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Weidmüller

1 Allgemeines

Energy Meter D650 Schnelleinstieg

- Ergänzung zur Betriebsanleitung
- Installation
- Kommunikations-Einstellungen
- Software „ecoExplorer go“-Einstellungen (siehe Link und QR-Code)



2 Sicherheit

Sicherheitshinweise

Dieser „Schnelleinstieg“ ersetzt nicht die Betriebsanleitung. Bitte lesen und verstehen Sie zunächst die produktbegleitende Betriebsanleitung.

Haltungsverschluss

Die Einhaltung der Informationsprodukte zu den Geräten ist Voraussetzung für den sicheren Betrieb und um angegebene Leistungsmarken und Produktigenschaften zu erreichen. Für Personen-, Sach- oder Verantwortungsdenkmale, die durch die Informationsprodukte entstehen, übernimmt die Weidmüller Interface GmbH & Co. KG keine Haftung. Sorgen Sie dafür, dass Ihre Informationsprodukte leserlich zugänglich sind.

Weiterleitende Dokumentationen

Die Einhaltung der nationalen Bestimmungen! Entsprechen Sie gegebenenfalls einzelne Teile, je nach Beschaffungs- und existierenden länderspezifischen Vorschriften, z.B. als:

Entsorgung

Relevante Gesetze,

Umwelthinweise

Maßnahmen zur Sicherheit

Wichtiges

Verwendung

Qualifiziertes Personal

Bestimmungsgemäße Verwendung

Montage

Versorgungsspannung anlegen

Sachschaden durch Nicht-

beachtung der Anschlussbedingungen oder unzulässige Überspannungen

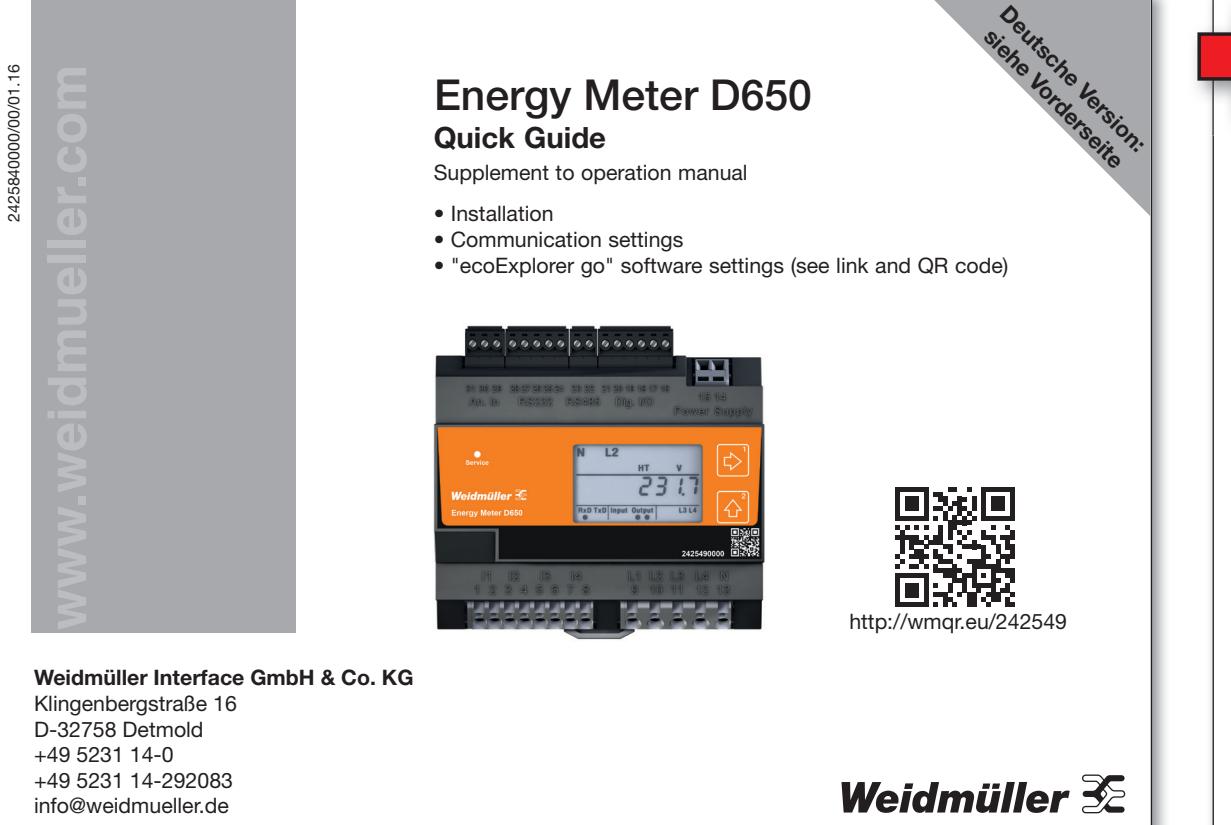
Durchschlagspannung der Anschlüsse

Überspannung der Anschlüsse auf dem Display

Überlastung des Typschutzes

Gefahrensituationen

Spannung und Frequenz müssen den Anforderungen entsprechen!



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1 General information

This "Quick guide" does not replace the operation manual. Please read and understand the operation manual enclosed with the product first.

2 Safety

Safety information

The "Quick guide" is not a complete directory of safety measured required to operate the device. Special operating conditions may require further measures. The "Quick guide" contains instructions that must be observed to ensure your personal safety and to prevent damage to property.

Disclaimer

Observe the national regulations! If necessary, dispose of individual parts according to their properties and existing country-specific regulations, e.g.:

- Electronic waste
- Plastics
- Metals
- or commission a certified disposal company with scrapping.

Further documentation

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

Copyright notice

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3 Device short description

Proper use

The device is:

- intended to be installed in switching cabinets or in small installation distributors in accordance with DIN EN 438-16
- not intended to be installed in vehicles! Using the device in non-stationary equipment is considered extraordinary environmental condition and is only permitted with a special agreement.
- not intended to be installed in environments with harmful oils, acids, gases, vapours, dusts, radiation, etc.

Qualified staff

In order to prevent personal injuries and damage to property, only qualified staff with electrical training may work on the device, with knowledge of:

- the national accident prevention regulations
- the safety engineering standards
- installing, commissioning and operating the device.

Safety measures

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

- Before connecting connections, earth the device at the ground wire 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).

Relevant laws, standards and directives

For information on the laws, standards and directives that Weidmüller Interface GmbH & Co. KG applied for the device, see the declaration of conformity.

Safety information

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

4 Connecting the supply voltage

Danger to property due to not observing the connection conditions or overvoltage

Failure to observe the connection conditions or exceeding the permissible voltage range can damage or destroy your device.

Before connecting the device to the supply voltage, note the following:

- The voltage on the frequency must meet the specification on the rating plate!
- Adhere to the threshold values as described in the operation manual!
- When installing in a switchgear, the supply voltage with a UL-listed line safety switch/fuse (6 A, char. B)!
- The circuit breaker
- must be easily accessible for the user and must be close to the device.
- must be labeled for the relevant device.
- Do not connect the supply voltage to the voltage transformer.
- Provide a fuse for the neutral conductor if the source's neutral conductor connection is not earthed.

Fig. Connecting supply voltage

5 Network systems

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

Three-phase four-conductor systems with earthed neutral conductor: L1, L2, L3, N, PE, 277 VLN / 480 VLL, 277 VLN / 480 VLL, 480 VLL, 240 VLL.

Three-phase three-conductor systems without earthed neutral conductor: L1, L2, L3, 277 VLN / 480 VLL, 277 VLN / 480 VLL, 480 VLL.

Two-phase two-conductor systems not earthed: L1, L2, E, 230 VLL.

Separated single-phase systems with earthed neutral conductor: L1, L2, N, PE, 230 VLN, 240 VLN / 480 VLL.

Risk of injuries or damage to the device

Hazardous voltages can be present on the connection points for the voltage measurement inputs that can cause injuries to persons or damage to the device. Therefore, note the following:

- The voltage measurement inputs must not be connected with a suitable, labelled fuse that is positioned close by and a circuit breaker (alternatively: a line safety switch).
- Voltages that exceed the permissible network rated voltages must be connected via a voltage transformer.
- Measured voltages and currents must derive from the same network.

Note!

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

6 Voltage measurement

The device only determines measured values if measured voltage of $>10\text{ V}$ is present on at least one voltage measurement input.

Voltage measurement in three-phase four-conductor system*, without voltage transformer (addr: 111 = 0, default setting)

Risk of injury or damage to the device

Hazardous voltages can be present on the connection points for the voltage measurement inputs that can cause injuries to persons or damage to the device. Therefore, note the following:

- The voltage measurement inputs must not be connected with a suitable, labelled fuse that is positioned close by and a circuit breaker (alternatively: a line safety switch).
- Voltages that exceed the permissible network rated voltages must be connected via a voltage transformer.
- Measured voltages and currents must derive from the same network.

Note!

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

7 Voltage measurement connection variants

Voltage measurement L1, L2, L3 (baseline setting)

Three-phase four-conductor system: Add: 111 = 0, default setting (see step 16)

Single-phase three-conductor system: Add: 111 = 0, default setting (see step 16)

Three-phase four-conductor system with voltage transformer: Add: 111 = 1 (see step 14)

Three-phase three-conductor system with voltage transformer: Add: 111 = 1 (see step 14)

RECOMMENDATION

Connect the protective earth (PE) to the primary side of the voltage transformer V4 (L4) for a PEN measurement. Do not use a green and yellow wire for this as the phase does not have a protective function (see fig. "Connection variant in three-phase four-conductor system" in step 6).

Voltage measurement NPE

Voltage measurement connection variants L4 (supporting measurement)

Three-phase four-conductor system: Add: 111 = 0, default setting (see step 16)

Single-phase three-conductor system: Add: 111 = 0, default setting (see step 16)

Three-phase four-conductor system with voltage transformer: Add: 111 = 1 (see step 14)

Three-phase three-conductor system with voltage transformer: Add: 111 = 1 (see step 14)

NOTE!

For further information on supporting measurement, see the operation manual.

8 Voltage measurement connection variants L4 (supporting measurement)

Three-phase four-conductor system: Add: 111 = 0, default setting (see step 16)

Single-phase three-conductor system: Add: 111 = 0, default setting (see step 16)

Three-phase four-conductor system with voltage transformer: Add: 111 = 1 (see step 14)

Three-phase three-conductor system with voltage transformer: Add: 111 = 1 (see step 14)

Voltage measurement NPE

9 Current measurement

The device is:

- only approved for measuring current with a current transformer.
- intended for connecting current transformers to measure secondary currents of $\lambda/1$ A and $\sqrt{3}/A$.
- has the current transformer ratio 5/5 A set as standard.

Risk of injury due to electric voltage!

Severe bodily injuries or death can occur due to:

- Touching bare or stripped wires that are live.
- Device inputs that are dangerous to touch.
- Dis-energise your device before starting work!

10 Current measurement connection variants

Current measurement I1, I2, I3

Three-phase four-conductor system: Add: 110 = 0, default setting (see step 16)

Single-phase three-conductor system: Add: 110 = 1 (see step 16)

Three-phase four-conductor system with current transformer: Add: 110 = 0, default setting (see step 16)

Single-phase three-conductor system with current transformer: Add: 110 = 1 (see step 16)

NOTE!

There is no connection variant for current measurement I4; at I4 you do not have to configure an address!

NOTE!

For further information on the current transformer and current transformer data, see the operation manual.

11 The most important technical data

Voltage measurement

Protection of the supply voltage (fuse)	6 A, char. B (approved IEC/UL/IEC)
Installation overvoltage category	300 V CAT II
Nominal range	95 V - 240 V (45 to 65 Hz)
Operating range	+10% to -20% of nominal range
Power consumption	Max. 9 VA, 7.3 W

Current measurement

Rated current	5 A
Rated current	6 A
Protection of current measurement when measuring directly (with a current transformer)	6 A, char. B (approved IEC/UL/IEC)
Resolution on the display	10 mA
Metering range	0.001 to 0.5 Amps
Current category	2 (based on 6 Amps)
Measurement voltage range	4 kV
Indication of voltage measurement	1 to 10 A
Metering range L+N	1 to 600 Vrms
Resolution	0.01 V
Cost factor	2 based on 480 Vrms
Impedance	4 MΩn / phase

Note!

For further technical data, see the device's operation manual.

12 Operation and button functions

The device is operated using buttons 1 and 2. The service button is designated for use by trained service employees only.

The device differentiates between **display mode** and **programming mode** (see step 13). Button intervals: Press the appropriate button for a short time:

- Shift forwards.
- Digitally +1.
- Press the appropriate button for a long time:
- Shift backwards.
- Digitally -1.

To switch between display mode and programming mode, press and hold both buttons simultaneously for 1 second.

The device switches from programming mode to display mode if:

- no buttons are pressed for 60 seconds.
- buttons 1 and 2 are pressed simultaneously for 1 second.

Note!

For further information on button functions and parameter settings, see the operation manual.

13 Display mode

After the power returns, the device is in display mode. In display mode, the device are carried out in **programming mode** (PRG).

Programming mode

The most important settings on the device are carried out in **programming mode** (PRG).

14 Voltage transformer ratio configuration

Voltage transformer ratios can be assigned to each of the 4 voltage transformer inputs on the device. The factory setting is 400/400 V (direct measurement). In addresses 002 and 003

- program the same voltage transformer ratios for all 4 phases.
- voltage transformer ratios that are entered overwrite addresses 012 to 043.

In addresses 012 to 043

- program voltage transformer ratios individually for each phase.

The device handles programmed values in addresses 012 to 043 with priority, whereupon it sets addresses 002 to 003 to 0.

Parameter list excerpt of "voltage transformer values"

002 L1 L2 L3 L4 (primary)
003 L1 L2 L3 L4 (secondary)
012 L1 (primary)
013 L2 (primary)
022 L2 (secondary)
023 L3 (primary)
032 L3 (secondary)
042 L4 (primary)
043 L4 (secondary)

15 Sample configuration: Voltage transformer ratios

Parameter list excerpt of "voltage transformer values"

002 L1 L2 L3 L4 (primary)
003 L1 L2 L3 L4 (secondary)
012 L1 (primary)
013 L2 (primary)
022 L2 (secondary)
023 L3 (primary)
042 L4 (primary)
043 L4 (secondary)

Display example 1:

Setting "Parameter list excerpt of voltage transformer values" table in step 14 to obtain the address for your voltage transformer measurement input and enter the current value. The factory setting is 5 A/5 A.

In addresses 000 and 001

1. Switch to programming mode - press and hold buttons 1 and 2 for 1 second.
2. Program the voltage transformer ratios.
3. Use button 2 to select the 1st position in the address.
4. Press button 1 to confirm the entry.
5. The 2nd position in the address area flashes.
6. Use button 2 to select the 2nd position in the address.
7. Press button 1 to confirm the entry.
8. The 3rd position in the address area flashes.
9. Use button 2 to select the 3rd position in the address.
10. Press button 1 to confirm the entry.
11. The position that is to be programmed in the content area flashes.
12. Use button 2 as described above to program the current value for the address area that you set.
13. Note that the unit can also be set for the primary currents.

Handle these in accordance with this programming procedure for each current transformer ratio of your current transformer

16 Current transformer ratio configuration

Current transformer ratios can be assigned to each of the 4 current transformer inputs on the device. The factory setting is 5 A/5 A.

In addresses 000 and 001

1. Switch to programming mode - press and hold buttons 1 and 2 for 1 second.
2. Program the same current transformer ratios for all 4 phases.
3. Use button 2 to select the 1st position in the address.
4. Press button 1 to confirm the entry.
5. The 2nd position in the address area flashes.
6. Use button 2 to select the 2nd position in the address.
7. Press button 1 to confirm the entry.
8. The 3rd position in the address area flashes.
9. Use button 2 to select the 3rd position in the address.
10. Press button 1 to confirm the entry.
11. The position that is to be programmed in the content area flashes.
12. Use button 2 as described above to program the voltage value for the address area that you set.
13. Note that the unit can also be set for the primary voltages.

Handle these in accordance with this programming procedure for each voltage transformer ratio of your voltage transformer

17 Sample configuration: Current transformer ratios

Parameter list excerpt of "current transformer values"

000 L1 L2 L3 L4 (primary)
001 L1 L2 L3 L4 (secondary)
010 L1 (primary)
011 L2 (primary)
020 L2 (secondary)
021 L3 (secondary)
040 L4 (primary)
041 L4 (secondary)

Display example 1:

Setting "Parameter list excerpt of current transformer values" table in step 16 to obtain the address for your current transformer measurement input and enter the current value. The factory setting is 5 A/5 A.

18 Establish the connection to the PC

The 4 most common connections for communication between the PC and the device are described below:

1. PC → RS232 → Energy Meter D650
2. PC → USB → USB → RS485 → Energy Meter D650 → Energy Meter D650 connected via interface converters.
3. PC → Ethernet → Energy Analyzer D550 → RS485 → Energy Meter D650 connected via an Energy Analyzer D550 as a gateway.
4. PC → RS232 → RS232 → RS485 → Energy Meter D650 connected via interface converters.

19 Example: PC connection via RS485 interface and Energy Analyser D550 as gateway

The device has 2 serial interfaces:

- RS232
- RS485

The most common method of connecting the Energy Meter D650 to a PC is via the RS485 interface, using an Energy Analyzer D550 as a gateway.

RS485 bus structure

- In an RS485 bus structure, connect all devices according to the bus principle.
- All devices in the RS485 bus structure can contain up to 32 participants/devices.
- Terminate the cable at the start and end of a segment with termination resistors (120 Ω, 0.5 W).
- The Energy Meter D650 does not contain a termination resistor.
- With more than 32 participants, use repeaters to connect segments.

Damage to property due to incorrect network settings

Incorrect network settings can cause faults in the IT network!

Obtain information from your network administrator about the network settings for your device.

Note!

For information on including your device in your Profibus network, see the operation manual.

20 "ecoExplorer go" software settings

Set up the PC connection for the Energy Meter D650 via the Energy Analyzer D550 as gateway

1. Configure your Energy Analyzer D550 as "Device" and "Gateway".
2. Assign the IP address of your PC (device IP address is automatically assigned when the Energy Analyzer D550 is connected to the RS485 interface (see step 19)).
3. Open the Energy Meter D650 to the Energy Analyzer D550, enter a 0 (Modbus RTU/slave).
4. In the "Measurement devices" category, select the Energy Meter D650 and Energy Meter D650 (and further Slave devices).

ecoExplorer go" software

Install the software on your computer and proceed as follows:

1. Open the software on your PC.
2. In the "Devices" menu bar, click "File" → "New project".
3. The "New file" window is displayed.
4. In step 1, "Select project", click "Continue".
5. In step 2, "Project path", select the "Project name".
6. Click "Next".
7. Your project is displayed on the left in the "Projects" window in the work area.

21 "ecoExplorer go" software device configuration

Basic settings

1. Right-click to open the context menu for your device.
2. In the selection list, select the "Ethernet gateway" (e.g. for devices on the RS485) connection.
3. In the "Address" input field, enter the IP address for your Energy Analyzer D550 (read address 300 to 303 in the device, see step 18).
4. In the "Name" selection field, select the device address for your Energy Meter D650 (read or set address 200 on the device, see step 18).
5. Enter the voltage and current ratios in the input fields in the "Transformer" menu in the "Configuration" window.

22 "ecoExplorer go" software recording settings

Recording settings

If necessary, check and configure the recorded values that the measurement device is to save in the "Recording configuration" menu.

A recording contains one measured value or the mean value of the measured value.

Recommendation:

6. In the selection lists in the "Connection variants" menu in the "Configuration" window, select the connection variants for voltage and current measurement on your device (see the operation manual).

NOTE!

Avoid data loss, save your changes to the device configuration by pressing "Transfer" or "Transfer to!"

NOTE!

The device configuration describes the basic settings. Additional device settings required for various functions are provided in the software's operating instructions (available online).

23 "ecoExplorer go" software connection test

Connection test

7. The "New file" window is displayed.

8. In the "Measurement devices" category, select the Energy Meter D650 "File type".

9. Click "Next".

10. Complete the "Insert new device into the project" step by clicking "Finish".

24 "ecoExplorer go" software connection test

Connection test

11. Important settings in "Configure connection":

- In the selection list, select the "Ethernet gateway" (e.g. for devices on the RS485) connection.
- In the "Address" input field, enter the IP address for your Energy Analyzer D550 (read address 300 to 303 in the device, see step 18).
- In the "Name" selection field, select the device address for your Energy Meter D650 (read or set address 200 on the device, see step 18).
- Click "Connection test".

12. The "Configure connection" step is displayed in the window.

13. Click "OK".

14. Complete the "Insert new device into the project" step by clicking "Finish".

25 "ecoExplorer go" software device configuration

Basic settings

1. Right-click to open the context menu for your device.
2. In the selection list, select the "Device" type.
3. The "Configuration (Device x)" window is displayed in the right half of the work area.
4. Enter your individual device name in the "Name" input field in the "Identity" window.

26 "ecoExplorer go" software connection test

Connection test

5. Enter the voltage and current ratios in the input fields in the "Transformer" menu in the "Configuration" window.

6. Click "Configuration" menu item in the context menu.

7. In the "Configuration" window, select the "Nominal values" menu in the "Configuration" window, select the nominal frequency in accordance with the network frequency that is present. Enter the nominal values for the phases as a reference, in order to detect events (overvoltage/undervoltage and over-current).

8. In order to compare recordings of transients and events with recordings of other measurement points, synchronise the device time with UTC time.

27 "ecoExplorer go" software connection test

Connection test

9. Click "OK".

10. Complete the "Connection test" step in the "Configuration" window.

28 "ecoExplorer go" software connection test

Connection test

11. The "Connection test" step is displayed in the window.

12. Click "OK".

13. The "Connection test" step is displayed in the window.

29 "ecoExplorer go" software connection test

Connection test

14. The "Connection test" step is displayed in the window.

15. Click "OK".

16. The "Connection test" step is displayed in the window.

30 "ecoExplorer go" software connection test

Connection test

17. The "Connection test" step is displayed in the window.

18. Click "OK".

19. The "Connection test" step is displayed in the window.

31 "ecoExplorer go" software connection test

Connection test

20. The "Connection test" step is displayed in the window.

21. Click "OK".

22. The "Connection test" step is displayed in the window.

32 "ecoExplorer go" software connection test

Connection test

23. The "Connection test" step is displayed in the window.

24. Click "OK".

25. The "Connection test" step is displayed in the window.

33 "ecoExplorer go" software connection test</