

Accessory Manual

Electrical Meter

EM 3P - ES Electrical energy meter for 3phase heat pump set

EM 1P - ES Electrical energy meter for 1phase heat pump set

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1 Introduction

The electrical meter is an optional accessory for ES M R290 units that is used to measure the whole electrical power consumption in an installation.

The electrical meter comes pre-configured from Energy Save. If purchased from a third party, the electrical meter will not work with systems from Energy Save.

There are two versions of the electrical meter:

- EM 3P
Can be used for all indoor unit models (two different connection options depending on heat pump indoor unit model).
- EM 1P
Can only be used for the ES MCB indoor unit model. Note that the MCB unit is the only unit with 1 phase power supply.

Features

- The heat pump can display energy consumption values, heat production values, and efficiency.
- The EGP (electric grid function, or "paragraph 14a") can be digitally activated and used.
- Makes it possible to optimize the system based on energy management data, leading to cost efficiencies.
- Easier troubleshooting.

2 Parts list

Description	Article number
EM 3P - 3 phase (400 V) for all indoor unit models	120718
EM 1P - 1 phase (230 V) for ES MCB indoor unit model	120719

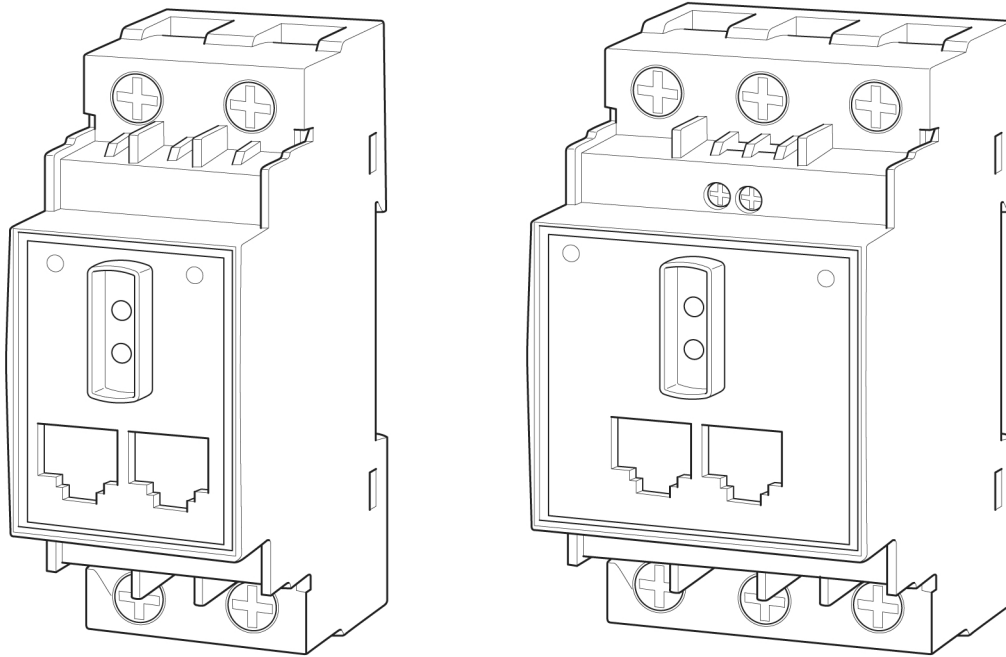


Figure 1: Electrical meters EM 1P (left) and EM 3P (right)

2.1 Included in the package



NOTE

Please check the package and make sure all the parts are present. If anything is missing or damaged, please contact the local distributor.

Product	Quantity	Notes
Terminal protection cover	2 pcs	Protection for HV connection screws. Instructions for connection are included in this manual.
Sealable terminal cap	2 pcs	

2.2 Front panel description

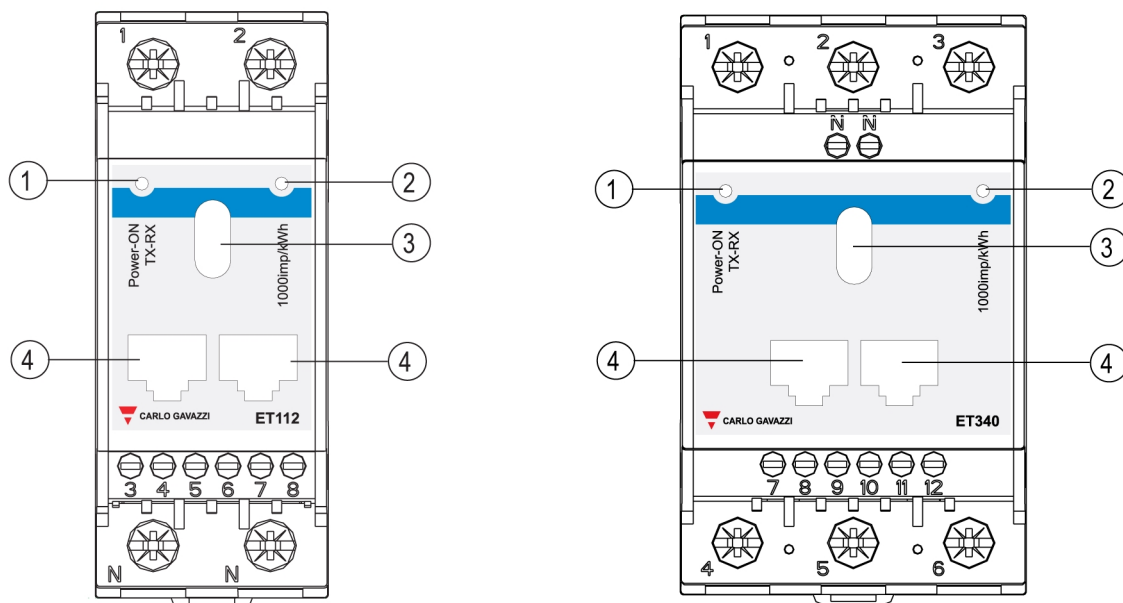


Figure 2: Front panels for electrical meters EM 1P (left) and EM 3P (right)

1. LED

Power-ON LED with communication indication (when blinking).

2. LED

LED proportional to kWh reading.

3. Optical port

Optical port for data transmission or programming.

4. RJ45 Modbus RTU ports (RS485)

Modbus ports for fast bus connection. The ports are in parallel. The screw terminals can be used as well (same Modbus port).

2.3 Dimensions

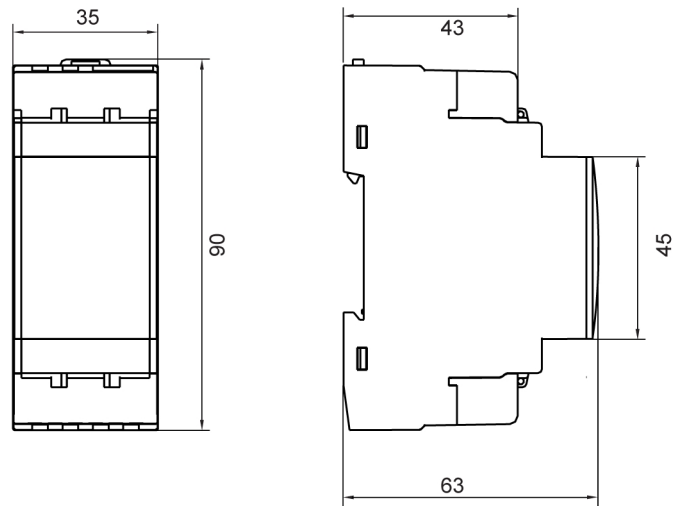


Figure 3: Dimensions for EM 1P

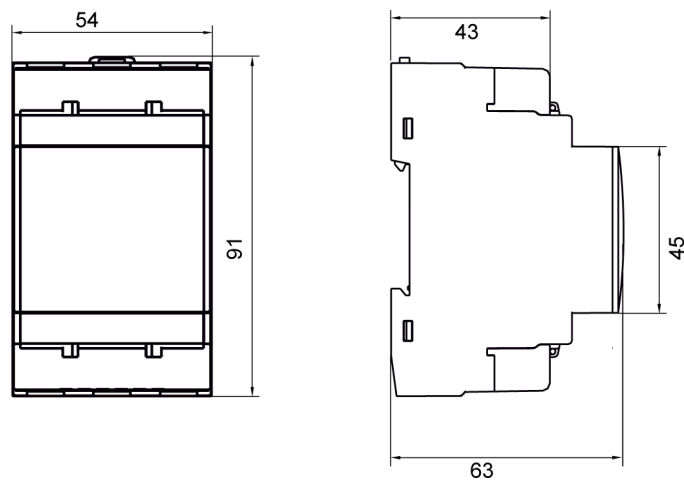


Figure 4: Dimensions for EM 3P

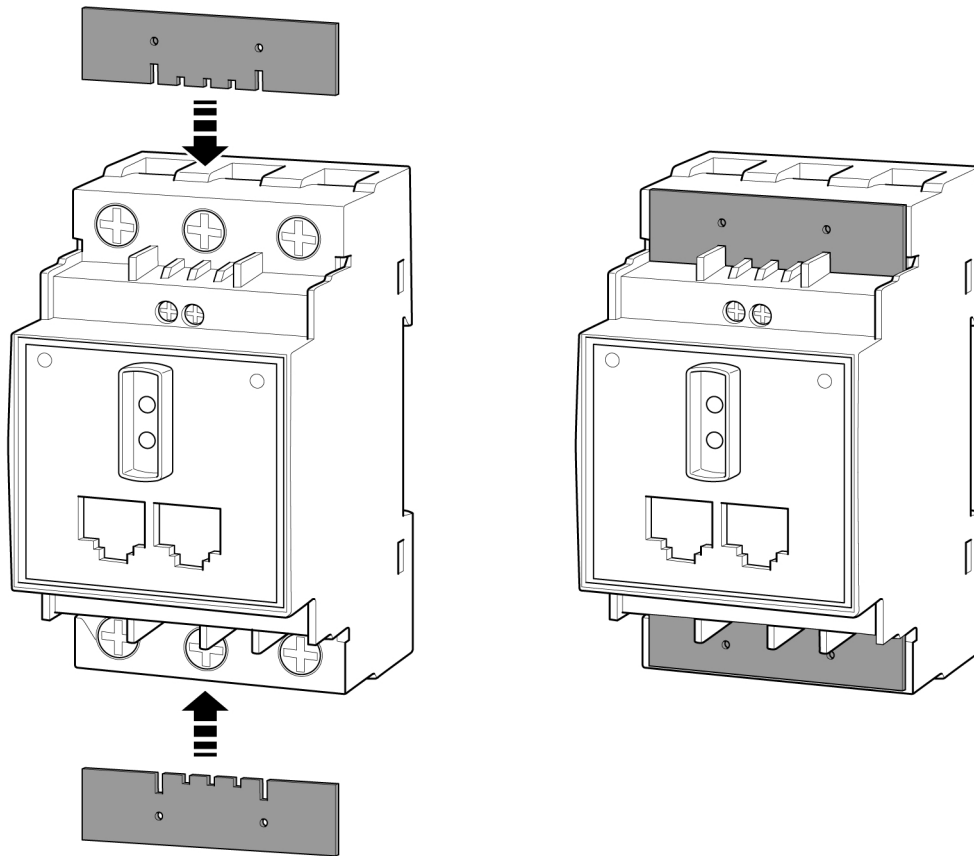
3 Installation

3.1 Attaching the terminal protection covers

The screws for HV connections should be protected from coming into contact with other cables.

- 1 Slide the first terminal protection cover over the HV connection screws on the top of the electrical meter.

- Slide the second terminal protection cover over the HV connection screws on the bottom of the electrical meter.



3.2 Connection of electrical meter

All additional electrical heating sources that are controlled by the heat pump control system must be powered from the electrical meter, and the power values of those heating sources must be entered in the settings. This is so the control system can distinguish between how much load is used for additional electrical heating sources and for the heat pump. Otherwise, the energy data presented in the display, fleet manager, and APP will show inaccurate values.



WARNING

Live parts, heart attack, burns and other injuries.

Disconnect the power supply and load before connection and protect the terminals with covers.

The connection must only be carried out by qualified/authorized personnel.



These instructions are an integral part of the product and should be consulted for all situations tied to connection and use. They should be kept within easy reach of operators, in a clean place and in good conditions.



NOTE

Before connecting any input/output wire, the terminal protection covers must be correctly installed. The metallic part of the wire or ferrule must be completely inserted into the terminal.

Maximum cable size and torque for the terminals in the electrical meters:

- **1-6:** 2.5-1.6 mm², torque 2.8 Nm
- **7-12, N:** 1.5 mm², torque 0.4 Nm

EM 3P, connection for models ES MHB, ES 100L ST, ES 100L ST UK, ES 250L ST, ES 250L ST UK

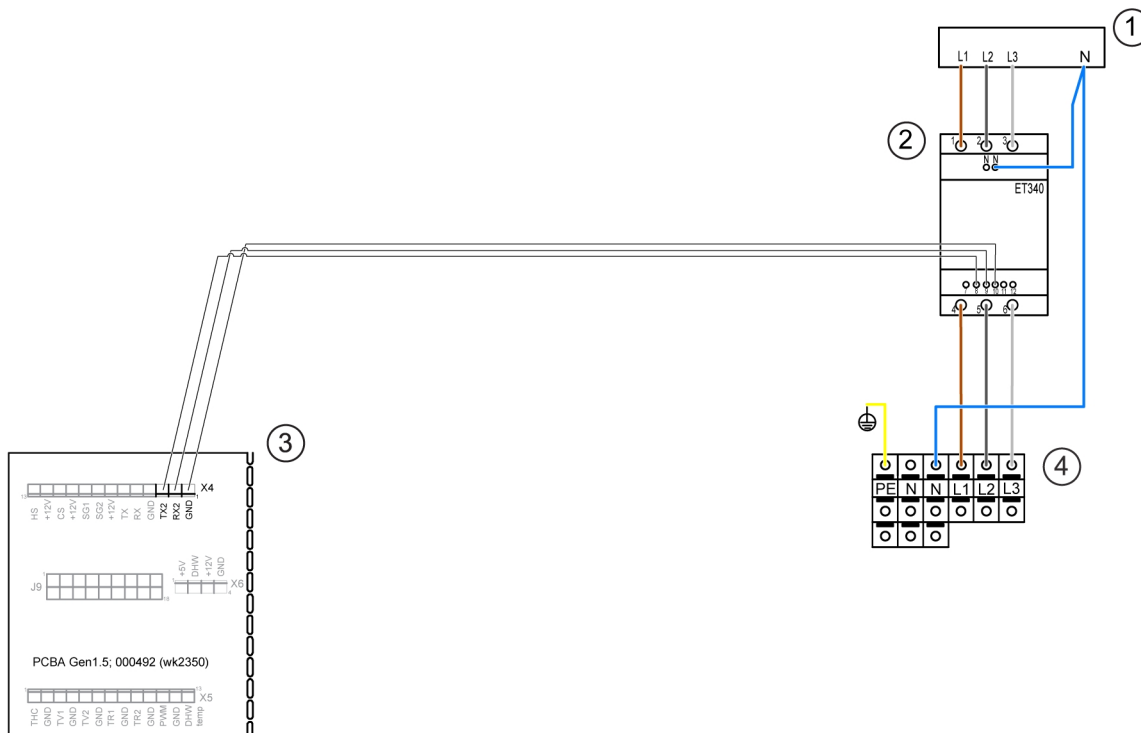


Figure 5: EM 3P connection, ES MHB, ES 100L ST, ES 100L ST UK, ES 250L ST, ES 250L ST UK

- | | | | |
|---|-------------------------|---|---|
| 1 | Fuse box, power supply | 3 | Indoor unit, terminal PCBA board connections, communication |
| 2 | Electrical meter, EM 3P | 4 | Indoor unit, main power supply terminals |

EM 3P

8
9
10

Indoor unit, PCBA board

TX2
RX2
GND

EM 3P, connection for model ES MCB

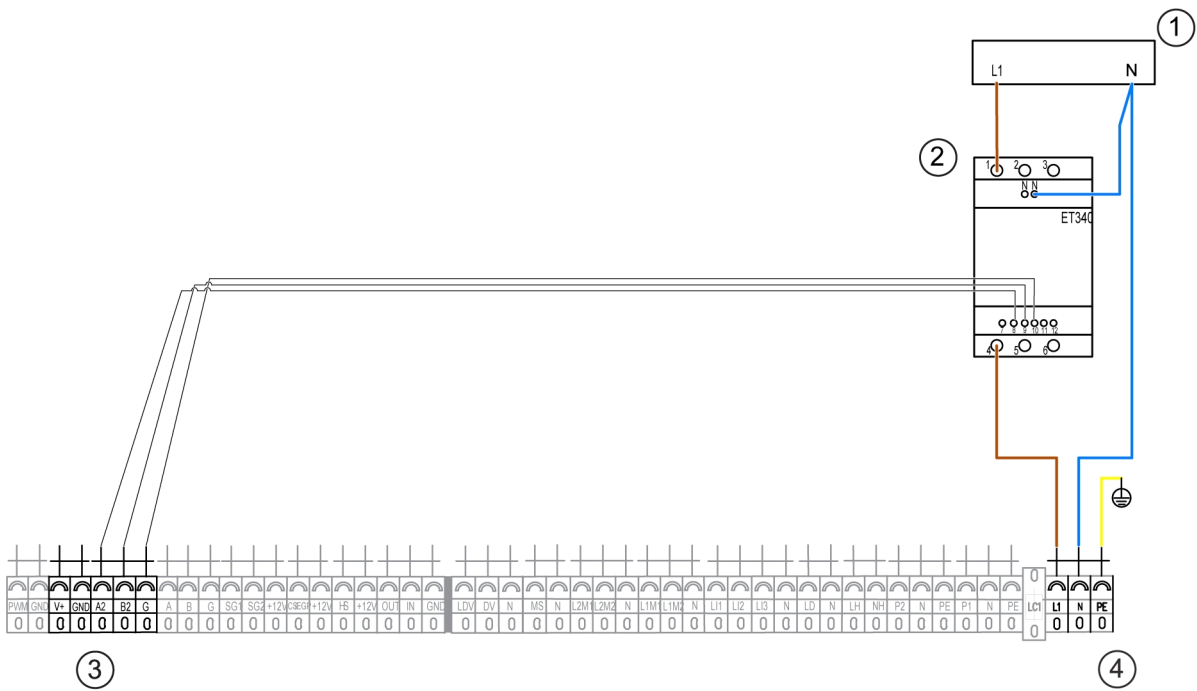


Figure 6: EM 3P connection, ES MCB

- 1 Fuse box, power supply
- 2 Electrical meter, EM 3P
- 3 Indoor unit, terminal connections, communication
- 4 Indoor unit, main power supply terminals

EM 3P

8

9

10

Indoor unit, terminal connections

A2

B2

G

EM 1P, connection for model ES MCB

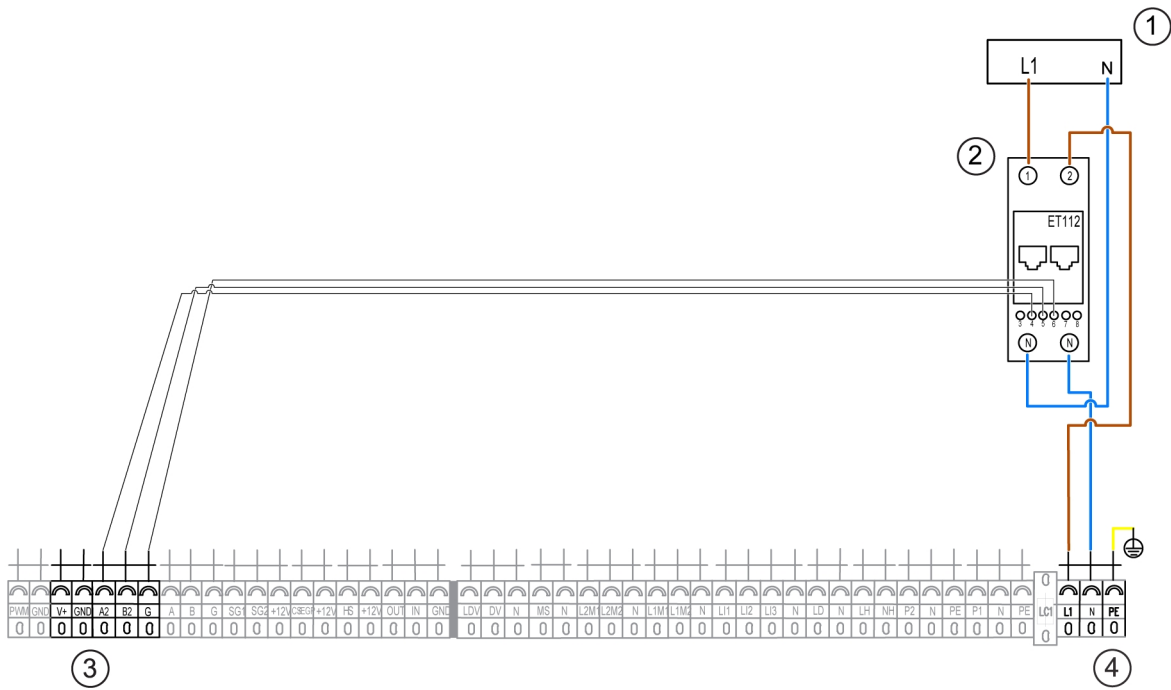


Figure 7: EM 1P connection, ES MCB

- | | | | |
|---|-------------------------|---|--|
| 1 | Fuse box, power supply | 3 | Indoor unit, terminal connections, communication |
| 2 | Electrical meter, EM 1P | 4 | Indoor unit, main power supply terminals |

EM 1P	Indoor unit, terminal connections
4	A2
5	B2
6	G

NOTE
 The installer must provide the communication cable between the electrical meter and the indoor unit. Unitronic LiYY 2x2x0.5 or an equivalent cable (twisted pair conductors) is recommended.

3.3 Connection of wireless thermostat and electrical meter

If both the wireless thermostat (with RF Gateway) and electrical meter are used, the connection points in the indoor unit are shared between the two devices.

RF Gateway and electrical meter EM 3P – connection for ES MHB, ES 100L ST, ES 100L ST UK, ES 250L ST, ES 250L ST UK

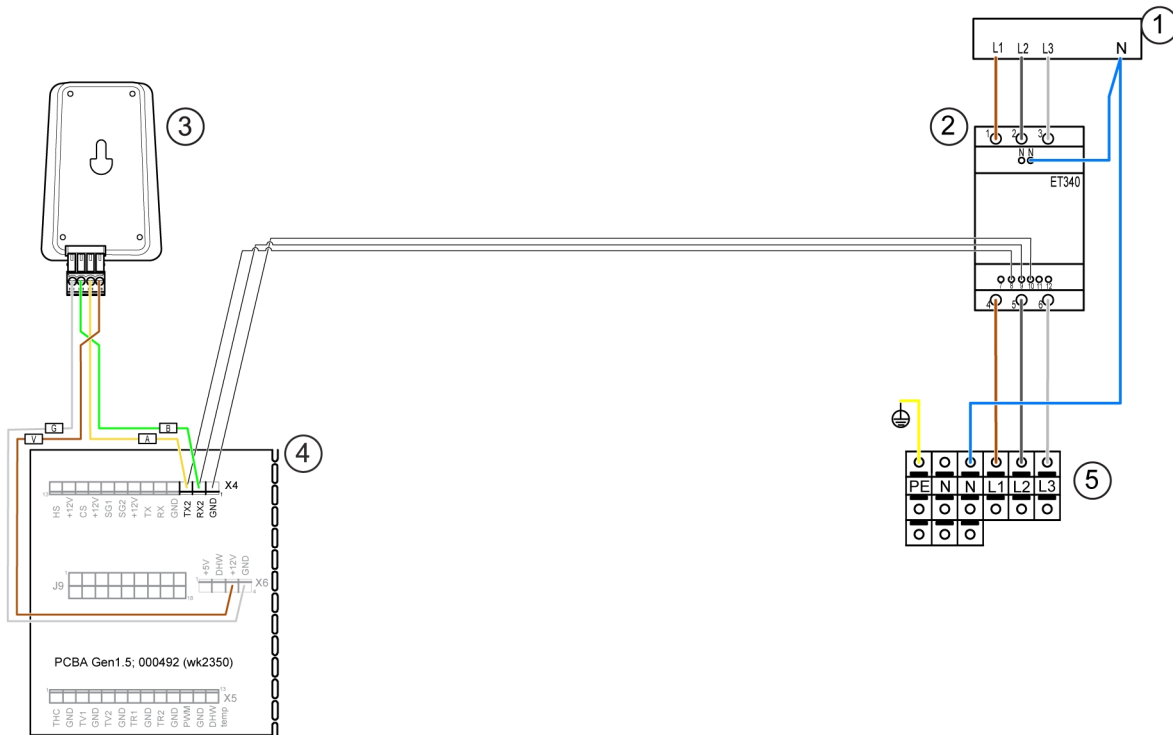


Figure 8: RF Gateway and EM 3P connection for ES MHB, ES 100L ST, ES 100L ST UK, ES 250L ST, ES 250L ST UK

- 1 Fuse box, power supply
- 2 Electrical meter, EM 3P
- 3 RF Gateway
- 4 Indoor unit, terminal PCBA board connections, communication
- 5 Indoor unit, main power supply terminals

RF Gateway	Indoor unit, PCBA board
Yellow (A)	TX2
Green (B)	RX2
Brown (V)	+12V
White (G)	GND

EM 3P	Indoor unit, PCBA board
8	TX2
9	RX2
10	GND

RF Gateway and electrical meter EM 3P – connection for ES MCB

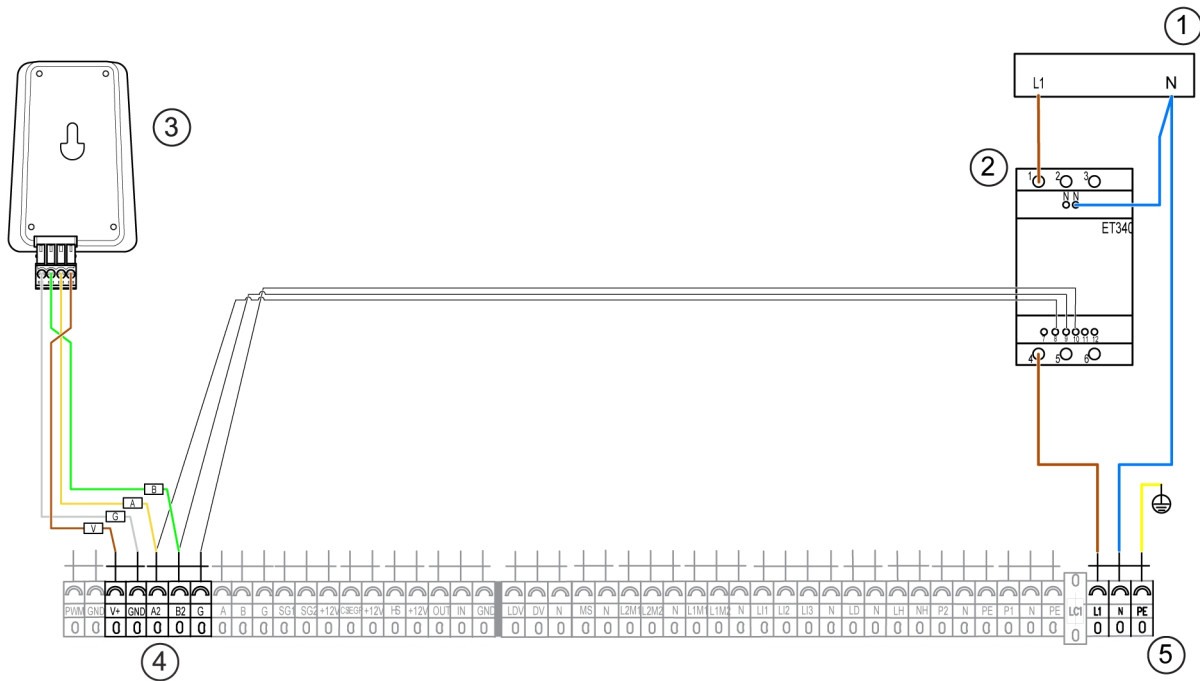


Figure 9: RF Gateway and EM 3P connection for ES MCB

- | | | | |
|---|-------------------------|---|--|
| 1 | Fuse box, power supply | 4 | Indoor unit, terminal connections, communication |
| 2 | Electrical meter, EM 3P | 5 | Indoor unit, main power supply terminals |
| 3 | RF Gateway | | |

RF Gateway

RF Gateway	Indoor unit, terminal connections
Yellow (A)	A2
Green (B)	B2
Brown (V)	V+
White (G)	GND

EM 3P

EM 3P	Indoor unit, terminal connections
8	A2
9	B2
10	G

RF Gateway and electrical meter EM 1P – connection for ES MCB

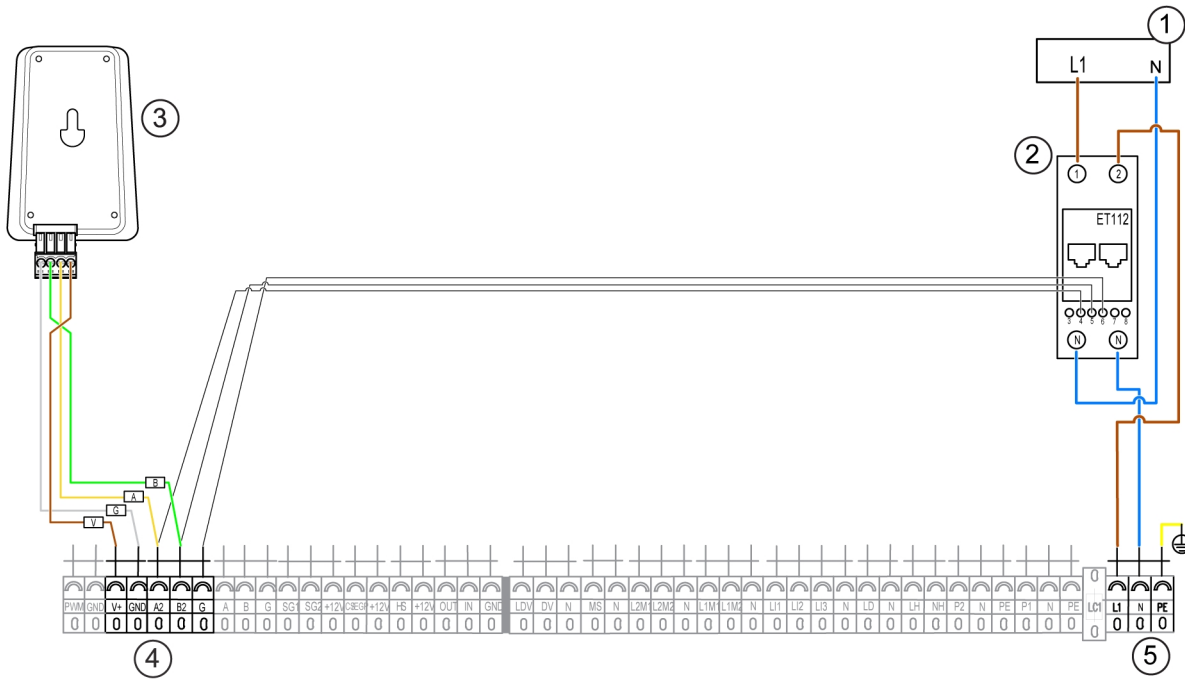


Figure 10: RF Gateway and EM 1P connection for ES MCB

- | | | | |
|---|-------------------------|---|--|
| 1 | Fuse box, power supply | 4 | Indoor unit, terminal connections, communication |
| 2 | Electrical meter, EM 1P | 5 | Indoor unit, main power supply terminals |
| 3 | RF Gateway | | |

RF Gateway

RF Gateway	Indoor unit, terminal connections
Yellow (A)	A2
Green (B)	B2
Brown (V)	V+
White (G)	GND

EM 1P





EM 1P	Indoor unit, terminal connections
4	A2
5	B2
6	G

3.4 Activating the electrical meter

For the electrical meter to work, it needs to be activated during the commissioning process. If it's not activated, refer to the following procedure.

- 1 Go to the **Installer settings** menu.
- 2 Enter the four-digit installer PIN code.

3 In *Installer settings parameters*, make sure the **Energy meter** is selected.

Parameter	Description
Commissioning:	
Commissioning	Tap to enter the Commissioning menu.
Alarms:	
Active alerts	Tap to view the Active alerts list for installers.
Alert history	Tap to view the Alert history list.
Manual mode:	
Manual mode	Tap to enter the Manual mode menu.
Electric grid protection:	
Electric grid protection	Tap the switch symbol to activate or deactivate the function. <ul style="list-style-type: none"> -  Electric grid protection is OFF -  Electric grid protection is ON
Energy meter	<ul style="list-style-type: none"> - None - ET112 - ET340
Basic power consumption settings	Tap to open the power selector. Select kW value by tapping the + (plus) and - (minus) buttons.
Digital input	<ul style="list-style-type: none"> - None - BMS Modbus Command - CS/EGP - HS/EGP
Activation signal type	Tap to select the activation signal type. <ul style="list-style-type: none"> - Normally open - Normally closed
SG ready:	
SG ready	Tap the switch symbol to activate or deactivate the function. <ul style="list-style-type: none"> -  SG ready is OFF -  SG ready is ON

Parameter	Description
Encouraged operation temperature settings	<p>Settings for SG ready encouraged operation status.</p> <p>Tap to open the temperature selectors for DHW delta, Buffer tank delta: Heating, and Buffer tank delta: Cooling. Select the allowed temperature deviation by tapping the + (plus) and - (minus) buttons.</p>
Forced operation temperature settings	<p>Settings for SG ready forced operation status.</p> <p>Tap to open the temperature selectors for DHW delta, Supply line delta: Heating, and Supply line delta: Cooling. Select the allowed temperature deviation by tapping the + (plus) and - (minus) buttons.</p>
Additional heating source priorities & thresholds:	
Outdoor temperature threshold	Outdoor temperature treshold for additional heating source to activate.
Heat balance threshold for heating	Heat balance treshold for additional heating source to activate
Shifting priorities:	
Shifting priorities	Configuration for system to shift between heating and DHW production.
Others:	
Heating season settings	<p>Tap to reach settings for the heating season.</p> <ul style="list-style-type: none"> - Based on outdoor temperature - Based on digital input
Cooling season settings	<p>Tap to reach settings for the cooling season.</p> <ul style="list-style-type: none"> - Based on outdoor temperature - Based on digital input
P0 water pump speed setting	<p>Settings for the P0 water pump.</p> <p>Tap to open selectors for Heating(%), Cooling(%), and DHW(%). Select percentage by tapping the + (plus) and - (minus) buttons.</p>

4 Technical data

Product version		EM 3P	EM 1P
Rated inputs	Current type	3-phase loads, direct connection	1-phase loads, direct connection
	Current range	5 (65) A	5 (100) A
	Nominal voltage	208 to 400 VLL AC	230 VLN AC (AV0 option) 120 VLN (AV1 option)

Energies	Active energy	Class 1 according to EN62053-21	
	Reactive energy	Class 2 according to EN62053-23	
Start-up current		20 mA (self consumption is not measured)	40 mA (AV0, AV1) (self consumption is not measured)
Start-up voltage		90 VLN	84 VLN (AV1); 161 VLN (AV0)
Current		0.001 A	
Voltage		0.1 V	
Power		0.1 W or var	
Frequency		0.1 Hz	
PF		0.001	
Energies (positive)		0.1 kWh or kvarh	
Energies (negative)		0.1 kWh or kvarh	
Run hour meter		0.01 h	
Current overloads	Continuous	65 A at 50 Hz	100 A at 50 Hz
	For 10 ms	8450 A	3000 A
Communication protocol		Modbus	
Working temperature		-20 to +65 °C	-25 to +65 °C
Storage temperature		-30°C to +80°C	
Relative humidity		0 to 90% non-condensing @ 40°C	
Environment		Indoor use only	

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