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FAKE PV RETROFIT USER MANUAL

VERSION 0.1 (beta)

Breeze Energies



Breeze Energies Sp. z o.o.
Ul. Wielkanocna 6/39
19-300 Ełk
NIP: 8481873644

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TABLE OF CONTENTS

TABLE OF CONTENTS	1
1. INTRODUCTION	3
1.1 PURPOSE OF THE DEVICE	3
1.2 SYSTEM COMPONENTS.....	3
2. PRECAUTIONS.....	4
2.1 GENERAL SAFETY RULES.....	4
2.2 SAFETY WHEN WORKING WITH ELECTRICAL EQUIPMENT	4
2.3 SAFETY WHEN INSTALLING THE LC48100 BATTERY	4
2.4 OPERATION WITH CURRENT TRANSFORMERS (CT)	4
2.5 ENVIRONMENTAL AND OPERATIONAL CONDITIONS	4
3. LIST OF COMPONENTS AND REQUIRED TOOLS	5
3.1 CONTENTS OF FAKE PV RETROFIT KIT	5
3.2 COMPONENTS REQUIRED (NOT INCLUDED)	5
3.3 TOOLS REQUIRED FOR ASSEMBLY	5
4. TECHNICAL DESCRIPTION OF THE EQUIPMENT	5
4.1 TECHNICAL PARAMETERS	5
4.2 EQUIPMENT COMPONENTS.....	6
5. CONNECTION DIAGRAM AND SYSTEM CONFIGURATION.....	7
5.1 OPTION A (CYCLICAL) - Current measurement at inverter output and Fake PV Retrofit	7
5.2 OPTION B (AUTOCONSUMPTION) - Measurement of current at network input.....	9
6. STEP-BY-STEP INSTALLATION.....	11
6.1 SITE AND EQUIPMENT PREPARATION	11
6.2 FAKE PV RETROFIT INSTALLATION.....	11
6.3 CONNECTING THE BATTERY	11
6.4 AC POWER CONNECTION	11
6.5 MOUNTING OF CT TRANSFORMERS	11
6.6 PV CONNECTION	12
7. INITIAL START-UP	13
7.1 URUCHOMIENIE URZĄDZENIA.....	13
7.2 ENTERING THE CONFIGURATION MENU	14
7.3 SETTING THE TIME AND DATE	14
7.4 BATTERY CAPACITY SETTING	15
7.5 LANGUAGE SETTING.....	15

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7.6	SETTING THE OPERATING MODE	15
7.7	MANUAL MODE	16
7.8	RETURN TO HOME SCREEN	16
8.	OPERATION AND MAINTENANCE	17
8.1	RECOMMENDATIONS FOR DAILY OPERATION.....	17
8.2	MONTHLY SYSTEM REVIEW	17
8.3	CLEANING AND MAINTENANCE.....	17
8.4	UPDATES AND SERVICE	17
9.	CONTACT AND SERVICE	18

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1. INTRODUCTION

This user manual is designed for those installing and using the Fake PV Retrofit device, an innovative solution that allows the expansion of a traditional photovoltaic installation with energy storage without replacing the inverter.

The purpose of the document is to provide clear, understandable and practical instructions for the correct connection, configuration and operation of the system. We assume that the reader does not have technical knowledge, so all procedures are presented step by step, in a way that can be understood by the installer, end customer or home user.

The manual includes:

- description of the functions and operation of the device,
- tips for safe installation,
- wiring diagrams,
- instructions for commissioning and initial configuration,
- principles of operation and diagnosis of problems.

The device is fully compatible with ION Breeze LC48100 battery packs and works with most mains inverters on the market. Please read the instructions carefully before installation and keep them for future reference.

The contents of the manual are subject to change/update due to product development. The information in the manual may be updated without warning. The most current version of the manual is available at: <https://breeze-energies.com/>

1.1 PURPOSE OF THE DEVICE

Fake PV Retrofit is a device designed to integrate energy storage into an existing PV installation, without the need to replace the grid inverter. The device redirects excess power produced by the actual PV installation to the battery, and then uses the stored energy to power the building when production from PV is insufficient (e.g., in the evening, at night), simulating the operation of the PV installation.

1.2 SYSTEM COMPONENTS

The following components are required for the system to work properly:

- Fake PV Retrofit device.
- A grid-tied inverter.
- PV installation.
- ION Breeze LC48100 lithium-iron-phosphate (LiFePO4) battery.

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2. PRECAUTIONS

Before installing and using the Fake PV Retrofit device, carefully read the following safety rules. Following them will minimize the risk of electric shock, damage to the device and other health and property hazards.

2.1 GENERAL SAFETY RULES

- **The installation may only be carried out by a person of legal age**, equipped with basic personal protective equipment (gloves, goggles), **certified to work with electrical equipment up to 1 kV**.
- **Do not connect the device to the power supply before completing the entire installation!**
- Avoid working in a humid environment - perform installation in a dry and well-ventilated place.
- Do not install the device or wires when they are wet or soggy.
- Do not touch connectors and wires with bare hands while the device is in operation - use only tools with insulated handles.

2.2 SAFETY WHEN WORKING WITH ELECTRICAL EQUIPMENT

- Before installation or disassembly, **disconnect the device and inverter from AC power and PV system, and disconnect the battery, protect the power sources from re-energizing!**
- **Do not allow short circuits!** When working, be careful, especially with battery terminals - do not use metal tools without insulation.
- Connect wires with the correct polarity: **red = plus (+), black = minus (-)**.

2.3 SAFETY WHEN INSTALLING THE LC48100 BATTERY

- Read the Ion Breeze LC48100 battery manual!
- Batteries are **heavy (approx. 40 kg)** - use safe lifting techniques and/or the assistance of another person.
- **Do not lift the battery by the leads or connectors!**
- The battery must be switched off before connecting - do this via the Breeze BMS app.

2.4 OPERATION WITH CURRENT TRANSFORMERS (CT)

- Current transformers are not live, but must be installed carefully, following the direction of current flow (as indicated by the arrow on the CT housing).
- **Do not cut the phase wires** - the transformer is applied directly to the existing wire.
- Always check that the transformer is well sealed and applied to the correct conductor.

2.5 ENVIRONMENTAL AND OPERATIONAL CONDITIONS

- Ambient temperature at which the unit can operate: **0°C to +40°C**.
- Avoid mounting in areas exposed to moisture, dust, grease, direct sun or intense vibration.
- The unit is not designed to be operated outdoors without a cover - if mounted in a garage or boiler room, make sure the location is dry.

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3. LIST OF COMPONENTS AND REQUIRED TOOLS

3.1 CONTENTS OF FAKE PV RETROFIT KIT

Make sure you have all the components necessary to install the unit before you start. The kit should include:

- Fake PV Retrofit device
- Warranty card
- Set of photovoltaic connectors (2 x male, 2 x female)

3.2 COMPONENTS REQUIRED (NOT INCLUDED)

Additional components are required for proper operation of the system and must be supplied separately:

- LiFePO4 battery **ION Breeze LC48100**
- **Mains inverter** - compatible with the electrical parameters of the unit
- **Cables (1x4mm², 1000V) to connect the unit to the inverter**

3.3 TOOLS REQUIRED FOR ASSEMBLY

It is recommended that the following tools are prepared for the installation:

- **Protective gloves and goggles** - for personal safety
- **Voltage meter or multimeter** - to verify the absence of voltages at the terminals of the device, PV installation, AC supply during the installation of the device
- **Insulation stripper**
- **Crimping tool for photovoltaic connectors**
- **Screwdriver or screwdriver**
- **Hammer drill**
- **Spirit level**
- **Sleeve crimping tool**

4. TECHNICAL DESCRIPTION OF THE EQUIPMENT

4.1 TECHNICAL PARAMETERS

Parameter	Value
AC operating voltage	3 x 230 V
Number of phases/conductors	3/5
AC input Conducto	Cable 5 x 1.5mm ²
Battery charge/discharge power	2 kW
Battery voltage range	45 V – 58,4 V

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Maximum battery current	50 A
PV input/output	1000 V / 15 A (złącze MC4)
Battery connector type	Anderson SB50
Recharge/discharge cycle efficiency (from AC connector to AC connector)	>85%
Dimensions (W x S x G)	435 x 483 x 179 mm
Weight	<15 kg
Permissible ambient temperature during operation	0 – 40°C
Protection	Thermal, Reverse polarity protection on PV input

4.2 EQUIPMENT COMPONENTS

The Fake PV Retrofit unit has the following physical components available to the user or installer:

- **AC input/output** - a port for connecting the unit to a domestic three-phase five-wire (3 x 230V) installation, in the form of a 5 x 1.5mm² cable, 5m long
- **PV input** - MC4 type connectors for the connection of cables from photovoltaic panels.
- **Battery output** - Anderson SB50 connector for safe and quick battery connection.
- **Current transformers (CT)** - measurement of current in individual phases, brought out on wires of 1.5m each.
- **Screen** - display for reading information and configuring the unit.
- **Two control buttons** - located next to the OLED screen, they are used, among other things, to navigate through the configuration menu, set the operating mode, etc.
- **LEDs** - auxiliary indicator lights.
- **GRID switch** - activates the device's power supply, enables the battery to be charged and the mains voltage to be measured.
- **PV switch** - activates the PV installation, allowing the actual set of panels to work with the inverter.

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5. CONNECTION DIAGRAM AND SYSTEM CONFIGURATION

The Fake PV Retrofit acts as an intermediary between the existing PV installation and the battery, without interfering with the inverter itself. The device does not replace the inverter, but works in conjunction with it, redirecting excess energy to the storage and returning it when needed.

The system includes:

- **Grid inverter** - serving production from PV.
- **LC48100 battery** - which stores the energy.
- **Fake PV Retrofit** - managing the flow of energy between the grid, PV and storage.

5.1 OPTION A (CYCLICAL) - Current measurement at inverter output and Fake PV Retrofit

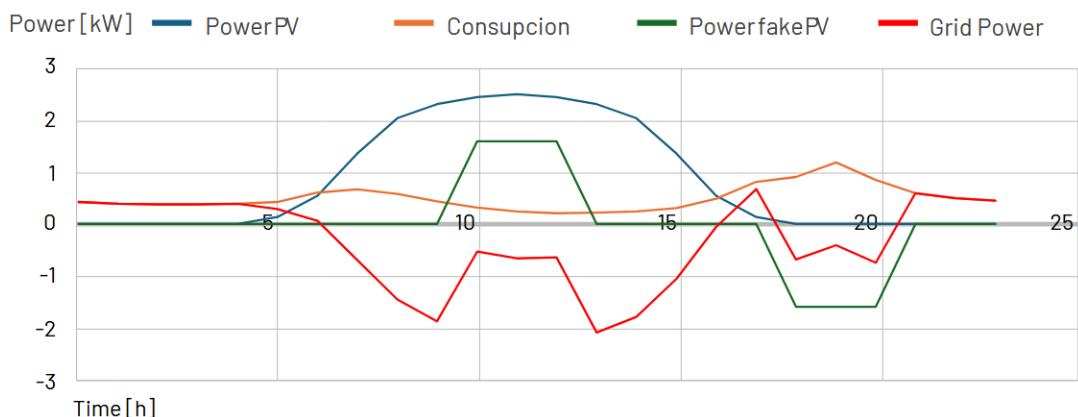
What are we measuring?

- The energy generated by the inverter.

Operating principle:

- The Fake PV Retrofit enters charging mode at **11:00 a.m.** and remains in charging mode until production disappears on the string to which it is connected.
- Production above **2 kW** is a prerequisite for the start of charging.
- Charging at a constant output of **2 kW**.
- When energy consumption exceeds PV production the missing energy is taken from the grid.
- Fake PV Retrofit enters discharge mode at **19:00**, provided there is no production on the string to which it is connected.
- The discharge time is selected to serve the period when the energy demand at home is usually highest and when the price of energy from the grid is highest.
- Discharge takes place at a constant power of **2 kW**, regardless of the house load.

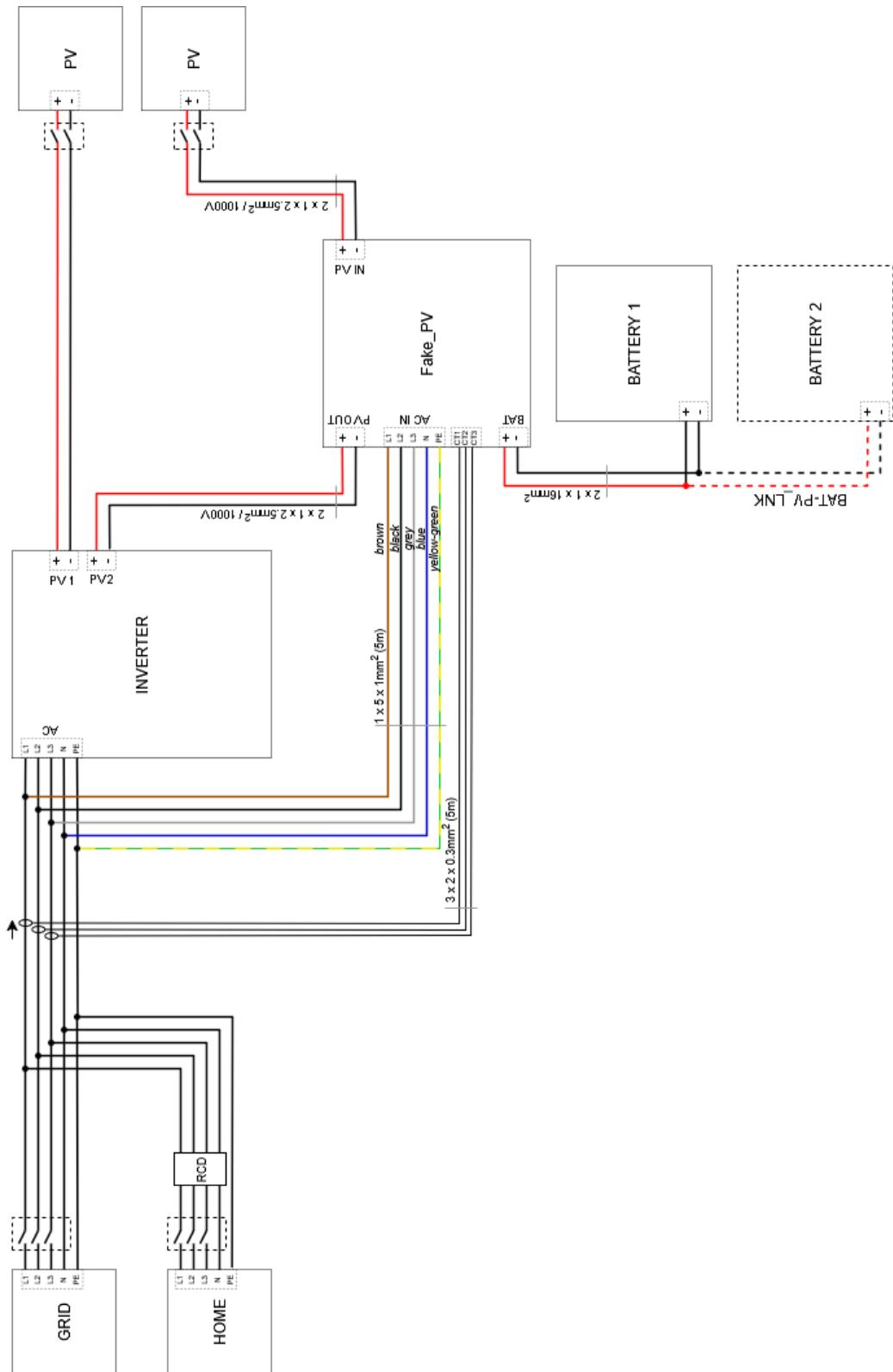
FAKE PV RETROFIT - operation with current measurement at the inverter output



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Where do we install CTs?

On the phase wires coming out of the inverter, after the connection point of the Fake PV Retrofit



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5.2 OPTION B (AUTOCONSUMPTION) - Measurement of current at network input

What are we measuring?

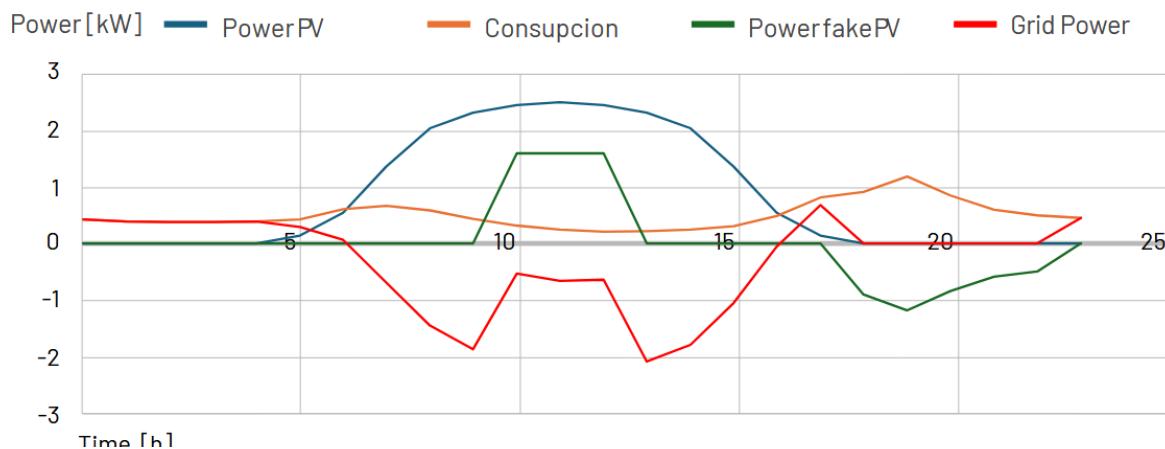
- Energy exchange with the electricity grid.

Operating principle:

- The Fake PV Retrofit enters charging mode at **11am** and remains in charging mode until the production on the string to which it is connected disappears.
- The prerequisite for the start of charging is the detection of energy being returned to the grid.
- Charging at a constant output of **2 kW**.
- When energy consumption exceeds PV production the battery will not be charged.
- Fake PV Retrofit enters discharge mode at **19:00**, provided there is no production on the string to which it is connected.
- The discharge power is matched to the current energy demand of the house.
- If the energy from the battery is not completely consumed by the household by dawn, the remainder will automatically be returned to the grid.

FAKE PV RETROFIT

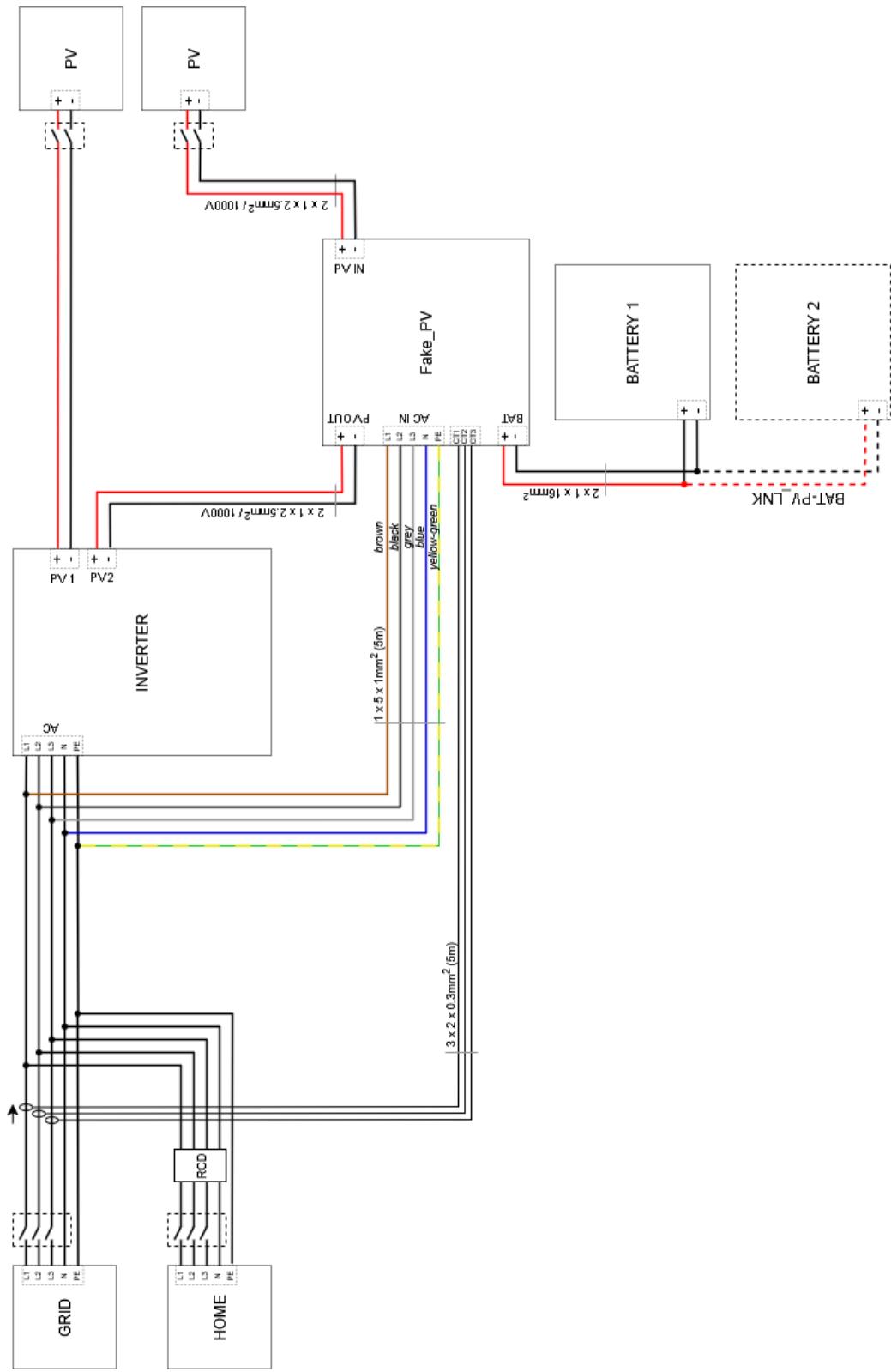
- Operation with current measurement at the grid input



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Where do we mount the CT?

On the phase wires bringing power from the mains to the main switchboard.



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6. STEP-BY-STEP INSTALLATION

This chapter will guide you through all the necessary steps to correctly install and commission the Fake PV Retrofit system.

6.1 SITE AND EQUIPMENT PREPARATION

Installation location:

- Should be dry, stable, well ventilated, away from direct sunlight and dampness.
- Ambient temperature: 0°C to +40°C.

Tools required for installation:

- Protective gloves and goggles.
- Voltage meter or multimeter.
- Insulation stripper, crimping tool for MC4 connectors and for sleeves.
- Screwdriver/screwdriver, hammer drill, spirit level.

6.2 FAKE PV RETROFIT INSTALLATION

1. Position the LC 48100 battery module on a stable, level and dry surface.
2. Place the FAKE PV RETROFIT directly on the battery module, matching the mounting holes.
3. Use the dedicated mounting screws to connect the FAKE PV RETROFIT to the battery pack.
4. Only after the kit has been screwed together, screw the whole (battery + FAKE PV RETROFIT) to the wall, using wall plugs and screws through the mounting holes in the battery housing.
5. Ensure that the structure is stable and that there is ventilation around the unit.

6.3 CONNECTING THE BATTERY

1. Download the Breeze BMS app and connect to the LC 48100 module.
2. Turn off the battery in the app before making any connections.
3. Locate the cable with the Anderson plug coming out of the FAKE PV RETROFIT.
4. Plug the Anderson plug directly into the battery socket, observing the correct polarity (red = plus, black = minus).
5. Ensure that the connector is correctly seated and has no play.

6.4 AC POWER CONNECTION

1. Switch off the power supply to the building and the inverter, make sure that there is no voltage on the phase wires.
2. Use a 5 x 1.5 mm² cable to connect the unit to the house installation (3 x 230 V).
3. Check that the connections are correct and that the wires are crimped.
4. Do not switch the power on yet - the GRID switch should be in the OFF position.

6.5 MOUNTING OF CT TRANSFORMERS

1. Select the mounting variant for the CT transformers:
 - **Variant A** - mounting on the phase conductors coming out of the inverter, after the Fake PV Retrofit sub-connection point, so that the measurement includes the current of both devices.
 - **Variant B** - mounting on the phase conductors bringing power from the grid to the main switchboard.
2. Each CT transformer has a designation (1, 2, 3) corresponding to phases L1, L2, L3.

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- **Transformer (CT) 1** must be put on the same phase to which the **L1** wire from the AC input of the FAKE PV Retrofit is connected.
- Similarly, **CT 2** to phase **L2**, **CT 3** to phase **L3**.

3. Attach the transformers to the corresponding wires, maintaining the direction of current flow (arrow on the CT housing in the direction of Fake PV Retrofit).
4. Ensure that all transformers are closed, firmly mounted and connected to the corresponding inputs on the unit.

6.6 PV CONNECTION

1. **Check safety conditions:**
 - Ensure that the PV installation is de-energised.
 - Check with a meter that there is no voltage on the PV wires before connection.
2. **Identify the PV wires:**
 - Find the DC wires coming from the strings of the PV panels.
 - Check their polarity: **red wire - plus (+)**, **black wire - minus (-)**.
3. **Connection to the FAKE PV RETROFIT:**
 - The FAKE PV RETROFIT is equipped with two MC4 (PV input/output) connectors.
 - Connect the PV cables to the corresponding MC4 connectors on the unit:
 - **Plus (+)** to the connector marked PV+
 - **Minus (-)** to the connector marked PV-.
4. **Check for correct connections:**
 - Make sure the MC4 connectors are plugged in as far as they will go - they should "click".
 - Check their firmness by pulling lightly on the cable - it should not slip out.
5. **Safety and polarity:**
 - Do not swap polarity - reverse connection may damage the unit.
 - If in doubt about polarity, measure the voltage on the PV wires before plugging in.
6. **Finalizing:**
 - After completing the connection, make sure that the wires are routed aesthetically, without tension and with adequate length reserve.
 - Avoid sharp bends in the wires and contact with the edges of the structure.
7. **Connecting the FAKE PV RETROFIT to the inverter:**
 - Two more MC4 connectors come out of the FAKE PV RETROFIT - this is the PV output (PV OUT).
 - Use 1x2.5 mm² solar cables to connect the MC4 output of the FAKE PV to the PV input of the inverter. Connect PV+ to the plus input of the inverter, PV- to the minus input.
 - Make sure that the length of the wires is appropriate and that the routing route protects them from damage.
8. **Check and finalise:**
 - Check all MC4 connections: plug in as far as possible, no slack, correct polarity.
 - Ensure cables are not stressed, kinked or damaged.
 - Verify cable routing to avoid the risk of abrasion or accidental disconnection.

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7. INITIAL START-UP

Once the physical assembly of the unit and all electrical connections have been completed, the system should be commissioned and verification of the correct operation of the system should be carried out.

7.1 URUCHOMIENIE URZĄDZENIA

Paragraphs 7 to 13 refer to the first start-up including checking the operation of the unit.

1. Check that all connectors are correctly connected as instructed in section 6 of this manual.
2. Check that the wires are tightened in the connectors by pulling lightly on the wire, the wire should not yield to movement.
3. Check that all switches are in the OFF position.
4. **Switch the batteries** on using the Breeze BMS app. Wait 30 seconds for the battery to complete the start-up process.(Pre-charge).
5. **Turn on power to the Fake PV Retrofit** - set the GRID switch to the ON position.
6. After a few seconds, the OLED screen on the Fake PV Retrofit will display:
 - **Current Date and Time at the top of the screen,**
 - **Daily, monthly and total energy generated at the PV OUT connector**
 - **Status of operation**
 - **Current battery power**
 - **Mode of operation (cyclic/autoconsumption)**

This information refreshes automatically every few seconds and allows you to monitor basic system parameters. It is possible to move between the information screens more quickly by briefly pressing the left button.



7. Verify the time displayed by the screen; if the time displayed is incorrect, change it via the menu.
Correct indication of the time by the unit is essential for correct operation of the entire unit!
8. Set the capacity of the connected energy storage in the menu according to the instructions in section 7.2.(The device has a default capacity setting: 100Ah). In the current version it is possible to choose between 100Ah and 200Ah.
9. Start **charging** the energy storage via manual control mode. The screen should change to Charge mode, the red LED on the right-hand side of the screen should blink and the battery power should increase to a value of approximately 2000W.
10. **Switch on the mains inverter.**
11. Via manual control mode, start **discharging** the energy storage. The screen should change to **Discharge mode**, the red LED on the left side of the screen should blink and the battery power should increase to a value of approximately 2000W. The power in discharge increases depending on the mode and inverter model, usually a linear increase after a 60 second time delay.
12. Return to **normal** operation via manual control mode.
13. **Switch off the mains inverter.**

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14. **Set the PV switch to the ON position** - activates the power supply from the photovoltaic panels to the unit.
15. **Switch on the mains inverter.**
16. If the data is visible and changes over time, it means that the system is working correctly.
17. If data is not visible or does not change:
 - Check the correct connection of the CT transformers.
 - Ensure that the battery is active (in the Breeze BMS application).
 - Restart the unit by setting the GRID switch to OFF and after 30s set it back to ON.

7.2 ENTERING THE CONFIGURATION MENU

1. **Hold down the right button for 1 second** to enter the settings menu.
2. A scrolling menu will appear on the screen:

A short press of the right button changes the sub-menu selection downwards.

A short press of the left button changes the sub-menu selection upwards.

Holding down the right button for 1 second validates the selections and moves to the next screen.



The menu screen shuts down spontaneously after 30 seconds without user interaction without saving the changes made.

7.3 SETTING THE TIME AND DATE

1. Select **Time**, hold down the right button for 1 second.
2. **Set the time** with the left button (a short press changes the value by 1 upwards, holding down activates the quick value change).
3. Press the right button briefly to move to minutes → day → month → year.
4. When all data is set, **hold down the right button for 1 second** to confirm and return to the main screen.



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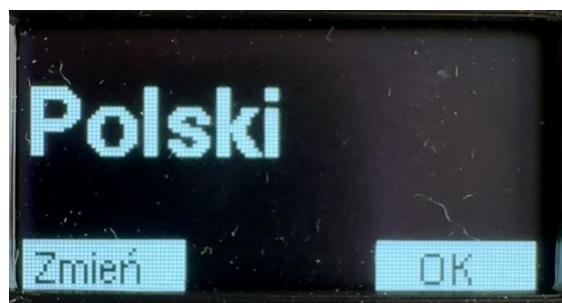
7.4 BATTERY CAPACITY SETTING

1. Enter **Battery Capacity** by holding down the right button for 1 second.
2. A short press on the left button changes the set battery capacity.
 - For LC48100 set to: **100 Ah**.
 - For 2xLC48100 set: **200Ah**.
3. Hold down the right button for one second to confirm.



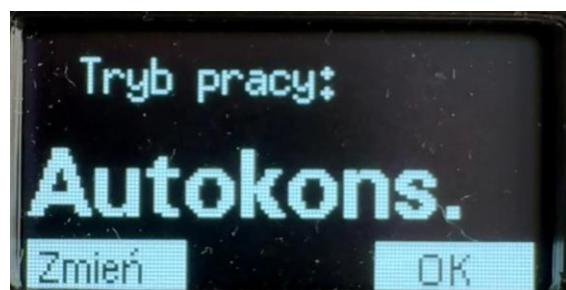
7.5 LANGUAGE SETTING

1. Enter the language by holding down the right button for 1 second.
2. Select language.
3. Confirm by holding down the right button for 1 second.



7.6 SETTING THE OPERATING MODE

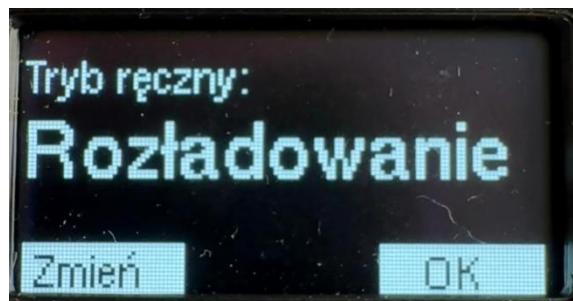
1. Enter **Operation Mode** by holding down the right button for 1 second.
2. There are two operating modes to choose from:
 - Cyclic - variant A (5.1)
 - Self-consumption - variant B (5.2)
3. A short press on the left button changes the mode.
4. Select the mode according to how the transformers (CT) are connected.
5. Confirm by holding down the right button for 1 second.



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7.7 MANUAL MODE

1. Enter **Manual Mode** by holding down the right button for 1 second if you want to manually force the unit to operate:
 - Charge - the unit will start charging from the PV/network.
 - Discharge - the unit will start discharging the battery.
 - Normal - return to operation as set in section 7.6.
2. Short press on the left button changes the mode.
3. Confirm by holding down the right button for 1 second.



7.8 RETURN TO HOME SCREEN

Select Exit from the menu and hold down the right button for 1 second to return to the main screen.

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8. OPERATION AND MAINTENANCE

The Fake PV Retrofit has been designed as a maintenance-free system. Nevertheless, it is advisable to check its operation periodically and to check the basic parameters of the system to ensure its long-term and safe operation.

8.1 RECOMMENDATIONS FOR DAILY OPERATION

- No daily operations are required.
- It is advisable to check the screen of the device occasionally to confirm:
 - Current operating mode
 - Charge or discharge power level
 - Energy status (Day Energy, Month Energy, All Energy).
- In the Breeze BMS app, it is useful to monitor every few days:
 - Battery voltage level and temperature,
 - Cell balance,

8.2 MONTHLY SYSTEM REVIEW

Once a month, perform a brief visual and functional inspection:

- **Check the unit screen** - make sure data is updated and the unit is operating in the selected mode.
- **Take a look at the Breeze BMS app** - check:
 - Battery voltage (should be between 45 and 58.4 volts),
 - Temperatures (within the operating range of 0-55°C),
 - No active alarms.
- **Check cable connections:**
 - Ensure AC, PV and battery cables are plugged in and have no slack.
 - Check CT terminals - they should be firmly closed and not loose.
 - Check condition of cable insulation.

8.3 CLEANING AND MAINTENANCE

- The housing of the appliance can be wiped with a dry or slightly damp cloth.
- **Do not use detergents** or spray the appliance with water or cleaning agents.
- Maintain good ventilation around the unit - **do not cover the ventilation openings**.

8.4 UPDATES AND SERVICE

- If new software versions or device features become available - information will be available from the distributor or manufacturer.
- In the event of errors or suspected faults, contact an authorised service centre or distributor.
- **Never open the housing of the appliance! Risk of electric shock!** No user-serviceable parts.

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9. CONTACT AND SERVICE

If you have any technical questions, need assistance with installation or require a service request, please contact the manufacturer or an authorised distributor of the device.

REGISTRATION DATA:

Breeze Energies Sp. z o.o.
Ul. Wielkanocna 6/39
19-300 Ełk
NIP: 8481873644

MAILING ADDRESS:

Breeze Energies Sp. z o.o.
Ul. Kolejowa 44
05-092 Łomianki k. Warszawy

SALES DEPARTMENT:

Tel: (+48) 791-322-572
Administrative department::
Tel: (+48) 726-322-572
Mail: office@breeze-energies.com

SERVICE DEPARTMENT:

Mail: serwis@breeze-energies.com
<https://systemrma.pl/reklamacje/obsluga/breeze/>