

Energy Meter 610-24
Energy Meter 610-230
Installation manual
Supplement to the operation manual

• Installation
• Technical data

h1p://wmmr.eu/254092

h1p://wmmr.eu/254085

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General

Disclaimer

The observation of the information products for the devices is a prerequisite for safe operation and to achieve the stipulated performance characteristics and the associated characteristics. Weidmüller Interface GmbH & Co. KG accepts no liability for injuries to personnel, property damage or financial losses arising due to a failure to comply with the information products. Ensure that your information products are accessible and legible.

Further documentation is available on our website at www.weidmuller.de.

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Subject to technical amendments

- Make sure that your device agrees with the installation manual.
- Read and understand first product-related documents.

Safety

Safety information

The installation manual is not a complete directory of all safety measures required to operate the device.

Special operating conditions may require further measures. The installation manual contains instructions that must be observed to ensure your personal safety and to prevent damage to property.

Symbols used:

- This symbol is an addition to the safety instructions and indicates an electrical hazard.
- This symbol is an addition to the safety instructions and indicates a potential hazard.
- This symbol with the word NOTE! describes:
 - Procedures that do not pose any risks of injuries.
 - Important information, procedures or handling steps.

Safety information is highlighted by a warning triangle and is indicated as follows depending on the degree of danger:

- Indicates an imminent danger that causes severe or fatal injuries.
- Indicates a potentially hazardous situation that can cause severe injuries or death.
- Indicates a potentially hazardous situation that can cause minor injuries or damage to property.

Safety measures

When operating electrical devices, certain parts of these devices are invariably subjected to hazardous voltage. Therefore, severe bodily injuries or damage to property can occur if they are not handled properly:

- Before connecting connections, ground the device at the protective conductor connection if present.
- Hazardous voltages may be present in all switching parts that are connected to the power supply.

Hazardous voltages may also be present in the device even after disconnecting the supply voltage (capacitor storage).

Do not operate equipment with current transformers while open.

Do not exceed the threshold values specified in the operation manual and on the rating plate. Also adhere to this when inspecting and commissioning.

Observe the safety and warning instructions in the documents that belong to the device!

Qualified staff

The device must only be installed, put into operation and maintained by qualified electricians who are familiar with national and international laws, provisions and standards.

Proper use

The device is intended for installation in switch cabinets and small installation distributors. It can be installed in any mounting position (please observe step 3 "Assembly").

All signals connected with the device's SELV circuit must also conform with the SELV provisions.

not intended for installation in vehicles!

The use of the device in mobile equipment is considered to be non-standard environmental conditions and is therefore only permitted after separate agreement.

not intended for installation in environments with hazardous oils, acids, gases, vapours, dusts, radiation, etc.

They should be installed in an appropriate enclosure (such as an electrical cabinet or distributor box) which provides a sufficient level of protection so that live current-carrying components cannot be touched and so that dust and water cannot penetrate the unit.

The safety of the device must not be impaired by its installation.

The prerequisites of faultless, safe operation of this device are proper transport and proper storage, set-up, installation, operation and maintenance.

Brief description of device

The device is a multi-functional network analyser, which:

- Measure and calculate electrical variables such as voltage, current, frequency, power, energy, harmonics (up to the 40th harmonic), etc. in building installations, on distribution units, circuit breakers and busbar trunking systems.
- Display and save measurement results and transmit them via interfaces.

Assembly

Install the device in the weatherproof front panel of switch cabinets.

Ensure!

- Install the device vertically!
- Adhere to clearances from neighbouring components!

Fig. Installation situation, rear view

Damage to property due to disregard of the installation instructions

Failing to observe the installation instructions can damage or destroy your device.

Ensure that there is adequate air circulation in your installation environment; if the ambient temperatures are high, ensure there is adequate cooling if required.

NOTE!

For further information on device functions, data and assembly, see the operation manual.

Connecting the supply voltage

The supply voltage level for your device is specified on the rating plate.

After connecting the supply voltage, an indication is shown on the display. If no indication appears, check whether the supply voltage is within the rated voltage range.

Risk of injury due to electric voltage!

WARNING!

Serious bodily injury or death can result from:

- Contact with bare or stripped live wires.
- Device inputs that are dangerous to touch.

De-energise your device before starting work! Check that it is de-energised.

Damage to property due to damage of the connection conditions or impermissible voltage swells

CAUTION!

Your device can be damaged or destroyed by a failure to comply with the connection conditions or by exceeding the permissible voltage range.

Before connecting the device to the supply voltage, please check:

- Voltage and frequency correspond to the details on the ratings plate! Threshold values stipulated in the operation manual have been complied with!
- In building installations, the supply voltage must be protected with a UL/IEC approved circuit breaker / a fuse!
- The circuit breaker
 - must be easily accessible for the user and be installed close to the device.
 - must be labelled for the relevant device.
- Do not connect the supply voltage to the voltage transformers.
- Provide a fuse for the neutral conductor if the source's neutral conductor connection is not earthed.

Mains systems

Suitable network systems and maximum rated voltages (DIN EN 61010-1/A1):

Three-phase, four-conductor systems with earthed neutral conductor (TN networks)

Three-phase, three-conductor systems with earthed neutral conductor (TN networks)

Three-phase, three-conductor systems with earthed neutral conductor (TN networks)

Three-phase, three-conductor systems with earthed neutral conductor (TN networks)

Single-phase, two-conductor systems with earthed neutral conductor

Separated single-phase, three-conductor system with earthed neutral conductor

The devices can be used in:

- 2, 3 and 4 conductor networks (TN, TT and IT networks)
- In residential and industrial applications.

Voltage measurement

The device has 3 voltage measurement inputs and is suitable for different connection variants.

Danger of injury or damage to the device

CAUTION!

Disregard of the connection conditions for the voltage measurement inputs can result in injuries or to the device being damaged.

For this reason, note that:

- The voltage measurement inputs are connected to DC voltage.
- are equipped with a suitable, labelled fuse and isolation device located in the vicinity (alternative: circuit breaker) located nearby.
- are dangerous to touch.
- Voltages that exceed the allowed network rated voltages must be connected via a voltage transformer.
- Measured voltages and measured currents must derive from the same network!

NOTE!

As an alternative to the fuse and circuit breaker, you can use a line safety switch.

Connection variants for voltage measurement

3p 4w (Addr. 509 = 0, standard setting)

3p 4wu (Addr. 509 = 1)

3p 4u (Addr. 509 = 2)

3p 2u (Addr. 509 = 5)

1p 2w1 (Addr. 509 = 4)

2p 4w (Addr. 509 = 3)

1p 2w (Addr. 509 = 6)

3p 1w (Addr. 509 = 7)

Current measurement I1, I2, I3

The device is only approved for current measurements with a current transformer.

is intended for the connection of current transformers with secondary currents of „I1 A and „I5 A.

has the current transformer ratio set to 5/5 A as standard.

Danger of injury due to electrical voltage!

WARNING!

Serious bodily injury or death can result from:

- Contact with bare or stripped live wires.
- Current measurement inputs on the device and on the current transformer that are dangerous to touch.

Render the system free of voltage before starting work! Check the system is free of electrical energy!

Earth your system! Use the earth connection points with earthing symbols for this! Earth the secondary windings of current transformers and all of the metal parts of the transformer that could be touched!

NOTE!

If the measurement range is exceeded, the measurement device display shows "EEF". Further information on this can be found in the operation manual.

Risk of injury due to large currents and high electrical energy!

WARNING!

Current transformers that are operated open in the secondary side (high voltage peaks) can cause severe bodily injuries or death.

Avoid operating current transformers when open, short circuit transformers that are unloaded!

Connection variants for current measurement I1, I2, I3

3p 2i (Addr. 510 = 1)

3p 2i2 (Addr. 510 = 2)

3p 3w3 (Addr. 510 = 3)

3p 3w (Addr. 510 = 4)

2p 4w (Addr. 510 = 5)

1p 2i (Addr. 510 = 6)

1p 2w (Addr. 510 = 7)

3p 1w (Addr. 510 = 8)

Current measurement I4

Connection variant for current measurement (I4) via current transformer

Current values but not power values can be calculated for current measurement input I4.

NOTE!

The measurement input I4 does not require address setting on the device.

NOTE!

Further information on current data and current transformer data can be found in the operation manual.

Establish connection to PC

The 3 most common connections for communication between PC and device are described in the following:

- USB (Typ A)
- RS232
- Ethernet

PC and device require a fixed IP address.

Connection of the device via an Energy Analyser D550 as gateway.

More details on device configuration and communication can be found from section 13.

Fig. Rear of the device

Recommendation for the Ethernet connection: Use at least a CAT5 cable!

Property damage due to incorrect network settings

CAUTION!

Incorrect network settings can cause faults in the IT network!

Find out the correct Ethernet network settings for your device from your network administrator.

Controls and button functions

The device is operated with buttons 1 and 2, whereby the following distinctions are made:

- Short press (button 1 or 2): Next step (+1).
- Longer press (button 1 or 2): Previous step (-1).

The device differentiates between display and programming mode.

Display mode

- Buttons 1 and 2 can be used to scroll between the measured value indications.
- The measured value indication shows up to 3 measured values.
- A time for the automatic display change between the measured value indications can be configured in the „acExplorer go“ software.

Programming mode

- Hold buttons 1 and 2 depressed simultaneously for 1 second to change between display mode and programming mode. The text PRG appears in the display.
- Configure the necessary settings for the operation of the device in programming mode.

Fig. Device display

Max. value, HT/Consumption

Min. value NT/Delivery

Mean value

Programming

Summation

Measurement

Phase conductor

Phase conductor

CT: Current transformer

K1: Output 1

V1: Voltage transformer

K2: Output 2

Button 2

Button 1

Delivery

The programming mode can be protected with a user password.

Button 2 switches between the programming menu:

- Current transformer
- Voltage transformer
- Parameter list

In order to switch from programming mode to display mode:

- press buttons 1 and 2 simultaneously for 1 second.
- do not press any buttons for 60 seconds (automatic).

NOTE!

Changes are only applied after exiting the programming mode.

NOTE!

- The following section contains an explanation of the most important programming menus: current transformer, voltage transformer and parameter list.
- More detailed information on the operation, display and button functions for your device can be found in the operation manual.

Programming current transformers

- Switch to programming mode.
- The symbols for the programming mode PRG and current transformer CT appear.
- Press button 1 - the first digit of the input field for the primary current flashes.
- Use button 2 to select the value of the 1st digit.
- Use button 1 to change to the 2nd digit.
- Use button 2 to select the value of the 2nd digit.
- Use button 1 to change to the 3rd digit.
- Use button 2 to select the value of the 3rd digit.
- Confirm with button 1.
- The complete number flashes.
- Use button 2 to select the decimal place and thus the unit of the primary current.
- Confirm with button 1.
- The input range of the secondary current flashes.
- Set the secondary current (value 1 A or 5 A) with button 2.
- Confirm with button 1.
- Exit programming mode by simultaneously pressing buttons 1 and 2 (1 sec.). Use button 2 to change to the input field for the voltage transformer.

Fig. "Current transformer" input area

NOTE!

- Changes are only applied after exiting programming mode.
- For further information on current transformers and current transformer ratios, see the operation manual.

Programming the voltage transformer

- Switch to programming mode.
- The symbols for programming mode PRG, and for the current transformer CT appear.
- Press button 2 twice to change to the programming mode for the parameter list.
- The symbols for Programming mode PRG, and for the voltage transformer VT appear.
- Press button 1 - the first digit of the input field for the primary voltage flashes.
- Use button 2 to select the value of the 1st digit.
- Use button 1 to change to the 2nd digit.
- Use button 2 to select the value of the 2nd digit.
- Use button 1 to change to the 3rd digit.
- Use button 2 to select the value of the 3rd digit.
- Confirm with button 1.
- The complete number flashes.
- Use button 2 to select the decimal place and thus the unit of the primary voltage.
- Confirm with button 1.
- The input range of the secondary voltage flashes.
- Set the secondary voltage with button 2.

Fig. "Voltage transformer" input area

NOTE!

- Changes are only applied after exiting programming mode.
- For further information on voltage transformers and voltage transformer ratios, see the operation manual.

Programming parameters

- Switch to programming mode.
- The symbols for programming mode PRG, and for the current transformer CT appear.
- Press button 2 twice to change to the programming mode for the parameter list.
- The input area of the parameter list appears.
- Confirm with button 1 - the first digit of the parameter address flashes.

NOTE!

- A detailed parameter list with setting areas and pre-settings can be found in the operation manual or the Modbus address list on our website.
- The parameter addresses of the device address (000) and the Baud rate (001) are explained in the following.

Use button 2 to select the value of the 1st digit.

Continue the process for the next digits of the parameter address and for the parameter settings.

Exit programming mode by simultaneously pressing button 1 and 2 (1 second). Use button 2 to change back to the input field for the current transformer.

Parameter address

Programming mode

Parameter setting

Fig. "Parameter list" input area

Set the device address (parameter address 000)

In a Master-Slave network via the RS485 interface it is possible to distinguish between a master device and other devices with the device address.

In the case of devices within this network, for the parameter address 000 please note:

- you must assign different device addresses.
- the parameter setting of the parameter address 000 must be within the range of 1 to 247 (0 and 248 to 255 are reserved).

Set the Baud rate (parameter address 001)

In a Master-Slave network via the RS485 interface, for each device:

- select a uniform Baud rate (parameter address 001) (for settings see the operation manual).
- select the number of stop bits (parameter address 003) (0=1 Bit, 1=2 Bits). Data bits (8) and parity (none) are preset.

Technical data

General information

Net weight (with attached connectors) approx. 358 g

Packaging weight (including accessories) approx. 790 g

Battery

Li-ion battery GR0302, 3 V (approval L a.u. UL 1642)

Service life

4000 h (after this period of time the lighting efficiency will reduce by approx. 50%)

Service life of background lighting

2

Transport and storage

The following information applies to devices which are transported or stored in the original packaging.

Free fall

1 m

Temperature

K55 (-20° C to +70° C)

Relative humidity

0 to 90% RH

Ambient conditions during operation

The device is intended for weather-protected, stationary use. Protection class II (a.u. IEC 60336 VDE 0106, Part 1).

Operating temperature range

K55 (-10° C to +55° C)

Relative humidity

0 to 75% RH

Operating altitude

0 to 2000 m above sea level

Degree of pollution

2

Mounting position

vertical

Ventilation

Forced ventilation is not required.

Protection against ingress of solid foreign bodies and water

IP40 (a.u. EN60529)

IP40 (a.u. EN60529)

IP54 (a.u. EN60529)

Supply voltage

Normal range

Option 230 V: AC 90 V - 277 V (50/60 Hz) or DC 90 V - 270 V, 300 V CAT III

Option 24 V: AC 24 V - 90 V (50/60 Hz) or DC 24 V - 80 V, 160 V CAT III

Operating range

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Power consumption

Type T1A / 250 VDC / 277 VAC

Internal fuse, not replaceable

Recommended over-current protection device for the line protection

Option 230 V: 6 A (IEC/UL approval)

Option 24 V: 1.6 A (IEC/UL approval)

Voltage measurement

3-phase, 4-conductor systems with rated voltages up to

277 V/480 V (+/-10%)

3-phase, 3-conductor systems, unearthed, with rated voltage up to

IT 480 V (+/-10%)

Overvoltage category

300 V CAT III

Measurement voltage surge

4 kV

Protection of voltage measurement

1...10 A (WV IEC / UL approval)

Measurement range L-N

0 to 300 Vrms (max. overvoltage 520 Vrms)

Voltage measurement

Measurement range L-L

0 to 520 Vrms (max. overvoltage 900 Vrms)

Resolution

0.01 V

Crest factor

2.45 related to the measurement range

Impedance

4 MΩ/cm / phase

Power consumption

approx. 0.1 VA

Sampling rate

21.33 kHz (50 Hz), 25.6 kHz (60 Hz) for each measurement channel

Frequency range of the fundamental component

45 Hz to 65 Hz

0.01 Hz

Digital outputs

6 digital outputs, semiconductor relays, not short-circuit proof.

Conductors to be connected.

Switching voltage

max. 33 V AC, 60 V DC

Switching current

max. 50 mA/ft AC/DC

Response time

10/12 periods + 10 ms

Pulse output (tenary pulse)

max. 50 Hz

* Response time e.g. at 50 Hz: 200 ms + 10 ms = 210 ms

Digital inputs

4 optional digital inputs, semiconductor relays, not short-circuit proof.

Maximum counter frequency

20 Hz

Input signal present

18 V - 28 V DC (typical 4 mA)

Input signal not present

0 - 5 V DC, current less than 0.5 mA

Cable length (digital inputs and outputs)

Up to 30 m

Unshielded

More than 30 m

Shielded

Serial interface

RS485 - Modbus RTU/Slave

9.6 kbps, 19.2 kbps, 38.4 kbps, 57.6 kbps, 115.2 kbps

Stripping length

7 mm

USB (receiptable)

USB 2.0, type B, max. transfer rate 921.6 kbps

Current measurement I1 - I4

Measurement range

0 to 6 Arms

Crest factor

1.88

Resolution

0.01 mA (display 0.01 A)

Overvoltage category

300 V CAT III

Measurement voltage surge

2 kV

Power consumption

approx. 0.2 VA (B) + 5 mΩ/cm

Overload for 1 sec.

120 A (arousal)

Sampling rate

21.33 kHz (50 Hz), 25.6 kHz (60 Hz) for each measurement channel

Terminal connection capacity (power supply voltage)

Conductors to be connected.

Only one conductor can be connected per terminal!

Single core, multi-core, fine-stranded

0.2 - 1.5 mm², AWG 28-16

Terminal pins, core and sheath

0.2 - 1.5 mm²

Tightening torque

0.2 - 0.25 Nm

Stripping length

7 mm

Terminal connection capacity (voltage measurement)

Conductors to be connected.

Only one conductor can be connected per terminal!

Single core, multi-core, fine-stranded

0.08 - 4.0 mm², AWG 28-12

Terminal pins, core and sheath

0.2 - 2.5 mm²

Tightening torque

0.4 - 0.5 Nm

Stripping length

7 mm

Terminal connection capacity (current measurement)

Conductors to be connected.

Only one conductor can be connected per terminal!

Single core, multi-core, fine-stranded

0.2 - 2.5 mm², AWG 28-12

Terminal pins, core and sheath

0.2 - 2.5 mm²

Tightening torque

0.4 - 0.5 Nm

Stripping length

7 mm

NOTE!

Further technical data can be found in the operation manual for the device.

Procedure in the event of faults

Possible fault

Cause

Remedy

No display

External fusing for the power supply voltage has tripped.

Replace fuse.

No current display

Measurement voltage is not connected.

Connect the measuring-circuit voltage.

Measurement current is not connected.

Connect measuring-circuit current.

Current measurement in the wrong phase.

Check connection and correct if necessary.

Current transformer factor is incorrectly programmed.

Read out and program the current transformer transformation ratio at the current transformer.

The current peak value at the measurement input is too large or too small.

Install current transformer with a larger transformation ratio.

The current at the measurement input fell short of.

Install current transformer with a suitable transformation ratio.

Measurement in the wrong phase.

Check connection and correct if necessary.

Voltage transformer incorrectly programmed.

Read out and program the voltage transformer transformation ratio at the voltage transformer.

Overvoltage.

Install voltage transformers.

Rated current voltage value at the measurement input has been exceeded by harmonic components.

Caution! Ensure the measurement inputs are not overloaded.

"EEF" in the display

See „error messages" in the operation manual.

"EEE BAT" in the display

Battery capacity is too low

Replace battery (see "Replacing the battery" in the operation manual).

Device still does not work despite all the above measures.

Device defective.

Send the device to the manufacturer for inspection and testing along with an accurate fault description.