

INTERFACE



User manual

UM EN EEM-MA600

Order No.: —

INTERFACE

User manual

Energy meter for single, two, and three-phase networks

2011-05-19

Designation: UM EN EEM-MA600

Version: 00

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Revision

Order No.
2901366

Please observe the following notes

In order to ensure the safe use of the product described, you have to read and understand this manual. The following notes provide information on how to use this user manual.

User group of this manual

The use of products described in this manual is oriented exclusively to

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Explanation of symbols used and signal words



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety measures that follow this symbol to avoid possible injury or death.



DANGER

This indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

This indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

This indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

The following types of messages provide information about possible property damage and general information concerning proper operation and ease-of-use.



NOTE

This symbol and the accompanying text alert the reader to a situation which may cause damage or malfunction to the device, hardware or software, or surrounding property.



This symbol and the accompanying text provide the reader with additional information, such as tips and advice on the efficient use of hardware and on software optimization. It is also used as a reference to other sources of information (manuals, data sheets) on the subject matter, product, etc.

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1 Safety notes

**DANGER: Risk of electric shocks, burns or explosions**

- The "attention symbol" on the device label means:
Carefully read through the installation note. Follow the installation note to avoid impairing the intended protection.
- Only qualified specialist personnel may install, start up, and operate the device. Observe the national safety and accident prevention regulations.
- When working on the device, always disconnect it from the power supply. Short circuit the secondary side of each current transformer.
- Use an appropriate voltage measuring device to ensure that no voltage is present.
- Mount all equipment, doors, and covers before switching on the device again.
- Installation should be carried out following the instructions provided in the operating instructions. Access to circuits within the device is not permitted.
- The device does not require maintenance. Repairs may only be carried out by the manufacturer.

Non-compliance with these safety precautions can result in serious injury.

**NOTE: Risk of damage to the device**

- Provide a switch/circuit breaker close to a device, which is labeled as the disconnect device for this device.
- Provide overcurrent protection ($I \leq 16 \text{ A}$) in the installation.
- Observe the maximum permissible values for the device supply (440 V AC/420 V DC), mains frequency (50/60 Hz), maximum voltage at connection terminal blocks (700 V AC phase/phase or 404 V AC phase/neutral conductor).
- Observe a maximum current of 10 A at the power supply connection terminal blocks (I1, I2, and I3).

2 Device description

The EEM-MA600 is a highly accurate energy meter for measuring electrical parameters in low voltage installations up to 700 V. It is designed for front-panel installation and supports the measurement, counting, and display of all electrical parameters in 1-, 2, and 3-phase networks with and without neutral conductors (symmetrical and asymmetrical).

The buttons located on the front of the device allow fast, direct access to the required parameters as well as device configuration. The device can be expanded using the special function and communication modules and can be configured using communication modules (Ethernet, PROFIBUS, MODBUS, see page 2-5).

The device can also be used to record the total harmonic distortion (THD) of the currents and voltages as well as the content of individual harmonic (odd) vibrations. Values up to the 25th harmonic can be shown on the display. The display up to the 63rd harmonic is possible via the MODBUS registers.

A trend calculation can be performed for the real and reactive power, and alarm management can be activated (extension module EEM-2DIO-MA600 required).

The following parameters can be measured or monitored:

Current	<ul style="list-style-type: none"> - Actual values I1, I2, I3, IN - Average value/maximum value I1, I2, I3, IN - Harmonic content and content of individual odd harmonics (displays up to 25th)
Voltages	<ul style="list-style-type: none"> - Actual phase/phase value (U12, U23, U31) - Actual phase/N value (V1, V2, V3) - Average value/maximum value for phase/phase (U12, U23, U31) and phase/N (V1, V2, V3) - Harmonic content and content of individual odd harmonics (displays up to 25th)
Frequency	<ul style="list-style-type: none"> - F
Real, reactive and apparent power	<ul style="list-style-type: none"> - Actual value for each phase (P1, P2, P3, Q1, Q2, Q3, S1, S2, S3) - Total actual value (ΣP, ΣQ, ΣS) - Average value/maximum value (ΣP, ΣQ, ΣS) - Trend (ΣPPR, ΣQPR, ΣSPR)
Power factor	<ul style="list-style-type: none"> - Actual value for each phase (PF1, PF2, PF3) - Total actual value (ΣPF) - Average value/maximum value (ΣPF)
Energy (power meter)	<ul style="list-style-type: none"> - Real energy (EA +/-) - Reactive energy (ER +/-) - Apparent energy (ES)

- Harmonics**
- Total harmonic distortion of currents I1, I2, I3, IN
 - Total harmonic distortion of line voltage U12, U23, U31
 - Total harmonic distortion of line voltage against N V1, V2, V3
 - Individual harmonic content up to 63rd
 - For currents I1, I2, I3
 - For line voltages (U12, U23, U31)
 - For line voltages against N (V1, V2, V3)
- Temperature**
- Internal
 - External via 3 PT100 temperature sensors
- Alarm setting**
- For all parameters (extension module EEM-2DIO-MA600 required)

2.1 Displaying measured values



To switch over to the next measured values within a menu, the corresponding button must be pressed once again.

- I/°C button**
- Currents (I1, I2, I3, IN), real energy (EA)
 - Currents (I1, I2, I3, IN) average value (I), real energy (EA)
 - Temperatures (when extension module EEM-TEMP-MA600 is connected)
- U/F button**
- Line voltages (U12, U23, U31), frequency (F), real energy (EA)
 - Line voltages against N (V1, V2, V3), frequency (F), real energy (EA)
 - Line voltages (U12, U23, U31), average value (U), real energy (EA)
 - Line voltages against N (V1, V2, V3), average value (V), real energy (EA)
- P/PF button**
- Real power for each phase (P1, P2, P3), total real power (ΣP), real energy (EA)
 - Reactive power for each phase (Q1, Q2, Q3), total reactive power (ΣQ), real energy (EA)
 - Apparent power for each phase (S1, S2, S3), total apparent power (ΣS), real energy (EA)
 - Power factor for each phase (PF1, PF2, PF3) total power factor (ΣPF), real energy (EA)
 - Real power trend (ΣPPR)
 - Reactive power trend (ΣQPR)
 - Apparent power trend (ΣSPR)

-
- | | |
|-----------------------|---|
| MAX/AVG button | <ul style="list-style-type: none">- Average value/maximum value for currents (I1, I2, I3, IN), real energy (EA)- Average value/maximum value for line voltages phase/phase (U12, U23, U31), average frequency value (F), real energy (EA)- Average value/maximum value for line voltages phase/N (V1, V2, V3), average frequency value (F), real energy (EA)- Average value/maximum real power value (ΣP)- Average value/maximum reactive power value (ΣQ)- Average value/maximum apparent power value (ΣS) |
| H button | <ul style="list-style-type: none">- Total harmonic distortion of currents (THD I1, THD I2, THD I3, THD IN), real energy (EA)- Total harmonic distortion of phase/phase (THD U12, THD U23, THD U31) conductor voltages, real energy (EA)- Total harmonic distortion of phase/N (THD V1, THD V2, THD V3) conductor voltages, real energy (EA)- Harmonic content for currents (I1, I2, I3, IN), real energy (EA)- Harmonic content for conductor voltages L/L (U12, U23, U31), real energy (EA)- Harmonic content for line voltages L/N (V1, V2, V3), real energy (EA) |
| E button | <ul style="list-style-type: none">- Positive real energy (EA +)- Positive reactive energy (ER +)- Apparent energy (ES)- Negative real energy (EA-)- Negative reactive energy (ER-)- Operating hours |

2.2 Characteristics

Current measurement (TRMS)	Current transformer primary	9999 A
	Current transformer secondary	1 or 5 A
	Minimum measured current	10 mA
	Display	0 ... 11 kA
	Intrinsic consumption	< 0.3 VA
	Measured value update	1 s
	Accuracy	0.2% (10 ... 110% I_N)
	Continuous overload	10 A
	Short-term overload	10 x I_N for 1 s
Voltage measurement (TRMS)	Direct phase/phase	18 ... 700 V AC
	Direct phase/N	11 ... 404 V AC
	Voltage transducer primary	up to 500 kV
	Voltage transducer secondary	60, 100, 110, 115, 120, 173, 190 V AC
	Measured value update	1 s
	Accuracy	0.2% (140 ... 700 V AC)
Power measurement	Display	0 ... 8000 MW/Mvar/MVA
	Measured value update	1 s
	Accuracy	0.5% (-90 ... +90°C)
Power factor measurement	Measured value update	1 s
	Accuracy	0.5% (0.5 < LF < 1)
Frequency measurement	Measuring range	45 ... 65 Hz
	Measured value update	1 s
	Accuracy	0.1% (45 ... 65 Hz)
Measurement of energy amount	Real energy (IEC 62053-22)	Class 0.5 S
	Reactive energy (IEC 62053-23)	Class 2

2.3 Extension modules

The device can be extended by means of extension modules. The extension modules are plugged into the back of the device and also secured in place with screws.



The description of the maximum number of individual extension modules and the slots to be used can be found at "Installation" on page 4-4.

2.3.1 Communication modules

To be able to adjust the device to various communication interfaces, the following communication modules are available:

- JBUS/MODBUS communication (EEM-RS 485-MA600, Order No. 2901367):
Serial RS485 JBUS/MODBUS connection in RTU mode with a speed of up to 38,400 baud
- PROFIBUS-DP communication (EEM-PB-MA600, Order No. 2901368)
Serial RS485 PROFIBUS DP connection with a speed of up to 1.5 MBd
- PROFIBUS-DP communication (EEM-PB12-MA600, Order No. 2901418):
serial connection RS485 PROFIBUS with D-SUB connector and a speed of up to 12 MBd
- Ethernet communication (EEM-ETH-MA600, Order No. 2901373):
100 base-T connection (RJ45), MODBUS TCP protocol, integrated web server
- Ethernet communication (EEM-ETH-RS485-MA600, Order No. 2901374):
MODBUS TCP (RJ45) Ethernet connection or JBUS/MODBUS RTU (RS485) via TCP (gateway function), to 247 JBUS/MODBUS slaves

2.3.2 Special function modules

The functional scope of the device can be extended with the following special function modules:

- Memory (EEM-MEMO-MA600, Order No. 2901370):
 - Storage of the last 10 alarms with date and time
 - Storage of the last undervoltages, surge voltages and voltage failures with date and time
 - Storage of current minimum and maximum measured values for I, IN, U, V, F, Σ PF, Σ P \pm , Σ Q \pm , Σ S, THD U, THD V, THD I, THD IN
 - Storage of real and reactive P \pm and Q \pm up to 62 days with an internal or external synchronization impulse for an adjustable measurement period of 5, 8, 10, 15, 20 and 30 minutes
 - Storage of course of average values U, V, and F based on the measurement duration (maximum of 60 days)
- Digital inputs/outputs (EEM-2DIO-MA600, Order No. 2901371):
Two switching outputs as alarm for voltage, currents, power, power factor, frequency and harmonic content
Two inputs for counting the impulses or for position checking (for example, switch setting)

- Analog outputs (EEM-2AO-MA600, Order No. 2901374):
Two analog outputs 4 ... 20 mA or 0 ... 20 mA can be set according to current, voltage, power and power factor Two modules with a maximum of four outputs can be installed
- Temperature inputs (EEM-TEMP-MA600, Order No. 2901949)
Module for measuring temperature from up to three PT100 temperature sensors from -20°C ... + 150°C. The ambient temperature in the direct vicinity of the module can be acquired from -10°C ... +55°C.

3 Operating and indication elements



Figure 3-1 Operating and indication elements

1. Pushbuttons with dual functionality:
Normal mode: display measured values
Programming mode: change configuration
2. Backlit LCD
3. Display measured values in relevant conductor
4. Measured value
5. Unit
6. Current measurement as a % bar indicator
7. Frequency display
8. Alarm relay 1 (if installed)
9. Alarm relay 2 (if installed)
10. Energy display
11. Display of active communication (if optional communication module is installed)
12. Display for recording the real energy (flashes for every kWh)

4 Mounting and installation



Avoid being in close proximity to systems that can generate electromagnetic interference. In addition, avoid mechanical vibrations with acceleration rates greater than 1g (9.81 m/s²) at frequencies below 60 Hz.

4.1 Cutout dimensions

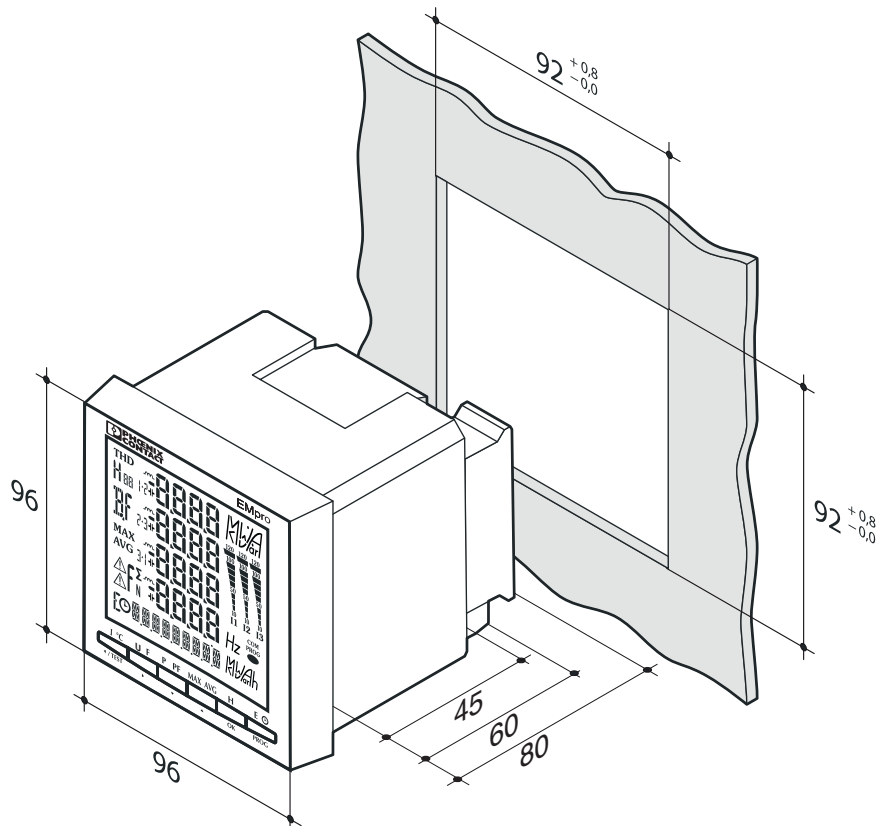


Figure 4-1 Cutout dimensions

4.2 Mounting

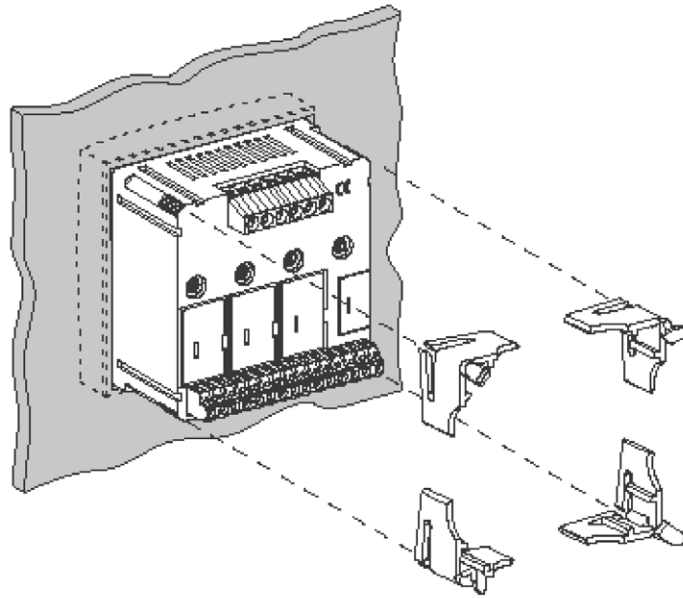


Figure 4-2 Mounting

To ensure that the device is securely placed on the front panel, the device must be pressed into the mounting slot from the front and then secured from behind using the four clamps provided.

To mount the device, proceed as follows:

1. Press the device into the mounting slot from the front and hold it in this position.
2. Secure the device from behind with the four clamps, as shown in Figure 4-2.
3. Push the clamps as far as they will go onto the latch, until the device is securely positioned and the clamps snap into place.

4.3 Pin assignment

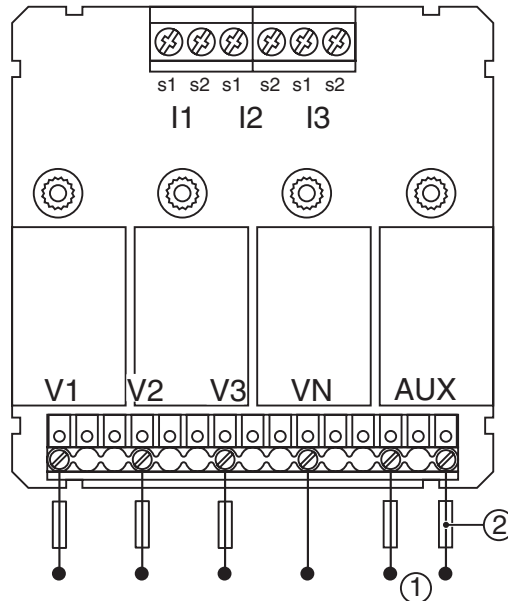


Figure 4-3 Pin assignment

- | | |
|---|--|
| <p>① Supply voltage range (AUX):</p> <p>② Fuse:</p> <p>I1, I2, I3</p> <p>V1, V2, V3, VN</p> | <p>110 ... 400 V AC $\pm 10\%$ at 50/60 Hz
120 ... 350 V DC $\pm 20\%$</p> <p>0.5 A gG/BS 88 2A gG/0.5 A class CC</p> <p>Connection of measured currents:
S1 (input)
S2 (output)</p> <p>Connection of measured voltage</p> |
|---|--|



Maximum tightening torque for the respective screws: **0.4 Nm**.



DANGER: Risk of electric shock

When you disconnect the device, you must short-circuit the secondary side of the current transformer.

A URTK6 (Order No. 3026272) transformer disconnect terminal block can be used.

4.4 Installation

The device is intended for connection to various mains types in two, three or four wire mains networks with symmetrical or asymmetrical load.



When measuring by means of transformers, the accuracy is greatly influenced by the quality of the transformers used.

4.4.1 External current transformers

When selecting the current transformer, the secondary nominal current must be 1 A or 5 A. The primary nominal current is determined by the current consumption of the load. Appropriate PACT current transformers can be found in the Phoenix Contact INTERFACE catalog.



DANGER: Risk of electric shock

Only install current transformers and corresponding measuring devices when the power supply is disconnected.

Observe the order in which the current transformers are connected when wiring them (direction of current flow). Primary circuit: K-P1 -> L-P2; secondary circuit: k-S1 -> I-S2

When the current transformer is operated with an open secondary circuit, hazardous voltages may occur at the secondary terminal blocks.

4.4.2 Three-phase network with asymmetrical load (4NBL)

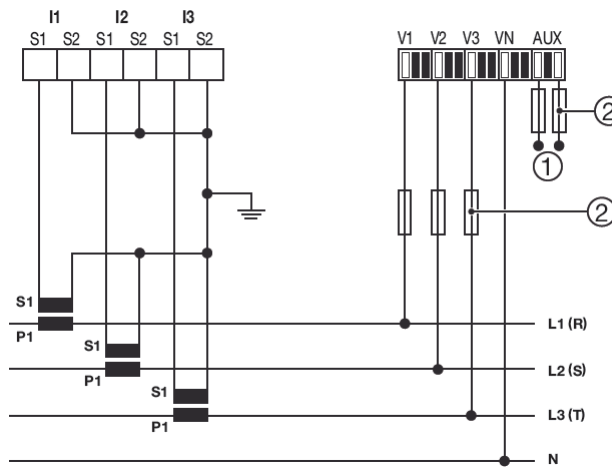


Figure 4-4 Three-phase network with asymmetrical load (4NBL)

- ① **Supply voltage range:** 110 ... 400 V AC $\pm 10\%$ at 50/60 Hz
120 ... 350 V DC $\pm 20\%$
- ② **Fuse:** 0.5 A gG/BS 88 2A gG/0.5 A class CC

4.4.3 Three-phase network with asymmetrical load (3NBL)

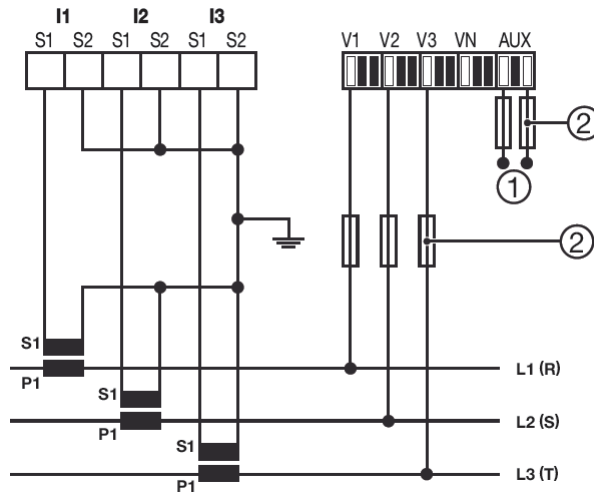


Figure 4-5 Measurement via 3 current transformers

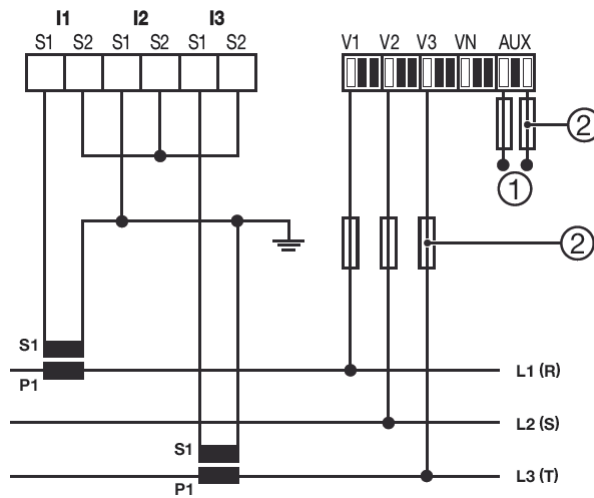


Figure 4-6 Measurement via 2 current transformers

- ① **Supply voltage range:** 110 ... 400 V AC $\pm 10\%$ at 50/60 Hz
120 ... 350 V DC $\pm 20\%$
- ② **Fuse:** 0.5 A gG/BS 88 2A gG/0.5 A class CC

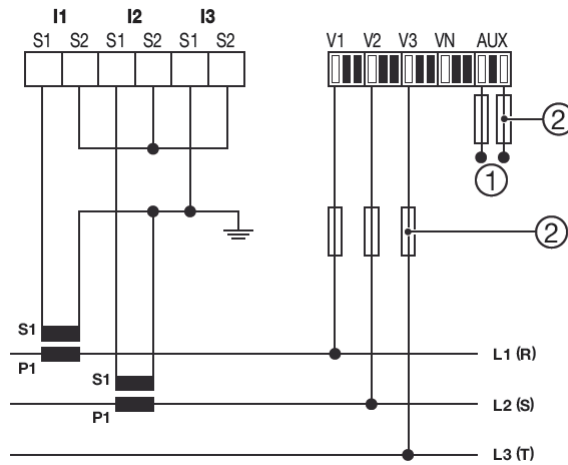


Figure 4-7 Measurement via 2 current transformers

- ① **Supply voltage range:** 110 ... 400 V AC $\pm 10\%$ at 50/60 Hz
120 ... 350 V DC $\pm 20\%$
- ② **Fuse:** 0.5 A gG/BS 88 2A gG/0.5 A class CC



The solution with two current transformers reduces the degree of accuracy of phases by 0.5%, whereby their current is calculated vectorially (without current transformer).

4.4.4 Three-phase network with symmetrical load (3BL/4BL)

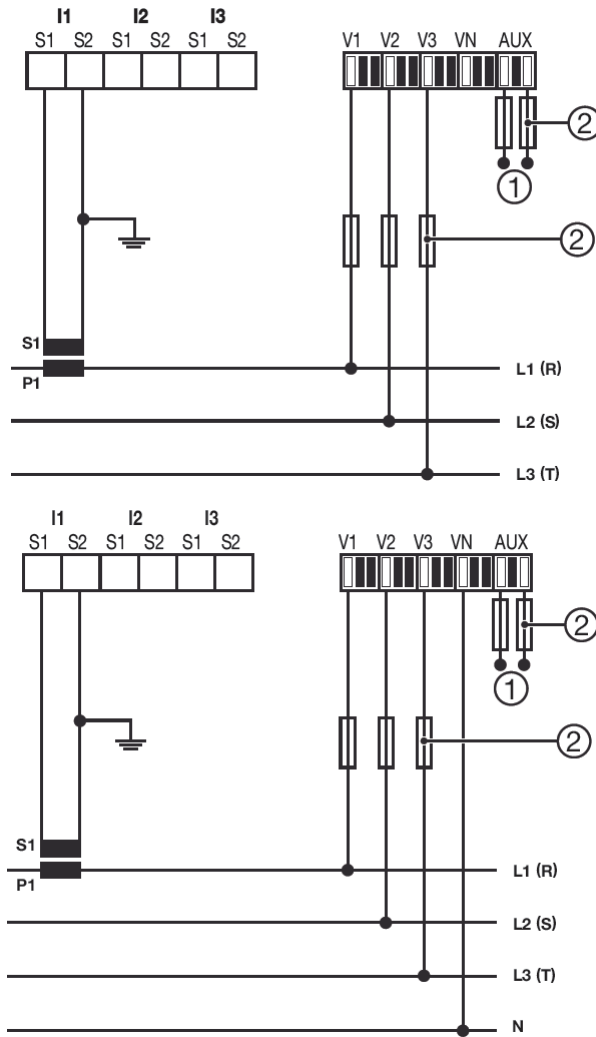


Figure 4-8 Three-phase network with symmetrical load (3BL/4BL)

- ① **Supply voltage range:** 110 ... 400 V AC $\pm 10\%$ at 50/60 Hz
120 ... 350 V DC $\pm 20\%$
- ② **Fuse:** 0.5 A gG/BS 88 2A gG/0.5 A class CC



The solution with a current transformer reduces the accuracy of phases by 0.5%, whereby their current is calculated vectorially (without current transformer).

4.4.5 Two-phase network (2BL)

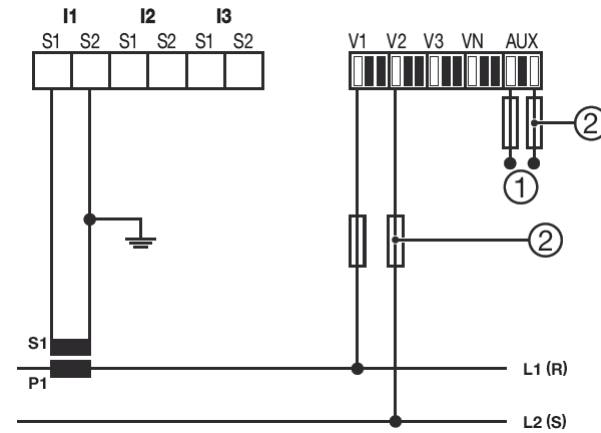


Figure 4-9 Two-phase network (2BL)

- ① **Supply voltage range:** 110 ... 400 V AC $\pm 10\%$ at 50/60 Hz
120 ... 350 V DC $\pm 20\%$
- ② **Fuse:** 0.5 A gG/BS 88 2A gG/0.5 A class CC

4.4.6 Single-phase network (1BL)

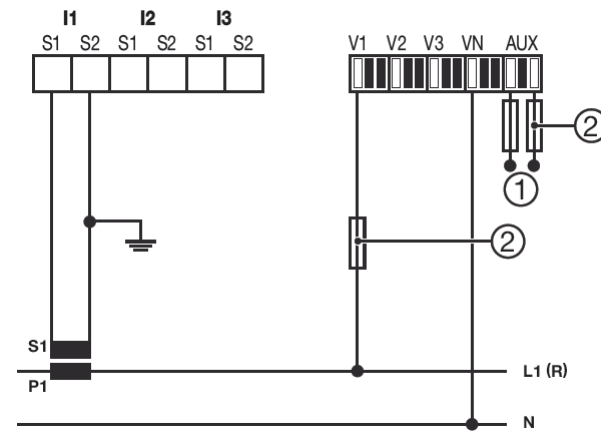


Figure 4-10 Single-phase network (1BL)

- ① **Supply voltage range:** 110 ... 400 V AC $\pm 10\%$ at 50/60 Hz
120 ... 350 V DC $\pm 20\%$
- ② **Fuse:** 0.5 A gG/BS 88 2A gG/0.5 A class CC

4.4.7 Voltage transducer

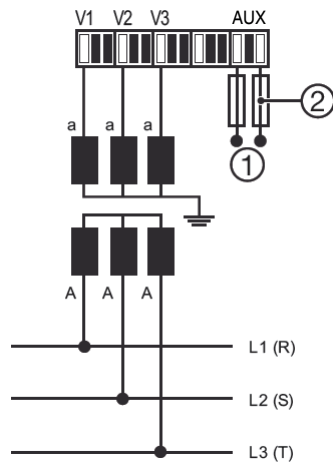


Figure 4-11 Voltage transducer

- | | | |
|---|------------------------------|--|
| ① | Supply voltage range: | 110 ... 400 V AC $\pm 10\%$ at 50/60 Hz
120 ... 350 V DC $\pm 20\%$ |
| ② | Fuse: | 0.5 A gG/BS 88 2A gG/0.5 A class CC |

4.5 Mounting extension modules

The extension modules are plugged into the back of the device and also secured in place with screws.

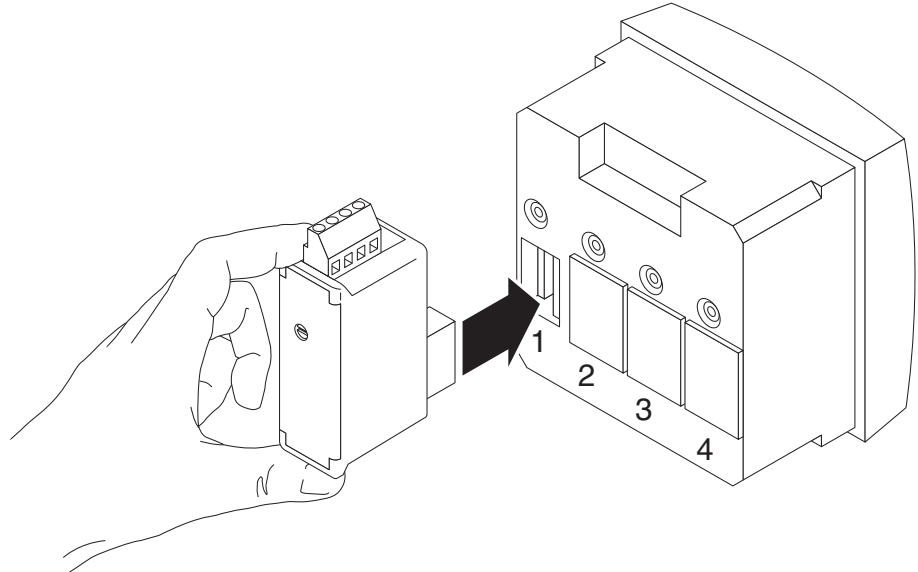


Figure 4-12 Mounting extension modules



You can find information about configuring the communication and extension modules in Section "Communication modules" on page 10-1.

Table 4-1 Installation overview

Designation	Order No.	Max. number	Space requirements	No. slots
EEM-RS485-MA600	2901367	1	1 slot	1 ... 4
EEM-ETH-MA600	2901373	1	2 slots	1 ... 4
EEM-ETH-RS485-MA600	2901374	1	2 slots	1 ... 4
EEM-PB-MA600	2901368	1	2 slots	1 ... 4
EEM-PB12-MA600	2901418	1	2 slots	1 ... 4
EEM-2DIO-MA600	2901371	3	1 slot	1 ... 4
EEM-MEMO-MA600	2901370	1	1 slot	2 or 3
EEM-2AO-MA600	2901475	2	1 slot	1 or 2
EEM-TEMP-MA600	2901949	1	1 slot	2 or 3

5 Configuration

The device can be configured via pushbuttons. The configuration is described in the following subsections.



To configure the EEM-MA600, press the gray buttons consecutively, as described in the respective example.

The corresponding configuration menu is displayed for the extension/communication module used. You will find the necessary configuration settings in Section "Communication modules" on page 10-1.

Button	Description
PROG	Open configuration mode (press and hold for 3 seconds)
▲ or ▼	Select the next menu item
▶	Open edit mode
◀ or ▶	In edit mode: select parameters/values to be changed
▲ or ▼	In edit mode: change parameters/values
OK	Confirm setting

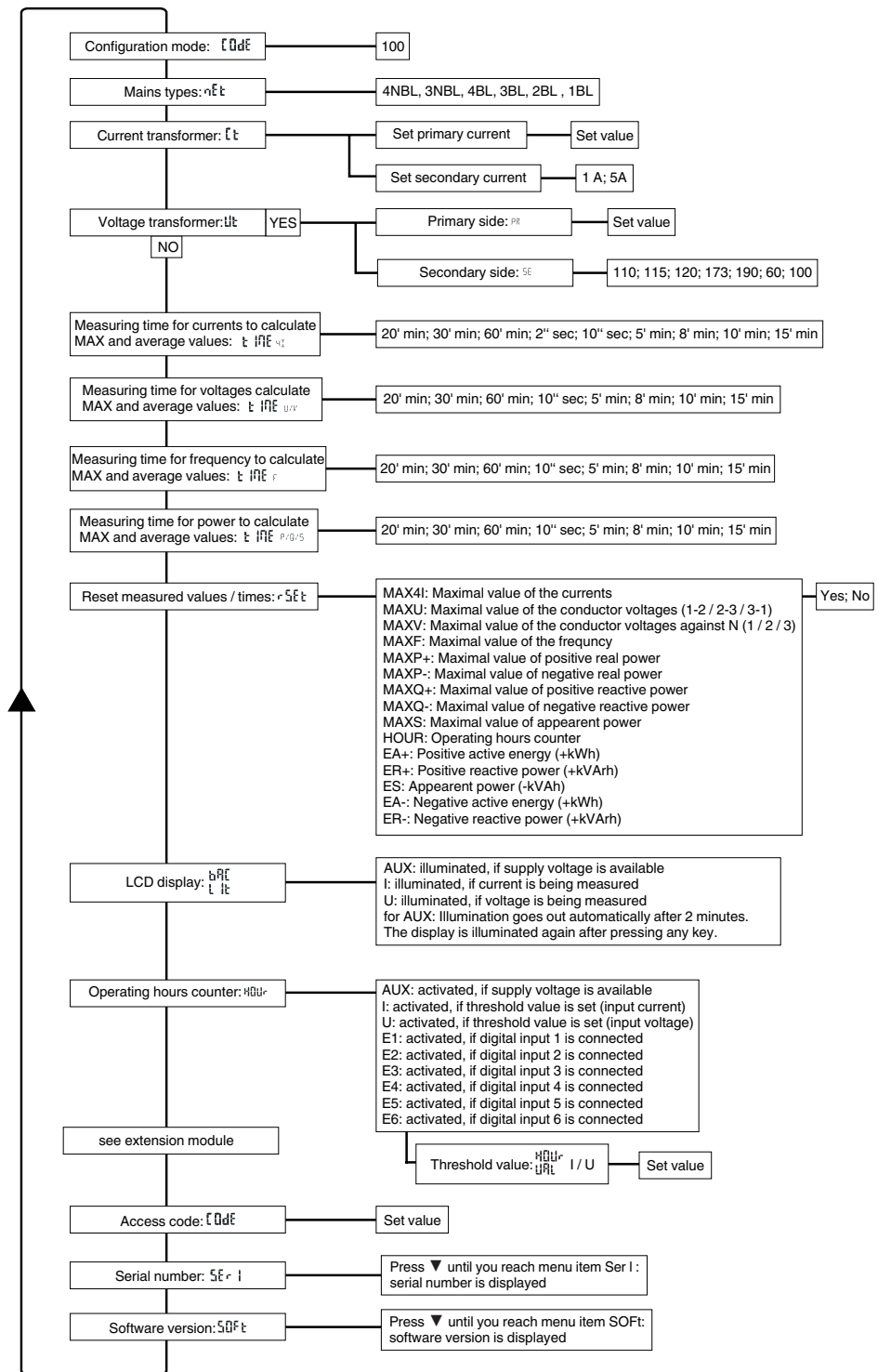


Figure 5-1 Flowchart

5.1 Configuration mode (PROG) – COdE 100



In configuration mode, the labeling below the pushbuttons applies.

Once the appropriate setting has been made and confirmed by pressing "OK", the next menu item is called automatically.

- To switch to configuration mode, press and hold the "PROG" button for a minimum of 3 seconds.
- Follow the instructions and enter "Code 100".
- Confirm with "OK".

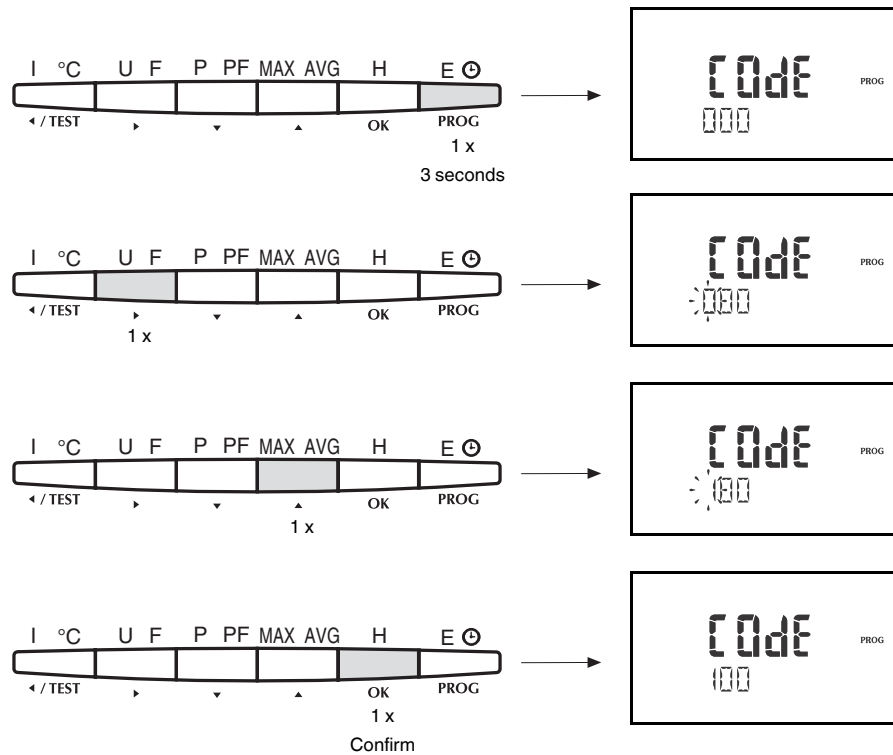


Figure 5-2 Switching to configuration mode

5.2 Example: configuring the device for a three-phase network with an asymmetrical load

NET = 3NBL

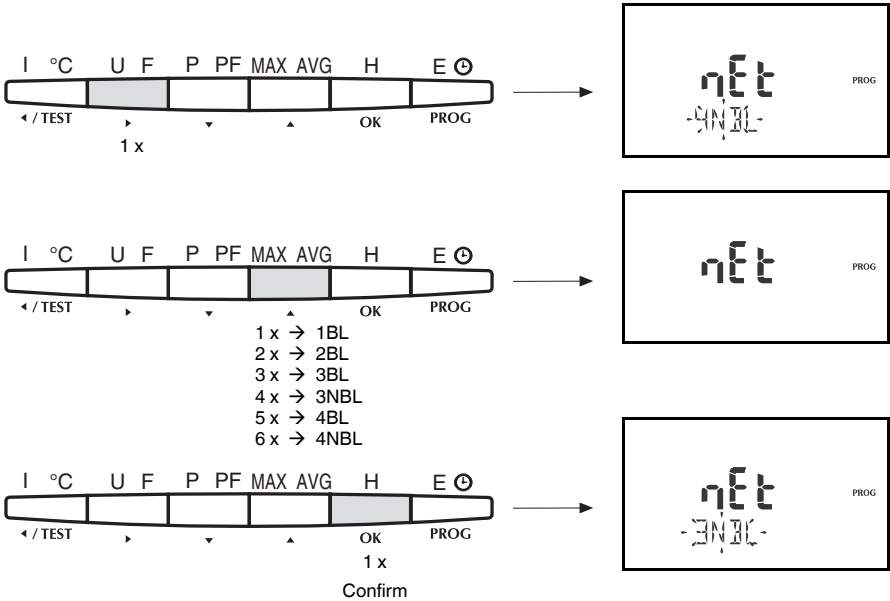


Figure 5-3 Setting a three-phase network with an asymmetrical load (3NBL)

5.3 Current transformers

Enter the ratio of the current transformers used as shown in the following example.

Example: transformer ratio CT = 1500/5A

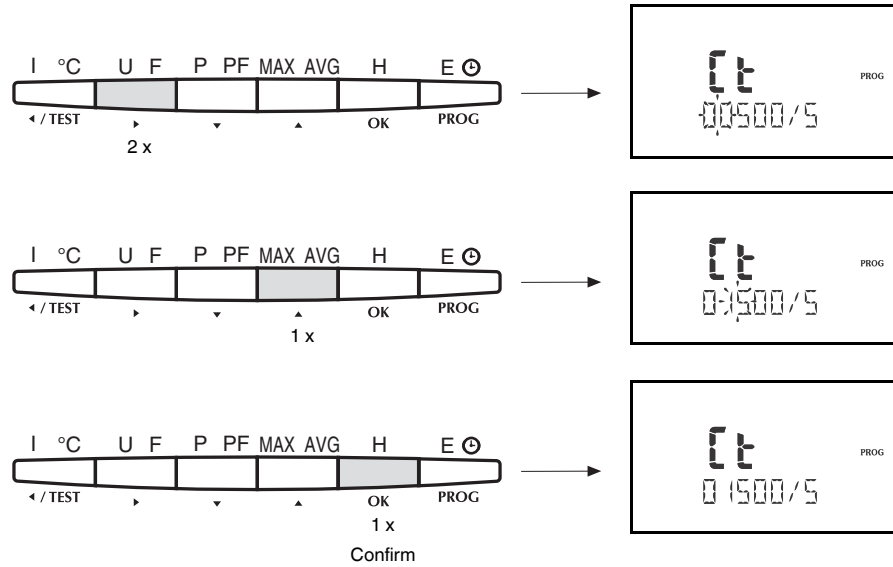


Figure 5-4 Setting the transformer ratio CT = 1500/5A



The transformer output can be set to 1 A or 5 A on the secondary side.

5.4 Voltage transducer

Select whether the connection is to be established via voltage transducers.

Example: connection via voltage transducers (YES/NO) Vt = YES

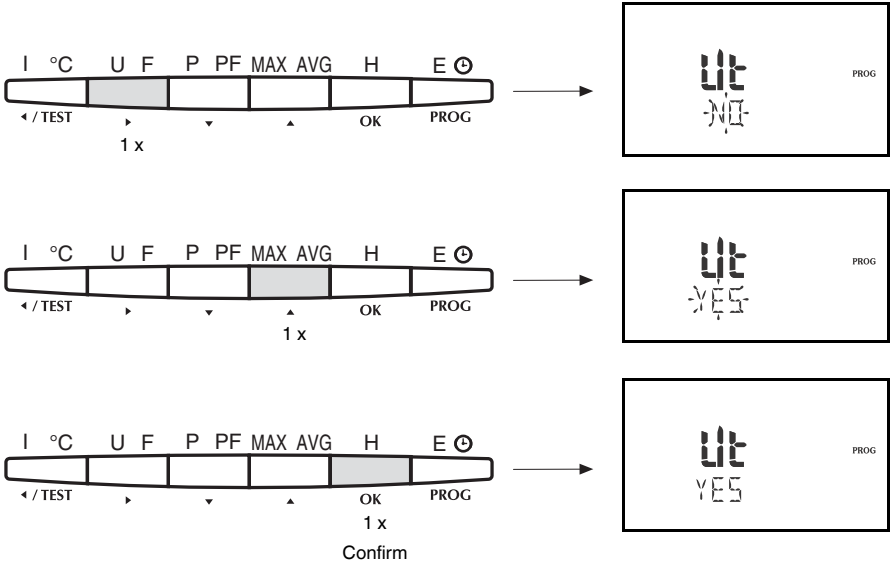


Figure 5-5 Setting voltage transducer connection to Vt = YES

5.4.1 Voltage transducer primary side

Set the primary side voltage as shown in the following example.

Example: primary side voltage = 20,000 V PR = 20,000

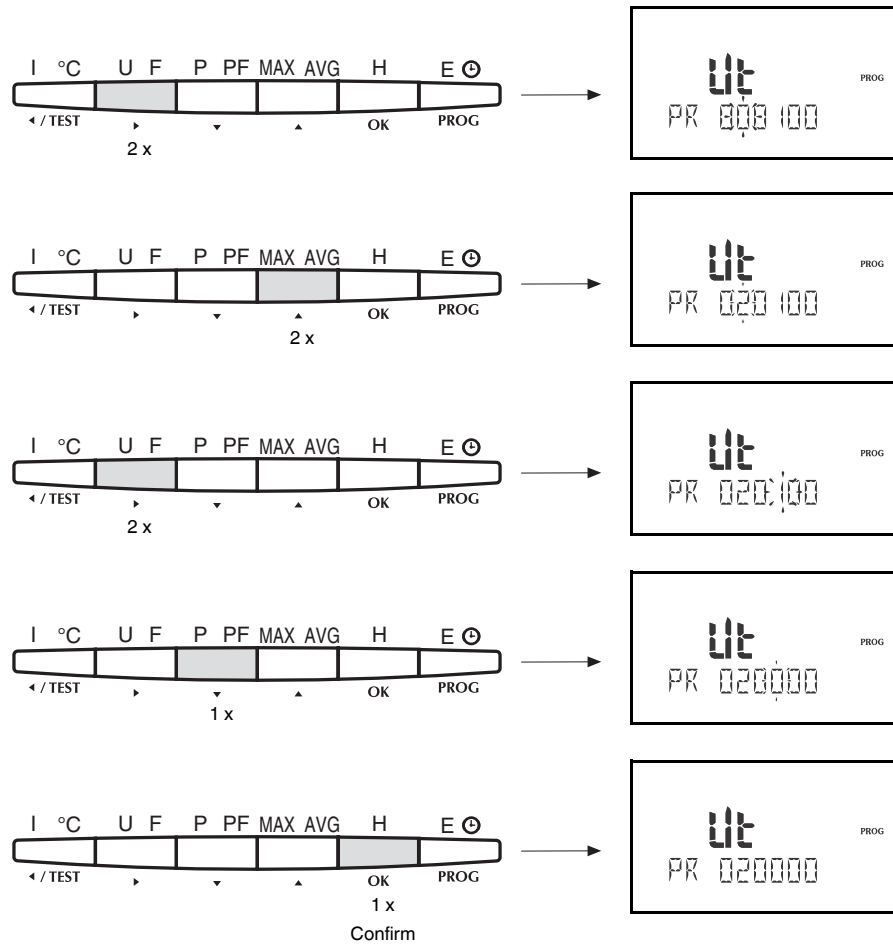


Figure 5-6 Setting voltage transducers on the primary side

5.4.2 Voltage transducer secondary side

Set the secondary side voltage as shown in the following example.

Example: secondary side voltage 110 V SE = 110

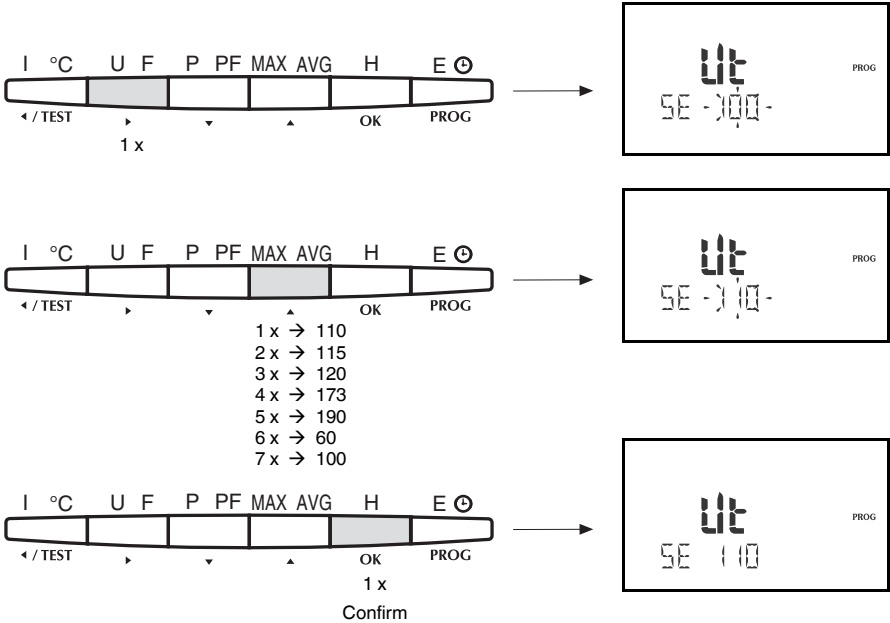


Figure 5-7 Setting voltage transducers on the secondary side

5.5 Measuring time of the currents

This value specifies over which period the currents are to be measured for determining the average and maximum values.

Example: measuring time of 20 minutes tIME 4I = 20

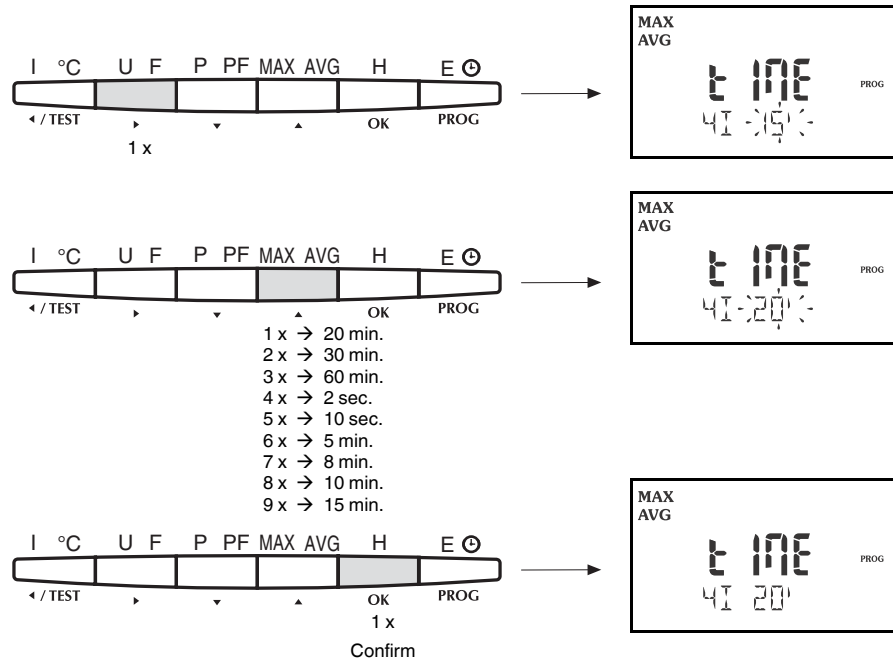


Figure 5-8 Setting the measuring time of the currents

5.6 Measuring time of voltages

This value specifies over which period the voltages are to be measured for determining the average and maximum values.

Example: measuring time of 20 minutes tIME U/V = 20

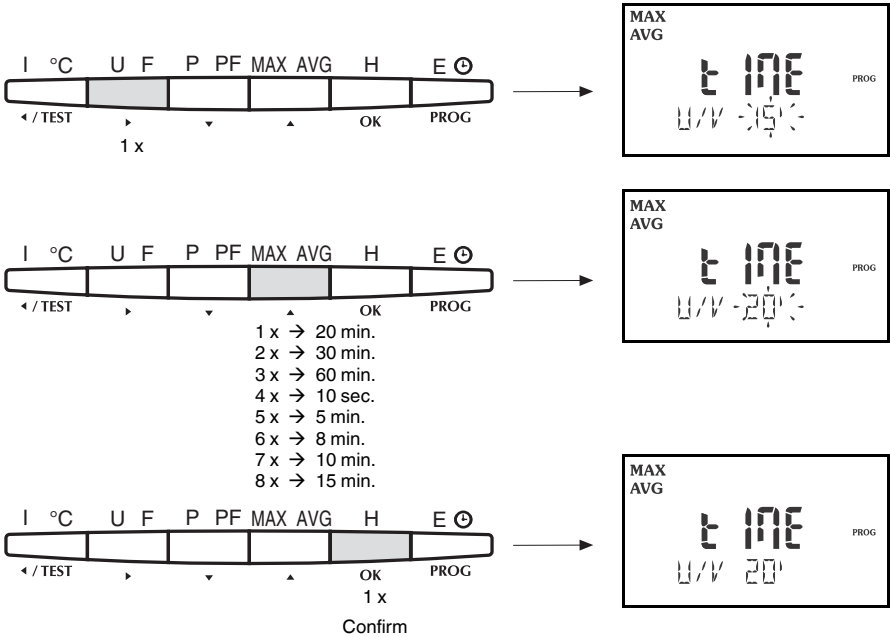


Figure 5-9 Setting the measuring time of voltages

5.7 Frequency measuring time

This value specifies over which period the frequency is to be measured for determining the average and maximum values.

Example: measuring time of 20 minutes tIME F = 20

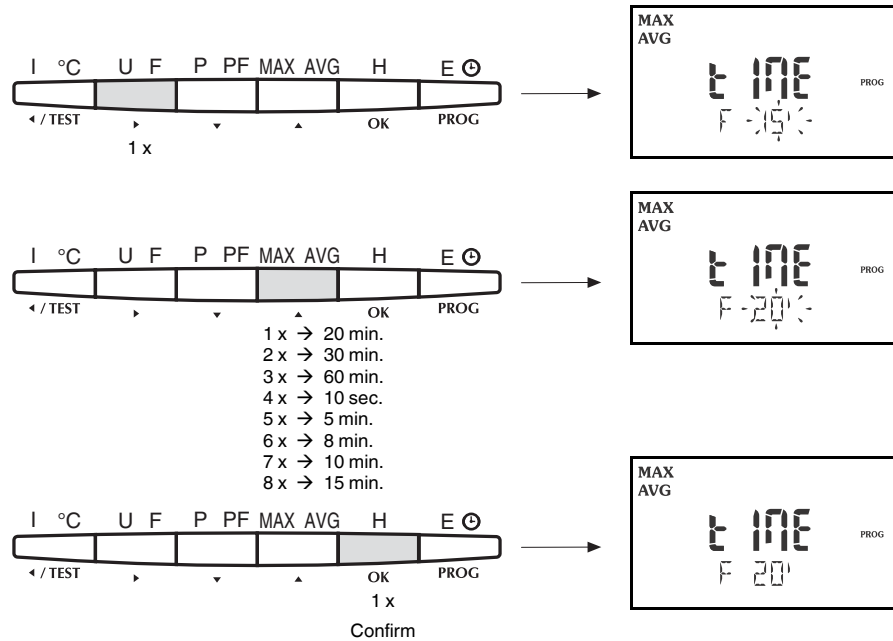


Figure 5-10 Setting the measuring time of the frequency

5.8 Power measuring time

This value specifies over which period the power is to be measured for determining the average and maximum values.

Example: measuring time of 20 minutes tIME P/Q/S = 20

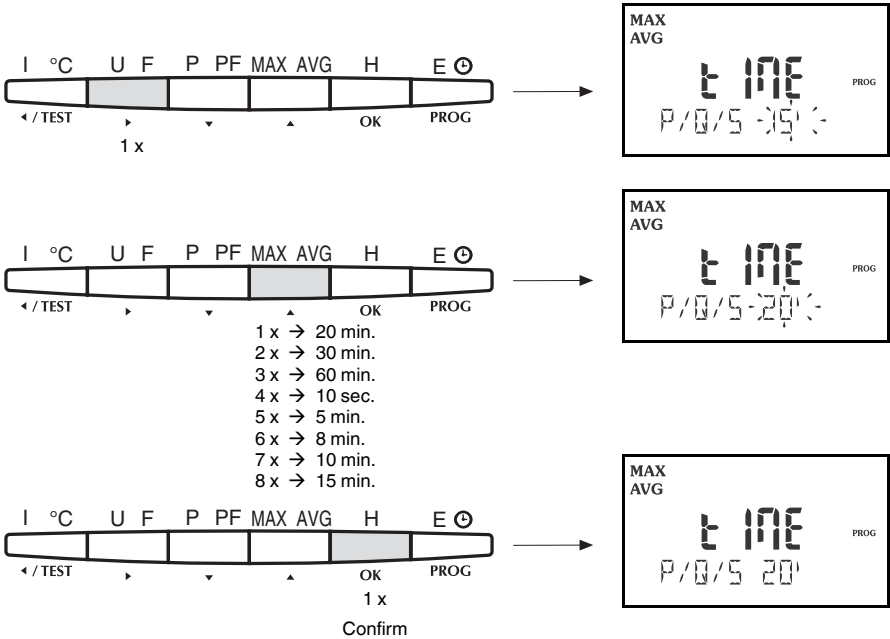


Figure 5-11 Setting the measuring time of the power

5.9 Reset

Example: rSET = EA+

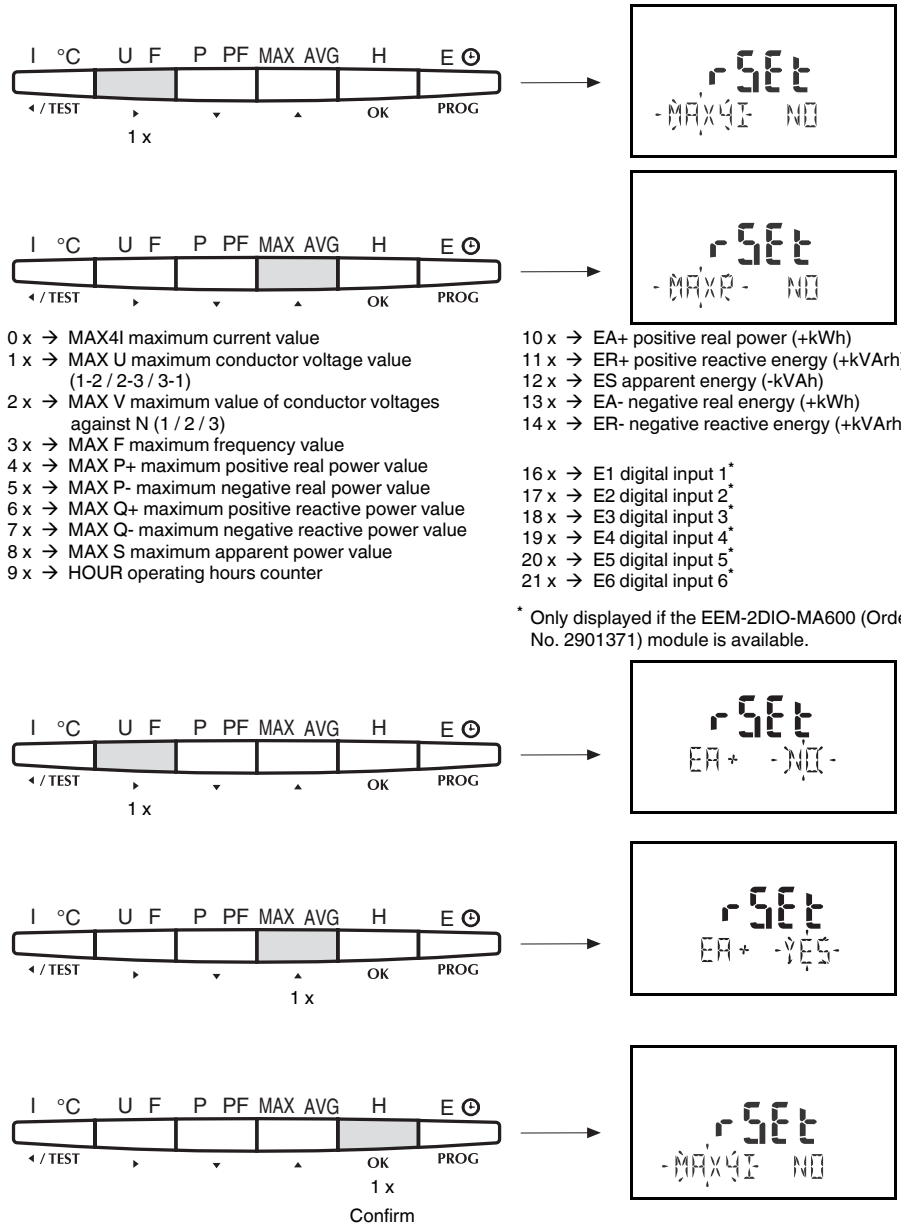


Figure 5-12 Setting restore rSET = EA+

5.10 Configuring the LCD

The LCD lighting can be configured in various ways.

Configuration options

The display is illuminated if:

- Supply voltage is applied (AUX)
- Current is measured (I)
- Voltage is measured (U)

For the AUX option (supply voltage is applied) , the display automatically goes out after 2 minutes. Press any button to illuminate the display again.

Example: the display is illuminated if supply voltage is applied
bACLIT = AUX

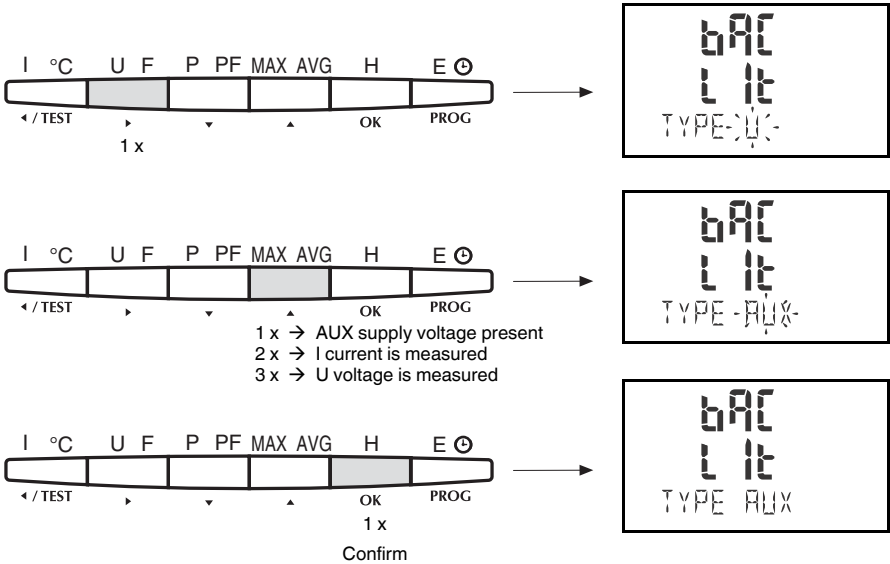


Figure 5-13 Configuring the LCD

5.11 Operating hours counter

Example: operating hours counter depending on the current flow. The counter is activated if the current is greater than 1000 A.

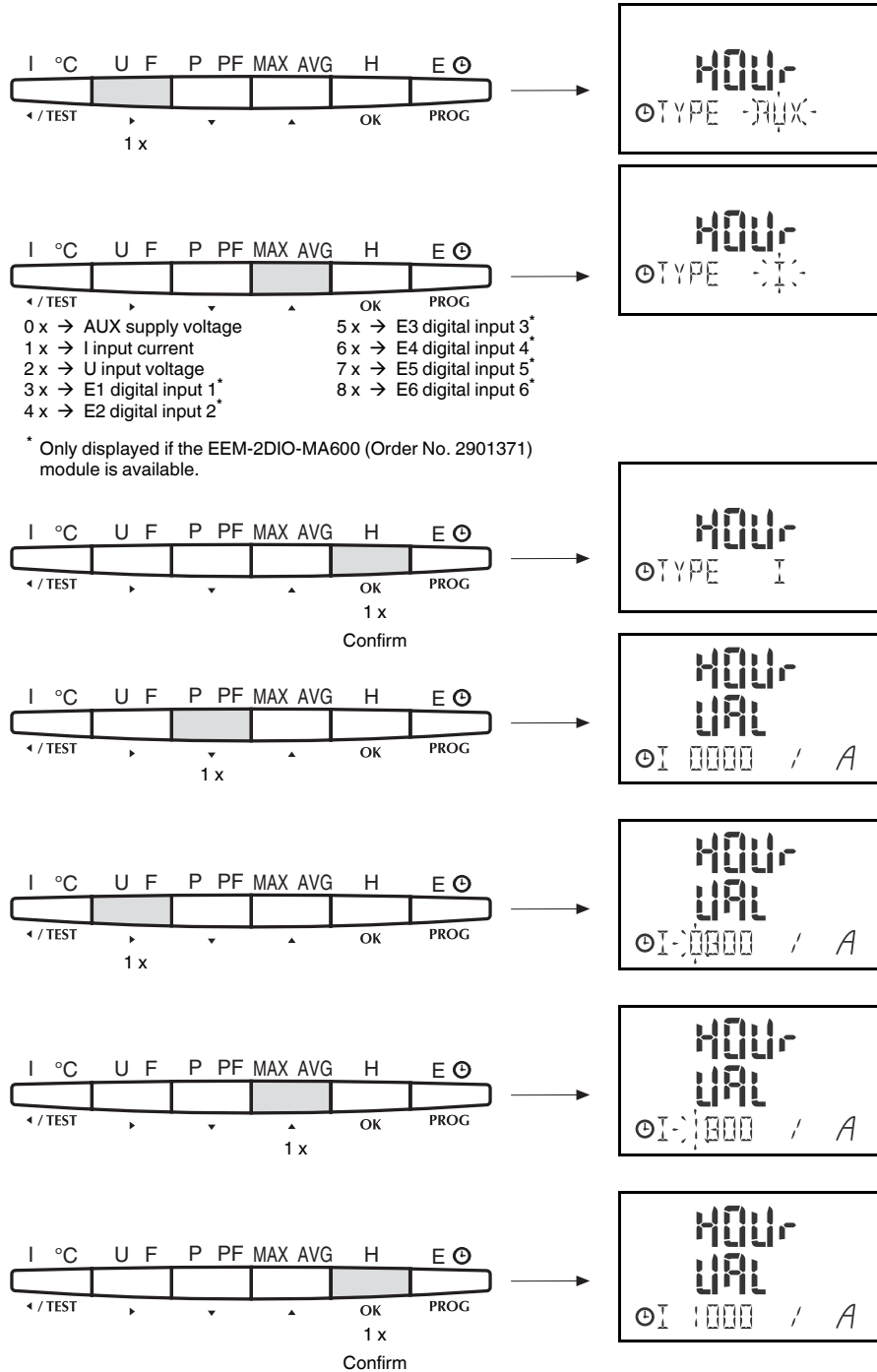


Figure 5-14 Setting a current-dependent operating hours counter

5.12 Changing the configuration mode access code

In order to change the configuration mode access code, proceed as follows:

Example: COdE = 200

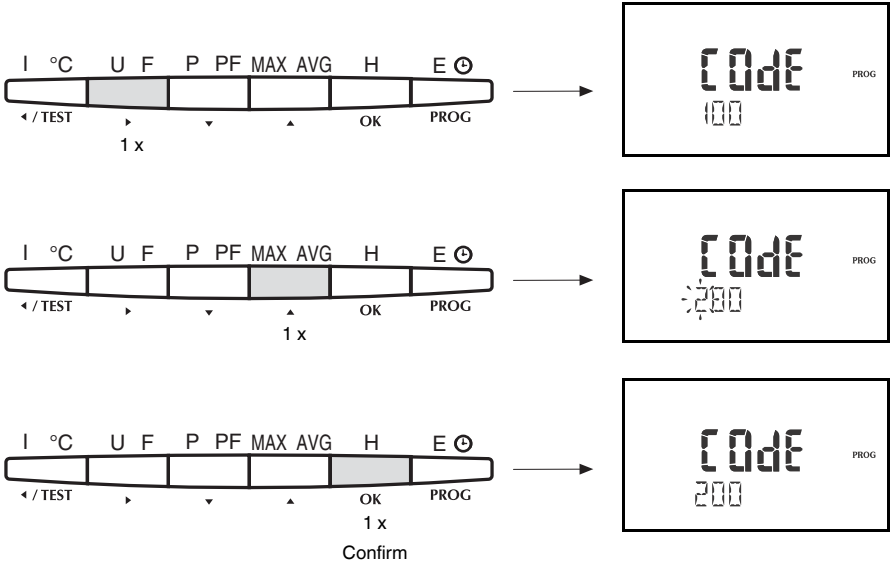
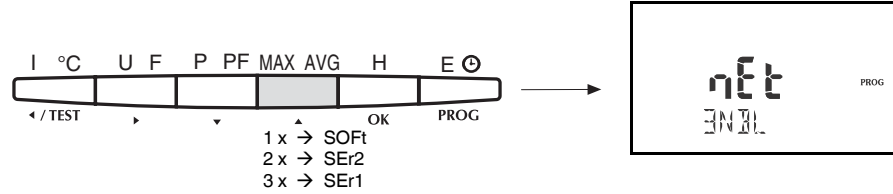


Figure 5-15 Changing the configuration mode access code

5.13 Displaying the software version and serial number

- Switch to programming mode.



Example: SOFt = 300



Example: SEr1 = 0320100

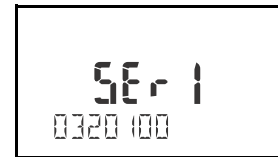


Figure 5-16 Displaying the software version and serial number

5.14 Exiting configuration mode

- Exit configuration mode by pressing and holding the "PROG" button for at least 3 seconds.

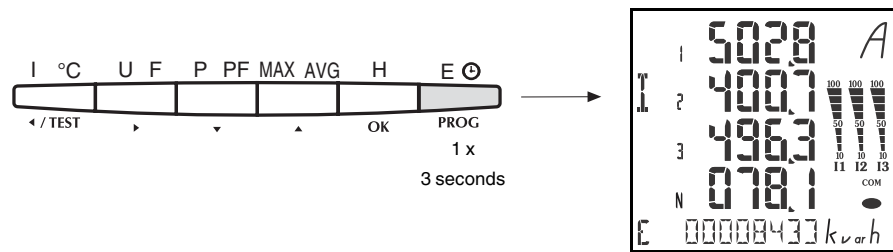


Figure 5-17 Exiting configuration mode

6 Operation – displaying the measured values

To gain fast access to the desired measured values, the device is equipped with six pushbuttons that enable direct access to the respective submenu.



In operating mode, the labeling above the pushbuttons applies.

Press the following pushbuttons to display the desired measured values:

Table 6-1 Pushbutton functions in operating mode

Pushbutton	Displays...
	Currents, temperatures (with extension module EEM-TEMP-MA600)
	Voltages, frequency
	Power, power factor
	Maximum values, average values
	Total harmonic deviation (TDH), harmonics
	Energy, operating hours, Date and time (with expansion module EEM-MEMO-MA600) Measured values via pulse input (with function module EEM-2DIO-MA600)

By pressing the appropriate pushbutton several times, further measured values can be displayed within the selected menu (see also "Displaying measured values" on page 2-2).

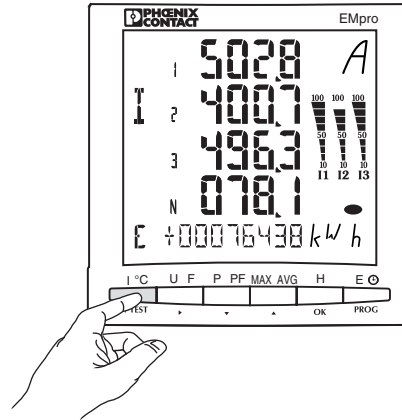
The figures in the following subsections explain the various measured value displays by means of pressing the pushbuttons several times.

6.1 Displaying currents and temperatures

Press button:

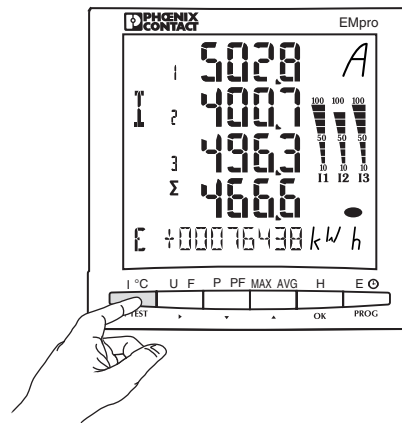


1 x



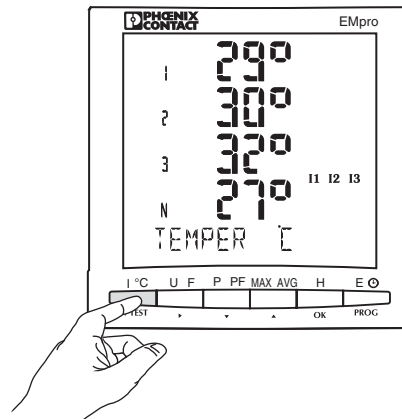
- Currents in conductors (I1, I2, I3)
- Current in neutral conductor (IN)
- Real energy (EA)

2 x



- Currents in conductors (I1, I2, I3)
- ISYS average current value $(I1 + I2 + I3) / 3$
- Real energy (EA)

3 x



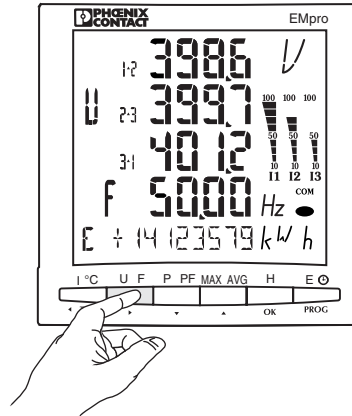
- Temperatures (extension module required)

6.2 Displaying the voltages and frequency

Press button:

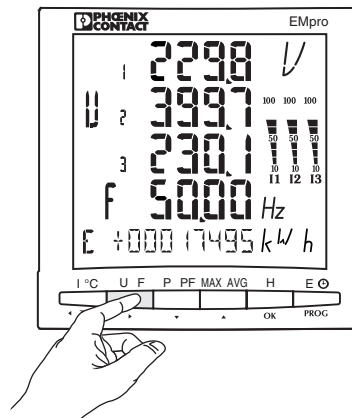


1 x



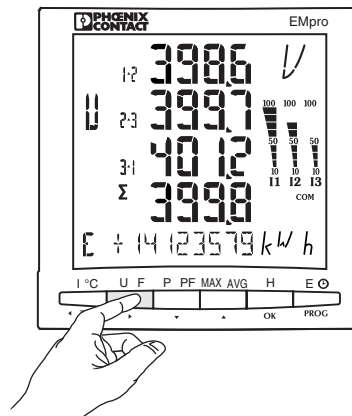
- Phase/phase conductor voltages (U12 + U23 + U31)
- Frequency (F)
- Real energy (EA)

2 x



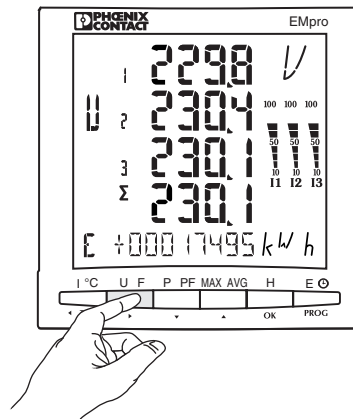
- Phase/N conductor voltages (V1, V2, V3)
- Frequency (F)
- Real energy (EA)

3 x



- Phase/N conductor voltages (V1, V2, V3)
- USYS average conductor voltage value $(U12 + U23 + U31)/3$
- Real energy (EA)

4 x



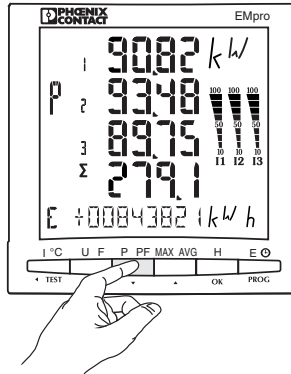
- Phase/N conductor voltages (V1, V2, V3)
- Phase/N VSYS average conductor voltage value $(V1 + V2 + V3)/3$
- Real energy (EA)

6.3 Displaying the power and power factors

Press button:

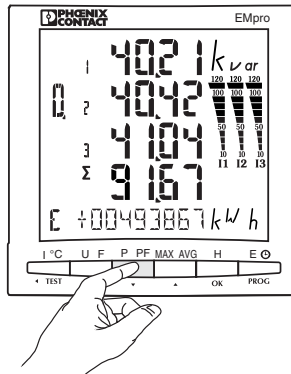


1 x



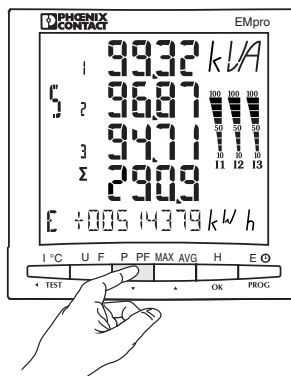
- Real power per phase (P1, P2, P3)
- Total real power (ΣP)
- Real energy (EA)

2 x



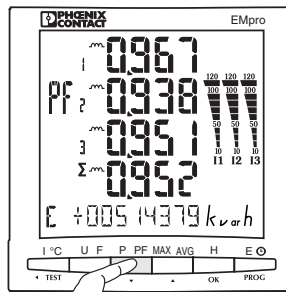
- Reactive power per phase (Q1, Q2, Q3)
- Total reactive power (ΣQ)
- Real energy (EA)

3 x

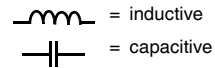


- Apparent power per phase (S1, S2, S3)
- Total apparent power (ΣS)
- Real energy (EA)

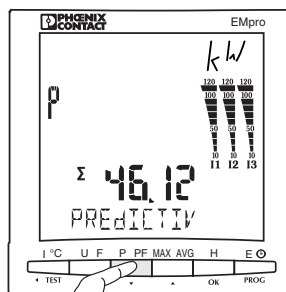
4 x



- Power factor per phase (PF1, PF2, PF3)
- Total power factor (ΣPF)
- Real energy (EA)

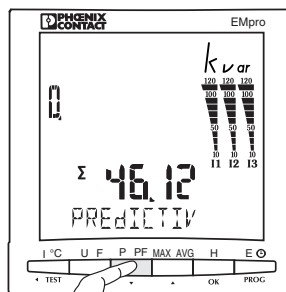


5 x



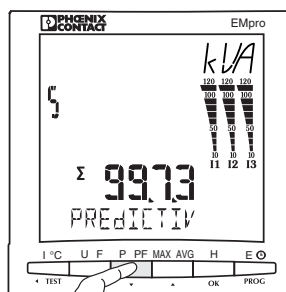
- Real power trend (ΣPPR)

6 x



- Reactive power trend (ΣQPR)

7 x



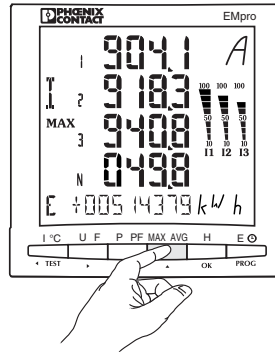
- Apparent power trend (ΣSPR)

6.4 Displaying the maximum and average values

Press button:

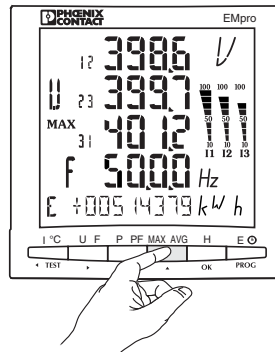


1 x



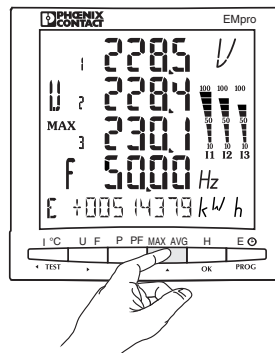
- Maximum current value (I1, I2, I3, IN)
- Real energy (EA)

2 x



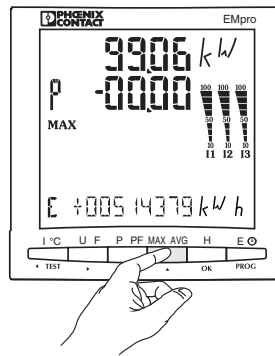
- Maximum phase/phase (U12, U23, U31) conductor voltage value
- Maximum frequency (F) value
- Real energy (EA)

3 x



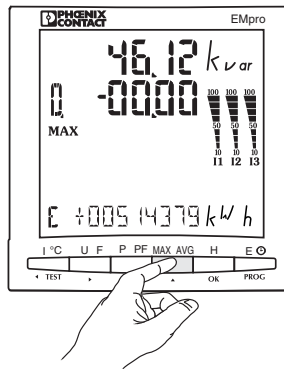
- Maximum phase/N conductor voltage value (V1 + V2 + V3)
- Maximum frequency (F) value
- Real energy (EA)

4 x



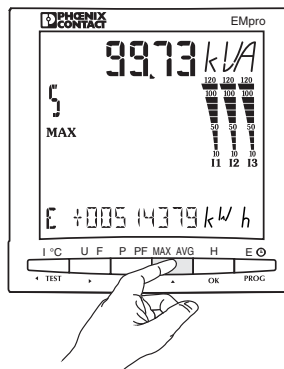
- Maximum real power (ΣP) value

5 x



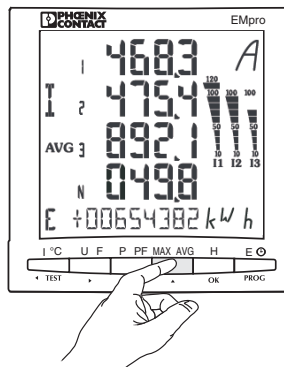
- Maximum reactive power (ΣQ) value

6 x



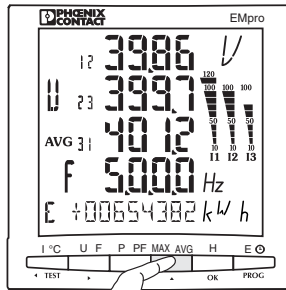
- Maximum apparent power (ΣS) value

7 x



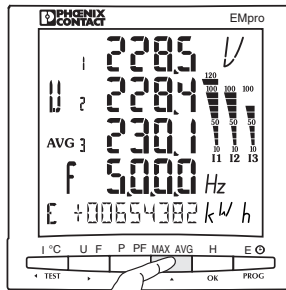
- Average current (I1, I2, I3, IN) value
- Real energy (EA)

8 x



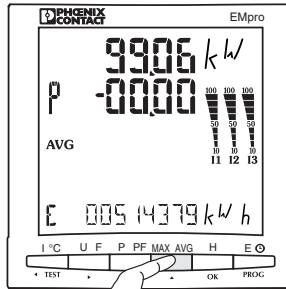
- Average phase/phase conductor voltage (U12 + U23 + U31) value
- Average frequency value (F)
- Real energy (EA)

9 x



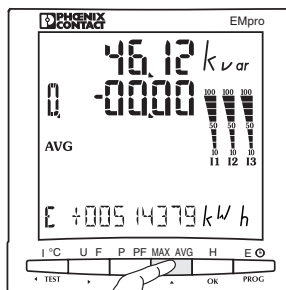
- Average phase/N conductor voltage (V1, V2, V3) value
- Average frequency value (F)
- Real energy (EA)

10 x



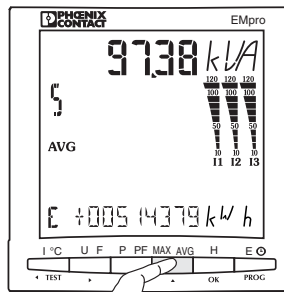
- Average real power value (ΣP)

11 x



- Average reactive power value (ΣQ)

12 x



- Average apparent power value (ΣS)

6.5 Displaying the total harmonic distortion and harmonics

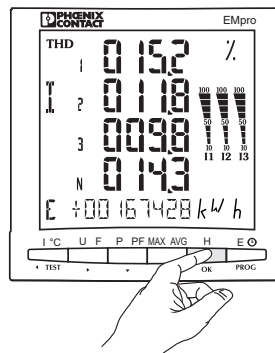
By pressing the "H" button, the following values are displayed:

1 touch:	THDI: total harmonic distortion of currents (THD I1, THD I2, THD I3, THD IN), real energy (EA)
2 touches:	Total harmonic distortion of phase/phase (THD U12, THD U23, THD U31) conductor voltages, real energy (EA)
3 touches:	Total harmonic distortion of phase/N (THD V1, THD V2, THD V3) conductor voltages, real energy (EA)
4 touches:	Content of 3rd harmonic for current (I1, I2, I3, IN), real energy (EA)
5...15 touches:	Content of 5th - 25th harmonic for currents (I1, I2, I3, IN), real energy (EA)
16 touches:	Content of 3rd harmonic for conductive voltages (U12, U23, U31), real energy (EA)
17...27 touches:	Content of 5th - 25th harmonic for conductor voltages L/L (U12, U23, U31), real energy (EA)
28 touches:	Content of 3rd harmonic for conductor voltages phase/N (V1, V2, V3), real energy (EA)
29...39 touches:	Content of 5th - 25th harmonic of phase/N (V1, V2, V3) conductor voltages, real energy (EA)

Press button:

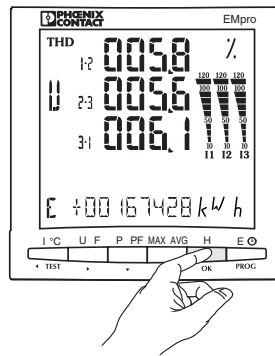


1 x



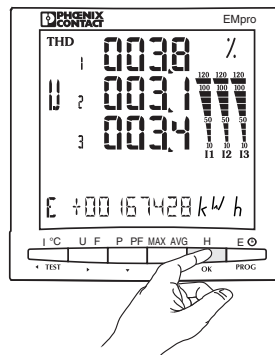
- Total harmonic distortion of currents (THD I1, THD I2, THD I3, THD IN)
- Real energy (EA)

2 x



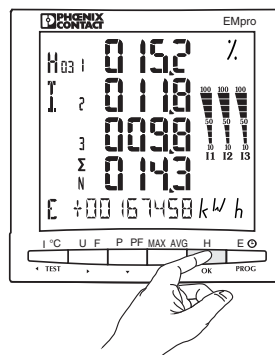
- Total harmonic distortion of phase/phase (THD U12, THD U23, THD U31) conductor voltages,
- Real energy (EA)

3 x



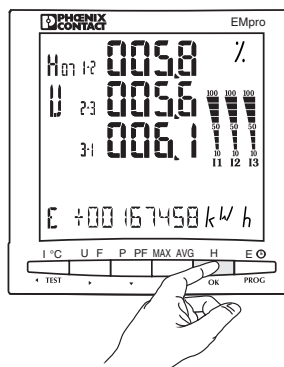
- Total harmonic distortion of phase/N (THD V1, THD V2, THD V3) conductor voltages
- Real energy (EA)

4 x



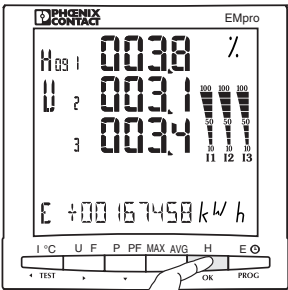
- Content of 3rd harmonic for currents (I1, I2, I3, IN)
- Real energy (EA)

18 x



- Content of 7th harmonic of L/L (U12, U23, U31) conductor voltages
- Real energy (EA)

31 x



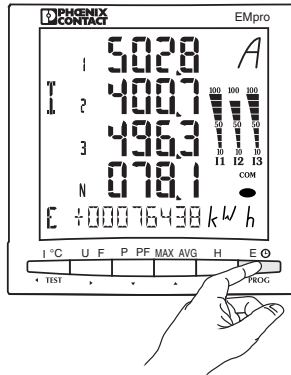
- Content of 9th harmonic for phase/N (V1, V2, V3) conductor voltages
- Real energy (EA)

6.6 Display of energy and operating hours

Press button:

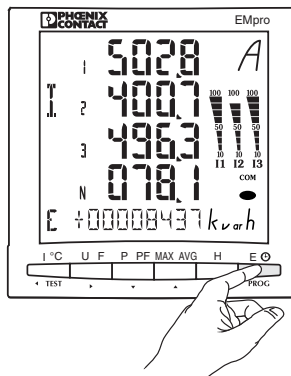


1 x



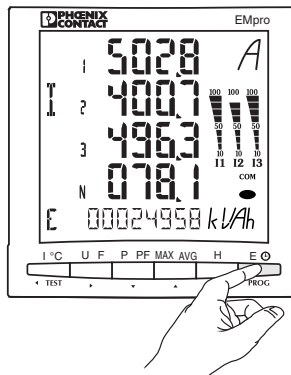
- Currents in conductors (I1, I2, I3)
- Current in neutral conductor (IN)
- Absorbed (positive) real energy (EA+)

2 x



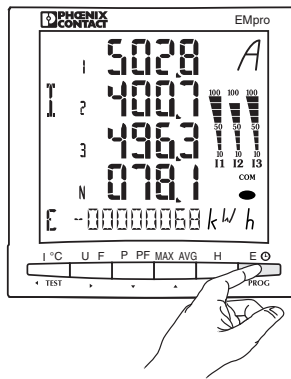
- Currents in conductors (I1, I2, I3)
- Current in neutral conductor (IN)
- Absorbed (positive) reactive energy

3 x



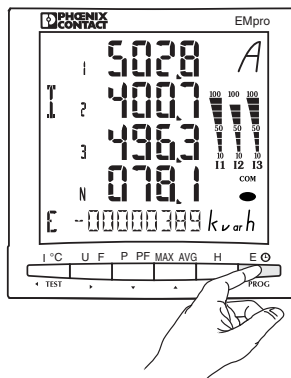
- Currents in conductors (I1, I2, I3)
- Current in neutral conductor (IN)
- Apparent energy

4 x



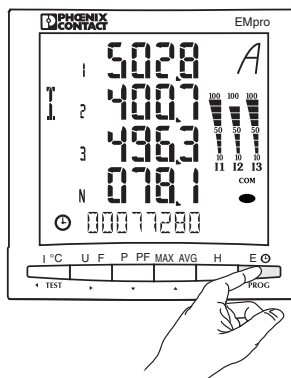
- Currents in conductors (I1, I2, I3)
- Current in neutral conductor (IN)
- Supplied (negative) real energy (EA-)

5 x



- Currents in conductors (I1, I2, I3)
- Current in neutral conductor (IN)
- Supplied (negative) reactive energy (ER-)

6 x



- Currents in conductors (I1, I2, I3)
- Current in neutral conductor (IN)
- Operating hours

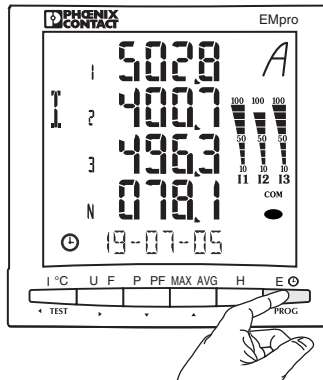
6.7 Date and time display

Press button:



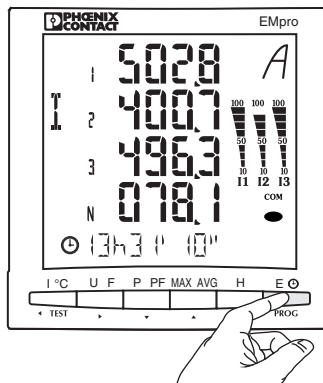
The display is only possible when the EEM-MEMO-MA600 storage module is connected.

7 x



- Date

8 x



- Time

6.8 Display the measured values via the pulse input

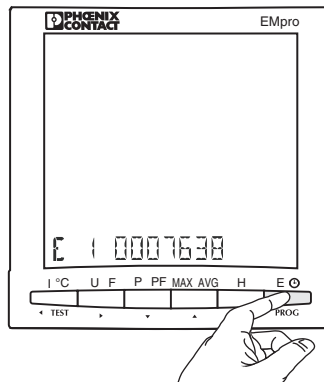
Press button:



You can display the counter pulses of the connected pulse input by pressing the E key several times.

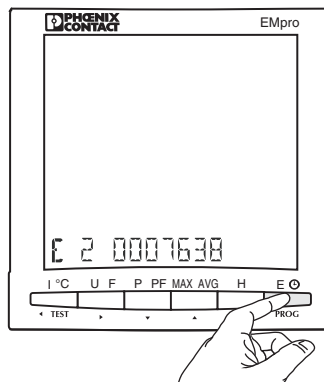
The display is only possible when function module EEM-2DIO-MA600 is connected.
 E 3, E 4 can be displayed when two EEM-2DIO-MA600 function modules are connected.
 E 5, E 6 can be displayed when three EEM-2DIO-MA600 function modules are connected.

1 x



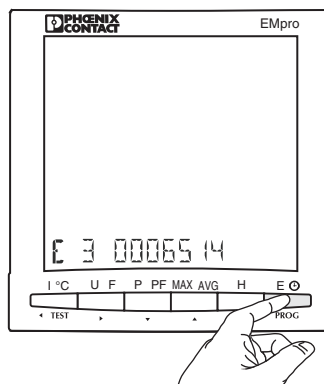
– Counter pulses E1

2 x



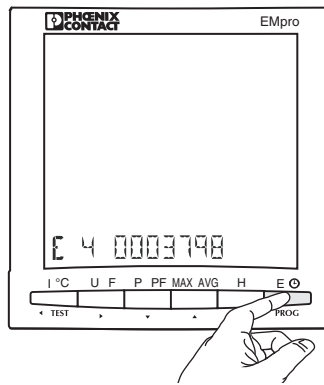
– Counter pulses E2

3 x



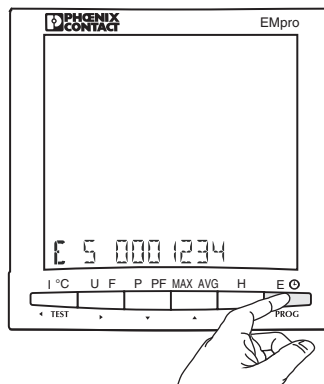
– Counter pulses E3

4 x



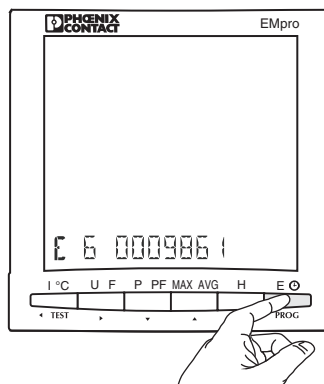
- Counter pulses E4

5 x



- Counter pulses E5

6 x



- Counter pulses E6

7 Function test



- To perform the function test, the device must be connected and ready for operation.
- The power factor (PF) of the system must be between $0.6 > PF < 1$. If the power factor is not within this range, this function cannot be used.
- The connections (without neutral conductors) are checked using the setting 4 BL/3 BL/2BL/1 BL.
- All connections (with neutral conductors) are checked using the 4 NBL and 3 NBL setting.

The following errors are displayed by the EEM-MA600:

Error	Description
Err 0	No error
Err 1/2/3	Current transformer connection phase 1/phase 2/phase 3
Err 4	Voltage between V1/V2
Err 5	Voltage between V2/V3
Err 6	Voltage between V3/V1

To eliminate Err 1, Err 2, and Err 3, change the order of the current connections. To eliminate Err 4, Err 5, and Err 6, change the order of the voltage connections of the measuring transducer.

7.1 Calling the function test

Press button



The test menu is opened when the "test button" is pressed and held down for at least three seconds.



The function test is started automatically if a test has not yet been performed.

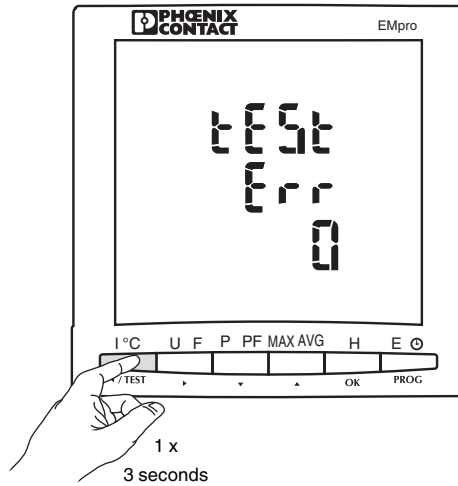


Figure 7-1 Calling the function test

- Hold down the "test button" for at least three seconds. The test starts automatically, and there are no errors in the example.

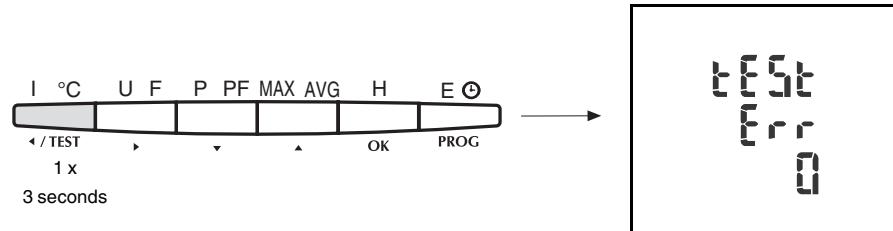


Figure 7-2 Calling the function test

- Press and hold down the "test button" again for at least three seconds; the device switches to display mode again.

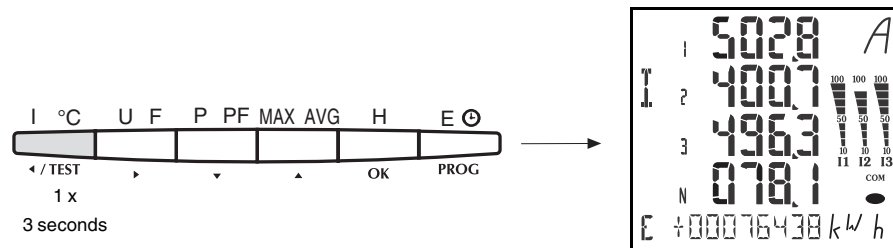


Figure 7-3 Exiting the function test

7.1.1 Automatic correction of current connections



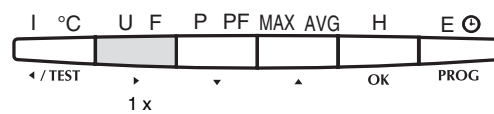
If the direction of current flow is mixed up due to the connection order being incorrect, the measurement signals can be corrected automatically. It is not necessary to rewire connection terminal blocks S1 (input) and S2 (output).

Example: Err 2 – Current transformer connection phase 2

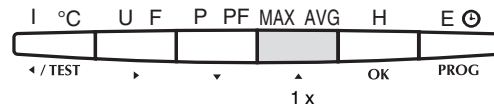
- Calling the function test



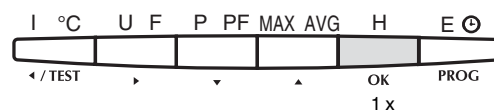
- Selecting correction



- Activating correction



- Confirming entry



- Exiting function test, display mode

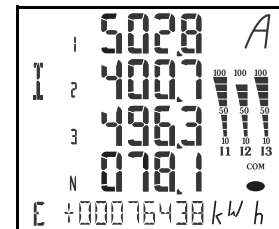


Figure 7-4 Automatic correction of current connections

7.2 Repeat function test (started manually)



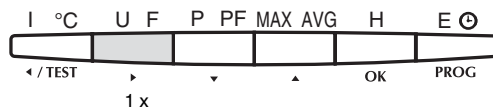
This menu is only displayed if the device has already been tested.

It is possible to perform an entirely new test, as described below.

- Calling the function test



- Selecting repeat function test



- Activating repeat function test

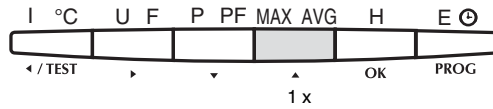


Figure 7-5 Performing repeat function test

- Confirm your entries with "OK".

8 Troubleshooting

This section contains a list of possible problems that may occur when working with the device. The action to be taken and the way in which the user must respond in order to solve the issue are described for each individual problem.

Error/fault	Remedy
Device not ready for operation	– Check the power supply
Backlighting goes out	– Check the configuration of the backlighting (see page 5-14)
Voltages = 0	– Check the voltage input
Currents = 0 or faulty	– Check the current input – Check the configuration of the current transformer ratios
Incorrect display of power, power factor, and energy	– Start the function test
No display of phases	– Check the configuration of the device (see page 5-4)

9 Special function modules

The EEM-MA600 can be extended with the following special function modules.

Module	Function	Description in...
EEM-MEMO-MA600	Memory module	Section "EEM-MEMO-MA600 configuration" on page 9-2
EEM-2DIO-MA600	Digital outputs	Section "EEM-2DIO-MA600 configuration" on page 9-15
EEM-2AO-MA600	Analog outputs	Section "EEM-2AO-MA600 configuration" on page 9-22

9.1 Connection and installation



You can find information about connecting and installing the special function modules in the associated package inserts at www.phoenixcontact.net/catalog.

9.2 Configuration

The special function modules can be configured using the pushbuttons on the front side of the EEM-MA600. The configuration is shown in the following subsections.



To configure the special function modules, press the gray buttons consecutively, as shown in the respective example.

In configuration mode, the labeling below the pushbuttons applies.

Button	Description
PROG	Open configuration mode (press and hold for 3 seconds)
▲ or ▼	Select the next menu item
▶	Open edit mode
◀ or ▶	In edit mode: select parameters/values to be changed
▲ or ▼	In edit mode: change parameters/values
OK	Confirm setting

9.2.1 EEM-MEMO-MA600 configuration

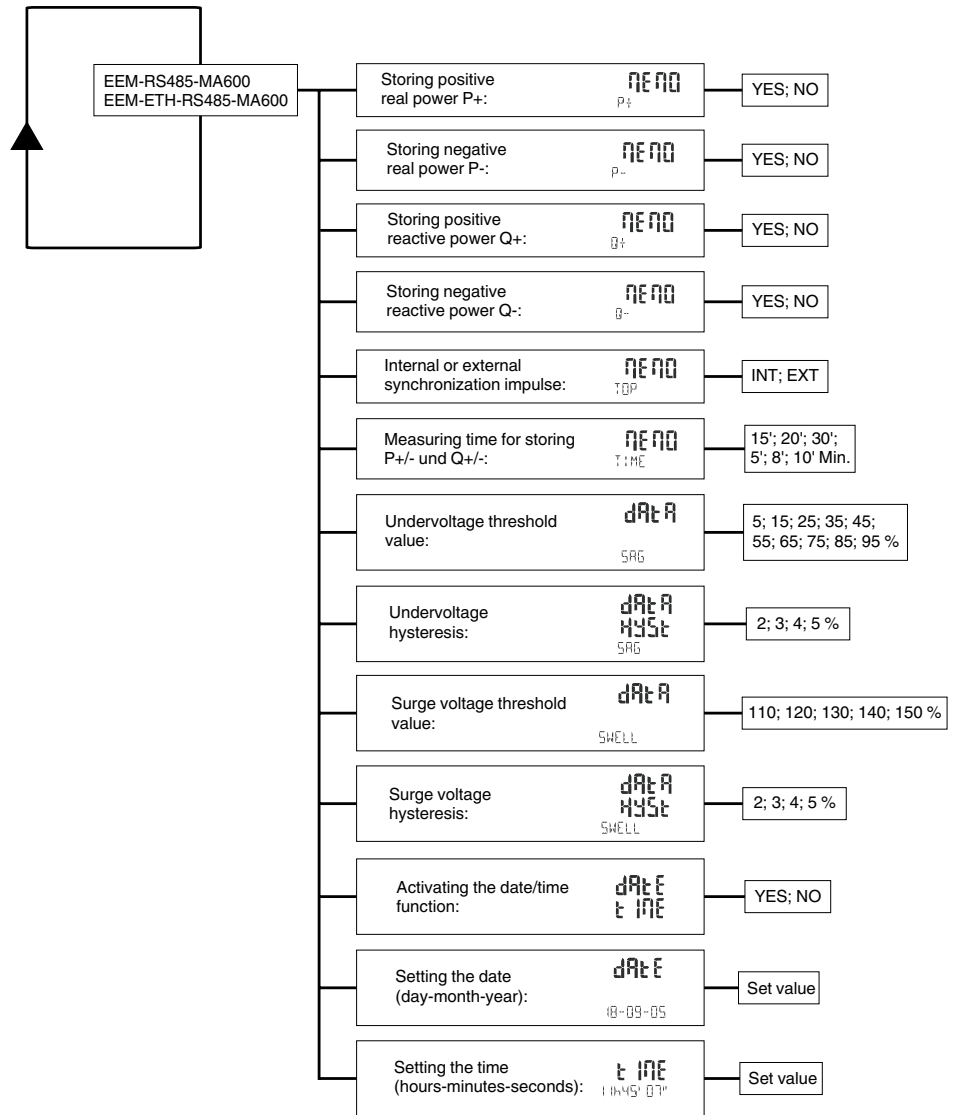


Figure 9-1 Flowchart

9.2.1.2 Selection of internal or external synchronization impulse

Select whether synchronization should take place via an internal or external impulse.

Example: MEMO TOP = External

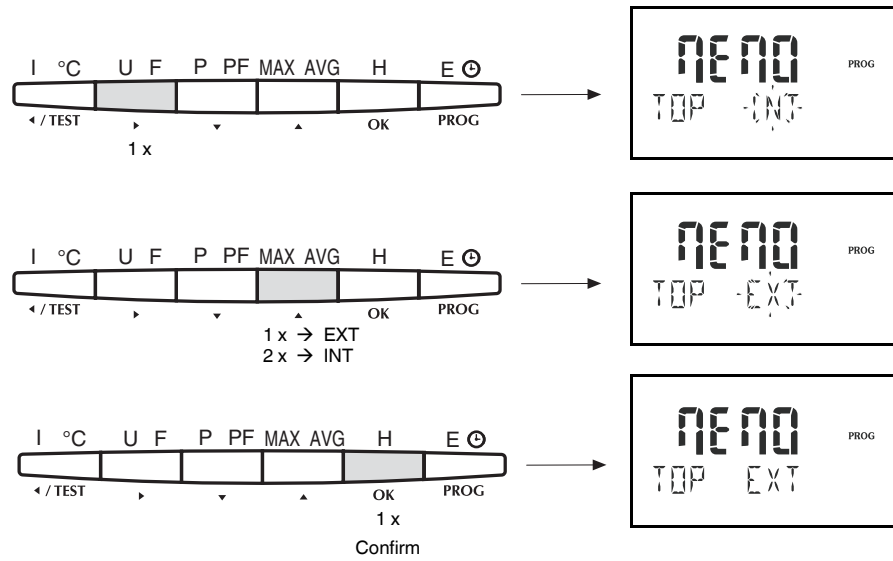


Figure 9-3 Select internal or external synchronization impulse

9.2.1.3 Setting the synchronization time (measurement duration)

Set the measurement duration as shown in the following example.

Example: MEMO TIME = 10 minutes

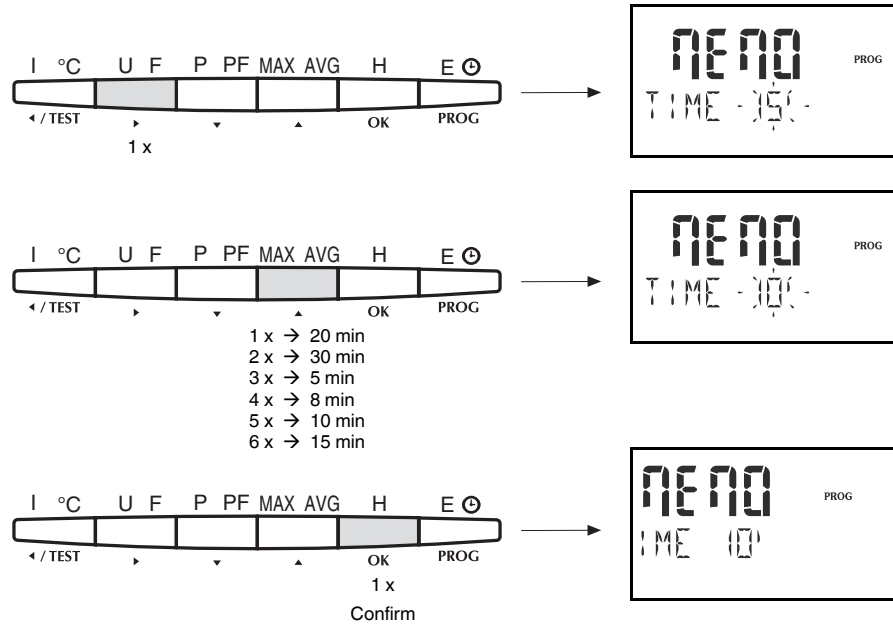


Figure 9-4 Setting synchronization time (measurement duration)

9.2.1.4 Setting the undervoltage threshold value

5 ... 95% of the nominal voltage is set as the undervoltage threshold value. Set the threshold value as shown in the following example.

Example: dAtA SAG = 15%

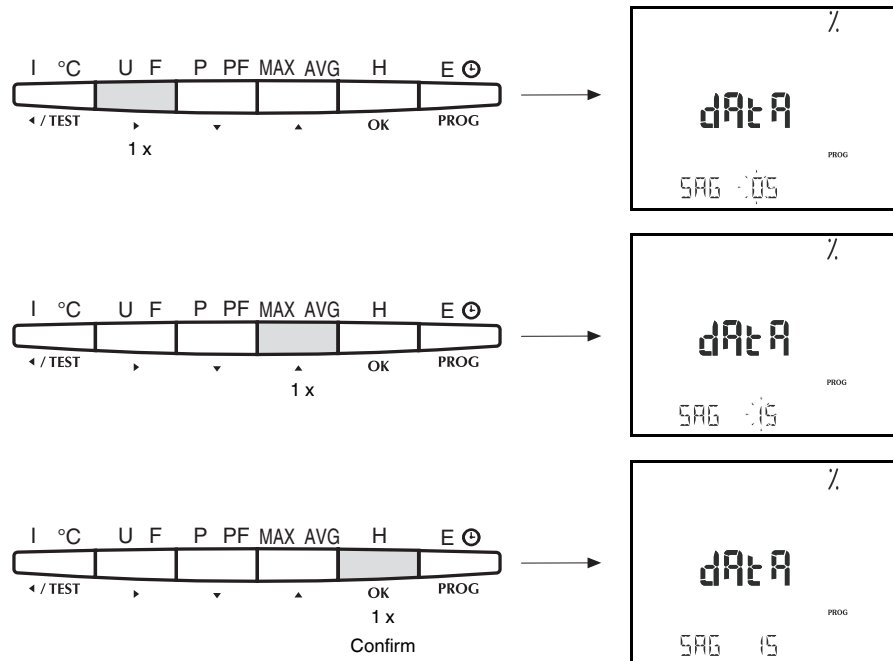


Figure 9-5 Setting the undervoltage threshold value

9.2.1.5 Setting the undervoltage hysteresis

The undervoltage hysteresis can be set for 2%, 3%, 4% or 5%. Set the hysteresis as shown in the following example.

Example: dAtA HYSt = 5%

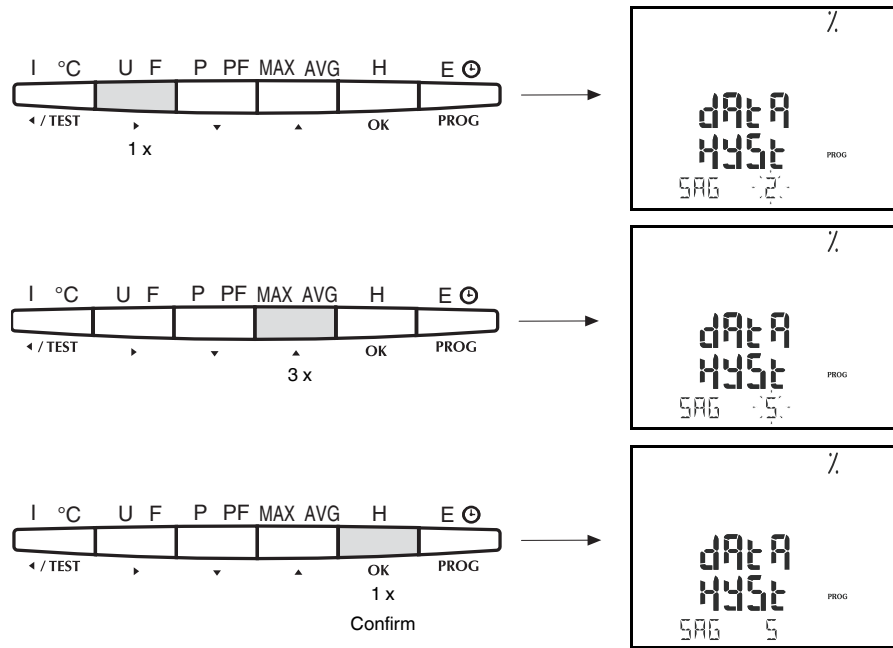


Figure 9-6 Setting the undervoltage threshold value

9.2.1.6 Setting the surge voltage threshold value

The surge voltage threshold value can be set for 110 ... 150% of the nominal voltage. Set the threshold value as shown in the following example.

Example: dAtA SWELL = 115%

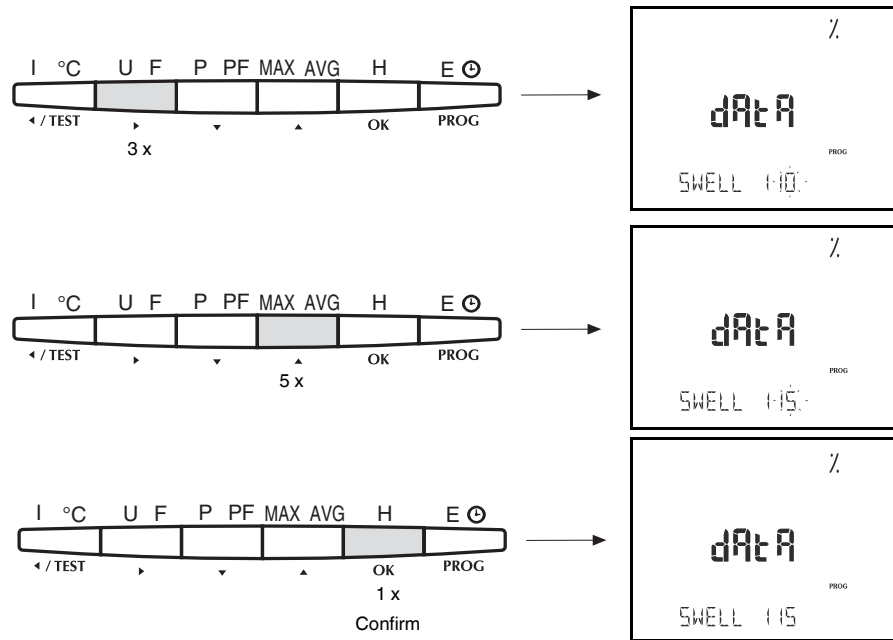


Figure 9-7 Setting the surge voltage threshold value

9.2.1.7 Setting the surge voltage hysteresis

The surge voltage hysteresis can be set at 2%, 3%, 4% or 5%. Set the hysteresis as shown in the following example.

Example: dAtA HYSt = 5%

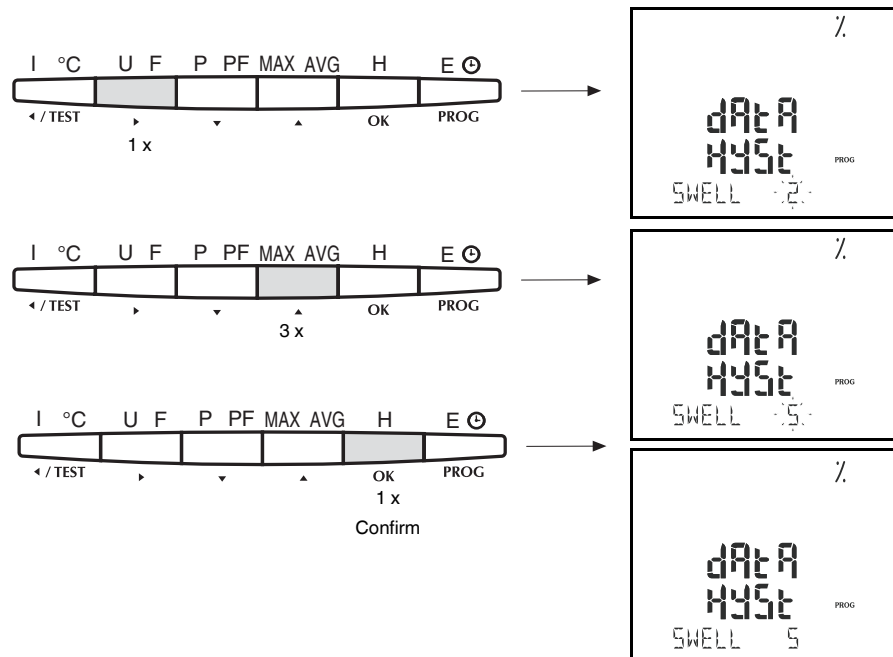


Figure 9-8 Setting the surge voltage hysteresis

9.2.1.8 Activating the date/time function

Activate the date/time function as shown in the following example.

Example: dAtE tIME = YES

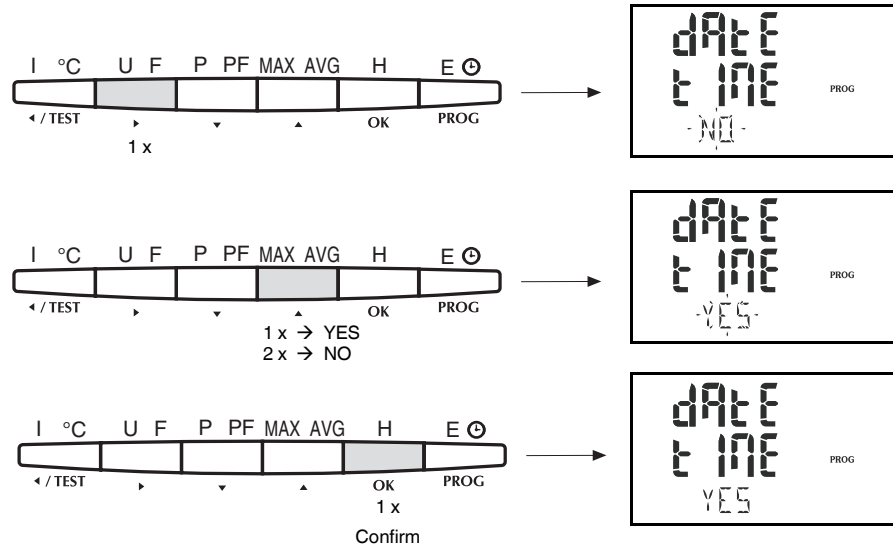


Figure 9-9 Activate date/time function

9.2.1.9 Setting the date

Set the date as shown in the following example.

Example: dAtE = 19-07-05

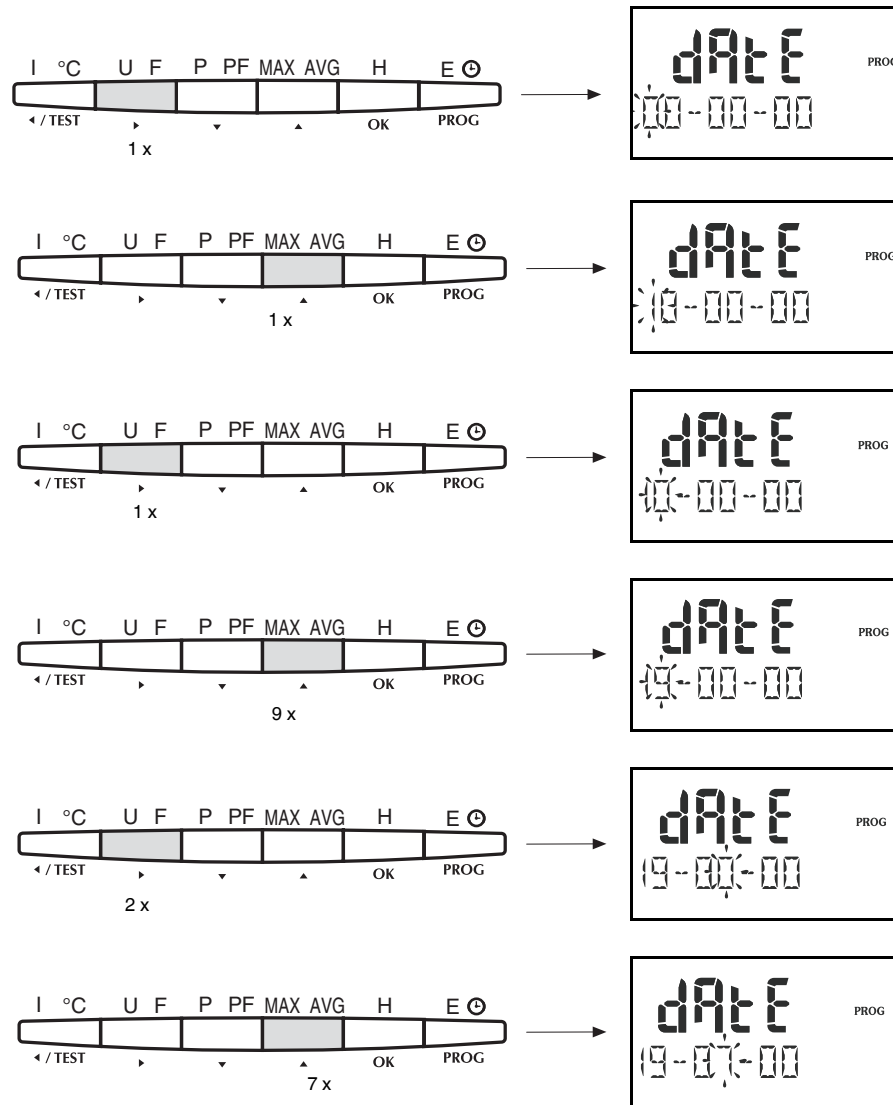


Figure 9-10 Set date - 1st part

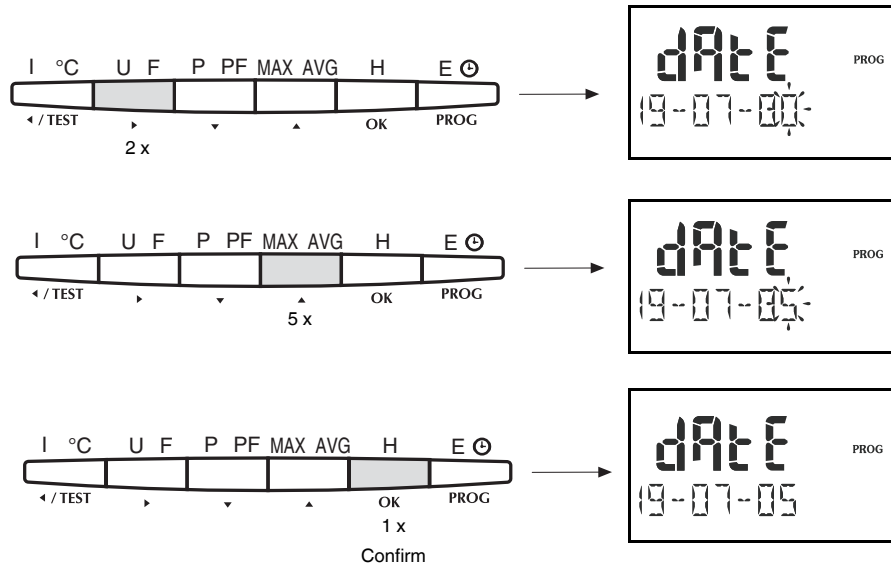


Figure 9-11 Set date - 2nd part

9.2.1.10 Setting the time

Set the time as shown in the following example.

Example: tIME = 14 h 02 min 30 sec

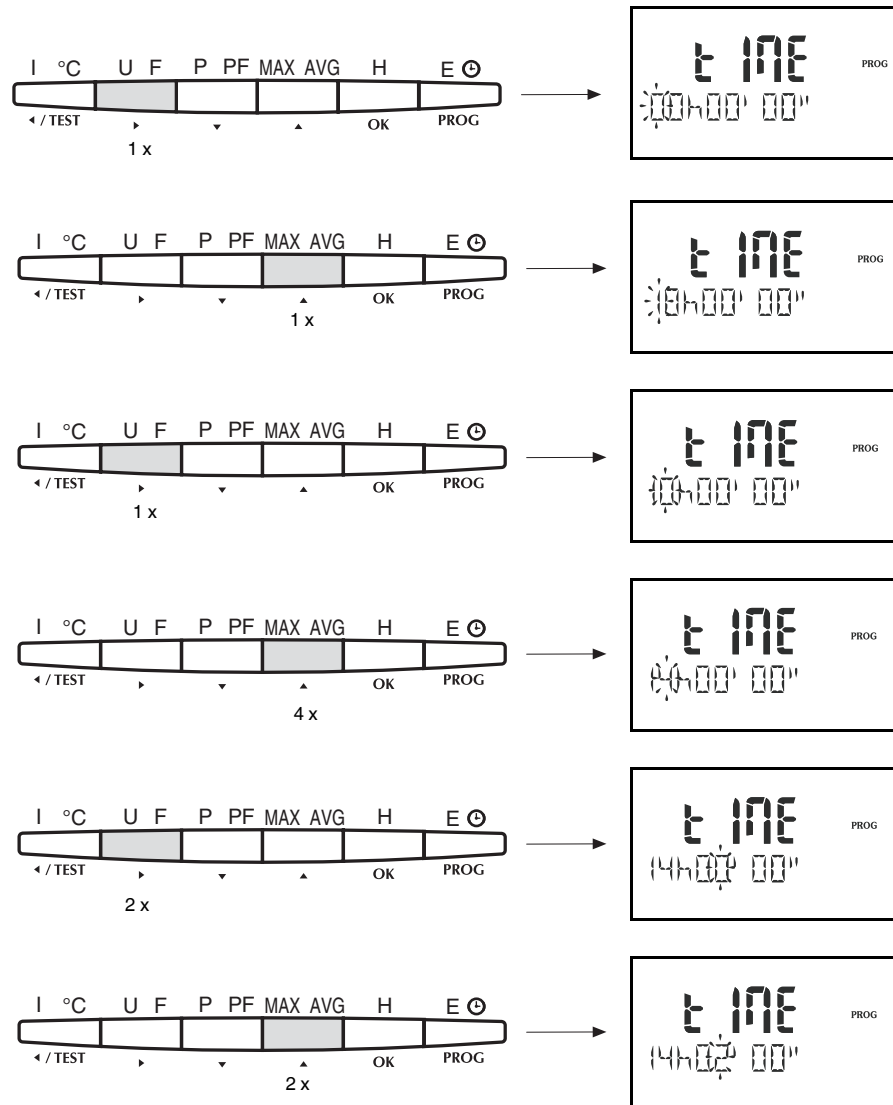


Figure 9-12 Set time - 1st part

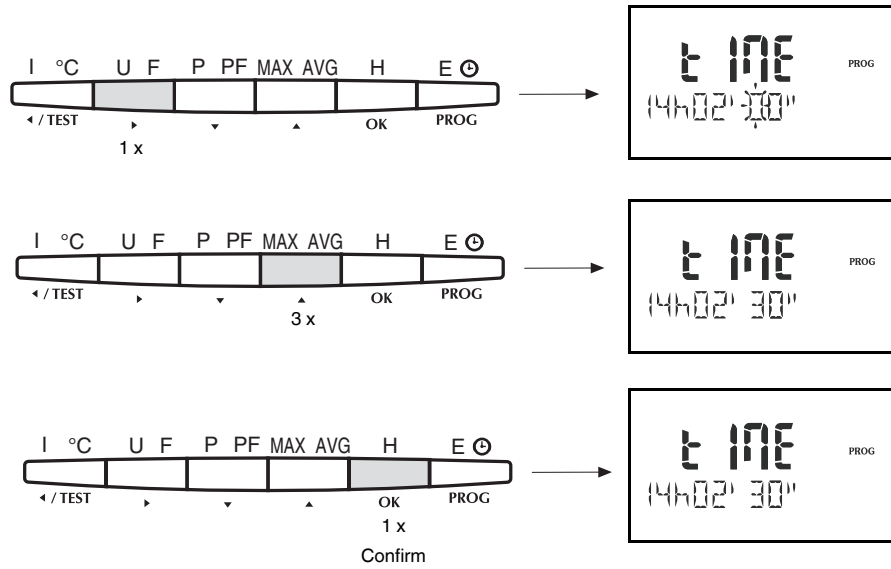


Figure 9-13 Set time - 2nd part

9.2.2 EEM-2DIO-MA600 configuration

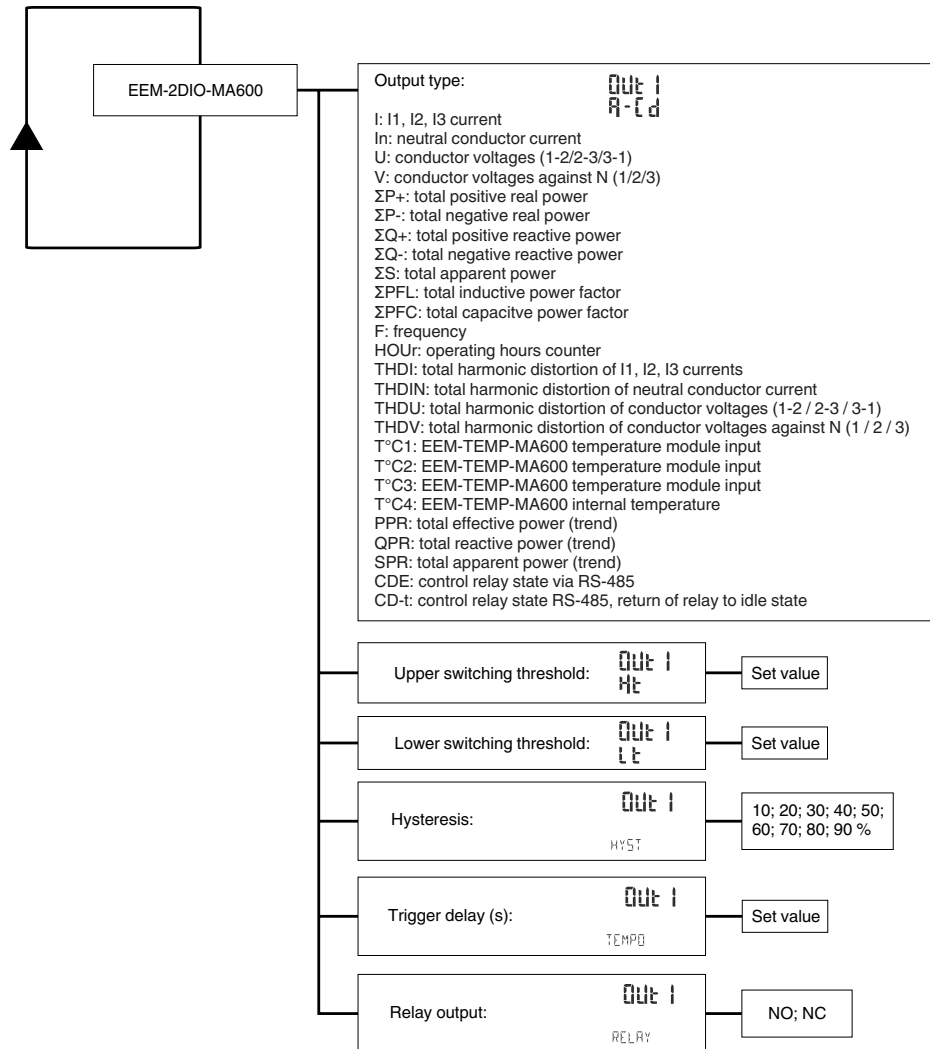


Figure 9-14 Flowchart

9.2.2.1 Setting the output type

Set the output type for the relay output as shown in the following example.

Example: Out I A-Cd type = I

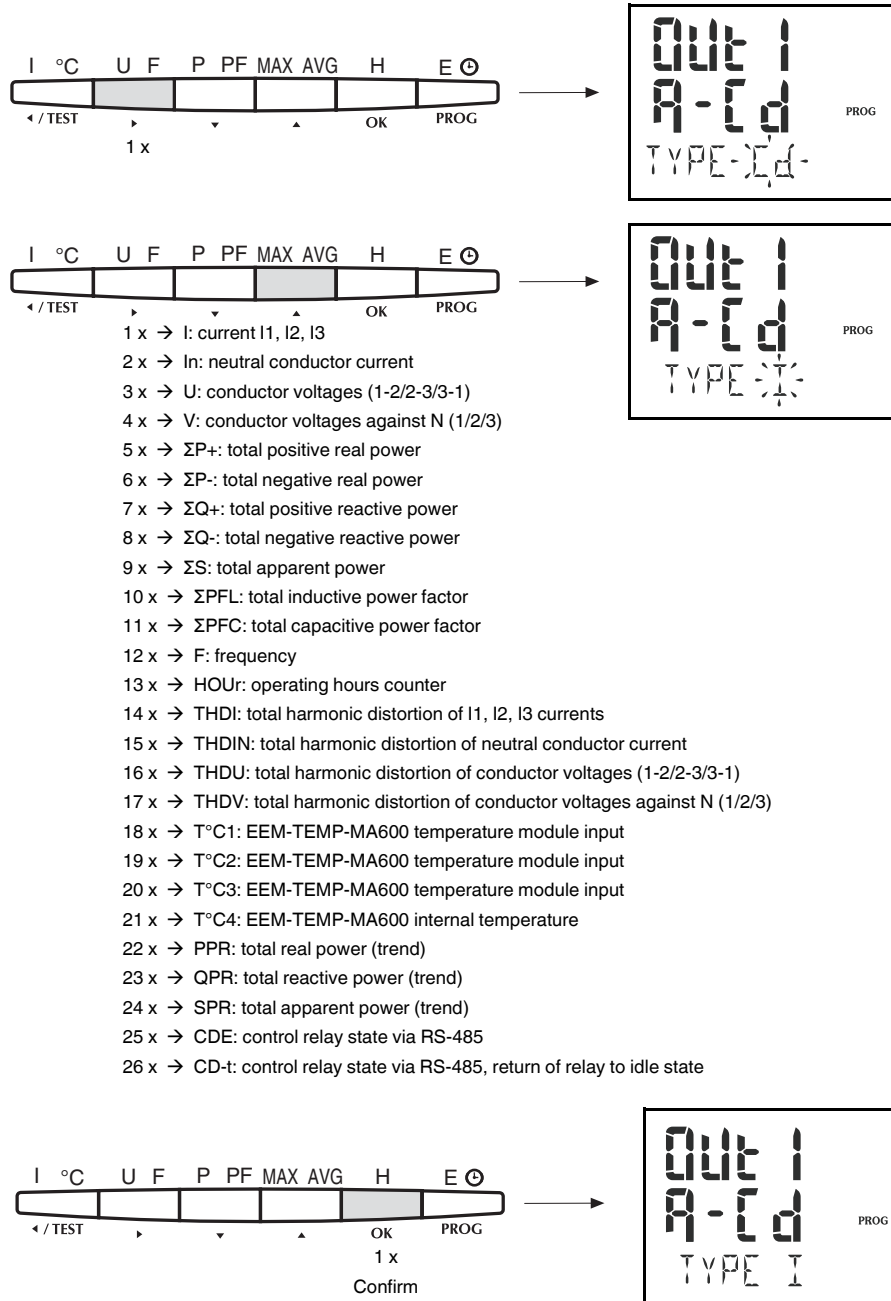


Figure 9-15 Setting the output type

9.2.2.2 Setting the upper switching threshold

Set the upper switching threshold for the relay as shown in the following example.

Example: Out I Ht = 100 kA

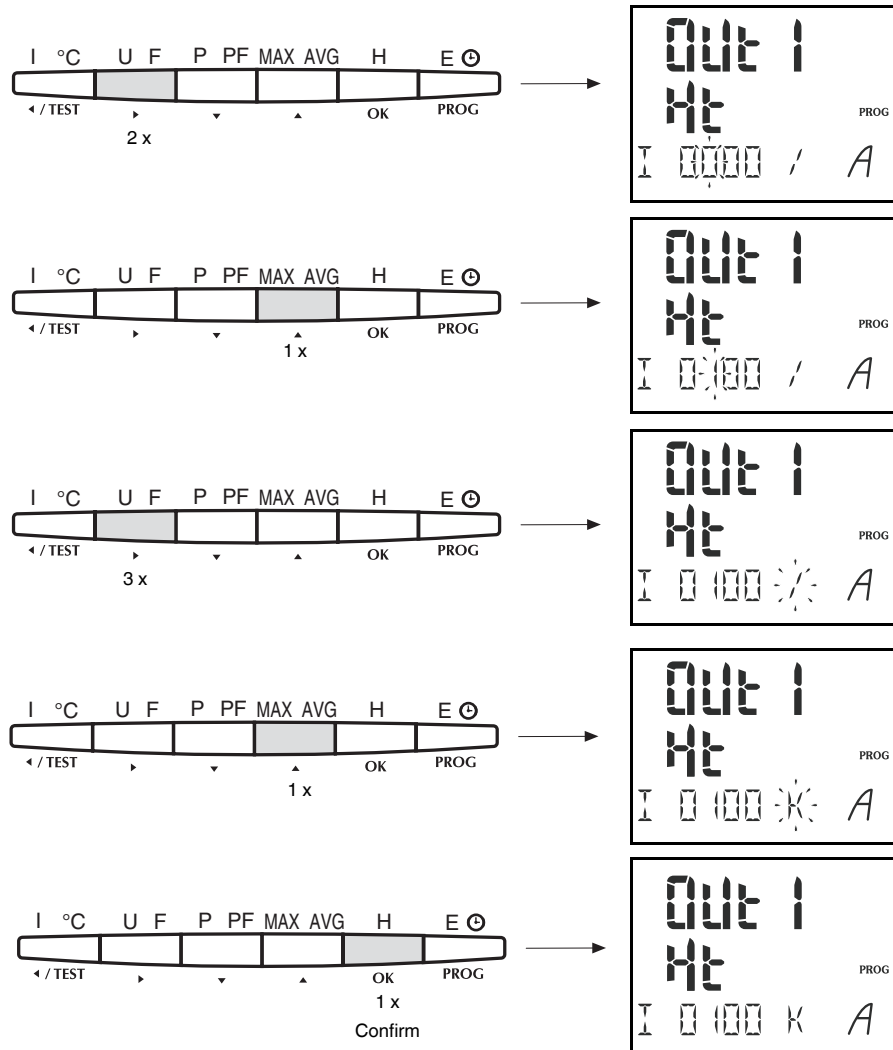


Figure 9-16 Setting the upper switching threshold

9.2.2.3 Setting the lower switching threshold

Set the lower switching threshold for the relay as shown in the following example.

Example: Out I Lt = 10 kA

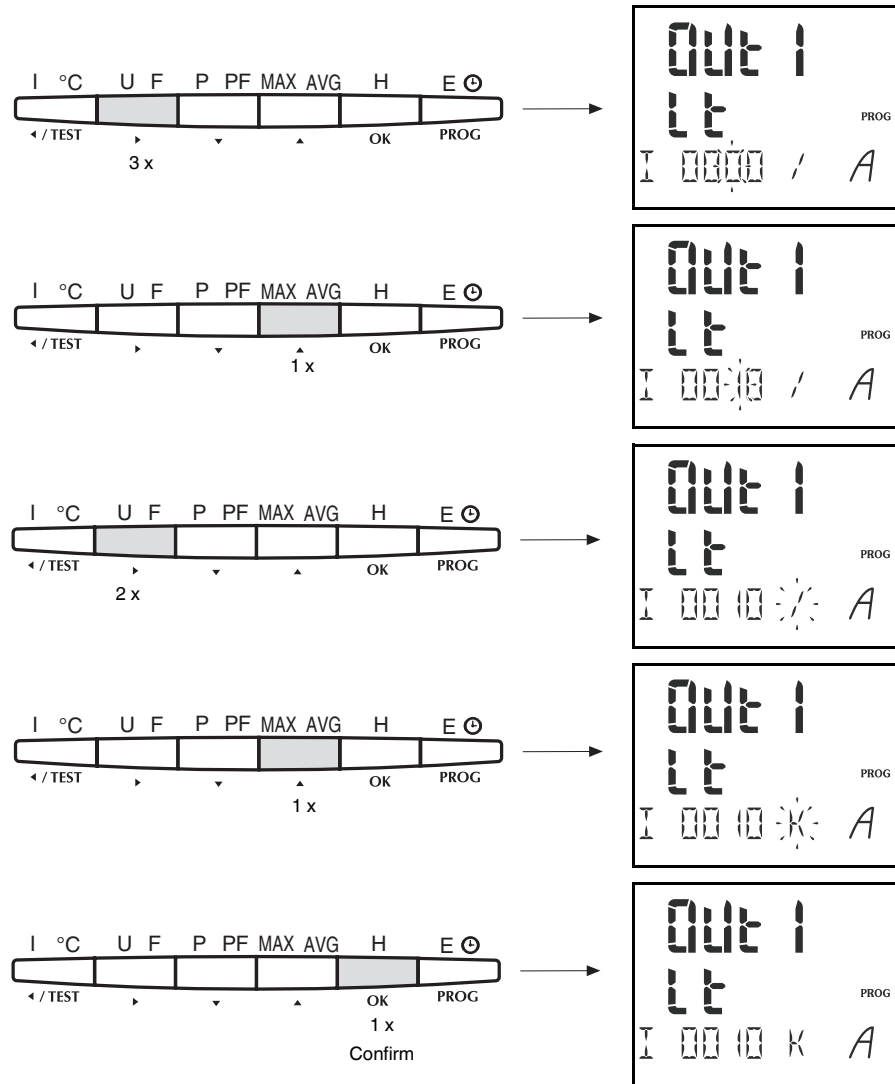


Figure 9-17 Setting the lower switching threshold

9.2.2.4 Setting the hysteresis

Set the hysteresis (10 ... 90%) for the relay as shown in the following example.

Example: Out I HYST = 20%

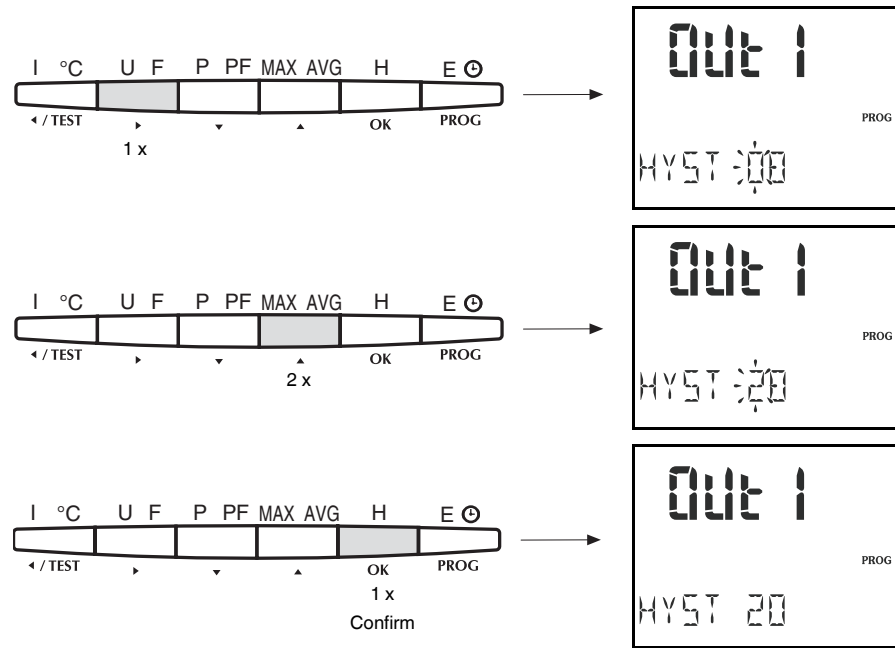


Figure 9-18 Setting the hysteresis

9.2.2.5 Setting the trigger delay

Set the trigger delay (in seconds) for the relay as shown in the following example.

Example: Out I TEMPO = 30 s

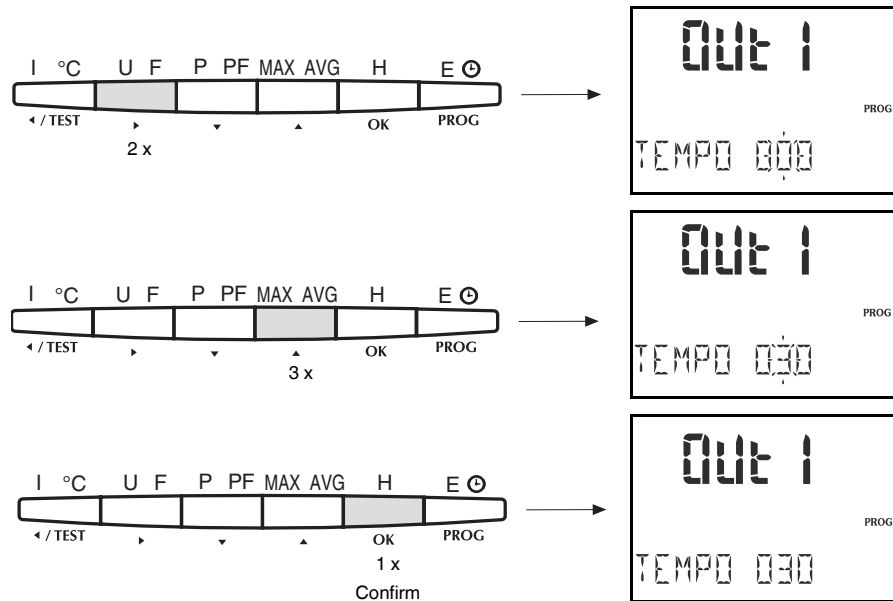


Figure 9-19 Setting the trigger delay

9.2.2.6 Setting the relay output

Set the output relay idle state as shown in the following example.

NO: relay open in idle state

NC: relay closed in idle state

Example: Out 1 RELAY = NO

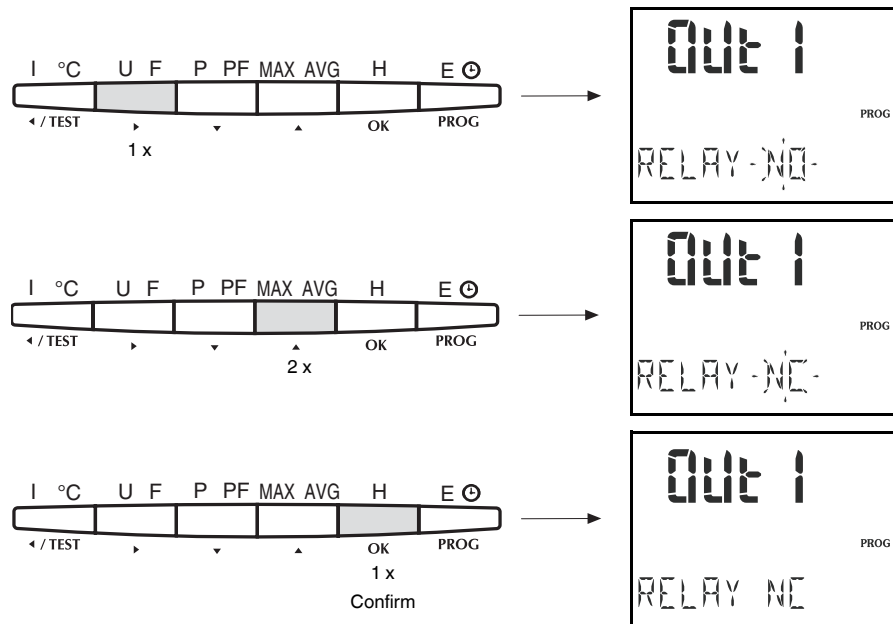


Figure 9-20 Setting the relay output



Repeat the settings for the other relay outputs Out 2, Out 3, Out 4, Out 5, Out 6.

9.2.3 EEM-2AO-MA600 configuration

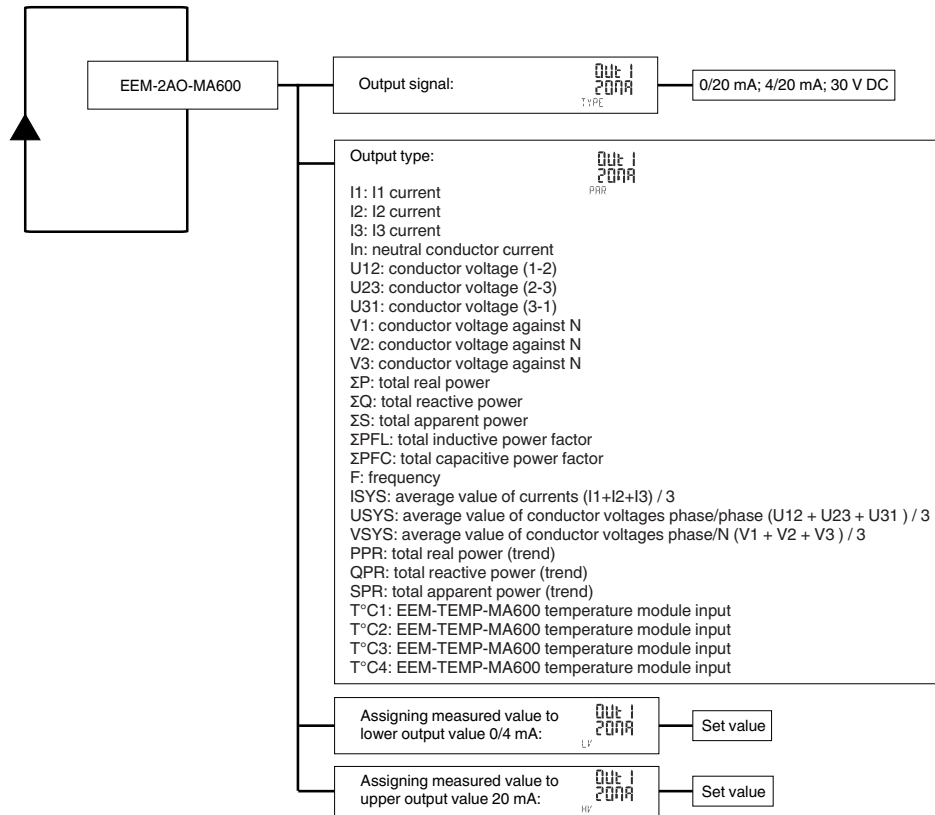


Figure 9-21 Flowchart

9.2.3.1 Setting the output signal

Set the output signal as shown in the following example.

Example: Out I 20 MA = 0/20 mA

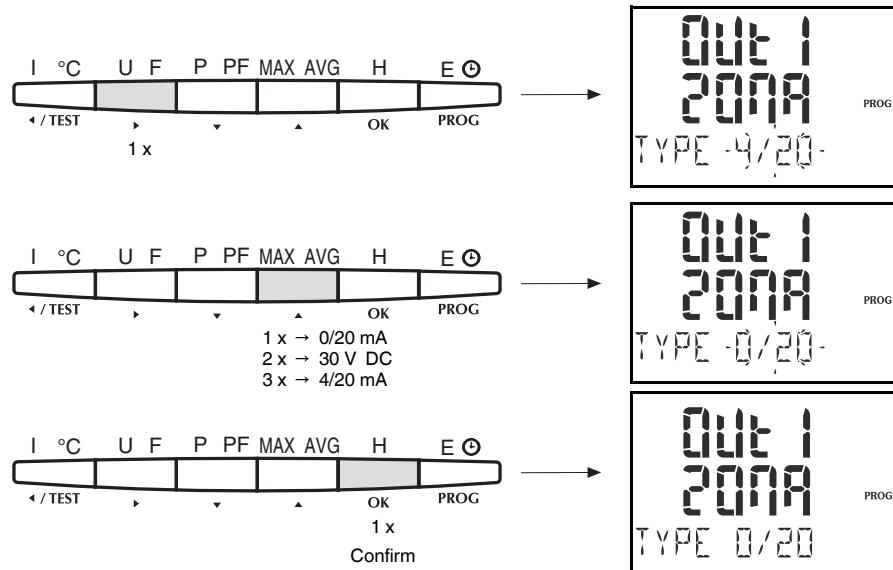


Figure 9-22 Setting the output signal

9.2.3.3 Assignment of measured values to lower output value 0 or 4 mA

Set the lower measured value for 0 or 4 mA.

Example: Out I 20 mA LV = 1000 kA

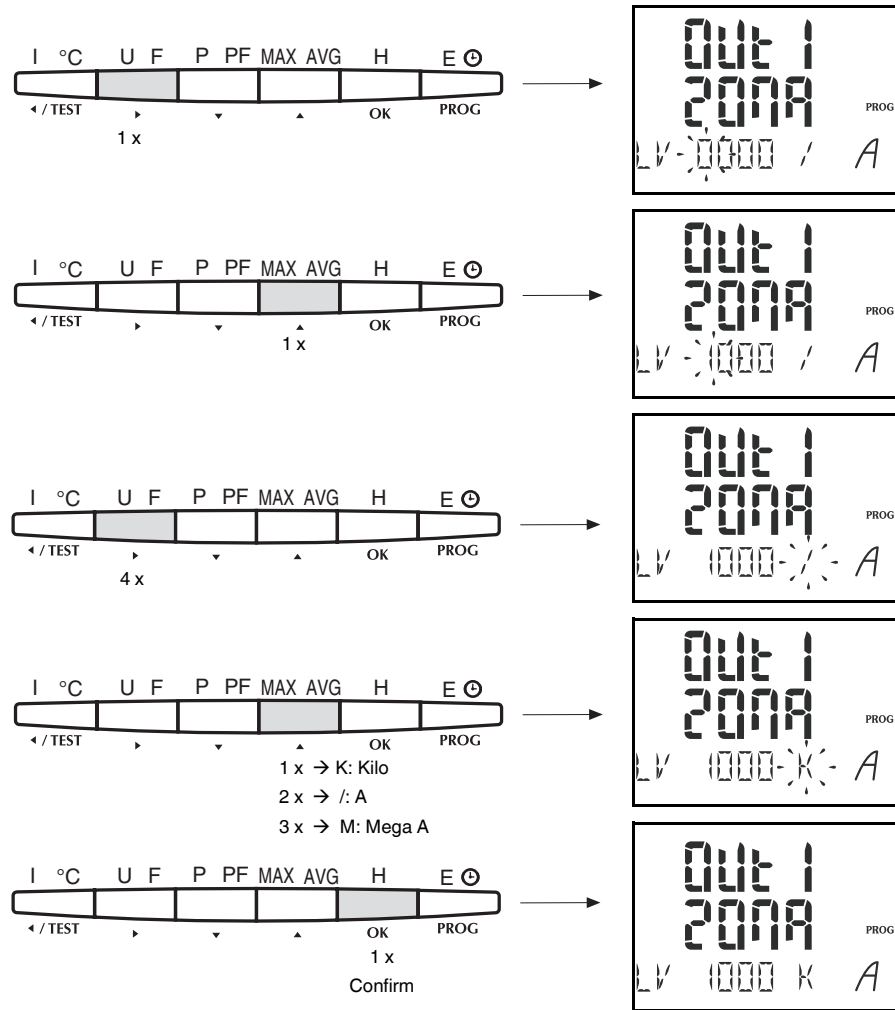


Figure 9-24 Assign the measured value to the lower output value 0 or 4 mA

9.2.3.4 Assignment of measured value to upper output value 20 mA

Set the upper measured value to 20 mA.

Example: Out I 20 mA HV = 2000 kA

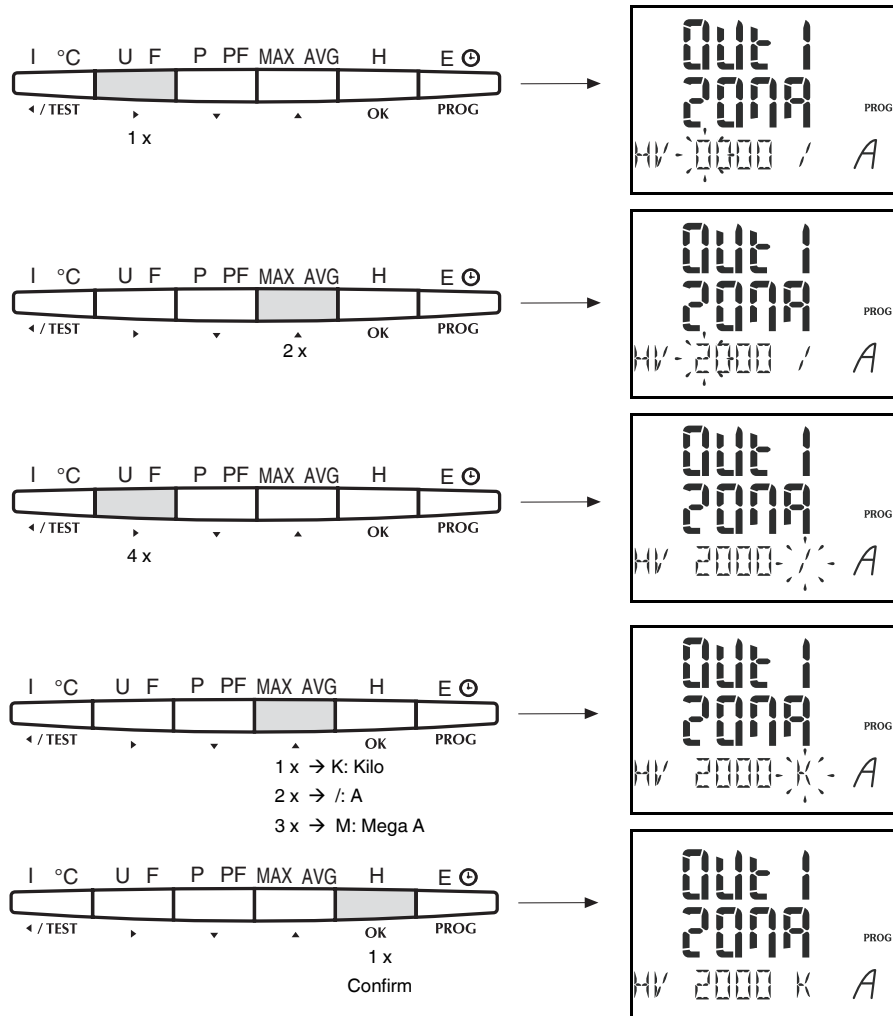


Figure 9-25 Assigning measured value to upper output value 20 mA



If the lower and the upper output values are the same, the output value is 0.
 Configuring the frequency output value: if value is 40 Hz, for example, set value to 4000 Hz.
 Configuring the power factor output value: if value is 0.5, for example, set to 500; if value is 1, for example, set to 1000.
 If you assign an alarm to a temperature input, it is automatically triggered if a temperature sensor is not connected.
 Repeat the settings for the other outputs Out 2, Out 3, Out 4.

10 Communication modules

The EEM-MA600 can be extended with different function modules.

Module	Technology	Description in...
EEM-RS485-MA600	MODBUS	Section "MODBUS" on page 10-1
EEM-ETH-MA600 EEM-ETH-RS485-MA600	Ethernet	Section "Ethernet" on page 10-12
EEM-PB-MA600 EEM-PB12-MA600	PROFIBUS	Section "PROFIBUS" on page 10-19

10.1 MODBUS

10.1.1 Basics

The data is transmitted for each MODBUS RTU (Remote Terminal Unit) protocol. Communication takes place according to the master-slave procedure. Communication begins when requested by the master (PLC). Each slave (EEM-MA600) has a one-time address (valid range 1 ... 247). If a slave detects that its address is addressed by the master, the slave always sends an answer. The slaves never communicate with each other. They are not able to initiate communication with the master. Connected extension modules write, for example, the analog/digital input and output values to an internal register.

The MODBUS master (PLC) can read the individual registers using the PLC address.

The data to be transmitted is always present in a fixed frame and is defined as follows:

Frame	Description
Slave address	Here, the slave address is given (valid range 1 ... 247)
Function code	Here, it is established whether parameters are read or written.
Address	Register Address
Data	- for example, from the master: which parameters are addressed? - for example, from the slave: content of addressed parameters
CRC (Cyclic Redundancy Check)	The cyclic redundancy check: test value for data in order to detect errors in data transmission.

Table 10-1 Example: read device parameters (initiated by the master)

Slave address	Function	High quality address	Low quality address	No. High quality words	No. Low quality words	CRC 16
05	03	C6	5C	00	02	3915

Table 10-2 Example: answer from a slave (initiated by slave)

Slave address	Function	Number of bytes	Low quality register value	High quality register value	CRC 16
05	03	04	0011	IDDD	2FAF

Table 10-3 Example: write device parameters

Slave address	Function	High quality address	Low quality address	High quality register value	Low quality register value	CRC 16
05	06	E0	00	00	05	7F8D



Each bus device must have a unique address. Slave address 0 is reserved for a broadcast.

Function codes in MODBUS

Several function codes are defined in MODBUS. They are as follows:

Function code	Name	Abbreviation	Description
03 Hex	Read hold register	R	Read device parameters
06 Hex 16 Hex	Write single register Write multiple registers	W	Write individual device parameters word by word, write several device parameters word by word



There are still other function codes, but these are not supported.

10.1.2 Connecting and installing communication module EEM-RS485-MA600



You can find information about connecting and installing the EEM-RS485-MA600 communication module from the associated package inserts at www.phoenixcontact.net/catalog.

10.1.3 Configuring communication module EEM-RS485-MA600

The module can be configured using the pushbutton on the front side of the measuring instrument. The configuration is shown in the following subchapters.

Button	Description
PROG	Open configuration mode (hold down for 3 seconds)
▲ or ▼	Select the next menu item
▶	Open edit mode
◀ or ►	In edit mode: Select parameters/values to be changed
▲ or ▼	In edit mode: change parameters/values
OK	Confirm setting

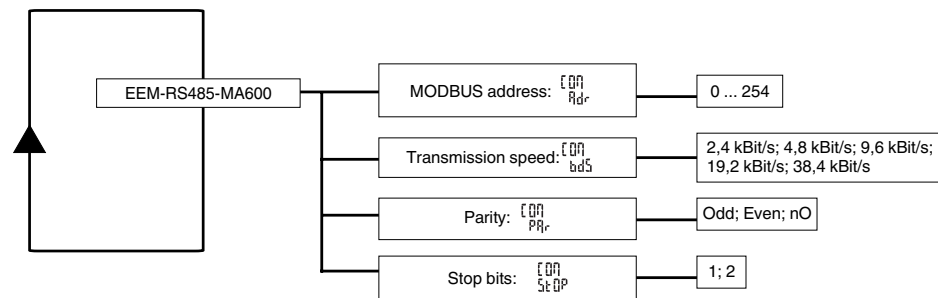


Figure 10-1 Flow chart

10.1.3.1 Setting the MODBUS address

Set the MODBUS address as shown in the following example.

Example: COM ADR = 7

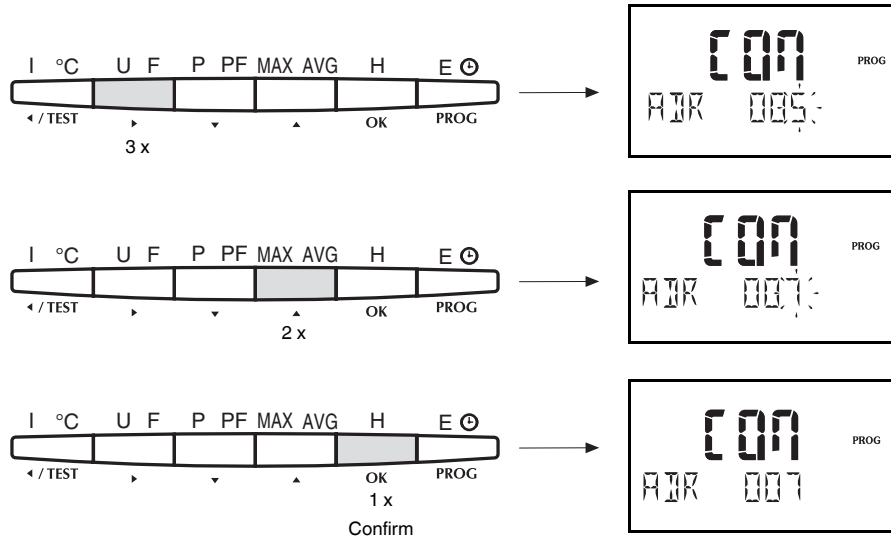


Figure 10-2 Setting the MODBUS address

10.1.3.2 Setting the transmission speed

Set the transmission speed as shown in the following example.



All MODBUS devices must be set to the same transmission speed.

Example: COM BDS = 19200 BDS (bauds)

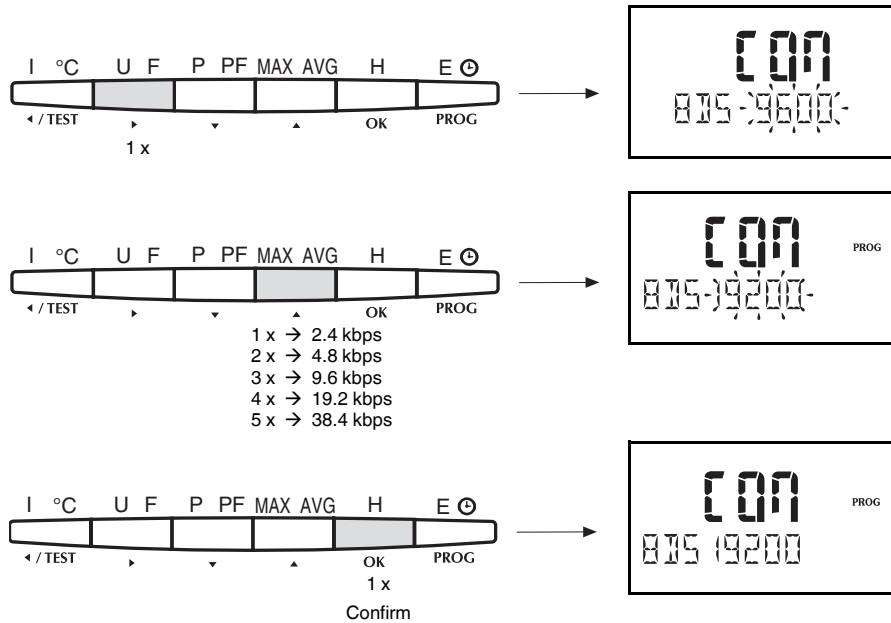


Figure 10-3 Setting the transmission speed

10.1.3.3 Setting the parity

Set the parity as shown in the following example.

Example: COM PAR = Even

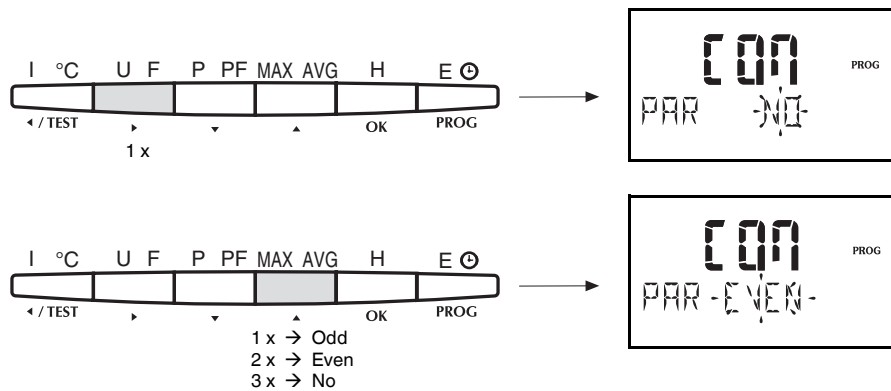


Figure 10-4 Setting the parity

10.1.3.4 Setting the stop bits

Set the stop bits as shown in the following example.

Example: COM STOP = 2

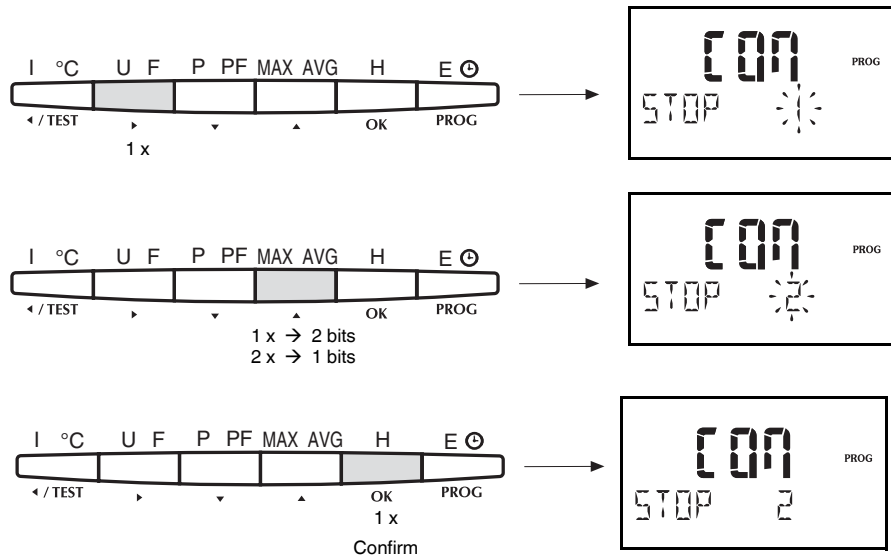


Figure 10-5 Setting the stop bits

10.1.4 MODBUS / JBUS register tables

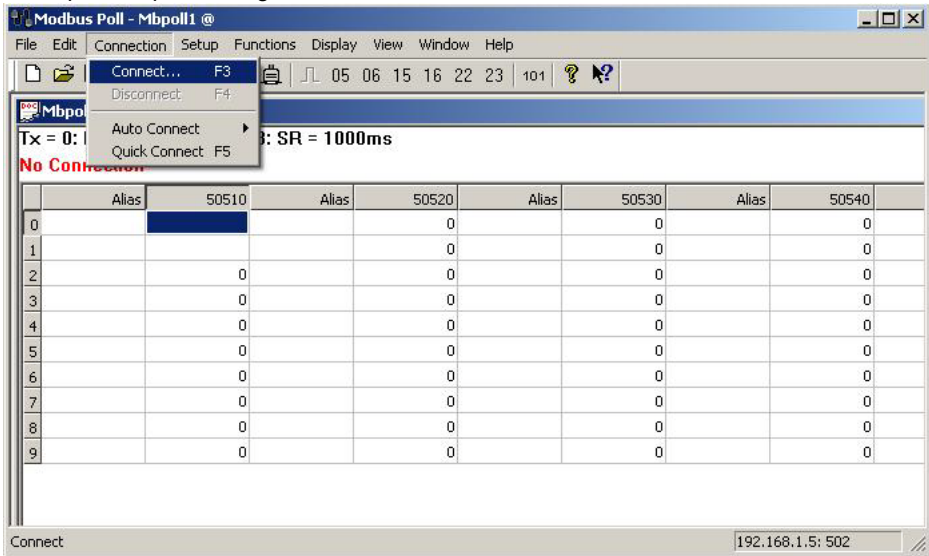
You can find the MODBUS/JBUS register tables at Section "MODBUS register" on page 11-1.

10.1.5 Reading/writing MODBUS RTU registers

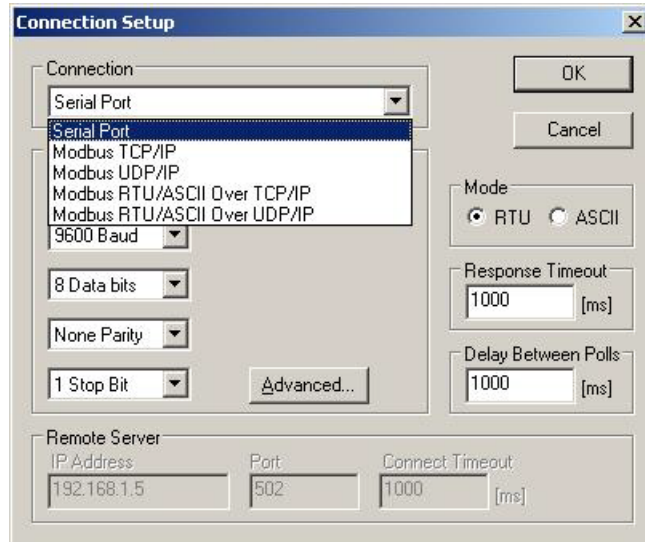
In the following example, some points for testing the MODBUS structure with the "Modbus Poll" simulation software are described. The simulation software is a freeware tool and can be downloaded from the Internet at <http://www.modbustools.com/>.

10.1.5.1 Settings

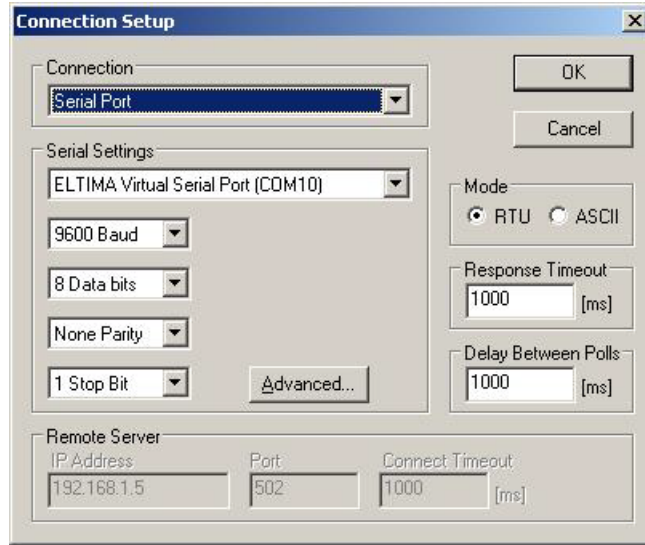
1. Open the port settings via "Connection, Connect".



2. Choose "Connection, Serial Port" as shown in the following example.



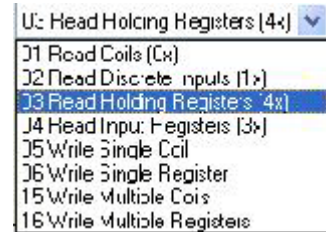
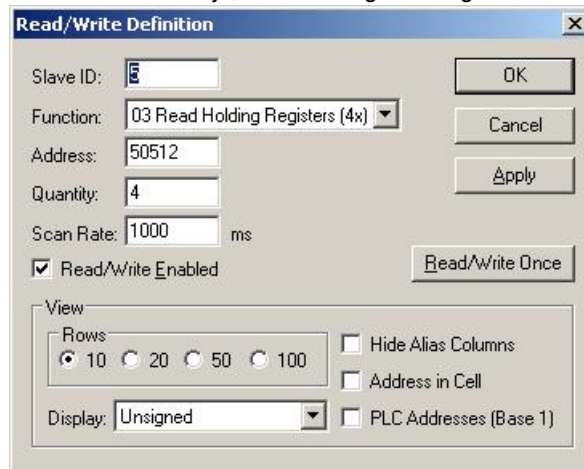
3. Enter the desired serial interface parameters in the fields below. Set "Mode" to RTU.



4. Confirm the settings with "OK".

10.1.5.2 Access to MODBUS register

1. Open the MODBUS register access settings as follows: "Setup, Read/Write Definition...".
2. Set the desired "Slave ID".
3. Under "Function," you can choose the register access type (Read "03" or write "06"/"16").
4. Under "Address", enter the start address for the desired register.
5. Under "Quantity", enter the register length.

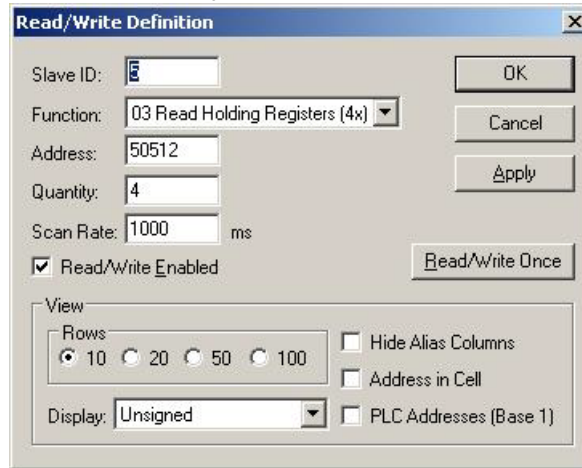


Example: "Read" function

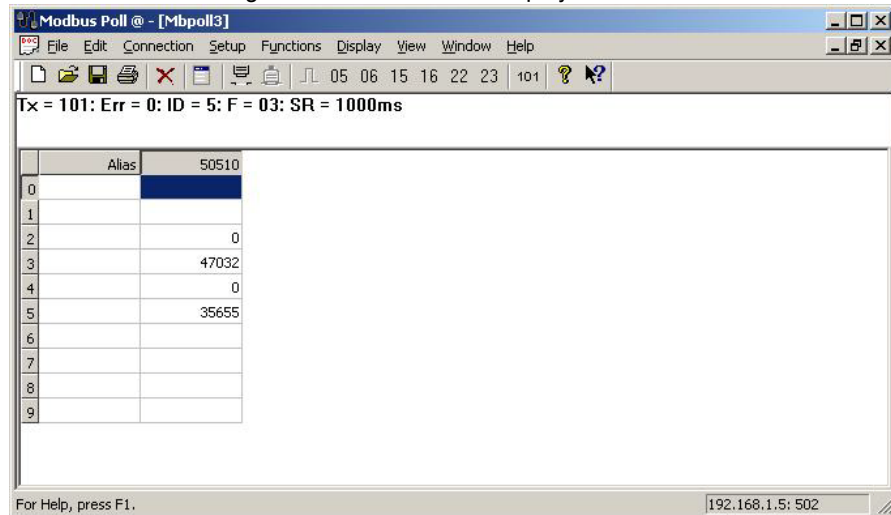
Main measured values read based on current and voltage transducer (see "C550 hex: display of current main measured values based on current and voltage transducer (under consideration of transmission ratios)" on page 11-2):

Hour counter Data word/decimal address 50512/50513
 Line voltage U12 Data word/decimal address 50514/50515

1. After you have entered the "Slave ID", choose the "Function" "03 Read Holding Registers".
2. Enter start address 50512 under "Address".
3. Under "Quantity", enter 4 as the number of data words.



4. Confirm with "OK".
 The contents of register 50512...50515 is displayed.



In order to be able to further use register contents, these must be converted into the corresponding units (see "C550 hex: display of current main measured values based on current and voltage transducer (under consideration of transmission ratios)" on page 11-2).

Register 50513 content (hour counter) = 47032

47032 : 100 = 470.32 h

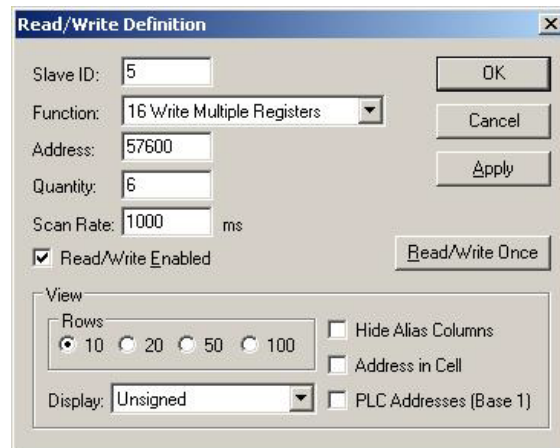
Register 50515 content (line voltage U12) = 35655

35655 : 100 = 356.57 V

Example: "Write" function

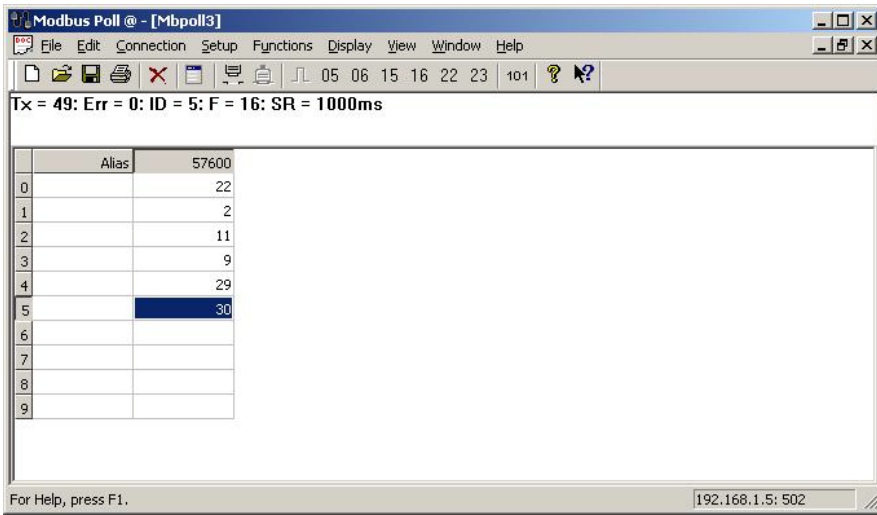
Date time configuration (see "E100 hex: date/time configuration" on page 11-21):

1. After entering the "Slave ID", choose "Function" "16 Write Multiple Registers".
2. Enter start address 57600 under "Address".
3. Enter 6 as the number of data words under "Quantity".



4. Confirm with "OK".

5. Enter the desired date and time in the lines listed below.



Decimal address	Designation	Value
57600	Day	22
57601	Month	2
57602	Year	11
57603	Hour	9
57604	Minute	29
57605	Second	30

Example Date: 02.22.2011
 Time: 09:29:30

10.2 Ethernet

10.2.1 Connecting and installing communication modules EEM-ETH-MA600 and EEM-ETH-RS485-MA600



You can find information about connecting and installing the EEM-ETH-MA600 and EEM-ETH-RS485-MA600 communication modules from the associated package inserts at www.phoenixcontact.net/catalog.

10.2.2 Configuring communication modules EEM-ETH-MA600 and EEM-ETH-RS485-MA600

The modules can be configured using the pushbutton on the front side of the measuring instrument. The configuration is shown in the following subchapters.

Button	Description
PROG	Open configuration mode (hold down for 3 seconds)
▲ or ▼	Select the next menu item
▶	Open edit mode
◀ or ▶	In edit mode: Select parameters/values to be changed
▲ or ▼	In edit mode: change parameters/values
OK	Confirm setting

The default settings are:

IP address: 192.168.1.1
 Subnet mask: 255.255.255.0
 Gateway: 0.0.0.0
 DHCP activation: No

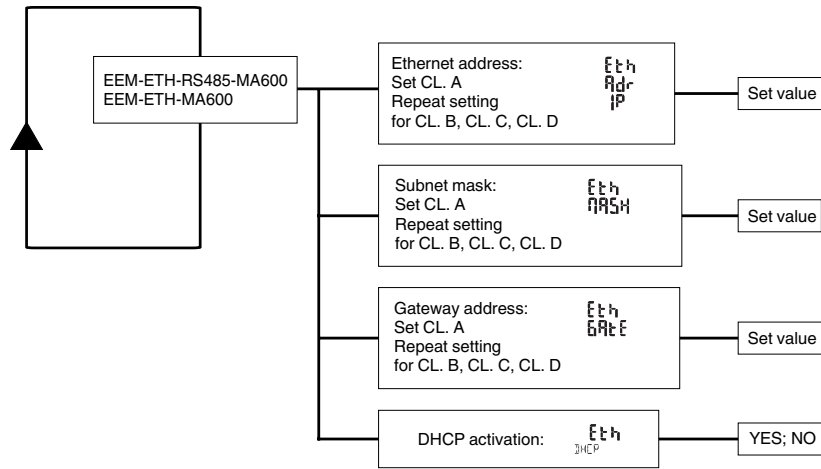


Figure 10-6 Flow chart

10.2.2.1 Setting the IP Address

Set the IP address as shown in the following example.

Example: IP address 191.158.1.7 CLASS A = 191

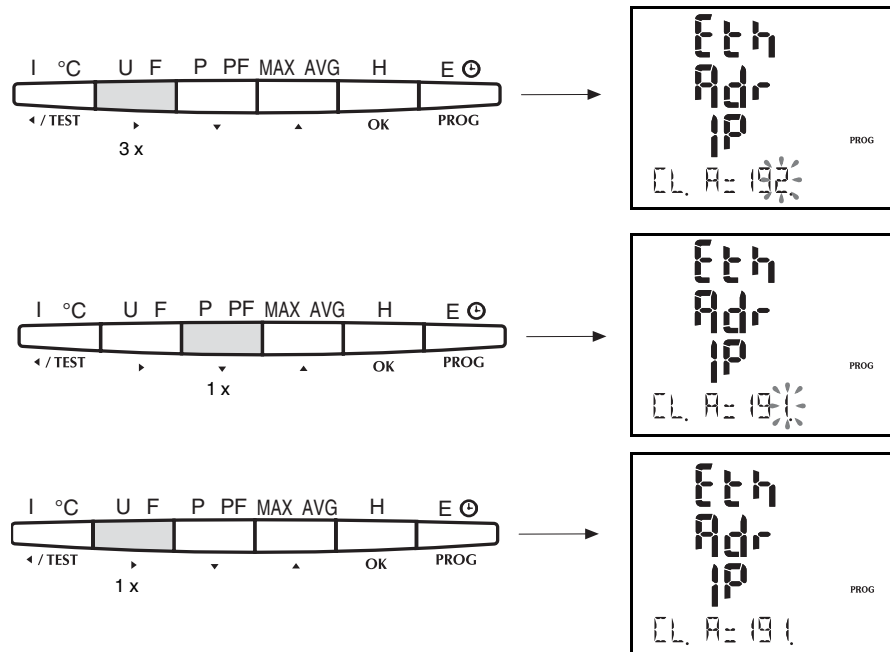


Figure 10-7 Setting the Class A IP address

Example: IP address CLASS B = 158

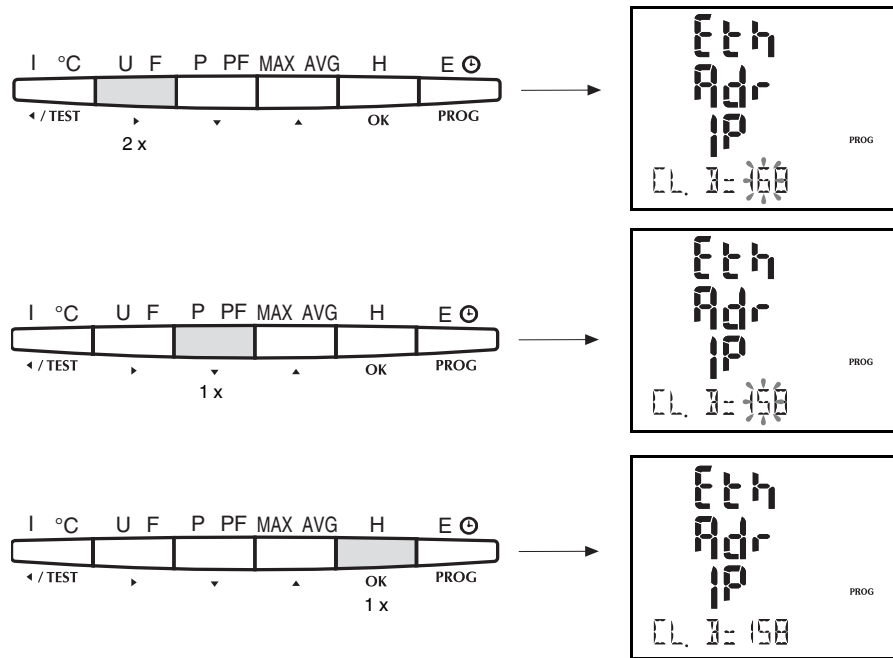


Figure 10-8 Setting the Class B IP address

Example: IP address CLASS C = 1

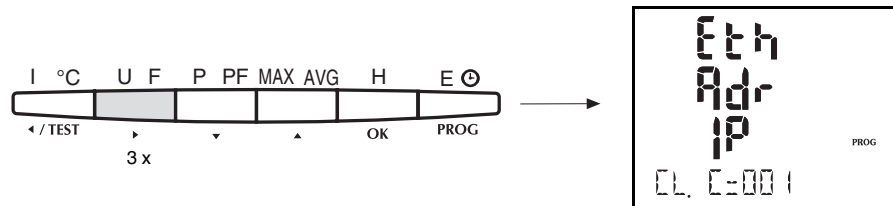


Figure 10-9 Setting the Class C IP address

Example: IP address CLASS D = 7

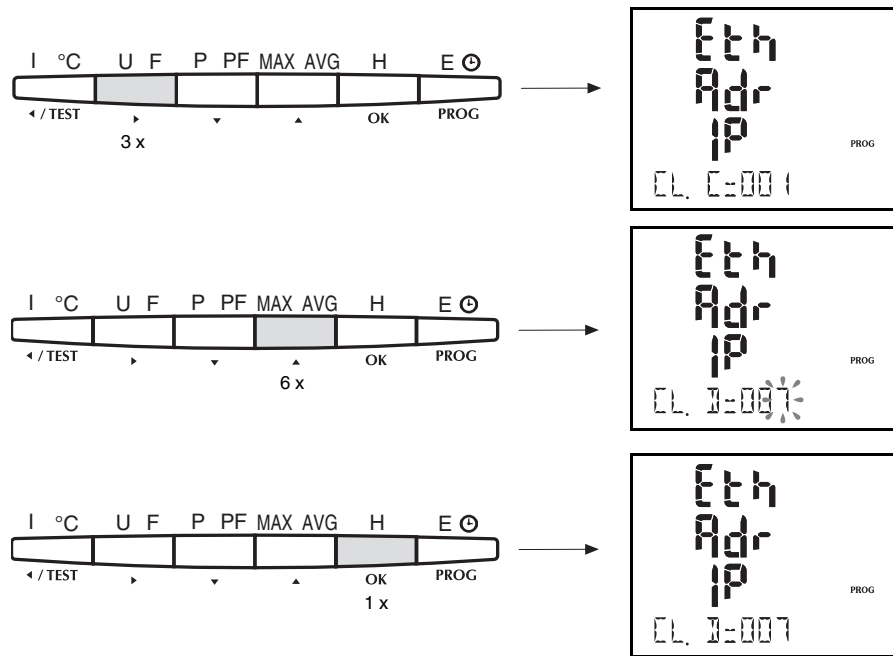


Figure 10-10 Setting the Class D IP address

10.2.2.2 Setting the subnet mask

Set the subnet mask as shown in the following example.

Example: Setting subnet mask 255.255.255.0

The principle is the same as with the IP address (see Section "Setting the IP Address" on page 10-13).

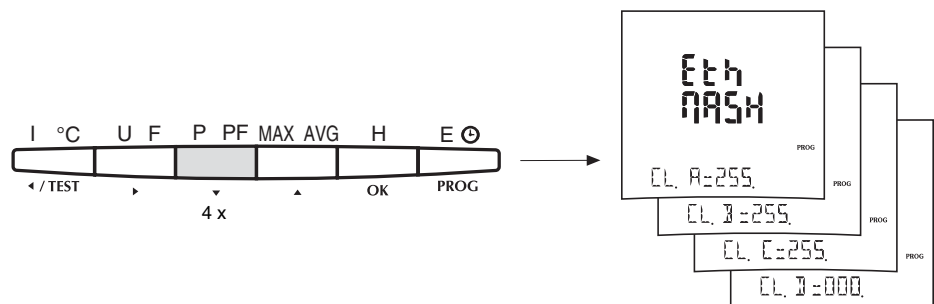


Figure 10-11 Setting the subnet mask

10.2.2.3 Setting the gateway address

Set the gateway address as shown in the following example.

Example: Gateway address 0.0.0.0

The principle is the same as with the IP address (see Section "Setting the IP Address" on page 10-13).

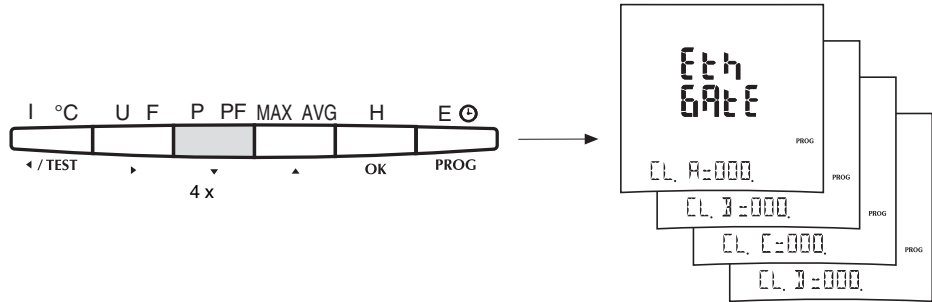


Figure 10-12 Setting the gateway address

10.2.2.4 Setting DHCP

Activate the DHCP as shown in the following example.



DHCP activation is not recommended. If necessary, contact your network administrator.

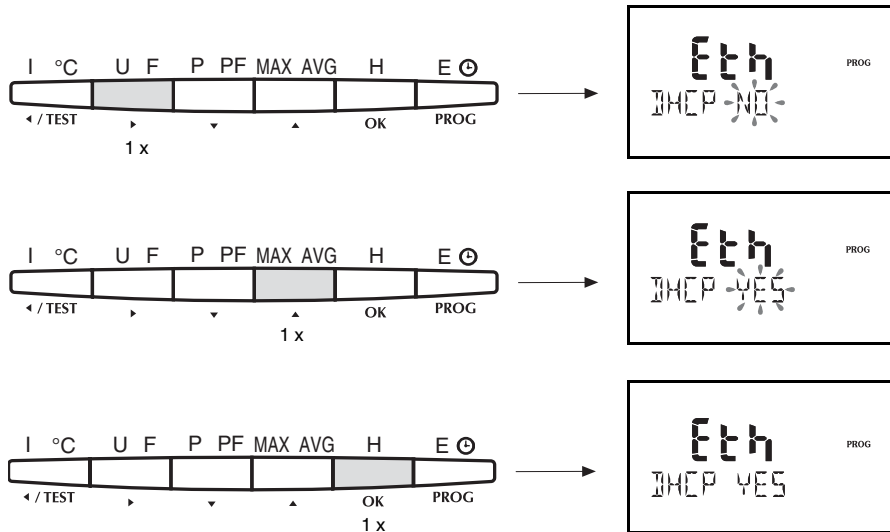


Figure 10-13 Setting DHCP

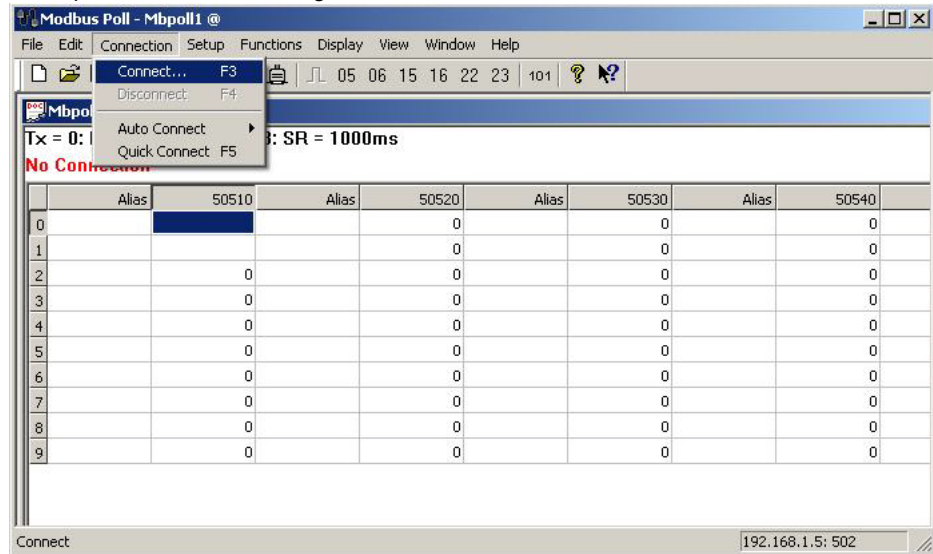
10.2.3 MODBUS / JBUS register tables

The register tables are the same as for MODBUS/JBUS communication (see Section "MODBUS register" on page 11-1).

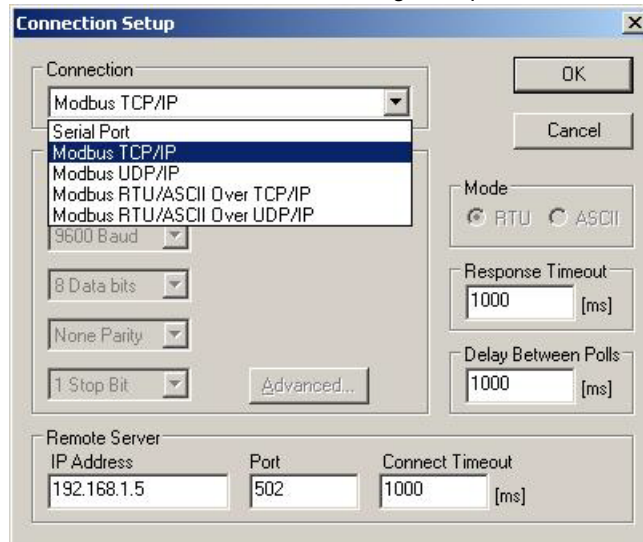
10.2.4 Reading/writing MODBUS TCP registers

In the following example, some points for testing the Ethernet MODBUS structure with the "Modbus Poll" simulation software are described. The simulation software is a freeware tool and can be downloaded from the Internet at <http://www.modbustools.com/>.

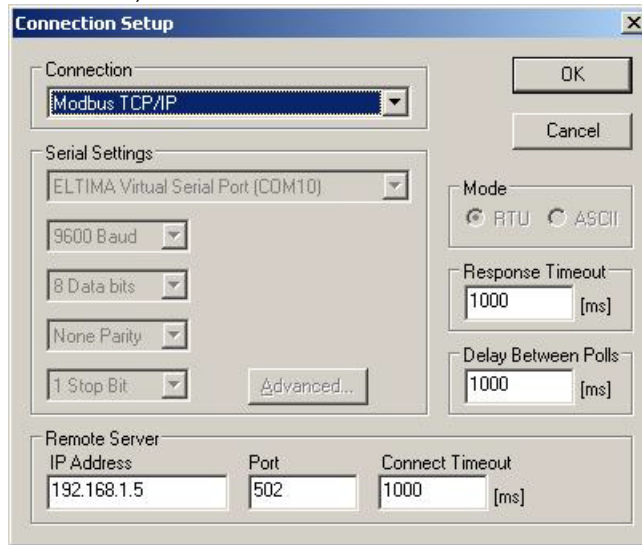
1. Open the interface settings via "Connection, Connect".



2. Choose as shown in the following example under "Connection, Modbus TCP/IP".



3. Enter the desired IP addresses in the fields below (the first three address areas for the IP addresses must be the same for the PC and the EEM-MA600 when 255.255.255.0 is set as the subnet mask).
4. Set the port to 502 (direct access to the connected measuring instrument EEM-MA600 with Ethernet extension module) or 503 (access via the gateway to connected Modbus devices).



5. Confirm the settings with "OK".

10.2.5 Access to MODBUS register

See Section "Reading/writing MODBUS TCP registers" on page 10-17.

10.2.6 "Read" and "Write" function

See Section "Reading/writing MODBUS RTU registers" on page 10-7.

10.2.7 Web server

You can have the most important current and average measured values and tallies displayed via the web server.

By entering the device IP address in the Internet browser, you can access the web server.

Example:

IP address of measuring instrument EEM-MA600:	192.168.1.0
URL address:	http://192.168.1.0/index.htm

10.3 PROFIBUS

10.3.1 Basics

The PROFIBUS is a serial bus system that transmits data between control systems and spatially distributed I/O terminals, to which sensors and actuators are connected.

The PROFIBUS has a star/tree structure. In the PROFIBUS topology, the individual devices are differentiated on the basis of their addressing. The communication profiles determine how the devices transmit their data serially via the bus. The PROFIBUS DP (distributed I/O) is typically a single-master system, i.e. all devices of a PROFIBUS DP are controlled by one master. PROFIBUS DP is optimized for the straightforward transmission of input and output data and is specifically designed for communication between automation systems and distributed I/O devices.

The characteristic communication features of a PROFIBUS DP device are defined in the form of an electronic device data sheet (GSD, device database file). The required GSD file for the measuring instrument is available at www.phoenixcontact.net/catalog.

10.3.2 Connecting and installing communication modules EEM-PB-MA600 and EEM-PB12-MA600



You can find information about connecting and installing communication modules EEM-PB-MA600 and EEM-PB12-MA600 from the associated package inserts at www.phoenixcontact.net/catalog.

10.3.3 Configuring communication modules EEM-PB-MA600 and EEM-PB12-MA600



Install the GSD file first.
The communication module automatically adjusts itself to the speed specified by the PROFIBUS master.

The module can be configured using the pushbutton on the front side of the measuring instrument. The configuration is shown in the following subchapters.

Button	Description
PROG	Open configuration mode (hold down for 3 seconds)
▲ or ▼	Select the next menu item
▶	Open edit mode
◀ or ▶	In edit mode: select parameters/values to be changed
▲ or ▼	In edit mode: change parameters/values
OK	Confirm setting

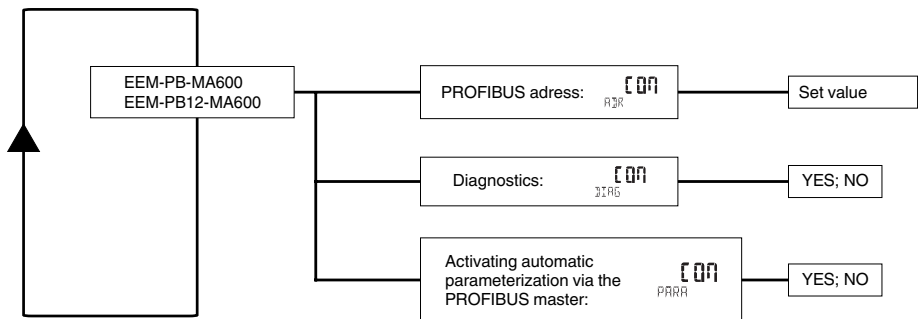


Figure 10-14 Flow chart EEM-PB-MA600 and EEM-PB12-MA600

10.3.3.1 Setting the PROFIBUS address

Set the PROFIBUS address as shown in the following example.

Example: COM ADR = 7

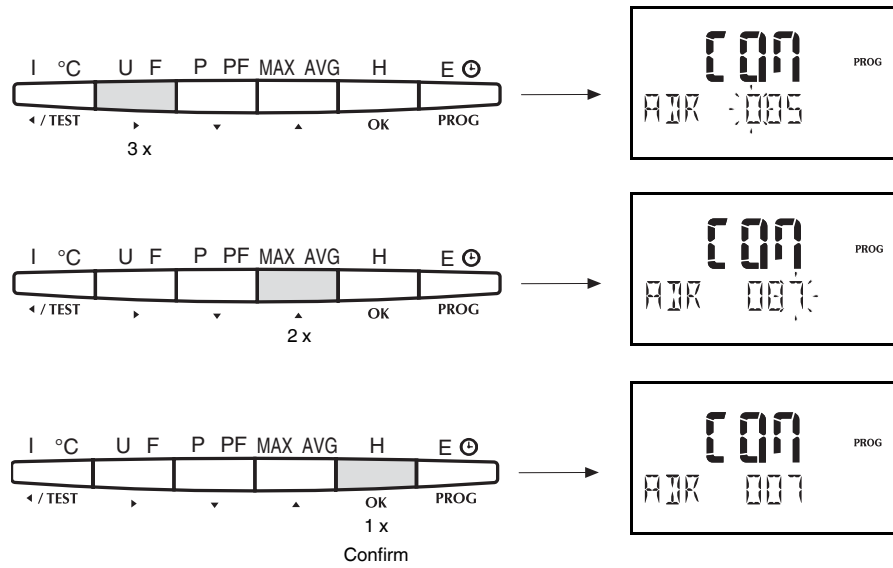


Figure 10-15 Setting the PROFIBUS address

10.3.3.2 Setting the diagnostics function

The diagnostic function shows the following:

- Availability of extension modules
- Serial number of the device
- Availability of an alarm or overrun

Example: COM DIAG = No

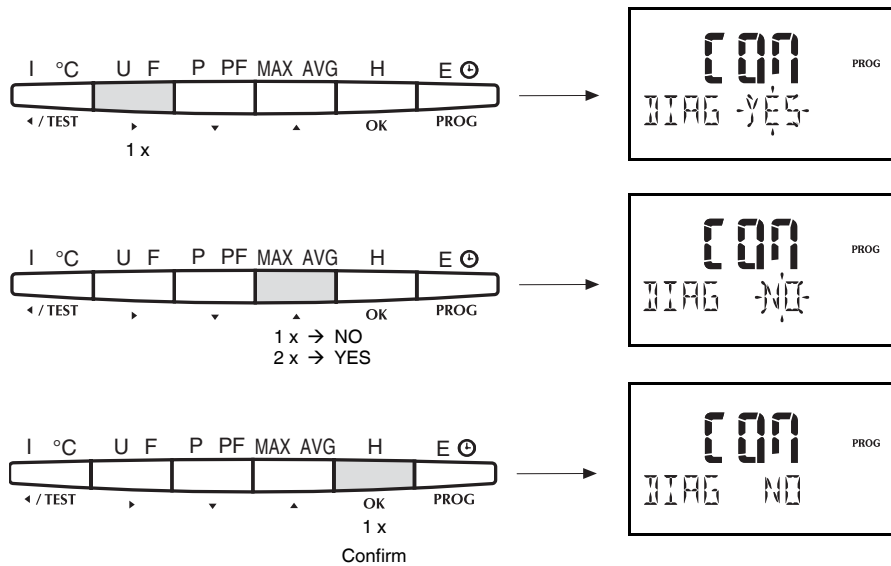


Figure 10-16 Setting diagnostic function

10.3.3.3 Activating automatic parameterization via the PROFIBUS master

With this function, you can activate or deactivate EEM-MA600 parameterization via the PROFIBUS DP master.

- YES** When the measuring instrument is restarted, the device settings are loaded from the GSD file. The information from the GSD file is sent by the PROFIBUS master to the slaves.
- NO** The last device settings are saved upon restarting.

Example: COM PARA = YES

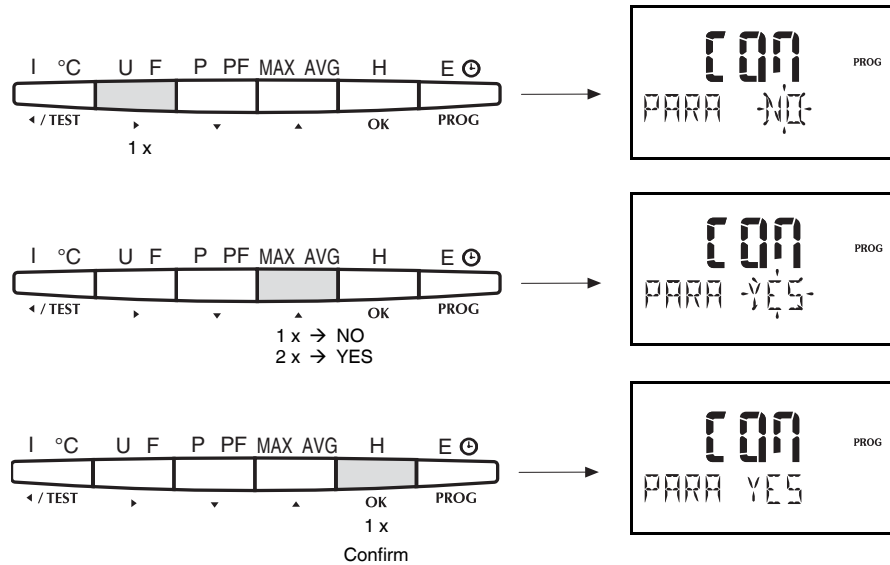


Figure 10-17 Setting automatic parameterization

10.3.4 PROFIBUS register tables

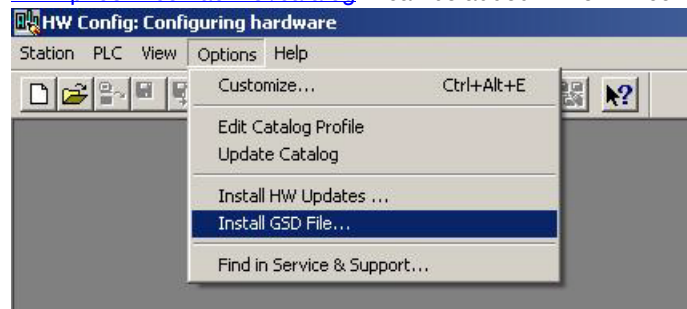
The PROFIBUS register tables are at Section "PROFIBUS register" on page 12-1.

10.3.5 Starting a PROFIBUS configuration

In the following example, some points about PROFIBUS configuration startup are described. This includes hardware implementation (EEM-MA600), calling the variable tables with parameter reading/controlling and importing/transferring parameters in the software.

10.3.5.1 Installing a GSD file

In a new or existing project, the EEM-MA600 should be inserted. The GSD file must be installed first. The required GSD file for the measuring instrument is available at www.phoenixcontact.net/catalog. It can be added in the HW configuration under "Extras".

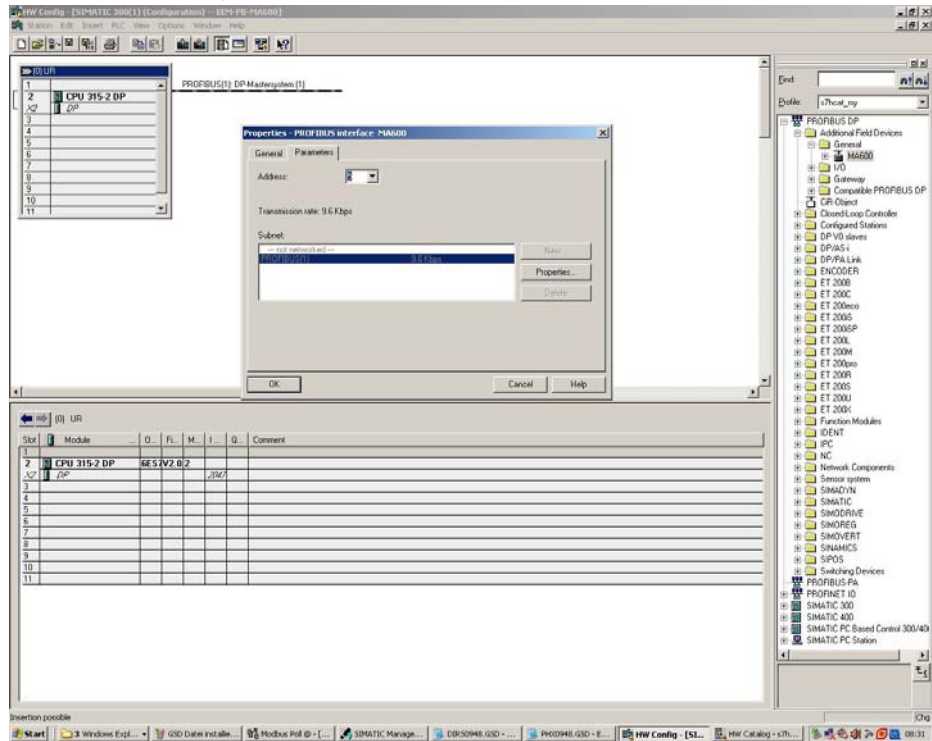


10.3.5.2 Add EEM-MA600 to hardware

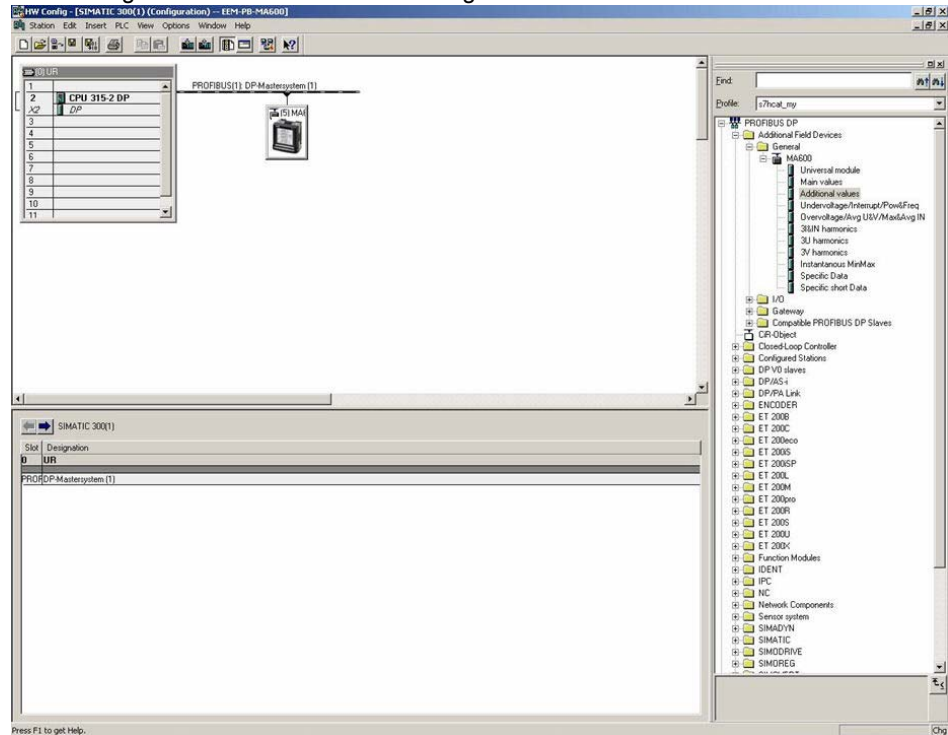
1. Load your master project after the GSD file installation is successfully implemented.
2. Under the path on the right-hand side, you will find measuring instrument EEM-MA600 under "PROFIBUS DP, Additional field devices, General". This can be linked to the bus through "Drag&Drop".

Then a window will automatically be displayed where the module is assigned an address and a name/description for the EEM-MA600 can be given. If the EEM-MA600 already has an assigned address, this should be chosen.

When delivered, the EEM-MA600 has address 5.

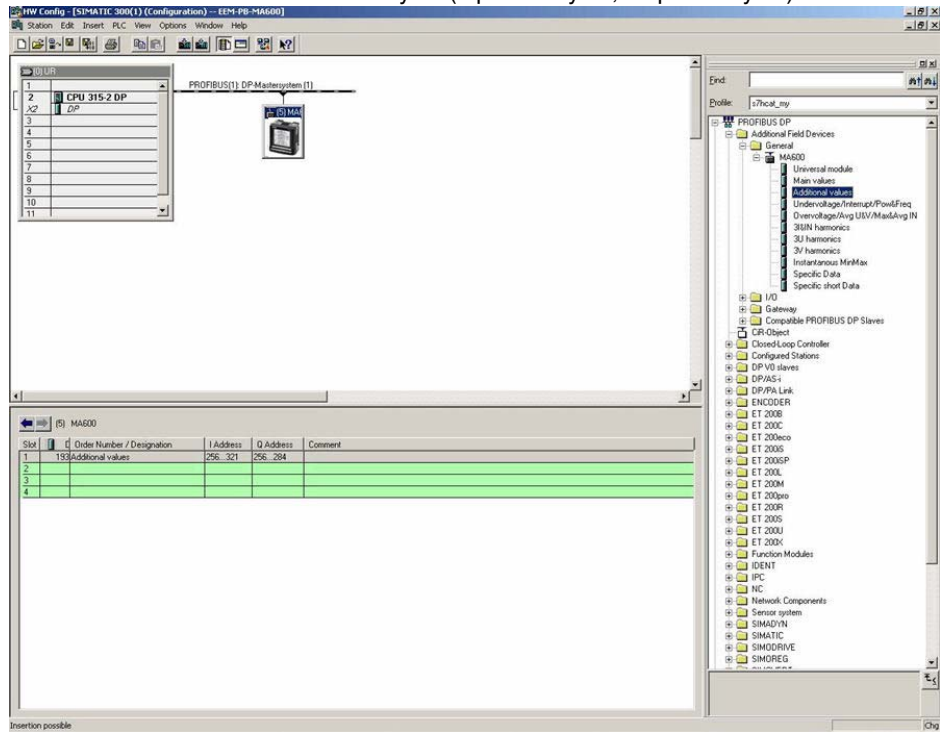


- After you add the measuring instrument to your PROFIBUS configuration, the EEM-MA600 must still be assigned the desired register tables (see Section "Module 1 "Main values"" on page 12-5, Section "Module 2 "Additional values"" on page 12-11, etc.) and the addresses for the particular inputs and outputs. Only the start address is given, since the prefabricated tables have fixed lengths and the end results from this length. The register tables are available on the right side under "MA600".

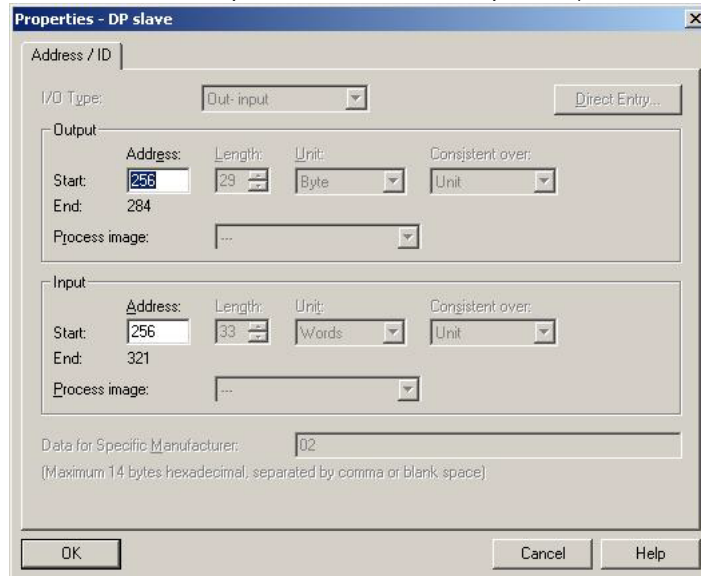


- You can drag the desired register tables via "Drag&Drop" from the right to the lower left area.

The maximum table size is 155 bytes (Input: 95 bytes, output 60 bytes).



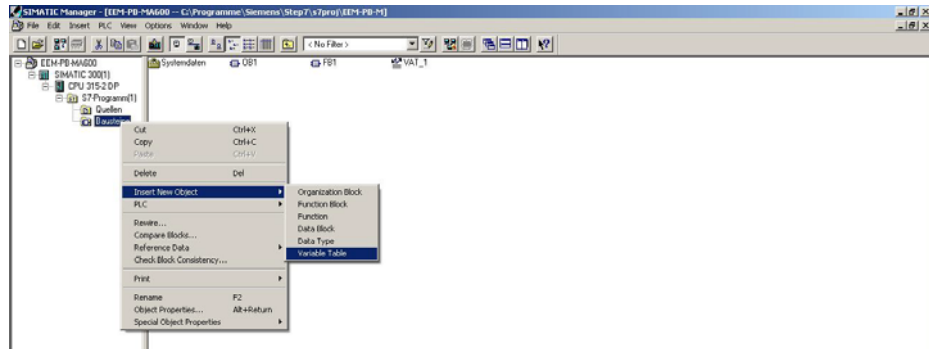
- Double-click on the green-highlighted area to open the "Properties - DP slave" window. Here, you can determine the start address for input and output registers (for example, start address output: 256, start address input: 256).



- Save the changes described above with "Save and compile".
- Load the changes with "Download to module" in the controller.

10.3.5.3 Variable table

1. After the new configuration is loaded, switch to the Simatic Manager window.
2. Under "S7 program", right-click on "Function blocks".
3. In the next window, choose "Insert New Object, Variable Table".



4. In the variable table, the outputs for previously entered modules can be controlled and the inputs read back. Access takes place via the input and output addresses set in the hardware configuration. The necessary quantities (bytes, words, double words) for the read and displayed data are described in the register tables.

You can, for example, read back the voltages for the individual phases as shown in the following example, Module 1: "Main values" (see Section "Module 1 "Main values"" on page 12-5).

Example start address 0 (Register size 2 bytes)

IW 14	V1: Conductor voltage against N (V/ 100)	Measured value: 110,10 V
IW 16	V2: Conductor voltage against N (V/ 100)	Measured value: 109,97 V
W 18	V3: Conductor voltage against N (V/ 100)	Measured value: 109,93 V

Example start address 10

If you have set the start address from 0 to 10 instead, you will find the three words to be read back in the variable tables under:

IW 24	Input word	10+14=24
IW 26		
IW 28		

Abbreviations for the tables include: (when English is the set language, these abbreviations can deviate for other language settings)

IB	Input byte	QB	Output byte
IW	Input word	QW	Output word
ID	Input double word	QD	Output double word

To display the measured values in the table under input words, you must first create a connection to the connected PROFIBUS device. Establish a connection with the "Set Up Connection to Directly Connected CPU" button. When you click on the "Monitor variable" button, the measured values for the values delivered from EEM-MA600 will be specified in the register upon updating.

Address	Symbol	Display	Status value	Modify value
1	IW 0	DEC	1996	
2	IW 2	DEC	2000	
3	IW 4	DEC	1969	
4	IW 6	DEC	0	
5	IW 8	DEC	19060	
6	IW 10	DEC	19043	
7	IW 12	DEC	19056	
8	IW 14	DEC	11010	
9	IW 16	DEC	10997	
10	IW 18	DEC	10993	
11	IW 20	DEC	4999	
12	IW 22	DEC	0	
13	IW 24	DEC	0	
14	IW 26	DEC	0	
15	IW 28	DEC	510	
16	IW 30	DEC	5011	
17	IW 32	DEC	2004	
18	IW 34	DEC	4007	
19	IW 36	DEC	1220	
20	IW 38	DEC	10	

10.3.5.4 Module 9 Special table

With Module 9, you can compile a specific table from the values from the special tables. This has a length of 33 bytes, with the first byte reserved for the table number. You can freely choose the table number (bit 0..6). In order to write values in the special table and/or have them read out from the table, bit 7 from input byte 1 for the output value must be set to 1. 16 words can be compiled with the desired data.

Then, the addresses for the chosen values are written in the following, up to 16 output words, and the table is defined.

The readout then takes place as with all other tables.

Set output values using the "Modify variable" command. You can activate this by right-clicking on a value or with Ctrl+F9 or the "Variable, Modify" tab.

With the help of the "Insert, Range of variables" menu item, a set of input/output values can be added, such as when several values should be added for a type consecutively (for example, IW 0 to IW 27, QW 0 to QW 27).

Address	Symbol	Display	Status value	Modify value
1				
2	QB 0	BIN	2#1000_0000	2#1000_0000
3	QW 1	DEC	0	0
4	QW 3	DEC	1	1
5	QW 5	DEC	2	2
6	QW 7	DEC	3	3
7	QW 9	DEC	4	4
8	QW 11	DEC	5	5
9	QW 13	DEC	6	6
10	QW 15	DEC	7	7
11	QW 17	DEC	8	8
12	QW 19	DEC	9	9
13	QW 21	DEC	10	10
14	QW 23	DEC	11	11
15	QW 25	DEC	12	12
16	QW 27	DEC	13	13
17				
18	IB 0	DEC	-128	
19	IB 1	DEC	2000	
20	IB 3	DEC	3001	
21	IB 5	DEC	2998	
22	IB 7	DEC	0	
23	IB 9	DEC	19063	
24	IB 11	DEC	19041	
25	IB 13	DEC	19047	
26	IB 15	DEC	11006	
27	IB 17	DEC	10964	
28	IB 19	DEC	10960	
29	IB 21	DEC	5000	
30	IB 23	DEC	99	
31	IB 25	DEC	42	
32	IB 27	DEC	98	

Example Tables No. 0

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Binary	1	0	0	0	0	0	0	0
Decimal	128							

Bit 7 must always be set to 1 in order to write values in the special tables and/or to have the table read back.

11 MODBUS register

In this section, you will find the following registers.

Table 11-1 Register overview

Start address	Description	On page...
C550 hex	Display of current main measured values based on current and voltage transducer (under consideration of transmission ratios)	Table 11-2 on page 11-2
C650 hex	Energy values display	Table 11-3 on page 11-3
C750 hex	Display of average values based on current and voltage transducer via the set measurement duration (under consideration of transmission ratios)	Table 11-4 on page 11-5
C850 hex	Display of current main measured values not based on current and voltage transducer (without consideration of transmission ratios)	Table 11-5 on page 11-7
370 hex	Display of current average current/voltage value based on current and voltage transducer (under consideration of transmission ratios)	Table 11-6 on page 11-8
741 hex	Display of current average current/voltage value not based on current and voltage transducer (without consideration of transmission ratios)	Table 11-7 on page 11-9
C900 hex	Temperature inputs display	Table 11-8 on page 11-9
C950 hex	Display of current harmonic distortion and harmonics	Table 11-9 on page 11-10
CB00 hex	Status of inputs/outputs	Table 11-10 on page 11-20
E000 hex	Measuring instrument terminal configuration	Table 11-11 on page 11-20
E100 hex	Date/time configuration	Table 11-13 on page 11-21
E110 hex	Ethernet communication module configuration	Table 11-14 on page 11-22
E200 hex	Saving configuration and restart for measuring instrument	Table 11-15 on page 11-23
7700 hex	Display of last alarm to digital outputs (EEM-2DIO-MA600)	Table 11-17 on page 11-24
100 hex	Information about connected extension modules	Table 11-18 on page 11-28
200 hex	Extension module display and configuration	Table 11-19 on page 11-29
400 hex	Reset measured values	Table 11-20 on page 11-39
C10 hex	Alarm history display (course of last 10 alarms)	Table 11-21 on page 11-42
D00 hex	Undervoltage (course of last 10 SAG threshold value undervoltages)	Table 11-22 on page 11-47

Table 11-1 Register overview [...]

Start address	Description	On page...
E00 hex	Surge voltage (course of last 10 SWELL surge voltages)	Table 11-23 on page 11-53
F00 hex	Current minimum and maximum measured values (measurement duration of 1 s)	Table 11-24 on page 11-58
1000 hex	Supply voltage failure (course of last 10 voltage interruptions)	Table 11-25 on page 11-65
3000 hex	Course of reactive and real energy over set measurement duration (without consideration of transmission ratios)	Table 11-26 on page 11-68
8000 hex	Course of average values for voltages over the set measurement duration	Table 11-27 on page 11-68
9000 hex	Course of average values for frequency over the set measurement duration	Table 11-28 on page 11-69

Table 11-2 C550 hex: display of current main measured values based on current and voltage transducer (under consideration of transmission ratios)

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
50512	C550	2	Hour: operating hours counter	h/100	R	
50514	C552	2	U12: line voltage (1-2)	V/100	R	
50516	C554	2	U23: line voltage (2-3)	V/100	R	
50518	C556	2	U31: line voltage (3-1)	V/100	R	
50520	C558	2	V1: line voltage against N	V/100	R	
50522	C55A	2	V2: line voltage against N	V/100	R	
50524	C55C	2	V3: line voltage against N	V/100	R	
50526	C55E	2	F: frequency	Hz/100	R	
50528	C560	2	I1: current	mA	R	
50530	C562	2	I2: current	mA	R	
50532	C564	2	I3: current	mA	R	
50534	C566	2	In: neutral conductor current	mA	R	
50536	C568	2	ΣP : total real power +/-	kW/100	R	
50538	C56A	2	ΣQ : total reactive power +/-	kvar/100	R	
50540	C56C	2	ΣS : total apparent power	kVA/100	R	
50542	C56E	2	ΣPF : total power factor -: capacitive and + : inductive	0.001	R	
50544	C570	2	P1: real power phase 1 +/-	kW/100	R	
50546	C572	2	P2: real power phase 2 +/-	kW/100	R	
50548	C574	2	P3: real power phase 3 +/-	kW/100	R	
50550	C576	2	Q1: reactive power phase 1 +/-	kvar/100	R	

Table 11-2 C550 hex: display of current main measured values based on current and voltage transducer (under consideration of transmission ratios) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
50552	C578	2	Q2: reactive power phase 2 +/-	kvar/100	R	
50554	C57A	2	Q3: reactive power phase 3 +/-	kvar/100	R	
50556	C57C	2	S1: apparent power phase 1	kVA/100	R	
50558	C57E	2	S2: apparent power phase 2	kVA/100	R	
50560	C580	2	S3: apparent power phase 3	kVA/100	R	
50562	C582	2	PF1: power factor phase 1 -: capacitive and + : inductive	0.001	R	
50564	C584	2	PF2: power factor phase 2 -: capacitive and + : inductive	0.001	R	
50566	C586	2	PF3: power factor phase 3 -: capacitive and + : inductive	0.001	R	
50568	C588	2	<i>Not available</i>	-	R	
50570	C58A	2	<i>Not available</i>	-	R	
50572	C58C	2	<i>Not available</i>	-	R	
Range extension: 62 words (decimal) or 3E words (hexadecimal).						

Table 11-3 C650 hex: energy value display

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
50768	C650	2	Hour: operating hours counter	h/100	R	
50770	C652	2	<i>Not available</i>	-	R	
50772	C654	2	<i>Not available</i>	-	R	
50774	C656	2	<i>Not available</i>	-	R	
50776	C658	2	<i>Not available</i>	-	R	
50778	C65A	2	<i>Not available</i>	-	R	
50780	C65C	2	Ea+: current positive real energy	kWh	R	
50782	C65E	2	Er +: current positive reactive energy	kvarh	R	
50784	C660	2	Es: current apparent energy	kVAh	R	
50786	C662	2	Ea-: current negative real energy	kWh	R	
50788	C664	2	Er -: current negative reactive energy	kvarh	R	
50790	C666	2	No. digital inputs (max 6)	-	R	
50792	C668	2	Counter reading digital input DI 1	-	R	EEM-2DIO-MA600
50794	C66A	2	Counter reading digital input DI 2	-	R	EEM-2DIO-MA600
50796	C66C	2	Counter reading digital input DI 3	-	R	EEM-2DIO-MA600
50798	C66E	2	Counter reading digital input DI 4	-	R	EEM-2DIO-MA600

EEM-MA600

Table 11-3 C650 hex: energy value display [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
50800	C670	2	Counter reading digital input DI 5	-	R	EEM-2DIO-MA600
50802	C672	2	Counter reading digital input DI 6	-	R	EEM-2DIO-MA600
50804	C674	2	<i>Not available</i>	-	R	
50806	C676	2	<i>Not available</i>	-	R	
50808	C678	2	<i>Not available</i>	-	R	
50810	C67A	2	<i>Not available</i>	-	R	
50812	C67C	2	Σ PPR: total real power over set measurement duration (trend)	kW/100	R	
50814	C67E	2	Σ QPR: total reactive power over set measurement duration (trend)	kvar/100	R	
50816	C680	2	Σ SPR: total apparent power over set measurement duration (trend)	kVA/100	R	
50818	C682	2	Ea+: current positive real energy over set measurement duration	kWh/10	R	
50820	C684	2	Ea-: current negative real energy over set measurement duration	kWh/10	R	
50822	C686	2	Er+: current positive reactive energy over set measurement duration	kvarh/10	R	
50824	C688	2	Er-: current negative reactive energy over set measurement duration	kvarh/10	R	
50826	C68A	2	<i>Not available</i>	-	R	
50828	C68C	1	<i>Not available</i>	-	R	
50829	C68D	1	<i>Not available</i>	-	R	
50830	C68E	1	<i>Not available</i>	-	R	
50831	C68F	1	<i>Not available</i>	-	R	
50832	C690	1	<i>Not available</i>	-	R	

Range extension: 65 words (decimal) or 41 words (hexadecimal).

Example:

In order to read the positive real energy from address C65C, the following data sequence must be sent:

Slave address	Function	High quality address	Low quality address	No. High quality words	No. Low quality words	CRC 16
05	03	C6	5C	00	02	3915

EEM-MA600 answer: the register contents correspond to a positive real energy of 177645 kWh.

Slave address	Function	Number of bytes	Low quality register value	High quality register value	CRC 16
05	03	04	0011	IDDD	2FAF
			17	7645	

Table 11-4 C750 hex: display of average values based on current and voltage transducer via the set measurement duration (under consideration of transmission ratios)

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51024	C750	2	Avg U12: average line voltage value	V/100	R	
51026	C752	2	Avg U23: average line voltage value	V/100	R	
51028	C754	2	Avg U31: average line voltage value	V/100	R	
51030	C756	2	Avg V1: average line voltage value against N	V/100	R	
51032	C758	2	Avg V2: average line voltage value against N	V/100	R	
51034	C75A	2	Avg V3: average line voltage value against N	V/100	R	
51036	C75C	2	Avg F: average frequency value	Hz/100	R	
51038	C75E	2	Avg I1: current average value	mA	R	
51040	C760	2	Avg I2: current average value	mA	R	
51042	C762	2	Avg I3: current average value	mA	R	
51044	C764	2	Avg In: neutral conductor current average value	mA	R	
51046	C766	2	Avg $\Sigma P+$: average total positive real power value	kW/100	R	
51048	C768	2	Avg $\Sigma P-$: average total negative real power value	kW/100	R	
51050	C76A	2	Avg $\Sigma Q+$: average total positive reactive power value	kvar/100	R	
51052	C76C	2	Avg $\Sigma Q-$: average total negative reactive power value	kvar/100	R	
51054	C76E	2	Avg ΣS : average total apparent power value	kVA/100	R	
51056	C770	2	Avg U12: average line voltage value	V/100	R	
51058	C772	2	Avg U23: average line voltage value	V/100	R	
51060	C774	2	Avg U31: average line voltage value	V/100	R	

Table 11-4 C750 hex: display of average values based on current and voltage transducer via the set measurement duration (under consideration of transmission ratios) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51062	C776	2	Max/avg V1: maximum value for line voltage against N	V/100	R	
51064	C778	2	Max/avg V2: maximum value for line voltage against N	V/100	R	
51066	C77A	2	Max/avg V3: maximum value for line voltage against N	V/100	R	
51068	C77C	2	Max/avg F: maximum frequency value	Hz/100	R	
51070	C77E	2	Max/avg I1: maximum current value	mA	R	
51072	C780	2	Max/avg I2: maximum current value	mA	R	
51074	C782	2	Max/avg I3: maximum current value	mA	R	
51076	C784	2	Max/avg In: maximum current value	mA	R	
51078	C786	2	Max/avg $\Sigma P+$: maximum total positive real power value	kW/100	R	
51080	C788	2	Max/avg $\Sigma P-$: maximum total negative real power value	kW/100	R	
51082	C78A	2	Max/avg $\Sigma Q+$: maximum total positive reactive power value	kvar/100	R	
51084	C78C	2	Max/avg $\Sigma Q-$: maximum total negative reactive power value	kvar/100	R	
51086	C78E	2	Max/avg ΣS : maximum total apparent power value	kVA/100	R	
51088	C790	1	<i>Not available</i>	-	R	
51089	C791	1	<i>Not available</i>	-	R	
51090	C792	1	<i>Not available</i>	-	R	
51091	C793	1	<i>Not available</i>	-	R	
51092	C794	1	<i>Not available</i>	-	R	
51093	C795	1	<i>Not available</i>	-	R	
Range extension: 70 words (decimal) or 46 words (hexadecimal).						



When you use this table, you must multiply the values by the transmission ratios for the converter used.

Table 11-5 C850 hex: display of current main measured values not based on current and voltage transducer (without consideration of transmission ratios)

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51280	C850	1	Hour: operating hours counter	h/100	R	
51281	C851	1	U12: line voltage	V/100	R	
51282	C852	1	U23: line voltage	V/100	R	
51283	C853	1	U31: line voltage	V/100	R	
51284	C854	1	V1: line voltage against N	V/100	R	
51285	C855	1	V2: line voltage against N	V/100	R	
51286	C856	1	V3: line voltage against N	V/100	R	
51287	C857	1	F: frequency	Hz/100	R	
51288	C858	1	I1: current	mA	R	
51289	C859	1	I2: current	mA	R	
51290	C85A	1	I3: current	mA	R	
51291	C85B	1	In: neutral conductor current	mA	R	
51292	C85C	1	ΣP: total real power +/-	kW/100	R	
51293	C85D	1	ΣQ: total reactive power +/-	kvar/100	R	
51294	C85E	1	ΣS: total apparent power	kVA/100	R	
51295	C85F	1	ΣPF: total power factor -: capacitive and + : inductive	0.001	R	
51296	C860	1	P1: real power phase 1 +/-	kW/100	R	
51297	C861	1	P2: real power phase 2 +/-	kW/100	R	
51298	C862	1	P3: real power phase 3 +/-	kW/100	R	
51299	C863	1	Q1: reactive power phase 1 +/-	kvar/100	R	
51300	C864	1	Q2: reactive power phase 2 +/-	kvar/100	R	
51301	C865	1	Q3: reactive power phase 3 +/-	kvar/100	R	
51302	C866	1	S1: apparent power phase 1	kVA/100	R	
51303	C867	1	S2: apparent power phase 2	kVA/100	R	
51304	C868	1	S3: apparent power phase 3	kVA/100	R	
51305	C869	1	PF1: power factor phase 1 -: capacitive and + : inductive	0.001	R	
51306	C86A	1	PF2: power factor phase 2 -: capacitive and + : inductive	0.001	R	
51307	C86B	1	PF3: power factor phase 3 -: capacitive and + : inductive	0.001	R	

Table 11-5 C850 hex: display of current main measured values not based on current and voltage transducer (without consideration of transmission ratios) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51308	C86C	1	<i>Not available</i>		R	
51309	C86D	1	<i>Not available</i>		R	
51310	C86E	1	<i>Not available</i>		R	
51311	C86F	1	EA+: Total positive real energy since startup (cannot be reset)	MWh	R	
51312	C870	1	<i>Not available</i>		R	
51313	C871	1	EA-: total negative real energy since startup (cannot be reset)	MWh	R	
51314	C872	1	<i>Not available</i>		R	

Range extension: 35 words (decimal) or 23 words (hexadecimal).

Example:

To have all values from table C850 with a length of 35 words read out with one query, the following data sequence must be sent:

Slave address	Function	High quality address	Low quality address	No. High quality words	No. Low quality words	CRC 16
05	03	C8	50	00	35	BA28

Table 11-6 370 Hex: display of current average current/voltage value based on current and voltage transducer (under consideration of transmission ratios)

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
880	370	2	ISYS: current average value $(I1+I2+I3)/3$	mA	R	-
882	372	2	USYS: line voltages $(U12 + U23 + U31)/3$ average value	V/100	R	-
884	374	2	VSYS: average value of line voltages against N $(V1 + V2 + V3)/3$	V/100	R	-

Range extension: 6 words (decimal) or 6 words (hexadecimal)



When you use this table, you must multiply the values by the transmission ratios for the converter used.

Table 11-7 741 hex: display of current average current/voltage value not based on current and voltage transducer (without consideration of transmission ratios)

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
1857	741	1	ISYS: current average value (I1+I2+I3)/3	mA	R	-
1858	742	1	USYS: line voltages (U12 + U23 + U31)/3 average value	V/10	R	-
1859	743	1	VSYS: average value of line voltages against N (V1 + V2 + V3)/3	V/10	R	-
Range extension: 3 words (decimal) or 3 words (hexadecimal)						

Table 11-8 C900 hex: temperature inputs display

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51456	C900	1	Internal temperature sensor available	Yes(1)/No(0)	R	
51457	C901	1	Internal module temperature	°C	R	EEM-TEMP-MA600
51458	C902	1	Number of temperature sensors (0-3 max) connected	-	R	
51459	C903	1	External temperature 1	°C	R	EEM-TEMP-MA600
51460	C904	1	External temperature 2	°C	R	EEM-TEMP-MA600
51461	C905	1	External temperature 3	°C	R	EEM-TEMP-MA600
51462	C906	1	<i>Not available</i>	-	R	
51463	C907	1	<i>Not available</i>	-	R	
Range extension: 8 words (decimal) or 8 words (hexadecimal)						

Table 11-9 C950 hex: display of current harmonic distortion and harmonics

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
Total THD harmonic distortion						
51536	C950	1	THD U12: total harmonic distortion of line voltage	0.10%	R	
51537	C951	1	THD U23: total harmonic distortion of line voltage	0.10%	R	
51538	C952	1	THD U31: total harmonic distortion of line voltage	0.10%	R	
51539	C953	1	THD V1: total harmonic distortion of line voltage against N	0.10%	R	
51540	C954	1	THD V2: total harmonic distortion of line voltage against N	0.10%	R	
51541	C955	1	THD V3: total harmonic distortion of line voltage against N	0.10%	R	
51542	C956	1	THD I1: total harmonic distortion of current	0.10%	R	
51543	C957	1	THD I2: total harmonic distortion of current	0.10%	R	
51544	C958	1	THD I3: total harmonic distortion of current	0.10%	R	
51545	C959	1	THD In: total harmonic distortion of neutral conductor current	0.10%	R	
Range extension: 10 words (decimal) or A words (hexadecimal).						
Individual harmonic content for currents: I						
51546	C95A	1	Highest ascertainable harmonic (63)		R	
51547	C95B	1	Content of 3rd harmonic I1	0.10%		
51548	C95C	1	Content of 3rd harmonic I2	0.10%	R	
51549	C95D	1	Content of 3rd harmonic I3	0.10%	R	
51550	C95E	1	Content of 3rd harmonic IN	0.10%	R	
51551	C95F	1	Content of 5th harmonic I1	0.10%	R	
51552	C960	1	Content of 5th harmonic I2	0.10%	R	
51553	C961	1	Content of 5th harmonic I3	0.10%	R	
51554	C962	1	Content of 5th harmonic IN	0.10%	R	
51555	C963	1	Content of 7th harmonic I1	0.10%	R	
51556	C964	1	Content of 7th harmonic I2	0.10%	R	
51557	C965	1	Content of 7th harmonic I3	0.10%	R	
51558	C966	1	Content of 7th harmonic IN	0.10%	R	
51559	C967	1	Content of 9th harmonic I1	0.10%	R	
51560	C968	1	Content of 9th harmonic I2	0.10%	R	

Table 11-9 C950 hex: display of current harmonic distortion and harmonics [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51561	C969	1	Content of 9th harmonic I3	0.10%	R	
51562	C96A	1	Content of 9th harmonic IN	0.10%	R	
51563	C96B	1	Content of 11th harmonic I1	0.10%	R	
51564	C96C	1	Content of 11th harmonic I2	0.10%	R	
51565	C96D	1	Content of 11th harmonic I3	0.10%	R	
51566	C96E	1	Content of 11th harmonic IN	0.10%	R	
51567	C96F	1	Content of 13th harmonic I1	0.10%	R	
51568	C970	1	Content of 13th harmonic I2	0.10%	R	
51569	C971	1	Content of 13th harmonic I3	0.10%	R	
51570	C972	1	Content of 13th harmonic IN	0.10%	R	
51571	C973	1	Content of 15th harmonic I1	0.10%	R	
51572	C974	1	Content of 15th harmonic I2	0.10%	R	
51573	C975	1	Content of 15th harmonic I3	0.10%	R	
51574	C976	1	Content of 15th harmonic IN	0.10%	R	
51575	C977	1	Content of 17th harmonic I1	0.10%	R	
51576	C978	1	Content of 17th harmonic I2	0.10%	R	
51577	C979	1	Content of 17th harmonic I3	0.10%	R	
51578	C97A	1	Content of 17th harmonic IN	0.10%	R	
51579	C97B	1	Content of 19th harmonic I1	0.10%	R	
51580	C97C	1	Content of 19th harmonic I2	0.10%	R	
51581	C97D	1	Content of 19th harmonic I3	0.10%	R	
51582	C97E	1	Content of 19th harmonic IN	0.10%	R	
51583	C97F	1	Content of 21st harmonic I1	0.10%	R	
51584	C980	1	Content of 21st harmonic I2	0.10%	R	
51585	C981	1	Content of 21st harmonic I3	0.10%	R	
51586	C982	1	Content of 21st harmonic IN	0.10%	R	
51587	C983	1	Content of 23rd harmonic I1	0.10%	R	
51588	C984	1	Content of 23rd harmonic I2	0.10%	R	
51589	C985	1	Content of 23rd harmonic I3	0.10%	R	
51590	C986	1	Content of 23rd harmonic IN	0.10%	R	
51591	C987	1	Content of 25th harmonic I1	0.10%	R	
51592	C988	1	Content of 25th harmonic I2	0.10%	R	
51593	C989	1	Content of 25th harmonic I3	0.10%	R	
51594	C98A	1	Content of 25th harmonic IN	0.10%	R	
51595	C98B	1	Content of 27th harmonic I1	0.10%	R	
51596	C98C	1	Content of 27th harmonic I2	0.10%	R	

Table 11-9 C950 hex: display of current harmonic distortion and harmonics [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51597	C98D	1	Content of 27th harmonic I3	0.10%	R	
51598	C98E	1	Content of 27th harmonic IN	0.10%	R	
51599	C98F	1	Content of 29th harmonic I1	0.10%	R	
51600	C990	1	Content of 29th harmonic I2	0.10%	R	
51601	C991	1	Content of 29th harmonic I3	0.10%	R	
51602	C992	1	Content of 29th harmonic IN	0.10%	R	
51603	C993	1	Content of 31st harmonic I1	0.10%	R	
51604	C994	1	Content of 31st harmonic I2	0.10%	R	
51605	C995	1	Content of 31st harmonic I3	0.10%	R	
51606	C996	1	Content of 31st harmonic IN	0.10%	R	
51607	C997	1	Content of 33rd harmonic I1	0.10%	R	
51608	C998	1	Content of 33rd harmonic I2	0.10%	R	
51609	C999	1	Content of 33rd harmonic I3	0.10%	R	
51610	C99A	1	Content of 33rd harmonic IN	0.10%	R	
51611	C99B	1	Content of 35th harmonic I1	0.10%	R	
51612	C99C	1	Content of 35th harmonic I2	0.10%	R	
51613	C99D	1	Content of 35th harmonic I3	0.10%	R	
51614	C99E	1	Content of 35th harmonic IN	0.10%	R	
51615	C99F	1	Content of 37th harmonic I1	0.10%	R	
51616	C9A0	1	Content of 37th harmonic I2	0.10%	R	
51617	C9A1	1	Content of 37th harmonic I3	0.10%	R	
51618	C9A2	1	Content of 37th harmonic IN	0.10%	R	
51619	C9A3	1	Content of 39th harmonic I1	0.10%	R	
51620	C9A4	1	Content of 39th harmonic I2	0.10%	R	
51621	C9A5	1	Content of 39th harmonic I3	0.10%	R	
51622	C9A6	1	Content of 39th harmonic IN	0.10%	R	
51623	C9A7	1	Content of 41st harmonic I1	0.10%	R	
51624	C9A8	1	Content of 41st harmonic I2	0.10%	R	
51625	C9A9	1	Content of 41st harmonic I3	0.10%	R	
51626	C9AA	1	Content of 41st harmonic IN	0.10%	R	
51627	C9AB	1	Content of 43rd harmonic I1	0.10%	R	
51628	C9AC	1	Content of 43rd harmonic I2	0.10%	R	
51629	C9AD	1	Content of 43rd harmonic I3	0.10%	R	
51630	C9AE	1	Content of 43rd harmonic IN	0.10%	R	
51631	C9AF	1	Content of 45th harmonic I1	0.10%	R	
51632	C9B0	1	Content of 45th harmonic I2	0.10%	R	

Table 11-9 C950 hex: display of current harmonic distortion and harmonics [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51633	C9B1	1	Content of 45th harmonic I3	0.10%	R	
51634	C9B2	1	Content of 45th harmonic IN	0.10%	R	
51635	C9B3	1	Content of 47th harmonic I1	0.10%	R	
51636	C9B4	1	Content of 47th harmonic I2	0.10%	R	
51637	C9B5	1	Content of 47th harmonic I3	0.10%	R	
51638	C9B6	1	Content of 47th harmonic IN	0.10%	R	
51639	C9B7	1	Content of 49th harmonic I1	0.10%	R	
51640	C9B8	1	Content of 49th harmonic I2	0.10%	R	
51641	C9B9	1	Content of 49th harmonic I3	0.10%	R	
51642	C9BA	1	Content of 49th harmonic IN	0.10%	R	
51643	C9BB	1	Content of 51st harmonic I1	0.10%	R	
51644	C9BC	1	Content of 51st harmonic I2	0.10%	R	
51645	C9BD	1	Content of 51st harmonic I3	0.10%	R	
51646	C9BE	1	Content of 51st harmonic IN	0.10%	R	
51647	C9BF	1	Content of 53rd harmonic I1	0.10%	R	
51648	C9C0	1	Content of 53rd harmonic I2	0.10%	R	
51649	C9C1	1	Content of 53rd harmonic I3	0.10%	R	
51650	C9C2	1	Content of 53rd harmonic IN	0.10%	R	
51651	C9C3	1	Content of 55th harmonic I1	0.10%	R	
51652	C9C4	1	Content of 55th harmonic I2	0.10%	R	
51653	C9C5	1	Content of 55th harmonic I3	0.10%	R	
51654	C9C6	1	Content of 55th harmonic IN	0.10%	R	
51655	C9C7	1	Content of 57th harmonic I1	0.10%	R	
51656	C9C8	1	Content of 57th harmonic I2	0.10%	R	
51657	C9C9	1	Content of 57th harmonic I3	0.10%	R	
51658	C9CA	1	Content of 57th harmonic IN	0.10%	R	
51659	C9CB	1	Content of 59th harmonic I1	0.10%	R	
51660	C9CC	1	Content of 59th harmonic I2	0.10%	R	
51661	C9CD	1	Content of 59th harmonic I3	0.10%	R	
51662	C9CE	1	Content of 59th harmonic IN	0.10%	R	
51663	C9CF	1	Content of 61st harmonic I1	0.10%	R	
51664	C9D0	1	Content of 61st harmonic I2	0.10%	R	
51665	C9D1	1	Content of 61st harmonic I3	0.10%	R	
51666	C9D2	1	Content of 61st harmonic IN	0.10%	R	
51667	C9D3	1	Content of 63rd harmonic I1	0.10%	R	
51668	C9D4	1	Content of 63rd harmonic I2	0.10%	R	

Table 11-9 C950 hex: display of current harmonic distortion and harmonics [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51669	C9D5	1	Content of 63rd harmonic I3	0.10%	R	
51670	C9D6	1	Content of 63rd harmonic IN	0.10%	R	
Range extension: 125 words (decimal) or 7D words (hexadecimal)						
Individual harmonic content for line voltages: U (phase/phase)						
51671	C9D7	1	Highest ascertainable harmonic (63)		R	
51672	C9D8	1	Content of 3rd harmonic U12	0.10%	R	
51673	C9D9	1	Content of 3rd harmonic U23	0.10%	R	
51674	C9DA	1	Content of 3rd harmonic U31	0.10%	R	
51675	C9DB	1	Content of 5th harmonic U12	0.10%	R	
51676	C9DC	1	Content of 5th harmonic U23	0.10%	R	
51677	C9DD	1	Content of 5th harmonic U31	0.10%	R	
51678	C9DE	1	Content of 7th harmonic U12	0.10%	R	
51679	C9DF	1	Content of 7th harmonic U23	0.10%	R	
51680	C9E0	1	Content of 7th harmonic U31	0.10%	R	
51681	C9E1	1	Content of 9th harmonic U12	0.10%	R	
51682	C9E2	1	Content of 9th harmonic U23	0.10%	R	
51683	C9E3	1	Content of 9th harmonic U31	0.10%	R	
51684	C9E4	1	Content of 11th harmonic U12	0.10%	R	
51685	C9E5	1	Content of 11th harmonic U23	0.10%	R	
51686	C9E6	1	Content of 11th harmonic U31	0.10%	R	
51687	C9E7	1	Content of 13th harmonic U12	0.10%	R	
51688	C9E8	1	Content of 13th harmonic U23	0.10%	R	
51689	C9E9	1	Content of 13th harmonic U31	0.10%	R	
51690	C9EA	1	Content of 15th harmonic U12	0.10%	R	
51691	C9EB	1	Content of 15th harmonic U23	0.10%	R	
51692	C9EC	1	Content of 15th harmonic U31	0.10%	R	
51693	C9ED	1	Content of 17th harmonic U12	0.10%	R	
51694	C9EE	1	Content of 17th harmonic U23	0.10%	R	
51695	C9EF	1	Content of 17th harmonic U31	0.10%	R	
51696	C9F0	1	Content of 19th harmonic U12	0.10%	R	
51697	C9F1	1	Content of 19th harmonic U23	0.10%	R	
51698	C9F2	1	Content of 19th harmonic U31	0.10%	R	
51699	C9F3	1	Content of 21st harmonic U12	0.10%	R	
51700	C9F4	1	Content of 21st harmonic U23	0.10%	R	
51701	C9F5	1	Content of 21st harmonic U31	0.10%	R	
51702	C9F6	1	Content of 23rd harmonic U12	0.10%	R	

Table 11-9 C950 hex: display of current harmonic distortion and harmonics [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51703	C9F7	1	Content of 23rd harmonic U23	0.10%	R	
51704	C9F8	1	Content of 23rd harmonic U31	0.10%	R	
51705	C9F9	1	Content of 25th harmonic U12	0.10%	R	
51706	C9FA	1	Content of 25th harmonic U23	0.10%	R	
51707	C9FB	1	Content of 25th harmonic U31	0.10%	R	
51708	C9FC	1	Content of 27th harmonic U12	0.10%	R	
51709	C9FD	1	Content of 27th harmonic U23	0.10%	R	
51710	C9FE	1	Content of 27th harmonic U31	0.10%	R	
51711	C9FF	1	Content of 29th harmonic U12	0.10%	R	
51712	CA00	1	Content of 29th harmonic U23	0.10%	R	
51713	CA01	1	Content of 29th harmonic U31	0.10%	R	
51714	CA02	1	Content of 31st harmonic U12	0.10%	R	
51715	CA03	1	Content of 31st harmonic U23	0.10%	R	
51716	CA04	1	Content of 31st harmonic U31	0.10%	R	
51717	CA05	1	Content of 33rd harmonic U12	0.10%	R	
51718	CA06	1	Content of 33rd harmonic U23	0.10%	R	
51719	CA07	1	Content of 33rd harmonic U31	0.10%	R	
51720	CA08	1	Content of 35th harmonic U12	0.10%	R	
51721	CA09	1	Content of 35th harmonic U23	0.10%	R	
51722	CA0A	1	Content of 35th harmonic U31	0.10%	R	
51723	CA0B	1	Content of 37th harmonic U12	0.10%	R	
51724	CA0C	1	Content of 37th harmonic U23	0.10%	R	
51725	CA0D	1	Content of 37th harmonic U31	0.10%	R	
51726	CA0E	1	Content of 39th harmonic U12	0.10%	R	
51727	CA0F	1	Content of 39th harmonic U23	0.10%	R	
51728	CA10	1	Content of 39th harmonic U31	0.10%	R	
51729	CA11	1	Content of 41st harmonic U12	0.10%	R	
51730	CA12	1	Content of 41st harmonic U23	0.10%	R	
51731	CA13	1	Content of 41st harmonic U31	0.10%	R	
51732	CA14	1	Content of 43rd harmonic U12	0.10%	R	
51733	CA15	1	Content of 43rd harmonic U23	0.10%	R	
51734	CA16	1	Content of 43rd harmonic U31	0.10%	R	
51735	CA17	1	Content of 45th harmonic U12	0.10%	R	
51736	CA18	1	Content of 45th harmonic U23	0.10%	R	
51737	CA19	1	Content of 45th harmonic U31	0.10%	R	
51738	CA1A	1	Content of 47th harmonic U12	0.10%	R	

Table 11-9 C950 hex: display of current harmonic distortion and harmonics [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51739	CA1B	1	Content of 47th harmonic U23	0.10%	R	
51740	CA1C	1	Content of 47th harmonic U31	0.10%	R	
51741	CA1D	1	Content of 49th harmonic U12	0.10%	R	
51742	CA1E	1	Content of 49th harmonic U23	0.10%	R	
51743	CA1F	1	Content of 49th harmonic U31	0.10%	R	
51744	CA20	1	Content of 51st harmonic U12	0.10%	R	
51745	CA21	1	Content of 51st harmonic U23	0.10%	R	
51746	CA22	1	Content of 51st harmonic U31	0.10%	R	
51747	CA23	1	Content of 53rd harmonic U12	0.10%	R	
51748	CA24	1	Content of 53rd harmonic U23	0.10%	R	
51749	CA25	1	Content of 53rd harmonic U31	0.10%	R	
51750	CA26	1	Content of 55th harmonic U12	0.10%	R	
51751	CA27	1	Content of 55th harmonic U23	0.10%	R	
51752	CA28	1	Content of 55th harmonic U31	0.10%	R	
51753	CA29	1	Content of 57th harmonic U12	0.10%	R	
51754	CA2A	1	Content of 57th harmonic U23	0.10%	R	
51755	CA2B	1	Content of 57th harmonic U31	0.10%	R	
51756	CA2C	1	Content of 59th harmonic U12	0.10%	R	
51757	CA2D	1	Content of 59th harmonic U23	0.10%	R	
51758	CA2E	1	Content of 59th harmonic U31	0.10%	R	
51759	CA2F	1	Content of 61st harmonic U12	0.10%	R	
51760	CA30	1	Content of 61st harmonic U23	0.10%	R	
51761	CA31	1	Content of 61st harmonic U31	0.10%	R	
51762	CA32	1	Content of 63rd harmonic U12	0.10%	R	
51763	CA33	1	Content of 63rd harmonic U23	0.10%	R	
51764	CA34	1	Content of 63rd harmonic U31	0.10%	R	
Range extension: 94 words (decimal) or 5E words (hexadecimal)						
Individual harmonic content for line voltages against N: V (phase/N)						
51765	CA35	1	Highest ascertainable harmonic (63)		R	
51766	CA36	1	Content of 3rd harmonic V1	0.10%	R	
51767	CA37	1	Content of 3rd harmonic V2	0.10%	R	
51768	CA38	1	Content of 3rd harmonic V3	0.10%	R	
51769	CA39	1	Content of 5th harmonic V1	0.10%	R	
51770	CA3A	1	Content of 5th harmonic V2	0.10%	R	
51771	CA3B	1	Content of 5th harmonic V3	0.10%	R	
51772	CA3C	1	Content of 7th harmonic V1	0.10%	R	

Table 11-9 C950 hex: display of current harmonic distortion and harmonics [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51773	CA3D	1	Content of 7th harmonic V2	0.10%	R	
51774	CA3E	1	Content of 7th harmonic V3	0.10%	R	
51775	CA3F	1	Content of 9th harmonic V1	0.10%	R	
51776	CA40	1	Content of 9th harmonic V2	0.10%	R	
51777	CA41	1	Content of 9th harmonic V3	0.10%	R	
51778	CA42	1	Content of 11th harmonic V1	0.10%	R	
51779	CA43	1	Content of 11th harmonic V2	0.10%	R	
51780	CA44	1	Content of 11th harmonic V3	0.10%	R	
51781	CA45	1	Content of 13th harmonic V1	0.10%	R	
51782	CA46	1	Content of 13th harmonic V2	0.10%	R	
51783	CA47	1	Content of 13th harmonic V3	0.10%	R	
51784	CA48	1	Content of 15th harmonic V1	0.10%	R	
51785	CA49	1	Content of 15th harmonic V2	0.10%	R	
51786	CA4A	1	Content of 15th harmonic V3	0.10%	R	
51787	CA4B	1	Content of 17th harmonic V1	0.10%	R	
51788	CA4C	1	Content of 17th harmonic V2	0.10%	R	
51789	CA4D	1	Content of 17th harmonic V3	0.10%	R	
51790	CA4E	1	Content of 19th harmonic V1	0.10%	R	
51791	CA4F	1	Content of 19th harmonic V2	0.10%	R	
51792	CA50	1	Content of 19th harmonic V3	0.10%	R	
51793	CA51	1	Content of 21st harmonic V1	0.10%	R	
51794	CA52	1	Content of 21st harmonic V2	0.10%	R	
51795	CA53	1	Content of 21st harmonic V3	0.10%	R	
51796	CA54	1	Content of 23rd harmonic V1	0.10%	R	
51797	CA55	1	Content of 23rd harmonic V2	0.10%	R	
51798	CA56	1	Content of 23rd harmonic V3	0.10%	R	
51799	CA57	1	Content of 25th harmonic V1	0.10%	R	
51800	CA58	1	Content of 25th harmonic V2	0.10%	R	
51801	CA59	1	Content of 25th harmonic V3	0.10%	R	
51802	CA5A	1	Content of 27th harmonic V1	0.10%	R	
51803	CA5B	1	Content of 27th harmonic V2	0.10%	R	
51804	CA5C	1	Content of 27th harmonic V3	0.10%	R	
51805	CA5D	1	Content of 29th harmonic V1	0.10%	R	
51806	CA5E	1	Content of 29th harmonic V2	0.10%	R	
51807	CA5F	1	Content of 29th harmonic V3	0.10%	R	
51808	CA60	1	Content of 31st harmonic V1	0.10%	R	

Table 11-9 C950 hex: display of current harmonic distortion and harmonics [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51809	CA61	1	Content of 31st harmonic V2	0.10%	R	
51810	CA62	1	Content of 31st harmonic V3	0.10%	R	
51811	CA63	1	Content of 33rd harmonic V1	0.10%	R	
51812	CA64	1	Content of 33rd harmonic V2	0.10%	R	
51813	CA65	1	Content of 33rd harmonic V3	0.10%	R	
51814	CA66	1	Content of 35th harmonic V1	0.10%	R	
51815	CA67	1	Content of 35th harmonic V2	0.10%	R	
51816	CA68	1	Content of 35th harmonic V3	0.10%	R	
51817	CA69	1	Content of 37th harmonic V1	0.10%	R	
51818	CA6A	1	Content of 37th harmonic V2	0.10%	R	
51819	CA6B	1	Content of 37th harmonic V3	0.10%	R	
51820	CA6C	1	Content of 39th harmonic V1	0.10%	R	
51821	CA6D	1	Content of 39th harmonic V2	0.10%	R	
51822	CA6E	1	Content of 39th harmonic V3	0.10%	R	
51823	CA6F	1	Content of 41st harmonic V1	0.10%	R	
51824	CA70	1	Content of 41st harmonic V2	0.10%	R	
51825	CA71	1	Content of 41st harmonic V3	0.10%	R	
51826	CA72	1	Content of 43rd harmonic V1	0.10%	R	
51827	CA73	1	Content of 43rd harmonic V2	0.10%	R	
51828	CA74	1	Content of 43rd harmonic V3	0.10%	R	
51829	CA75	1	Content of 45th harmonic V1	0.10%	R	
51830	CA76	1	Content of 45th harmonic V2	0.10%	R	
51831	CA77	1	Content of 45th harmonic V3	0.10%	R	
51832	CA78	1	Content of 47th harmonic V1	0.10%	R	
51833	CA79	1	Content of 47th harmonic V2	0.10%	R	
51834	CA7A	1	Content of 47th harmonic V3	0.10%	R	
51835	CA7B	1	Content of 49th harmonic V1	0.10%	R	
51836	CA7C	1	Content of 49th harmonic V2	0.10%	R	
51837	CA7D	1	Content of 49th harmonic V3	0.10%	R	
51838	CA7E	1	Content of 51st harmonic V1	0.10%	R	
51839	CA7F	1	Content of 51st harmonic V2	0.10%	R	
51840	CA80	1	Content of 51st harmonic V3	0.10%	R	
51841	CA81	1	Content of 53rd harmonic V1	0.10%	R	
51842	CA82	1	Content of 53rd harmonic V2	0.10%	R	
51843	CA83	1	Content of 53rd harmonic V3	0.10%	R	
51844	CA84	1	Content of 55th harmonic V1	0.10%	R	

Table 11-9 C950 hex: display of current harmonic distortion and harmonics [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51845	CA85	1	Content of 55th harmonic V2	0.10%	R	
51846	CA86	1	Content of 55th harmonic V3	0.10%	R	
51847	CA87	1	Content of 57th harmonic V1	0.10%	R	
51848	CA88	1	Content of 57th harmonic V2	0.10%	R	
51849	CA89	1	Content of 57th harmonic V3	0.10%	R	
51850	CA8A	1	Content of 59th harmonic V1	0.10%	R	
51851	CA8B	1	Content of 59th harmonic V2	0.10%	R	
51852	CA8C	1	Content of 59th harmonic V3	0.10%	R	
51853	CA8D	1	Content of 61st harmonic V1	0.10%	R	
51854	CA8E	1	Content of 61st harmonic V2	0.10%	R	
51855	CA8F	1	Content of 61st harmonic V3	0.10%	R	
51856	CA90	1	Content of 63rd harmonic V1	0.10%	R	
51857	CA91	1	Content of 63rd harmonic V2	0.10%	R	
51858	CA92	1	Content of 63rd harmonic V3	0.10%	R	
Range extension: 94 words (decimal) or 5E words (hexadecimal)						
Total range extension: 323 words (decimal) or 143 words (hexadecimal)						

Table 11-10 CB00 hex: status of inputs/outputs

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
51968	CB00	1	No. Digital inputs (max. 6)		R	
51969	CB01	1	Bit 0: state input 1 high or low Bit 1: state input 2 high or low Bit 2: state input 3 high or low Bit 3: state input 4 high or low Bit 4: state input 5 high or low Bit 5: state input 6 high or low		R	EEM-2DIO-MA600
51970	CB02	1	No. Digital outputs (max. 6)		R	
51971	CB03	1	Bit 0: state output 1 high or low Bit 1: state output 2 high or low Bit 2: state output 3 high or low Bit 3: state output 4 high or low Bit 4: state output 5 high or low Bit 5: state output 6 high or low		R	EEM-2DIO-MA600
Range extension: 4 words (decimal) or 4 words (hexadecimal)						

Table 11-11 E000 hex: measuring instrument terminal configuration

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
57344	E000	1	Network type: 0: 1BL 1: 2BL 2: 3BL 3: 3NBL 4: 4BL 5: 4NBL	–	R/W	
57345	E001	1	Current transformer's secondary side: 1: 1 A/5: 5 A	A	R/W	
57346	E002	1	Current transformer's primary side	A	R/W	
57347	E003	1	<i>Not available</i>		R/W	
57348	E004	1	<i>Not available</i>		R/W	
57349	E005	1	<i>Not available</i>		R/W	
57350	E006	1	Voltage transducer present? 0: No 1: Yes	–	R/W	

Table 11-11 E000 hex: measuring instrument terminal configuration [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
57351	E007	1	Voltage transducer's secondary side: 60: 60 V 100: 100 V 110: 110 V 115: 115 V 120: 120 V 173: 173 V 190: 190 V	V	R/W	
57352	E008	2	Voltage transducer's primary side	V	R/W	
57354	E00A	1	Synchronization impulse start signal	1:external/ 0:internal	R/W	EEM-MEMO-MA600
57355	E00B	1	Measurement duration for saving the averaged real and reactive power P+/- and Q+/-: 5 min, 8 min, 10 min, 15 min, 20 min, 30 min	s	R/W	EEM-MEMO-MA600
Range extension: 12 words (decimal) or C words (hexadecimal)						

Example:

Table 11-12 Configuring a 4 line network with an asymmetrical load (4 NBL) for the EEM-MA600

Slave address	Function	High quality address	Low quality address	High quality register value	Low quality register value	CRC 16
05	06	E0	00	00	05	7F8D

The reply for EEM-MA600 is identical to the sent message.

Table 11-13 E100 hex: date/time configuration

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
57600	E100	1	Day		R/W	EEM-MEMO-MA600
57601	E101	1	Month		R/W	EEM-MEMO-MA600
57602	E102	1	Year		R/W	EEM-MEMO-MA600
57603	E103	1	Hour		R/W	EEM-MEMO-MA600
57604	E104	1	Minute		R/W	EEM-MEMO-MA600
57605	E105	1	Second		R/W	EEM-MEMO-MA600
Range extension: 6 words (decimal) or 6 words (hexadecimal)						

Table 11-14 E110 hex: Ethernet communication module configuration

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
57616	E110	1	IP = CL. A, B, C, D Ethernet IP address - CL. A (0-255)	0 - 255	R/W	EEM-ETH-MA600 / EEM-ETH-RS485-MA600
57617	E111	1	Ethernet IP address - CL. B (0-255)	0 - 255	R/W	EEM-ETH-MA600 / EEM-ETH-RS485-MA600
57618	E112	1	Ethernet IP address - CL. C (0-255)	0 - 255	R/W	EEM-ETH-MA600 / EEM-ETH-RS485-MA600
57619	E113	1	Ethernet IP address - CL. D (0-255)	0 - 255	R/W	EEM-ETH-MA600 / EEM-ETH-RS485-MA600
57620	E114	1	Ethernet gateway- address - CL. A (0-255)	0 - 255	R/W	EEM-ETH-MA600 / EEM-ETH-RS485-MA600
57621	E115	1	Ethernet gateway- address - CL. B (0-255)	0 - 255	R/W	EEM-ETH-MA600 / EEM-ETH-RS485-MA600
57622	E116	1	Ethernet gateway- address - CL. C (0-255)	0 - 255	R/W	EEM-ETH-MA600 / EEM-ETH-RS485-MA600
57623	E117	1	Ethernet gateway- address - CL. D (0-255)	0 - 255	R/W	EEM-ETH-MA600 / EEM-ETH-RS485-MA600
57624	E118	1	Ethernet subnet mask - CL. A (0-255)	0 - 255	R/W	EEM-ETH-MA600 / EEM-ETH-RS485-MA600
57625	E119	1	Ethernet subnet mask - CL. B (0-255)	0 - 255	R/W	EEM-ETH-MA600 / EEM-ETH-RS485-MA600
57626	E11A	1	Ethernet subnet mask - CL. C (0-255)	0 - 255	R/W	EEM-ETH-MA600 / EEM-ETH-RS485-MA600
57627	E11B	1	Ethernet subnet mask - CL. D (0-255)	0 - 255	R/W	EEM-ETH-MA600 / EEM-ETH-RS485-MA600
57628	E11C	1	DHCP activated	Yes(1)/No(0)	R/W	EEM-ETH-MA600 / EEM-ETH-RS485-MA600
57629	E11D	1	<i>Not available</i>	-		
57630	E11E	1	<i>Not available</i>	-		
57631	E11F	1	Ethernet gateway: JBUS/MODBUS interface speed 0: 2400 bps 1: 4800 bps 2: 9600 bps 3: 19200 bps 4: 38400 bps	0: 2400 bps 1: 4800 bps 2: 9600 bps 3: 19200 bps 4: 38400 bps	R/W	EEM-ETH-RS485-MA600

Table 11-14 E110 hex: Ethernet communication module configuration [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
57632	E120	1	Ethernet gateway: JBUS/MODBUS interface parity 0: none 1: even 2: odd	0: none 1: even 2: odd	R/W	EEM-ETH-RS485-MA600
57633	E121	1	Ethernet gateway: JBUS/MODBUS interface stop bit	1: 1 stop bit 2: 2 stop bits	R/W	EEM-ETH-RS485-MA600
57634	E122	1	<i>Not available</i>	-		
57635	E123	1	Ethernet gateway: JBUS/MODBUS slave address	1-247	R/W	EEM-ETH-RS485-MA600
Range extension: 20 words (decimal) or 14 words (hexadecimal)						

Table 11-15 E200 hex: saving configuration and restart for measuring instrument

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
57856	E200	1	Action: 0xA1: save settings in EEPROM 0xB2: restart measuring instrument		W	
Range extension: 1 word (decimal) or 1 word (hexadecimal)						

Example:

Table 11-16 After changing the configuration parameters, the following command lets them be saved

Slave address	Function	High quality address	Low quality address	High quality register value	Low quality register value	CRC 16
05	06	E2	00	00	A1	7F8E

The reply for EEM-MA600 is identical to the sent message.

Table 11-17 7700 hex: display of last alarm to digital outputs (EEM-2DIO-MA600)

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
OUT 1: Alarm to digital extension module 1						
30464	7700	1	OUT 1 Current alarm under threshold (output types): 0: no alarm 1: I1: current 2: I2: current 3: I3: current 4: In: neutral conductor current 5: U12: line voltages (1-2) 6: U23: line voltages (2-3) 7: U31: line voltages (3-1) 8: ΣP: total real power 9: ΣQ: total reactive power 10: ΣS: total apparent power 11: F: frequency 12: ΣPFL: total power factor inductive 15: THD I1: total harmonic distortion of current 16: THD I2: total harmonic distortion of current 17: THD I3: total harmonic distortion of current 18: THD U12: total harmonic distortion of line voltage 19: THD U23: total harmonic distortion of line voltage 20: THD U31: total harmonic distortion of line voltage 21: HOUr: operating hours counter 22: V1: line voltages against N 23: V2: line voltages against N 24: V3: line voltages against N 25: THD IN: total harmonic distortion of neutral conductor current 26: THD V1: total harmonic distortion of line voltage against N 27: THD V2: total harmonic distortion of line voltage against N 28: THD V3: total harmonic distortion of line voltage against N 31: ΣPFC: total capacitive power factor 32: T°C1 temperature module input 33: T°C2 temperature module input 34: T°C3 temperature module input 35: T°C4 internal temperature 36: PPR total effective power (trend) 37: QPR total reactive power (trend) 38: SPR total apparent power (trend)	0: / 1: mA 2: mA 3: mA 4: mA 5: mV 6: mV 7: mV 8: mW 9: mvar 10: mVA 11: Hz/1000 12: SPFL 15: /1000 16: /1000 17: /1000 18: /1000 19: /1000 20: /1000 21: h/100 22: mV 23: mV 24: mV 25: /1000 26: /1000 27: /1000 28: /1000 31: SPFL 32: °C 33: °C 34: °C 35: °C 36: kW/100 37: kvar/100 38: kVA/100	R	EEM-2DIO-MA600

Table 11-17 7700 hex: display of last alarm to digital outputs (EEM-2DIO-MA600) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
30465	7701	2	OUT 1 Current alarm: lowest measured value	/	R	EEM-2DIO-MA600
30467	7703	1	OUT 1 Current alarm, upper threshold: output types, see lower threshold current alarm	Units, see lower threshold current alarm	R	EEM-2DIO-MA600
30468	7704	2	OUT 1 Current alarm: highest measured value	/	R	EEM-2DIO-MA600
30470	7706	1	OUT 1 Current alarm: duration	s	R	EEM-2DIO-MA600
30471	7707	1	OUT 1 Alarm n-1: lower threshold: output types, see lower threshold current alarm	Units, see lower threshold current alarm	R	EEM-2DIO-MA600
30472	7708	2	OUT 1 Alarm n-1: lowest measured value	/	R	EEM-2DIO-MA600
30474	770 A	1	OUT 1 Alarm n-1: upper threshold: output types, see lower threshold current alarm	/	R	EEM-2DIO-MA600
30475	770B	2	OUT 1 Alarm n-1: highest measured value	/	R	EEM-2DIO-MA600
30477	770D	1	OUT 1 Alarm n-1: duration	s	R	EEM-2DIO-MA600
30478	770E	1	OUT 1 Alarm n-2: lower threshold: output types, see lower threshold current alarm	Units, see lower threshold current alarm	R	EEM-2DIO-MA600
30479	770F	2	OUT 1 Alarm n-2: lowest measured value	/	R	EEM-2DIO-MA600
30481	7711	1	OUT 1 Alarm n-2: upper threshold: output types, see lower threshold current alarm	/	R	EEM-2DIO-MA600
30482	7712	2	OUT 1 Alarm n-2: highest measured value	/	R	EEM-2DIO-MA600
30484	7714	1	OUT 1 Alarm n-2: duration	s	R	EEM-2DIO-MA600
30485	7715	1	OUT 1 Alarm n-3: lower threshold: output types, see lower threshold current alarm	Units, see lower threshold current alarm	R	EEM-2DIO-MA600
30486	7716	2	OUT 1 Alarm n-3: lowest measured value	/	R	EEM-2DIO-MA600

Table 11-17 7700 hex: display of last alarm to digital outputs (EEM-2DIO-MA600) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
30488	7718	1	OUT 1 Alarm n-3: upper threshold: output types, see lower threshold current alarm	/	R	EEM-2DIO-MA600
30489	7719	2	OUT 1 Alarm n-3: highest measured value	/	R	EEM-2DIO-MA600
30491	771B	1	OUT 1 Alarm n-3: duration	s	R	EEM-2DIO-MA600
OUT 2: Alarm to digital extension module 2						
30492	771C	1	OUT 2 Current alarm: output types, see OUT 1	Units, see OUT 1	R	EEM-2DIO-MA600
30493	771D	2	OUT 2 Current alarm: lowest measured value	/	R	EEM-2DIO-MA600
30495	771F	1	OUT 2 Current alarm: upper threshold: output types, see OUT 1	/	R	EEM-2DIO-MA600
30496	7720	2	OUT 2 Current alarm: highest measured value	/	R	EEM-2DIO-MA600
30498	7722	1	OUT 2 Current alarm: duration	s	R	EEM-2DIO-MA600
30499	7723	1	OUT 2 Alarm n-1: lower threshold: output types, see OUT 1		R	EEM-2DIO-MA600
30500	7724	2	OUT 2 Alarm n-1: lowest measured value	/	R	EEM-2DIO-MA600
30502	7726	1	OUT 2 Alarm n-1: upper threshold: output types, see OUT 1	/	R	EEM-2DIO-MA600
30503	7727	2	OUT 2 Alarm n-1: highest measured value	/	R	EEM-2DIO-MA600
30505	7729	1	OUT 2 Alarm n-1: duration	s	R	EEM-2DIO-MA600
30506	772 A	1	OUT 2 Alarm n-2: lower threshold: output types, see OUT 1		R	EEM-2DIO-MA600
30507	772B	2	OUT 2 Alarm n-2: lowest measured value	/	R	EEM-2DIO-MA600
30509	772D	1	OUT 2 Alarm n-2: upper threshold: output types, see OUT 1	/	R	EEM-2DIO-MA600
30510	772E	2	OUT 2 Alarm n-2: highest measured value	/	R	EEM-2DIO-MA600
30512	7730	1	OUT 2 Alarm n-2: duration	s	R	EEM-2DIO-MA600
30513	7731	1	OUT 2 Alarm n-3: lower threshold: output types, see OUT 1		R	EEM-2DIO-MA600
30514	7732	2	OUT 2 Alarm n-3: lowest measured value	/	R	EEM-2DIO-MA600
30516	7734	1	OUT 2 Alarm n-3: upper threshold: output types, see OUT 1	/	R	EEM-2DIO-MA600

Table 11-17 7700 hex: display of last alarm to digital outputs (EEM-2DIO-MA600) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
30517	7735	2	OUT 2 Alarm n-3: highest measured value	/	R	EEM-2DIO-MA600
30519	7737	1	OUT 2 Alarm n-3: duration	s	R	EEM-2DIO-MA600
OUT 3: Alarm to digital extension module 3						
30520	7738	1	OUT 3 Current alarm: output types, see OUT 1	Units, see OUT 1	R	EEM-2DIO-MA600
30521	7739	2	OUT 3 Current alarm: lowest measured value	/	R	EEM-2DIO-MA600
30523	773B	1	OUT 3 Current alarm: upper threshold: output types, see OUT 1	/	R	EEM-2DIO-MA600
30524	773C	2	OUT 3 Current alarm: highest measured value	/	R	EEM-2DIO-MA600
30526	773E	1	OUT 3 Current alarm: duration	s	R	EEM-2DIO-MA600
OUT 4: Alarm to digital extension module 4						
30527	773F	1	OUT 4 Current alarm: output types, see OUT 1	Units, see OUT 1	R	EEM-2DIO-MA600
30528	7740	2	OUT 4 Current alarm: lowest measured value	/	R	EEM-2DIO-MA600
30530	7742	1	OUT 4 Current alarm: upper threshold: output types, see OUT 1	/	R	EEM-2DIO-MA600
30531	7743	2	OUT 4 Current alarm: highest measured value	/	R	EEM-2DIO-MA600
30533	7745	1	OUT 4 Current alarm: duration	s	R	EEM-2DIO-MA600
OUT 5: Alarm to digital extension module 5						
30534	7746	1	OUT 5 Current alarm: output types, see OUT 1	Units, see OUT 1	R	EEM-2DIO-MA600
30535	7747	2	OUT 5 Current alarm: lowest measured value	/	R	EEM-2DIO-MA600
30537	7749	1	OUT 5 Current alarm: upper threshold: output types, see OUT 1	/	R	EEM-2DIO-MA600
30538	774 A	2	OUT 5 Current alarm: highest measured value	/	R	EEM-2DIO-MA600
30540	774C	1	OUT 5 Current alarm: duration	s	R	EEM-2DIO-MA600
OUT 6: Alarm to digital extension module 6						
30541	774D	1	OUT 6 Current alarm: output types, see OUT 1	Units, see OUT 1	R	EEM-2DIO-MA600
30542	774E	2	OUT 6 Current alarm: lowest measured value	/	R	EEM-2DIO-MA600

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Table 11-17 7700 hex: display of last alarm to digital outputs (EEM-2DIO-MA600) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
30544	7750	1	OUT 6 Current alarm: upper threshold: output types, see OUT 1	/	R	EEM-2DIO-MA600
30545	7751	2	OUT 6 Current alarm: highest measured value	/	R	EEM-2DIO-MA600
30547	7753	1	OUT 6 Current alarm: duration	s	R	EEM-2DIO-MA600
Range extension: 164 words (decimal) or A4 words (hexadecimal)						

Table 11-18 100 hex: information about connected extension modules

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
256	100	1	<i>Not available</i>			
257	101	1	Manufacturer code		R	
258	102	1	Slot 1 0xFF: No module connected 0x0: JBUS/MODBUS EEM-RS485-MA600 0x1: <i>Not available</i> 0x02: <i>Not available</i> 0x03: <i>Not available</i> 0xF0: <i>Not available</i> 0x20: Input/Output EEM-2DIO-MA600 0x30: Analog output EEM-2AO-MA600 0x40: Memory EEM-MEMO-MA600 0x50: PROFIBUS, EEM-PB-MA600 or EEM-PB12-MA600 0x60: Temperature EEM-TEMP-MA600 0x70: Ethernet EEM-ETH-MA600 or EEM-ETH-RS485-MA600		R	
259	103	1	Slot 2: see slot 1		R	
260	104	1	Slot 3: see slot 1		R	
261	105	1	Slot 4: see slot 1		R	
262	106	1	Software version		R	
263	107	4	Serial number		R	
Range extension: 11 words (decimal) or B words (hexadecimal)						

Table 11-19 200 hex: extension module display and configuration

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
512	200	1	Network type: 0: 1BL 1: 2BL 2: 3BL 3: 3NBL 4: 4BL 5: 4NBL	/	R/W	
513	201	1	Current transformer's secondary side: 1: 1 A/5: 5 A	A	R/W	
514	202	1	Current transformer's primary side	A	R/W	
515	203	1	Voltage transducer present? 0: No 1: Yes			
516	204	2	Voltage transducer's secondary side: 60: 60 V 100: 100 V 110: 110 V 115: 115 V 120: 120 V 173: 173 V 190: 190 V			
518	206	1	Voltage transducer's primary side			
519	207	1	Measurement duration to average value/maximum accumulation of value for current: (2 s, 10 s, 5 min, 8 min, 10 min, 15 min, 20 min, 30 min, 60 min)	s	R/W	
520	208	1	Measurement duration to average value/maximum accumulation of value for P,Q,S power: (10 s, 5 min, 8 min, 10 min, 15 min, 20 min, 30 min, 60 min)	s	R/W	
521 ... 526	209 ... 20E	6	<i>Not available</i>	-	-	
Analog extension module EEM-2AO-MA600						
527	20F	1	Output signal AO OUT 1: 0: 0/20 mA 1: 4/20 mA 2: 30 V		R/W	EEM-2AO-MA600

Table 11-19 200 hex: extension module display and configuration [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
528	210	1	Output type AO OUT 1: 0: I1: power 1: I2: power 2: I3: power 3: In: neutral conductor power 4: U12: line voltages (1-2) 5: U23: Line voltages (2-3) 6: U31: Line voltages (3-1) 7: ΣP : Real power sum 8: ΣQ : Reactive power sum 9: ΣS : Apparent power sum 10: ΣPFL : Inductive power factor sum 11: V1: Line voltages against N 12: V2: Line voltages against N 13: V3: Line voltages against N 14: F: Frequency 15: ΣPFC : Capacitive power factor sum 16: I: Power I1, I2, I3 17: U: Line voltage (1-2/2-3/3-1) 18: V: Line voltage against N (1/2/3) 19: PPR: Total real power (trend) 20: QPR: Total reactive power (trend) 21: SPR: Total apparent power (trend) 22: T°C1: Temperature module input EEM-TEMP-MA600 23: T°C2: Temperature module input EEM-TEMP-MA600 24: T°C3: Temperature module input EEM-TEMP-MA600 25: T°C4: internal temperature EEM-TEMP-MA600	0: A 1: A 2: A 3: A 4: V 5: V 6: V 7: W 8: var 9: VA 10: 1/1000 11: V 12: V 13: V 14: Hz 15: 1/1000 16: A 17: V 18: V 19: W 20: var 21: VA 22: °C 23: °C 24: °C 25: °C	R/W	EEM-2AO-MA600
529	211	1	AO OUT 1 output value for 0 or 4mA		R/W	EEM-2AO-MA600
530	212	1	AO OUT 1 unit of output value for 0 or 4 mA: 0: / 1: k 2: M		R/W	EEM-2AO-MA600
531	213	1	Output value AO OUT 1 for 20 mA		R/W	EEM-2AO-MA600
532	214	1	AO OUT 1 unit of output value for 20 mA: 0: / 1: k 2: M		R/W	EEM-2AO-MA600

Table 11-19 200 hex: extension module display and configuration [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
533	215	1	Output signal AO OUT 2: 0: 0/20 mA 1: 4/20 mA 2: 30 V		R/W	EEM-2AO-MA600
534	216	1	Output type AO OUT 2: see AO OUT 1		R/W	EEM-2AO-MA600
535	217	1	AO OUT 2 output value for 0 or 4 mA		R/W	EEM-2AO-MA600
536	218	1	AO OUT 2 unit of output value for 0 or 4 mA: 0: / 1: k 2: M		R/W	EEM-2AO-MA600
537	219	1	AO OUT 2 output value for 20 mA		R/W	EEM-2AO-MA600
538	21 A	1	AO OUT 2 unit of output value for 20 mA: 0: / 1: k 2: M		R/W	EEM-2AO-MA600
539	21B	1	Output signal AO OUT 3: 0: 0/20 mA 1: 4/20 mA 2: 30 V		R/W	EEM-2AO-MA600
540	21C	1	Output type AO OUT 3: see AO OUT 1		R/W	EEM-2AO-MA600
541	21D	1	AO OUT 3 output value for 0 or 4 mA		R/W	EEM-2AO-MA600
542	21E	1	AO OUT 3 unit of output value for 0 or 4 mA: 0: / 1: k 2: M		R/W	EEM-2AO-MA600
543	21F	1	Output value AO OUT 3 for 20 mA		R/W	EEM-2AO-MA600
544	220	1	AO OUT 2 unit of output value for 20 mA: 0: / 1: k 2: M		R/W	EEM-2AO-MA600
545	221	1	Output signal AO OUT 4: 0: 0/20 mA 1: 4/20 mA 2: 30 V		R/W	EEM-2AO-MA600
546	222	1	Output type AO OUT 4: see AO OUT 1		R/W	EEM-2AO-MA600
547	223	1	AO OUT 4 output value for 0 or 4 mA		R/W	EEM-2AO-MA600

EEM-MA600

Table 11-19 200 hex: extension module display and configuration [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
548	224	1	AO OUT 4 unit of output value for 0 or 4 mA: 0: / 1: k 2: M		R/W	EEM-2AO-MA600
549	225	1	Output value AO OUT 4 for 20 mA		R/W	EEM-2AO-MA600
550	226	1	AO OUT 4 unit of output value for 20 mA: 0: / 1: k 2: M		R/W	EEM-2AO-MA600

Table 11-19 200 hex: extension module display and configuration [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
Digital extension module EEM-2DIO-MA600						
551	227	1	Output type DO OUT 1: 0: CDE: Controlling relay state via RS485 1: I: Current I1, I2, I3 2: U: Line voltages (1-2/2-3/3-1) 3: ΣP+: Total positive real power 4: ΣQ+: Total positive reactive power 5: ΣS: Total apparent power 6: F: Frequency 7: ΣPFL: Total inductive power factor 8: THDI: Total harmonic distortion for currents I1, I2, I3 9: THDU: Total harmonic distortion for line voltages (1-2/2-3/3-1) 10: In: Neutral conductor current 11: HOUr: Operating hours counter 12: V: Line voltages against N (1/2/3) 13: THD In: Total harmonic distortion of neutral conductor current 14: THDV: Total harmonic distortion of line voltages against N (1 / 2 / 3) 15: ΣP-: Total negative real power 16: ΣQ-: Total negative reactive power 17: ΣPFC: Total capacitive power factor 18: CDT: Controlling relay status via RS485, resetting relay to idle 19: T°C1: Input temperature module EEM-TEMP-MA600 20: T°C2: Input temperature module EEM-TEMP-MA600 21: T°C3: Input temperature module EEM-TEMP-MA600 22: T°C4: Internal temperature EEM-TEMP-MA600 23: PPR: Total real power (trend) 24: QPR: Total reactive power (trend) 25: SPR: Total apparent power (trend)	0: / 1: A 2: V 3: W 4: var 5: VA 6: 1/10 Hz 7: 1/100 8: % 9: % 10: A 11: h 12: V 13: % 14: % 15: W 16: var 17: 1/100 18: / 19: °C 20: °C 21: °C 22: °C 23: W 24: var 25: VA	R/W	
552	228	1	DO OUT 1 alarm output value for lower switching threshold		R/W	EEM-2DIO-MA600
553	229	1	DO OUT 1 output value unit for the lower switching threshold 0: / 1: k 2: M		R/W	EEM-2DIO-MA600

EEM-MA600

Table 11-19 200 hex: extension module display and configuration [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
554	22 A	1	DO OUT 1 alarm output value for upper switching threshold		R/W	EEM-2DIO-MA600
555	22B	1	DO OUT 1 output value unit for the upper switching threshold 0: / 1: k 2: M		R/W	EEM-2DIO-MA600
556	22C	1	DO OUT 1 hysteresis (0-99)	%	R/W	EEM-2DIO-MA600
557	22D	1	DO OUT 1 response delay (0-999)	s	R/W	EEM-2DIO-MA600
558	22E	1	DO OUT 1 relay idle: 0: NO (open) 1: NC (closed)		R/W	EEM-2DIO-MA600
559	22F	1	Output type DO OUT 2: see DO OUT 1		R/W	EEM-2DIO-MA600
560	230	1	DO OUT 2 alarm output value for lower switching threshold		R/W	EEM-2DIO-MA600
561	231	1	DO OUT 2 output value unit for the lower switching threshold 0: / 1: k 2: M		R/W	EEM-2DIO-MA600
562	232	1	DO OUT 2 alarm output value for upper switching threshold		R/W	EEM-2DIO-MA600
563	233	1	DO OUT 2 output value unit for the upper switching threshold 0: / 1: k 2: M		R/W	EEM-2DIO-MA600
564	234	1	DO OUT 2 hysteresis (0-99)	%	R/W	EEM-2DIO-MA600
565	235	1	DO OUT 2 response delay (0-999)	s	R/W	EEM-2DIO-MA600
566	236	1	DO OUT 2 relay idle: 0: NO (open) 1: NC (closed)		R/W	EEM-2DIO-MA600
567	237	1	<i>Not available</i>			
568	238	1	<i>Not available</i>			
569	239	1	<i>Not available</i>			
570	23 A	1	<i>Not available</i>			
571	23B	1	<i>Not available</i>			
572	23C	1	<i>Not available</i>			

Table 11-19 200 hex: extension module display and configuration [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
573	23D	1	Measurement duration to average value/maximum accumulation of value for line voltages U: (10 s, 5 min, 8 min, 10 min, 15 min, 20 min, 30 min, 60 min)	s	R/W	EEM-2DIO-MA600
574	23E	1	Measurement duration to average value/maximum accumulation of value for frequency F: (10 s, 5 min, 8 min, 10 min, 15 min, 20 min, 30 min, 60 min)	s	R/W	EEM-2DIO-MA600
575	23F	1	Save averaged positive real power P+: 0: No 1: Yes		R/W	EEM-MEMO-MA600
576	240	1	Save averaged negative real power P+: 0: No 1: Yes		R/W	EEM-MEMO-MA600
577	241	1	Store averaged positive reactive power Q+: 0: No 1: Yes		R/W	EEM-MEMO-MA600
578	242	1	Store averaged negative reactive power Q-: 0: No 1: Yes		R/W	EEM-MEMO-MA600
579	243	1	Synchronization impulse start signal	1:external/ 0:internal	R/W	EEM-MEMO-MA600
580	244	1	Measurement duration for saving the averaged real and reactive power P+/- and Q+/-: 5 min, 8 min, 10 min, 15 min, 20 min, 30 min	s	R/W	EEM-MEMO-MA600
581	245	1	Output type DO OUT 3: see DO OUT 1		"R/W	EEM-2DIO-MA600
582	246	1	DO OUT 3 alarm output value for lower switching threshold		R/W	EEM-2DIO-MA600
583	247	1	DO OUT 3 output value unit for the lower switching threshold 0: / 1: k 2: M		R/W	EEM-2DIO-MA600
584	248	1	DO OUT 3 alarm output value for upper switching threshold		R/W	EEM-2DIO-MA600

EEM-MA600

Table 11-19 200 hex: extension module display and configuration [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
585	249	1	DO OUT 3 output value unit for the upper switching threshold 0: / 1: k 2: M		R/W	EEM-2DIO-MA600
586	24 A	1	DO OUT 3 hysteresis (0-99)	%	R/W	EEM-2DIO-MA600
587	24B	1	DO OUT 3 response delay (0-999)	s	R/W	EEM-2DIO-MA600
588	24C	1	DO OUT 3 relay idle: 0: NO (open) 1: NC (closed)		R/W	EEM-2DIO-MA600
589	24D	1	Output type DO OUT 4: see DO OUT 1		R/W	EEM-2DIO-MA600
590	24E	1	DO OUT 4 alarm output value for lower switching threshold		R/W	EEM-2DIO-MA600
591	24F	1	DO OUT 4 output value unit for the lower switching threshold 0: / 1: k 2: M		R/W	EEM-2DIO-MA600
592	250	1	DO OUT 4 alarm output value for upper switching threshold		R/W	EEM-2DIO-MA600
593	251	1	DO OUT 4 output value unit for the upper switching threshold 0: / 1: k 2: M		R/W	EEM-2DIO-MA600
594	252	1	DO OUT 4 hysteresis (0-99)	%	R/W	EEM-2DIO-MA600
595	253	1	DO OUT 4 response delay (0-999)	s	R/W	EEM-2DIO-MA600
596	254	1	DO OUT 4 relay idle: 0: NO (open) 1: NC (closed)		R/W	EEM-2DIO-MA600
597	255	1	Output type DO OUT 5: see DO OUT 1		R/W	EEM-2DIO-MA600
598	256	1	DO OUT 5 alarm output value for lower switching threshold		R/W	EEM-2DIO-MA600
599	257	1	DO OUT 5 output value unit for the lower switching threshold 0: / 1: k 2: M		R/W	EEM-2DIO-MA600
600	258	1	DO OUT 5 alarm output value for upper switching threshold		R/W	EEM-2DIO-MA600

Table 11-19 200 hex: extension module display and configuration [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
601	259	1	DO OUT 5 output value unit for the upper switching threshold 0: / 1: k 2: M		R/W	EEM-2DIO-MA600
602	25 A	1	DO OUT 5 hysteresis (0-99)	%	R/W	EEM-2DIO-MA600
603	25B	1	DO OUT 5 response delay (0-999)	s	R/W	EEM-2DIO-MA600
604	25C	1	DO OUT 5 relay idle: 0: NO (open) 1: NC (closed)		R/W	EEM-2DIO-MA600
605	25D	1	Output type DO OUT 6: see DO OUT 1		R/W	EEM-2DIO-MA600
606	25E	1	DO OUT 6 alarm output value for lower switching threshold		R/W	EEM-2DIO-MA600
607	25F	1	DO OUT 6 output value unit for the lower switching threshold 0: / 1: k 2: M		R/W	EEM-2DIO-MA600
608	260	1	DO OUT 6 alarm output value for upper switching threshold		R/W	EEM-2DIO-MA600
609	261	1	DO OUT 6 output value unit for the upper switching threshold 0: / 1: k 2: M		R/W	EEM-2DIO-MA600
610	262	1	DO OUT 6 hysteresis (0-99)	%	R/W	EEM-2DIO-MA600
611	263	1	DO OUT 6 response delay (0-999)	s	R/W	EEM-2DIO-MA600
612	264	1	DO OUT 6 relay idle: 0: NO (open) 1: NC (closed)		R/W	EEM-2DIO-MA600
Memory module EEM-MEMO-MA600						
613	265	1	Threshold value for acquiring undervoltages (SAG)	%	R/W	
614	266	1	Hysteresis of threshold value undervoltages (SAG)	%	R/W	
615	267	1	Threshold value for acquiring surge voltages (SWELL)	%	R/W	
616	268	1	Hysteresis of threshold value surge voltages (SWELL)	%	R/W	
617	269	1	<i>Not available</i>		R/W	

EEM-MA600

Table 11-19 200 hex: extension module display and configuration [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
618	26 A	1	<i>Not available</i>		R/W	
619	26B	1	<i>Not available</i>		R/W	
Range extension: 108 words (decimal) or 6C words (hexadecimal)						

Table 11-20 400 hex: reset measured values

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
1024	400	1	Reset: max/avg I1, I2, I3: maximum value of current (I1, I2, I3): 0x1 max/avg ΣP+: maximum total positive real power value: 0x2 max/avg ΣP-: maximum total negative real power value: 0x4 max/avg ΣQ+: maximum total positive reactive power value: 0x8 max/avg ΣQ-: maximum total negative reactive power value: 0x10 max/avg ΣS: maximum total apparent power value: 0x20 HOUr: Operating hours counter: 0x40 EA+: current positive real energy kWh+: 0x80 ER+: current positive reactive energy kvarh+: 0x100 ES: current apparent energy kVAh: 0x200 EA-: current negative real energy kWh-: 0x400 ER-: current negative reactive energy kvarh-: 0x800 All measured values: 0x1000 max/avg U12, U23, U31: maximum line voltage value (U12, U23, U31): 0x2000 max/avg V1, V2, V3: maximum value of line voltages against N (V1, V2, V3): 0x4000 max/avg F: maximum frequency value: 0x8000	/	W	

Table 11-20 400 hex: reset measured values [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
1025	401	1	Reset: E1: Counter status digital input 1: 0x1 E2: Counter status digital input 2: 0x2 E3: Counter status digital input 3: 0x4 E4: Counter status digital input 4: 0x8 E5: Counter status digital input 5: 0x10 E6: Counter status digital input 6: 0x20 Min./Max. I: Min./Max. current from I1, I2, or I3: 0x40 Min./Max. In: Min./Max. neutral conductor current: 0x80 Min./Max. U: Min./Max. line voltage from U12, U23, or U31: 0x100 Min./Max. F: Min./Max. frequency value: 0x200 Min./Max. Σ PF: Min./Max. power factor (total): 0x400 Min./Max. Σ P: Min./Max. positive and negative real power (total): 0x800 Min./Max. Σ Q: Min./Max. positive und negative reactive power (total): 0x1000 Min./Max. THD I: Min./Max. total harmonic distortion of currents from I1, I2, or I3: 0x2000 Min./Max. THD IN: Min./Max. total harmonic distortion of current from neutral conductor current: 0x4000 Min./Max. THD U: Min./Max. total harmonic distortion of line voltages from U12, U23, or U31: 0x8000	/	W	

Table 11-20 400 hex: reset measured values [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
1026	402	1	Reset: Min/Max Σ S: Min./Max. apparent power (total) 0x0001 Min/Max V: Min./Max. line voltage against N from V1, V2, or V3: 0x0002 Min/Max THD V: Min./Max. total harmonic distortion of line voltages against N from V1, V2, or V3: 0x0004 External input (storage module): 0x0008 10 last saved alarms (storage module): 0x0010 10 last saved undervoltages (storage module): 0x0020 10 last saved surge voltages (storage module): 0x0040 10 last saved voltage failures (storage module): 0x0080	/	W	
Range extension: 3 words (decimal) or 3 words (hexadecimal)						



If you want to reset several parameters concurrently, you must add the numbers to the "Designation" column, for example: Resetting max. P+ and kvarh +:
 $2 + 100 = 102$. (Hex)"

Example:

The following data sequence allows all saved values to be reset:"

Slave address	Function	High quality address	Low quality address	High quality register value	Low quality register value	CRC 16
05	06	04	00	10	00	84BE

The reply for EEM-MA600 is identical to the sent message.

Table 11-21 C10 hex: alarm history display (course of last 10 alarms)

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
Stored alarm n-1						
3088	C10	1	Output 1-6 alarm		R	EEM-MEMO-MA600
3089	C11	1	Alarm n-1: lower threshold (output type): 0: no alarm 1: I1: current 2: I2: current 3: I3: current 4: In: neutral conductor current 5: U12: line voltages (1-2) 6: U23: line voltages (2-3) 7: U31: line voltages (3-1) 8: ΣP: total real power 9: ΣQ: total reactive power 10: ΣS: total apparent power 11: F: frequency 12: ΣPFL: total inductive power factor 15: THD I1: total harmonic distortion of current 16: THD I2: total harmonic distortion of current 17: THD I3: total harmonic distortion of current 18: THD U12: total harmonic distortion of line voltage 19: THD U23: total harmonic distortion of line voltage 20: THD U31: total harmonic distortion of line voltage 21: HOu: operating hours counter 22: V1: line voltages against N 23: V2: line voltages against N 24: V3: line voltages against N 25: THD IN: total harmonic distortion of neutral conductor current		R	EEM-MEMO-MA600
3090	C12	2	Alarm n-1: lowest measured value		R	EEM-MEMO-MA600
3092	C14	1	Alarm n-1: upper threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3094	C15	2	Alarm n-1: highest measured value		R	EEM-MEMO-MA600
3095	C17	1	Duration	s	R	EEM-MEMO-MA600
3096	C18	1	Day		R	EEM-MEMO-MA600
3097	C19	1	Month		R	EEM-MEMO-MA600
3098	C1A	1	Year		R	EEM-MEMO-MA600
3099	C1B	1	Hour		R	EEM-MEMO-MA600

Table 11-21 C10 hex: alarm history display (course of last 10 alarms) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3100	C1C	1	Minute		R	EEM-MEMO-MA600
3101	C1D	1	Second		R	EEM-MEMO-MA600
Stored alarm n-2						
3102	C1E	1	Output 1-6 alarm		R	EEM-MEMO-MA600
3103	C1F	1	Alarm n-2: lower threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3105	C21	2	Alarm n-2: lowest measured value		R	EEM-MEMO-MA600
3106	C22	1	Alarm n-2: upper threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3107	C23	2	Alarm n-2: highest measured value		R	EEM-MEMO-MA600
3109	C25	1	Duration	s	R	EEM-MEMO-MA600
3110	C26	1	Day		R	EEM-MEMO-MA600
3111	C27	1	Month		R	EEM-MEMO-MA600
3112	C28	1	Year		R	EEM-MEMO-MA600
3113	C29	1	Hour		R	EEM-MEMO-MA600
3114	C2A	1	Minute		R	EEM-MEMO-MA600
3115	C2B	1	Second		R	EEM-MEMO-MA600
Stored alarm n-3						
3116	C2C	1	Output 1-6 alarm		R	EEM-MEMO-MA600
3117	C2D	1	Alarm n-3: lower threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3118	C2E	1	Alarm n-3: lowest measured value:		R	EEM-MEMO-MA600
3119	C2F	2	Alarm n-3: upper threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3121	C31	1	Alarm n-3: highest measured value		R	EEM-MEMO-MA600
3122	C32	2	Duration	s	R	EEM-MEMO-MA600
3124	C34	1	Day		R	EEM-MEMO-MA600
3125	C35	1	Month		R	EEM-MEMO-MA600
3126	C36	1	Year		R	EEM-MEMO-MA600
3127	C37	1	Hour		R	EEM-MEMO-MA600
3128	C38	1	Minute		R	EEM-MEMO-MA600
3129	C39	1	Second		R	EEM-MEMO-MA600
Stored alarm n-4						
3130	C3A	1	Output 1-6 alarm		R	EEM-MEMO-MA600

Table 11-21 C10 hex: alarm history display (course of last 10 alarms) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3131	C3B	1	Alarm n-4: lower threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3132	C3C	1	Alarm n-4: lower threshold value:		R	EEM-MEMO-MA600
3134	C3D	2	Alarm n-4: upper threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3135	C3F	1	Alarm n-4: highest measured value		R	EEM-MEMO-MA600
3136	C40	2	Duration	s	R	EEM-MEMO-MA600
3138	C42	1	Day		R	EEM-MEMO-MA600
3139	C43	1	Month		R	EEM-MEMO-MA600
3140	C44	1	Year		R	EEM-MEMO-MA600
3141	C45	1	Hour		R	EEM-MEMO-MA600
3142	C46	1	Minute		R	EEM-MEMO-MA600
3143	C47	1	Second		R	EEM-MEMO-MA600
Stored alarm n-5						
3144	C48	1	Output 1-6 alarm		R	EEM-MEMO-MA600
3145	C49	1	Alarm n-5: lower threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3146	C4A	1	Alarm n-5: lowest measured value:		R	EEM-MEMO-MA600
3147	C4B	2	Alarm n-5: upper threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3149	C4C	1	Alarm n-5: highest measured value		R	EEM-MEMO-MA600
3150	C4D	2	Duration	s	R	EEM-MEMO-MA600
3152	C4F	1	Day		R	EEM-MEMO-MA600
3153	C51	1	Month		R	EEM-MEMO-MA600
3154	C52	1	Year		R	EEM-MEMO-MA600
3155	C53	1	Hour		R	EEM-MEMO-MA600
3156	C54	1	Minute		R	EEM-MEMO-MA600
3157	C55	1	Second		R	EEM-MEMO-MA600
Stored alarm n-6						
3158	C56	1	Output 1-6 alarm		R	EEM-MEMO-MA600
3159	C57	1	Alarm n-6: lower threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3160	C58	1	Alarm n-6: lowest measured value:		R	EEM-MEMO-MA600

Table 11-21 C10 hex: alarm history display (course of last 10 alarms) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3161	C59	2	Alarm n-6: upper threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3163	C5B	1	Alarm n-6: highest measured value		R	EEM-MEMO-MA600
3164	C5C	2	Duration	s	R	EEM-MEMO-MA600
3166	C5E	1	Day		R	EEM-MEMO-MA600
3167	C5F	1	Month		R	EEM-MEMO-MA600
3168	C60	1	Year		R	EEM-MEMO-MA600
3169	C61	1	Hour		R	EEM-MEMO-MA600
3170	C62	1	Minute		R	EEM-MEMO-MA600
3171	C63	1	Second		R	EEM-MEMO-MA600
Stored alarm n-7						
3172	C64	1	Output 1-6 alarm		R	EEM-MEMO-MA600
3173	C65	1	Alarm n-7: lower threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3174	C66	1	Alarm n-7: lowest measured value:		R	EEM-MEMO-MA600
3175	C67	2	Alarm n-7: upper threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3177	C69	1	Alarm n-7: highest measured value		R	EEM-MEMO-MA600
3178	C6A	2	Duration	s	R	EEM-MEMO-MA600
3180	C6C	1	Day		R	EEM-MEMO-MA600
3181	C6D	1	Month		R	EEM-MEMO-MA600
3182	C6E	1	Year		R	EEM-MEMO-MA600
3183	C6F	1	Hour		R	EEM-MEMO-MA600
3184	C70	1	Minute		R	EEM-MEMO-MA600
3185	C71	1	Second		R	EEM-MEMO-MA600
Stored alarm n-8						
3186	C72	1	Output 1-6 alarm		R	EEM-MEMO-MA600
3187	C73	1	Alarm n-8: lower threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3188	C74	1	Alarm n-8: lowest measured value:		R	EEM-MEMO-MA600
3189	C75	2	Alarm n-8: upper threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3191	C77	1	Alarm n-8: highest measured value		R	EEM-MEMO-MA600
3192	C78	2	Duration	s	R	EEM-MEMO-MA600

Table 11-21 C10 hex: alarm history display (course of last 10 alarms) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3194	C7A	1	Day		R	EEM-MEMO-MA600
3195	C7B	1	Month		R	EEM-MEMO-MA600
3196	C7C	1	Year		R	EEM-MEMO-MA600
3197	C7D	1	Hour		R	EEM-MEMO-MA600
3198	C7E	1	Minute		R	EEM-MEMO-MA600
3199	C7F	1	Second		R	EEM-MEMO-MA600
Stored alarm n-9						
3200	C80	1	Output 1-6 alarm		R	EEM-MEMO-MA600
3201	C81	1	Alarm n-9: lower threshold: Output types, see alarm n-1 lower threshold		R	EEM-MEMO-MA600
3202	C82	1	Alarm n-9: lowest measured value:		R	EEM-MEMO-MA600
3203	C83	2	Alarm n-9: upper threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3205	C85	1	Alarm n-9: highest measured value		R	EEM-MEMO-MA600
3206	C86	2	Duration	s	R	EEM-MEMO-MA600
3208	C88	1	Day		R	EEM-MEMO-MA600
3209	C89	1	Month		R	EEM-MEMO-MA600
3210	C8A	1	Year		R	EEM-MEMO-MA600
3211	C8B	1	Hour		R	EEM-MEMO-MA600
3212	C8C	1	Minute		R	EEM-MEMO-MA600
3213	C8D	1	Second		R	EEM-MEMO-MA600
Stored alarm n-10						
3214	C8E	1	Output 1-6 alarm		R	
3215	C8F	1	Alarm n-10: lower threshold: Output types, see alarm n-1 lower threshold		R	EEM-MEMO-MA600
3216	C90	1	Alarm n-10: lowest measured value		R	EEM-MEMO-MA600
3217	C91	2	Alarm n-10: upper threshold: Output types, see alarm n-1: lower threshold		R	EEM-MEMO-MA600
3219	C93	1	Alarm n-10: highest measured value		R	EEM-MEMO-MA600
3220	C94	2	Duration	s	R	EEM-MEMO-MA600
3222	C96	1	Day		R	EEM-MEMO-MA600
3223	C97	1	Month		R	EEM-MEMO-MA600
3224	C98	1	Year		R	EEM-MEMO-MA600
3225	C99	1	Hour		R	EEM-MEMO-MA600

Table 11-21 C10 hex: alarm history display (course of last 10 alarms) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3226	C9A	1	Minute		R	EEM-MEMO-MA600
3227	C9B	1	Second		R	EEM-MEMO-MA600
Range extension: 140 words (decimal) or 8C words (hexadecimal)						

Table 11-22 D00 hex: undervoltage (course of last 10 SAG threshold value undervoltages)

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
Threshold value shortfall n-1						
3328	D00	1	Threshold value shortfall on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3329	D01	2	Value		R	EEM-MEMO-MA600
3331	D03	1	Threshold value shortfall on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3332	D04	2	Value		R	EEM-MEMO-MA600
3334	D06	2	Duration	ms	R	EEM-MEMO-MA600
3336	D08	1	Day		R	EEM-MEMO-MA600
3337	D09	1	Month		R	EEM-MEMO-MA600
3338	D0A	1	Year		R	EEM-MEMO-MA600
3339	D0B	1	Hour		R	EEM-MEMO-MA600
3340	D0C	1	Minute		R	EEM-MEMO-MA600
3341	D0D	1	Second		R	EEM-MEMO-MA600
Threshold value shortfall n-2						
3342	D0E	1	Threshold value shortfall on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3343	D0F	2	Value		R	EEM-MEMO-MA600

EEM-MA600

Table 11-22 D00 hex: undervoltage (course of last 10 SAG threshold value undervoltages) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3345	D11	1	Threshold value shortfall on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3346	D12	2	Value		R	EEM-MEMO-MA600
3348	D14	2	Duration	ms	R	EEM-MEMO-MA600
3350	D16	1	Day		R	EEM-MEMO-MA600
3351	D17	1	Month		R	EEM-MEMO-MA600
3352	D18	1	Year		R	EEM-MEMO-MA600
3353	D19	1	Hour		R	EEM-MEMO-MA600
3354	D1A	1	Minute		R	EEM-MEMO-MA600
3355	D1B	1	Second		R	EEM-MEMO-MA600
Threshold value shortfall n-3						
3356	D1C	1	Threshold value shortfall on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3357	D1D	2	Value		R	EEM-MEMO-MA600
3359	D1F	1	Threshold value shortfall on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3360	D20	2	Value		R	EEM-MEMO-MA600
3362	D22	2	Duration	ms	R	EEM-MEMO-MA600
3364	D24	1	Day		R	EEM-MEMO-MA600
3365	D25	1	Month		R	EEM-MEMO-MA600
3366	D26	1	Year		R	EEM-MEMO-MA600
3367	D27	1	Hour		R	EEM-MEMO-MA600
3368	D28	1	Minute		R	EEM-MEMO-MA600
3369	D29	1	Second		R	EEM-MEMO-MA600

Table 11-22 D00 hex: undervoltage (course of last 10 SAG threshold value undervoltages) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
Threshold value shortfall n-4						
3370	D2A	1	Threshold value shortfall on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3371	D2B	2	Value		R	EEM-MEMO-MA600
3373	D2D	1	Threshold value shortfall on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3374	D2E	2	Value		R	EEM-MEMO-MA600
3376	D30	2	Duration	ms	R	EEM-MEMO-MA600
3378	D32	1	Day		R	EEM-MEMO-MA600
3379	D33	1	Month		R	EEM-MEMO-MA600
3380	D34	1	Year		R	EEM-MEMO-MA600
3381	D35	1	Hour		R	EEM-MEMO-MA600
3382	D36	1	Minute		R	EEM-MEMO-MA600
3383	D37	1	Second		R	EEM-MEMO-MA600
Threshold value shortfall n-5						
3384	D38	1	Threshold value shortfall on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3385	D39	2	Value		R	EEM-MEMO-MA600
3387	D3B	1	Threshold value shortfall on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3388	D3C	2	Value		R	EEM-MEMO-MA600
3390	D3E	2	Duration	ms	R	EEM-MEMO-MA600
3392	D40	1	Day		R	EEM-MEMO-MA600
3393	D41	1	Month		R	EEM-MEMO-MA600
3394	D42	1	Year		R	EEM-MEMO-MA600

EEM-MA600

Table 11-22 D00 hex: undervoltage (course of last 10 SAG threshold value undervoltages) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3395	D43	1	Hour		R	EEM-MEMO-MA600
3396	D44	1	Minute		R	EEM-MEMO-MA600
3397	D45	1	Second		R	EEM-MEMO-MA600
Threshold value shortfall n-6						
3398	D46	1	Threshold value shortfall on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3399	D47	2	Value		R	EEM-MEMO-MA600
3401	D49	1	Threshold value shortfall on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3402	D4A	2	Value		R	EEM-MEMO-MA600
3404	D4C	2	Duration	ms	R	EEM-MEMO-MA600
3406	D4E	1	Day		R	EEM-MEMO-MA600
3407	D4F	1	Month		R	EEM-MEMO-MA600
3408	D50	1	Year		R	EEM-MEMO-MA600
3409	D51	1	Hour		R	EEM-MEMO-MA600
3410	D52	1	Minute		R	EEM-MEMO-MA600
3411	D53	1	Second		R	
Threshold value shortfall n-7						
3412	D54	1	Threshold value shortfall on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3413	D55	2	Value		R	EEM-MEMO-MA600
3415	D57	1	Threshold value shortfall on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3416	D58	2	Value		R	EEM-MEMO-MA600
3418	D5A	2	Duration	ms	R	EEM-MEMO-MA600

Table 11-22 D00 hex: undervoltage (course of last 10 SAG threshold value undervoltages) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3420	D5C	1	Day		R	EEM-MEMO-MA600
3421	D5D	1	Month		R	EEM-MEMO-MA600
3422	D5E	1	Year		R	EEM-MEMO-MA600
3423	D5F	1	Hour		R	EEM-MEMO-MA600
3424	D60	1	Minute		R	EEM-MEMO-MA600
3425	D61	1	Second		R	EEM-MEMO-MA600
Threshold value shortfall n-8						
3426	D62	1	Threshold value shortfall on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3427	D63	2	Value		R	EEM-MEMO-MA600
3429	D65	1	Threshold value shortfall on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3430	D66	2	Value		R	EEM-MEMO-MA600
3432	D68	2	Duration	ms	R	EEM-MEMO-MA600
3434	D6A	1	Day		R	EEM-MEMO-MA600
3435	D6B	1	Month		R	EEM-MEMO-MA600
3436	D6C	1	Year		R	EEM-MEMO-MA600
3437	D6D	1	Hour		R	EEM-MEMO-MA600
3438	D6E	1	Minute		R	EEM-MEMO-MA600
3439	D6F	1	Second		R	EEM-MEMO-MA600
Threshold value shortfall n-9						
3440	D70	1	Threshold value shortfall on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3441	D71	2	Value		R	EEM-MEMO-MA600

EEM-MA600

Table 11-22 D00 hex: undervoltage (course of last 10 SAG threshold value undervoltages) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3443	D73	1	Threshold value shortfall on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3444	D74	2	Value		R	EEM-MEMO-MA600
3446	D76	2	Duration	ms	R	EEM-MEMO-MA600
3448	D78	1	Day		R	EEM-MEMO-MA600
3449	D79	1	Month		R	EEM-MEMO-MA600
3450	D7A	1	Year		R	EEM-MEMO-MA600
3451	D7B	1	Hour		R	EEM-MEMO-MA600
3452	D7C	1	Minute		R	EEM-MEMO-MA600
3453	D7D	1	Second		R	EEM-MEMO-MA600
Threshold value shortfall n-10						
3454	D7E	1	Threshold value shortfall on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3455	D7F	2	Value		R	EEM-MEMO-MA600
3457	D81	1	Threshold value shortfall on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3458	D82	2	Value		R	EEM-MEMO-MA600
3460	D84	2	Duration	ms	R	EEM-MEMO-MA600
3462	D86	1	Day		R	EEM-MEMO-MA600
3463	D87	1	Month		R	EEM-MEMO-MA600
3464	D88	1	Year		R	EEM-MEMO-MA600
3465	D89	1	Hour		R	EEM-MEMO-MA600
3466	D8A	1	Minute		R	EEM-MEMO-MA600
3467	D8B	1	Second		R	EEM-MEMO-MA600
Range extension: 140 words (decimal) or 8C words (hexadecimal)						

Table 11-23 E00 hex: surge voltage (course of last 10 SWELL surge voltages)

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
Threshold value exceedance n-1						
3584	E00	1	Threshold value exceedance on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3585	E01	2	Value		R	EEM-MEMO-MA600
3587	E03	1	Threshold value exceedance on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3588	E04	2	Value		R	EEM-MEMO-MA600
3590	E06	2	Duration	ms	R	EEM-MEMO-MA600
3592	E08	1	Day		R	EEM-MEMO-MA600
3593	E09	1	Month		R	EEM-MEMO-MA600
3594	E0A	1	Year		R	EEM-MEMO-MA600
3595	E0B	1	Hour		R	EEM-MEMO-MA600
3596	E0C	1	Minute		R	EEM-MEMO-MA600
3597	E0D	1	Second		R	EEM-MEMO-MA600
Threshold value exceedance n-2						
3598	E0E	1	Threshold value exceedance on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3599	E0F	2	Value		R	EEM-MEMO-MA600
3601	E11	1	Threshold value exceedance on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3602	E12	2	Value		R	EEM-MEMO-MA600
3604	E14	2	Duration	ms	R	EEM-MEMO-MA600
3606	E16	1	Day		R	EEM-MEMO-MA600
3607	E17	1	Month		R	EEM-MEMO-MA600

EEM-MA600

Table 11-23 E00 hex: surge voltage (course of last 10 SWELL surge voltages) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3608	E18	1	Year		R	EEM-MEMO-MA600
3609	E19	1	Hour		R	EEM-MEMO-MA600
3610	E1A	1	Minute		R	EEM-MEMO-MA600
3611	E1B	1	Second		R	EEM-MEMO-MA600
Threshold value exceedance n-3						
3612	E1C	1	Threshold value exceedance on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3614	E1D	2	Value		R	EEM-MEMO-MA600
3615	E1F	1	Threshold value exceedance on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3616	E20	2	Value		R	EEM-MEMO-MA600
3618	E22	2	Duration	ms	R	EEM-MEMO-MA600
3620	E24	1	Day		R	EEM-MEMO-MA600
3621	E25	1	Month		R	EEM-MEMO-MA600
3622	E26	1	Year		R	EEM-MEMO-MA600
3623	E27	1	Hour		R	EEM-MEMO-MA600
3624	E28	1	Minute		R	EEM-MEMO-MA600
3625	E29	1	Second		R	EEM-MEMO-MA600
Threshold value exceedance n-4						
3626	E2A	1	Threshold value exceedance on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3627	E2B	2	Value		R	EEM-MEMO-MA600
3629	E2D	1	Threshold value exceedance on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3630	E2E	2	Value		R	EEM-MEMO-MA600

Table 11-23 E00 hex: surge voltage (course of last 10 SWELL surge voltages) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3632	E30	2	Duration	ms	R	EEM-MEMO-MA600
3634	E32	1	Day		R	EEM-MEMO-MA600
3635	E33	1	Month		R	EEM-MEMO-MA600
3636	E34	1	Year		R	EEM-MEMO-MA600
3637	E35	1	Hour		R	EEM-MEMO-MA600
3638	E36	1	Minute		R	EEM-MEMO-MA600
3639	E37	1	Second			EEM-MEMO-MA600
Threshold value exceedance n-5						
3640	E38	1	Threshold value exceedance on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3641	E39	2	Value		R	EEM-MEMO-MA600
3642	E3B	1	Threshold value exceedance on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3643	E3C	2	Value		R	EEM-MEMO-MA600
3644	E3E	2	Duration	ms	R	EEM-MEMO-MA600
3645	E40	1	Day		R	EEM-MEMO-MA600
3646	E41	1	Month		R	EEM-MEMO-MA600
3647	E42	1	Year		R	EEM-MEMO-MA600
3648	E43	1	Hour		R	EEM-MEMO-MA600
3649	E44	1	Minute		R	EEM-MEMO-MA600
3650	E45	1	Second		R	EEM-MEMO-MA600
Threshold value exceedance n-6						
3654	E46	1	Threshold value exceedance on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3655	E47	2	Value		R	EEM-MEMO-MA600

EEM-MA600

Table 11-23 E00 hex: surge voltage (course of last 10 SWELL surge voltages) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3657	E49	1	Threshold value exceedance on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3658	E4A	2	Value		R	EEM-MEMO-MA600
3660	E4C	2	Duration	ms	R	EEM-MEMO-MA600
3662	E4E	1	Day		R	EEM-MEMO-MA600
3663	E4F	1	Month		R	EEM-MEMO-MA600
3664	E50	1	Year		R	EEM-MEMO-MA600
3665	E51	1	Hour		R	EEM-MEMO-MA600
3666	E52	1	Minute		R	EEM-MEMO-MA600
3667	E53	1	Second		R	EEM-MEMO-MA600
Threshold value exceedance n-7						
3668	E54	1	Threshold value exceedance on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3669	E55	2	Value		R	EEM-MEMO-MA600
3671	E57	1	Threshold value exceedance on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3672	E58	2	Value		R	EEM-MEMO-MA600
3674	E5A	2	Duration	ms	R	EEM-MEMO-MA600
3676	E5C	1	Day		R	EEM-MEMO-MA600
3677	E5D	1	Month		R	EEM-MEMO-MA600
3678	E5E	1	Year		R	EEM-MEMO-MA600
3679	E5F	1	Hour		R	EEM-MEMO-MA600
3680	E60	1	Minute		R	EEM-MEMO-MA600
3681	E61	1	Second		R	EEM-MEMO-MA600

Table 11-23 E00 hex: surge voltage (course of last 10 SWELL surge voltages) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
Threshold value exceedance n-8						
3682	E62	1	Threshold value exceedance on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3683	E63	2	Value		R	EEM-MEMO-MA600
3685	E65	1	Threshold value exceedance on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3686	E66	2	Value		R	EEM-MEMO-MA600
3688	E68	2	Duration	ms	R	EEM-MEMO-MA600
3690	E6A	1	Day		R	EEM-MEMO-MA600
3691	E6B	1	Month		R	EEM-MEMO-MA600
3692	E6C	1	Year		R	EEM-MEMO-MA600
3693	E6D	1	Hour		R	EEM-MEMO-MA600
3694	E6E	1	Minute		R	EEM-MEMO-MA600
3695	E6F	1	Second		R	EEM-MEMO-MA600
Threshold value exceedance n-9						
3696	E70	1	Threshold value exceedance on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3697	E71	2	Value		R	EEM-MEMO-MA600
3699	E73	1	Threshold value exceedance on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3700	E74	2	Value		R	EEM-MEMO-MA600
3702	E76	2	Duration	ms	R	EEM-MEMO-MA600
3704	E78	1	Day		R	EEM-MEMO-MA600
3705	E79	1	Month		R	EEM-MEMO-MA600
3706	E7A	1	Year		R	EEM-MEMO-MA600

EEM-MA600

Table 11-23 E00 hex: surge voltage (course of last 10 SWELL surge voltages) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3707	E7B	1	Hour		R	EEM-MEMO-MA600
3708	E7C	1	Minute		R	EEM-MEMO-MA600
3709	E7D	1	Second		R	EEM-MEMO-MA600
Threshold value exceedance n-10						
3710	E7E	1	Threshold value exceedance on line voltage 0: none 5: U12 6: U23 7: U31		R	EEM-MEMO-MA600
3711	E7F	2	Value		R	EEM-MEMO-MA600
3713	E81	1	Threshold value exceedance on line voltage against N 0: none 22: V1 23: V2 24: V3		R	EEM-MEMO-MA600
3714	E82	2	Value		R	EEM-MEMO-MA600
3716	E84	2	Duration	ms	R	EEM-MEMO-MA600
3718	E86	1	Day		R	EEM-MEMO-MA600
3719	E87	1	Month		R	EEM-MEMO-MA600
3720	E88	1	Year		R	EEM-MEMO-MA600
3721	E89	1	Hour		R	EEM-MEMO-MA600
3722	E8A	1	Minute		R	EEM-MEMO-MA600
3723	E8B	1	Second		R	EEM-MEMO-MA600
Range extension: 140 words (decimal) or 8C words (hexadecimal)						

Table 11-24 F00 hex: current minimum and maximum measured values (measurement duration of 1 s)

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3840	F00	2	Min. I: minimum current from I1, I2 or I3	mA	R	
3842	F02	1	Day		R	EEM-MEMO-MA600
3843	F03	1	Month		R	EEM-MEMO-MA600
3844	F04	1	Year		R	EEM-MEMO-MA600
3845	F05	1	Hour		R	EEM-MEMO-MA600

Table 11-24 F00 hex: current minimum and maximum measured values (measurement duration of 1 s) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3846	F06	1	Minute		R	EEM-MEMO-MA600
3847	F07	1	Second		R	EEM-MEMO-MA600
3848	F08	2	Max. I: maximum current from I1, I2 or I3	mA	R	
3850	F0A	1	Day		R	EEM-MEMO-MA600
3851	F0B	1	Month		R	EEM-MEMO-MA600
3852	F0C	1	Year		R	EEM-MEMO-MA600
3853	F0D	1	Hour		R	EEM-MEMO-MA600
3854	F0E	1	Minute		R	EEM-MEMO-MA600
3855	F0F	1	Second		R	EEM-MEMO-MA600
3856	F10	2	Min. IN: minimum neutral conductor current IN	mA	R	
3858	F12	1	Day		R	EEM-MEMO-MA600
3859	F13	1	Month		R	EEM-MEMO-MA600
3860	F14	1	Year		R	EEM-MEMO-MA600
3861	F15	1	Hour		R	EEM-MEMO-MA600
3862	F16	1	Minute		R	EEM-MEMO-MA600
3863	F17	1	Second		R	EEM-MEMO-MA600
3864	F18	2	Max. IN: maximum neutral conductor current IN	mA	R	
3866	F1A	1	Day		R	EEM-MEMO-MA600
3867	F1B	1	Month		R	EEM-MEMO-MA600
3868	F1C	1	Year		R	EEM-MEMO-MA600
3869	F1D	1	Hour		R	EEM-MEMO-MA600
3870	F1E	1	Minute		R	EEM-MEMO-MA600
3871	F1F	1	Second		R	EEM-MEMO-MA600
3872	F20	2	Min. U: minimum line voltage from U12, U23 or U31	V / 100	R	
3874	F22	1	Day		R	EEM-MEMO-MA600
3875	F23	1	Month		R	EEM-MEMO-MA600
3876	F24	1	Year		R	EEM-MEMO-MA600
3877	F25	1	Hour		R	EEM-MEMO-MA600
3878	F26	1	Minute		R	EEM-MEMO-MA600
3879	F27	1	Second		R	EEM-MEMO-MA600
3880	F28	2	Max. U: maximum line voltage from U12, U23 or U31	V / 100	R	
3882	F2A	1	Day		R	EEM-MEMO-MA600

EEM-MA600

Table 11-24 F00 hex: current minimum and maximum measured values (measurement duration of 1 s) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3883	F2B	1	Month		R	EEM-MEMO-MA600
3884	F2C	1	Year		R	EEM-MEMO-MA600
3885	F2D	1	Hour		R	EEM-MEMO-MA600
3886	F2E	1	Minute		R	EEM-MEMO-MA600
3887	F2F	1	Second		R	EEM-MEMO-MA600
3888	F30	2	Min. V: minimum line voltage against N from V1, V2 or V3	V / 100	R	
3890	F32	1	Day		R	EEM-MEMO-MA600
3891	F33	1	Month		R	EEM-MEMO-MA600
3892	F34	1	Year		R	EEM-MEMO-MA600
3893	F35	1	Hour		R	EEM-MEMO-MA600
3894	F36	1	Minute		R	EEM-MEMO-MA600
3895	F37	1	Second		R	EEM-MEMO-MA600
3896	F38	2	Max. V: maximum line voltage against N from V1, V2 or V3	V / 100	R	
3898	F3A	1	Day		R	EEM-MEMO-MA600
3899	F3B	1	Month		R	EEM-MEMO-MA600
3900	F3C	1	Year		R	EEM-MEMO-MA600
3901	F3D	1	Hour		R	EEM-MEMO-MA600
3902	F3E	1	Minute		R	EEM-MEMO-MA600
3903	F3F	1	Second		R	EEM-MEMO-MA600
3904	F40	2	Min. F: minimum frequency F	Hz / 100	R	
3906	F42	1	Day		R	EEM-MEMO-MA600
3907	F43	1	Month		R	EEM-MEMO-MA600
3908	F44	1	Year		R	EEM-MEMO-MA600
3909	F45	1	Hour		R	EEM-MEMO-MA600
3910	F46	1	Minute		R	EEM-MEMO-MA600
3911	F47	1	Second		R	EEM-MEMO-MA600
3912	F48	2	Max. F: maximum frequency F	Hz / 100	R	
3914	F4A	1	Day		R	EEM-MEMO-MA600
3915	F4B	1	Month		R	EEM-MEMO-MA600
3916	F4C	1	Year		R	EEM-MEMO-MA600
3917	F4D	1	Hour		R	EEM-MEMO-MA600
3918	F4E	1	Minute		R	EEM-MEMO-MA600
3919	F4F	1	Second		R	EEM-MEMO-MA600
3920	F50	2	Min. ΣPF: minimum power factor (total)	1 / 1000	R	

Table 11-24 F00 hex: current minimum and maximum measured values (measurement duration of 1 s) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3922	F52	1	Day		R	EEM-MEMO-MA600
3923	F53	1	Month		R	EEM-MEMO-MA600
3924	F54	1	Year		R	EEM-MEMO-MA600
3925	F55	1	Hour		R	EEM-MEMO-MA600
3926	F56	1	Minute		R	EEM-MEMO-MA600
3927	F57	1	Second		R	EEM-MEMO-MA600
3928	F58	2	Max. ΣPF: maximum power factor (total)	1 / 1000	R	
3930	F5A	1	Day		R	EEM-MEMO-MA600
3931	F5B	1	Month		R	EEM-MEMO-MA600
3932	F5C	1	Year		R	EEM-MEMO-MA600
3933	F5D	1	Hour		R	EEM-MEMO-MA600
3934	F5E	1	Minute		R	EEM-MEMO-MA600
3935	F5F	1	Second		R	EEM-MEMO-MA600
3936	F60	2	Min. ΣP+: minimum positive real power (total)	kW / 100	R	
3938	F62	1	Day		R	EEM-MEMO-MA600
3939	F63	1	Month		R	EEM-MEMO-MA600
3940	F64	1	Year		R	EEM-MEMO-MA600
3941	F65	1	Hour		R	EEM-MEMO-MA600
3942	F66	1	Minute		R	EEM-MEMO-MA600
3943	F67	1	Second		R	EEM-MEMO-MA600
3944	F68	2	Max. ΣP+: maximum positive real power (total)	kW / 100	R	
3946	F6A	1	Day		R	EEM-MEMO-MA600
3947	F6B	1	Month		R	EEM-MEMO-MA600
3948	F6C	1	Year		R	EEM-MEMO-MA600
3949	F6D	1	Hour		R	EEM-MEMO-MA600
3950	F6E	1	Minute		R	EEM-MEMO-MA600
3951	F6F	1	Second		R	EEM-MEMO-MA600
3952	F70	2	Min. ΣP-: minimum negative real power (total)	kW / 100	R	
3954	F72	1	Day		R	EEM-MEMO-MA600
3955	F73	1	Month		R	EEM-MEMO-MA600
3956	F74	1	Year		R	EEM-MEMO-MA600
3957	F75	1	Hour		R	EEM-MEMO-MA600
3958	F76	1	Minute		R	EEM-MEMO-MA600

EEM-MA600

Table 11-24 F00 hex: current minimum and maximum measured values (measurement duration of 1 s) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3959	F77	1	Second		R	EEM-MEMO-MA600
3960	F78	2	Max. ΣP^-: maximum negative real power (total)	kW / 100	R	
3962	F7A	1	Day		R	EEM-MEMO-MA600
3963	F7B	1	Month		R	EEM-MEMO-MA600
3964	F7C	1	Year		R	EEM-MEMO-MA600
3965	F7D	1	Hour		R	EEM-MEMO-MA600
3966	F7E	1	Minute		R	EEM-MEMO-MA600
3967	F7F	1	Second		R	EEM-MEMO-MA600
3968	F80	2	Min. ΣQ^+: minimum positive reactive power (total)	kvar / 100	R	
3970	F82	1	Day		R	EEM-MEMO-MA600
3971	F83	1	Month		R	EEM-MEMO-MA600
3972	F84	1	Year		R	EEM-MEMO-MA600
3973	F85	1	Hour		R	EEM-MEMO-MA600
3974	F86	1	Minute		R	EEM-MEMO-MA600
3975	F87	1	Second		R	EEM-MEMO-MA600
3976	F88	2	Max. ΣQ^+: maximum positive reactive power (total)	kvar / 100	R	
3978	F8A	1	Day		R	EEM-MEMO-MA600
3979	F8B	1	Month		R	EEM-MEMO-MA600
3980	F8C	1	Year		R	EEM-MEMO-MA600
3981	F8D	1	Hour		R	EEM-MEMO-MA600
3982	F8E	1	Minute		R	EEM-MEMO-MA600
3983	F8F	1	Second		R	EEM-MEMO-MA600
3984	F90	2	Min. ΣQ^-: minimum negative reactive power (total)	kvar / 100	R	
3986	F92	1	Day		R	EEM-MEMO-MA600
3987	F93	1	Month		R	EEM-MEMO-MA600
3988	F94	1	Year		R	EEM-MEMO-MA600
3989	F95	1	Hour		R	EEM-MEMO-MA600
3990	F96	1	Minute		R	EEM-MEMO-MA600
3991	F97	1	Second		R	EEM-MEMO-MA600
3992	F98	2	Max. ΣQ^-: maximum negative reactive power (total)	kvar / 100	R	
3994	F9A	1	Day		R	EEM-MEMO-MA600
3995	F9B	1	Month		R	EEM-MEMO-MA600

Table 11-24 F00 hex: current minimum and maximum measured values (measurement duration of 1 s) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
3996	F9C	1	Year		R	EEM-MEMO-MA600
3997	F9D	1	Hour		R	EEM-MEMO-MA600
3998	F9E	1	Minute		R	EEM-MEMO-MA600
3999	F9F	1	Second		R	EEM-MEMO-MA600
4000	FA0	2	Min. ΣS: minimum apparent power (total)	kVA / 100	R	
4002	FA2	1	Month		R	EEM-MEMO-MA600
4003	FA3	1	Day		R	EEM-MEMO-MA600
4004	FA4	1	Year		R	EEM-MEMO-MA600
4005	FA5	1	Hour		R	EEM-MEMO-MA600
4006	FA6	1	Minute		R	EEM-MEMO-MA600
4007	FA7	1	Second		R	EEM-MEMO-MA600
4008	FA8	2	Max. ΣS: maximum apparent power (total)	kVA / 100	R	
4010	FAA	1	Day		R	EEM-MEMO-MA600
4011	FAB	1	Month		R	EEM-MEMO-MA600
4012	FAC	1	Year		R	EEM-MEMO-MA600
4013	FAD	1	Hour		R	EEM-MEMO-MA600
4014	FAE	1	Minute		R	EEM-MEMO-MA600
4015	FAF	1	Second		R	EEM-MEMO-MA600
4016	FB0	2	Min. THD I: minimum total harmonic distortion of currents from I1, I2 or I3	0.10%	R	
4018	FB2	1	Day		R	EEM-MEMO-MA600
4019	FB3	1	Month		R	EEM-MEMO-MA600
4020	FB4	1	Year		R	EEM-MEMO-MA600
4021	FB5	1	Hour		R	EEM-MEMO-MA600
4022	FB6	1	Minute		R	EEM-MEMO-MA600
4023	FB7	1	Second		R	EEM-MEMO-MA600
4024	FB8	2	Max. THD I: maximum total harmonic distortion of currents from I1, I2 or I3	0.10%	R	
4026	FBA	1	Day		R	EEM-MEMO-MA600
4027	FBB	1	Month		R	EEM-MEMO-MA600
4028	FBC	1	Year		R	EEM-MEMO-MA600
4029	FBD	1	Hour		R	EEM-MEMO-MA600
4030	FBE	1	Minute		R	EEM-MEMO-MA600
4031	FBF	1	Second		R	EEM-MEMO-MA600

Table 11-24 F00 hex: current minimum and maximum measured values (measurement duration of 1 s) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
4032	FC0	2	Min. THD IN: minimum total harmonic distortion of neutral conductor current	0.10%	R	
4034	FC2	1	Day		R	EEM-MEMO-MA600
4035	FC3	1	Month		R	EEM-MEMO-MA600
4036	FC4	1	Year		R	EEM-MEMO-MA600
4037	FC5	1	Hour		R	EEM-MEMO-MA600
4038	FC6	1	Minute		R	EEM-MEMO-MA600
4039	FC7	1	Second		R	EEM-MEMO-MA600
4040	FC8	2	Max. THD IN: maximum total harmonic distortion of neutral conductor current	0.10%	R	
4042	FCA	1	Day		R	EEM-MEMO-MA600
4043	FCB	1	Month		R	EEM-MEMO-MA600
4044	FCC	1	Year		R	EEM-MEMO-MA600
4045	FCD	1	Hour		R	EEM-MEMO-MA600
4046	FCE	1	Minute		R	EEM-MEMO-MA600
4047	FCF	1	Second		R	EEM-MEMO-MA600
4048	FD0	2	Min. THD U: minimum total harmonic distortion of line voltages from U12, U23 or U31	0.10%	R	
4050	FD2	1	Day		R	EEM-MEMO-MA600
4051	FD3	1	Month		R	EEM-MEMO-MA600
4052	FD4	1	Year		R	EEM-MEMO-MA600
4053	FD5	1	Hour		R	EEM-MEMO-MA600
4054	FD6	1	Minute		R	EEM-MEMO-MA600
4055	FD7	1	Second		R	EEM-MEMO-MA600
4056	FD8	2	Max. THD U: maximum total harmonic distortion of line voltages from U12, U23 or U31	0.10%	R	
4058	FDA	1	Day		R	EEM-MEMO-MA600
4059	FDB	1	Month		R	EEM-MEMO-MA600
4060	FDC	1	Year		R	EEM-MEMO-MA600
4061	FDD	1	Hour		R	EEM-MEMO-MA600
4062	FDE	1	Minute		R	EEM-MEMO-MA600
4063	FDF	1	Second		R	EEM-MEMO-MA600

Table 11-24 F00 hex: current minimum and maximum measured values (measurement duration of 1 s) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
4064	FE0	2	Min. THD V: minimum total harmonic distortion of line voltages against N from V1, V2 or V3	0.10%	R	
4066	FE2	1	Day		R	EEM-MEMO-MA600
4067	FE3	1	Month		R	EEM-MEMO-MA600
4068	FE4	1	Year		R	EEM-MEMO-MA600
4069	FE5	1	Hour		R	EEM-MEMO-MA600
4070	FE6	1	Minute		R	EEM-MEMO-MA600
4071	FE7	1	Second		R	EEM-MEMO-MA600
4072	FE8	2	Max. THD V: maximum total harmonic distortion of line voltages against N from V1, V2 or V3	0.10%	R	
4074	FEA	1	Day		R	EEM-MEMO-MA600
4075	FEB	1	Month		R	EEM-MEMO-MA600
4076	FEC	1	Year		R	EEM-MEMO-MA600
4077	FED	1	Hour		R	EEM-MEMO-MA600
4078	FEE	1	Minute		R	EEM-MEMO-MA600
4079	FEF	1	Second		R	EEM-MEMO-MA600
Range extension: 240 words (decimal) or F0 words (hexadecimal)						

Table 11-25 1000 hex: supply voltage failure (course of last 10 voltage interruptions)

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
Voltage interruption n-1						
4096	1000	1	Day		R	EEM-MEMO-MA600
4097	1001	1	Month		R	EEM-MEMO-MA600
4098	1002	1	Year		R	EEM-MEMO-MA600
4099	1003	1	Hour		R	EEM-MEMO-MA600
4100	1004	1	Minute		R	EEM-MEMO-MA600
4101	1005	1	Second		R	EEM-MEMO-MA600
Voltage interruption n-2						
4102	1006	1	Day		R	EEM-MEMO-MA600
4103	1007	1	Month		R	EEM-MEMO-MA600

EEM-MA600

Table 11-25 1000 hex: supply voltage failure (course of last 10 voltage interruptions) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
4104	1008	1	Year		R	EEM-MEMO-MA600
4105	1009	1	Hour		R	EEM-MEMO-MA600
4106	100A	1	Minute		R	EEM-MEMO-MA600
4107	100B	1	Second		R	EEM-MEMO-MA600
Voltage interruption n-3						
4108	100C	1	Day		R	EEM-MEMO-MA600
4109	100D	1	Month		R	EEM-MEMO-MA600
4110	100E	1	Year		R	EEM-MEMO-MA600
4111	100F	1	Hour		R	EEM-MEMO-MA600
4112	1010	1	Minute		R	EEM-MEMO-MA600
4113	1011	1	Second		R	EEM-MEMO-MA600
Voltage interruption n-4						
4114	1012	1	Day		R	EEM-MEMO-MA600
4115	1013	1	Month		R	EEM-MEMO-MA600
4116	1014	1	Year		R	EEM-MEMO-MA600
4117	1015	1	Hour		R	EEM-MEMO-MA600
4118	1016	1	Minute		R	EEM-MEMO-MA600
4119	1017	1	Second		R	EEM-MEMO-MA600
Voltage interruption n-5						
4120	1018	1	Day		R	EEM-MEMO-MA600
4121	1019	1	Month		R	EEM-MEMO-MA600
4122	101A	1	Year		R	EEM-MEMO-MA600
4123	101B	1	Hour		R	EEM-MEMO-MA600
4124	101C	1	Minute		R	EEM-MEMO-MA600
4125	101D	1	Second		R	EEM-MEMO-MA600
Voltage interruption n-6						
4126	101E	1	Day		R	EEM-MEMO-MA600
4127	101F	1	Month		R	EEM-MEMO-MA600
4128	1020	1	Year		R	EEM-MEMO-MA600
4129	1021	1	Hour		R	EEM-MEMO-MA600
4130	1022	1	Minute		R	EEM-MEMO-MA600
4131	1023	1	Second		R	EEM-MEMO-MA600
Voltage interruption n-7						
4132	1024	1	Day		R	EEM-MEMO-MA600
4133	1025	1	Month		R	EEM-MEMO-MA600
4134	1026	1	Year		R	EEM-MEMO-MA600

Table 11-25 1000 hex: supply voltage failure (course of last 10 voltage interruptions) [...]

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
4135	1027	1	Hour		R	EEM-MEMO-MA600
4136	1028	1	Minute		R	EEM-MEMO-MA600
4137	1029	1	Second		R	EEM-MEMO-MA600
Voltage interruption n-8						
4138	102A	1	Day		R	EEM-MEMO-MA600
4139	102B	1	Month		R	EEM-MEMO-MA600
4140	102C	1	Year		R	EEM-MEMO-MA600
4141	102D	1	Hour		R	EEM-MEMO-MA600
4142	102E	1	Minute		R	EEM-MEMO-MA600
4143	102F	1	Second		R	EEM-MEMO-MA600
Voltage interruption n-9						
4144	1030	1	Day		R	EEM-MEMO-MA600
4145	1031	1	Month		R	EEM-MEMO-MA600
4146	1032	1	Year		R	EEM-MEMO-MA600
4147	1033	1	Hour		R	EEM-MEMO-MA600
4148	1034	1	Minute		R	EEM-MEMO-MA600
4149	1035	1	Second		R	EEM-MEMO-MA600
Voltage interruption n-10						
4150	1036	1	Day		R	EEM-MEMO-MA600
4151	1037	1	Month		R	EEM-MEMO-MA600
4152	1038	1	Year		R	EEM-MEMO-MA600
4153	1039	1	Hour		R	EEM-MEMO-MA600
4154	103A	1	Minute		R	EEM-MEMO-MA600
4155	103B	1	Second		R	EEM-MEMO-MA600
Range extension: 60 words (decimal) or 3C words (hexadecimal)						



The indicator is a continuous counter that gives the status of the register in which the last value was saved via the set measurement duration.

When you use this table, you must multiply the values by the transmission ratios for the converter used.

Real and reactive energy values are saved in registers 3005...7655. These must be allocated by the set measurement duration in order to determine the real and reactive power (see "Example: readout of contents of address 3051" on page 11-70, "Storage register entries" on page 11-70).

Table 11-26 3000 hex: Course of reactive and real energy over set measurement duration (without consideration of transmission ratios)

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
12288	3000	1	Indicator for average value real power P+/P-		R	EEM-MEMO-MA600
12289	3001	1	Indicator for average value reactive power Q+/Q-		R	EEM-MEMO-MA600
12290	3002	3	Date/time indicator update		R	EEM-MEMO-MA600
12293	3005	4500	Range P.1 average value for real power P+/P-	kWh/100	R	EEM-MEMO-MA600
16793	4199	4500	Range P.2 average value for real power P+/P-	kWh/100	R	EEM-MEMO-MA600
21293	532D	4500	Range Q.1 average value for reactive power Q+/Q-	kvarh/100	R	EEM-MEMO-MA600
25793	64C1	4500	Range Q.2 average value for reactive power Q+/Q-	kvarh/100	R	EEM-MEMO-MA600
30293	7655	End of range				
Range extension: 18005 words (decimal) or 4655 words (hexadecimal)						



The indicator is a continuous counter that gives the status of the register in which the last value was saved via the set measurement duration.

When you use this table, you must multiply the values by the transmission ratios for the converter used.

Table 11-27 8000 hex: course of average values for voltages over the set measurement duration

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
32768	8000	1	Voltages indicator		R	EEM-MEMO-MA600
32769	8001	3	Date/time indicator update		R	EEM-MEMO-MA600
32772	8004	875	Value of line voltages (3U) Value of line voltages against N (3V)	V/10	R	EEM-MEMO-MA600
33647	836F	End of range				
Range extension: 879 words (decimal) or 36F words (hexadecimal)						



The indicator is a continuous counter that gives the status of the register in which the last value was saved via the set measurement duration.

Table 11-28 9000 hex: course of average values for frequency over the set measurement duration

Decimal address	Hexadecimal address	Number of data words	Designation	Unit	Register access	Available through extension module
36864	9000	1	Frequency indicator		R	EEM-MEMO-MA600
36865	9001	3	Date/time indicator update		R	EEM-MEMO-MA600
36868	9004	8700	Value of frequency F	Hz/100	R	EEM-MEMO-MA600
45568	B200	End of range				

Range extension: 8704 words (decimal) or 2200 words (hexadecimal)

Example: readout of register 3002 hex "Date/time indicator update"

The register shows the date/time of the last indicator update (last save).

Slave address	Function	High quality address	Low quality address	No. High quality words	No. Low quality words	CRC 16
01	03	30	02	00	03	AB0B

The answer for EEM-MA600 is:

Slave address	Function	Number of bytes	Register value word 1	Register value word 2	Register value word 3	CRC 16
01	03	06	071F	100A	000B	5D0
			07 (month July) / 31. (Day)	16:10 time (16 hour / 10 minutes)	0 (seconds) / 2011 (year)	

Example: readout of register 3000 hex "indicator address for real power P+/P-

The indicator shows the place in the register where the last value was stored.

Slave address	Function	High quality address	Low quality address	No. High quality words	No. Low quality words	CRC 16
01	03	30	00	00	01	8B0A

The answer for EEM-MA600 is:

Slave address	Function	Number of bytes	Register value word 1	CRC 16
01	03	02	004C	B9B1

The last value was stored in address 3051 (address 3005 + 4C indicator counter).

Example: readout of contents of address 3051

Measurement duration 10 minutes.

Slave address	Function	High quality address	Low quality address	No. High quality words	No. Low quality words	CRC 16
01	03	30	51	00	01	DADB
		Address 3005 + 4C = 3051				

EEM-MA600's answer is:

Slave address	Function	Number of bytes	Register value word 1	CRC 16
01	03	02	16FA	3667

Register value word 1 statement:

16FA kWh (hex) → 5882 kWh/100 (decimal) not based on current and voltage transducer (without consideration of transmission ratios)

58.82 kWh x (1000 A/5 A) = 11764 kWh (for a measurement duration set for 10 minutes at 16:10)

Determination of power: $P = E/t$ → For a measurement duration of 10 min, you must divide the measured energy by the measurement duration:

11764 kWh/6 (1 h/10 min) = 1960 kW

Storage register entries

Table 11-29 Storage of the real energy (measurement duration of 10 minutes)

Hexadecimal address	Measured value (decimal) kWh/100	Date/time	Register value ¹	Register value ²	Calculated real power ³	Calculated real energy ⁴	Calculated real power ⁵
...
304D	5828		58.28	11656	9.7	11656	1942
304E	4796		47.96	9592	7.9	9592	1598
304F	3597		35.97	7194	5.9	7194	1199
3050	5467		54.67	10934	9.1	10934	1822
3051	5882		58.82	11764	9.8	11764	1960

¹ without consideration of transmission ratios (kWh)

² under consideration of the current transformer transmission ratios 1000 A/5 A (kWh)

³ without consideration of the transmission ratios (kW): Determination of power $P = E/t$ (for example, 58.82 kWh/6 (1 h/10 min) = 9.8 kW)

⁴ under consideration of the current transformer transmission ratios 1000 A/5 A (kWh)

⁵ under consideration of current transformer transmission ratios 1000 A/5 A (kW): Determination of power $P = E/t$ (for example, 11764 kWh/6 (1 h/10 min) = 1960 kW)

Register date/time readout when supply voltage fails

Example: moment of deactivation

The first word starts with \$E

Address + 0	\$Emdd	1 word	m: month 1...12 dd: day 1...31
Address + 1	\$hhnn	1 word	hh: hour 0...23 nn: minute 0...60
Address + 2	\$ssyy	1 word	ss: second 0...59 yy: year 0...255

Example: switch-on moment

The first word starts with \$F

Address + 0	\$Fmdd	1 word	m: month 1...12 dd: day 1...31
Address + 1	\$hhnn	1 word	hh: hour 0...23 nn: Minute 0...60
Address + 2	\$ssyy	1 word	ss: second 0...59 yy: year 0...255

12 PROFIBUS register

In this section, you will find the following registers.

Table 12-1 Register overview

Description	For further information...
Configuration	See Table 12-2 on page 12-1
Module 1 "Main values"	See page 12-5
Module 2 "Additional values"	See page 12-11
Module 3 "Undervoltage/Interrupt/Pow&Freq"	See page 12-13
Module 4 "Overvoltage/Avg U&V/Max&Avg IN"	See page 12-13
Module 5 "3I&IN harmonics"	See page 12-14
Module 6 "3U harmonics"	See page 12-16
Module 7 "3V harmonics"	See page 12-17
Module 8 "Instantaneous MinMax"	See page 12-18
Module 9 "Specific Data"	See page 12-18
Module 10 (not available)	See page 12-27
Module 11 "Specific short data"	See page 12-28
Diagnostics	See page 12-29

12.1 Configuration

Table 12-2 Configuration (user prm data)

Designation	Register size (bytes)	Register access	Available through extension module
<i>Not available</i> Note: register content is always zero	1	W	
Network type : 0 : 1BL 1 : 2BL 2 : 3BL 3 : 3NBL 4 : 4BL 5 : 4NBL	1	W	
Current transformer secondary side (A) 1 : 1 A 5 : 5 A	1	W	
Current transformer primary side (A)	2	W	

Table 12-2 Configuration (user prm data) [...]

Designation	Register size (bytes)	Register access	Available through extension module
Voltage transducer present? 0 : No 1 : Yes	1	W	
Voltage transducer primary side (V)	4	W	
Voltage transducer secondary side (V) : 60 : 60 V 100 : 100 V 110 : 110 V 115 : 115 V 120 : 120 V 173 : 173 V 190 : 190 V	1	W	
Measurement duration for average value/maximum value accumulation for currents: (2 s, 10 s, 5 min, 8 min, 10 min, 15 min, 20 min, 30 min, 60 min)	1	W	
Measurement duration for average value/maximum value accumulation for P, Q, S power: (10 s, 5 min, 8 min, 10 min, 15 min, 20 min, 30 min, 60 min)	1	W	
<i>Not available</i>	1	W	
<i>Not available</i>	1	W	
<i>Not available</i>	1	W	
<i>Not available</i>	1	W	
<i>Not available</i>	1	W	
<i>Not available</i>	1	W	
Output signal AO OUT 1: 0 : 0/20 mA 1 : 4/20 mA 2 : 30 V	1	W	EEM-2AO-MA600

Table 12-2 Configuration (user prm data) [...]

Designation	Register size (bytes)	Register access	Available through extension module
Output type AO OUT 1: 0: I1: current 1: I2: current 2: I3: current 3: In: neutral conductor current 4: U12: line voltages (1-2) 5: U23: line voltages (2-3) 6: U31: line voltages (3-1) 7: ΣP: total real power 8: ΣQ: total real power 9: ΣS: total apparent power 10: ΣPFL: total inductive power factor 11: V1: line voltages against N 12: V2: line voltages against N 13: V3: line voltages against N 14: F: frequency 15: ΣPFC: total capacitive power factor 16: I: current I1, I2, I3 17: U: line voltages (1-2/2-3/3-1) 18: V: line voltages against N (1/2/3) 19: PPR: total real power (trend) 20: QPR: total reactive power (trend) 21: SPR: total apparent power (trend) 22: T°C1: temperature module input EEM-TEMP-MA600 23: T°C2: temperature module input EEM-TEMP-MA600 24: T°C3: temperature module input EEM-TEMP-MA600 25: T°C4: internal temperature EEM-TEMP-MA600	1	W	EEM-2AO-MA600
Output value AO OUT 1 for 0 or 4 mA	2	W	EEM-2AO-MA600
AO OUT 1 unit of output value for 0 or 4 mA: 0: / 1: k 2: M	1	W	EEM-2AO-MA600
Output value AO OUT 1 for 20 mA	2	W	EEM-2AO-MA600
AO OUT 1 unit of output value for 20 mA: 0: / 1: k 2: M	1	W	EEM-2AO-MA600
Output signal AO OUT 2: 0: 0/20 mA 1: 4/20 mA 2: 30 V	1	W	EEM-2AO-MA600
Output type AO OUT 2: see AO OUT 1	1	W	EEM-2AO-MA600
AO OUT 2 output value for 0 or 4 mA	2	W	EEM-2AO-MA600
AO OUT 2 unit of output value for 0 or 4 mA: 0: / 1: k 2: M	1	W	EEM-2AO-MA600

EEM-MA600

Table 12-2 Configuration (user prm data) [...]

Designation	Register size (bytes)	Register access	Available through extension module
AO OUT 2 output value for 20 mA	2	W	EEM-2AO-MA600
AO OUT 2 unit of output value for 20 mA: 0 : / 1 : k 2 : M	1	W	EEM-2AO-MA600
Output signal AO OUT 3: 0 : 0/20 mA 1 : 4/20 mA 2 : 30 V	1	W	EEM-2AO-MA600
Output type AO OUT 3: see AO OUT 1	1	W	EEM-2AO-MA600
AO OUT 3 output value for 0 or 4 mA	2	W	EEM-2AO-MA600
AO OUT 3 unit of output value for 0 or 4 mA: 0 : / 1 : k 2 : M	1	W	EEM-2AO-MA600
AO OUT 3 output value for 20 mA	2	W	EEM-2AO-MA600
AO OUT 2 unit of output value for 20 mA: 0 : / 1 : k 2 : M	1	W	EEM-2AO-MA600
Output signal AO OUT 4: 0 : 0/20 mA 1 : 4/20 mA 2 : 30 V	1	W	EEM-2AO-MA600
Output type AO OUT 4: see AO OUT 1	1	W	EEM-2AO-MA600
AO OUT 4 output value for 0 or 4 mA	2	W	EEM-2AO-MA600
AO OUT 4 unit of output value for 0 or 4 mA: 0 : / 1 : k 2 : M	1	W	EEM-2AO-MA600
AO OUT 4 output value for 20 mA	2	W	EEM-2AO-MA600
AO OUT 4 unit of output value for 20 mA: 0 : / 1 : k 2 : M	1	W	EEM-2AO-MA600
Current transformer secondary side (A) 1 : 1 A 5 : 5 A	1	W	
Current transformer primary side (A)	2	W	
Length : 54 bytes			



NOTE:

Check whether the setting data matches the data provided in the device.
 When a slave is not recognized by the PROFIBUS® master, the master sends GSD file parameters or the default settings. Two options are specified for this procedure:

- Deactivate the EEM-MA600 programming via the master
- Configure the EEM-MA600 via the master and then open the "Programming" menu on the front side of the measuring instrument and close again.



The modules feature inputs (display) and outputs (configuration).

12.2 Module 1 "Main values"

Example:

In order to change the idle state for relay 1, you must set bit 4 and bit 0 to 1.

Table 12-3 Output table

Designation	Register size (bytes)	Register access	Available through extension module
Relay change of state If bit 4 and the allocated bit for the desired relay output is at 1, the relay's idle state can be changed. Bit 0 : relay 1 Bit 1 : relay 2 Bit 2 : relay 3 Bit 3 : relay 4 Bit 4 : changing relay configuration Bit 5 : resetting a size Bit 6 : <i>not available</i> Bit 7 : <i>not available</i>	1	W	EEM-2DIO-MA600
DO OUT 1 relay idle state: 0 : NO (open) 1 : NC (closed)	1	W	EEM-2DIO-MA600
DO OUT 2 relay idle state: 0 : NO (open) 1 : NC (closed)	1	W	EEM-2DIO-MA600
DO OUT 3 relay idle state: 0 : NO (open) 1 : NC (closed)	1	W	EEM-2DIO-MA600
DO OUT 4 relay idle state: 0 : NO (open) 1 : NC (closed)	1	W	EEM-2DIO-MA600

Table 12-3 Output table [...]

Designation	Register size (bytes)	Register access	Available through extension module
DO OUT 1 output type : 0 : CDE: Controlling relay state via RS485 1 : I: current I1, I2, I3 2 : U: line voltages (1-2/2-3/3-1) 3 : $\Sigma P+$: total positive real power 4 : $\Sigma Q+$: total positive reactive power 5 : ΣS : total apparent power 6 : F: frequency 7 : ΣPFL : total inductive power factor 8 : THDI: total harmonic distortion of currents I1, I2, I3 9 : THDU: total harmonic distortion of the conductor voltages (1-2/2-3/3-1) 10 : IN: neutral conductor current 11 : HOUr: operating hours counter 12 : V: conductor voltages against N (1/2/3) 13 : THDIN: total harmonic distortion of neutral conductor current 14 : THDV: total harmonic distortion of conductor voltages against N (1/2/3) 15 : $\Sigma P-$: total negative real power 16 : $\Sigma Q-$: total negative reactive power 17 : ΣPFC : total capacitive power factor 18 : CDT: control of relay state via RS485, resetting relay with idle state 19 : T°C1: temperature module input EEM-TEMP-MA600 20 : T°C2: temperature module input EEM-TEMP-MA600 21 : T°C3: temperature module input EEM-TEMP-MA600 22 : T°C4: internal temperature EEM-TEMP-MA600 23 : PPR: total real power (trend) 24 : QPR: total reactive power (trend) 25 : SPR: total apparent power (trend)	1	W	EEM-2DIO-MA600
DO OUT 1 alarm output value lower switching threshold	2	W	EEM-2DIO-MA600
DO OUT 1 unit of output value for the lower switching threshold 0: / 1: k 2: M	1	W	EEM-2DIO-MA600
DO OUT 1 alarm output value upper switching threshold	2	W	EEM-2DIO-MA600
DO OUT 1 output value unit for the upper switching threshold 0: / 1: k 2: M	1	W	EEM-2DIO-MA600
DO OUT 1 hysteresis (0-99%)	1	W	EEM-2DIO-MA600
DO OUT 1 trigger delay (0-999 s)	2	W	EEM-2DIO-MA600
Output type DO OUT 2: see DO OUT 1	1	W	EEM-2DIO-MA600
DO OUT 2 alarm output value lower switching threshold	2	W	EEM-2DIO-MA600

Table 12-3 Output table [...]

Designation	Register size (bytes)	Register access	Available through extension module
DO OUT 2 unit of output value for the lower switching threshold 0: / 1: k 2: M	1	W	EEM-2DIO-MA600
DO OUT 2 alarm output value upper switching threshold	2	W	EEM-2DIO-MA600
DO OUT 2 unit of output value for upper switching threshold 0: / 1: k 2: M	1	W	EEM-2DIO-MA600
DO OUT 2 hysteresis (0-99%)	1	W	EEM-2DIO-MA600
DO OUT 2 trigger delay (0-999 s)	2	W	EEM-2DIO-MA600

Table 12-3 Output table [...]

Designation	Register size (bytes)	Register access	Available through extension module
Output resetting (Reset) Bit 0 : max/avg I1,I2,I3: maximum value for currents (I1, I2, I3) Bit 1 : max/avg $\Sigma P+$: maximum value of total positive real power Bit 2 : max/avg $\Sigma P-$: maximum value of total negative real power Bit 3 : max/avg $\Sigma Q+$: maximum value of total positive reactive power Bit 4 : max/avg $\Sigma Q-$: maximum value of total negative reactive power Bit 5 : max/avg ΣS : maximum value of total apparent power Bit 6 : HOUR: operating hours counter Bit 7 : EA+: current positive real energy kWh+ Bit 8 : ER+: current positive reactive energy kvarh+ Bit 9 : ES: current apparent energy kVAh Bit 10 : EA-: current negative real energy kWh- Bit 11 : ER-: current negative reactive energy kvarh- Bit 12 : all measured values Bit 13 : E1: counter state for digital input 1 Bit 14 : E2: counter state for digital input 2 Bit 15 : <i>not available</i>	2	W	
Output resetting (Reset) Bit 0 : E1: counter state for digital input 1 Bit 1 : E2: counter state for digital input 2 Bit 2 : E3: counter state for digital input 3 Bit 3 : E4: counter state for digital input 4 Bit 4 : <i>not available</i> Bit 5 : <i>not available</i> Bit 6 : min./max. I: min./max. power from I1, I2 or I3 Bit 7 : min./max. In: min./max. neutral conductor current Bit 8 : min./max. U: min./max. line voltage from U12, U23 or U31 Bit 9 : min./max. F: min./max. frequency value Bit 10 : min./max. ΣPF : min./max. power factor (total) Bit 11 : min./max. ΣP : min./max. positive and negative real power (total) Bit 12 : min./max. ΣQ : min./max. positive and negative reactive power (total) Bit 13 : min./max. THD I: min./max. total harmonic distortion of currents from I1, I2, or I3 Bit 14 : min./max. THD IN: min./max. total harmonic distortion of neutral conductor current Bit 15 : min./max. THD U: min./max. total harmonic distortion of line voltages from U12, U23 or U31	2	W	
Length : 29 bytes			



When you use this table, you must multiply the values by the transformation ratios for the converters used.

This module contains the measured values for the currents, voltages, power, frequencies, power factors, positive energy and operating hour counter values.

Table 12-4 Display of main measured values not based on current transformer and voltage transducer (without consideration of transformation ratios) input table

Designation	Register size (bytes)	Register access	Available through extension module
I1: current (mA)	2	R	
I2: current (mA)	2	R	
I3: current (mA)	2	R	
In: neutral conductor current (mA)	2	R	
U12: line voltage (V/100)	2	R	
U23: line voltage (V/100)	2	R	
U31: line voltage (V/100)	2	R	
V1: line voltage against N (V/100)	2	R	
V2: line voltage against N (V/100)	2	R	
V3: line voltage against N (V/100)	2	R	
F: frequency (Hz/100)	2	R	
ΣP : total real power +/- (kW/100)	2	R	
ΣQ : total reactive power +/- (kvar/100)	2	R	
ΣS : total apparent power (kVA/100)	2	R	
ΣPF : total power factor -: capacitive and +: inductive (0.001)	2	R	
Max/avg I1: maximum current value (mA)	2	R	
Max/avg I2: maximum current value (mA)	2	R	
Max/avg I3: maximum current value (mA)	2	R	
Max/avg $\Sigma P+$: maximum total positive real power value (W)	2	R	
Max/avg $\Sigma P-$: maximum total negative real power value (W)	2	R	
Max/avg $\Sigma Q+$: maximum total positive reactive power value (var)	2	R	
Max/avg $\Sigma Q-$: maximum total negative reactive power value (var)	2	R	
Max/avg ΣS : maximum total apparent power value (VA)	2	R	
Ea+: current positive real energy < 10,000 kWh	2	R	
Ea+: current positive real energy > 10,000 kWh	2	R	
Er +: current positive reactive energy < 10,000 kvarh	2	R	
Er +: current positive reactive energy > 10,000 kvarh	2	R	
ES: current apparent energy < 10,000 kVAh	2	R	
ES: current apparent energy > 10,000 kVAh	2	R	
ISYS: average current value (I1+I2+I3)/3 (mA)	2	R	

12.3 Module 2 "Additional values"



When you use this table, you must multiply the values by the transformation ratios for the converters used.

This module contains the measurements per phase, average values, - energy and states (on/off input).

The output table is identical to the output table from module 1.

Table 12-5 Display of additional measured values not based on current transformer and voltage transducer (without consideration of transformation ratios), input table

Designation	Register size (bytes)	Register access	Available through extension module
P1: real power phase 1 +/- (kW/100)	2	R	
P2: real power phase 2 +/- (kW/100)	2	R	
P3: real power phase 3 +/- (kW/100)	2	R	
Q1: reactive power phase 1 +/- (kvar/100)	2	R	
Q2: reactive power phase 2 +/- (kvar/100)	2	R	
Q3: reactive power phase 3 +/- (kvar/100)	2	R	
S1: apparent power phase 1 (kVA/100)	2	R	
S2: apparent power phase 2 (kVA/100)	2	R	
S3: apparent power phase 3 (kVA/100)	2	R	
PF1: power factor phase 1 -: capacitive and +: inductive (0.001)	2	R	
PF2: power factor phase 2 -: capacitive and +: inductive (0.001)	2	R	
PF3: power factor phase 3 -: capacitive and +: inductive (0.001)	2	R	
Avg I1: average current value (mA)	2	R	
Avg I2: average current value (mA)	2	R	
Avg I3: average current value (mA)	2	R	
Avg P+: average total positive real power value (W)	2	R	
Avg P-: average total negative real power value (W)	2	R	
Avg Q+: average total positive reactive power value (var)	2	R	
Avg Q-: average total negative reactive power value (var)	2	R	
Avg S: average total apparent power value (VA)	2	R	
EA-: negative real energy < 10,000 kWh	2	R	
EA+: negative real energy > 10,000 kWh	2	R	
ER-: negative reactive energy < 10,000 kvarh	2	R	
ER+: negative reactive energy > 10,000 kvarh	2	R	
Counter state digital input DI 1 < 10,000	2	R	EEM-2DIO-MA600

Table 12-5 Display of additional measured values not based on current transformer and voltage transducer (without consideration of transformation ratios), input table [...]

Designation	Register size (bytes)	Register access	Available through extension module
Counter state digital input DI 1 > 10,000	2	R	EEM-2DIO-MA600
Counter state digital input DI 2 < 10,000	2	R	EEM-2DIO-MA600
Counter state digital input DI 2 > 10,000	2	R	EEM-2DIO-MA600
Counter state digital input DI 3 < 10,000	2	R	EEM-2DIO-MA600
Counter state digital input DI 3 > 10,000	2	R	EEM-2DIO-MA600
Counter state digital input DI 4 < 10,000	2	R	EEM-2DIO-MA600
Counter state digital input DI 4 > 10,000	2	R	EEM-2DIO-MA600
Status of digital inputs 1, 2, 3, 4.	2	R	EEM-2DIO-MA600
Length: 66 bytes			

Note

The currents must be multiplied by the SW ratio, the currents with the SpW ratio (for high voltage) and the power by the SW x SpW ratio.

Example:

$$SW = 100/5 = 20$$

$$SpW = 20,000/100 = 200$$

$$SW \times SpW = 20 \times 200 = 4000$$

All power is multiplied by 4000 (without SpW, SpW = 1), currents by 20 and voltages by 200.

Status of the inputs

Input 1 = 0 bit

Input 2 = 1 bit

Input 3 = 2 bit

Input 4 = 4 bit

When active, bit 1

When inactive, bit 0

Conversion of values with and without sign bits

When the current, voltages or energy is negative, the following rule must be applied:

- use the opposite bit per data bit
- Add 1 to this opposite bit

12.6 Module 5 "3I&IN harmonics"



This module contains the THD values I and THD IN as well as the individual harmonic content for currents: I up to 15. harmonic.

The output table is identical to the output table from module 1.

Table 12-6 Display of total harmonic distortion (THD) and harmonics for currents, input table

Designation	Register size (bytes)	Register access	Available through extension module
THD I1: total harmonic distortion of current (0.1%)	2	R	
THD I2: total harmonic distortion of current (0.1%)	2	R	
THD I3: total harmonic distortion of current (0.1%)	2	R	
THD In: total harmonic distortion of neutral conductor current (0.1%)	2	R	
Content of 3rd harmonic I1 (0.1%)	2	R	
Content of 3rd harmonic I2 (0.1%)	2	R	
Content of 3rd harmonic I3 (0.1%)	2	R	
Content of 3rd harmonic IN (0.1%)	2	R	
Content of 5th harmonic I1 (0.1%)	2	R	
Content of 5th harmonic I2 (0.1%)	2	R	
Content of 5th harmonic I3 (0.1%)	2	R	
Content of 5th harmonic IN (0.1%)	2	R	
Content of 7th harmonic I1 (0.1%)	2	R	
Content of 7th harmonic I2 (0.1%)	2	R	
Content of 7th harmonic I3 (0.1%)	2	R	
Content of 7th harmonic IN (0.1%)	2	R	
Content of 9th harmonic I1 (0.1%)	2	R	
Content of 9th harmonic I2 (0.1%)	2	R	
Content of 9th harmonic I3 (0.1%)	2	R	
Content of 9th harmonic IN (0.1%)	2	R	
Content of 11th harmonic I1 (0.1%)	2	R	
Content of 11th harmonic I2 (0.1%)	2	R	
Content of 11th harmonic I3 (0.1%)	2	R	
Content of 11th harmonic IN (0.1%)	2	R	
Content of 13th harmonic I1 (0.1%)	2	R	
Content of 13th harmonic I2 (0.1%)	2	R	
Content of 13th harmonic I3 (0.1%)	2	R	
Content of 13th harmonic IN (0.1%)	2	R	
Content of 15th harmonic I1 (0.1%)	2	R	

Table 12-6 Display of total harmonic distortion (THD) and harmonics for currents, input table [...]

Designation	Register size (bytes)	Register access	Available through extension module
Content of 15th harmonic I2 (0.1%)	2	R	
Content of 15th harmonic I3 (0.1%)	2	R	
Content of 15th harmonic IN (0.1%)	2		
Length: 64 bytes			

12.7 Module 6 "3U harmonics"



This module contains the THD values as well as the individual harmonic content for line voltages up to 11th harmonic.

The output table is identical to the output table from module 1.

Table 12-7 Display of total harmonic distortion (THD) and harmonics for line voltages U (phase/phase), input table

Designation	Register size (bytes)	Register access	Available through extension module
THD U12: total harmonic distortion of line voltage (0.1%)	2	R	
THD U23: total harmonic distortion of line voltage (0.1%)	2	R	
THD U31: total harmonic distortion of line voltage (0.1%)	2	R	
Content of 3rd harmonic U12 (0.1%)	2	R	
Content of 3rd harmonic U23 (0.1%)	2	R	
Content of 3rd harmonic U31 (0.1%)	2	R	
<i>Not available</i>	2	R	
Content of 5th harmonic U12 (0.1%)	2	R	
Content of 5th harmonic U23 (0.1%)	2	R	
Content of 5th harmonic U31 (0.1%)	2	R	
<i>Not available</i>	2	R	
Content of 7th harmonic U12 (0.1%)	2	R	
Content of 7th harmonic U23 (0.1%)	2	R	
Content of 7th harmonic U31 (0.1%)	2	R	
<i>Not available</i>	2	R	
Content of 9th harmonic U12 (0.1%)	2	R	
Content of 9th harmonic U23 (0.1%)	2	R	
Content of 9th harmonic U31 (0.1%)	2	R	
<i>Not available</i>	2	R	
Content of 11th harmonic U12 (0.1%)	2	R	
Content of 11th harmonic U23 (0.1%)	2	R	
Content of 11th harmonic U31 (0.1%)	2	R	
<i>Not available</i>	2	R	
Length: 48 bytes			

12.8 Module 7 "3V harmonics"



This module contains the THD values as well as the individual harmonic content for line voltages against N up to 11th harmonic.

The output table is identical to the output table from module 1.

Table 12-8 Display of total harmonic distortion (THD) and harmonics for line voltages against N (V), input table

Designation	Register size (bytes)	Register access	Available through extension module
THD V1: total harmonic distortion of line voltage against N (0.1%)	2	R	
THD V2: total harmonic distortion of line voltage against N (0.1%)	2	R	
THD V3: total harmonic distortion of line voltage against N (0.1%)	2	R	
Content of 3rd harmonic V1 (0.1%)	2	R	
Content of 3rd harmonic V2 (0.1%)	2	R	
Content of 3rd harmonic V3 (0.1%)	2	R	
<i>Not available</i>	2	R	
Content of 5th harmonic V1 (0.1%)	2	R	
Content of 5th harmonic V2 (0.1%)	2	R	
Content of 5th harmonic V3 (0.1%)	2	R	
<i>Not available</i>	2	R	
Content of 7th harmonic V1 (0.1%)	2	R	
Content of 7th harmonic V2 (0.1%)	2	R	
Content of 7th harmonic V3 (0.1%)	2	R	
<i>Not available</i>	2	R	
Content of 9th harmonic V1 (0.1%)	2	R	
Content of 9th harmonic V2 (0.1%)	2	R	
Content of 9th harmonic V3 (0.1%)	2	R	
<i>Not available</i>	2	R	
Content of 11th harmonic V1 (0.1%)	2	R	
Content of 11th harmonic V2 (0.1%)	2	R	
Content of 11th harmonic V3 (0.1%)	2	R	
<i>Not available</i>	2	R	
Length: 48 bytes			

12.9 Module 8 "Instantaneous MinMax"



Module 8 is not available.

12.10 Module 9 "Specific Data"

12.10.1 Configuration of the outputs



When bit 7 of byte 1 is at 0, the table can be used as standard to configure the outputs.

Example:

In order to change the idle state for relay 1, you must set bit 4 and bit 0 to 1.

Table 12-9 Special table, output table

Designation	Register size (bytes)	Register access	Available through extension module
Relay change of state If bit 4 and the allocated bit for the desired relay output is at 1, the relay's idle state can be changed. Bit 0 : relay 1 Bit 1 : relay 2 Bit 2 : relay 3 Bit 3 : relay 4 Bit 4 : changing relay configuration Bit 5 : resetting a size Bit 6 : not used Bit 7 : 0 > activate table for parameterization of digital outputs	1	W	EEM-2DIO-MA600
DO OUT 1 relay idle state: 0 : NO (open) 1 : NC (closed)	1	W	EEM-2DIO-MA600
DO OUT 2 relay idle state: 0 : NO (open) 1 : NC (closed)	1	W	EEM-2DIO-MA600
DO OUT 3 relay idle state: 0 : NO (open) 1 : NC (closed)	1	W	EEM-2DIO-MA600
DO OUT 4 relay idle state: 0 : NO (open) 1 : NC (closed)	1	W	EEM-2DIO-MA600

Table 12-9 Special table, output table [...]

Designation	Register size (bytes)	Register access	Available through extension module
Output type DO OUT 1: 0: CDE: controlling relay state via RS485 1: I: current I1, I2, I3 2: U: line voltages (1-2/2-3/3-1) 3: $\Sigma P+$: total positive real power 4: $\Sigma Q+$: total positive reactive power 5: ΣS : total apparent power 6: F: frequency 7: ΣPFL : total inductive power factor 8: THDI: total harmonic distortion for currents I1, I2, I3 9: THDU: total harmonic distortion for line voltages (1-2/2-3/3-1) 10: In: neutral conductor current 11: HOUr: operating hours counter 12: V: line voltages against N (1/2/3) 13: THDIN: total harmonic distortion of neutral conductor current 14: THDV: total harmonic distortion of line voltages against N (1/2/3) 15: $\Sigma P-$: total negative real power 16: $\Sigma Q-$: total negative reactive power 17: ΣPFC : total capacitive power factor 18: CDT: controlling relay state via RS485, resetting relay to idle 19: T°C1: temperature module input EEM-TEMP-MA600 20: T°C2: temperature module input EEM-TEMP-MA600 21: T°C3: temperature module input EEM-TEMP-MA600 22: T°C4: internal temperature EEM-TEMP-MA600 23: PPR: total real power (trend) 24: QPR: total reactive power (trend) 25: SPR: total apparent power (trend)	1	W	EEM-2DIO-MA600
DO OUT 1 alarm output value lower switching threshold	2	W	EEM-2DIO-MA600
DO OUT 1 unit of output value for the lower switching threshold 0: / 1: k 2: M	1	W	EEM-2DIO-MA600
DO OUT 1 alarm output value upper switching threshold	2	W	EEM-2DIO-MA600
DO OUT 1 output value unit for the upper switching threshold 0: / 1: k 2: M	1	W	EEM-2DIO-MA600
DO OUT 1 hysteresis (0-99%)	1	W	EEM-2DIO-MA600
DO OUT 1 trigger delay (0-999 s)	2	W	EEM-2DIO-MA600
Output type DO OUT 2: see DO OUT 1	1	W	EEM-2DIO-MA600
DO OUT 2 alarm output value lower switching threshold	2	W	EEM-2DIO-MA600
DO OUT 2 unit of output value for the lower switching threshold 0: / 1: k 2: M	1	W	EEM-2DIO-MA600

EEM-MA600

Table 12-9 Special table, output table [...]

Designation	Register size (bytes)	Register access	Available through extension module
DO OUT 2 alarm output value upper switching threshold	2	W	EEM-2DIO-MA600
DO OUT 2 unit of output value for upper switching threshold 0: / 1: k 2: M	1	W	EEM-2DIO-MA600
DO OUT 2 hysteresis (0-99%)	1	W	EEM-2DIO-MA600
DO OUT 2 trigger delay (0-999 s)	2	W	EEM-2DIO-MA600
Resetting outputs (reset) Bit 0 : max/avg I1,I2,I3: maximum value of currents (I1, I2, I3) Bit 1 : max/avg $\Sigma P+$: maximum total positive real power value Bit 2 : max/avg $\Sigma P-$: maximum total negative real power value Bit 3 : max/avg $\Sigma Q+$: maximum total positive reactive power value Bit 4 : max/avg $\Sigma Q-$: maximum total negative reactive power value Bit 5 : max/avg ΣS : maximum total apparent power value Bit 6 : HOUr: operating hours counter Bit 7 : EA+: current positive real energy kWh+ Bit 8 : ER+: current positive reactive energy kvarh+ Bit 9 : ES: current apparent energy kVAh Bit 10 : EA-: current negative real energy kWh- Bit 11 : ER-: current negative reactive energy kvarh- Bit 12 : all measured values Bit 13 : E1: counter state digital input 1 Bit 14 : E2: counter state digital input 2 Bit 15 : <i>not available</i>	2	W	
Resetting outputs (reset) Bit 0 : E1: counter state digital input 1 Bit 1 : E2: counter state digital input 2 Bit 2 : E3: counter state digital input 3 Bit 3 : E4: counter state digital input 4 Bit 4 : <i>not available</i> Bit 5 : not available Bit 6 : Min./Max. I: min./max. current from I1, I2, or I3 Bit 7 : Min./Max. In: min./max. neutral conductor current Bit 8 : Min./Max. U: min./max. line voltage from U12, U23 or U31 Bit 9 : Min./Max. F: min./max. frequency value Bit 10 : Min./Max. ΣPF : min./max. power factor (total) Bit 11 : Min./Max. ΣP : min./max. positive and negative real power (total) Bit 12 : Min./Max. ΣQ : min./max. positive and negative reactive power (total) Bit 13 : Min./Max. THD I: min./max. total harmonic distortion of currents from I1, I2 or I3 Bit 14 : Min./Max. THD IN: min./max. total harmonic distortion of neutral conductor current Bit 15 : Min./Max. THD U: min./max. total harmonic distortion of line voltages from U12, U23 or U31	2	W	
<i>Not available</i>	4		
Length: 33 bytes			

12.10.2 User-defined table



Users can take advantage of Module 9 by compiling their own specific tables from "all" values.

If bit 7 of byte 1 is at 1, the user can assign the outputs.

The table number is an identification number that refers to the module table. You can create a table with 16 registers with addresses from module table 9.

Table 12-10 Special table, output table

Designation	Register size (bytes)	Register access	Available through extension module
Table number Bit 0-6 : table number Bit 7 : 1 > address table	1	W	
Value 1 address	2	W	
Value 2 address	2	W	
Value 3 address	2	W	
Value 4 address	2	W	
Value 5 address	2	W	
Value 6 address	2	W	
Value 7 address	2	W	
Value 8 address	2	W	
Value 9 address	2	W	
Value 10 address	2	W	
Value 11 address	2	W	
Value 12 address	2	W	
Value 13 address	2	W	
Value 14 address	2	W	
Value 15 address	2	W	
Value 16 address	2	W	



MSB: most significant byte (for example, 8-bit number with the MSB as bit 0)

LSB: least significant byte (for example, 8-bit number with LSB as bit 0)

Table 12-11 List of values (assignment of addresses to corresponding measured values), input table

Designation	Register size (bytes)	Decimal address	Hexadecimal address	Register access	Available through extension module
I1: current (mA)		0	0000	R	
I2: current (mA)		1	0001	R	
I3: current (mA)		2	0002	R	
In: neutral conductor current (mA)		3	0003	R	
U12: line voltage (V/100)		4	0004	R	
U23: line voltage (V/100)		5	0005	R	
U31: line voltage (V/100)		6	0006	R	
V1: line voltage against N (V/100)		7	0007	R	
V2: line voltage against N (V/100)		8	0008	R	
V3: line voltage against N (V/100)		9	0009	R	
F: frequency (Hz/100)		10	000 A	R	
ΣP : total real power +/- (kW/100)		11	000B	R	
ΣQ : total reactive power +/- (kvar/100)		12	000C	R	
ΣS : total apparent power (kVA/100)		13	000D	R	
ΣPF : total power factor -: capacitive and +: inductive (0.001)		14	000E	R	
Max/avg I1: maximum current value (mA)		15	000F	R	
Max/avg I2: maximum current value (mA)		16	0010	R	
Max/avg I3: maximum current value (mA)		17	0011	R	
Max/avg ΣP +: maximum total positive real power value (kW/100)		18	0012	R	
Max/avg ΣP -: maximum total negative real power value (kW/100)		19	0013	R	
Max/avg ΣQ +: maximum total positive reactive power value (kvar/100)		20	0014	R	
Max/avg ΣQ -: maximum total negative reactive power value (kvar/100)		21	0015	R	
Max/avg ΣS : maximum total apparent power value (kVA/100)		22	0016	R	
EA+: current positive real energy < 10,000 (kWh)		23	0017	R	
EA+: current positive real energy > 10,000 (kWh)		24	0018	R	
ER +: current positive reactive energy < 10,000 (kvarh)		25	0019	R	
ER +: current positive reactive energy > 10,000 (kvarh)		26	001 A	R	
ES: current apparent energy < 10,000 (kVAh)		27	001B	R	
ES: current apparent energy > 10,000 (kVAh)		28	001C	R	

Table 12-11 List of values (assignment of addresses to corresponding measured values), input table [...]

Designation	Register size (bytes)	Decimal address	Hexadecimal address	Register access	Available through extension module
P1: real power phase 1 +/- (kW/100)		29	001D	R	
P2: real power phase 2 +/- (kW/100)		30	001E	R	
P3: real power phase 3 +/- (kW/100)		31	001F	R	
Q1: reactive power phase 1 +/- (kvar/100)		32	0020	R	
Q2: reactive power phase 2 +/- (kvar/100)		33	0021	R	
Q3: reactive power phase 3 +/- (kvar/100)		34	0022	R	
S1: apparent power phase 1 (kVA/100)		35	0023	R	
S2: apparent power phase 2 (kVA/100)		36	0024	R	
S3: apparent power phase 3 (kVA/100)		37	0025	R	
PF1: power factor phase 1 -: capacitive and +: inductive (0.001)		38	0026	R	
PF2: power factor phase 2 -: capacitive and +: inductive (0.001)		39	0027	R	
PF3: power factor phase 3 -: capacitive and +: inductive (0.001)		40	0028	R	
Avg I1: average current value (mA)		41	0029	R	
Avg I2: average current value (mA)		42	002 A	R	
Avg I3: average current value (mA)		43	002B	R	
Avg Σ P+: average total positive real power value (W)		44	002C	R	
Avg Σ P-: average total negative real power value (W)		45	002D	R	
Avg Σ Q+: average total positive reactive power value (var)		46	002E	R	
Avg Σ Q-: average total negative reactive power value (var)		47	002F	R	
Avg Σ S: average total apparent value (VA)		48	0030	R	
EA-: current negative real energy < 10,000 (kWh)		49	0031	R	
EA-: current negative real energy > 10,000 (kWh)		50	0032	R	
ER -: current negative reactive energy < 10,000 (kvar)		51	0033	R	
ER -: current negative reactive energy > 10,000 (kvar)		52	0034	R	
Counter state digital input DI 1 < 10,000		53	0035	R	
Counter state digital input DI 1 > 10,000		54	0036	R	
Counter state digital input DI 2 < 10,000		55	0037	R	
Counter state digital input DI 2 > 10,000		56	0038	R	
Counter state digital input DI 3 < 10,000		57	0039	R	
Counter state digital input DI 3 > 10,000		58	003 A	R	

Table 12-11 List of values (assignment of addresses to corresponding measured values), input table [...]

Designation	Register size (bytes)	Decimal address	Hexadecimal address	Register access	Available through extension module
Counter state digital input DI 4 < 10,000		59	003B	R	
Counter state digital input DI 4 > 10,000		60	003C	R	
Status of digital inputs 1, 2, 3, 4		61	003D	R	
THD I1: total harmonic distortion of current (0.1%)		62	003E	R	
THD I2: total harmonic distortion of current (0.1%)		63	003F	R	
THD I3: total harmonic distortion of current (0.1%)		64	0040	R	
THD In: total harmonic distortion of neutral conductor current (0.1%)		65	0041	R	
Content of 3rd harmonic I1 (0.1%)		66	0042	R	
Content of 3rd harmonic I2 (0.1%)		67	0043	R	
Content of 3rd harmonic I3 (0.1%)		68	0044	R	
Content of 3rd harmonic IN (0.1%)		69	0045	R	
Content of 5th harmonic I1 (0.1%)		70	0046	R	
Content of 5th harmonic I2 (0.1%)		71	0047	R	
Content of 5th harmonic I3 (0.1%)		72	0048	R	
Content of 5th harmonic IN (0.1%)		73	0049	R	
Content of 7th harmonic I1 (0.1%)		74	004 A	R	
Content of 7th harmonic I2 (0.1%)		75	004B	R	
Content of 7th harmonic I3 (0.1%)		76	004C	R	
Content of 7th harmonic IN (0.1%)		77	004D	R	
Content of 9th harmonic I1 (0.1%)		78	004E	R	
Content of 9th harmonic I2 (0.1%)		79	004F	R	
Content of 9th harmonic I3 (0.1%)		80	0050	R	
Content of 9th harmonic IN (0.1%)		81	0051	R	
Content of 11th harmonic I1 (0.1%)		82	0052	R	
Content of 11th harmonic I2 (0.1%)		83	0053	R	
Content of 11th harmonic I3 (0.1%)		84	0054	R	
Content of 11th harmonic IN (0.1%)		85	0055	R	
Content of 13th harmonic I1 (0.1%)		86	0056	R	
Content of 13th harmonic I2 (0.1%)		87	0057	R	
Content of 13th harmonic I3 (0.1%)		88	0058	R	
Content of 13th harmonic IN (0.1%)		89	0059	R	
Content of 15th harmonic I1 (0.1%)		90	005 A	R	
Content of 15th harmonic I2 (0.1%)		91	005B	R	

Table 12-11 List of values (assignment of addresses to corresponding measured values), input table [...]

Designation	Register size (bytes)	Decimal address	Hexadecimal address	Register access	Available through extension module
Content of 15th harmonic I3 (0.1%)		92	005C	R	
Content of 15th harmonic IN (0.1%)		93	005D	R	
THD U12: total harmonic distortion of line voltage (0.1%)		94	005E	R	
THD U23: total harmonic distortion of line voltage (0.1%)		95	005F	R	
THD U31: total harmonic distortion of line voltage (0.1%)		96	0060	R	
Content of 3rd harmonic U12 (0.1%)		97	0061	R	
Content of 3rd harmonic U23 (0.1%)		98	0062	R	
Content of 3rd harmonic U31 (0.1%)		99	0063	R	
Content of 5th harmonic U12 (0.1%)		100	0064	R	
Content of 5th harmonic U23 (0.1%)		101	0065	R	
Content of 5th harmonic U31 (0.1%)		102	0066	R	
Content of 7th harmonic U12 (0.1%)		103	0067	R	
Content of 7th harmonic U23 (0.1%)		104	0068	R	
Content of 7th harmonic U31 (0.1%)		105	0069	R	
Content of 9th harmonic U12 (0.1%)		106	006 A	R	
Content of 9th harmonic U23 (0.1%)		107	006B	R	
Content of 9th harmonic U31 (0.1%)		108	006C	R	
Content of 11th harmonic U12 (0.1%)		109	006D	R	
Content of 11th harmonic U23 (0.1%)		110	006E	R	
Content of 11th harmonic U31 (0.1%)		111	006F	R	
Content of 13th harmonic U12 (0.1%)		112	0070	R	
Content of 13th harmonic U23 (0.1%)		113	0071	R	
Content of 13th harmonic U31 (0.1%)		114	0072	R	
Content of 15th harmonic U12 (0.1%)		115	0073	R	
Content of 15th harmonic U23 (0.1%)		116	0074	R	
Content of 15th harmonic U31 (0.1%)		117	0075	R	
THD V1: total harmonic distortion of line voltage against N (0.1%)		118	0076	R	
THD V2: total harmonic distortion of line voltage against N (0.1%)		119	0077	R	
THD V3: total harmonic distortion of line voltage against N (0.1%)		120	0078	R	
Content of 3rd harmonic V1 (0.1%)		121	0079	R	
Content of 3rd harmonic V2 (0.1%)		122	007 A	R	
Content of 3rd harmonic V3 (0.1%)		123	007B	R	

Table 12-11 List of values (assignment of addresses to corresponding measured values), input table [...]

Designation	Register size (bytes)	Decimal address	Hexadecimal address	Register access	Available through extension module
Content of 5th harmonic V1 (0.1%)		124	007C	R	
Content of 5th harmonic V2 (0.1%)		125	007D	R	
Content of 5th harmonic V3 (0.1%)		126	007E	R	
Content of 7th harmonic V1 (0.1%)		127	007F	R	
Content of 7th harmonic V2 (0.1%)		128	0080	R	
Content of 7th harmonic V3 (0.1%)		129	0081	R	
Content of 9th harmonic V1 (0.1%)		130	0082	R	
Content of 9th harmonic V2 (0.1%)		131	0083	R	
Content of 9th harmonic V3 (0.1%)		132	0084	R	
Content of 11th harmonic V1 (0.1%)		133	0085	R	
Content of 11th harmonic V2 (0.1%)		134	0086	R	
Content of 11th harmonic V3 (0.1%)		135	0087	R	
Content of 13th harmonic V1 (0.1%)		136	0088	R	
Content of 13th harmonic V2 (0.1%)		137	0089	R	
Content of 13th harmonic V3 (0.1%)		138	008 A	R	
Content of 15th harmonic V1 (0.1%)		139	008B	R	
Content of 15th harmonic V2 (0.1%)		140	008C	R	
Content of 15th harmonic V3 (0.1%)		141	008D	R	
ISYS: average current value $(I1 + I2 + I3)/3$ (mA)		142	008E	R	
USYS: average line voltage value $(U12 + U23 + U31)/3$ (V/10)		143	008F	R	
VSYS: average line voltage value against N $(V1 + V2 + V3)/3$ (V/10)		144	0090	R	
Operating hours counter < 10,000 (h/100)		145	0091	R	
Operating hours counter > 10,000 (h/100)		146	0092	R	



The table number is an identification number that refers to the module table. You can create a table with 16 registers with addresses from module table 9.

Table 12-12 Input table

Designation	Register size (bytes)	Register access	Available through expansion module
Table number	1	R	
Value 1	2	R	
Value 2	2	R	

Table 12-12 Input table [...]

Designation	Register size (bytes)	Register access	Available through expansion module
Value 3	2	R	
Value 4	2	R	
Value 5	2	R	
Value 6	2	R	
Value 7	2	R	
Value 8	2	R	
Value 9	2	R	
Value 10	2	R	
Value 11	2	R	
Value 12	2	R	
Value 13	2	R	
Value 14	2	R	
Value 15	2	R	
Value 16	2	R	
Length: 33 bytes			

12.11 Module 10 (not available)



Module 10 is not available.

12.12 Module 11 "Specific short data"



The table number is an identification number that refers to the module table. You can create a table with 4 registers with addresses from module table 9.

Table 12-13 Limited special table, output table

Designation	Register size (bytes)	Register access	Available through expansion module
Table number	1		
Value 1 address	2	W	
Value 2 address	2	W	
Value 3 address	2	W	
Value 4 address	2	W	
Length: 9 bytes			



You can read out the assigned addresses using the input table.

Table 12-14 Input table

Designation	Register size (bytes)	Register access	Available through expansion module
Table number	1	R	
Value 1	2	R	
Value 2	2	R	
Value 3	2	R	
Value 4	2	R	
Length: 9 bytes			

12.13 Diagnostics



The diagnostics function includes the display of an extension module, serial number, measuring instrument product code as well as of an alarm or value overrun.

Table 12-15 Diagnostics

Designation	Register size (bytes)	Register access	Available through expansion module
Slot 1 0xFF: No module connected 0x0: JBUS/MODBUS EEM-RS485-MA600 0x1: <i>Not available</i> 0x02: <i>Not available</i> 0x03: <i>Not available</i> 0xF0: <i>Not available</i> 0x20: Input/Output EEM-2DIO-MA600 0x30: Analog output EEM-2AO-MA600 0x40: Memory EEM-MEMO-MA600 0x50: PROFIBUS, EEM-PB-MA600 or EEM-PB12-MA600 0x60: Temperature EEM-TEMP-MA600 0x70: Ethernet EEM-ETH-MA600 or EEM-ETH-RS485-MA600	1	R	
Slot 2 0xFF: No module connected 0x0: JBUS/MODBUS EEM-RS485-MA600 0x1: <i>Not available</i> 0x02: <i>Not available</i> 0x03: <i>Not available</i> 0xF0: <i>Not available</i> 0x20: Input/Output EEM-2DIO-MA600 0x30: Analog output EEM-2AO-MA600 0x40: Memory EEM-MEMO-MA600 0x50: PROFIBUS, EEM-PB-MA600 or EEM-PB12-MA600 0x60: Temperature EEM-TEMP-MA600 0x70: Ethernet EEM-ETH-MA600 or EEM-ETH-RS485-MA600	1	R	
Slot 3 0xFF: No module connected 0x0: JBUS/MODBUS EEM-RS485-MA600 0x1: <i>Not available</i> 0x02: <i>Not available</i> 0x03: <i>Not available</i> 0xF0: <i>Not available</i> 0x20: Input/Output EEM-2DIO-MA600 0x30: Analog output EEM-2AO-MA600 0x40: Memory EEM-MEMO-MA600 0x50: PROFIBUS, EEM-PB-MA600 or EEM-PB12-MA600 0x60: Temperature EEM-TEMP-MA600 0x70: Ethernet EEM-ETH-MA600 or EEM-ETH-RS485-MA600	1	R	

EEM-MA600

Table 12-15 Diagnostics [...]

Designation	Register size (bytes)	Register access	Available through expansion module
Slot 4 0xFF: No module connected 0x0: JBUS/MODBUS EEM-RS485-MA600 0x1: <i>Not available</i> 0x02: <i>Not available</i> 0x03: <i>Not available</i> 0xF0: <i>Not available</i> 0x20: Input/Output EEM-2DIO-MA600 0x30: Analog output EEM-2AO-MA600 0x40: Memory EEM-MEMO-MA600 0x50: PROFIBUS, EEM-PB-MA600 or EEM-PB12-MA600 0x60: Temperature EEM-TEMP-MA600 0x70: Ethernet EEM-ETH-MA600 or EEM-ETH-RS485-MA600	1	R	
Serial number	4	R	
Manufacturer code	1	R	

Table 12-15 Diagnostics [...]

Designation	Register size (bytes)	Register access	Available through expansion module
OUT 1 Current alarm lower threshold (output types): Bit 0: I: Total current Bit 1: In: Neutral conductor current Bit 2: U: Line voltages (1-2/2-3/3-1) Bit 3: V: Line voltage against N (1/2/3) Bit 4: $\Sigma P+$: Total positive real power Bit 5: $\Sigma Q+$: Total positive reactive power Bit 6: ΣS : Total apparent power Bit 7: F: Frequency Bit 8: ΣPFL : Total inductive power factor Bit 9: HOUr: operating hours counter Bit 10: THD I: Total harmonic distortion of current Bit 11: THD IN: Total harmonic distortion of neutral conductor current Bit 12: THD U: Total harmonic distortion of line voltage (1-2/2-3/3-1) Bit 13: THD V: Total harmonic distortion of line voltage against N (1/2/3) Bit 14: $\Sigma P-$: Total negative real power Bit 15: $\Sigma Q-$: Total negative reactive power Bit 16: ΣPFC : Total capacitive power factor Bit 17...31: <i>not available</i>	4	R	
OUT 1 threshold exceeded (output types): Bit 0: I: Total current Bit 1: In: Neutral conductor current Bit 2: U: Line voltages (1-2/2-3/3-1) Bit 3: V: Line voltage against N (1/2/3) Bit 4: $\Sigma P+$: Total positive real power Bit 5: $\Sigma Q+$: Total positive reactive power Bit 6: ΣS : Total apparent power Bit 7: F: Frequency Bit 8: ΣPFL : Total inductive power factor Bit 9: HOUr: Operating hours counter Bit 10: THD I: Total harmonic distortion of current Bit 11: THD IN: Total harmonic distortion of neutral conductor current Bit 12: THD U: Total harmonic distortion of line voltage (1-2/2-3/3-1) Bit 13: THD V: Total harmonic distortion of line voltage against N (1/2/3) Bit 14: $\Sigma P-$: Total negative real power Bit 15: $\Sigma Q-$: Total negative reactive power Bit 16: ΣPFC : Total capacitive power factor Bit 17...31: <i>not available</i>	4	R	
Length: 17 bytes			

13 Technical data

Input data

Measuring principle	True r.m.s. value measurement (TRMS) up to 63 Harmonic
Measured value	AC sine (45 Hz ... 65 Hz)

Voltage measurement V1, V2, V3

Input voltage range	Phase/phase Phase/neutral conductor	18 700 V AC 11 404 V AC
Accuracy		0.2%

Current measurement I1, I2, I3

Input current (via external transformers)	Primary Secondary	≤ 9999 A 1 A or 5 A
Overload capacity		10 A (continuous)
Operate threshold of the nominal measuring range value		10 mA
Accuracy		0.2%

Power measurement

Measuring range	0 ... 8000 MW/Mvar/MVA
Accuracy	0.5%
Real energy (IEC 62053-22)	Class 0.5S
Reactive energy (IEC 62053-23)	Class 2

Output data

Optional for special function/communication module

Supply

Supply voltage range	110 ... 400 V AC ±10% 120 ... 350 V DC ±20%
Nominal power consumption	< 10 VA (without extension modules) < 20 VA (with extension modules)

Display

Type	Backlit LCD
Refresh	1 s

General data

Dimensions W/H/D	96 x 96 x 82 mm	
Installation depth without extension module	60 mm	
Installation depth with extension module	80 mm	
Degree of protection	Front Back	IP52 IP30
Weight	400 g	

Electrical isolation

Rated insulation voltage	< 300 V AC (L/N) surge voltage category III ≥ 300 V AC ... 600 V AC surge voltage category II
Measuring instrument input/measuring instrument power supply (measuring instrument IN/measuring instrument POW)	Safe isolation (EN 61010-1)
Measuring instrument input/extension module (measuring instrument IN/extension module)	See extension module
Measuring instrument power supply/extension module (measuring instrument POW/extension module)	See extension module
Test voltage	3.5 kV AC (50 Hz, 1 min.) safe isolation
Pollution degree	2

Connection data

Conductor cross section (current)	0.5 mm ² ... 6 mm ²
Conductor cross section (voltage and other)	0.5 mm ² ... 2.5 mm ²
Connection method	Screw connection
Tightening torque	0.4 Nm

Ambient conditions

Ambient temperature (operation)	-10°C ... 55°C (14°F ... 131°F)
Ambient temperature (storage/transport)	-20°C ... +85°C (-4°F ... 185°F)
Permissible humidity (operation)	≤ 95%

Conformance/approvals

Conformance	CE-compliant
Conformance with EMC Directive 2004/108/EC	
Immunity to electrostatic discharge according to	IEC 61000-4-2
Immunity to high-frequency electromagnetic fields according to	IEC 61000-4-3
Immunity to electrical fast transients/burst according to	IEC 61000-4-4
Immunity to surge voltages according to	IEC 61000-4-5
Immunity to power frequency magnetic fields according to	IEC 61000-4-8
Immunity to voltage dips, short-term interruptions and voltage fluctuations	IEC 61000-4-11
Wired and radiated noise emission according to	EN 55011 Class B

Conformance with low-voltage directive 2006/95/EC

Electrical safety for electrical equipment for measurement, control, regulation, and laboratory use	EN 61010-1
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A Specifications according to IEC 61557-12

Table A-1 PMD features

Feature type	Examples of possible characteristics	Additional features
Features for evaluating power quality (if function is available)	-	-
PMD classification	SD	-
Temperature	K55	-
Humidity + height	-	-
Real power or real energy accuracy class (if function is available)	0.5	-

Table A-2 Functional features

Function	Symbols	Measuring range	Function-related accuracy class in accordance with IEC 61557-12	Additional features
Total real power	P_a	-	0.5	$-90^\circ \dots +90^\circ$
Total reactive power (arithmetic or vectorial)	Q_A, Q_V	-	1	-
Total apparent power (arithmetic or vectorial)	S_A, S_V	-	1	-
Total real energy	E_a	0 ... 99999999 kW/h	0.5	0.02 ... 1.2 In with PF = 0.5 L or 0.8 C
Total reactive energy (arithmetic or vectorial)	E_{rA}, E_{rV}	0 ... 99999999 kVar/h	1	0.1 ... 1.2 In with SinPhi = 0.5 L or 0.5 C
Total apparent energy (arithmetic or vectorial)	E_{apA}, E_{apV}	0 ... 99999999 kW/h	0.5	-
Frequency	f	45 .. 65 Hz	0.02	-
Phase current	I	0.1 ... 1.2 A for 1 A current transformer 0.5 ... 6 A for 5 A current transformer	0.2	10 ... 110% of In (In = 1 or 5 A depending on current transformer)
Neutral conductor current	I_N, I_{Nc}	0.1 ... 1.2 A for 1 A current transformer 0.5 ... 6 A for 5 A current transformer	0.2	10 ... 110% of In (In = 1 or 5 A depending on current transformer)
Voltage	U	50 ... 600 V phase/phase	0.2	-
Power factor (arithmetic or vectorial)	PF_A, PF_V	-	0.5	for PF 0.5 ... 1
Flicker (short-term, long-term)	P_{st}, P_{lt}	-	-	-
Voltage dips	U_{dip}	50 ... 600 V phase/phase	0.2 or 0.5	-
Excessive voltage	U_{swl}	50 ... 600 V phase/phase	0.2 or 0.5	-
Voltage interrupts	U_{tr}	-	-	-
	U_{int}	50 ... 600 V phase/phase	0.5	-
Voltage asymmetry in terms of amplitude	U_{nba}	-	-	-
Voltage asymmetry in terms of phase and amplitude	U_{nb}	-	-	-
Voltage harmonics	U_h	50 ... 600 V phase/phase	1	-
Voltage THD (based on ground)	THD_u	50 ... 600 V phase/phase	1	-

Table A-2 Functional features (...)


Function	Symbols	Measuring range	Function-related accuracy class in accordance with IEC 61557-12	Additional features
Voltage THD (based on harmonic)	THD-R _U	-	-	-
Current harmonic	I _h	0.1 ... 1.2 A for 1 A current transformer 0.5 ... 6 A for 5 A current transformer	1	-
Current THD (based on ground)	THD _i	0.1 ... 1.2 A for 1 A current transformer 0.5 ... 6 A for 5 A current transformer	1	-
Current THD (based on harmonic)	THD-R _i	-	-	-
Mains signal voltage	M _{sv}	-	-	-

Table A-3 Functional features for evaluating mains quality

Function	Symbols	Measuring range	Function-related accuracy class in accordance with IEC 61557-12	Additional features
Frequency	f	45 ... 65 Hz	0.02	-
Phase current	I	0.1 ... 1.2 A for 1 A current transformer 0.5 ... 6 A for 5 A current transformer	0.2	-
Neutral conductor current	I _n , I _{nc}	0.1 ... 1.2 A for 1 A current transformer 0.5 ... 6 A for 5 A current transformer	0.5	-
Voltage	U	50 ... 600 V phase/phase	0.2	-
Flicker (short-term, long-term)	P _{st} , P _{lt}	-	-	-
Voltage dips	U _{dip}	50 ... 600 V phase/phase	0.2 or 0.5	-
Excessive voltage	U _{swl}	50 ... 600 V phase/phase	0.2 or 0.5	-
Voltage interrupts	U _{int}	50 ... 600 V phase/phase	0.5	-
Voltage asymmetry in terms of amplitude	U _{nba}	-	-	-
Voltage asymmetry in terms of phase and amplitude	U _{nb}	-	-	-
Voltage harmonics	U _h	50 ... 600 V phase/phase	1	-
Current harmonic	I _h	0.1 ... 1.2 A for 1 A current transformer 0.5 ... 6 A for 5 A current transformer	1	-
Mains signal voltage	M _{sv}	-	-	-

B Abbreviations

1BL	Single-phase network, 2-wire with 1 current transformer
2BL	Two-phase network, 2-wire with 1 current transformer
3BL	Three-phase network with symmetrical load, 3-wire with 1 current transformer
3NBL	Three-phase network with asymmetrical load, 3-wire with 2 or 3 current transformers
4BL	Three-phase network with symmetrical load, 4-wire with 1 current transformer
4NBL	Three-phase network with asymmetrical load, 4-wire with 3 current transformers
AUX	Supply voltage
AVG	Average values
bACLIt	Backlighting
Ct	Current transformer
Ct In	Current transformer for neutral conductor
EA-	Negative real energy (-kWh)
EA+	Positive real energy (+kWh)
ER-	Negative reactive energy (-kvarh)
ER+	Positive reactive energy (+kvarh)
ES	Apparent energy (-kVAh)
HOUr	Hour counter
ISYS	Average current value $(I_1+I_2+I_3)/3$
MAX	Maximum values
MAX P-	Maximum value of negative real power within the measuring time
MAX P+	Maximum value of positive real power within the measuring time
MAX Q-	Maximum value of negative reactive power within the measuring time
MAX Q+	Maximum value of positive reactive power within the measuring time
MAX S	Maximum value of the apparent power within the measuring time
nEt	Network type
PF	Power factor

rSET	Reset
SErI	Serial number
SOft	Software version
THD I	Total harmonic distortion of currents
THD In	Total harmonic distortion of neutral conductor current
THD U	Total harmonic distortion of conductor voltages (1-2/2-3/3-1)
THD V	Total harmonic distortion of conductor voltages against N (1/2/3)
tIME 4I	Measuring time to determine the average and maximum current values
tIME F	Measuring time to determine the average and maximum frequency values
tIME P/Q/S	Measuring time to determine the average and maximum power values
tIME U	Measuring time to determine the average and maximum voltage values
TRMS	True r.m.s. value measurement (True Root Mean Square)
Ut	Voltage transducer
Ut PR	Voltage transducer primary side
Ut SE	Voltage transducer secondary side
USYS	Average value of the phase/phase conductor voltages $(U_{12} + U_{23} + U_{31})/3$
VSYS	Average value of the phase/N conductor voltages $(V_1 + V_2 + V_3)/3$
	Hour counter