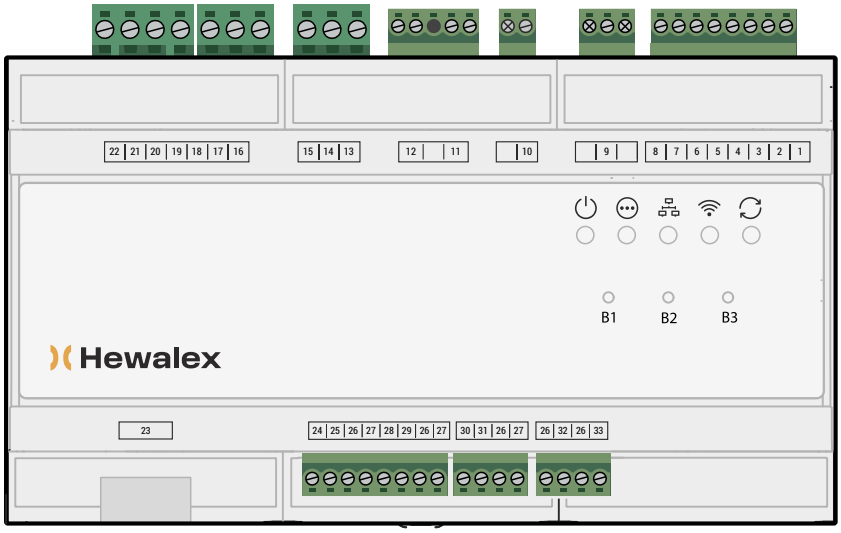
EN

OPTI-ENER 2.0 DIN

Installation and Operating Manual

Hewalex
HEWALEX Sp. z o.o. Sp. k.
+48 32 214 17 10
www.hewalex.pl



Scan this code to download the lates technical documentation

1/12.2024

1. SAFETY REQUIREMENTS

NOTE:
Read carefully and follow the specified safety conditions.

a **Safety requirements:**

Before operating the OPTI-ENER 2.0 DIN, please read the following manual carefully. It contains important safety information that must be read and strictly observed. The manufacturer does not assume any responsibility in case of non-compliance with safety rules, improper use of the device or incorrect settings of the contro

b **Safety warning:**

This equipment is not intended for maintenance by persons (including children) with limited physical, sensory or mental ability, persons without experience or knowledge of the equipment, unless it is done under the supervision of a person with electrical qualifications or in accordance with the instructions for use of the equipment provided by persons responsible for their safety.

c **Permitted use:**

The use of the device is carried out from the website or mobile application only with appropriate instructions for safe use and provided that the user understands the risks associated with operation.

d **Installation location:**

Due to the nature of the device, installation and connection of the OPTI-ENER 2.0 DIN controller must be performed by qualified person with specialized knowledge and current electrical authorization up to 1kV. In case of changing location of the device also use the services of qualified installers.

e **Installation location:**

Due to the degree of protection (IP20), the device is intended for domestic use only. Outdoor installation of the building is possible, provided that the device is installed in an enclosure with a higher degree of protection, such as switchboard electrical (IP65-IP68). Do not store explosive and flammable materials, such as aerosol cans, and do not store or use gasoline or other flammable materials near the appliance. Maintain the appropriate distance of the gas installation from the appliance in accordance with applicable standards. Ensure that the device does not stand near water source or in a dusty place. The device is designed to operate in areas with temperatures of -20° to 60° C and humidity of 5% to 85%. The device may not work properly or may be permanently damaged, if it is left for a long time in a room with air parameters exceeding the specified range.

f **Cleaning and maintenance:**

Never use steam cleaning equipment. Wear gloves protective gloves for cleaning and maintenance of the device. Disconnect the device from electrical power supply before performing any maintenance activity. Do not use harsh or abrasive cleaners for cleaning plastic parts, such as glass cleaners, scouring cleaners, flammable liquids, cleaning waxes, concentrated detergents, bleach or cleaners containing petroleum-based substances. Do not use paper towels, sponges or other sharp cleaning tools.

! **CAUTION::**

Do not insert metallic objects into the case and do not touch the controller's motherboard while the voltage is applied to it.

2. DEVICE DESCRIPTION

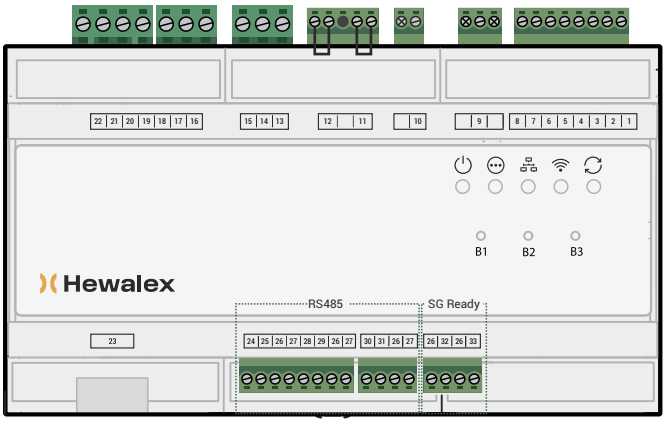
The OPTI-ENER controller is designed and manufactured to manage electricity consumption. The principle of operation is based on a measuring system; measuring the voltage and current of the individual phases of the building's power supply from the power grid and the power source (such as a photovoltaic installation). In this way, the user has control over the amount of energy: produced, given to grid, taken from the grid and consumed by the monitored installation. OPTI-ENER allows manual, automatic switching on and off of management circuits (relay outputs). Management of OPTI-ENER system circuits is carried out through the EKONTROL platform available in the browser version www.ekontrol.pl, as well as in the form of the OPTI-ENER mobile application (iOS/Android).

NOTE:
The OPTI-ENER controller requires Internet connectivity for full performance and access to logged data.

OPTI-ENER 2.0 DIN specifications:

- Power supply: 230V AC, 50 Hz
- Voltage range: od 195 V AC do 253 V AC
- Dimensions (width x height x depth): 160 x 110 x 65 mm
- Working conditions:
  - Ambient temperature: from -20°C to 60°C
  - RH: from 5% to 85% (no condensation and/or icing)
- Power consumption: <3W
- Degree of protection: IP20
- Output relays:
  Relay 1: NO 8A / NC 5A max
  Relay 2: NO 8A / NC 5A max
  Relay 3: NO 8A max
  Relay 4: NO 8A max

Fig.1 **OPTI-ENER 2.0 DIN - front view**



Included:

- OPTI-ENER 2.0 DIN controller
- Operating Manual
- 4 pcs. of Current Transformer SCT (dependent on the selected set)

Tab 1. LED indicator overview

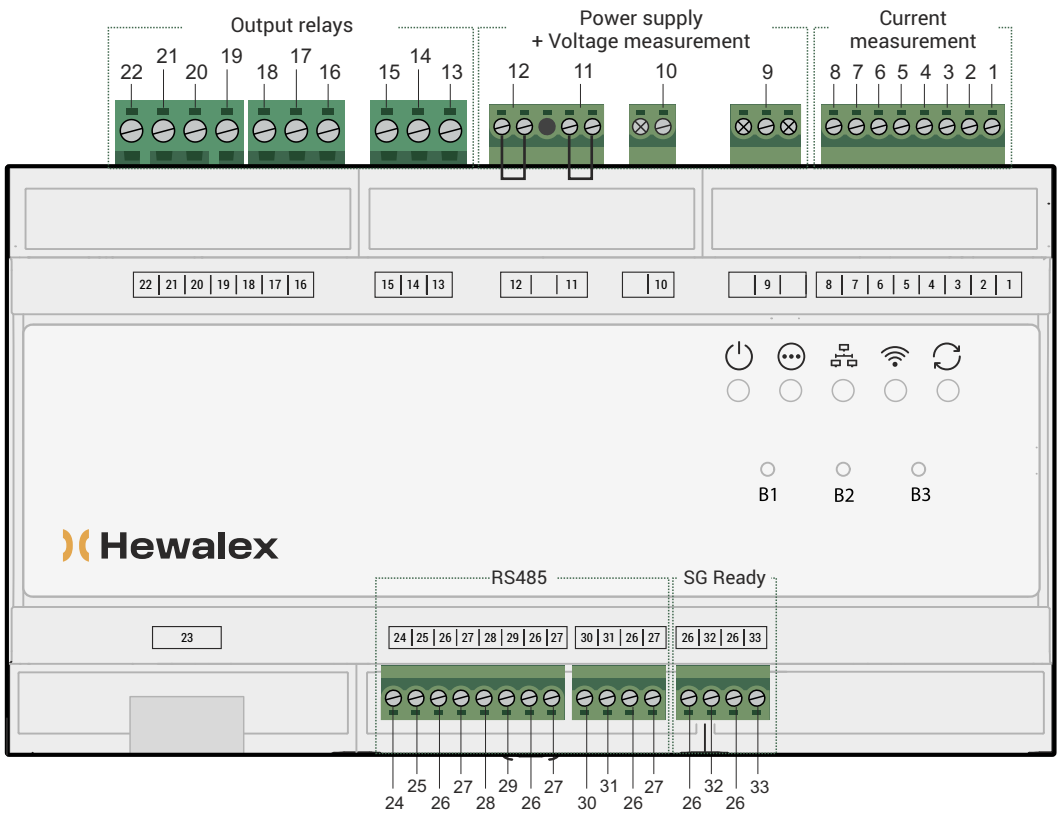
Icon	Description	Indication
	Power supply	Continuous light - device on No signaling - device switched off
	Device status	The menu mode opened with the configuration key: Single flash – no menu option selected; Double flash – optional module pairing mode; Triple flash – subnetwork device removal mode; Quadruple flash – device reset to default settings; Menu mode off: - Steady light – no active errors; - Single flash – heater detection error; - Double flash – storage tank temperature sensor error
	Optional module communication	Steady on – device paired; Off – no communication with optional modules
	Connection status	Flashing – connection establishment Continuous lighting - connection established
	Updating	Fast flashing (9 Hz) - update in progress

2.1. Controller overview and assignment of inputs

OPTI-ENER has measurement inputs - voltage and current, as well as relay outputs and RS485 bus communication ports including Modbus RTU output. The device is equipped with a Wi-Fi module for wireless connectivit to home Internet network and SG Ready connector.

The location of the various plug connectors and the location of configuration buttons B1, B2, B3 are shown in Fig. 2. Detailed wiring diagrams are provided in Chapter 3. Installation. Fig.2 shows B1,B2,B3 buttons for operation of the device, as well as LEDs indicating its status operation. The description of the contacts of the individual plug connectors is shown in Tab.2. Information on the use of the pushbuttons and on the indications of the indication LEDs is included in Chapter 3. Installation and in the instructions supplied with the OPTI-TEMP module.

Fig.2



Tab.2 Description of controller connector inputs

1	**CT3 +**	Current transformer phase L3 of the network, plus wire (black)
2	**CT3 -**	Current transformer phase L3 of the network, minus (white)
3	**CT2 +**	Current transformer phase L2 of the network,plus wire (black)
4	**CT2 -**	Current transformer phase L2 of the network, minus wire (white)
5	**CT1 +**	Current transformer phase L1 of the network, plus wire (black)
6	**CT1 -**	Current transformer phase L1 of the network, minus wire (white)
7	**CT1i +**	Current transformer phase L1 inverter, plus wire (black)
8	**CT1i -**	Current transformer phase L1 inverter, minus wire (white)
9	**L3**	L3 phase voltage measurement
10	**L2**	L2 phase voltage measurement
11	**L1**	Controller power supply and measurement voltage L1 phase
12	**N**	Neutral wire of power supply controller

13	**NO1**	Relay 1 normal open contact
14	**COM1**	Relay 1 common contact
15	**NC1**	Relay 1 normal close contact
16	**NO2**	Relay 2 normal open contact
17	**COM2**	Relay 2 common contact
18	**NC2**	Relay 2 normal close contact
19	**NO3**	Relay 3 normal open contact
20	**COM3**	Relay 3 common contact
21	**NO4**	Relay 4 normal open contact
22	**COM4**	Relay 4 common contact
23	**8P8C**	ETHERNET 8P8C (RJ45)
24	**B-**	RS485 communication, signal
25	**A+**	RS485 communication, signal

26	**GND**	GND common
27	**+12V**	+12 VDC common
28	**B-**	RS485 communication, signal (Modbus RTU)
29	**A+**	RS485 communication, signal (Modbus RTU)
30	**B-**	RS485 communication, signal (Modbus Master - Inwerter)
31	**A+**	Komunikacja RS485, sygnał + , (Modbus Master - Inwerter)
32	**IN2**	SG Ready input, normal open 2
33	**IN1**	SG Ready input, normal open 1

B1 **B2** **B3**	Configuration buttons

3. INSTALLATION

3.1. Installation location

The OPTI-ENER 2.0_DIN controller is designed for DIN/TH35 rail mounting and occupies a width of 9 modules. OPTI-ENER should be installed near the main switchboard of the building. For indoor installation, it is recommended a minimum distance of 10 cm from fixed partitions. Due to the controller's IP20 protection rating, outdoor installation is possible only in a weatherproof enclosure with a protection rating of IP65 or higher. For proper operation of the controller, Internet access - Wi-Fi range (2.4 GHz) or network cable UTP minimum 5th category terminated with 8P8C connector is absolutely required.

DIN/TH35 (width 9 modules)

3.2. Connecting the current and voltage measurement lines

With the help of current transformers, the OPTI-ENER controller allows you to measure the value of the current and determine the direction of its flow. During installation, special attention should be paid to the correct installation of the current transformer on phase conductor. Incorrect installation will result in incorrect reading of measured values and incorrect operation of the OPTIENER system. The current transformer should be placed on the phase wire between the electricity meter and the power distribution of the consumers in the home electrical system. This will allow you to capture the total amount of energy consumed or released to the grid. Figures 5-6 show the correct way and direction of mounting current transformers. When it is necessary to extend the wires of the transformer, soldered connections should be made or quick connectors should be used. Connections should be made with due care and ensure that the connection point is protected from the influence of factors that reduce the quality of the electrical contact. Due to interference, do not run the signal wires from the transformers along high voltage wires.

Voltage and current measurements for a given phase take into account the phase shift and are closely related.

Connecting voltage measurement (from phase L1), and current measurement (from phase L2) for the same measurement channel will result in incorrect power and energy readings, and consequently improper operation of the OPTI-ENER. Figure 7 shows the correct way to make the connection to the controller.

According to the instruction diagram (Fig. 7), we check the place where the voltage measurement system should be installed. It is recommended that the measurement system of the OPTI-ENER controller be connected to a separate disconnector or overcurrent circuit breaker to facilitate installation and service work, and also to protect the device. The connection of the system should be made with a copper wire with a minimum diameter of 0.5 mm2. It is not recommended to install the conductors N;L1;L2;L3 under the terminals of the electrical apparatus, in which wires of a different cross-section are connected. Before connecting the conductors L1;L2;L3 performing a measurement of the phase-to-phase voltage, make sure that the power supply is three-phase.

NOTE:
OPTI-ENER 2.0 controller is compatible with selected current transformers:
- SCT010 (50A/0.333V)
- SCT019s (300A/0.333V)
- SCT031ql (300A/0.333V) Use of incompatible current transformers may damage the device.
- same as wall-mounted version

Fig. 5 How to mount the transformer on the phase wire of the home installation.

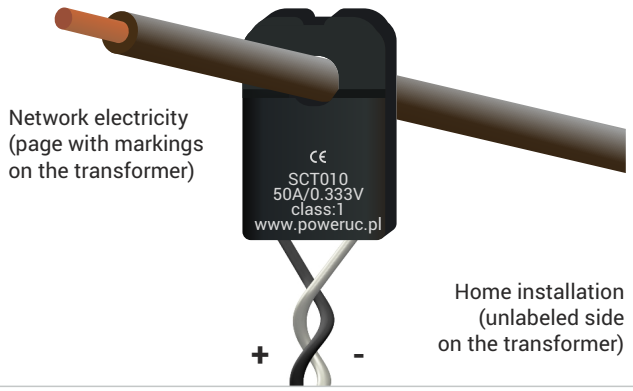
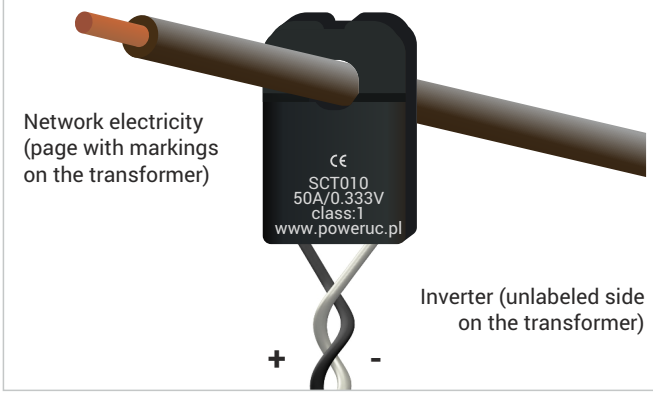


Fig. 6 How to mount the transformer on the phase wire of the inverter.



NOTE:

An isolation switch or an overcurrent circuit breaker is not included in the OPTI-ENER kit! The values of the parameters measured by the OPTI-ENER system do not take into account the period during which the installation was not monitored. The measurement tolerance of the controller is +/- 2.5%.

Make sure that the place of connection of the power source (e.g. photovoltaic installation) to the home installation is located below the location of current transformers CT1, CT2, CT3 so that these capture the total amount of energy input/output.

3.3. Internet connection

The OPTI-ENER controller can be connected to the Internet via an Ethernet cable terminated with an 8P8C connector or wirelessly via a Wi-Fi signal. In order to configure the OPTI-ENER 2.0 DIN controller, the mobile application "Hewalex Wi-Fi" released by Hewalex is required. The app is available on Android (+9.1) and iOS (+11.0).

OPTI-ENER - mobile application

android iOS

Preparation

1. Download the Hewalex Wi-Fi app - you can find it in the AppStore or Google Play.
2. Launch the app and log in. If you don't have an account yet, create one. You will also need your login information to use the EKONTROL service available in your browser and the OPTI-ENER mobile app.
3. Turn off mobile network packet data on your mobile device.
4. Turn on the power of the controller - connection setup is available up to 5 minutes after power on.

Wireless connection

1.The controller will start broadcasting its own Wi-Fi network.

2. Open the phone settings and connect to the new network Wi-Fi network of the controller. The default password is "**12345678**".

3. After successful connection, the Wi-Fi indicator LED on the controller will start to light up steadily.

4. In the Hewalex Wi-Fi app, find the OPTI-ENER controller in the device list and click its name.

5. Select "Set up local Wi-Fi connection" and enter the data of your home Wi-Fi network (name and password). Make sure the network has access to the Internet.

6. Click "Save" - The driver will start connecting to the selected network, which will be indicated by flashing Wi-Fi LED.

7. Connect your mobile device to the Wi-Fi network to which you have assigned the OPTI-ENER controller.

8. Returning to the Hewalex Wi-Fi app, you will find the controller in the list of devices. Click its name and select "Set up remote connection via the Internet".

9. Accept permission to send data to the remote server and confirm.

Wired connection

1. Connect your mobile device to the same home network, to which the OPTI-ENER controller is connected.

2. Open the Hewalex Wi-Fi app and find the OPTI-ENER controller in the list of devices.

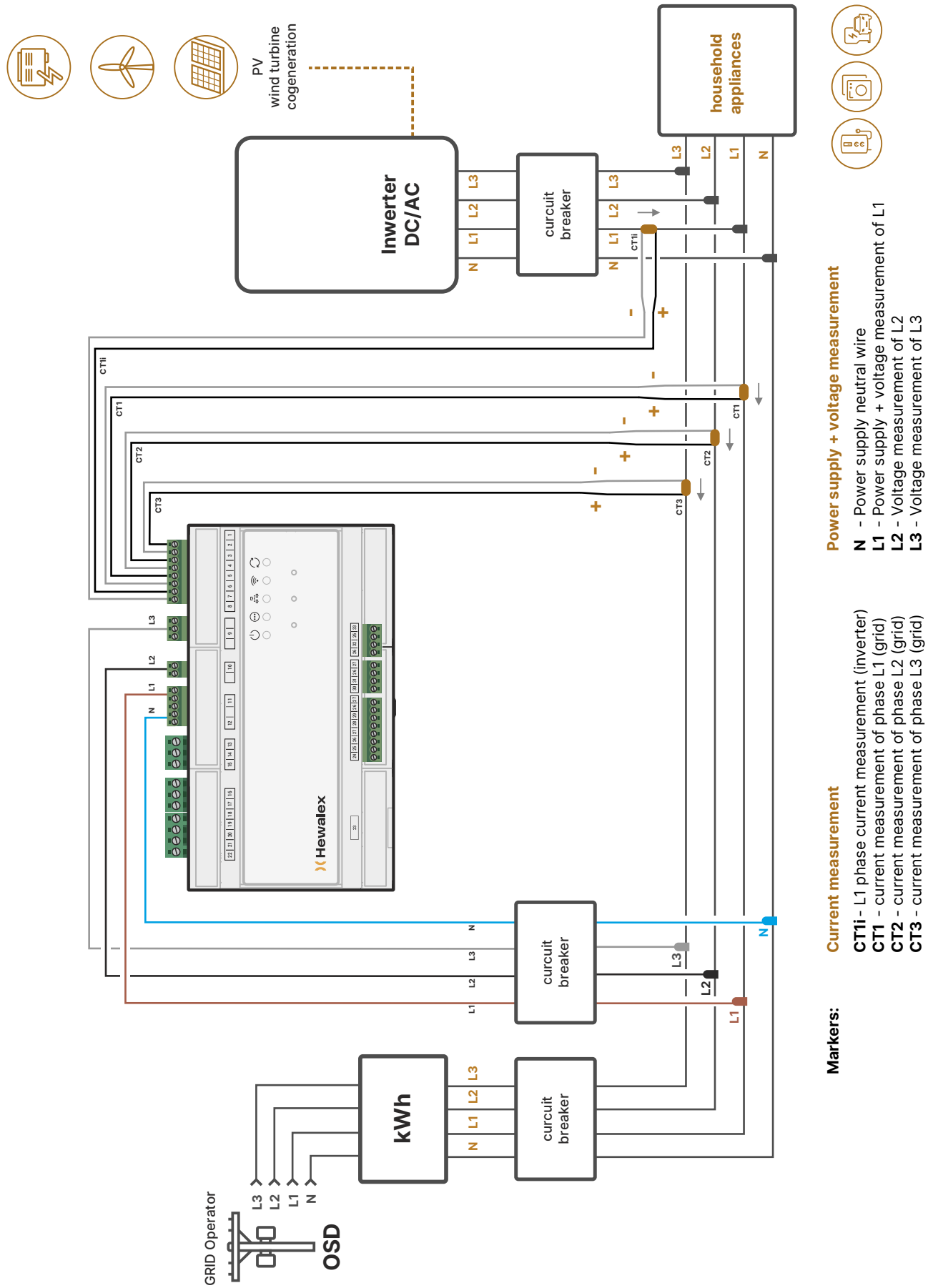
3. Click the name of the controller and select "Set up remote connection over the Internet". Make sure your network has access to Internet.

4. Accept permission to send data to remote server and confirm.

NOTE:
When making a Wi-Fi connection, be sure to turn off Packet Data on your mobile.

Once the above steps have been correctly completed, the controller will be assigned to a user account and its operation will be possible to monitor from the Ekontrol platform in both browser and mobile versions.

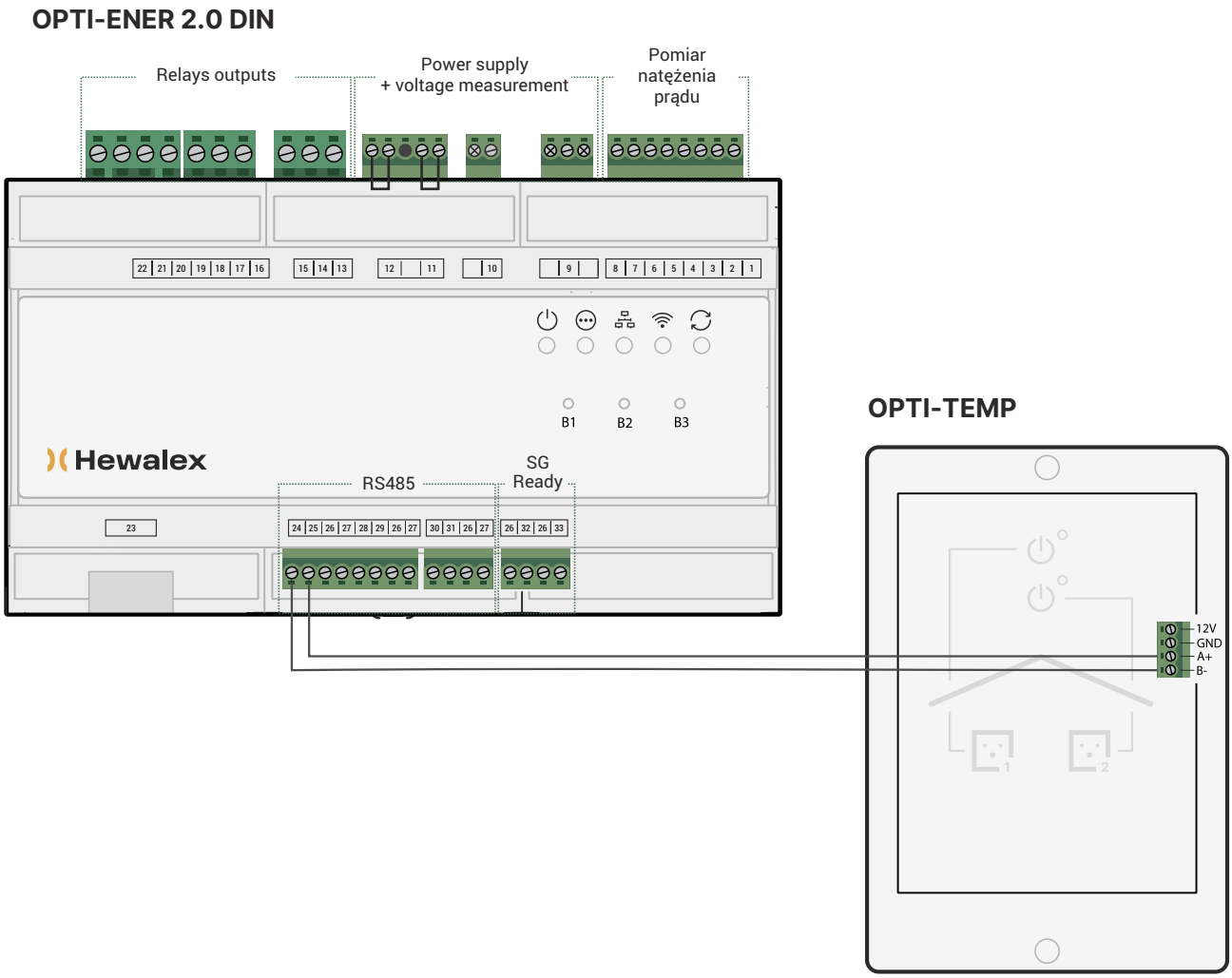
Fig. 7 How to assemble the measurement system



3.4. Connecting the OPTI-TEMP module

OPTI-TEMP allows stepless power control of a resistive element with a power of up to 2kW, such as an electric heater. The regulation is based on use of the temporary surplus of power produced by the photovoltaic installation over the consumption resulting from the current demand. Thus, we can reduce the surplus energy given to the grid, keeping the balance of power given and consumed at zero. The wiring diagram of the OPTI TEMP module is shown in Figure 8. For more information, see the manual provided with the OPTI-TEMP module.

Fig. 8 **OPTI-TEMP device wiring diagram**



3.5. Connecting the inverter

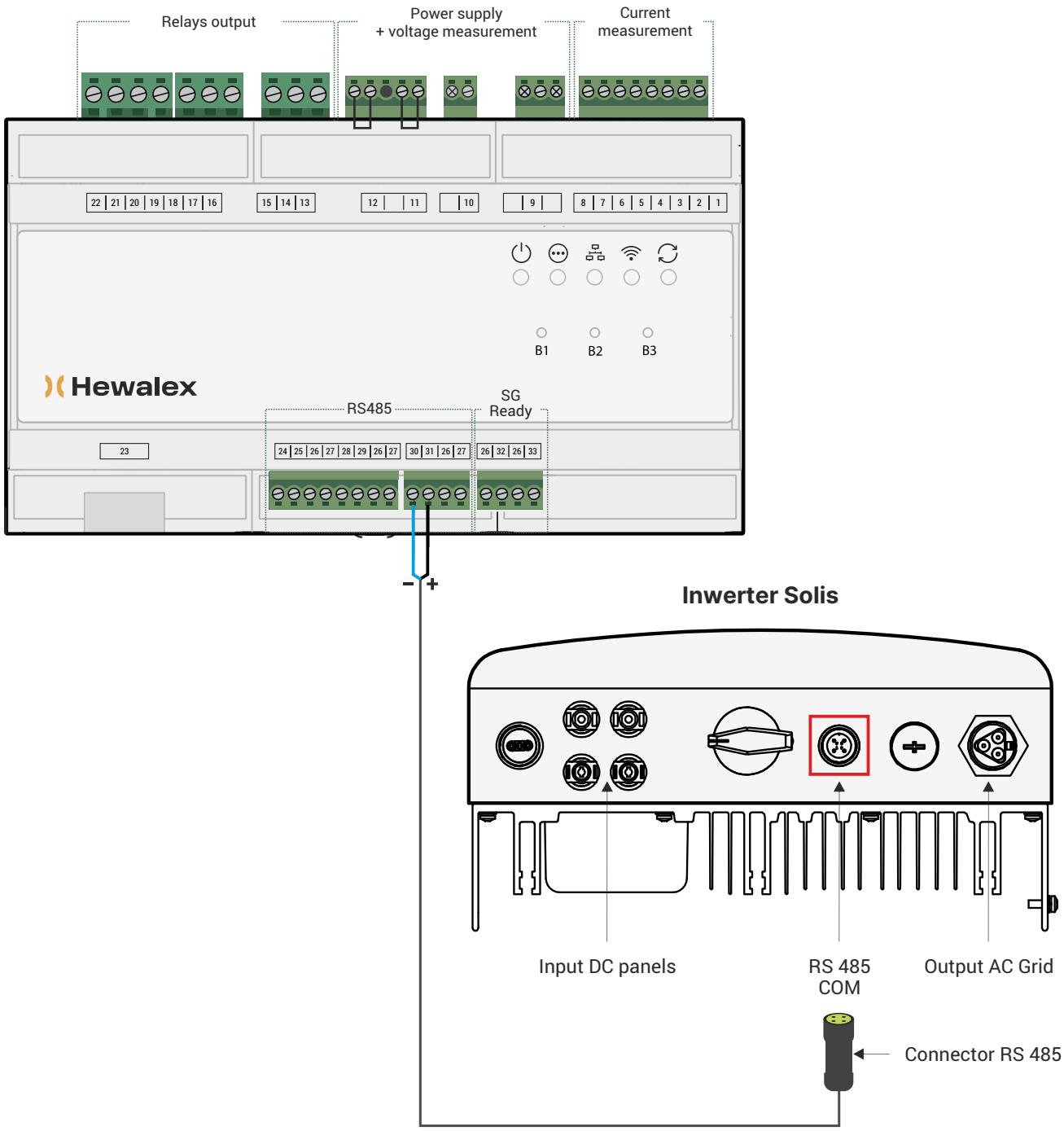
OPTI-ENER controller allows remote reading of parameters measured by the inverter. In addition, in the case of necessity smooth limitation of power generated by the photovoltaic installation, we can maintain the programmed threshold of energy discharged to the grid, for example, having a photovoltaic installation of 20kW after programming the maximum level of power discharged to the grid at 10kW, this threshold will not be exceeded. Functionality can be particularly useful in facilities, which can not send surplus energy to the grid. The connection diagram is shown in Figure 9.

Correct communication with the inverter is indicated by a continuous LED light .

NOTE:

OPTI-ENER works only with SOLIS (Ginlong) inverter, purchase of communication plug is required for connection.

Fig. 9 **Inverter wiring diagram**



The following operating modes of the power limiter are available:

A - off, no power limiter operation

B - limiting inverter power to the least loaded phase for a 1-phase inverter

C - limitation of inverter power to the level resulting from power balancing for phases L1, L2, L3

D - limiting inverter power to the least loaded phase for a 3-phase inverter

E - limitation of the power of the installation from the current voltage

3.6. OPTI-ENER operational buttons

The OPTI-ENER controller is equipped with three buttons B1; B2; B3 located on the front of the housing. The configuration of the functions possible to be called by B1; B2; B3 buttons, as well as non-standard LED signaling, is listed in Tab. 3.

Options: Controller Restart, Subnet Device Removal, Factory Reset, and Wi-Fi Removal from available up to 3 minutes after powering up the OPTI-ENER controller.

Tab 3. Description of configuration buttons

Button	Hold time	Description	Indication
B2	Until 2 times pulsing	Addition of OPTI-TEMP add-on module; Solis Inverter to OPTI-ENER subnet.	The green diode ( ) turns on and off for 1 second and then starts flashing. The red diode ( ) flashes 2 times
B2	Until 3 times pulsing	Driver Restart Causes devices to be removed from the OPTI-ENER subnet. Without changing the driver settings.	The green ( ) and red ( ) LEDs of will light up simultaneously for 1 second , and then turn off.
B2	Until 4 times pulsing	Restore factory settings and remove from OPTI-ENER subnet.	The red LED ( ) will turn on and light continuously. Releasing the buttons will turn on the green LED ( ) for 1 second.
B3	5 seconds	Removing Wi-Fi networks from the memory of the OPTI-ENER driver.	After 5 seconds, the green LED ( ) will start flashing.

4. POWER CONTROL OF ELECTRICAL APPLIANCES

4.1. Voltage-free normally closed contacts

OPTI-ENER 2.0 DIN controller has four voltage-free relay outputs, which allow to switch on/off independently four circuits with separate settings for each relay output.

Control of devices can be realized by:

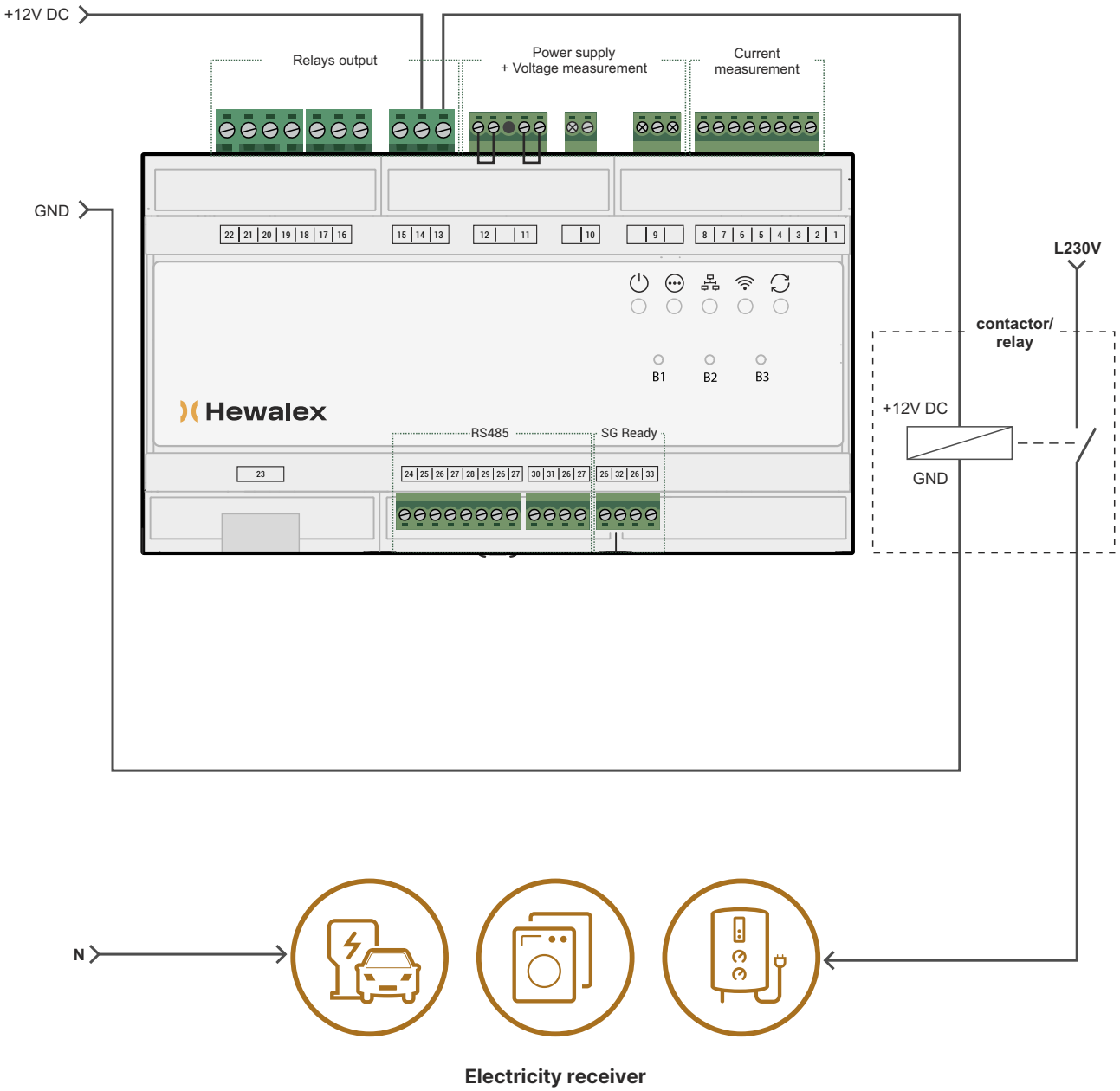
- direct connection of receivers under the contacts of the controller *
- using radio communication - connecting a compatible transmitter
- connecting a radio transmitter of the OPTI-HOME system (details of commissioning and operation are included in the manual provided with the device).

Diagrams of example connections are shown in Figure 10.

NOTE:

Direct connection of the power supply to the device with the maximum current exceeding the maximum current load of the relay contacts (see p.3) is forbidden and risks damaging the OPTI-ENER 2.0 DIN electronics. If you wish to connect a more powerful power consumption, it is recommended to use additional electrical apparatus (contactor/relay).

Fig.10 **An example of the use of the relay's NO contacts.**



Electricity receiver

In the figure, power is supplied to all relays, while the power supply to the contactor coil is derived only for relay 1, the others are connected analogously.

4.2. SG Ready

The OPTI-ENER controller is equipped with a special connector that allows integration with the smart grid (Smart Grid - SG). SG Ready functionality refers to the operation of the OPTI-ENER system circuit control algorithm.

The cooperation of the device with the smart grid can be carried out according to four modes of operation, the description of which is presented below.

1) Lock mode 1:0
No authorization for Opti-Ener + Opti-Temp circuits.

2) Normal mode 0:0
Idle state. Does not affect changes in Opti-Ener circuit control.

3) Elevated mode 0:1
Forces the two circuits with the highest priority to be switched on.

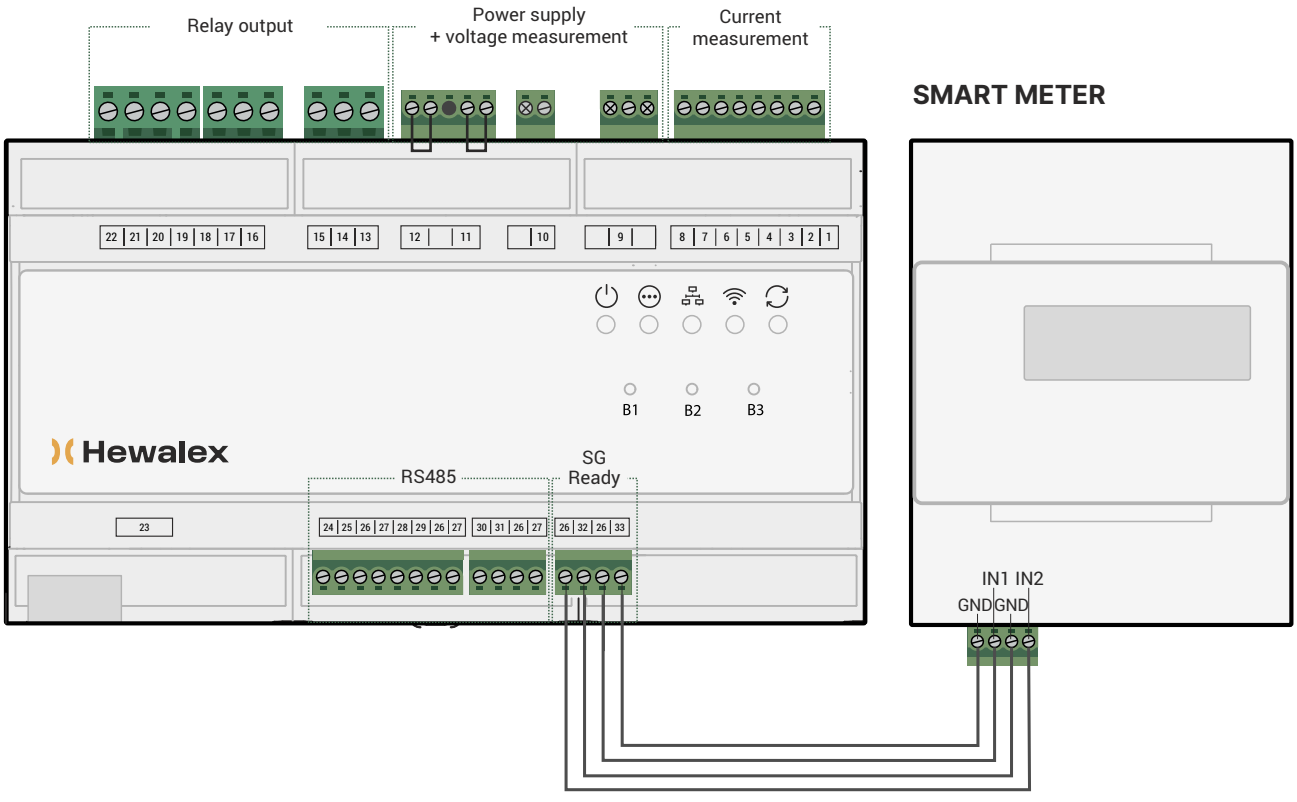
4) Elevated mode and forcing 1:1 inclusion
Forces 1E,2E,3E,4E + 1T,2T circuits and the heater (where the heater runs 0/1 until max temp is reached).

From the moment the switch-off signal is received, the circuit remains switched on according to the setting of the parameter "Minimum time switch-on".

The SG Ready connector can be used as an ON/OFF key button output to manually turn on/off the relay outputs according to the ON/OFF signal received.

NOTE:
Circuits with priority 0 (disabled) do not participate in SG Ready control.

Fig. 11 **Example of connecting OPTI-ENER 2.0 DIN with a Smart Meter**



5. ACCOUNT CONFIGURATION

5.1. Settings - Installer

After the OPTI-ENER system is properly installed, take the following steps:

1) Download and install the Hewalex Wi-Fi app.

2) Create a user account. Configure the Wi-Fi network according to the application instructions or connect the Ethernet cable 8P8C and associate the device with the user account (remote access).

3) From the Ekontrol platform, open the installer window.

4) Expand and complete the General ribbon - selection of energy balancing method, operation mode, power returned to the grid, power source, type of transformer, nominal power of power source.

5) Expand and complete the ribbon Opti-Ener circuit control and Opti-Temp circuit control (optional). For correct control settings of each circuit, fill in the following fields:

- Phase selection - declare the order in which the circuits are switched on (option available for operation mode B)
- Priority - declare the order in which the circuits are switched on
- Excess power threshold - declare the value of the excess power that will switch on the circuit (device)
- Switch-on delay time - declare the period for which the excess power must persist in order to switch on the circuit (device)
- Switch-on time - declare the minimum time for which the circuit (device) is to remain switched on.

A detailed description of each parameter is available to call up by clicking the information button ". Their meaning in the context of system correctness is marked with colors:

- Red - description of the setting related to the selection of the control algorithm, intended for editing only by the installer,
- Yellow - description of the setting related to the selection of the control algorithm, intended for editing mainly by the installer,
- Green - description of the setting intended for editing by the user.

5.2. Settings - user

The User window is for user changes, where we will find the time program and manual control. This is where will find up to two ribbons - Opti-Ener circuit control and, for owners of the add-on module, the ribbon

Opti- Temp control, the description of which can be found in the device manual.

1) Manual control - switching on/off the circuit (devices).

2) Timed program - setting a program that will turn on the circuit (device) regardless of other settings.

A detailed description of each parameter is available for calling by clicking on the information button „ ".

The OPTI-ENER system is constantly being developed for newer and newer functionalities, which are added as part of updates.

6. TROUBLESHOOTING

Lp.	Issue description	Solution to the issue
1	The device does not turn on - no response from signaling LEDs.	1. Check that the power supply is applied to the appropriate plug connector - in accordance with the diagram Fig. 7. 2. Check whether the supplied wires are live. 3. Check whether the supplied wires have been correctly plugged into the sockets.
2	The device does not display in the mobile app or on ekontrol.pl/en/	1 Verify that the device is on - continuous LED light⏻ . 2. Verify the correct connection of the Ethernet cable in case of LAN connection. 3. verify that the Wi-Fi network is configured correctly via the mobile application. If necessary, repeat the process. 4. verify that the controller has been assigned to a user account using mobile application.
3	When the device was connected, the protection against electric shock was triggered.	1. Check the correctness of electrical connections. 2. Check the correctness of the anti-shock apparatus.
4	Power indications are invariably zero.	1. Check the power supply - phase voltage. 2. Check the correctness of the connections of the measuring system according to the diagram in Figure 7.
5	OPTI-ENER indicates 3 times less power than the indication on the inverter.	1. Change the power sources to 3-phase in the Settings-Installer-General-Power Source menu.
6	Power indications have incorrect signs. The state of energy consumption is marked with a negative value. The state of energy output is marked with a positive value.	1. Check if the readings from phase L1; L2; L3 are positive (energy output), if so invert the current transformer on the phase wire or swap places transformer wires connected to OPTI-ENER. 2 Check if the inverter power indicates a negative reading (energy consumption), if so invert the current transformer on the L1 phase wire from the inverter or swap the transformer cores connected to the OPTI-ENER by places.
7	The system shows incorrect values of power consumed and/or given up.	1. Check that the correct type of current transformer is selected in the menu Settings-Installer-General-Type-Transformer. 2. Voltage and current measurements for the same measurement channel take place for different phases (see section 3.2).
8	The power produced is added to the power consumed.	1. Verify whether turning the inverter on/off during the day will cause an increase/ decrease in the value on the meter of energy consumed at home: - no - correct operation, no action. - yes - verify the correctness of the connections according to Figure 7. 2. Verify that the place of plugging the power source into the home installation is below the location of current transformers L1; L2; L3; so that these capture the total amount of energy given/collected.
9	OPTI-ENER does not turn on/off circuit (device) on basis of excess energy.	1. Update OPTI-ENER software. 2. Check the correctness of the connections of the voltage-free NO contacts with the diagram in Fig. 10. 3. Check whether the manual priority has been enabled in the menu Settings - Installer -Circuit Control-Priority menu. 4. Check whether the excess power threshold switching on the circuit (device) has been reached. Check whether the minimum time to turn on the circuit (device) has been reached. 6. Check whether the circuit (appliance) switch-on delay time has passed.
10	OPTI-ENER does not connect with OPTI-TEMP or SOLIS inverter	1. Check the behavior of the indication LEDs on the OPTI-TEMP according to the instructions. 2. Check the signaling LED 🖧 . 3. Check the correct connections of the communication ports according to the diagram in Figure 8-9. 4. Restart the controller and repeat the pairing process.

7. INFORMATION ON LABELING AND COLLECTION OF WASTE ELECTRONIC EQUIPMENT

The symbol on the product or its packaging indicates the selective collection of used electrical and electronic equipment. This means that this product should not be disposed of with other household waste. Proper disposal of old and used electrical and electronic equipment will help avoid potentially adverse effects on the environment and human health. It is the user's responsibility to selectively collect used equipment, and should return it to collector of used equipment.

!

- This equipment is not intended for use by persons (including children) with limited physical, sensory or mental ability, or persons without experience or familiarity with the equipment, unless under supervision or in accordance with the instructions for use of the equipment given by persons responsible for their safety. Children should be watched to ensure that they do not play with the equipment.
- If the non-removable power cord becomes damaged, it should be replaced at the manufacturer or at a specialized repair facility or by a qualified person to avoid danger.