OLM-03-ECT

USER MANUAL

onlinemonitoring.cloud
SMART ENERGY SOLUTIONS

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1. Foreword

Supports the local use of locally generated electricity in solar power systems. Supports automatic monitoring of existing electricity, natural gas or heat consumption, and water (main) meter readings.

After registration, you can access the data measured by the device remotely at any time on the www.onlinemonitoring.cloud website, without installing a separate application.

Compatible with smart home control systems (e.g., OpenHub) and easy to integrate with them.

Keep your energy consumption/production under control with smart equipment and reduce your costs. Use the energy you generate locally and protect the environment!

The OLM-03-ECT device can be installed in a 4-wire (three phase conductors + neutral conductor) TN-C electrical network with a nominal voltage of 230V and a frequency of 50 Hz.

2. Glossary

RCD:

An electrical switch device that disconnects the network behind it if it detects a (relatively small) leakage current.

De-energization:

A work process performed in a specific order, during which the electrical equipment

1) is disconnected from all possible energy sources and
2) is prevented from being energized.

Steps:

1. disconnection,
2. protection against reconnection,
3. checking that the electrical equipment is de-energized,
4. grounding and short-circuiting,
5. Isolation of nearby active parts.

De-energized state:

The electrical equipment or certain parts thereof are disconnected from all possible sources of energy, and the steps for de-energizing have been completed in full and in the correct order.

Equipment under voltage:

If it is not de-energized, i.e. it has already been put into operation and the de-energization process has not been carried out or has not been carried out properly.

Work performed without voltage:

work performed on electrical equipment after it has been de-energized.

Low-voltage electrical network:

A TN-C touch protection system electrical network consisting of three phase conductors and a common neutral conductor with a nominal phase voltage of 230V and a frequency of 50 Hz. (Line voltage: 400V)

Useful power:

In an alternating circuit, the instantaneous voltage is the product of the instantaneous current and the cosine of the phase angle enclosed by them. Its unit of measurement is the watt.

Reactive power:

In an alternating circuit, the instantaneous voltage is the instantaneous current multiplied by the sine of the phase angle between them. Its unit of measurement is VAr.

Apparent power:

In an alternating current circuit, the instantaneous voltage is the product of the instantaneous current. Its unit of measurement is VA.

Harmonic:

All non-sinusoidal signals can be written as the sum of sinusoidal signals. This means that if the electrical network contains harmonics, its signal shape is not sinusoidal. This can cause unfavorable operating conditions. It is necessary to measure these components because they can be used to draw conclusions about the quality of the electrical network.

THD:

The percentage value of the total harmonic component of the signal (all harmonics) projected onto the fundamental signal. In the case of an ideal sinusoidal signal, this is 0%. If the electrical network contains harmonics, the serving transformer is likely to be overloaded.

3. General information

Below you will find the information necessary for installing and commissioning the OLM-03-ECT device. Before starting installation, please read this document carefully to avoid accident risks and material damage.

During the installation and commissioning of the device, it is essential to intervene in the existing building electrical system. For these reasons, compliance with the Hungarian national standard MSZ 1585:2012 – Operation of Electrical Equipment is mandatory during installation in Hungary. In other countries, the requirements of a standard equivalent to the above standard must be applied.

The requirements of the MSZ 1585:2012 standard apply to the safe operation of electrical equipment and to work carried out on or near such equipment.

Compliance with the personal and material requirements specified in the standard is mandatory.

Installation may be carried out by persons with heavy current qualifications to which their certification applies (hereinafter: specialists).

The OLM-03-ECT device cannot be installed in environments or locations requiring explosion-proof (Ex, RB) installation!

Before starting the installation of the OLM-03-ECT device, check that the relevant low-voltage electrical network is de-energized.

The device can be mounted on a standard "DIN" rail (EN 50022) in a standard outdoor or indoor distribution cabinet (small distribution board).
The device requires 7 units of space on the DIN rail.

The device does not include overvoltage and overcurrent protection in its low-voltage network circuit. These protection levels require the installation of other external devices (miniature circuit breakers, surge arresters) and AVK devices to improve their sensitivity. If these protective devices have already been installed, the installation of the OLM-03-ECT device will not affect the autonomous operation of the existing protection levels.

Ensure Wi-Fi network coverage and an Internet connection operating in the 2.4 GHz band at the installation site of the OLM-03-ECT device. Only use the Wi-Fi antenna supplied with the device and recommended by the manufacturer.

Do not install a mechanically damaged, broken, or cracked OLM-03-ECT

device! Protect your OLM-03-ECT device from:

- direct sunlight,
- dust,
- moisture,
- heat,
- mechanical impact,
- overcurrent,
- and overvoltage.

Your device draws the power it needs to operate from the low-voltage mains supply. At least one phase conductor must be live for the device to operate.

Your device does not contain a battery.

Your device does not require any special care or maintenance.

Checking and, if necessary, tightening the electrical connections in the distribution cabinet is part of the regular maintenance work on the electrical network.

Your device does not contain any parts that can be repaired or replaced by the user. In the event of a malfunction, only Gelka Kft.'s specialist service department is authorized to carry out repairs.

Attention:

The connection sequence for the open-type current transformer coils supplied with the device is as follows:

1. The coils must be left free; they must not be placed on the phase conductors. In this state, connect the coil terminals to the device.
2. Place the current transformer coils on the phase conductors in accordance with the direction of the current.
3. After completing the installation work, check on the reconnected low-voltage network that the OLM device displays IMPORT for consumption and EXPORT for production on its display for the given phase.

It is FORBIDDEN to interrupt the circuit of the current transformer coils during operation!

The circuit of the current transformer coils must not contain any overcurrent protection devices (e.g. miniature circuit breakers).

4. Maintenance

Your device does not require any special care or maintenance.

Checking and, if necessary, tightening the electrical connections in the distribution cabinet is part of the regular maintenance of the electrical network.

Your device does not contain any parts that can be repaired or replaced by the user. In the event of a malfunction, only Gelka Kft.'s specialist service department is authorized to carry out repairs.

5. Risks

Risk of electric shock

Before starting work on the electrical network and its equipment, the power must be disconnected. Work may only be carried out when the power is disconnected.

In the case of networks equipped with inverters, generators (or other electrical power generation equipment), special care must be taken to ensure that there is no backfeeding. The DC side disconnect switch of the solar inverter must be switched off.

Material damage

Improperly connected equipment may be damaged. Comply with the provisions of standards, regulations, and professional and technical specifications, as well as the requirements of this installation manual.

Fire hazard

Wires with an inadequate cross-section, poor quality or inadequate electrical connections may overheat, causing an electrical fire. In all cases, ensure that the building's electrical system is designed in accordance with standards and is suitable for the load.

The manufacturer of the OLM-03-ECT device accepts no liability for direct or indirect damage.

6. General description of the device

The device has been developed for data collection, measurement/recording of electrical parameters and circuit control.

It is not a measuring device for billing purposes.

The quantities are measured at one-minute intervals and transmitted via the communication interface to the configured server, and some of the data is also displayed on the device's own website.

7. Measured quantities

Measured quantities in low-voltage electrical networks:

Two-way (send/receive) measurement on all three phase conductors:

- Voltage [V],
- Current [A],
- Active power [kW],
- Reactive power [kVAr],
- Apparent power [kVA],
- Power factor (cos φ)[int16],
- Active electrical energy (work) [kW],
- Reactive electrical energy (work) [kVArh],
- Phase angle [degrees],
- Frequency [Hz],
- Voltage harmonic content (2nd, 3rd, 4th, 5th harmonic) [%],
- Current harmonic content (2nd, 3rd, 4th, 5th harmonic) [%],
- Total voltage harmonic distortion (THD) [%],
- Total current harmonic distortion (THD) [%],
- Scrolled value of the set initial main meter reading [kWh],
- Energy flow direction (supply/consumption) [char]

Monitoring the current status of gas meters/heat meters, measured quantity:

Natural gas consumption meters / heat meters with contact-type pulse transmitters can be connected to the OLM-03-ECT device. By "counting" the pulses given by these transmitters
, the device is able to display the meter reading.

- Gas meter reading [m3] or Heat quantity [GJ]

Monitoring the current water meter reading, measured quantity:

Drinking water meters with contact-type pulse transmitters can be connected to the OLM-03-ECT device. Based on these transmitters, the device is able to display the meter reading.

- Water meter reading [m3]

Communication quantities, parameters:

- Current Wi-Fi network reception signal level [dBm],
- IPv4 local network IP address [char],
- Wi-Fi interface MAC address [char],
- Wi-Fi server (Access Point) name (SSID) [char]

Quantities and parameters relating to the correct, normal operation of the device:

- Temperature of the SoIC chip measuring the parameters of the electrical network [°C],
- Free heap memory capacity of the communication SoIC chip [kByte],
- Time elapsed since last power-up (uptime), expressed in minutes [int32],
- Error codes [int16]

Status of controlled outputs:

- status of integrated three-phase magnetic switch [bool],
  ]

Status of digital inputs (gas/heat quantity, water pulse transmitters):

- status of integrated 1st contact input (water imp.) [bool],
- Integrated 2nd contact input (gas or heat quantity imp.) status [bool]

8. Measurement frequency

The device calculates the measurement data continuously, every minute (every 60 seconds), and sends it to the configured MQTT server via the communication channel. Synchronous measurement of multiple devices is ensured by NTP synchronization.

9. Technical data

Overall dimensions:	126 mm x 97 mm x 76 mm
Weight (without antenna):	0.6 kg
Radio interface:	IEEE802.11 /a/b/g/n, 2.4 GHz wireless (Wi-Fi), equipped with SMA female connector.

Low-current interfaces:

DC voltage connectable to inputs: 5…12V.

The inputs are galvanically isolated. (optically isolated)

External current transformer inputs:

Differential arrangement, ground-symmetrical (low current 0). Protected against overvoltage, limitation

Active above +-3.6V.

L1, L2, L3 measuring circuit impedance (50/60 Hz): 4.8 Ohm

Supply voltage output voltage: 11.4 +- 0.3V load current less than 80 mA.

The supply voltage output is galvanically isolated from the low-voltage electrical network, inputs and outputs.

High-current electrical parameters:

Nominal power consumption during operation:	Pn < 10W,
Nominal voltage:	3 x 230V AC, (+-10%)
Minimum current:	0.05A
Nominal current:	3 x 5 A alternating current,
Maximum current:	3 x 60 A alternating current,
Nominal frequency:	50 Hz (+-10%)
Protection:	IP40,
Operating temperature:	-20….+50°C

For the OLM-03-ECT device to operate properly, the mains voltage must be within the range of 180 to 260 V.

10. Measurement accuracy

Quantity:	Measurement error:
Low voltage network voltage:	error less than +- 1%
Low voltage network nominal current:	error less than +- 2%
Low voltage network power:	error less than +- 3%
Low voltage network energy (work):	error less than +- 3% Low
voltage network power factor:	error less than +- 0.05 Low
voltage network phase angle:	error less than +- 2 degrees Low
voltage network harmonics,	
above 10% harmonic content:	error less than +- 3%
Below 10% harmonic content:	error less than +- 5%

Communication parameters:

Quantity:	Measurement error:
Current reception signal level of Wi-Fi network:	+-2 dBm

The measurement error is not applicable to other quantities.

Quantities and parameters relating to the correct, normal operation of the device:

Quantity:

Measureme

nt error:

Temperature of the SoIC chip measuring the parameters of the electrical network: +-1 °C
The measurement error is not applicable to other quantities.

Status of digital inputs (gas/heat quantity, water pulse transmitters):
Measurement error is not applicable.

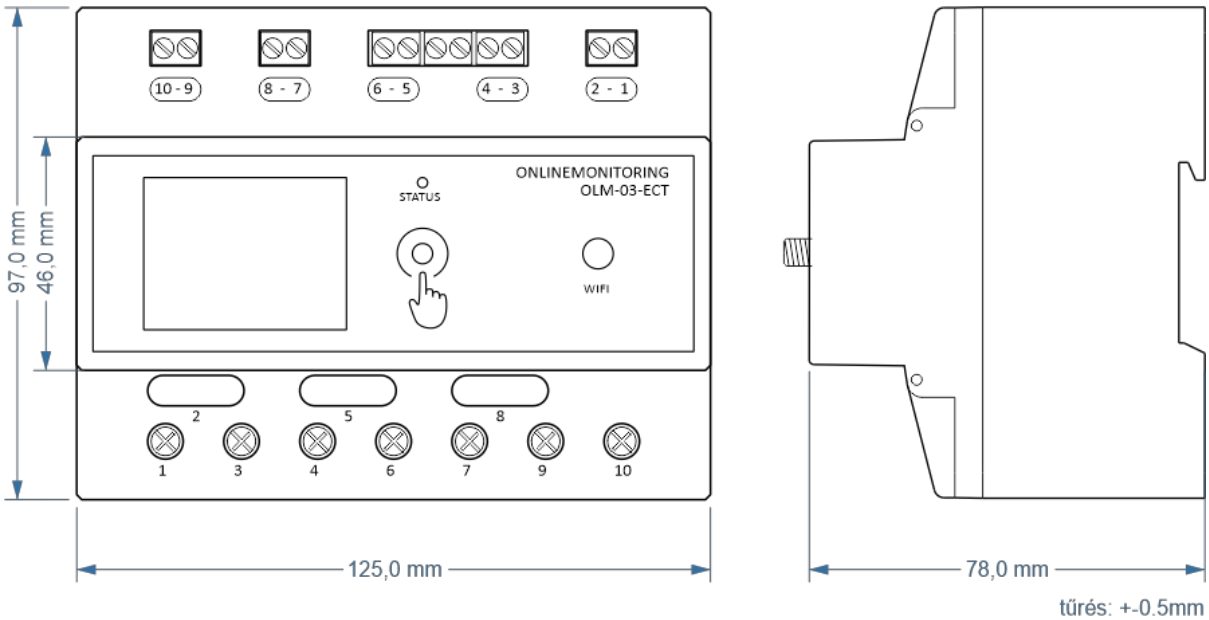
The measurement error is not interpretable in terms of gas/heat quantity and water meter reading.

The high range of the signal connected to the pulse inputs must be T_H> 250 ms, and the low range must be T_L> 250 ms. Based on this, the period time T = 500 ms. Maximum pulse frequency: 2 Hz.

11. Mechanical design

Photo of the device:

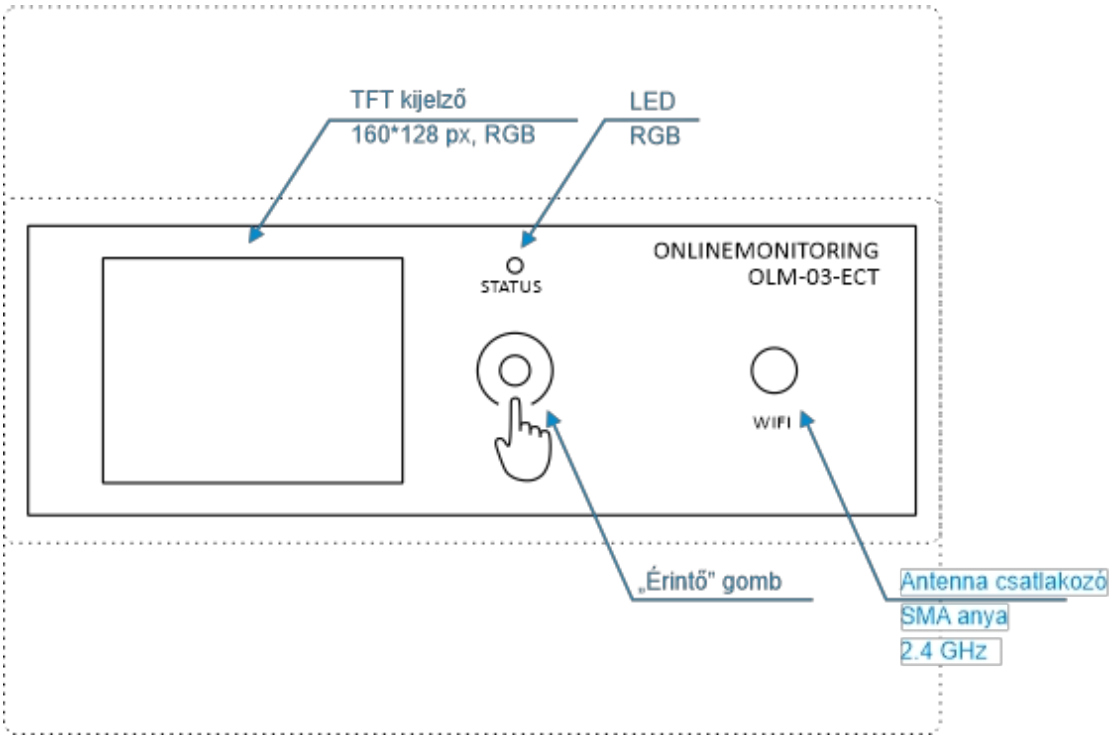
Overall dimensions:



The device can be installed in both indoor and outdoor distribution cabinets and can be mounted on a standard top-hat rail.

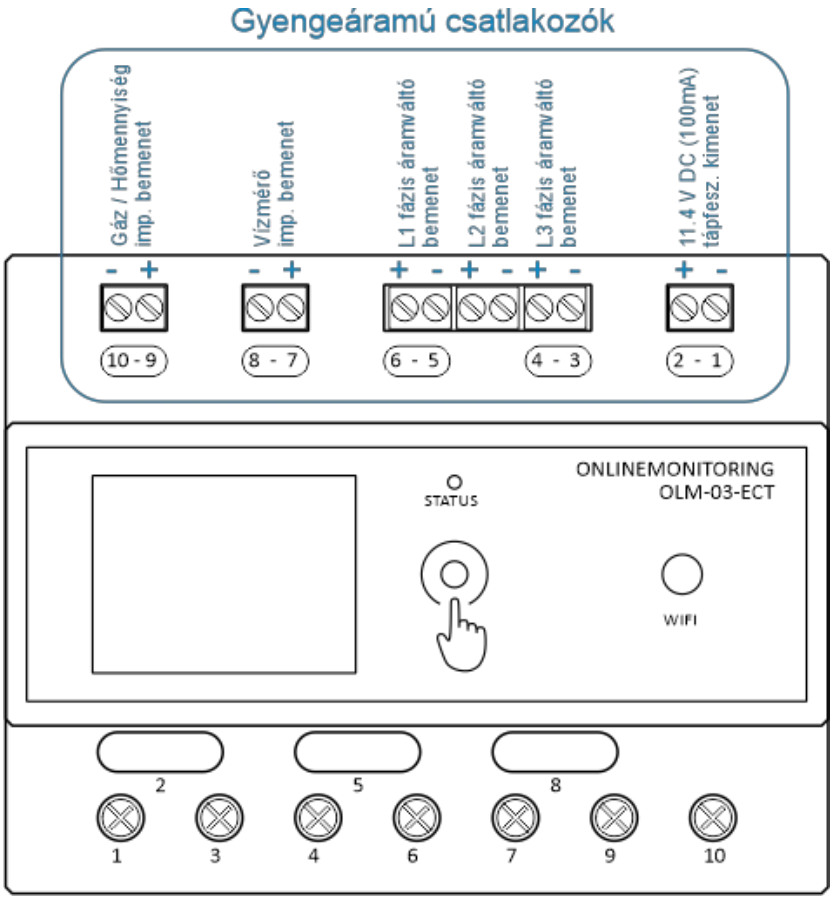
Control unit:

- Its 160x128 pixel color TFT display shows information in a continuous sequence.
- It has a single touch button, which is only needed to perform the initial setup.



Low-current connectors

The screw-type low-current connectors are located on the **top** of the device, as shown in the figure below:

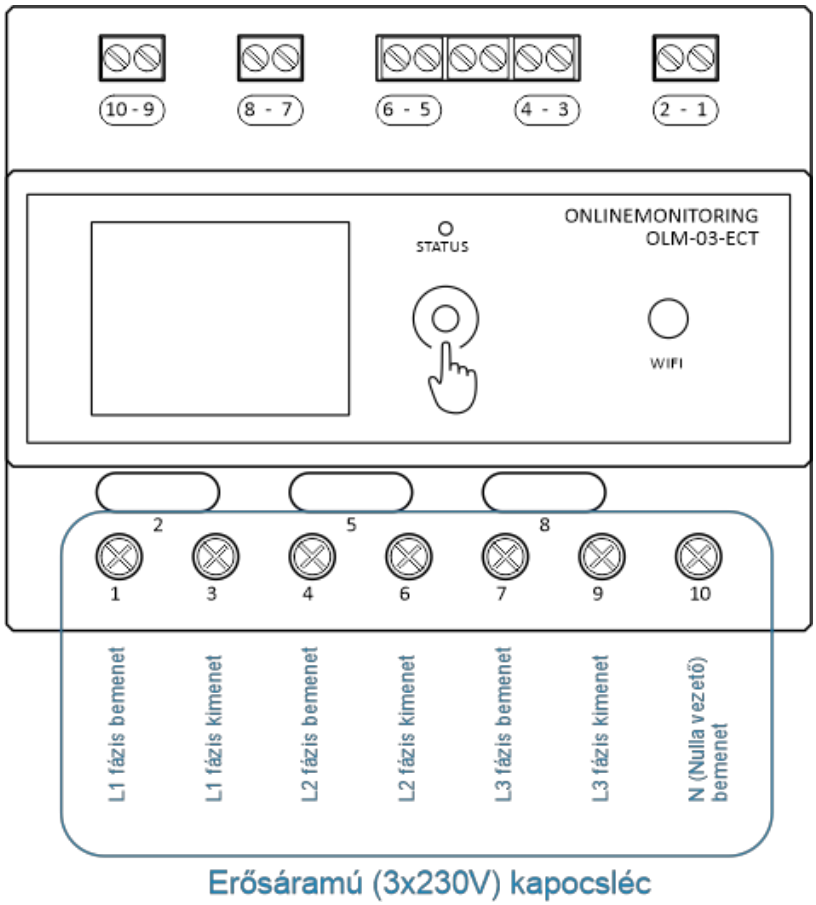


The low-current terminal block is suitable for cables with a cross-section of 0.5 to 0.75 mm2. It is FORBIDDEN to interrupt the circuits of the external current transformer coils during operation!

Work on the external current transformer circuits is only possible when the main circuit is de-energized. The output of the external current transformers contains a Zener barrier, with a maximum output voltage of 17V. The positive terminal is marked in red and the negative terminal in black.

High-current connectors

The screw-type high-current connectors are located on the **bottom** of the device, as shown in the figure below:



Erősáramú (3x230V) kapocsléc

High-current connector layout:

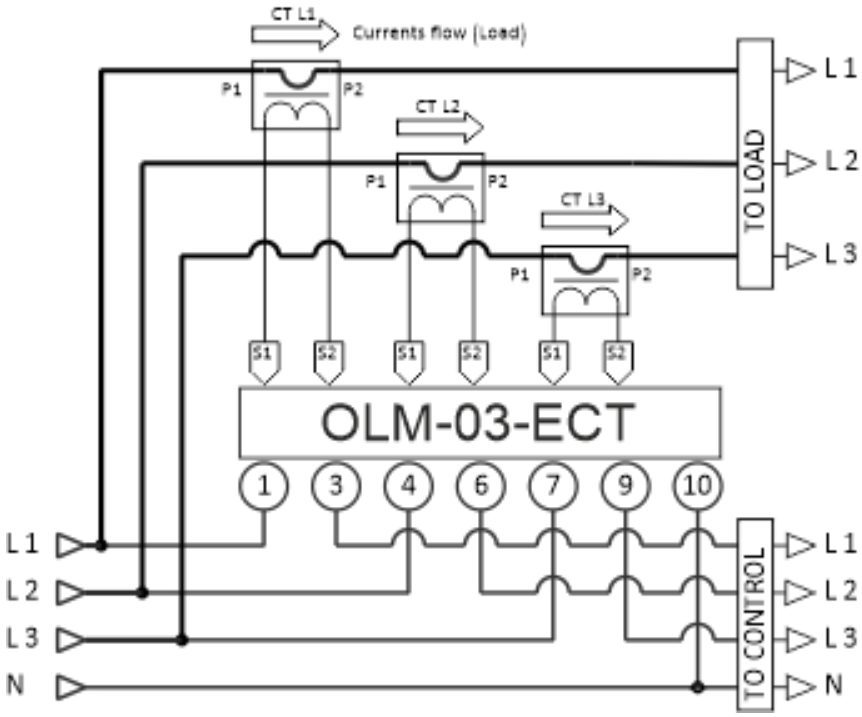
1	1st phase input (from the main meter)
3	Phase 1 output (to controlled circuit)
4	Phase 2 input (from main meter)
6	Phase 2 output (to controlled circuit)
7	Phase 3 input (from main meter)
9	Phase 3 output (to controlled circuit)
10	Neutral conductor input

Note: Do not remove the jumper plates marked with the numbers 2, 5, and 8, as this may cause the device to malfunction!

The high-current screw connections (current connection) of the device are suitable for 1…25 mm2 cables.

12. Installation, circuit design

The **OLM-03-ECT** device must be installed within the property boundary, after the electricity meter and the existing main switch and circuit breakers, in a three-phase electrical network with a nominal line voltage of 0.4 kV.



Typical circuit design

Circuit for measuring the power input of high-power consumers/generators with a single device. Without disrupting the existing circuit, using current transformer adapters that can be retrofitted to the phase conductor. The current transformers are available in two designs:

- OLM-CT4 100 A / 50 mA (1:2000) ratio, openable
- OLM-CT4 160 (200) A / 50 mA (1:4000) ratio, openable design.

Accuracy class of current transformers: 0.5

The device draws the power required for its operation (<10W) and control (e.g. magnetic switch) from the inputs numbered 1, 4, and 7 of the low-voltage terminal block. If you wish to use a magnetic switch, select a pull-in coil with a nominal voltage of 230V.

The device supplies a nominal mains voltage of 230V at terminals 3, 6, and 9 (it short-circuits terminals 1-3, 4-6, and 7-9 when the circuit is switched on, and opens them when the circuit is switched off).

The rated load capacity of the switch element built into the device is 60A.

13. Internal structure

Hardware:

When designing the OLM-03-EU device, we made sure to use components from companies that are market leaders in terms of quality indicators and service life.

Our component suppliers include, but are not limited to: MICROCHIP, ESPRESSIF, FUJITSU, MURATA

Your OLM-03-EU device is built from selected components. Our product complies with the ROHS standard, thereby contributing to reducing the environmental impact of harmful substances.

The device is built around an ESP32 Dual Core SoIC. This chip is responsible for communication and connecting to peripherals. Electrical parameters are measured by a MICROCHIP AT90E36 chip. This data is read out periodically via an SPI bus.

The scrolled measurement data and other special variables are stored in FRAM via an I2C bus.

The information displayed can be read by the user on a colour 160x128 pixel TFT display.

Software:

The device uses an RTOS "operating" system. Four different task-performing "threads" have been implemented, which run event-driven and separately from each other on their dedicated cores. They are responsible for the required number of their own "processes".

14. Setting up the local IT network at the installation site

Recommended IT network structure, guidelines, security considerations:

Your network firewall (WAN/LAN router) is primarily responsible for handling and preventing incidents originating from the external WAN network. Only allow traffic on ports that are essential for the operation of your IT infrastructure.

A common method of attack today is to attempt to gain unauthorized access to network data traffic from within (from the LAN side) and interfere with the traffic flowing there. To reduce the success of these attacks and preserve transmission capacity, segment your network.

If possible, create logical units (e.g., Marketing, Design, Manufacturing) and use a separate network interface on your router for data exchange between these units. You can also increase the security of your network by setting up VLANs.

Only install network devices whose network communication definition is guaranteed to work. *(We have encountered a Far Eastern camera system that continuously transmitted all image data in compressed form to the country of manufacture).*

If possible, use the 5 GHz band to serve Wi-Fi clients that handle large amounts of data traffic. You can use the 2.4 GHz band for IoT solutions and data collection by sensors.

Wi-Fi network:

Ensure a Wi-Fi network operating in the 2.4 GHz band with adequate coverage for normal operation. It is advisable to segment the network to increase data security and transmission capacity.

The device also includes an integrated web server. Your device connects to the access point specified by the user during the initial setup, which must have WPA2 security and AES encryption.

IP address allocation:

The device's IPv4 local network address must be assigned by a DHCP server.

If you want to assign a static IP address to your device, please set it up on your DHCP server. NTP time

(UDP123 port):

The device identifies the sent data with a timestamp and synchronizes it with the time information received from the network time server at 15-minute intervals. It starts measurements between 0 and 5 seconds of every minute, which takes 60 seconds. This solution ensures synchronization between multiple devices installed at the same location. For this technical reason, it is necessary to access the NTP time server, which is done using the standard UDP protocol on port 123.

Please enable traffic on this NTP port in your firewall.

HTTP (TCP port 80):

Some of the data measured by your device is displayed using the integrated web server. This solution makes it easy to visually monitor and check normal operation. During normal operation, data can only be read via the HTTP protocol. Control commands cannot be issued for security reasons. The integrated web server can serve up to four client requests at a time.

MQTT (TCP port 1883, TLS port 8883):

As the manufacturer, we have set up the ONLINEMONITORING data collection system MQTT broker to be accessible to the device. If you are installing your own local energy management platform that supports MQTT data exchange, use the settings recommended by the platform. Control commands can only be sent to the device via the MQTT protocol. If required, the channel can be encrypted with TLS coding to increase data security. The device executes the control command within 1 second of receiving it.

15. User interface:

Settings and data display via website

The device has a built-in web server that allows you to configure the device and check that it is operating as intended.

Initial setup, "Setup" mode:

Ensure that the Wi-Fi antenna supplied by the manufacturer is properly connected.

After the device has been professionally installed, its low-voltage circuit must be connected to the power supply.

The Gelka Kft. and ONLINEMONITORING logos will appear on the device display.

Place your index finger on the touch sensor on the front panel of the device.  front panel of the device.

Keep your index finger on the touch sensor. The device

will then enter setup mode.

In setup mode, your device will launch its own integrated Wi-Fi access point, which you can connect to with your IT device.

The name of the access point is: **OLM03-xxxxxxxx,** where the **xxxxxxxx** characters represent the factory number of your

device. In this example, the factory number is:

SAMPLE01

The password required for Wi-Fi connection is: Administrator

Once you have connected to the device with your IT device, please enter the following URL in your browser:

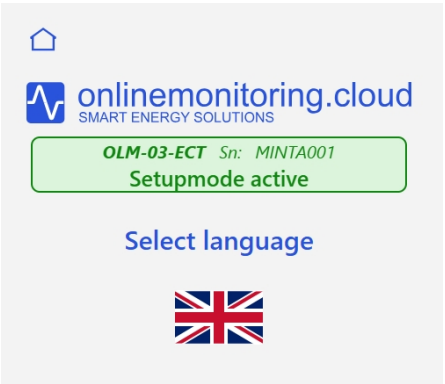
http://192.168.1.10

You can configure your device on this web interface.

Please note: If no Wi-Fi client connects to the device within 5 minutes of switching it on, it will automatically restart and switch to "Normal" mode. In "Normal" mode, you cannot change the settings of your device.

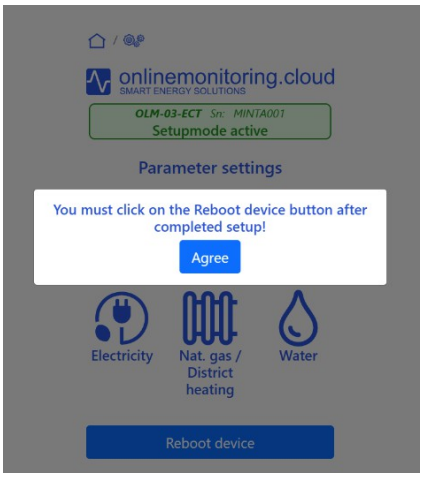
"Setup" mode can only be activated by restarting the device as described above.

"Setup" mode, configuration via website:

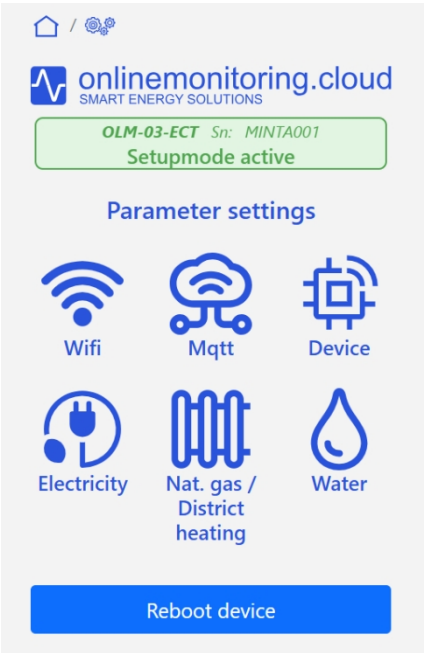


The device's website will open at the URL http://192.168.1.10.

Click on the English flag.



By pressing the "Agree" button, you accept the warning that after completing the settings, you must press the button labeled "Reboot device" to save the data.



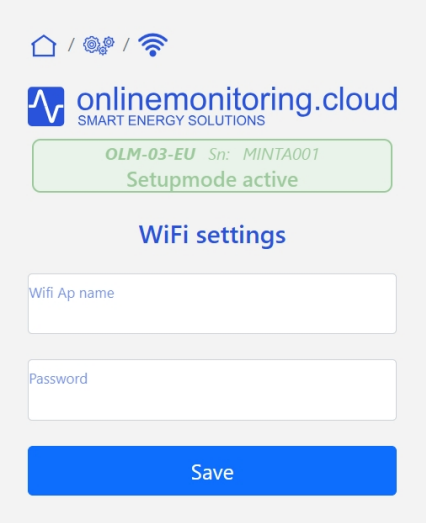
You can specify the operating settings as shown in the figure:

- Wi-Fi: Wi-Fi setup,
- MQTT: MQTT broker used for data transmission and control,
- Device: Other parameters of the device,
- Electricity: Readings from the main meter of the electricity network,
- Natural gas / district heating: Natural gas consumption meter / district heating heat meter settings,
- Water: Water meter consumption meter settings

Reboot button: Save data and restart.

Once you have completed the settings listed, a green check mark will appear next to the icons to help you navigate.

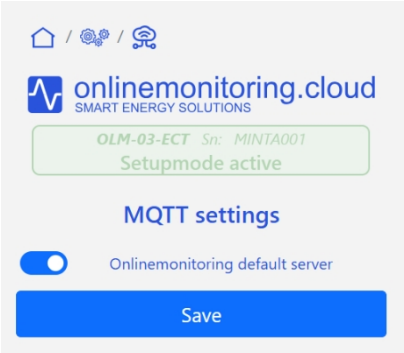
Wi-Fi network setup:



Enter the name and password of the 2.4 GHz Wi-Fi network server you want to use on your local network. Your device will connect to this access point.

Click the "Save" button.

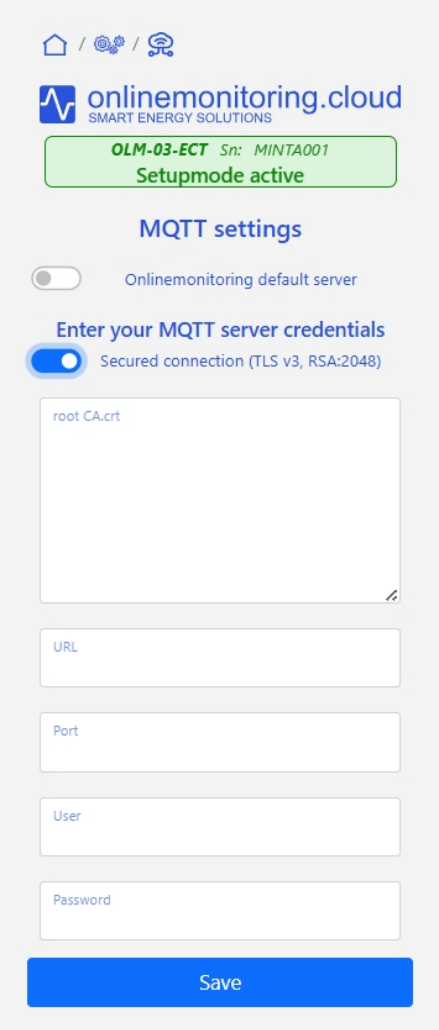
Data transmission settings:



If you want to use the ONLINEMONITORING measurement system, you don't need to do anything. Click the Save button.

If you want to use your own MQTT broker, turn off the

"ONLINEMONITORING default server" switch. Then, in the drop-down menu, enter the details of the MQTT broker you want to use as follows:



URL: IP address or domain name of your MQTT broker. (Local network MDNS name resolution is not supported)

Port: MQTT broker port

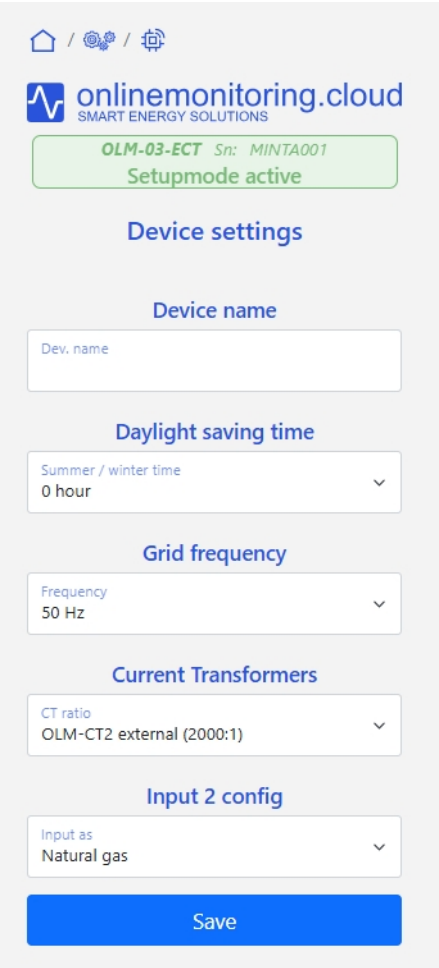
User: Username required to connect to your MQTT broker

Passwd: Password required to connect to your MQTT broker.

You also have the option to encrypt data transmission. To do so, enable the "Secured connection" switch and copy the root ca key of your mqtt server into the text field.

After entering the data, click the Save button.

Setting the device operating parameters:



Device name: Name your device as you wish, using the name you want to identify it by later.

Daylight saving time: In the case of daylight saving time, you can set the interval relative to local time.

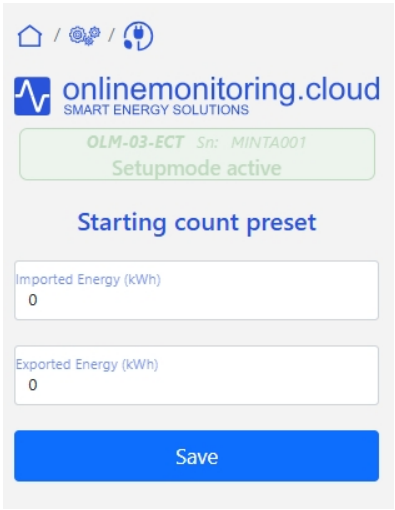
Grid frequency: The frequency of the electrical grid.

Current transformers: You must specify the type of external, openable current transformers purchased for your device to ensure correct measurement.

Input 2 config: The device is capable of receiving signals from gas/heat meter pulse transmitters. In this drop-down menu, you can select whether to use the input for gas or heat pulse counting.

After setting the data, click on the "Save" button.

Setting the electricity meter reading:



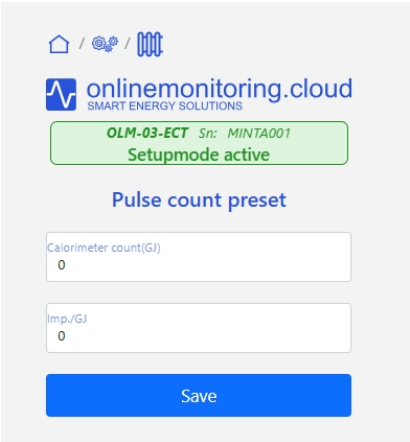
If you want to track the meter reading of your main meter (your device was installed as a sub-meter), you can enter the current meter reading in the fields. (Imported = purchased, Exported = fed back electricity)

In the case of an inverter sub-meter, you can enter the total energy generated by the inverter in the Exported Energy field, which can be accessed from the application provided by the inverter manufacturer.

If you do not fill in the fields, the device will track your electricity consumption/production from the current status.

In this case, the meters will start from 0.

Setting the meter reading for natural gas/heat consumption:



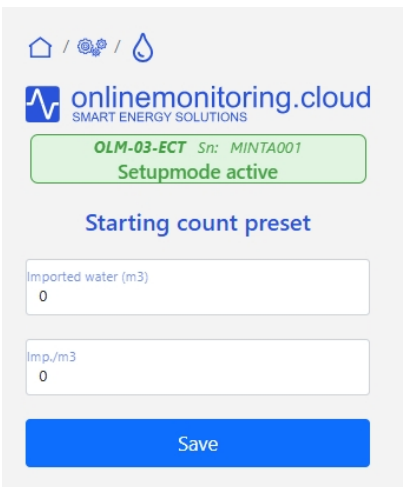
In this menu, you can set the starting value of the gas meter or heat meter. Read the gas or heat consumption meter and enter it in the field.

For gas meters, specify how many pulses the installed pulse transmitter sends per cubic meter of consumption. (usually 10 or 100 pulses/m3)

For heat meters, enter how many pulses the installed heat meter sends per GJoule of energy consumption. (usually 10 or 100 pulses / GJ)

Please note: a gas meter pulse transmitter or heat meter pulse output must be installed! If you do not have one, leave the fields blank.

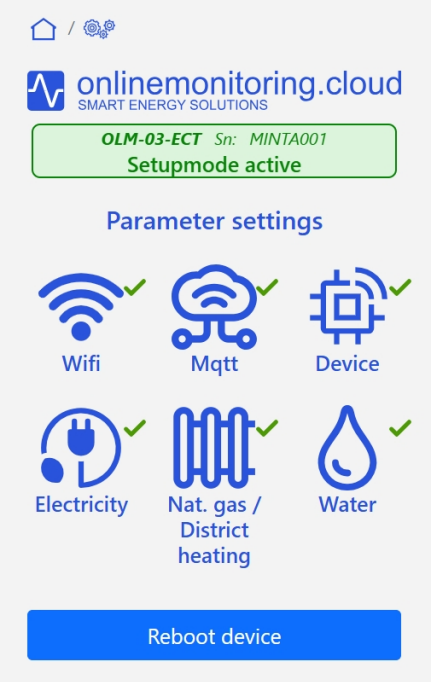
Setting the water meter reading:



In this menu, you can set the starting value of your water meter. Read the reading on your water meter and enter it in the Imported water field.

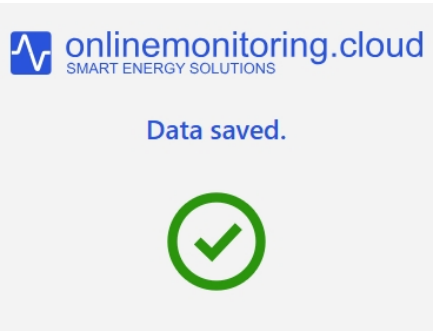
Specify how many pulses the installed pulse transmitter sends per cubic meter of consumption. (Usually 10 or 100 pulses/m3)

Please note: a water meter pulse sensor must be installed! If you do not have one, leave the fields blank.

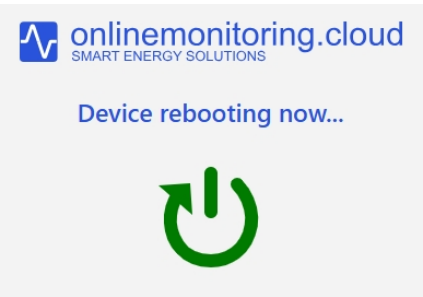


After successfully completing the menus, a green check mark will appear.

To save the data and restart the device, press the Reboot device button.



Your device will indicate on the website when the data has been saved. No action is required on your part.



The device will restart based on the saved settings. No action is required on your part.

Your browser will be redirected to the onlinemonitoring.cloud website. (If you have an internet connection)

"Normal" mode:

After restarting (e.g., initial setup or power failure), your device monitors the touch sensor signal.

After the first 15 seconds of the start-up process, if no touch is detected, your device will start in normal mode.

1. It starts measuring the electrical network and other parameters,
2. connects to the Wi-Fi server set up in setup mode,
3. synchronizes with the network time server,
4. connects to the MQTT server specified in setup mode.

If any connection is interrupted or other communication errors occur, your device will handle them automatically. It will re-establish the faulty connection and simultaneously display an error code on its display. Data loss/data error handling on the communication channel is the responsibility of the TCP/IP protocol, which has been implemented in the device.

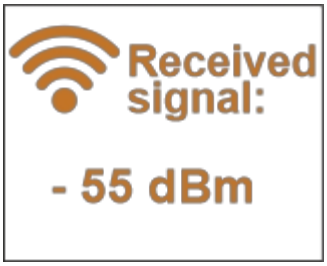
Data classification and filtering is the responsibility of the local energy management system; the device only buffers the last set of measurement data.

If the value of the electrical network differs from the specified parameters (voltage level or phase error), an error code will also appear on the display.

Error codes are also displayed on the device's website, display, and in MQTT data. The following messages are repeated on the device's display at 5-second intervals:

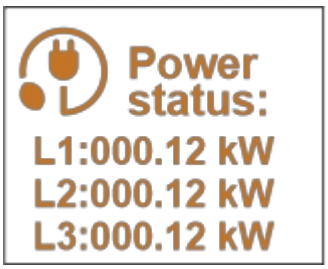
The device name you have set.

The unique serial number provided by the manufacturer of your device.



The signal level of the radio frequency signal received from the configured Wi-Fi server. Recommended value: between -50 and -80 dBm

The local network IP address of your device.
Your device's web page is available at this address.



The useful power measured per phase based on the last 1 minute of measurement data from the electrical network.

Status measured based on the last 1 minute of measurement data from the electrical network. If there is a feedback to the public electrical network, the circuit is displayed in green.

In the case of a sub-meter circuit design, the value of the useful electrical energy consumed. If you have entered the reading of your main meter in setup mode, the energy consumption measured by your device will be added to the value entered there.
This is how the amount of electricity measured by the main meter is "tracked".

In the case of a sub-meter circuit design, the value of the energy consumed by the inverter from the power grid.

In the case of a sub-meter circuit design, the value of the useful electrical energy fed back. If you have entered the reading of your main meter in setup mode, the value measured by your device will be added to the value entered there.

This is how the amount of electrical energy measured by the main meter is "tracked".

In the case of an inverter sub-meter circuit design, the value of all useful electrical energy produced by the solar panel system.

If you have set input 2 as a gas pulse input in setup mode and entered the reading on your gas meter, the gas consumption measured by your device will be added to the value entered there.

or:

in setup mode, you have set input 2 as a heat meter pulse input and entered the reading on your heat meter, the consumption value measured by your device will be added to the value entered there.

If you have entered the reading of your water meter in setup mode, the value measured by your device will be added to the value entered there.

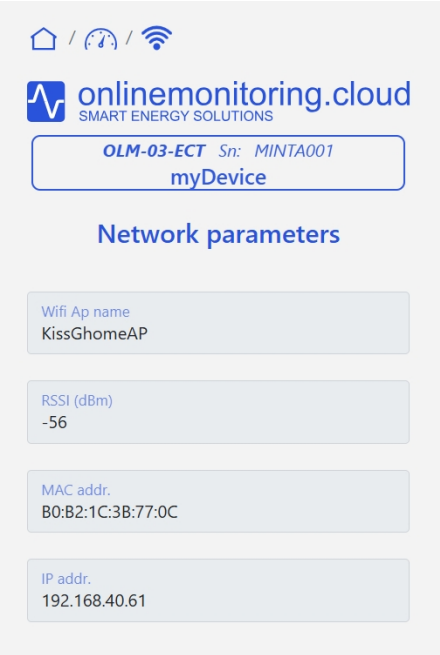
"Normal" mode, data display on the website:

The set parameters cannot be changed on the device's website. The data is read-only.

Connect your IT device to the same network on which your device is installed. Enter the IP address shown on the device display into the URL field of your browser.

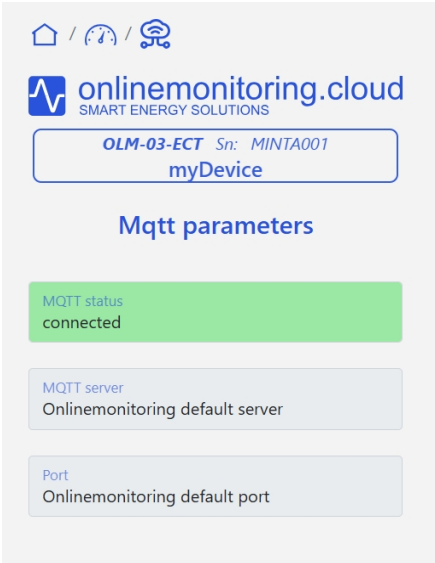
Click on the English flag.

On the website that appears, you can select the data to be displayed by clicking on the icons.



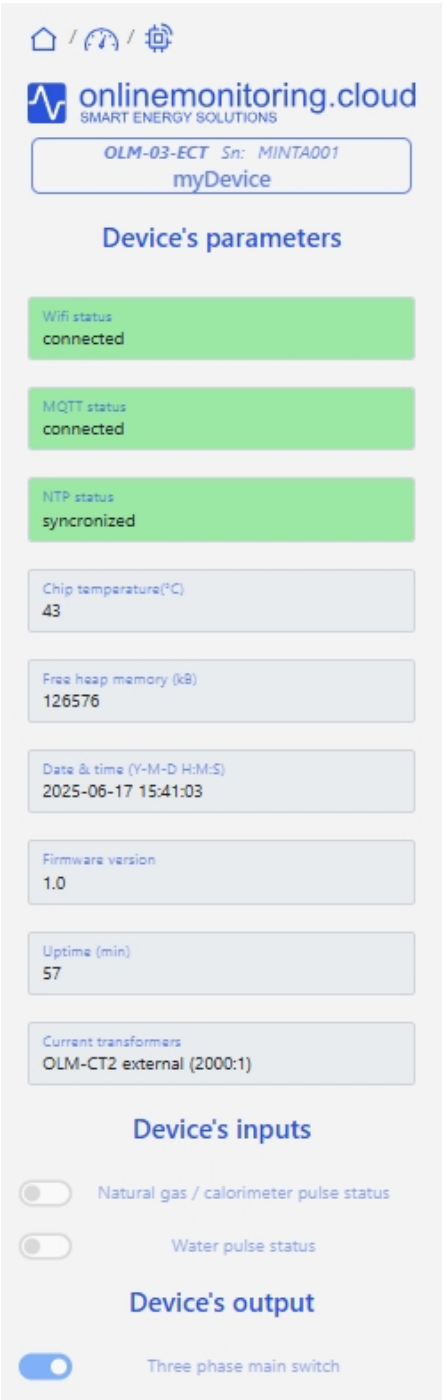
By clicking on the Wi-Fi icon, you can query the wireless network parameters of your device.

The displayed data is updated automatically.



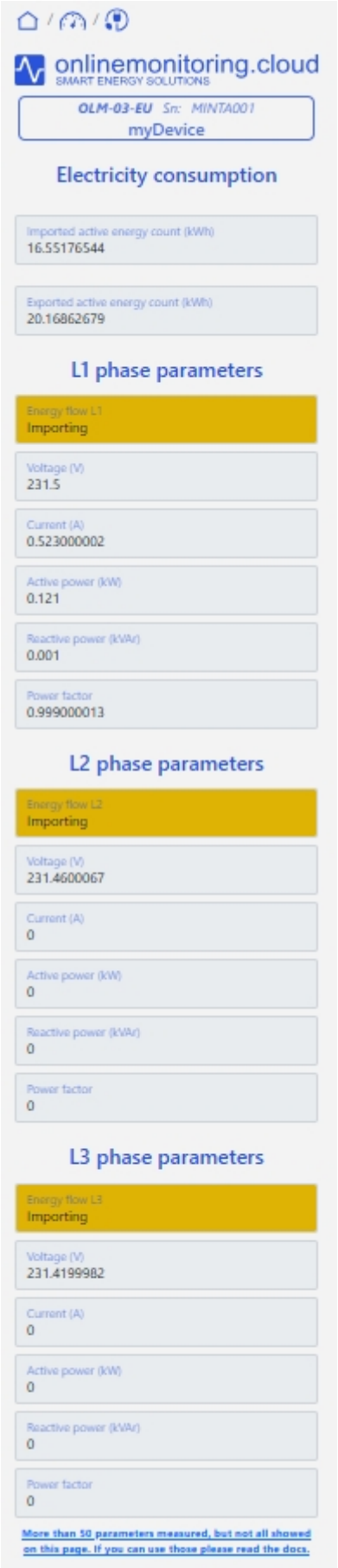
The MQTT menu displays the MQTT settings and client status.

The displayed data is updated automatically.



In the device menu, you can view the parameters of your device and the status of its inputs and outputs.

The displayed data is updated automatically.



The electrical network parameters measured by the device:

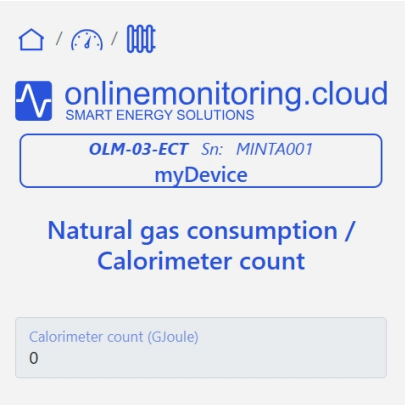
The most important data of the electrical network are displayed on the device's internal website:

- electricity consumption meter reading
- meter reading for electricity generated (fed back)

Per phase:

- mains voltage
- current
- useful power
- reactive power
- power factor

The displayed data is updated automatically.



Gas/heat consumption value.
(If you have a pulse sensor and it has been set up.)

Value of water consumption.

(If you have a pulse generator and it has been set up.)

16. Data communication with IT applications

The device provides two interfaces for applications:

- Basic information is available via HTTP protocol, which is read-only for security reasons.
- All data is accessible via the MQTT protocol, and your device can be controlled remotely.

Access via HTTP protocol:

We have implemented this protocol for smart homes and other primarily data-oriented applications. Its purpose is to provide easy access to the most important features and an easily processable data structure. Data sent via the HTTP protocol is not separately encrypted. (In addition to the WPA2/AES encryption algorithm used by Wi-Fi.)

This data is in standard JSON format.

Access and reading via MQTT protocol:

Data sent via the MQTT protocol is encrypted using the TLS algorithm, and username and password authentication is also required for data connection with the MQTT broker.

Data received by the MQTT broker also follows a standard JSON structure. The

interface description is available on our website.

17. Closing remarks

The manufacturer and distributor (Gelka Kft.) reserve the right to make changes to the detailed operation of the device.

If you have any questions, please send your comments toinfo@gelkakft.hu .