2 voltage	V/100	
0010H	2	L2-L3 voltage		
0012H	2	L3-L1 voltage		
0014H	2	L1 active energy	W/100	Signed long
0016H	2	L2 active energy	W/100	
0018H	2	L3 active energy		
001AH	2	L1 reactive power	Var/100	
001CH	2	L2 reactive power		
001EH	2	L3 reactive power		
0020H	2	L1 apparent power	VA/100	Unsigned long
0022H	2	L2 apparent power		
0024H	2	L3 apparent power		
0026H	2	L1 power factor	/10000	Signed long
0028H	2	L2 power factor		
002AH	2	L3 power factor		
0032H	2	Frequency	Hz/100	Unsigned long
0034H	2	Average phase voltage	V/100	
0036H	2	Average conductor voltage	V/100	
0038H	2	Average current	A/10000	
003AH	2	Average active energy	W/100	Signed long
003CH	2	Average reactive power	Var/100	
003EH	2	Average apparent power	%/100	Unsigned long
0040H	2	Average power factor		Signed long
0042H	2	L-L voltage unbalance		Unsigned long
0044H	2	L-N voltage unbalance		
0046H	2	Current unbalance		
0048H	2	N-conductor	A/10000	
0054H	2	L1 voltage THD	%/100	
0056H	2	L2 voltage THD		

Address	Number of registers	Measured variable	Unit	Format
0058H	2	L3 voltage THD		
005AH	2	L1 current THD		
005CH	2	L2 current THD		
005EH	2	L3 current THD		
0060H	2	L1-2 voltage THD		
0062H	2	L2-3 voltage THD		
0064H	2	L3-1 voltage THD		
0070H	2	KW L1-2	W/100	
0072H	2	KW L2-3		
0074H	2	KW L3-1		

Address	Number of registers	Measured variable	Unit	Format
Max. measured variables (HI)				
0400H	2	L1 phase voltage	V/100	Unsigned long
0402H	2	L2 phase voltage		
…				
0462H	2	L3-1 voltage THD	%/100	
Min. measured variables (LO)				
0600H	2	L1 phase voltage	V/100	Unsigned long
0602H	2	L2 phase voltage		
…				
0662H	2	L3-1 voltage THD	%/100	
…				
Average measured variables (AV)				
0800H	2	L1 phase voltage	V/100	Unsigned long
0802H	2	L2 phase voltage		
…				
0862H	2	L3-1 voltage THD	%/100	
Max. demand values of measured variables (MD)				
0A00H	2	L1 phase voltage	V/100	Unsigned long
0A02H	2	L2 phase voltage		
…				
0A62H	2	L3-1 voltage THD	%/100	

Address	Number of registers	Measured variable	Unit	Format
0C00H	2	2nd harmonic, L1 voltage	%	Unsigned long
0C02H	2	3rd harmonic, L1 voltage		
…				
0C1AH	2	15th harmonic, L1 voltage		
0C40H	2	2nd harmonic, L2 voltage		
…				
0C5AH	2	15th harmonic, L2 voltage		
0C80H	2	2nd harmonic, L3 voltage		
…				
0C9AH	2	15th harmonic, L3 voltage		
0CC0H	2	2nd harmonic, L1 current		
…				
0CDAH	2	15th harmonic, L1 current		
0D00H	2	2nd harmonic, L2 current		
…				
0D1AH	2	15th harmonic, L2 current		
0D40H	2	2nd harmonic, L3 current		
…				
0D5AH	2	15th harmonic, L3 current		
0D80H	2	2nd harmonic, L1-L2 voltage		
…				
0D9AH	2	15th harmonic, L1-L2 voltage		
0DC0H	2	2nd harmonic, L2-L3 voltage		
…				
0DDAH	2	15th harmonic, L2-L3 voltage		
0E00H	2	2nd harmonic, L3-L1 voltage		
…				
0E1AH	2	15th harmonic, L3-L1 voltage		
20F0H	1	Phase sequence • 1 = o.k. • 0 = not o.k.	–	Unsigned int

Address	Number of registers	Measured variable	Unit	Format
1B20H [1)]	4	Total active energy import	kWh/100	Unsigned long-long
1B24H [1)]	4	Total active energy export		
1B28H [1)]	4	Total reactive energy import	kvarh/100	
1B2CH [1)]	4	Total reactive energy export		
1B30H [1)]	4	Total apparent energy	kVAh/100	
1B34H [1)]	4	Partial active energy import	kWh/100	
1B38H [1)]	4	Partial active energy export		
1B3CH [1)]	4	Partial reactive energy import	kvarh/100	
1B40H [1)]	4	Partial reactive energy export		

[1)] The energy meters at these addresses are 4 words (4 bytes) long. They reset to 0 as soon as the counter value 999999999.99 kWh is exceeded for devices.

Address	Number of registers	Measured variable	Unit	Format
1E20H	4	L1 active energy import	kWh/100	Unsigned long-long
1E24H	4	L1 active energy export		
1E28H	4	L1 inductive reactive energy	kvarh/100	
1E2CH	4	L1 capacitive reactive energy		
1E30H	4	L1 apparent energy import	kVAh/100	
1E34H	4	L1 partial active energy import	kWh/100	
1E38H	4	L1 partial active energy import		
1E3CH	4	L1 inductive partial reactive energy	kvarh/100	
1E40H	4	L1 capacitive partial reactive energy		
1E44H	4	L1 partial apparent energy import	kVAh/100	
1E48H	4	L2 active energy import	kWh/100	
…				
1E70H	4	L3 active energy import	kWh/100	
…				

Address	Number of registers	Measured variable	Unit	Format
1E00H	2	Total hour counter	s	Unsigned long
1E02H	2	Partial hour counter		
2120H	1	OR across all alarms	–	Unsigned int
2140H	1	OR across all limits		
4F00H	1	Remote 1	bool	

6.4.2 Modbus command parameters

Modbus function code 06

Address	WORDS	Measured variables	UNIT	FORMAT
2FF0H	1	Reset HI-LO values	0	Unsigned int
2FF0H	1	Reset max. average values	1	Unsigned int
2FF0H	1	Reset partial energy	2	Unsigned int
2FF0H	1	Reset partial hour counter	3	Unsigned int
2FF0H	1	Reset energy tariffs	6	Unsigned int
2FF0H	1	Reset alarms	7	Unsigned int
2FF0H	1	Reset limits	11	Unsigned int
2FF0H	1	Reset energy total	12	Unsigned int
2FF0H	1	Reset all hour counters	13[1)]	Unsigned int
2FF0H	1	Factory setting	14[1)]	Unsigned int
2FF0H	1	Save parameters	15[1)]	Unsigned int
2FF0H	1	Load parameters	16[2)]	Unsigned int
2FF0H	1	Wiring test	100	Unsigned int
2FF0H	1	Reset HI	200	Unsigned int
2F01H	1	Reset LO	1	Unsigned int

1) After executing this command, it is recommended that you issue the REBOOT command.
2) After executing this command, you can use query 4 under address 0x1F20 to obtain the test result. The bit assignments are shown in the wiring test results table below.

Wiring test results

The wiring is correct if the result is 0 or no bit is active.

Bit	Measured variable
0	Voltage L1 - N
1	Voltage L2 - N
2	Voltage L3 - N
3	Current N - L1
4	Current N - L2
5	Current N - L3
6	Incorrect phase sequence
7	Phase unbalance
8	Current transformer 1 inverted
9	Current transformer 2 inverted
10	Current transformer 3 inverted
11	Current transformer 1 on phase L2
12	Current transformer 1 on phase L3
13	Current transformer 1 on phase L1

Bit	Measured variable
14	Current transformer 2 on phase L3
15	Current transformer 3 on phase L1
16	Current transformer 3 on phase L2

6.4.3 Setup parameters

Note

You can find further details, such as default values and units, in chapter Parameter tables (Page 28).

Note

For use with function codes 04 and 06.

M01 General

CODE	MENU	MIN	MAX	DEF	WORDS	ADDRESS
P01.01	Primary current of the current transformer	1	10000	5	1	5000H
P01.02	Secondary current of the current transformer	0	1	1	1	5002H
P01.03	Nominal voltage	49	500000	49	2	5004H
P01.04	Rated power	0	1	0	1	5006H
P01.05	Primary rated power	50	500000	100	2	5008H
P01.06	Secondary rated power	50	500	100	1	500AH
P01.07	Wiring configuration	0	5	0	1	500CH

M02 Utility

CODE	MENU	MIN	MAX	DEF	WORDS	ADDRESS
P02.01	Language	0	4	0	1	5080H
P02.03	High backlight level	10	100	100	1	5084H
P02.04	Low backlight level	10	100	30	1	5086H
P02.05	Low backlight delay	5	600	30	1	5088H
P02.06	Default page return	9	600	60	1	508AH
P02.07	Default page	1	32	1	1	508CH
P02.08	Default subpage	0	13	0	1	508EH
P02.09	Display update time	1	50	5	1	5090H

M03 Password

CODE	MENU	MIN	MAX	DEF	WORDS	ADDRESS
P03.01	Enable password	0	1	0	1	5100H
P03.02	User-level password	0	9999	1000	1	5102H
P03.03	Administrator password	0	9999	2000	1	5104H

M04 Integration

CODE	MENU	MIN	MAX	DEF	WORDS	ADDRESS
P04.01	Demand values	0	3	1	1	5180H
P04.02	Power demand values	1	60	15	1	5182H
P04.03	Current demand values	1	60	15	1	5184H

M05 Hour counter

CODE	MENU	MIN	MAX	DEF	WORDS	ADDRESS
P05.01	Activate total hour counter	0	1	1	1	5200H
P05.02	Activate partial hour counter	0	4	1	1	5202H

M07 Communication

CODE	MENU	MIN	MAX	DEF	WORDS	ADDRESS
P07.n.01	Address	1	255	1	1	5300H + (n -1) x 80H
P07.n.02	Baud rate	0	5	3	1	5302H + (n -1) x 80H
P07.n.03	Data format.	0	4	0	1	5304H + (n -1) x 80H
P07.n.04	Stop bits	0	1	0	1	5306H + (n -1) x 80H
P07.n.05	Protocol	0	1	0	1	5308H + (n -1) x 80H

Rules for reading and writing

Parameters are read and written in accordance with the following rules:

Address	Words	Description	Function	Example
0x5000	1	Selection of menu number	4 read – 6 write	Write the value 1 to select menu number 1.
0x5001	1	Selection of submenu number		Write the value 4 to select submenu number 4. If the number of the submenu is not required, write 0.
0x5002	1	Selection of parameter number		Write the value 2 to select parameter number 2.
0x5004	1 … 28	Parameter value	4 read – 6 write 16 multiwrite	–
0x2F01	1	Save in flash memory	6 write	Value = 1

Service and maintenance

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The device has been calibrated by the manufacturer before shipping. Recalibration is not required provided the environmental conditions are maintained.

7.1 Firmware update

A firmware update is not possible.

7.2 Fault elimination measures

Fault	Measures
Device is not working.	• Check power supply connection. • Check fuse.
Voltage or current measured values are not displayed.	• Check fuse. • Check configuration. You can find more information under Parameterizing with powerconfig (Page 50).
Voltage values are not plausible.	Check that the measuring voltages are connected correctly. In the case of voltage transformers, ensure that transformer ratios are set correctly.
Current values are not plausible.	Check the settings and the wiring of the current transformers and correct if necessary.
No communication.	Check communication settings.
Power values are incorrect, although voltage and current are correctly applied.	• Check voltages and currents of the phases to ensure that they are properly connected to one another. • Check the polarity of the current transformers.

7.3 Warranty

Note

Loss of warranty

If you open the device, you will invalidate the Siemens warranty. Only the manufacturer is permitted to carry out repairs to the devices. Return faulty or damaged devices to Siemens for repair or replacement.

Procedure

If the device is faulty or damaged, proceed as follows (only during the warranty period):

1. Uninstall the device. You can find more information in chapter Installation/removal (Page 39).
2. Pack the device in a suitable manner to prevent it from being damaged during transport.
3. Return the device to Siemens. You can obtain the address from:
   - Your Siemens sales partner
   - Technical Assistance

You can find more information in chapter AUTOHOTSPOT.

7.4 Disposal

- Dispose of the module or device in accordance with the applicable laws and regulations in your country.
- Do not dispose of the module or device in general domestic waste.
- Collect and dispose of old devices separately.

Technical data

8

8.1 Technical data

7KT PAC1600 multimeter

Auxiliary power	
Nominal voltage	• 100 V~ … 240 V~ • 110 V= … 250 V=
Operating voltage range	• 90 V~ … 264 V~ • 93.5 V= … 300 V=
Nominal frequency	45 Hz … 66 Hz
Power consumption/power loss	• 7KT1681: 0.5 VA … 1.5 VA • 7KT1682: 0.8 VA … 2.2 VA
Recommended fuses	1 A quick-response

Input voltage	
Nominal voltage	600 V~ L-L (346 V~ L-N)
Voltage range	50 V~ … 720 V~ L-L (415 V~ L-N)
Frequency range	45 Hz … 65 Hz
Measurement type	True root mean square value (TRMS)
Input impedance of measurement	L-N … L-L > 8 MΩ
Wiring configuration	Single-phase, two-phase, three-phase with or without neutral conductor or three-phase with equal load Refer to chapter Connection examples (Page 42).
Recommended fuses	1 A quick-response

Input current	
Rated current	1 A~ or 5 A~
Measuring range	• For 5 A: 0.025 A~ … 6 A~ • For 1 A: 0.025 A~ … 1.2 A~
Input	Max. 5 A secondary current transformer, nominal range
Measurement type	True root mean square value (TRMS)
Overload capability	20%
Overload peak	50 A for 1 s
Burden (per phase)	≤ 0.6 VA

Measuring accuracy	
Reference conditions	
Temperature	+23 °C ±2 °C
Phase-to-neutral voltage	±0.5% (50 V~ … 480 V~) ±0.5 digit
Phase-to-phase voltage	±0.5% (80 V~ … 830 V~) ±0.5 digit
Current (xx/5)	±0.5% (0.1 in … 1.2 in) ±0.5 digit
Active energy	Class 1 (IEC/EN 62053-21)
Reactive energy	Class 2 (IEC/EN 62053-23)

Additional faults	
Temperature	0.05 %/K for V, A, W

Environmental conditions	
Installation	For indoor use only
Operating temperature	−20 °C … +60 °C
Storage temperature	−30 °C … +80 °C
Relative humidity (IEC/EN 60068-2-78)	< 80% non-condensing
Maximum degree of pollution	2
Overvoltage category	3
Measuring category	III
Climatic sequence	Z/ABDM (IEC/EN 60068-2-61)
Shock resistance	15 g (IEC/EN 60068-2-27)
Vibration resistance	0.7 g (IEC/EN 60068-2-6)

Insulation voltage	
Rated insulation voltage L-N	600 V~
Rated impulse withstand voltage U_{imp}	9.5 kV~
AC withstand voltage	5.2 kV~

Enclosure

You can find information about the enclosure in chapter Dimensional drawings (Page 67).

Certifications

The 7KT PAC1600 multimeter complies with the requirements of the following European Directives:

CE

- DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND COUNCIL of February 26, 2014, on the harmonization of the laws of the Member States relating to electromagnetic compatibility and repealing the Directive 89/336/EEC
- DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND COUNCIL of February 26, 2014, on the harmonization of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits
- DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND COUNCIL OF June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic devices

Conformity with these Directives is verified by compliance with the following standards:

- EN 61010-1: 2011
- EN 61010-2-030: 2011
- EN 61010-1: 2010
- EN 61000-6-2: 2005
- EN 61000-6-3: 2007 + A1: 2011
- EN 61010-2-030: 2010

Approval for Eurasian customs union

EAC

Valid in Russia, Belarus, Kazakhstan, Kyrgyzstan and Armenia.

8.2 Labels on the enclosure

Symbol, label	Explanation
PAC1600	Product/device designation
LQN/YYMMDDxxxxxx	Serial number of the device
EAC	EAC certification
CAT III	Overvoltage category CAT III for current and voltage inputs
	Protective insulation, device with safety class II
CE	CE mark. Confirmation of conformity of the product/device with the applicable EU directives and compliance with the essential requirements contained in these directives
	Electrical installation demands technical competence
	Do not dispose of this device with general domestic waste.

Dimensional drawings

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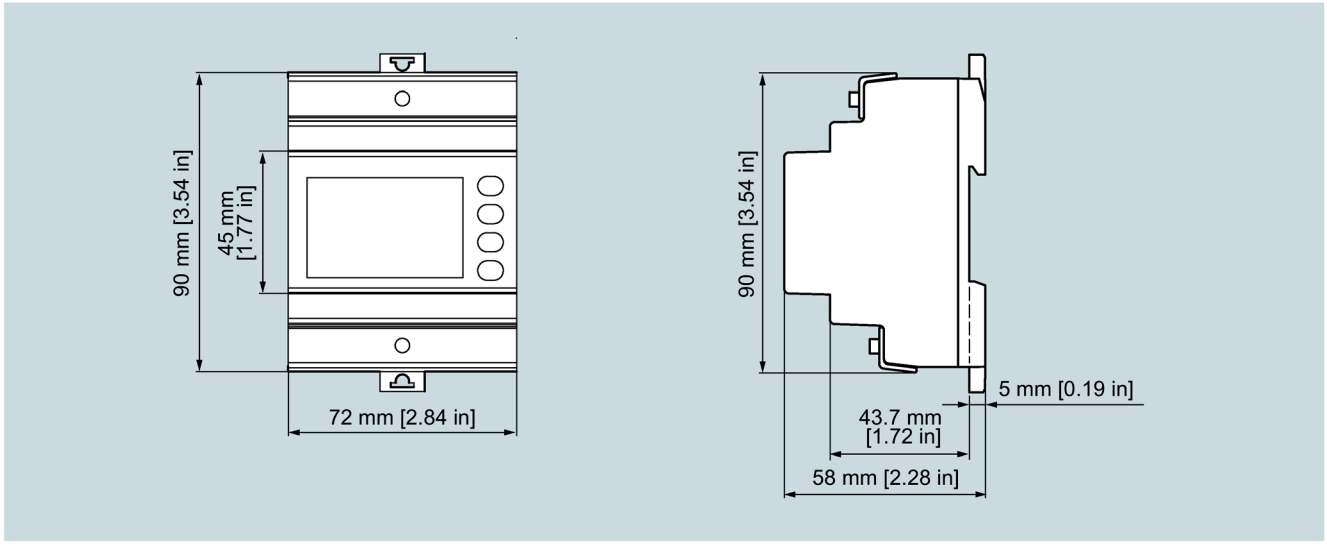


ESD guidelines

A

A.1 Electrostatic sensitive devices (ESD)

Electrostatic sensitive devices are destroyed by voltage and energy levels 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. Electrostatic sensitive devices which have been subject to such voltages are usually not immediately recognized as being defective, because a malfunction does not occur until after an extended period of operation.

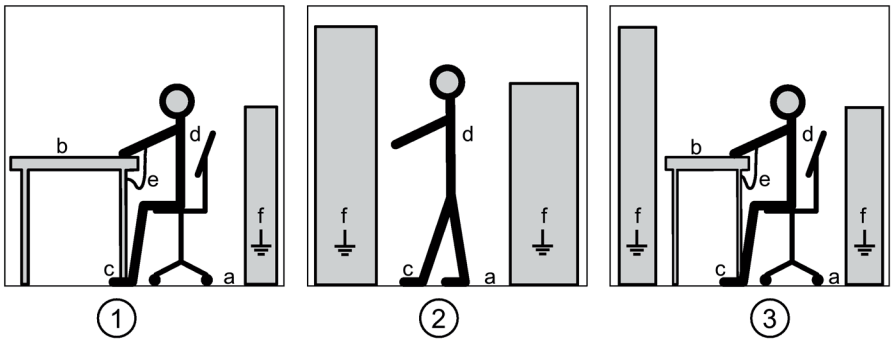
ESD Guidelines

NOTICE
Electrostatic sensitive devices Electronic modules contain components that can be destroyed by electrostatic discharge. These modules can be easily destroyed or damaged by 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. metallized plastic or metal containers. Leave the component in its packaging until installation.

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

ESD workstation

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



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

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Further Information

Always at your disposal: our extensive support
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