ES ENERGY SAVE

Installation Manual

Air/Water Heat Pump R290 Series

ES 100L ST / ES 100L ST UK
ES 250L ST / ES 250L ST UK
ES MCB
ES MHB
ES M8 R290
ES M12 R290
ES M15 R290 1 PH
ES M15 R290 3 PH

v2.7 2024-12-13

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1 Document history

Version	Release date	Version information
1.0	October 3, 2024	First release
2.7	December 13, 2024	Restructure and updates of the entire manual

1.1 Abbreviation List

Abbreviation	Definition	Description
ATEX	ATmosphères EXplosibles	ATEX 2014/34/EU Directive policies on the sale and use of equipment and protective systems for the use in potentially explosive atmospheres
DHW	Domestic Hot Water	Hot water for use in the household
EEV	Electronic Expansion Valve	A valve that controls the flow of refrigerant into the evaporator
ErP	Energy related Products	Performance test
ES	Energy Save	
ESD	ElectroStatic Discharge	The transfer of an electrical charge between two electrically charged objects
GFCI	Ground Fault Circuit Interrupter	A safety device that shuts the electrical power off when ground faults are detected
GWP	Global Warming Potential	A system to compare environmental impact by converting to units of CO2 equivalents
Hz	Hertz	Unit for frequency; cycles per second
IEC	International Electrotechnical Commission	A global organization responsible for preparing and publishing international standards for all electrical, electronic, and related technologies
kW	kiloWatt	Unit for effect
kWh	kiloWatt-hour	Unit for energy
MCB	Monobloc Control Box	Indoor unit with no water connections
MHB	Monobloc HydroBox	Indoor unit with no tank, but including diverter valve for hotwater, electric heater, flowmeter, and expansion tank
PWM	Pulse Width Modulation	Speed control signal to the circulation pump
RCD	Residual-Current Device	A life-saving device which is designed to prevent you from getting a fatal electric shock if you touch something live
rpm	revolutions per minute	Unit for speed in rotating devices (e.g. pumps)
SG-Ready	Smart Grid Ready	A label certifying that a heat pump can respond to specific external control signals
ST	Storage Tank	A tank that stores the hot water produced
THC	Temperature Heating Cooling	Heating/cooling temperature sensor
TDW	Temperature Domestic Hot Water	Domestic hot water temperature sensor
TPRV	Temperature and Pressure Relief Valve	Mechanical safety valve that triggers on both temperature and pressure

Abbreviation	Definition	Description
TR1/TR2		Room temperature sensors
TV1/TV2		Mixing circuit temperature sensors

2 Introduction

This manual covers the main steps and detailed settings for the installation of the ES R290 series air/water heat pumps. The manual is intended for personnel involved in the installation of the heat pump as well as the connected equipment.

The following heat pump models are covered in the manual:

Indoor units	Outdoor units
ES MCB	ES M8 R290
ES MHB	ES M12 R290
ES 100L ST	ES M15 R290 1 PH
ES 100L ST UK	ES M15 R290 3 PH
ES 250L ST	
ES 250L ST UK	

We ask that you carefully read the manual and take into account all of the instructions regarding device installation and operation in order to prevent possible damage to the device or personnel.

Before use, read and understand this manual.

Technical data can be changed without notice because of product upgrades. Please look at the rating label on the device for latest technical specifications.

2.1 Disclaimer

Proper adherence to the directions provided herein is vital for both the smooth operation of this system, as well as for your safety and the safety of those around you. Energy Save is not responsible or liable for any losses incurred due to misuse or mishandling of this product, which includes, but is not limited to:

- Purchasing, installing, and/or operating this product with the intention of using it outside of its established, technical purpose.
- Carrying out improper work upon the unit, or any of its components, which has not been given explicit, prior consent in the form of writing.
- Installation attempts of this system by anyone other than a properly trained and licensed professional.
- Negligence of properly worn personal protection (safety glasses, gloves etc.) while performing installation, maintenance, or servicing of this product.
- The operation of this system during ambient temperatures which are below or beyond the temperature range intended.

2.2 Conformity to safety regulations

If unsure of what installation procedures to use, please contact your local distributor for information and/or advise. Any electrical work must be carried out by certified electricians only. The manufacturer is not responsible for any alterations or modifications that are made without explicit, written approval. The design of this unit complies and conforms to all necessary and relevant safety regulations and is otherwise safe to operate for its intended use.

3 Safety

Safety precautions must meet the requirements that apply to this type of equipment. The following recommendations should be observed in addition to the standard safety regulations that apply to the workplace.

The safety precautions stated in this manual address the most important topics for proper and safe installation and operation of the heat pump. For this reason, follow them carefully.

For further questions contact your installer or technical support from Energy Save. Contact details can be found on the last page of this document, or on the Energy Save website: https://energysave.se/contact/

3.1 Symbols used in this document

The following attention symbols are used throughout this document.

DANGER

Risk of serious and potentially life-threatening personal injury and/or severe damage to property if the instructions are not followed.

WARNING

Risk of personal injury and/or damage to equipment if the instructions are not followed.

CAUTION

Risk of minor or moderate personal injury. Risk of equipment damage, loss of data, extra work, or unexpected results, if the instructions are not followed.

NOTE

Facts and conditions to be considered.

3.2 Safety precautions

DANGER

- The outdoor unit contains R290 refrigerant, an extremely flammable gas that may explode if heated.
- Work on the refrigerant system must only be carried out by authorised installation personnel which has completed adequate training for the use of flammable refrigerant (EN 378, Part 4 or IEC 60335-2-40, Annex HH).
- Transportation and storage of components that contain refrigerant must be done according to applicable safety regulations.
- A check valve must be installed with the installation on the return line. The check valve is included in the outdoor unit package.

WARNING

- Inspect the refrigerant circuit for leaks before starting work, as electrostatic discharge and sparks may cause an explosion.
- Ensure that there is sufficient air flow in the work area around the outdoor unit for the duration of the work.
- Smoking next to the outdoor unit is prohibited.
- Do not touch the grill in front of the fan when the motor is running.
- Be aware that the fan blade edges are sharp and can cause damage to fingers when touched carelessly and without the right safety protective gear.
- Water or other form of liquid is strictly forbidden to be poured on or into the equipment. This may cause electric shock or destruction of the unit.
- Appropriate personal protective gear (PPE) and tools must be used for transportation, installation, service, and repairs.
- There is a tip-over risk during transportation and storage before the products are properly mounted and secured. Use appropriate measures to prevent tipping accidents as it can harm people, property and damage the products.
- Contact your local distributor if any products or components show damage or have been tipped over or dropped.
- Do not pierce or burn any components in the system.
- This unit is not allowed to be used by children younger than 8 years old.

  Children aged from 8 years and above and persons with reduced physical, sensory, or mental capabilities or lack of experience and knowledge can update the heating settings if they have been given supervision or instruction concerning use of the heat pump system in a safe way and understand the hazards involved.
- To avoid electrical shock, disconnect the power supply 1 minute or more before servicing the electrical parts. Even after 1 minute, always measure the voltage at the terminals of the main circuit capacitors or electrical parts before touching to make sure that those voltages are lower than the safety voltage.
- Do not touch any components if a power cord, outlet, or other electrical connection is loose or broken and immediately contact your local distributor.
- Carefully remove the protective covers of the indoor and outdoor unit and take safety measures to prevent burning accidents from hot surfaces as some components store energy.
- The outdoor units must be stored in a well-ventilated area.
- Bear in mind that the refrigerant in the outdoor unit is clear and odourless making leak detection difficult.
- The indoor and outdoor units are heavy (indoor 9-127 kg, outdoor 123-187 kg) and require appropriate lifting and transportation support to avoid injury or damage.

CAUTION

- Installation, service, repairs and disposal must comply with all applicable national and international laws and standards.
- The complete installation manual must be read before installation, service or repairs to be followed.
- Installation, service, and repairs must be performed by properly trained and licensed professionals that is well-acquainted with the equipment.
- All electrical connections must be done by a professional and accordance with electrical standards.
- Do not use means to accelerate the defrosting process or clean other than those recommended by the manufacturer.
- The appliance shall be stored in a room without continuously ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).
- The power supply to the device must be earthed.
- Avoid stacking items against or on top of the outdoor unit, as this can restrict air intake or cause damage to the unit.
- Do not build a cover around the outdoor unit that may restrict airflow, as it will reduce system efficiency.
- Outdoor units must be stored and transported in an upright position.
- Ensure all products are protected from weather conditions during transportation and storage.
- Check all products for transportation damage and contact your local distributor if any damage is discovered.

Emergency procedures

WARNING

In case of fire

Do not attempt to put out a fire yourself. Always prioritize personal safety and immediately contact local emergency services. The outdoor unit contains a high-pressure, flammable refrigerant that can explode if exposed to flames. If there is a risk of the outdoor unit catching fire, keep a safe distance and wait for emergency personnel to handle it.

CAUTION

In case of water leakage

If a leak is detected, promptly shut off the water supply, protect any surrounding areas that could be affected, and contact customer support right away.

CAUTION

Power shut down in sub-zero temperatures

In cold weather, extended power outages increase the risk of water in the system freezing, potentially causing permanent damage to the indoor unit, outdoor unit, and heating system.

If the system will be without power for an extended period, ensure all components exposed to sub-zero temperatures are drained of water. The risk of freezing depends primarily on factors like temperature, duration, water volume relative to surface area, and insulation. If you're unsure, please contact your local installer for support for guidance.

3.3 Regulations to be observed

Note that national and regional regulations should be observed. Statutory regulations for accident prevention and environmental protection along with specific trade norms should also be assessed prior to installation.

3.4 R290 refrigerant safety

Work on the refrigerant system must only be carried out by authorised installation personnel which have completed adequate training for the use of flammable refrigerants (EN 378, Part 4 or IEC 60335-2-40, Annex HH).

DANGER

Extremely flammable gas, may explode if heated.

WARNING

Precautions:

- Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.
- No smoking.
- Liquefied compressed gas can cause freeze burn.
- Avoid breathing of vapour.

Transportation and storage of components that contain refrigerant must be done according to applicable safety regulations.

Preparations

The following preparatory measures should be taken in the working environment:

- Define a protective area around the equipment containing the refrigerant circuits, and inform people staying nearby about the restricted area.
- The work area should be cleared from any potential ignition sources, such as open flames, hot surfaces, power sources, battery-driven devices, mobile phones.

– Any tools or equipment used must be classified for use in hazardous areas (ATEX and IEC Ex certification, Zone 2).
– Ensure that all possible sources of static electricity are eliminated, by earthing of equipment, devices and clothing, and by wearing anti-static work shoes (ESD safety shoes).
– Ensure good ventilation during the entire workflow.
– Use a portable gas leak detector to detect any leakage of propane.
– Ensure that a fire extinguisher (Class C, powder type) is readily available in case a major gas leak or fire should appear.
– Wear protective clothing against exposure to heat as well as to cold from liquified gas.

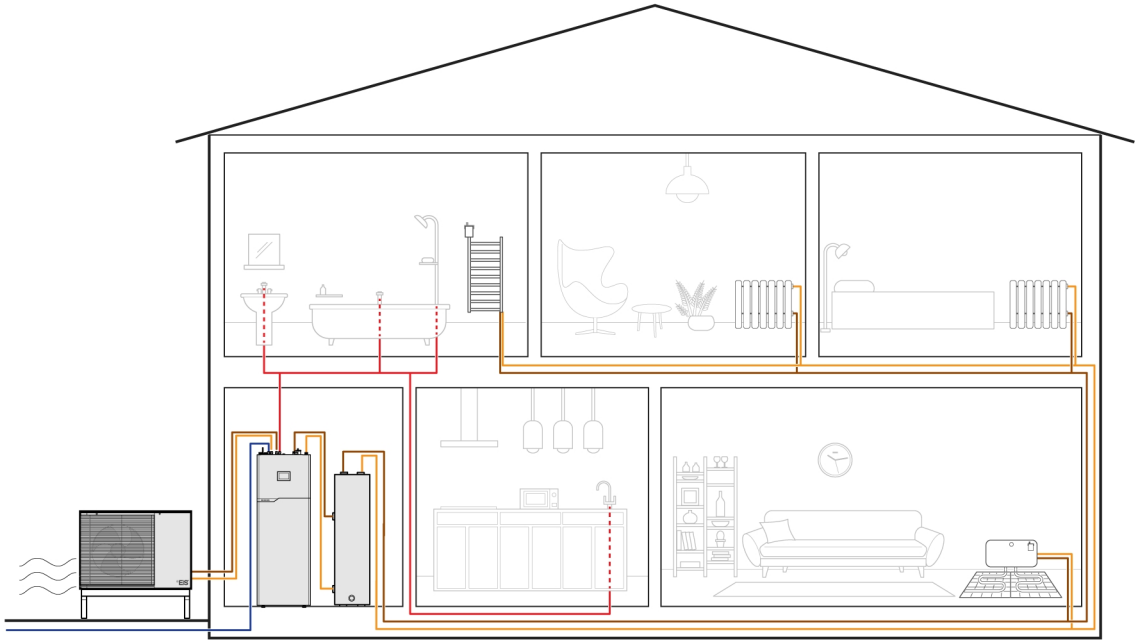
During the work:

– Check for gas leakage during the whole operation.
– If signs of gas leakage appear, immediately switch off any electrical appliances, including light sources. Evacuate the premises, and ventilate thoroughly. Repair must only be done by authorised personnel.
– If a gas leak has been encountered and fixed, make sure the work area and affected components are well ventilated and completely cleared from gas before resuming the work.
– Do not impact the refrigerant system by drilling, welding, or any other operation that may result in holes and weak spots, or that can create heat or sparks.
– Do not stress equipment that is pressurised by applying additional load on it, or by exposing it to blows and shocks.

When the installation is completed:

– If there is a risk that the hydraulic system has been exposed to refrigerant, a deaeration must be done.

4 System description

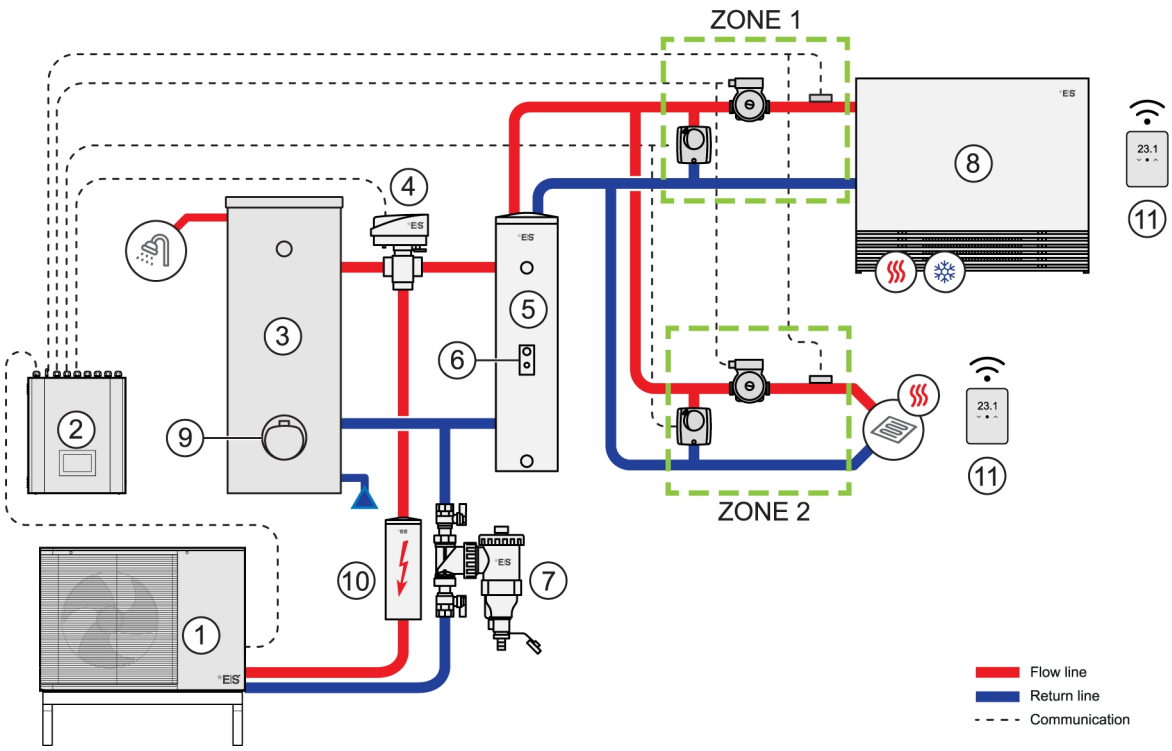


An air-to-water heat pump takes advantage of the energy in the outdoor air, using it to heat water for use in the household and for different types of space heating.

1. A compressor compresses refrigerant gas, which generates heat.
2. A heat exchanging process transfers the heat to the water system.
3. In this process the refrigerant changes state from gas to liquid form.
4. The liquid refrigerant enters an evaporator, where heat from the outdoor air is used to transform the liquid refrigerant into gas.
5. The refrigerant gas is returned to the compressor and the cycle repeats.

The electrical energy used for running the equipment is considerably lower than the energy extracted and used in the building.

4.1 Generic flow diagram



1 Outdoor unit
2 Indoor unit
3 DHW tank
4 Diverting valve
5 Buffer tank
6 Additional heating source for the buffer tank
7 Dirt and magnetic filter
8 Distribution heating/cooling circuit
9 Additional heating source for the DHW tank
10 Additional inline heating source
11 Wireless room thermostats

4.2 Configuration of Indoor and Outdoor Units

Indoor unit	DHW tank	Buffer tank	8 kW	12 kW	15 kW
ES 100L ST ES 100L ST UK	100 liter tank integrated	Recommended	✓	✓	✗
ES 250L ST ES 250L UK	250 liter tank integrated	Recommended	✓	✓	✓
ES MCB	Optional*	Recommended	✓	✓	✓
ES MHB	Optional*	Recommended	✓	✓	✓

* If the installation requires domestic hot water.

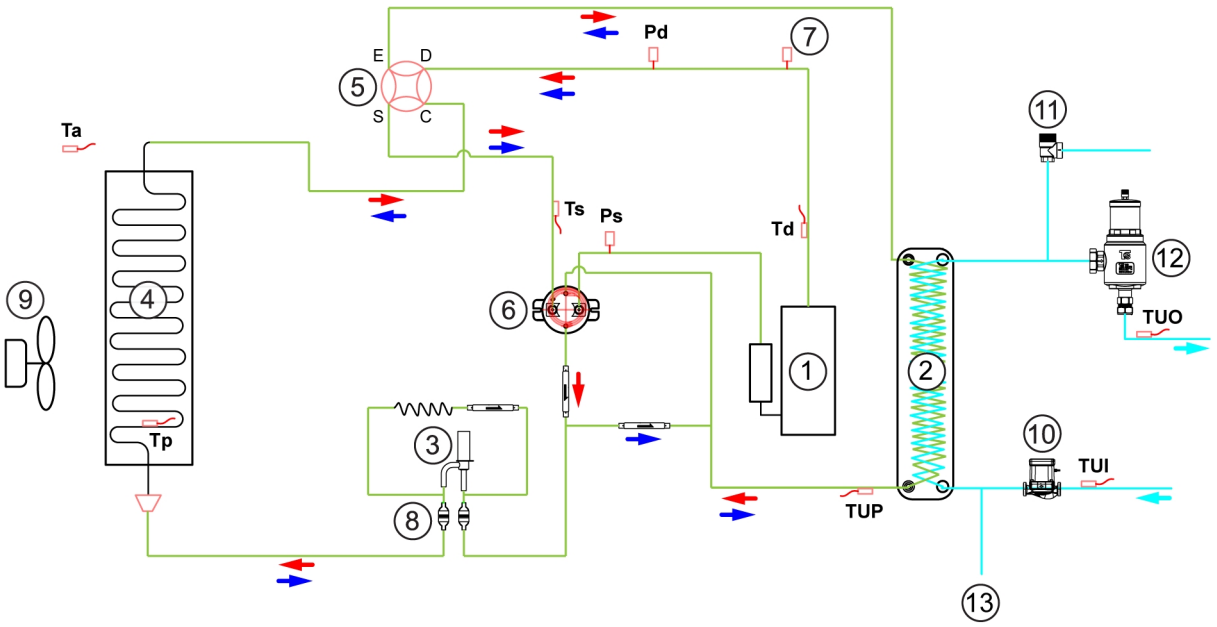
4.3 Included in the package

The following accessories are included with your purchase. Please check that no items are missing or damaged, and contact your local distributor in that case.

Product	Component	Quantity	Notes
ES M8 R290 ES M12 R290 ES M15 R290 1 PH ES M15 R290 3 PH	Check valve for outdoor units	1 pcs	Regulatory requirement to mitigate refrigerant leakage going into the home (collection by gas separator). To be installed on the return line.
ES M8 R290 ES M12 R290	Magnet ring for power supply cable	1 pcs	Regulatory requirement. Instructions for connection are included in this manual.
ES MCB	THC Temperature sensor	1 × 5 m Extension cable	
	TV1 Temperature sensor	1 × 5 m Extension cable	
	TV2 Temperature sensor	1 × 5 m Extension cable	
	TR1 Temperature sensor	1 × 20 m Extension cable	
	TR2 Temperature sensor	1 × 20 m Extension cable	
	TDW Temperature sensor	1 × 5 m Extension cable	
	Flow sensor	1 × 2 m Extension cable	
	Communication cable between indoor and outdoor unit	1 × 15 m	
	PWM speed control cable for circulation pump between indoor and outdoor unit	1 × 15 m	
	Antenna for Wi-Fi	1 pcs	
	Magnet ring for communications cable	1 pcs	

Product	Component	Quantity	Notes
ES MHB	THC Temperature sensor	1 × 5 m Extension cable	
	TV1 Temperature sensor	1 × 5 m Extension cable	
	TV2 Temperature sensor	1 × 5 m Extension cable	
	TDW Temperature sensor	1 × 5 m Extension cable	
	Communication cable between indoor and outdoor unit	1 × 15 m	
	PWM speed control cable for circulation pump between indoor and outdoor unit	1 × 15 m	
	Antenna for Wi-Fi	1 pcs	
ES 100L ST ES 100L ST UK ES 250L ST ES 250L ST UK	THC Temperature sensor	1 × 5 m Extension cable	
	TV1 Temperature sensor	1 × 5 m Extension cable	
	TV2 Temperature sensor	1 × 5 m Extension cable	
	Communication cable between indoor and outdoor unit	1 × 15 m	
	PWM speed control cable for circulation pump between indoor and outdoor unit	1 × 15 m	
	Antenna for Wi-Fi	1 pcs	

4.4 Heat pump circuit



	Description		Description
1	Compressor	**Ta**	Outdoor temperature sensor
2	Condenser (plate heat exchanger)	**Tp**	Evaporating temperature sensor
3	Electronic expansion valve (EEV)	**Ts**	Suction temperature sensor
4	Evaporator	**Td**	Discharge temperature sensor
5	4-way valve	**Ps**	Suction pressure sensor
6	Refrigerant heat exchanger	**Pd**	Discharge pressure sensor
7	High pressure switch	**TUP**	Condenser temperature sensor (liquid refrigerant)
8	Refrigerant filters	**TUO**	Condenser outlet water temperature sensor
9	Fan	**TUI**	Condenser inlet water temperature sensor
10	Water pump P0		Heating direction
11	Pressure release valve		Cooling direction
12	Gas separator		Water flow direction
13	Drainage		

4-way valve connections

Heating and DHW mode	Cooling mode
D→E for high pressure flow	**D→C** for high pressure flow
C→S for low pressure flow	**E→S** for low pressure flow

NOTE

The arrow (→) represents the real refrigerant flow direction.

4.4.1 Gas separator valve

A gas separator valve is already installed within the outdoor unit. This gas separator has been specially adapted for usage in R290 heat pumps. If an internal leakage occurs in the heat pump, the gas separator will prevent refrigerant from entering the house via the heating circuit.

Gas separators are used to continuously remove the air contained in the hydraulic circuits of the heating and cooling systems, down to micro-bubble level. The circulation of fully deaerated water enables the systems to operate under optimal conditions, free from noise, corrosion, local overheating, or mechanical damage.

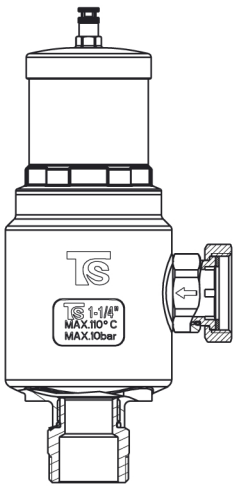


Figure 1: Gas separator valve

4.4.2 Pressure relief valve

The outdoor units are equipped with a 2.5-bar pressure relief valve. The valve protects the system from over-pressurization caused by thermal expansion or malfunctions. It opens automatically when pressure exceeds 2.5 bar, releasing excess pressure to prevent damage to components like heat exchangers or piping. Once pressure is normalised, the valve closes to restore normal operation. This ensures safe, reliable, and efficient system performance.

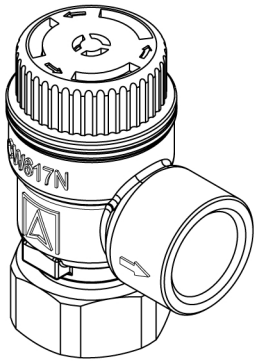


Figure 2: Pressure relief valve

5 Product information

The R290 range of outdoor units has three main variants – 8 kW, 12 kW and 15 kW. The 15 kW unit is available in both single phase and three phase.

The R290 range of indoor units includes an ES MCB, ES MHB and two all-in-one units (ES 100L ST and ES 250L ST) with different sizes of DHW volume.

The indoor units are comprised of a controller that manages the heating, a DHW tank and a connectivity module that sends and receives data. Note that the ES MCB and ES MHB do not have a DHW tank.

The outdoor unit collects the ambient outdoor air and transforms it into heat energy. This heats the water in the indoor unit, where the heat generated can then either be distributed in the form of heating or domestic hot water in your home. The indoor unit can also store the hot water for later use, and via the indoor unit's heating control system you can monitor and optimise the heating as needed.

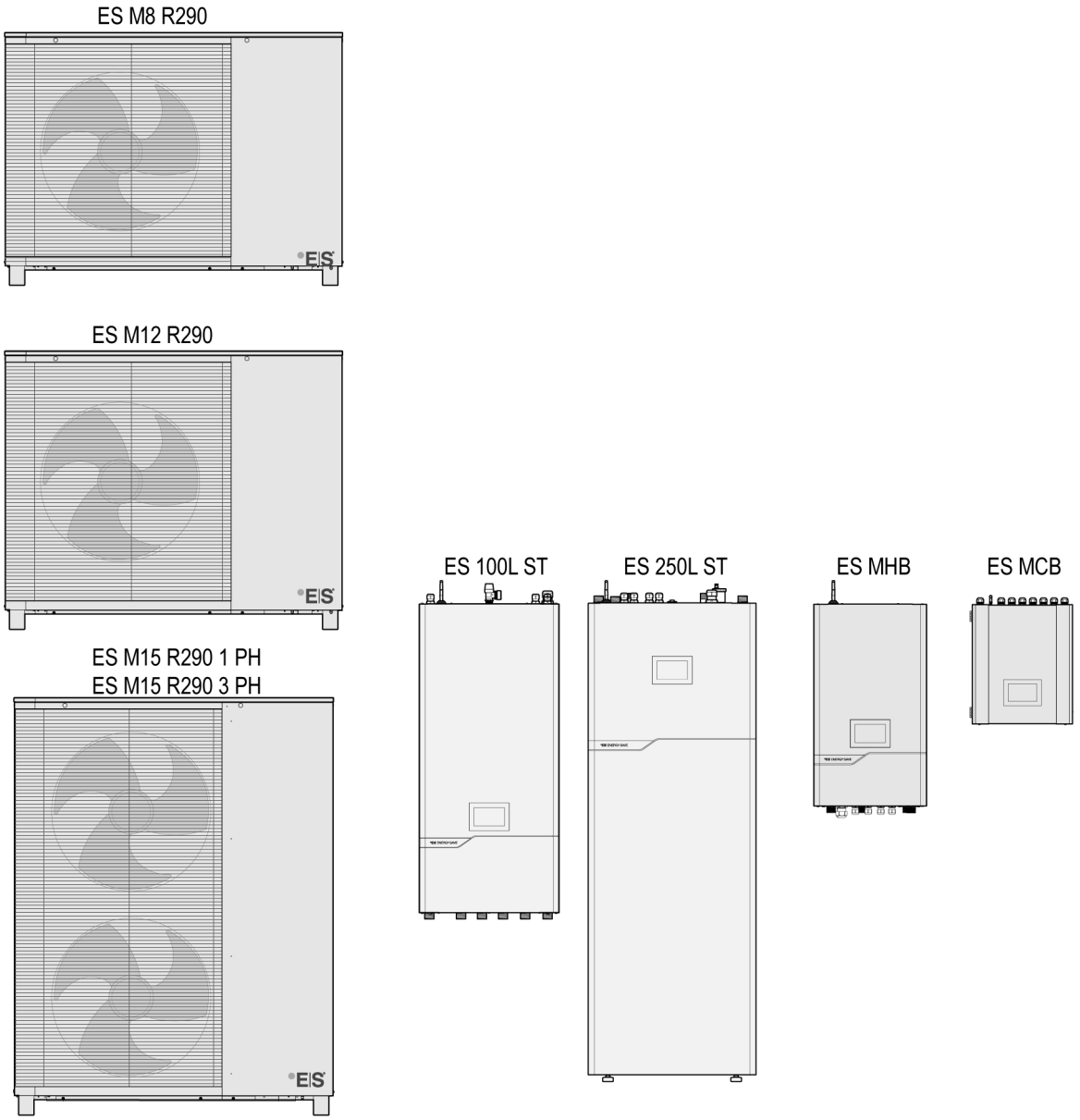


Figure 3: The ES R290 product range

5.1 About the R290 refrigerant

The refrigerant used in this heat pump is propane (R290), a natural non-toxic hydrocarbon refrigerant with very low environmental impact and excellent thermal efficiency. This makes it an ideal choice for use in heating and cooling systems.

The high flammability of propane, however, means that there are high demands on the equipment and handling of the gas when it comes to safety. All product and manufacturing safety precautions have therefore been taken regarding system dimensioning and security solutions. At installation it is important that the space requirements are followed, as do the safety precautions stated in the safety section.

WARNING

Safety precautions must be followed during all times to minimize the risk of ignition in case of a propane leak.

Only authorised personnel are allowed to service or remove refrigerant from the system.

5.2 Placement

Follow the below instructions for the safe placement of your indoor and outdoor units.

5.2.1 Indoor unit placement

The following considerations must be made regarding the placement of the indoor unit:

- The indoor unit must be placed indoors.
- Ensure that the location is dry and well-ventilated.
- Ensure that the environment is completely free from volatile, corrosive, or flammable liquids or gases.
- Ensure that sound from the indoor unit or pipes will not be disturbing to adjacent living spaces such as bedrooms or living rooms.

Place the indoor unit as close as possible to the outdoor unit for shorter and more efficient connections to the water supply and drainage.

Ensure that there is enough space left around the unit for future maintenance.

NOTE

The ES 250L ST and ES 250L ST UK have adjustable feet.

Follow the stated distances in the illustration below for the minimum distances.

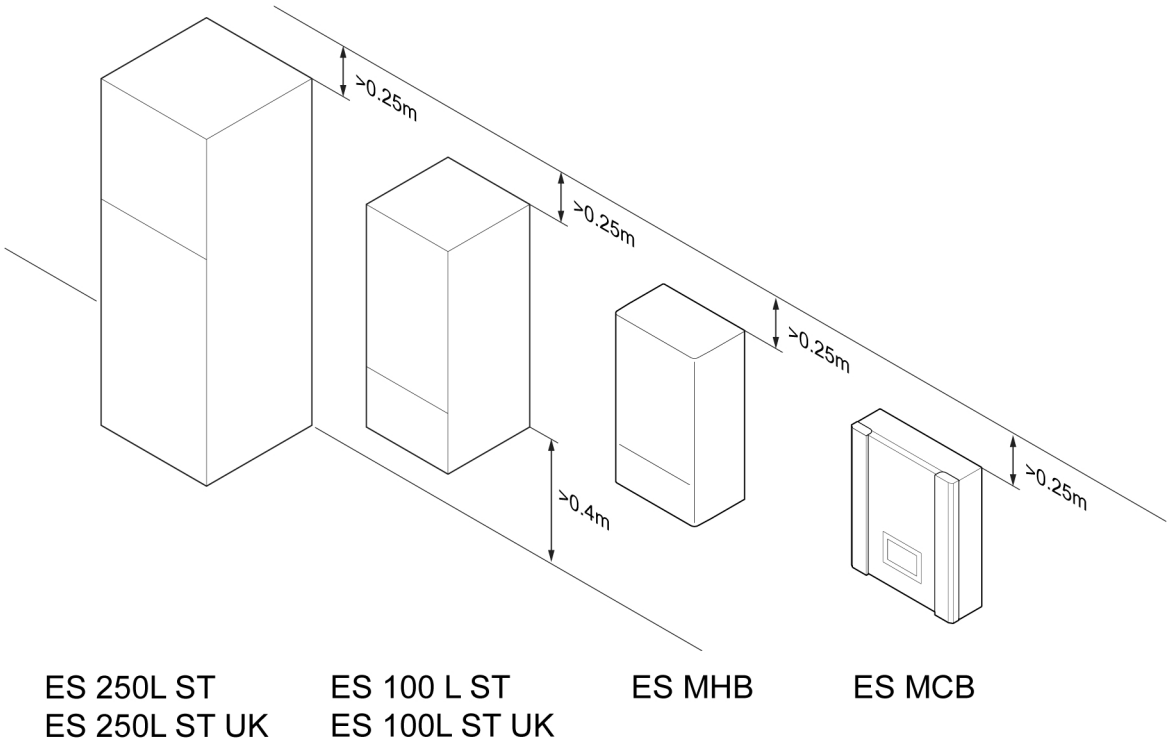


Figure 4: Space requirement for indoor units

5.2.2 Outdoor unit placement

CAUTION

The heat pump may only be installed outdoors!

Examples of suitable locations for the outdoor unit:

- Open space
- Corridor
- Balcony
- Roof
- Wall mounted

The following environmental considerations must be made:

- Ensure that the environment is completely free from volatile, corrosive, or flammable liquids or gases.
- Ensure there is enough space around the unit for ventilation and maintenance (see the space requirements).
- It is recommended to install an awning above the unit, to protect snow from clogging the air inlet and outlet.
- Ensure there is a drainage system around the location, for outflow of condensate water under defrost mode.
- Do not install the outdoor unit near an exhaust from the kitchen, to prevent oil and smoke from entering the heat exchanger.
- Avoid placing the unit near bedrooms and living rooms, as noise from the unit can be disturbing when it is operating.

– The heat pump must not be placed in sinks or in places where refrigerant can accumulate in the event of a leak. The heat pump must be positioned in such a way that no refrigerant enters the building in the event of a leak or can endanger people in any other way.
– In the protected area, which is located between the upper edge of the appliance and the floor, there must be no ignition sources, windows, doors, ventilation openings, light shafts and the like. The protected area may not extend to neighbouring properties or public traffic areas. The wall penetration through the building envelope must be gas-tight.

CAUTION

To ensure an unobstructed air flow, the minimum distances to walls and other objects must be followed.

CAUTION

Air inlets or windows are not allowed within the protected area.

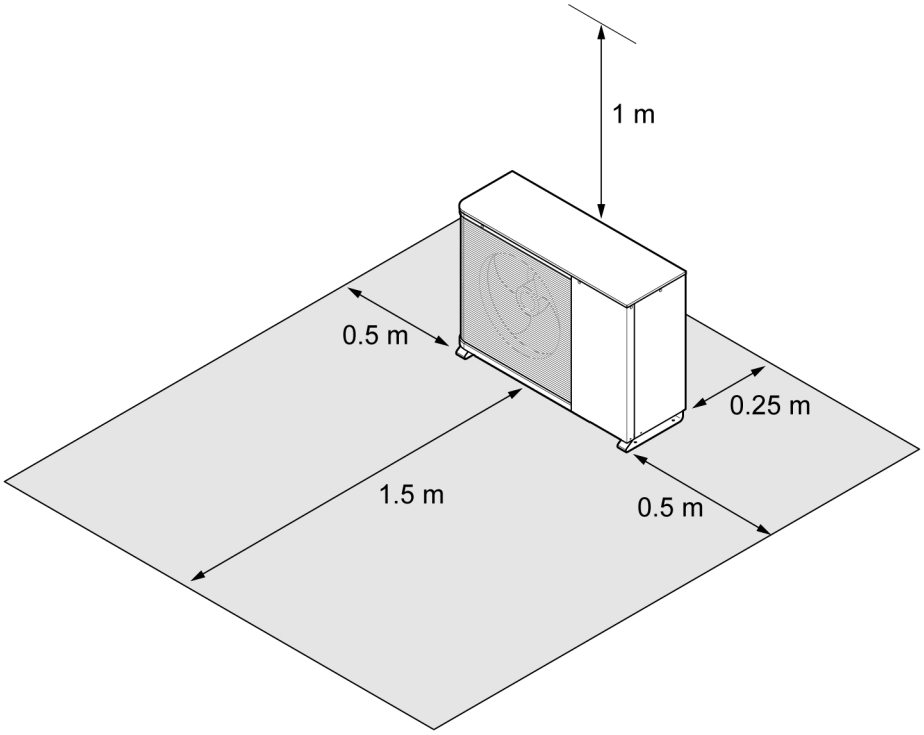


Figure 5: Space requirement for sufficient air flow around the heat pump

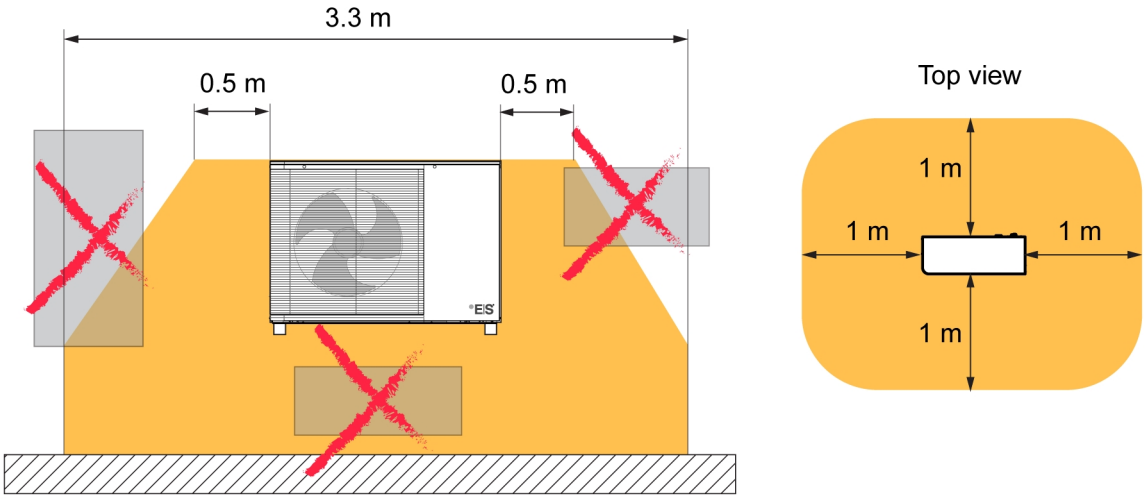


Figure 6: Protected area clear from windows, doors, and air inlets/outlets

Figure 6 "Protected area clear from windows, doors, and air inlets/outlets", page 23 depicts the minimum boundaries from the outdoor unit to windows, doors and air inlets/outlets to prevent gas leakages into the home. If the unit is placed in an area without any windows, doors and air inlets/outlets then follow the minimum boundaries in Figure 5 "Space requirement for sufficient air flow around the heat pump", page 22.

For outdoor unit dimensions, see Section 5.9 "Outdoor units dimensions", page 38.

5.3 Hydraulic requirements

Hydraulic schematics provided by an ES distributor or ES personnel contain official requirements for the installation of your heat pump into a hydraulic system. These must be followed to ensure the safe working of the heat pumps.

The most common hydraulic schematics are found in the Appendix B in this manual.

5.3.1 System water supply

The water used for the system must comply with local regulations or the following specifications:

System water:

- Chloride ion (Cl-) concentration less than 300 ppm (300 mg/L)
- Ammonium ion (NH4+) concentration: 0 ppm
- pH value: 6–8
- Heating system pressure: 1–1.8 bar

NOTE

Too low water pressure can cause cavitation on the rotors of the water pumps, which can drastically reduce the life span of the water pumps.

Domestic hot water:

- Chloride ion (Cl-) concentration less than 90 ppm (90 mg/L)

– Ammonium ion (NH4+) concentration: 0 ppm
– pH value: 6–8

5.3.2 DHW production specification

Maximum freshwater pressure: 7 bar (regulated by pressure valve)

CAUTION

For sanitary hot water, always add a mixing valve before the water tap and set it to proper temperature.

If a DHW tank with coil is used for heating the sanitary water, the coil must have a minimum surface area to ensure normal operation of the heat pump.

The coil must have a minimum surface area of 0.125 m^2 × nominal heating capacity of the heat pump at A7/W35.

5.3.3 Buffer tank volume

The minimum volume of the buffer tank is 12 litres per kW of heating capacity. The calculation is based on the nominal heating capacity of the heat pump at A7/W35.

Conditions when a buffer tank must be installed

System	Specification
Multiple zone regulation	If more than one heat distribution circuits are used.
Radiator system	If radiators are used as the heat distribution system.
Zone valve regulation	If any kind of shut-off valves are used on the heat distribution system. An example is if electronic valves on the distribution system of the floor heating system are used, and can be regulated separately from the heat pump controls.
Fan coils for heating or cooling	If fan coils are used for the heat distribution system.

Required buffer tank size based on heat pump model

Outdoor Unit model	Minimum buffer tank volume
ES M8 R290	108 liter
ES M12 R290	144 liter
ES M15 R290 1 PH	180 liter
ES M15 R290 3 PH	180 liter

5.4 Indoor units technical data

5.4.1 ES MCB, ES MHB

	Unit	ES MCB	ES MHB
Dimensions (W×D×H)	mm	380×115×480	400×260×800
Net weight	kg	9	27
IP rating		IP31	IPX1
ErP energy efficiency class		/	/
Hot tap water profile		/	/
Operating conditions		Indoor use only	
Power supply	V/PH/Hz	380–415 / 3N / 50	
Energy savings features		Heating curve optimization, vacation mode, reduced mode	
Domestic hot water protection		Legionella prevention	
Domestic hot water tank type		/	/
Domestic hot water tank volume	liter	/	/
Domestic hot water max. tank safety valve	bar	/	/
Electric heater - system heating	kW	/	3 × 3
3-way diverting valve for DHW tank		/	Yes
Expansion vessel - water heating	liter	/	14
Flow sensor		In the package	Pre-installed
User interface type/size		LCD touch screen / 5"	
Internet connection		Wi-Fi and Ethernet	
Wi-Fi frequency/power	GHz/dBm	2.4 / 15	

5.4.2 ES 100L ST, ES 250L ST

	Unit	ES 100L ST ES 100L ST UK	ES 250L ST ES 250L ST UK
Dimensions (W×D×H)	mm	500×500×1100	600×670×1720
Net weight	kg	75	127
IP rating		IPX1	IPX1
ErP energy efficiency class		A	A+ / A*
Hot tap water profile		M	L
Operating conditions		Indoor use only	
Power supply	V/PH/Hz	380–415 / 3N / 50	
Energy savings features		Heating curve optimization, vacation mode, reduced mode	
Domestic hot water protection		Legionella prevention	
Domestic hot water storage tank		Stainless steel assembly with 2205 duplex on tank body and 316 L on coil	
Domestic hot water tank volume	liter	100	250

	Unit	ES 100L ST ES 100L ST UK	ES 250L ST ES 250L ST UK
Domestic hot water max. tank safety valve	bar	7	7
Electric heater - system heating	kW	3 × 3	
3-way diverting valve for DHW tank		Yes	Yes
Expansion vessel - water heating	liter	/	10
Flow sensor		Pre-installed	
User interface type/size		LCD touch screen / 5"	
Internet connection		Wi-Fi and Ethernet	
Wi-Fi frequency/power	GHz/dBm	2.4–2.5 / 16	
		5.15–7.125 / 16.5	
Thread frequency/power	GHz/dBm	2.41–2.49 / 10	

*ErP energy efficiency class with 8 or 12 kW outdoor unit: A+. ErP energy efficiency class with 15 kW outdoor unit: A.

5.5 Outdoor units technical data

5.5.1 ES M8 R290, ES M12 R290

	Unit	ES M8 R290	ES M12 R290
Dimensions (W×D×H)		1207×437×895	1207×437×995
Net weight		123	138
IP rating		IPX4	IPX4
ErP energy efficiency class		A+++	
SCOP - average climate, low temperature		4.71	4.70
Heating capacity [1]	kW	3.1–9.5	3.8–12
C.O.P min./max. - Coefficient of Performance [1]	W/W	4.55 / 5.1	3.92 / 4.8
El heating power input min./max. [1]	W	585 / 2089	900 / 3065
Max. flow temp. in heating mode	°C	70	
Min. flow temp. in heating mode	°C	7	
Min./max. ambient working temp. in heating mode	°C	-25 to +45	
Min./max. cooling capacity [2]	kW	2.4 / 8.0	5.0 / 10.2
E.E.R. min./max. - Energy Efficiency Ratio [2]		3.80 / 4.00	3.60 / 3.90
SEER value, 7 °C / 18 °C		3.83 / 6.22	3.61 / 6.36
Min. flow temp. in cooling mode	°C	7	
Min./max. ambient working temp. in cooling mode	°C	+20 to +45	
Power supply	V/ph/Hz	230 / 1N / 50	230 / 1N / 50
Defrost upon demand		Yes	
Type/mass of refrigerant	kg	R290 / 0.7	R290 / 0.9

		Unit	ES M8 R290	ES M12 R290
Global warming potential (GWP)			3	
Type of connection between indoor and outdoor unit			Hydraulic plus two signal cables	
Dimensions of hydraulic pipe connectors		inch	G1"	G1"
Sound power level LwA		dB(A)	57	56
Sound pressure level at a distance	1 m	dB(A)	49	48
	5 m	dB(A)	35	34
	10 m	dB(A)	29	28
	15 m	dB(A)	25	24
Max. operation pressure		bar	31	
Min. operation pressure		bar	0.4	
PS Hydraulics cicuit pressure		bar	2.5	

1) Heating conditions for heat pumps: water temperature in/out 30 °C / 35 °C, ambient temperature DB 7 °C / WB 6 °C

2) Cooling condition: water inlet/outlet temperature 23 °C / 18 °C, ambient temperature DB 35 °C / WB 34 °C

5.5.2 ES M15 R290 1 PH, ES M15 R290 3 PH

	Unit	ES M15 R290 1 PH	ES M15 R290 3 PH
Dimensions (W×D×H)		1142×428×1492	1142×428×1492
Net weight		187	187
IP rating		IPX4	IPX4
ErP energy efficiency class		A+++	
SCOP - average climate, low temperature		4.72	4.70
Heating capacity [1]	kW	5.8–16.7	5.6–16.5
C.O.P. min./max. - Coefficient of Performance [1]	W/W	3.93 / 4.71	3.98 / 5.05
El. heating power input min./max. [1]	W	1231 / 4250	1120 / 4170
Max. flow temp. in heating mode	°C	70	
Min. flow temp. in heating mode	°C	7	
Min./max. ambient working temp. in heating mode	°C	-25 to +45	
Min./max. cooling capacity [2]	kW	6.6 / 13.5	6.9 / 13.2
E.E.R. min./max. - Energy Efficiency Ratio [2]		3.60 / 4.38	3.65 / 4.40
SEER value, 7 °C / 18 °C		n/a	
Min. flow temp. in cooling mode	°C	7	
Min./max. ambient working temp. in cooling mode	°C	+20 to +45	
Power supply	V/PH/Hz	230 / 1N / 50	400 / 3N / 50
Defrost upon demand		Yes	
Type/mass of refrigerant	kg	R290 / 1.5	R290 / 1.5
Global warming potential (GWP)		3	

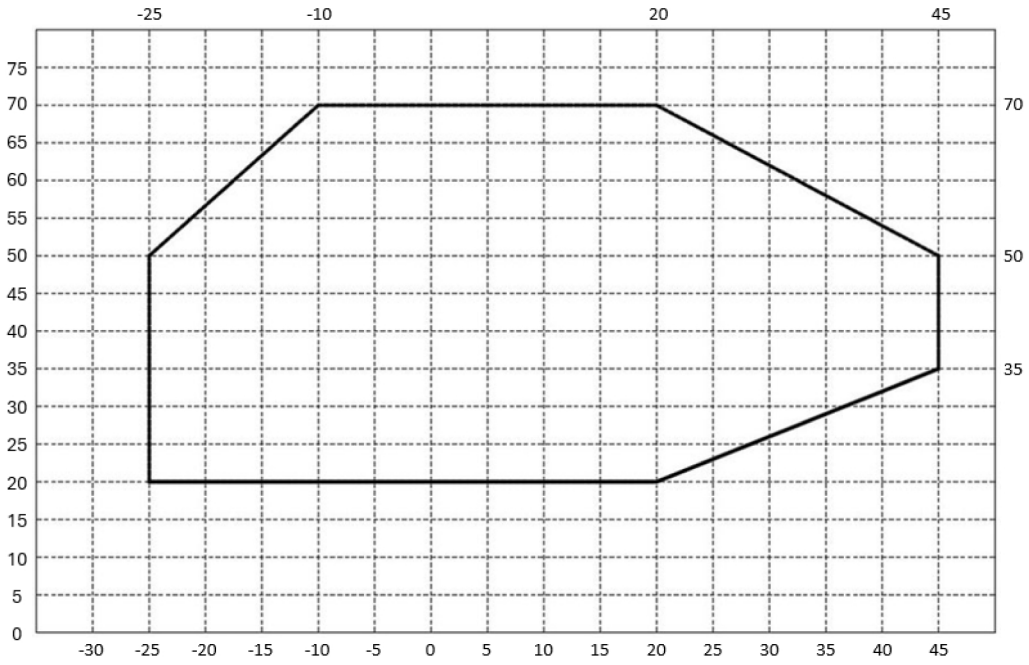
		Unit	ES M15 R290 1 PH	ES M15 R290 3 PH
Type of connection between indoor and outdoor unit			Hydraulic plus two signal cables	
Dimensions of hydraulic pipe connectors		inch	G1 ¼"	G1 ¼"
Sound power level LwA		dB(A)	59	57
Sound pressure level at a distance	1 m	dB(A)	49	52
	5 m	dB(A)	35	38
	10 m	dB(A)	29	32
	15 m	dB(A)	25	28
Max. operation pressure		bar	31	
Min. operation pressure		bar	0.4	
PS Hydraulics circuit pressure		bar	2.5	

1) Heating conditions for heat pumps: water temperature in/out 30 °C / 35 °C, ambient temperature DB 7 °C / WB 6 °C

2) Cooling condition: water inlet/outlet temperature 23 °C / 18 °C, ambient temperature DB 35 °C / WB 34 °C

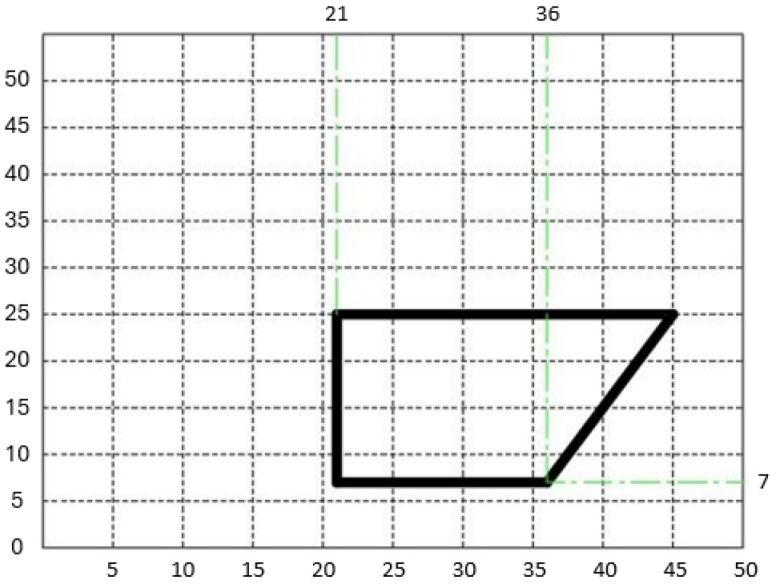
5.6 Operating range diagrams

Heating mode



X-axis = Ambient temperature (°C), Y-axis = Water outlet temperature (°C)

Cooling mode

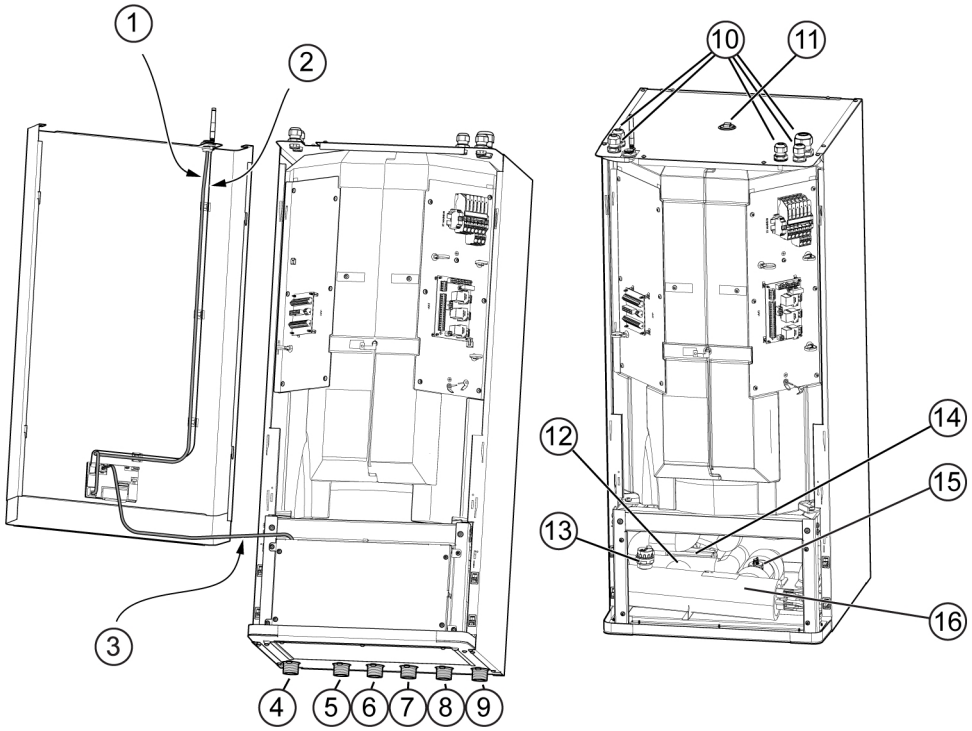


X-axis = Ambient temperature (°C), Y-axis = Water outlet temperature (°C)

5.7 Product overview

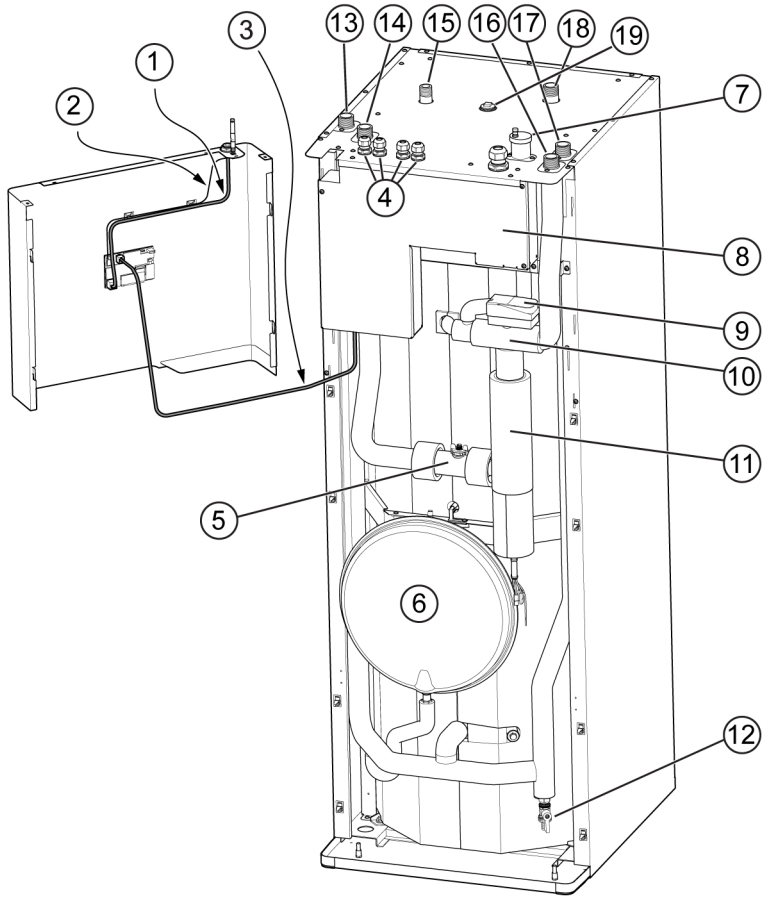
5.7.1 Indoor units product overview

ES 100L ST and ES 100L ST UK



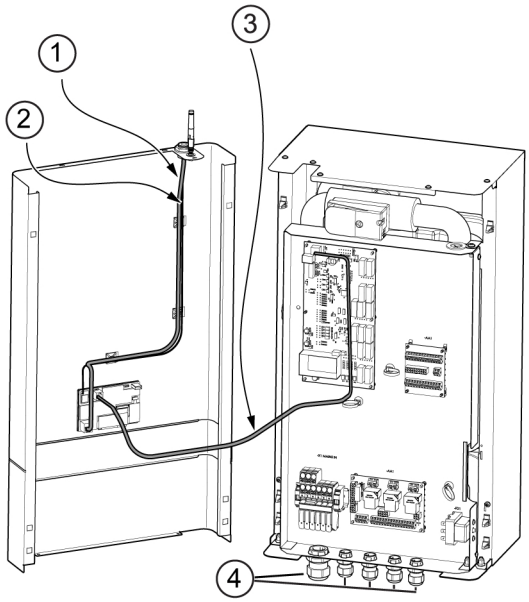
1 Ethernet/LAN cable
2 Antenna cable
3 RJ11 cable
4 Cold domestic water inlet (G1" male)
5 Hot domestic water outlet (G1" male)
6 Flow line heating system (G1" male)
7 Water inlet from outdoor unit (G1" male)
8 Return line heating system (G1" male)
9 Water outlet from outdoor unit (G1" male)
10 Cable glands
11 Temperature and pressure relief valve (UK only)
12 Three-way valve
13 Automatic air vent
14 Three-way valve actuator
15 Flow meter
16 Immersion heater

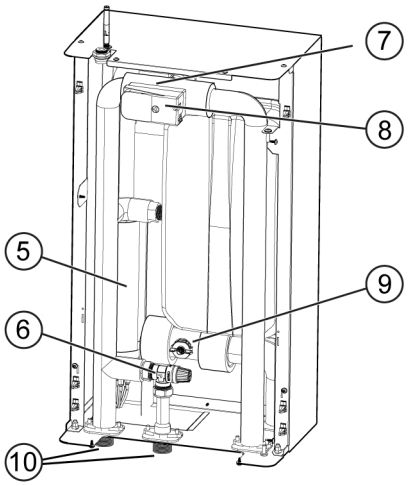
ES 250L ST and ES 250L ST UK



1 Ethernet/LAN cable
2 Antenna cable
3 RJ11 cable
4 Cable glands
5 Flow meter
6 Expansion vessel
7 Automatic air purging valve
8 Electric box
9 Three-way valve actuator
10 Three-way valve
11 Immersion heater
12 Drainage valve
13 Water outlet to outdoor unit (G1" male)
14 Water inlet from outdoor unit (G1" male)
15 Cold domestic water inlet (G¾" male)
16 Flow line heating system (G1" male)
17 Return line heating system (G1" male)
18 Hot domestic water outlet (G1" male)
19 Temperature and pressure relief valve (UK only)

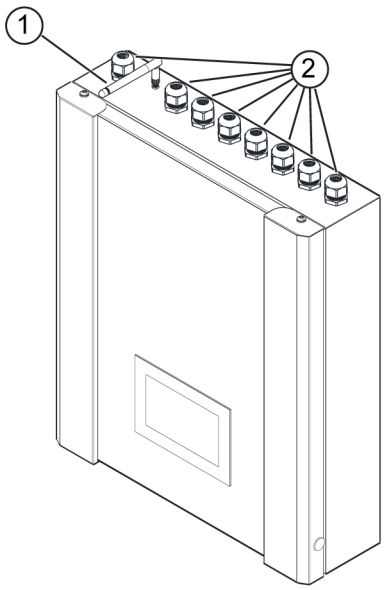
ES MHB

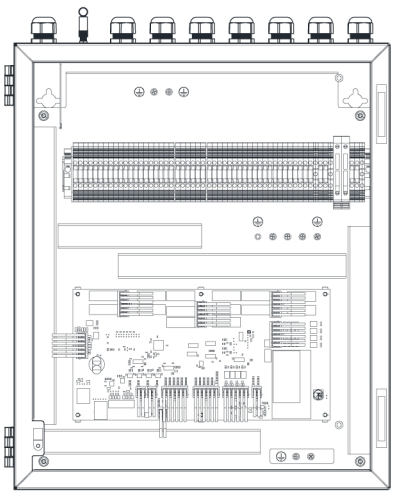




1 Ethernet/LAN cable
2 Antenna cable
3 RJ11 cable
4 Cable glands
5 Immersion heater
6 Pressure relief valve
7 Three-way valve
8 Three-way valve actuator
9 Flow meter

ES MCB

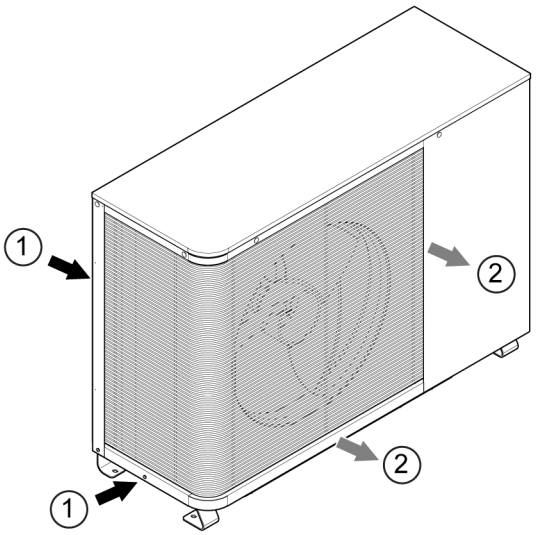


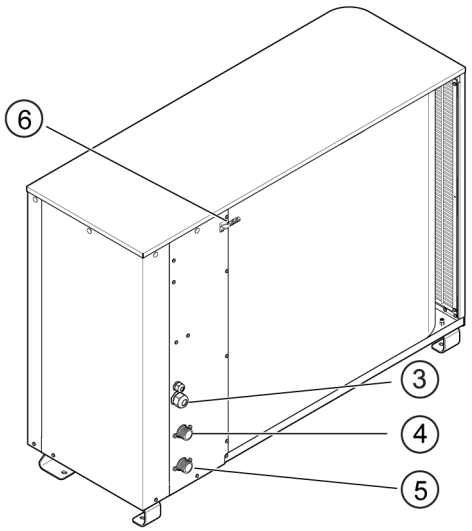


1 Antenna
2 Cable glands

5.7.2 Outdoor units product overview

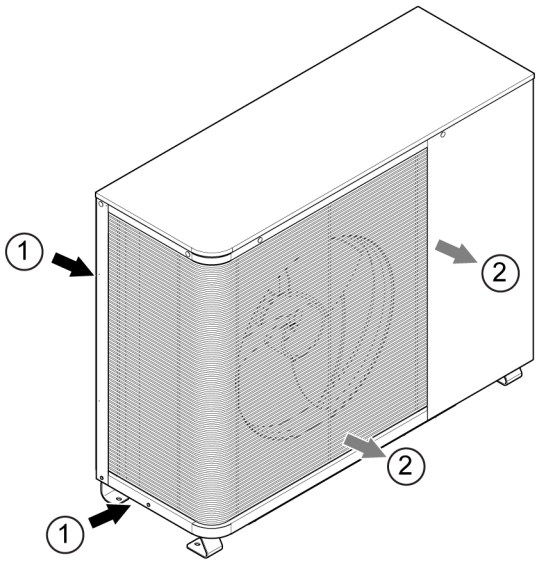
ES M8 R290

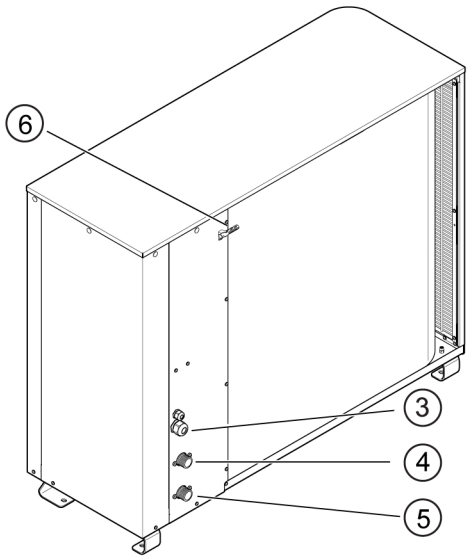




1 Air inlet
2 Air outlet
3 Cable gland
4 Water outlet
5 Water inlet
6 Outdoor temperature sensor

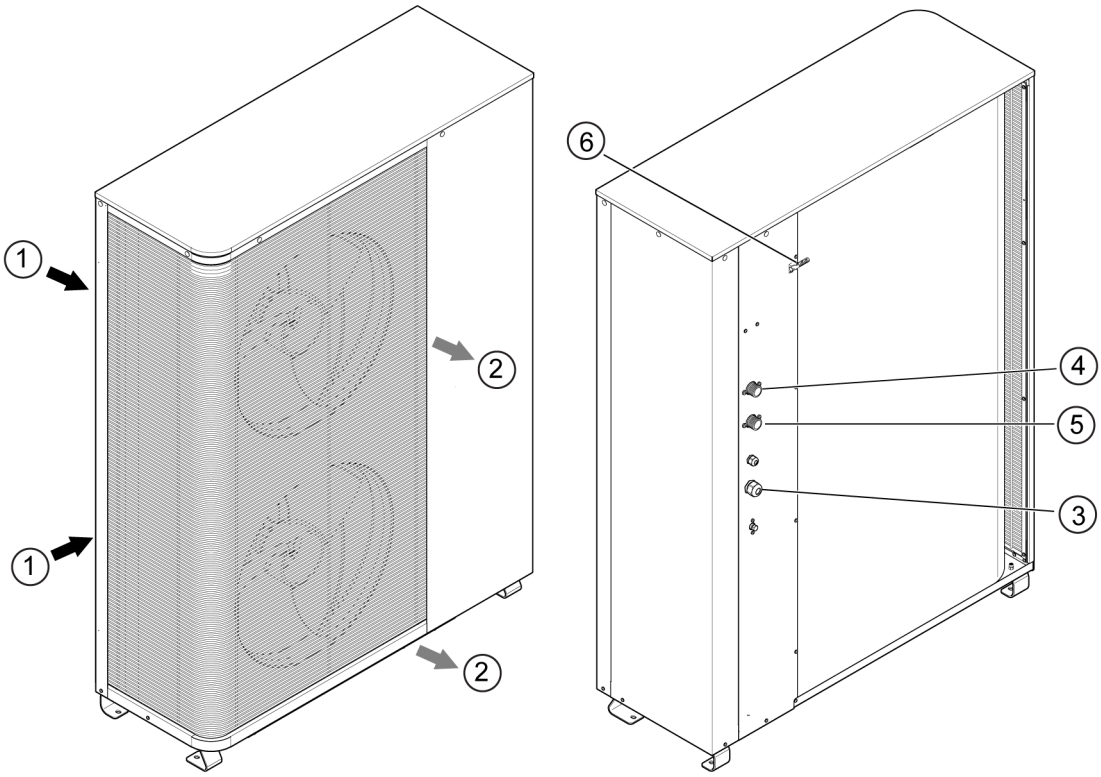
ES M12 R290





1 Air inlet
2 Air outlet
3 Cable gland
4 Water outlet
5 Water inlet
6 Outdoor temperature sensor

ES M15 R290 1 PH and ES M15 R290 3 PH



1 Air inlet
2 Air outlet
3 Cable gland
4 Water outlet
5 Water inlet
6 Outdoor temperature sensor

5.8 Indoor units dimensions

5.8.1 ES 100L ST and ES 100L ST UK

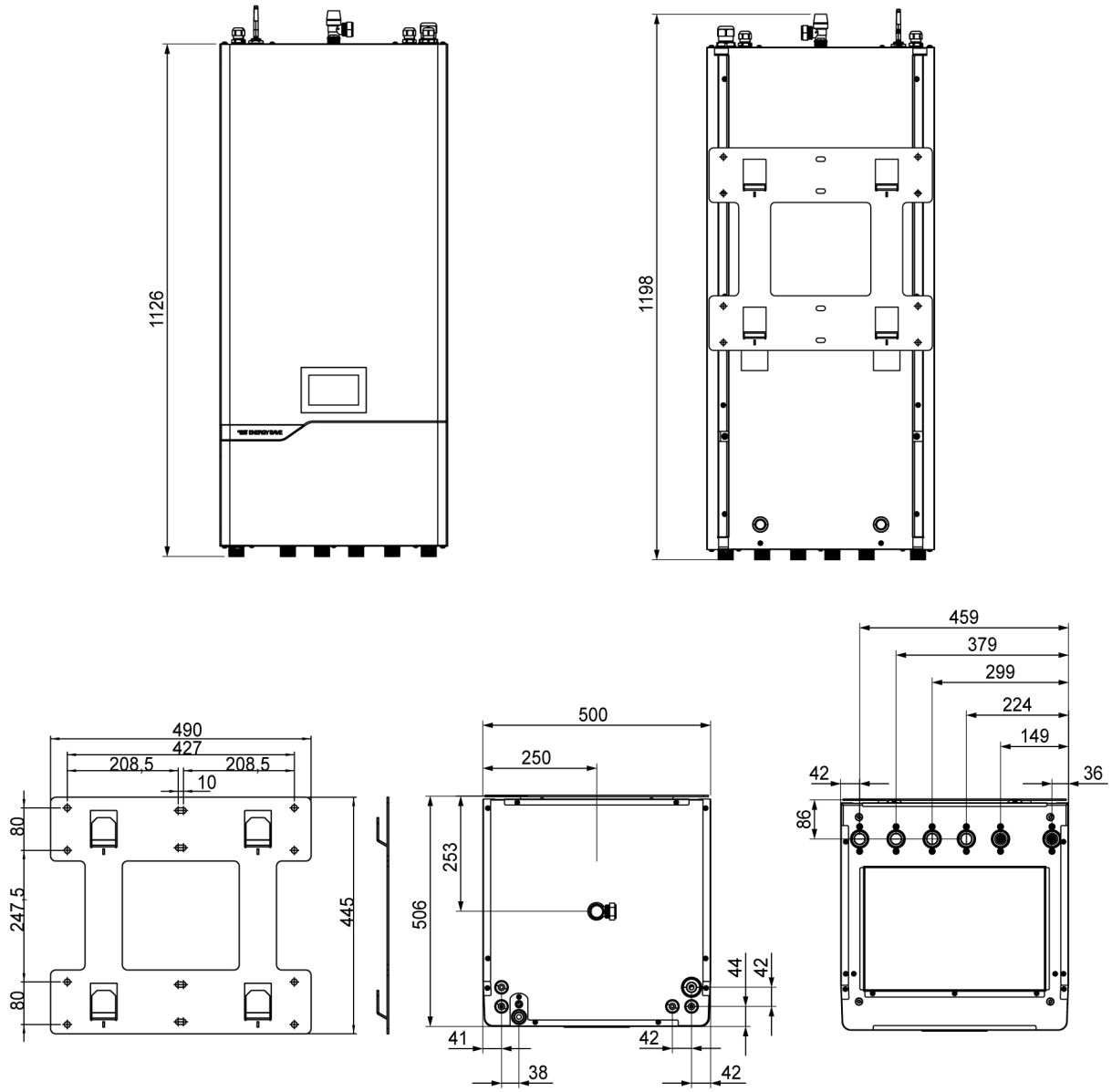


Figure 7: Dimensions (mm)

5.8.2 ES 250L ST and ES 250L ST UK

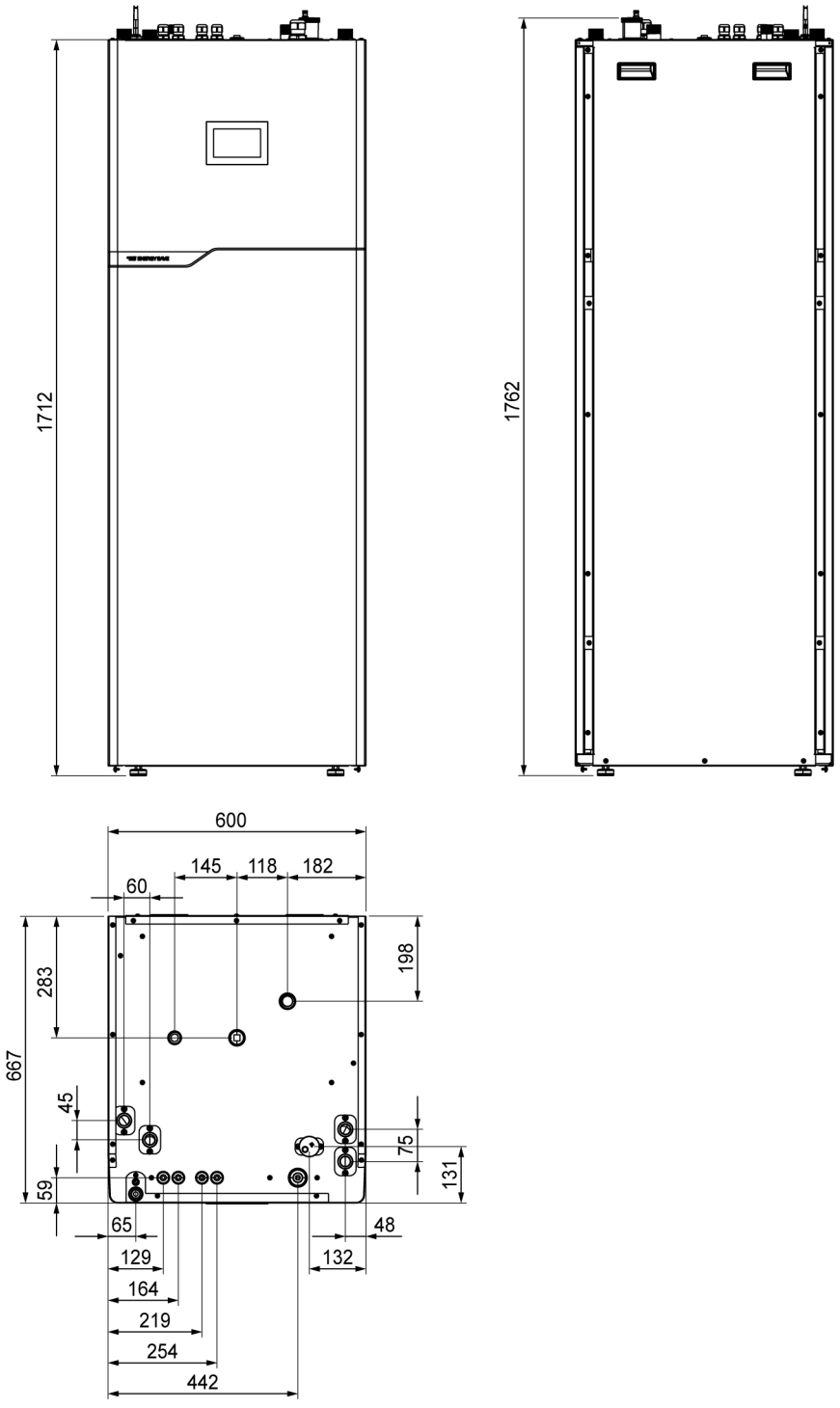


Figure 8: Dimensions (mm)

5.8.3 ES MCB

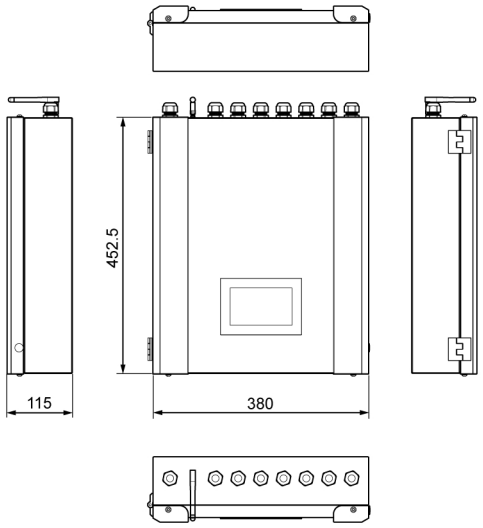


Figure 9: Dimensions (mm)

5.8.4 ES MHB

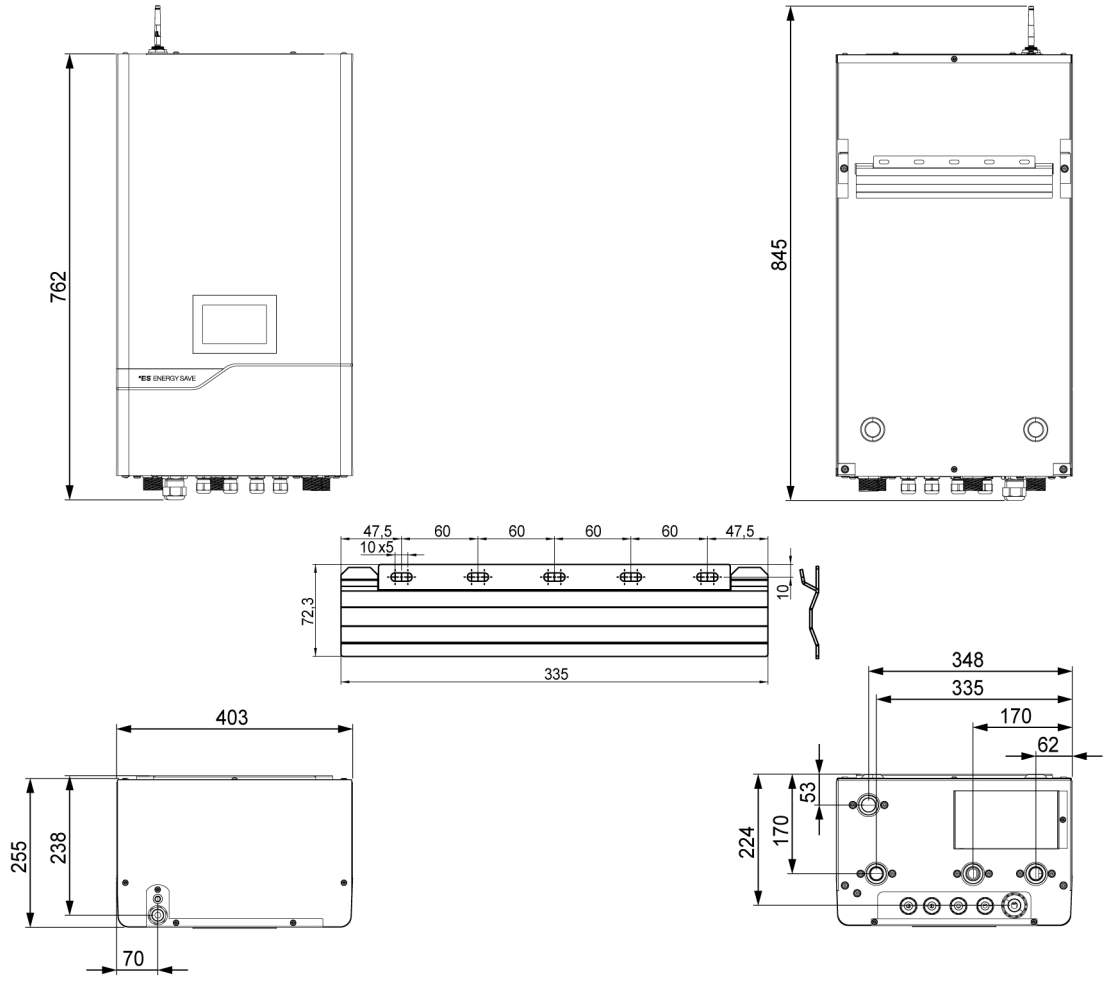


Figure 10: Dimensions (mm)

5.9 Outdoor units dimensions

5.9.1 ES M8 R290

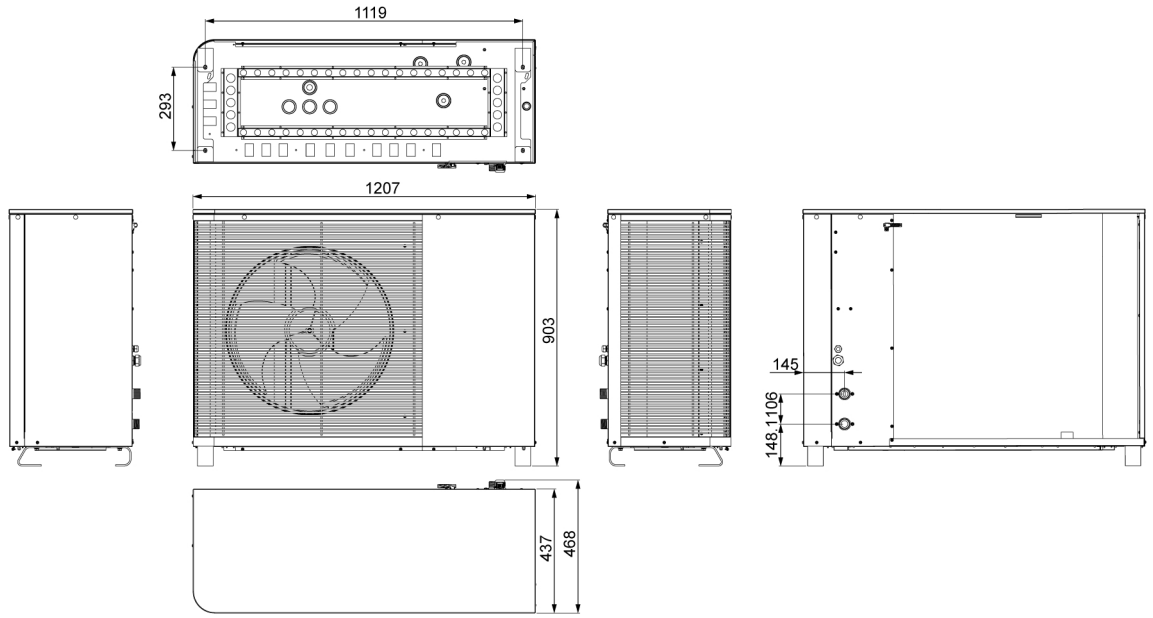


Figure 11: Dimensions (mm)

5.9.2 ES M12 R290

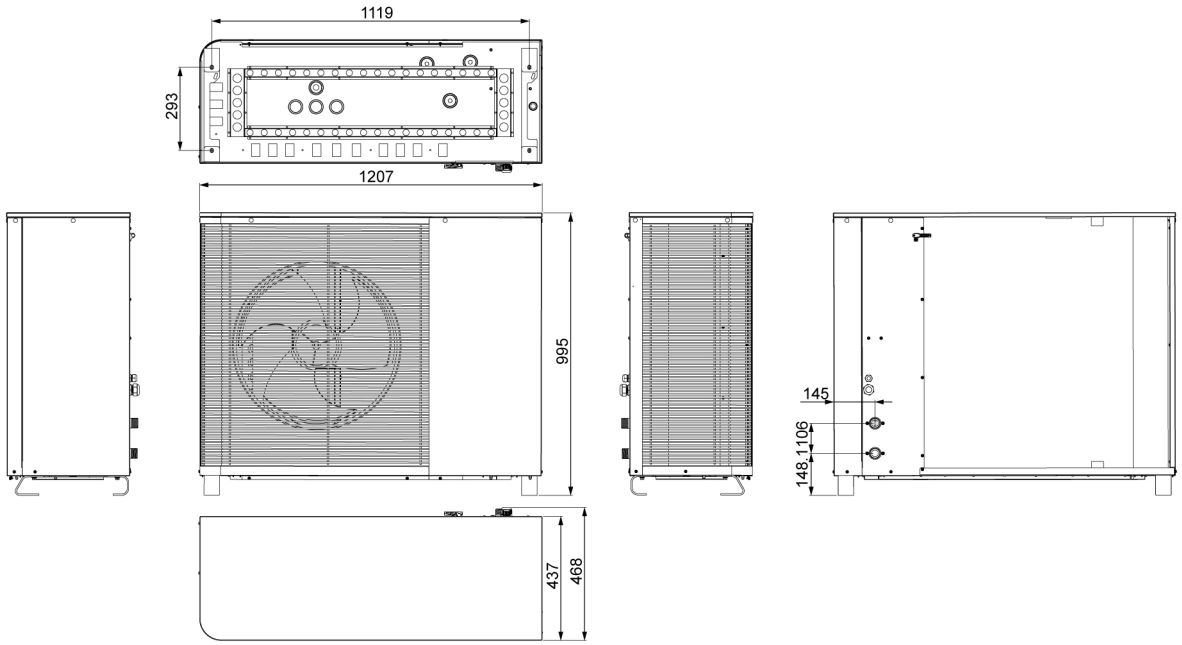


Figure 12: Dimensions (mm)

5.9.3 ES M15 R290

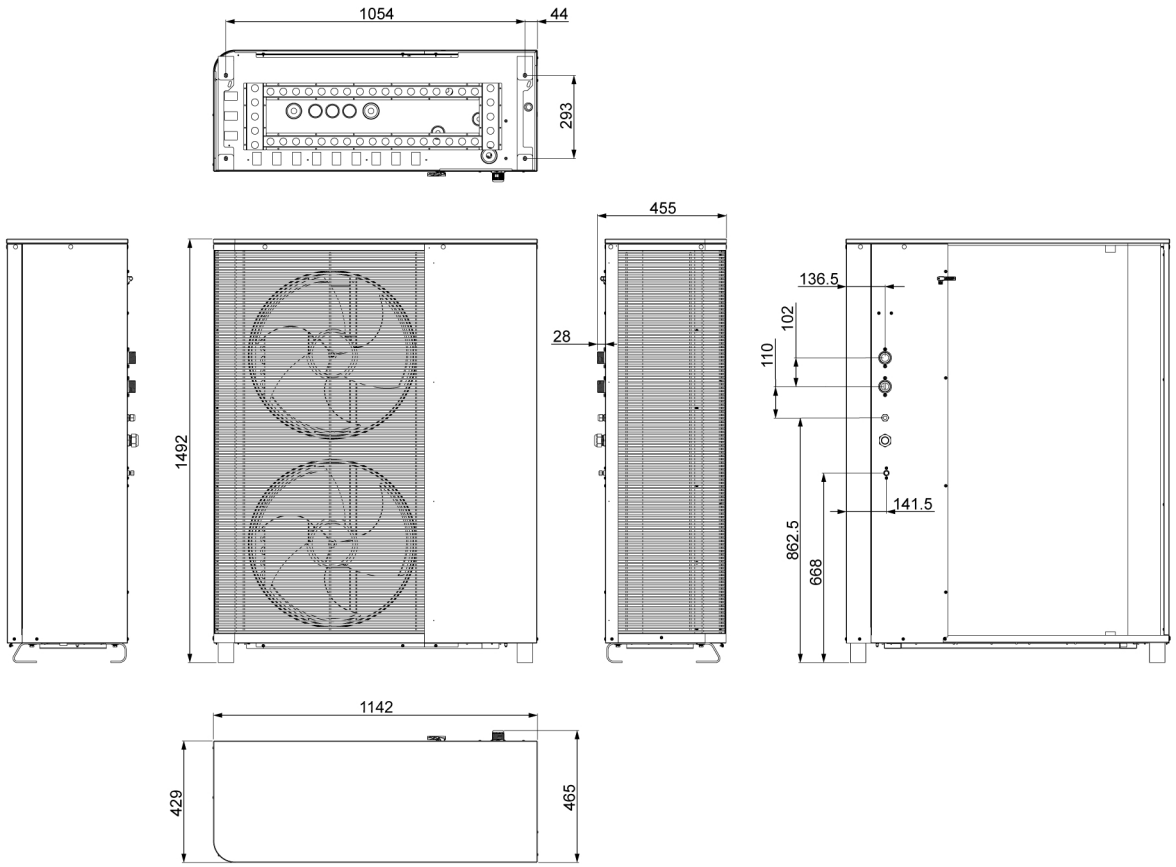


Figure 13: Dimensions (mm)

6 Installation

For a safe and successful installation of the heat pump system, follow the below instructions.

Be aware that different requirements and considerations may apply depending on the choice of indoor and outdoor unit as well as on the conditions at the installation site.

6.1 Outdoor installation options

For the outdoor units there are three different installation setups:

- out of the box with feet on a stone caisson
- with the outdoor stand accessory (see)
- with both the outdoor stand and the drain pan accessory (see)

In areas where sub-zero temperatures and snowfalls may occur, it is important to place the outdoor unit above the average snow depth at the location, and at a minimum distance of 400 mm above ground.

6.2 Preparing the site for installation

When preparing the site for installation work, follow the applicable environmental and safety regulations.

1. Identify any potential risks or challenges. Consider the layout, dimensions, access, power, ventilation, earthing, and environmental factors.
2. Clear the site from any material and obstacles in order to provide adequate space for the whole workflow when it comes to safety and ergonomics.
3. Ensure that the site is free of dust, dirt, grease, oil, or moisture that could damage the equipment or affect its performance.
4. Observe the stated space requirements and plan the placement of the equipment accordingly.
5. Make sure that people in the building are informed about any interruptions of water supply or power during the work.

6.3 Transportation and storage

WARNING

- The outdoor units must be stored in a well-ventilated area.
- The indoor and outdoor units are heavy (indoor 9-127 kg, outdoor 123-187 kg) and require appropriate lifting and transportation support to avoid injury or damage.
- Appropriate measures need to be taken to prevent the tipping over of the units prior to the units being mounted and secured. Harm could be inflicted on people and property otherwise.

CAUTION

- The units need to be stored and transported upright.
- All products including components must be protected against the weather during transportation and storage.
- Always check all products and components for transportation damage. If damage is observed, contact your local distributor immediately.

6.4 Disposal

When removing and disposing of old products, ensure that each products' manual is followed for instructions on how to detach the old products and disassemble parts if needed.

The old products need to be recycled in accordance with local regulations in a safe and proper manner.

6.5 Drainage preparation

The drainage of the condensation water must work properly not to cause damage to the building.

- Make sure that the outlet of the condensation water pipe is correctly positioned.
- If the water pipes are at risk for exposure to frost they must be provided with a suitable heating cable.
- Make sure that local regulations are followed for the drainage.
- Check the condensate drainage regularly (especially in autumn) and clean if necessary.

The following alternatives are recommended drainage solutions.

Stone caisson

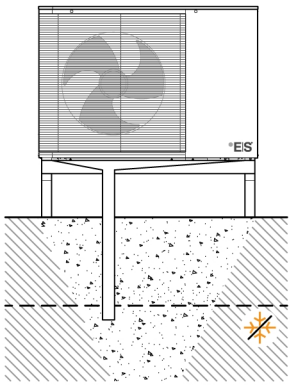


Figure 14: Stone caisson drainage

For the stone caisson it is important to make sure that it is placed in such a way that the condensation water is not transported towards the cellar of the building. If there is no cellar then the stone caisson can be placed underneath the outdoor unit.

Gutter drainage

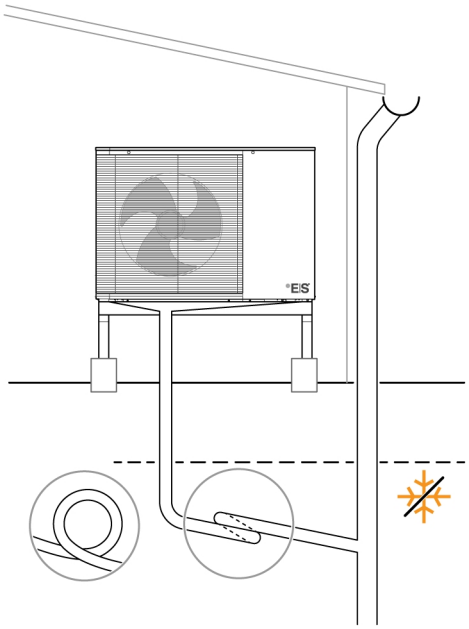


Figure 15: Gutter drainage

For the gutter drainage it is important that the drainage pipe has a water seal to prevent air from circulating in the drainage pipe.

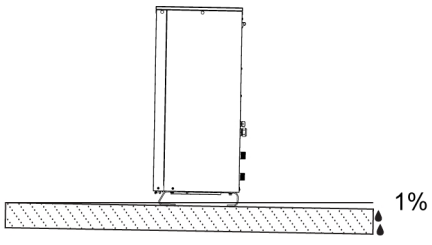
The outlet of the condensation water pipe must be located at a depth below the frost line to prevent freezing.

6.6 Placing the outdoor unit

For information regarding outdoor unit placement, see Section 5.2.2 "Outdoor unit placement", page 21.

1 Above the prepared drainage, create a solid flat foundation, stable enough to carry the weight of the outdoor unit.

The foundation should have a small incline (10 mm per 1000 mm) in order to prevent ice build-up.



2 Use appropriate lifting equipment and connect to the outdoor unit.

3 Lift and position the outdoor unit in place on the foundation or stand using the lifting straps.

CAUTION

Do not attempt to place the outdoor unit without appropriate lifting equipment. Keep hands away from the impact area.

4 Ensure that the unit is tilted slightly backwards to prevent ice build-up.

5 Secure the unit in place using a chain or strap to prevent tip-over accidents. The metal grid in the back right side or one of the pipe connection screws can be used to anchor the unit.

6 It is recommended to install the drainpan to capture condensation. When installing, ensure that it is done correctly to ensure proper operation and to prevent the build-up of ice that may otherwise damage the outdoor unit.

6.7 Connecting water pipes to the outdoor unit

CAUTION

The piping must be installed in accordance with current norms and directives.

1 Connect the water pipes to the outdoor unit according to the hydraulic connection diagrams for the unit.

2 Insulate all outdoor and hot water pipes to reduce heat transfer loss and protect them from the cool air outside. The insulation must be tied up tightly without gaps.

Use insulation type and thickness in accordance with national standards.

3 Seal the holes in the walls with fire-rated insulation foam and cover with ducting.

4 **Check valve**

Install a check valve to avoid back flow of water. The check valve is included in the package of the outdoor unit.

Make sure that the check valve is installed with the right flow direction.

5 **Filter**

Install a filter (20 mesh/cm²) at the water inlet of the water tank as well as that of the indoor unit, to avoid sediments and guarantee water quality.

6 **Ball valve**

A ball valve is recommended for easy operation of drainage or filter cleaning.

7 Before the heat pump is connected the system must be flushed and pressure tested with water to remove any residues that could damage the system.

For hydraulic connection diagrams, see Section 7.1 "Piping", page 48.

To complete the installation follow the procedure for indoor units in Section 7 "Hydraulic installation", page 47.

6.8 Mechanical installation

6.8.1 Piping distances between the indoor and outdoor units

ES heat pump model	Piping dimensions	Buffer tank in system	Number of elbows	Max piping distance
ES M8 R290	DN25 / DN32	Yes	6	20 m / 30 m
ES 100L ST / UK	DN25 / DN32	No	6	10 m / 15 m
ES 250L ST / UK				
ES MHB				
ES MCB				
ES M12 R290	DN25 / DN32	Yes	6	20 m / 30 m
ES 100L ST / UK	DN25 / DN32	No	6	10 m / 15 m
ES 250L ST / UK				
ES MHB				
ES MCB				
ES M15 R290 3 PH	DN32 / DN40	Yes	6	20 m / 30 m
ES 250L ST / UK	DN32 / DN40	No	6	10 m / 15 m
ES MHB				
ES MCB				
ES M15 R290 1 PH	DN32 / DN40	Yes	6	20 m / 30 m
ES 250L ST / UK	DN32 / DN40	No	6	10 m / 15 m
ES MHB				
ES MCB				

6.9 Placement of additional components

6.9.1 Filters

On the return line of the hydraulic system a dirt separator and magnetic filter must be installed, se an example in Figure 16 "DIRTMAGPLUS filter", page 45.

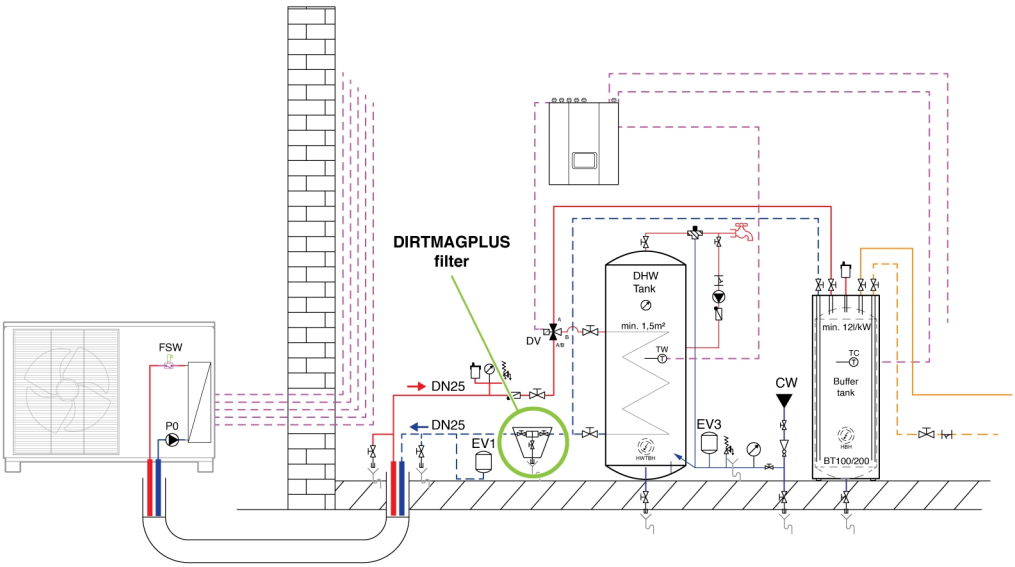


Figure 16: DIRTMAGPLUS filter

6.9.2 Temperature sensors

The temperature sensors need to be correctly positioned. For reference, always use the hydraulic schemes provided by Energy Save.

NOTE

Which temperature sensors to be used is dependent on the installation type.

Description		Position
TR1/ TR2	Room temperature sensor – for heating curve compensation according to the room temperature setting.	Leaving area. Recommended height appr. 1.5 m from floor.
TDW	Sanitary hot water temperature sensor	Upper half of the DHW tank.
THC	Heating / cooling temperature sensor	Upper half of the buffer tank. Flow line after the 3-way valve (if no buffer).
TV1	Mixing circuit 1 temperature sensor	After the circulation pump for circuit 1
TV2	Mixing circuit 2 temperature sensor	After the circulation pump for circuit 2

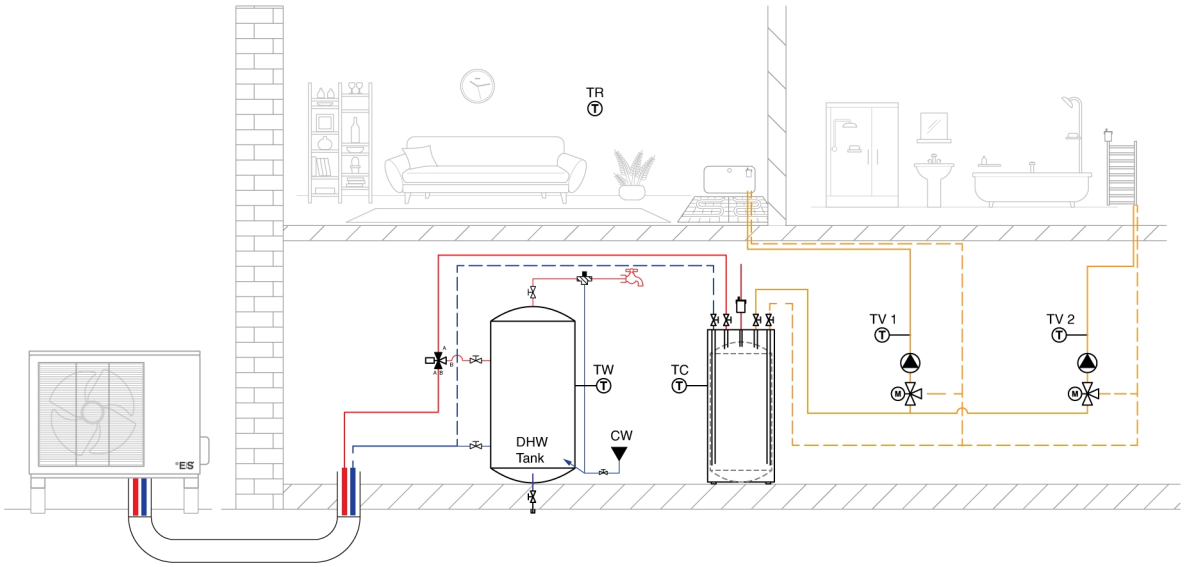
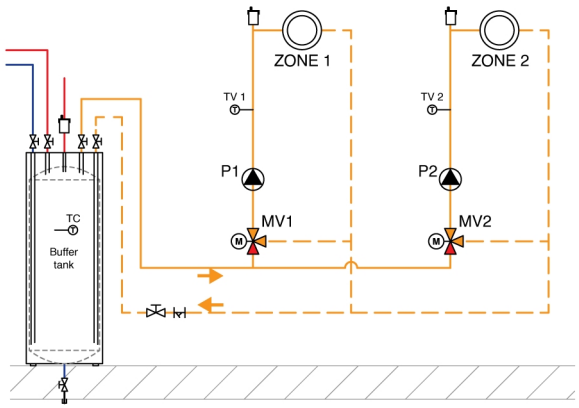


Figure 17: Example of temperature sensor positioning

6.9.3 Mixing valve

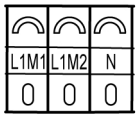
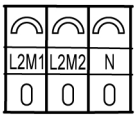
The heat pumps can control two heating and/or cooling mixing circuits. Required temperature sensors for two mixing circuits are included in the package. When controlling two circuits a buffer tank must be used in the hydraulic system.

For each circuit (zone) the mixing valve must be enabled in the menu ***Zone 1*** (if used for circuit 1) and ***Zone 2*** (if used for circuit 2).

Description		Scheme
MV1	Mixing valve for Zone 1	
P1	Water pump for Zone 1	
TV1	Temperature sensor for mixing circuit 1	
MV2	Mixing valve for Zone 2	
P2	Water pump for Zone 2	
TV2	Temperature sensor for mixing circuit 2	

6.9.3.1 Type of mixing valve actuator

The type of mixing valve should be a 3-point 230 V AC signal.

Zone 1		Zone 2	
L1M1	230 V signal – open	L2M1	230 V signal – open
L1M2	230 V signal – close	L2M2	230 V signal – close
N	Neutral	N	Neutral
			

6.10 Installing the MCB and MHB

There are some additional considerations regarding the installation of the MCB Control box and the MHB Hydrobox.

DHW production specifications

When installing an MCB or MHB, a DHW unit needs to be added. The 100L and 250L units include a DHW tank.

If a DHW tank with coil is used for heating the DHW, the coil must have a certain surface area to ensure normal operation of the heat pump. The minimum surface area of the coil is 0.125 × the nominal heating capacity of the heat pump at A7/W35.

Outdoor unit model	Minimum coil surface area
ES M8 R290	1.13 m^2
ES M12 R290	1.50 m^2
ES M15 R290 1 PH	1.88 m^2
ES M15 R290 3 PH	1.88 m^2

For cabling information regarding MCB and MHB, see Section 8.1.3 "ES MCB", page 51, Section 8.1.4 "ES MHB", page 53 and Section 8.2.3.1 "Installing magnet rings on the power supply cable", page 55.

7 Hydraulic installation

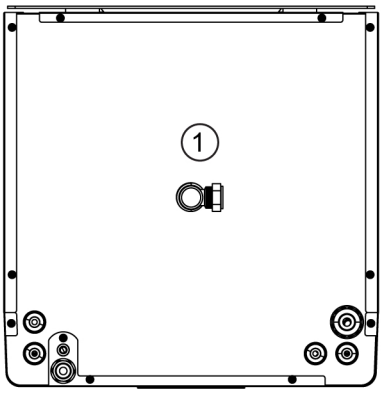
NOTE

Hydraulic schemes provided by the Energy Save distributor or Energy Save personnel contain official requirements for the installation of the Energy Save heat pump into a hydraulic system.

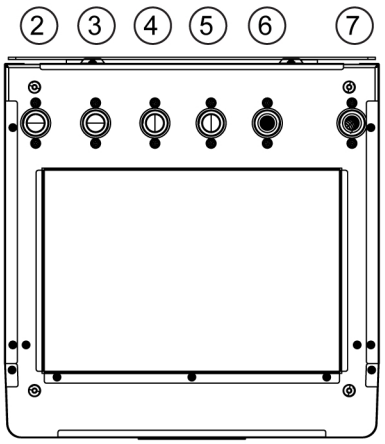
7.1 Piping

7.1.1 Hydraulic connections for ES 100L ST and ES 100L ST UK

Top view



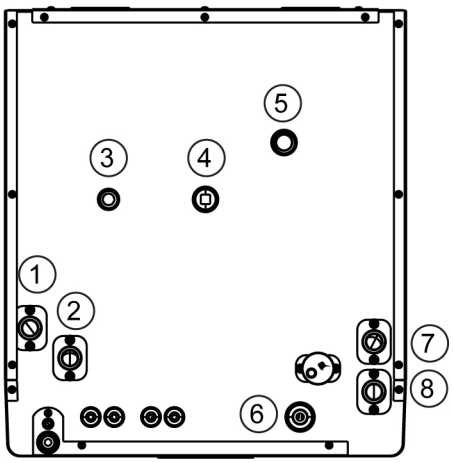
Bottom view



	Connection	Size		Connection	Size
1	Temperature and pressure relief valve, TPRV placement (UK only)		**5**	Flow line heating system	G1" male
2	Water outlet to outdoor unit	G1" male	**6**	Hot domestic water outlet	G1" male
3	Return line heating system	G1" male	**7**	Cold domestic water inlet	G1" male
4	Water inlet from outdoor unit	G1" male			

7.1.2 Hydraulic connections for ES 250L ST and ES 250L ST UK

Top view



	Connection	Size		Connection	Size
1	Water outlet to outdoor unit	G1" male	**5**	Hot domestic water outlet	G1" male
2	Water inlet from outdoor unit	G1" male	**6**	Automatic air purging valve	

	Connection	Size		Connection	Size
3	Cold domestic water inlet	G¾" male	**7**	Return line heating system	G1" male
4	TPRV placement (UK only)		**8**	Flow line heating system	G1" male

8 Wiring

CAUTION

All electrical connections must be done by a professional and in accordance with the electrical standards.

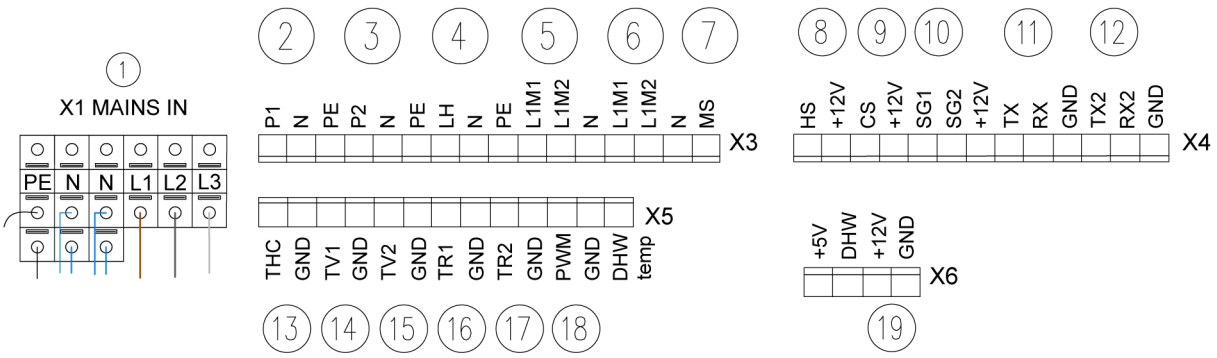
CAUTION

It is mandatory to use a suitable fuse for the heat pump and make sure the power supply to the unit corresponds to the specifications.

Also, a RCD (residual-current device) / GFCI (ground fault circuit interrupter) must be added before the fuses for the heat pump.

8.1 Indoor units wiring connections

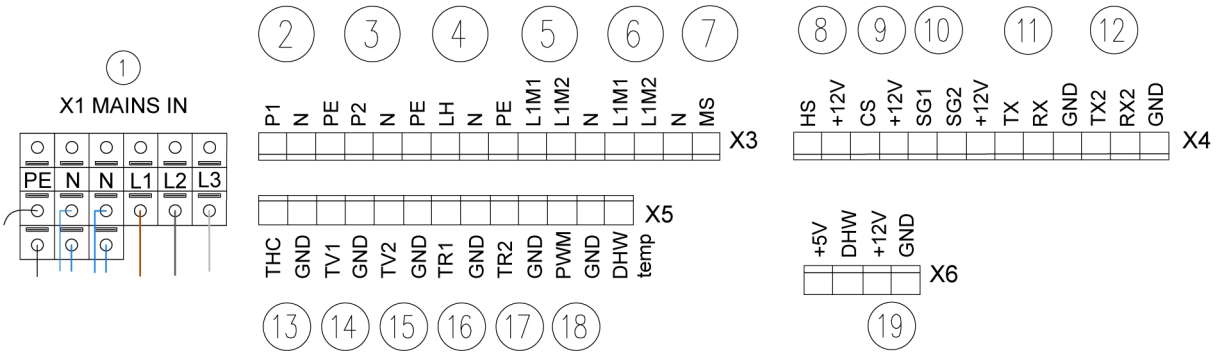
8.1.1 ES 100L ST and ES 100L ST UK



	Connections	Description
1	PE, N, N, L1, L2, L3	Main power supply - 400 V AC
2	P1, N, PE	Water pump P1 - 230 V AC output
3	P2, N, PE	Water pump P2 - 230 V AC output
4	LH, N, PE	Additional buffer tank heating source (signal only)
5	L1M1, L1M2, N	Mixing valve 1 - ZONE 1
6	L1M1, L1M2, N	Mixing valve 2 - ZONE 2
7	MS, N	Mode signal output - 230 V AC
8	HS, +12V	Heating signal -HS- digital input

	Connections	Description
9	CS, +12V	Cooling signal -CS- digital input
10	SG1, SG2, +12V	SG ready
11	TX, RX, GND	Communication indoor - outdoor unit TX = A RX = B GND = G
12	TX2, RX2, GND	Communication - RF dongle
13	THC, GND	Buffer tank temperature sensor - THC
14	TV1, GND	Mixing circuit 1 temperature sensor - TV1
15	TV2, GND	Mixing circuit 2 temperature sensor - TV2
16	TR1, GND	Wired room temperature sensor 1 - TR1
17	TR2, GND	Wired room temperature sensor 2 - TR2
18	PWM, GND	Water pump P0 PWM signal
19	12V+, GND	Power supply - wireless room thermostat (12 V DC)

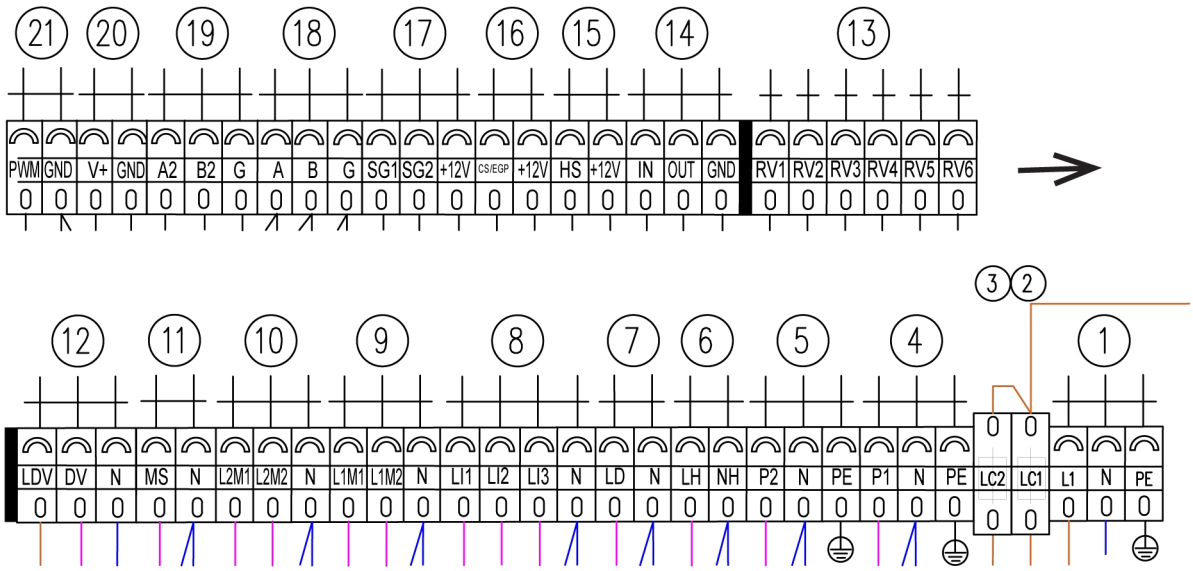
8.1.2 ES 250L ST and ES 250L ST UK



	Connections	Description
1	PE, N, N, L1, L2, L3	Main power supply - 400 V AC
2	P1, N, PE	Water pump P1 - 230 V AC output
3	P2, N, PE	Water pump P2 - 230 V AC output
4	LH, N, PE	Additional buffer tank heating source (signal only)
5	L1M1, L1M2, N	Mixing valve 1 - ZONE 1
6	L1M1, L1M2, N	Mixing valve 2 - ZONE 2
7	N, MS	Mode signal output - 230 V AC
8	HS, +12V	Heating signal -HS- digital input
9	CS, +12V	Cooling signal -CS- digital input
10	SG1, SG2, +12V	SG ready

	Connections	Description
11	TX, RX, GND	Communication indoor - outdoor unit TX = A RX = B GND = G
12	TX2, RX2, GND	Communication - RF dongle
13	THC, GND	Buffer tank temperature sensor - THC
14	TV1, GND	Mixing circuit 1 temperature sensor - TV1
15	TV2, GND	Mixing circuit 2 temperature sensor - TV2
16	TR1, GND	Wired room temperature sensor 1 - TR1
17	TR2, GND	Wired room temperature sensor 2 - TR2
18	PWM, GND	Water pump P0 PWM signal
19	12V+, GND	Power supply - wireless room thermostat (12 V DC)

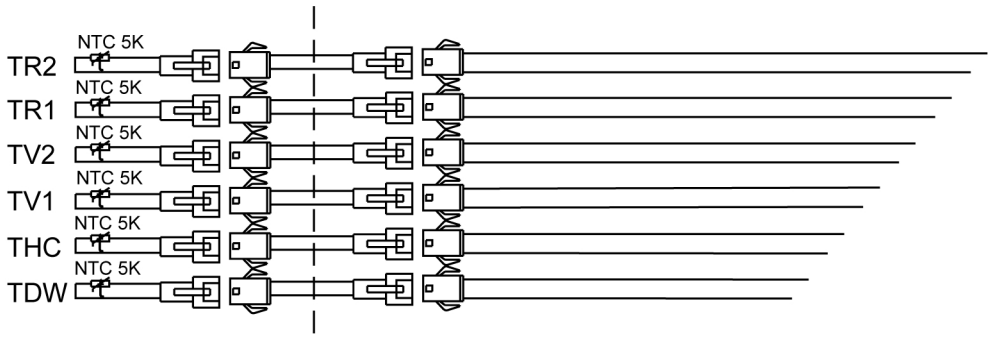
8.1.3 ES MCB



	Connections	Description
1	PE, L1, N	Main power supply - 230 V AC
2	LC1	Ceramic fuse LC1 - Main controller - 4A
3	LC2	Ceramic fuse LC2 - Outputs - 4A
4	PE, P1, N	Water pump P1 - 230 V AC output
5	PE, P2, N	Water pump P2 - 230 V AC output
6	NH, LH	Additional buffer tank heating source (signal only)
7	LD, N	Additional DHW tank heating source (signal only)
8	LI1, LI2, LI3, N	Additional inline heating source - 3 stages (signal only)
9	L1M1, L1M2, N	Mixing valve 1 - ZONE 1

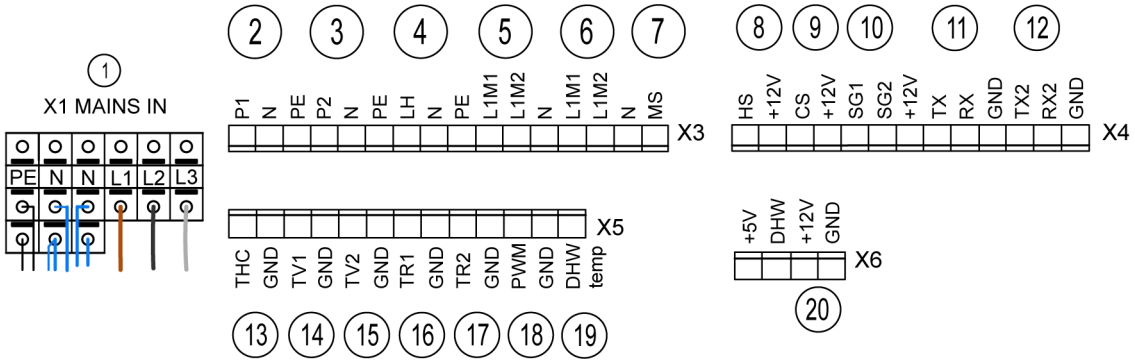
	Connections	Description
10	L2M2, L2M1, N	Mixing valve 2 - ZONE 2
11	MS, N	Mode signal output - 230 V AC
12	DV, LDV, N	Diverting valve - LDV = permanent 230 V; DV = signal output 230 V (in DHW mode)
13	RV1, RV2, RV3, RV4, RV5, RV6	Reserve (RV1 – RV6)
14	IN, OUT, GND	Flow sensor
15	HS, +12V	Heating signal - digital input
16	CS/EGP, +12V	Cooling signal / Electric grid protection - digital input
17	SG1, SG2, +12V	SG ready
18	A, B, G	Communication indoor – outdoor unit
19	A2, B2, G	Communication accessory components
20	V+, GND	Power supply - wireless room thermostat (12 V DC)
21	PWM, GND	Water pump P0 PWM signal

Temperature sensors



Connections	Description
TR2	Room temperature 1
TR1	Room temperature 2
TV2	Mixing circuit 1 temperature
TV1	Mixing circuit 2 temperature
THC	Heating / cooling system temperature
TDW	Domestic hot water temperature

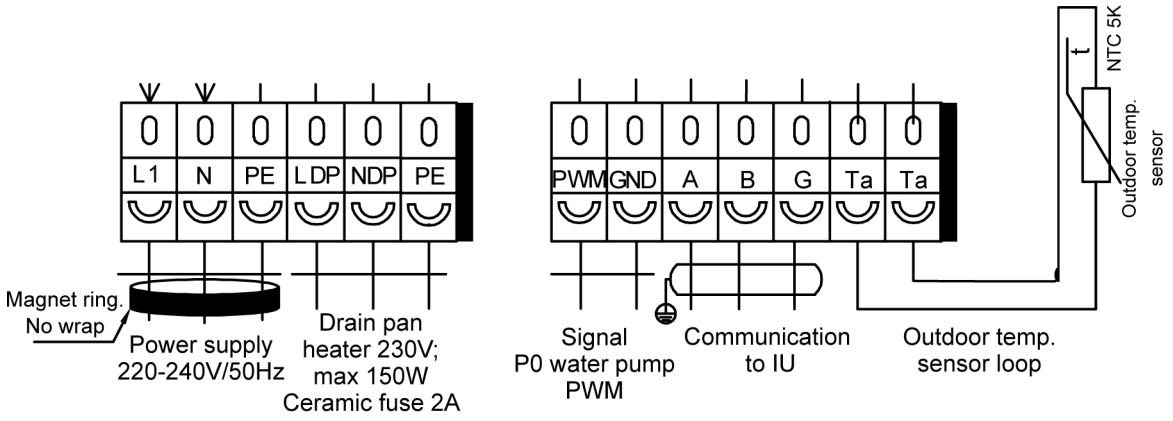
8.1.4 ES MHB



	Connections	Description
1	PE, N, N, L1, L2, L3	Main power supply - 400 V AC
2	P1, N, PE	Water pump P1 - 230 V AC output
3	P2, N, PE	Water pump P2 - 230 V AC output
4	LH, N	Additional buffer tank heating source (signal only)
5	L1M1, L1M2, N	Mixing valve 1 - ZONE 1
6	L1M1, L1M2, N	Mixing valve 2 - ZONE 2
7	MS	Mode signal output - 230 V AC
8	HS, +12V	Heating signal -HS- digital input
9	CS, +12V	Cooling signal -CS- digital input
10	SG1, SG2, +12V	SG ready
11	TX, RX, GND	Communication indoor - outdoor unit TX = A RX = B GND = G
12	TX2, RX2, GND	Communication - RF dongle
13	THC, GND	Buffer tank temperature sensor - THC
14	TV1, GND	Mixing circuit 1 temperature sensor - TV1
15	TV2, GND	Mixing circuit 2 temperature sensor - TV2
16	TR1, GND	Wired room temperature sensor 1 - TR1
17	TR2, GND	Wired room temperature sensor 2 - TR2
18	PWM, GND	Water pump P0 PWM signal
19	DHW, temp	DHW tank temperature sensor - TDW
20	12V+, GND	Power supply - wireless room thermostat

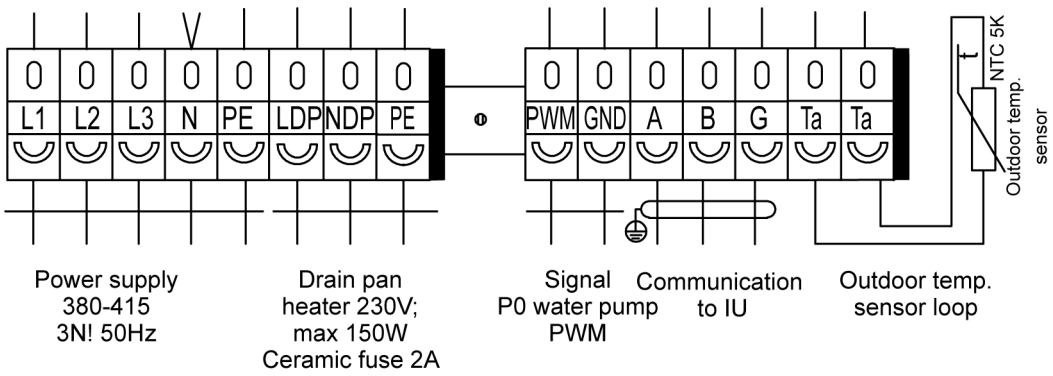
8.2 Outdoor units wiring connections

8.2.1 ES M8 R290 and ES M12 R290



	Connections
Power supply 220-240 V/50 Hz	L1, N, PE
Drain pan heater 230 V, max 150 W (for connecting an external drain pan heater)	LDP, NDP, PE
Signal P0 water pump PWM	PWM, GND
Communication to indoor unit	A, B, G
Outdoor temperature sensor (pre-installed)	Ta, Ta

8.2.2 ES M15 R290 3 PH



	Connections
Power supply 380–415 V, 3N, 50 Hz	L1, L2, L3, N, PE
Drain pan heater 230 V, max 150 W (for connecting an external drain pan heater)	LDP, NDP, PE
Signal P0 water pump PWM	PWM, GND

	Connections
Communication to indoor unit	A, B, G
Outdoor temperature sensor (pre-installed)	Ta, Ta

8.2.3 Installing magnetic rings

See the following instructions for installing a magnet ring on the power supply and communication cable.

NOTE

For ES MCB indoor unit installations, the magnetic ring should be installed on the communication cable. For all other installations, the magnet ring should be installed on the power supply cable.

8.2.3.1 Installing magnet rings on the power supply cable

For ES M8 R290 and ES M12 R290 installations

1. Make sure that the power supply cable has been installed correctly.
2. Measure a distance of 100 mm from the terminal block where the power supply cable is attached.
3. Open the magnet ring (F9 SCRC 200D).
4. Put the magnet ring on the power supply cable and close it.

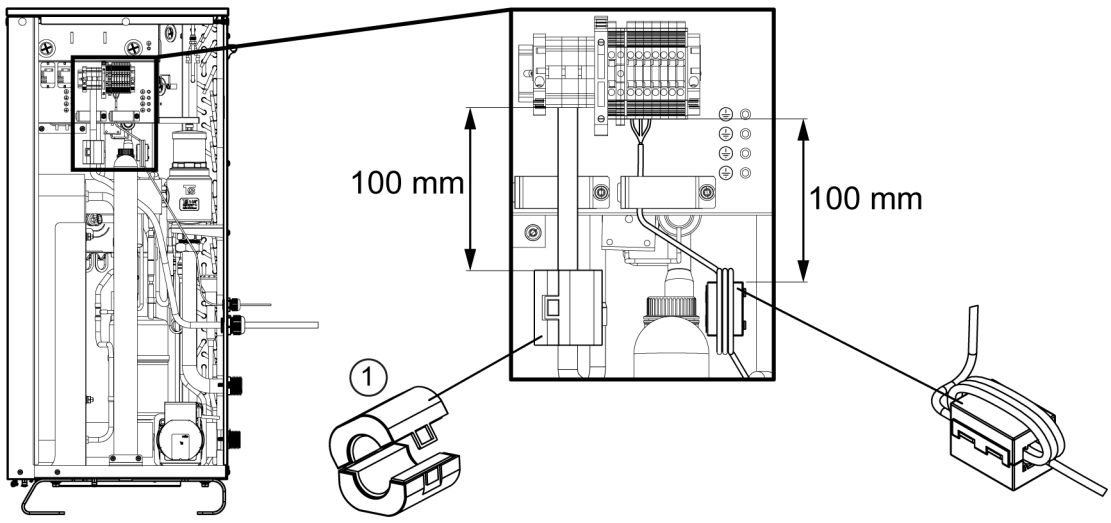


Figure 18: Installation of magnet ring (ES M8 R290 and ES M12 R290)

1 F9 SCRC 200D

For ES M15 R90 1 PH installations

1. Make sure that the power supply cable has been installed correctly.
2. Measure a distance of 100 mm from the terminal block where the power supply cable is attached.
3. Open the magnet ring (F9 SCRC 200D).

4 Put the magnet ring on the power supply cable and close it.

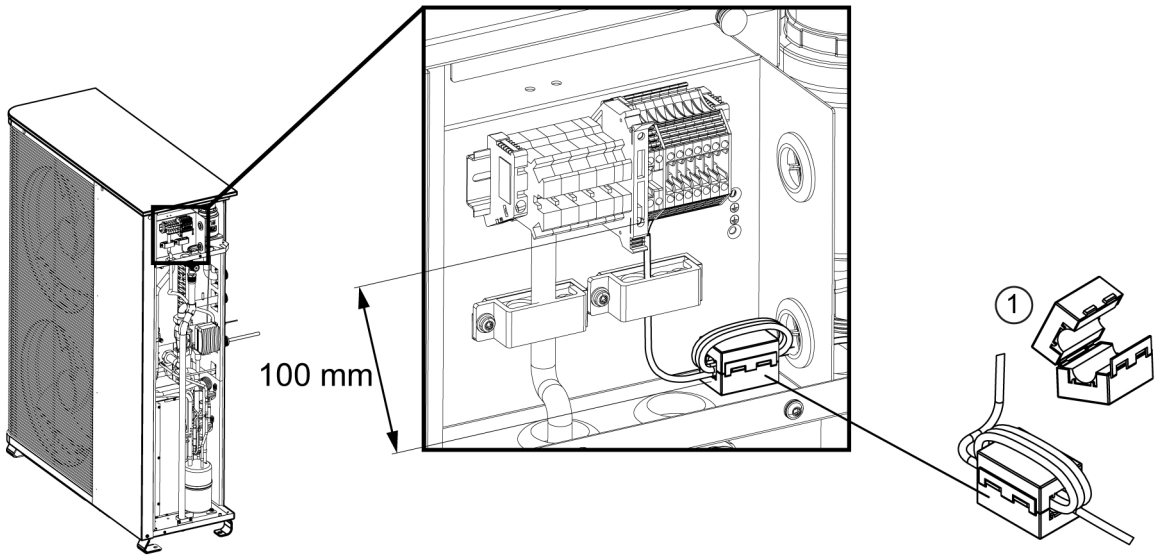


Figure 19: Installation of magnet ring (ES M15 R90 1 PH)

1 F9 SCRC 200D

8.2.3.2 Installing magnet rings on the communication cable

For ES M8 R290 and ES M12 R290 installation

1 Make sure that the communication cable has been installed correctly.

2 Measure a distance of 250 mm from the terminal block where the communication cable is attached.

3 Open the magnet ring (F9 SCNF 130A).

4 Put the cable in the magnet ring and wrap it around the ring three times and close it.

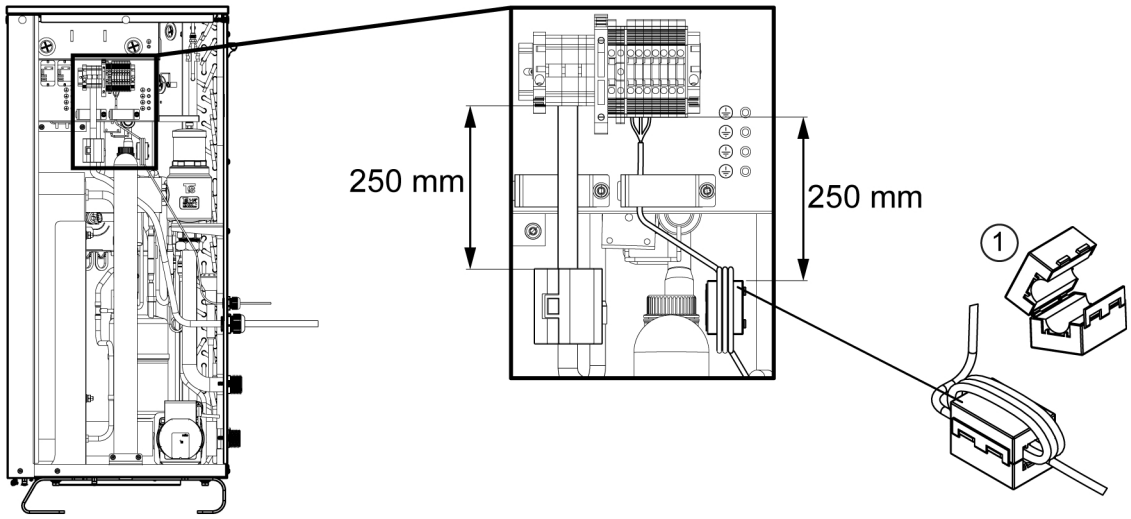


Figure 20: Installation of magnet ring (ES M8 R290 and ES M12 R290)

1 F9 SCNF 130A

For ES M15 R90 1 PH and ES M15 R90 3 PH installations

1 Make sure that the communication cable has been installed correctly.

2 Measure a distance of 100 mm from the terminal block where the communication cable is attached.

3 Open the magnet ring (F9 SCNF 130A).

4 Put the cable in the magnet ring and wrap it around the ring three times and close it.

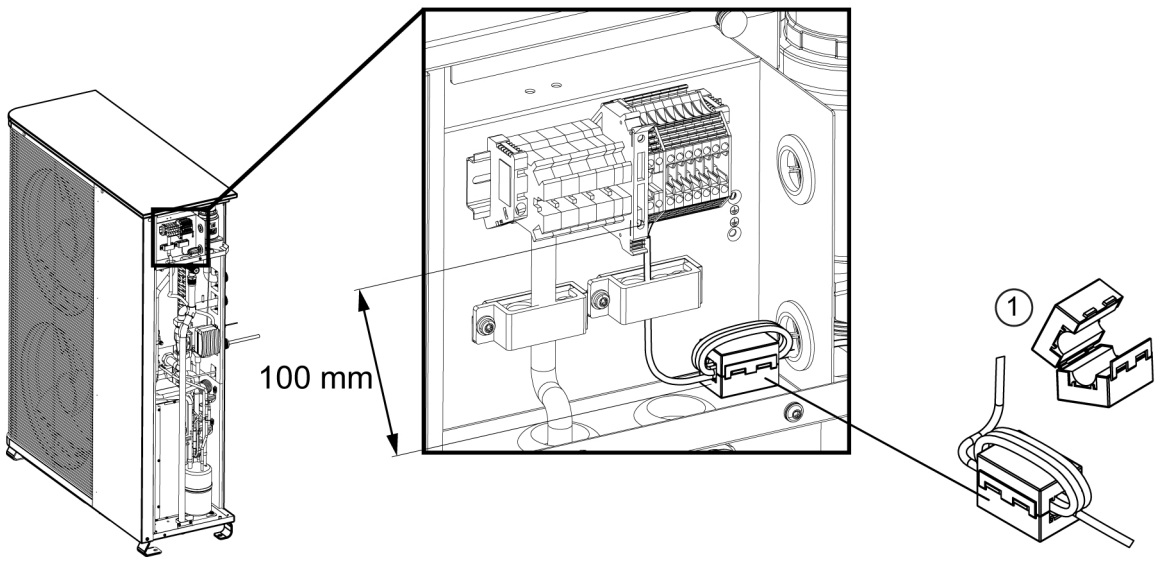


Figure 21: Installation of magnet ring (ES M15 R90 1 PH and ES M15 R90 3 PH)

1 F9 SCNF 130A

9 Commissioning and configuration

9.1 Commissioning and registration

Commissioning here refers to an activity by the installer in setting up the configuration of the system, mostly through the display interface.

It typically happens after physical installation and before other general configurations and leaving the site. The action order suggested below is based on:

- The internal logic and sequence of the controller
- Common practice

1 **Connect to internet**

Installer settings** » **Commissioning** » **Wi-Fi/Ethernet

Connect to internet via Wi-Fi, see Section 9.3.10.4 "Connecting to Wi-Fi", page 79.

Alternatively connect to internet via Ethernet.

2 **Registration to the cloud**

Installer settings** » **Commissioning** » **ES cloud connection

Register the device on the fleet management online.

Alternatively, register the device on the fleet management offline.

NOTE

Refer to Section 9.2 "Warranty", page 59 for more information about warranty and registration.

3 **Software update**

NOTE

An automatic software update is triggered every 24 hour, but to make sure that the latest software is used during the commissioning, update the software manually according to the following step.

Installer settings** » **Commissioning** » **Software & Updates

Update the software via FOTA (internet connection is required).

Alternatively use USB to update.

4 **Reset to factory settings**

Reset all configuration values (installer and user settings) to default factory settings. Software updates and registration to cloud are not impacted by this action.

Installer settings** » **Commissioning** » **Reset to factory settings

NOTE

When the previous steps (1 to 4) are completed, your system will be registered and connected, with the latest software and default values.

5 **Install wireless room thermostat and pair (optional)**

Install wireless thermostat RF dongle and thermostat and finish pairing, refer to the Accessories Manual for more information.

6 **Commissioning and system health check**

Installer settings **»** ***Commissioning*** **»** ***System health***

First configure **Zones**, **DHW**, etc., and then proceed to perform system health check via **Alerts**, **Real time data** and **Manual mode**. Adjust the configuration if necessary until all configuration is as desired.

> **NOTE**
>
> Air purging function is available in **Manual mode**.

7 **Other system settings in installer settings, and user settings**

Installer settings

User settings

Configure other installer settings and user settings as neccesary.

8 **Start operation**

Operation

Start system operation.

9.2 Warranty

By following the instructions and directions in this manual, the units have a 2-year warranty. A 3-year unit warranty and a 5-year compressor warranty is valid only if the unit is registered within 30 days of installation in the Energy Save registration system. The unit is considered to be registered if the unit is connected to the ES Cloud (online registration) or if the unit is registered via the offline registration procedure.

9.3 User interface

9.3.1 Status indications

The top bar of the display shows general information about the system.

1 Menu icon
2 Current date and time
3 Energy Save Cloud connection status
4 Internet connection status
5 Current outdoor temperature

When an alert or a special function is active in the system, this is presented on the main screen with a symbol.

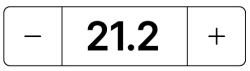
Symbol	Description
	Space heating is in progress.
	An additional heating source is activated.
	Space cooling is in progress.
	Domestic hot water production is in progress.
	The defrosting function is activated.
	The compressor is running.
	The anti-legionella function is activated.
	Reduced mode is activated.
	Quiet mode is activated.
	Vacation mode is activated.
	Electric grid protection is activated.
	SG ready encouraged mode
	SG ready forced mode
	SG ready blocked mode

Alert symbols

Symbol	Description	Action
	**ALARM**	Tap to view information.
	**WARNING**	Tap to view information.
	**INFORMATION**	Tap to view information.

9.3.2 Menu navigation

The main navigation tools used to access parameters and information in the menu are:

Symbol		Function
	**Menu** icon	Tap to access the menu system.
	**Back** icon	Tap to exit the current screen or menu.
>	(symbol after a value)	Tap to enter a submenu.
	**Selector**	Tap the **+** (plus) or **-** (minus) buttons to increase or decrease the value. Tap the middle button to enter the value with a keypad.
	**Next** button	Tap to go to the next data point on a heating/cooling curve.
	**Previous** button	Tap to go to the previous data point on a heating/cooling curve.
 	**On/Off** icon	Tap to activate or deactivate a specific function.
	**Reset** icon	Tap to reset to the default setting.
	**Switch** icon	Tap to switch between two different setting modes.
	**Edit** icon	Tap to edit a setting.
	**Add** icon	Tap to add a setting.

Symbol		Function
	Apply to all icon	Tap to apply a changed setting to all instances.
	Bin icon	Tap to remove a setting.

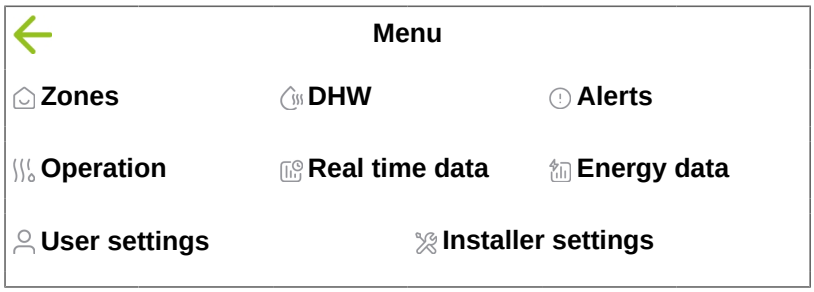
NOTE

A green icon means the function is enabled. A grey icon means the function is disabled, or that you need to tap the icon to enable it.

9.3.3 Main menu

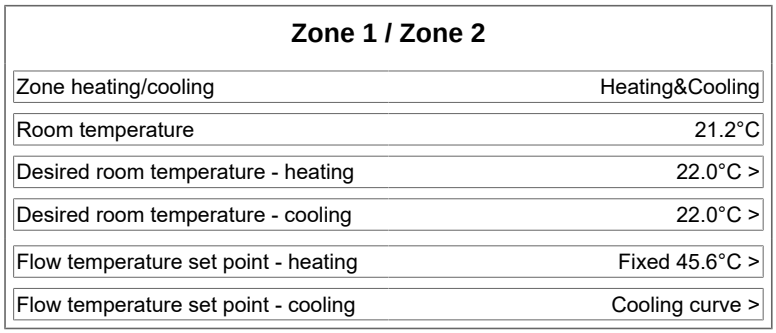
To access the main menu, tap the ***Menu*** icon on the top bar of the display.

Tap the button for one of the menus to access parameter settings or view data.



9.3.4 Zones

The ***Zones*** menu contains heating and cooling settings for ***Zone 1*** and ***Zone 2***. The parameters for Zone 1 are shown at the top of the display. Scroll down to reach the corresponding parameters for Zone 2.



NOTE

The functions that are visible depends on which one were enabled during the commissioning.

Zone 1 and Zone 2 settings

Parameter	Description
Zone heating/cooling	Type of temperature adjustment in the zone. (Read-only - installer level access required) – **Heating** – **Cooling** – **Heating&Cooling**
Room temperature	Current detected room temperature in the zone. **NOTE** Only applicable if a room temperature sensor is present in the zone.
Desired room temperature - heating	Setting of the desired room temperature for heating season. **NOTE** Only applicable if a room temperature sensor is present in the zone. Tap to open the temperature selector. Select temperature by tapping the **+** (plus) and **-** (minus) buttons.
Desired room temperature - cooling	Setting of the desired room temperature for cooling season. **NOTE** Only applicable if a room temperature sensor is present in the zone. Tap to open the temperature selector. Select temperature by tapping the **+** (plus) and **-** (minus) buttons.
Flow temperature set point - heating	Setting of the desired flow temperature in the zone in heating operation. (Only visible if **Heating** has been enabled in the **Zone heating/cooling** parameter) See Section 9.3.4.1 "Heating curve settings", page 64 for settings.
Flow temperature set point - cooling	Setting of the desired flow temperature in the zone in cooling operation. (Only visible if **Cooling** has been enabled in the **Zone heating/cooling** parameter) See Section 9.3.4.2 "Cooling curve settings", page 64 for settings.

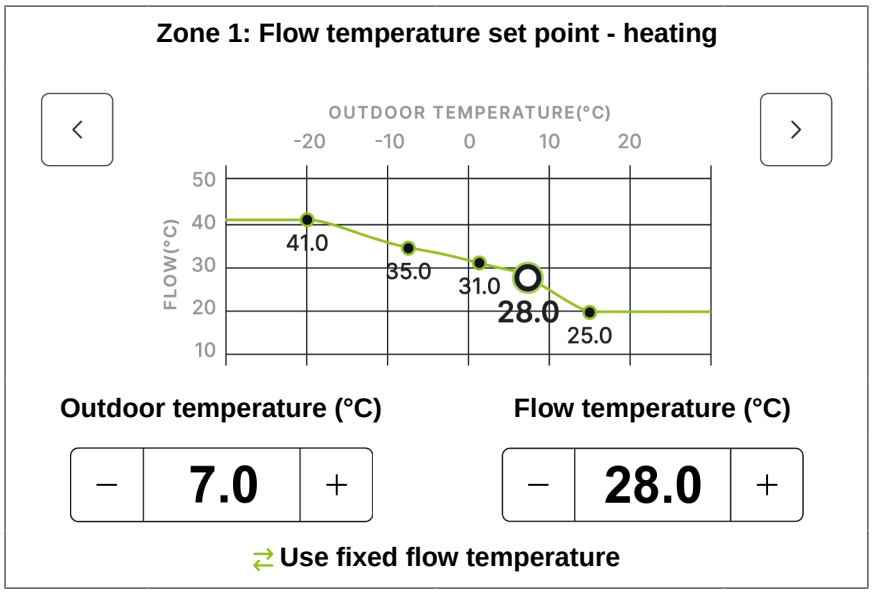
9.3.4.1 Heating curve settings

To reach the settings for the Zone 1 heating curve, go to ***Zones*** » ***Zone 1*** » ***Flow temperature set point - heating***. For Zone 2 heating curve, scroll down to ***Zone 2*** » ***Flow temperature set point - heating***. Tap the value to the right to change the settings.

NOTE

The parameter is only visible if ***Zone heating/cooling*** is set to ***Heating*** or ***Heating&Cooling***.

The flow temperature range will be affected by the setting of ***Flow temperature min limit*** and ***Flow temperature max limit***, found under ***Installer settings*** » ***Commissioning*** » ***Zones***.



The heating curve is displayed in the middle of the screen, with temperature selectors for the ***Outdoor temperature (°C)*** and ***Flow temperature (°C)*** below.

Adjusting the heating curve

– Tap < or > to select a point on the heating curve.
– Change the temperature settings in the temperature selectors, by tapping the **+** (plus) and **-** (minus) buttons or by tapping the temperature value and changing it with the keypad that appears.

Setting a fixed flow temperature

– To switch to using a fixed flow temperature instead of a heating curve, tap ***Use fixed flow temperature***.
– Change the temperature settings in the temperature selectors, by tapping the **+** (plus) and **-** (minus) buttons or by tapping the temperature value and changing it with the keypad that appears.

To revert to using a heating curve again, tap ***Use heating curve***.

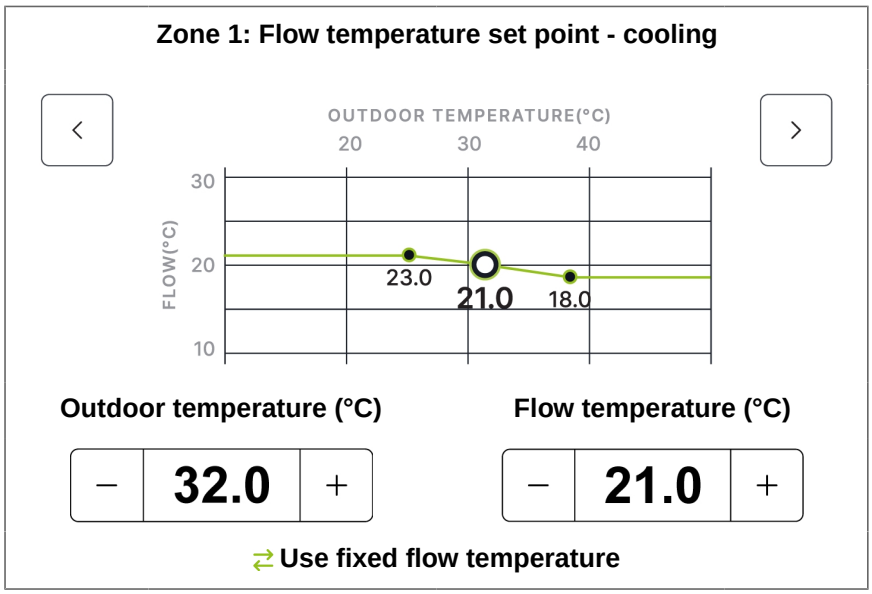
9.3.4.2 Cooling curve settings

To reach the settings for the Zone 1 cooling curve, go to ***Zones*** » ***Zone 1*** » ***Flow temperature set point - cooling***. For Zone 2 cooling curve, scroll down to ***Zone 2*** » ***Flow temperature set point - cooling***. Tap the value to the right to change the settings.

NOTE

The parameter is only visible if ***Zone heating/cooling*** is set to ***Cooling*** or ***Heating&Cooling***.

The flow temperature range will be affected by the setting of ***Flow temperature min limit*** and ***Flow temperature max limit***, found under ***Installer settings*** » ***Commissioning*** » ***Zones***.



The cooling curve is displayed in the middle of the screen, with temperature selectors for the ***Outdoor temperature (°C)*** and ***Flow temperature (°C)*** below.

Adjusting the cooling curve

- Tap < or > to select a point on the cooling curve.
- Change the temperature settings in the temperature selectors, by tapping the **+** (plus) and **-** (minus) buttons or by tapping the temperature value and changing it with the keypad that appears.

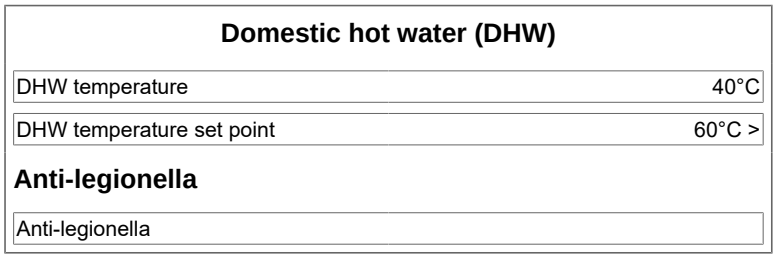
Setting a fixed flow temperature

- To switch to using a fixed flow temperature instead of a cooling curve, tap ***Use fixed flow temperature***.
- Change the temperature settings in the temperature selectors, by tapping the **+** (plus) and **-** (minus) buttons or by tapping the temperature value and changing it with the keypad that appears.

To revert to using a cooling curve again, tap ***Use cooling curve***.

9.3.5 Domestic hot water (DHW)

The ***Domestic hot water (DHW)*** menu contains temperature settings for the domestic hot water heating, and also the possibility to set up an anti-legionella treatment program.



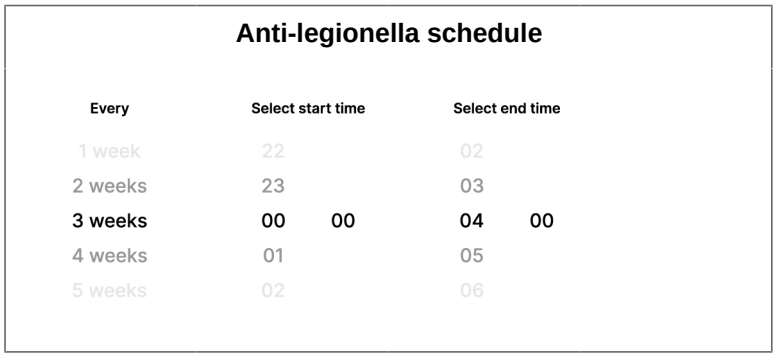
Domestic hot water (DHW) settings

Parameter	Description
DHW temperature	Current detected domestic hot water temperature.
DHW temperature set point	Setting of the desired domestic hot water temperature. Tap to open the temperature selector. Select temperature by tapping the **+** (plus) and **-** (minus) buttons or by tapping the temperature value and changing it with the keypad that appears.
Anti-legionella:	
Anti-legionella	Activation of the anti-legionella function. Tap the switch symbol to activate or deactivate the function. – Deactivated – Activated Activation of the anti-legionella function opens up additional parameters that are used for setting up the performance of the anti-legionella program. Scroll down to reach those parameters.
Anti-legionella schedule	Schedule for the anti-legionella program (only visible if the anti-legionella function is activated). See Section 9.3.5.1 "Setting up the anti-legionella treatment", page 67 for settings.
Anti-legionella temperature set point	Setting of the desired water temperature for the anti-legionella treatment (only visible if the anti-legionella function is activated). See Section 9.3.5.1 "Setting up the anti-legionella treatment", page 67 for settings.

Parameter	Description
Anti-legionella duration	Setting of the time (minutes) during which the heat pump should maintain the anti-legionella temperature set point once it has been reached. (Only visible if the anti-legionella function is activated). See Section 9.3.5.1 "Setting up the anti-legionella treatment", page 67 for settings.
Anti-legionella time-out	Setting of the time-out for the anti-legionella program (only visible if the anti-legionella function is activated). If the heat pump cannot execute the anti-legionella function within this time period (meaning heating the water to the set temperature and holding this for the set time), then the legionella program will be terminated. A new attempt will be done the next day. See Section 9.3.5.1 "Setting up the anti-legionella treatment", page 67 for settings.

9.3.5.1 Setting up the anti-legionella treatment

To set the schedule for the anti-legionella treatment:



1 Go to ***Domestic hot water (DHW)*** » ***Anti-legionella*** » ***Anti-legionella schedule*** and tap to change the setting.

2 Under ***Every***, scroll to select how frequently the anti-legionella program should run.

Range: Every week to every 8 weeks.

3 Scroll to select a start time and an end time (hour increments).

The first run of the anti-legionella program will start 48 hours after the heat pump is powered on.

To set the temperature of the anti-legionella treatment:

1 Go to ***Anti-legionella temperature set point***.

2 Tap to open the temperature selector. Select temperature by tapping the **+** (plus) and **-** (minus) buttons or by tapping the temperature value and changing it with the keypad that appears.

To set the duration of the anti-legionella treatment:

1 Go to ***Anti-legionella duration***.

2 Tap to open the time selector. Select the time (in 1 minute increments) by tapping the **+** (plus) and **-** (minus) buttons or by tapping the time value and changing it with the keypad that appears.

To set the time-out for the anti-legionella treatment (if the temperature is not reached):

1 Go to ***Anti-legionella time-out***.

2 Tap to open the time selector. Select the time (in 15 minute increments) by tapping the **+** (plus) and **-** (minus) buttons or by tapping the time value and changing it with the keypad that appears.

9.3.6 Alerts

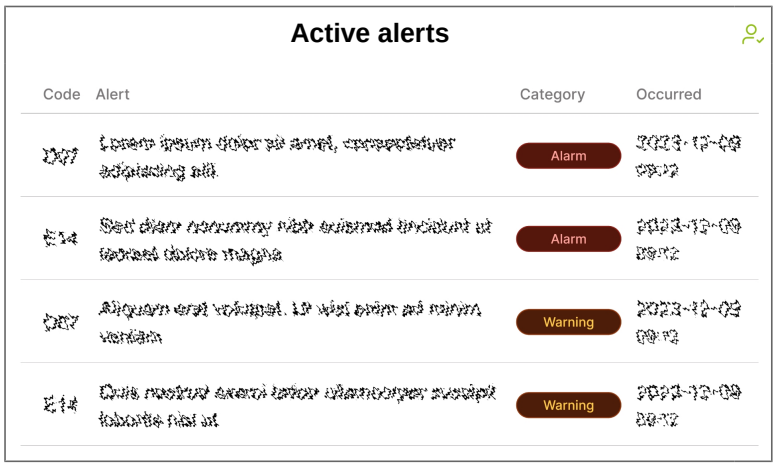
If there is an active alert an icon is displayed in the lower left of the main screen.

Example:

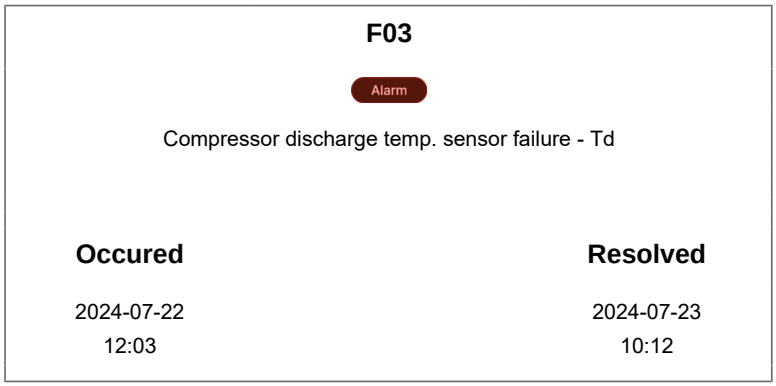
Tapping the icon opens the ***Active alerts*** list.

The alerts list can also be reached by selecting ***Alerts*** in the main menu.

The list is filtered for the end user. Installers can reach a complete list of all active alerts under ***Installer settings » Active alerts***.



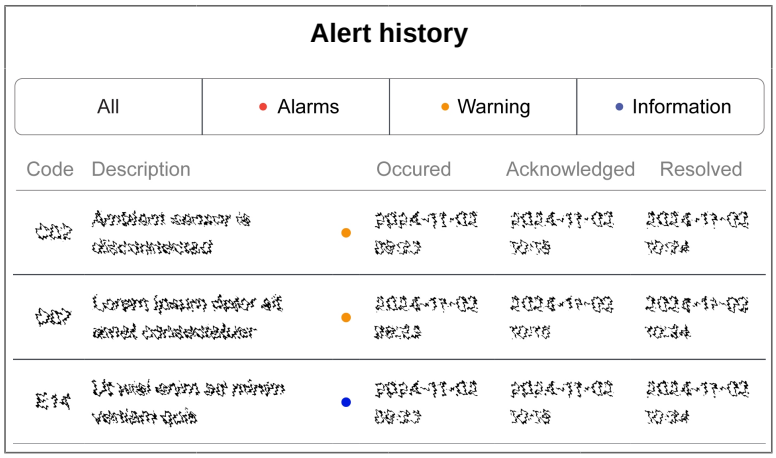
Tapping the alert symbol for the specific alert opens up detailed information about the alert.



Some alarms and warnings require confirmation, which is done by tapping in the upper right of the alerts list.

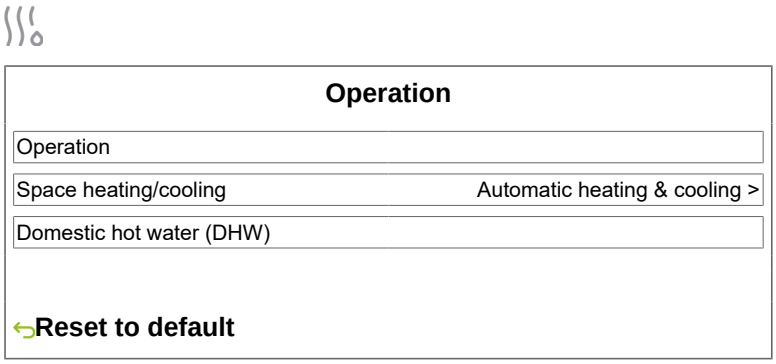
Alert history

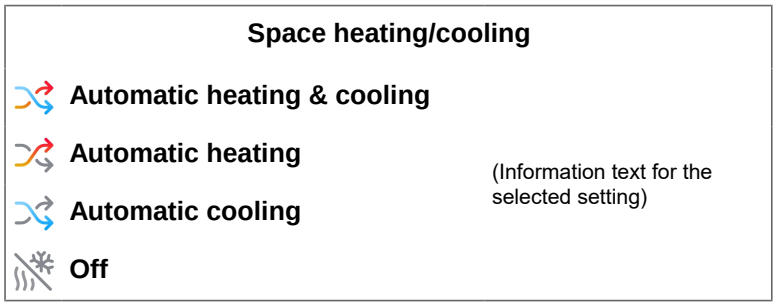
To view the alert history list, go to ***Installer settings*** » ***Alert history***. Installer level access is required.



The coloured dots in the alert history list represent the same categories as the alert symbols, that is: red for alarm, orange for warning, and blue for information.

9.3.7 Operation



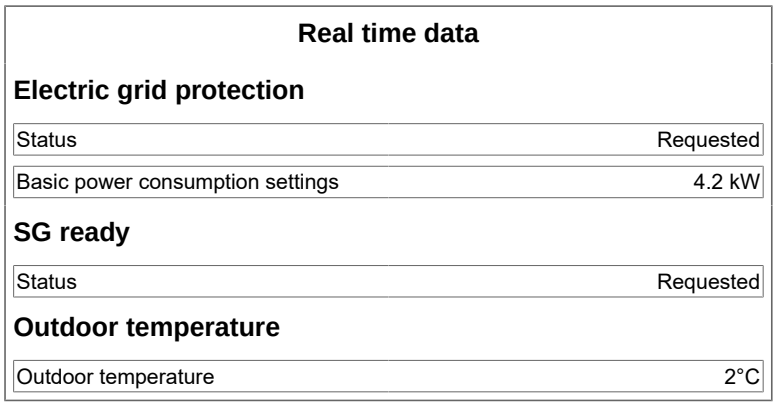


Operation settings

Parameter	Description
Operation	Tap the switch symbol to switch on or off the entire heat pump system. – System is OFF – System is ON **NOTE** The anti-freeze function will stay active, to protect the water in the outdoor unit from freezing.
Space heating/cooling	Menu for selection of heating and/or cooling operation, applicable for all zones. This will be impacted by the heating/cooling setup of the zone at the installation. For detailed settings, go to the **Zones** menu.
Domestic hot water (DHW)	Activation/deactivation of the domestic hot water heating. Tap the switch symbol to activate or deactivate the function. – DHW heating is OFF – DHW heating is ON For detailed settings, go to the **Domestic hot water (DHW)** menu.
Automatic heating & cooling	Selected with a check mark. The system will automatically start heating or cooling based on season conditions.
Automatic heating	Selected with a check mark. The system will automatically start heating mode. No cooling.
Automatic cooling	Selected with a check mark. The system will automatically start cooliing mode. No heating.
Off	Selected with a check mark. Heating and cooling are both off.

9.3.8 Real time data

In the ***Real time data*** menu all the current state or running data for the whole system is listed, such as temperatures, status of different elements, digital inputs, and more.



Scroll down to reach the below parameters.

Real time data parameters

Parameter	Description
Electric grid protection:	
Status	– **Requested** – **Active** – **Inactive**
Basic power consumption settings	(kW)
SG ready:	
Status	– **Normal** – **Encouraged** - Increased heat production - Stage 1 – **Forced** - Increased heat production - Stage 2 – **Blocked** - Compressor blocked for working
Outdoor temperature:	
Outdoor temperature	Current outdoor temperature (°C)
Average outdoor temperature 1h/3h/24h	Average outdoor temperature (°C) in 1 hour/3 hours/24 hours respectively
Season:	

Parameter	Description
Current season	The current season the system is in. – **Cooling** – **Heating** – **Neutral**
Hydraulic parameters:	
System heat balance	Heat balance of the system
Heating/cooling water temperature THC	Water temperature (°C) in the buffer tank (or flow line after 3-way valve)
DHW tank temperature TDW	Domestic hot water temperature (°C) in the DHW tank
Mixing circuit 1 temperature TV1	Temperature (°C) in mixing circuit 1 (sensor after circulation pump for circuit 1)
Mixing circuit 2 temperature TV2	Temperature (°C) in mixing circuit 2 (sensor after circulation pump for circuit 2)
Condenser outlet water temperature TUO	Outlet water temperature (°C) from the heat exchanger
Condenser inlet water temperature TUI	Inlet water temperature (°C) to the heat exchanger
Water flow rate	Water flow rate in the primary hydraulic circuit
Refrigerant parameters:	
Compressor speed	Running speed (Hz) of the compressor
High pressure Pd	High pressure (bar) in the discharge line
Compressor discharge temperature TD	Hot gas temperature (°C) in the discharge line from the compressor
Low pressure Ps	Low pressure (bar) in the suction line
Compressor suction temperature TS	Suction line temperature (°C) to the compressor
Condensing temperature TUP	Liquid refrigerant temperature (°C) after the condenser
Evaporating temperature TP	Vapour temperature (°C) in the outdoor coil (refrigerant)
EEV opening	Electronic expansion valve opening, in steps (p)
Fan speed 1	Fan 1 running speed (rpm)
Fan speed 2	Fan 2 running speed (rpm)
Additional heating source:	

Parameter	Description
Additional inline heating source	– **Active 1/3**: 1 stage on (regardless of which one) – **Active 2/3**: 2 stages on (regardless of which ones) – **Active 3/3**: 3 stages on (regardless of which ones) – **Inactive**
Additional DHW tank heating source	– **Active** – **Inactive**
Additional buffer tank heating source	– **Active** – **Inactive**
Accumulated operation time:	
Heat pump	Total running time of the heat pump
Additional inline heating source: Stage 1	Total running time of additional inline heating source stage 1
Additional inline heating source: Stage 2	Total running time of additional inline heating source stage 2
Additional inline heating source: Stage 3	Total running time of additional inline heating source stage 3
Additional DHW tank heating source	Total running time of additional DHW tank heating source
Additional buffer tank heating source	Total running time of additional buffer tank heating source
Others:	
Outdoor unit current	Current (A) of the outdoor unit compressor
Outdoor unit voltage	Voltage (V) supplied to the outdoor unit

9.3.9 Energy data

Energy data
Now >
Last 24 hours >
Last 7 days >
Last 30 days >
Calendar month >
Calendar year >

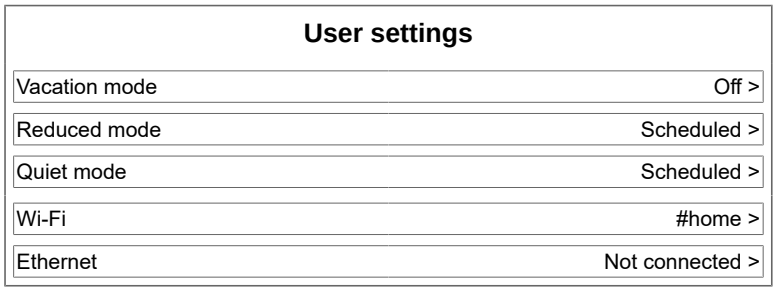
Scroll down to reach the below parameters.

Energy data parameters

Parameter	Description
Now	Tap to view real time power data.
Last 24 hours	Tap to view the total amount of energy used and produced in the last 24 hours.
Last 7 days	Tap to view the total amount of energy used and produced in the last 7 days.
Last 30 days	Tap to view the total amount of energy used and produced in the last 30 days.
Calendar month	Tap to view the total amount of energy used and produced in a certain month. Select month by tapping the **+** (plus) and **-** (minus) buttons.
Calendar year	Tap to view the total amount of energy used and produced in a certain year. Select year by tapping the **+** (plus) and **-** (minus) buttons.
Heat pump	Heat pump data for the selected time period. – **Production** - power (kW) or energy (kWh) – **Consumption** - power (kW) or energy (kWh) – **COP/EER** - heating or cooling efficiency • COP measures the efficiency of a system in heating mode. • EER measures the efficiency of a system in cooling mode.
Additional electric heating source	Data for any additional heating sources used in the selected time period. – **Production** - power (kW) or energy (kWh) – **Consumption** - power (kW) or energy (kWh)
System	Data for the entire heating/cooling system in the selected time period. – **Production** - power (kW) or energy (kWh) – **Consumption** - power (kW) or energy (kWh) – **COP/EER** - heating or cooling efficiency

9.3.10 User settings

The ***User settings*** menu is intended for both installers and users, however some parameter settings require installer level access. For those parameters the user can view the settings but is not allowed to change anything.



Scroll down to reach the below parameters.

User menu settings

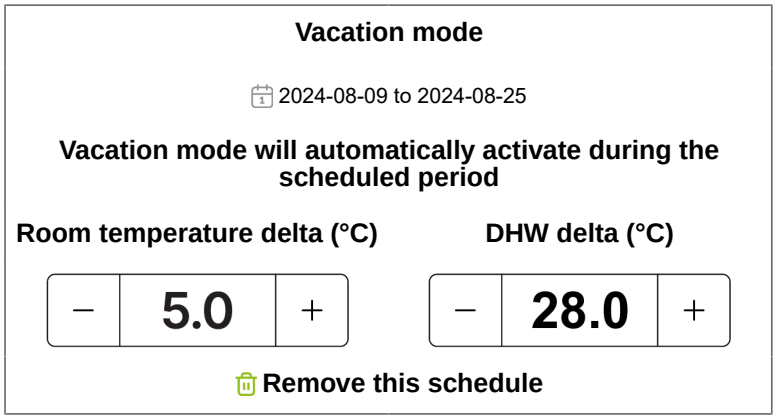
Parameter	Description
Vacation mode	Scheduling of periods of absence when space heating and/or hot water temperatures should be reduced. Status indications: – **Off** - no schedule – **Scheduled** - scheduled but not active – **On** - scheduled and active Active status is also indicated with the symbol on the display. See Section 9.3.10.1 "Setting up the vacation mode schedule", page 77 for scheduling.
Reduced mode	Scheduling of recurring periods when space heating and/or hot water temperatures should be reduced, at night for example. Status indications: – **Off** - no schedule – **Scheduled** - scheduled but not active – **On** - scheduled and active Active status is also indicated with the symbol on the display. See Section 9.3.10.2 "Setting up the reduced mode schedule", page 77 for scheduling.

Parameter	Description
Quiet mode	Scheduling of recurring periods when the heat pump should operate extra silently (the compressor and the fan motor will run with limited speed, to reduce the sound power of the heat pump). **NOTE** By using this function, the heat pump might not be able to produce sufficient heat to heat the space to the desired temperatures! Status indications: – **Off** - no schedule – **Scheduled** - scheduled but not active – **On** - scheduled and active See Section 9.3.10.3 "Setting up the quiet mode schedule", page 78 for scheduling.
Wi-Fi	Connection to a wireless network. Tap to set the switch symbol to ON in order to enable the connection. See Section 9.3.10.4 "Connecting to Wi-Fi", page 79 for connection information.
Ethernet	Connection status for connection via Ethernet. Tap to view connection details.
Software & Updates	Information on software versions and available updates.
Pair with user app	Pairing with the dedicated user app. Tap to request a verification code for pairing, then enter the code in the user app. For detailed information, see the **Energy Save App** instructions.
Season start/stop conditions:	
Heating season start/stop	Setting of the desired outdoor temperature for system to go in and out of, hence start and stop, heating season. Tap to open the temperature selector. Select temperature by tapping the **+** (plus) and **-** (minus) buttons.
Cooling season start/stop	Setting of the desired outdoor temperature for system to go in and out of, hence start and stop, cooling season. Tap to open the temperature selector. Select temperature by tapping the **+** (plus) and **-** (minus) buttons.
General:	
Language	Selection of menu language.

Parameter	Description
Date & Time	Current date and time.
Information:	
About	System information such as serial numbers and software and hardware versions.
Dealer information	Contact details for the dealer of the equipment.

9.3.10.1 Setting up the vacation mode schedule

To set the schedule when the vacation mode should be active:



1 Go to ***User settings*** » ***Vacation mode***. Tap to change the setting.

2 Tap ***Add vacation schedule*** to open a date selector for the vacation. Scroll to select a start date and an end date, then tap ***Save***.

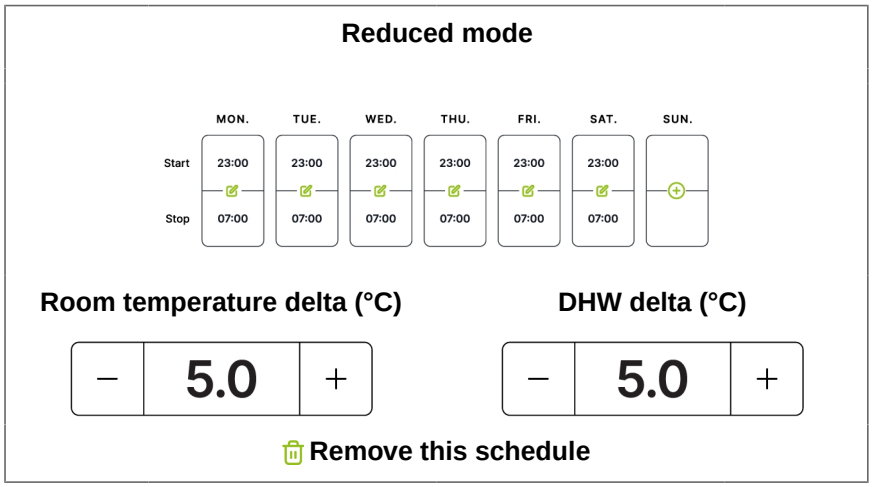
3 In the screen that opens, select the temperature drop in the temperature selectors for ***Room temperature delta (°C)*** and ***DHW delta (°C)*** by tapping the **+** (plus) and **-** (minus) buttons or by tapping the temperature value and changing it with the keypad that appears.

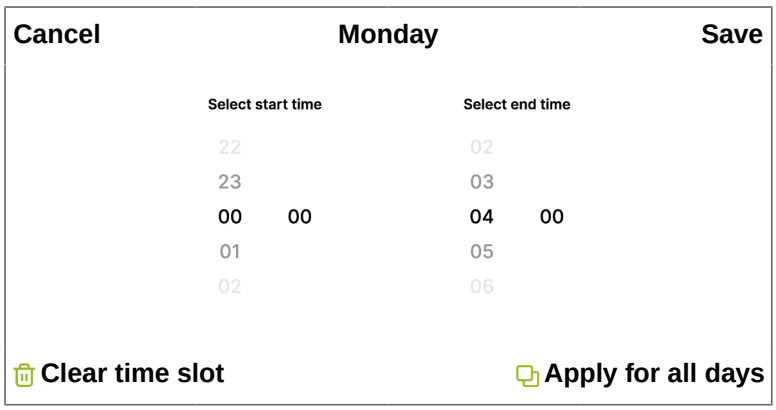
> **NOTE**
>
> The temperature drop for ***Room temperature delta (°C)*** refers to the room temperature, not to be confused with the flow temperature.

To remove the entire schedule, tap ***Remove this schedule***.

9.3.10.2 Setting up the reduced mode schedule

To set the schedule for the reduced mode (night setback function):





1 Go to ***User settings*** » ***Reduced mode***. Tap to change the setting.

2 Tap ***Add reduced mode schedule*** to open a screen with time slot settings for each day (night) of the week.

3 To edit the time settings, tap the edit icon to open a time selector for the selected day. Scroll to select a start time and an end time.

4 Tap ***Save*** to save the setting for the selected day, or tap ***Apply for all days*** to save the same setting for all days of the week.

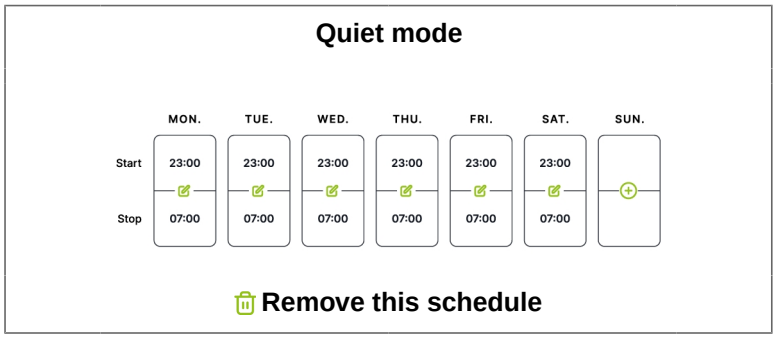
To remove the reduced mode for the selected day, tap ***Clear time slot***.

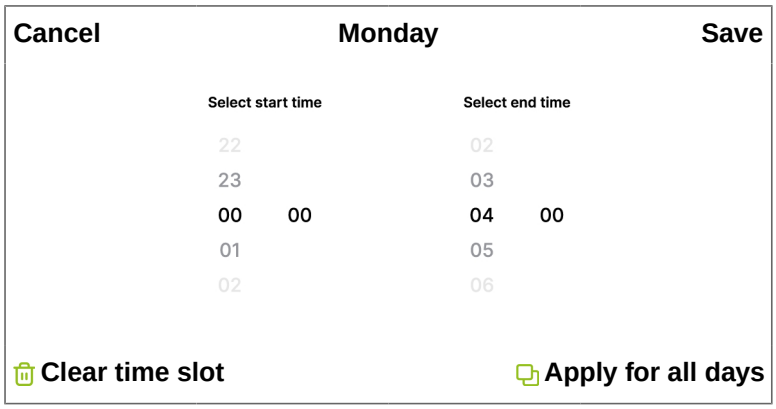
5 Back in the reduced mode schedule, select the temperature drop in the temperature selectors for ***Room temperature delta (°C)*** and ***DHW delta (°C)*** by tapping the **+** (plus) and **-** (minus) buttons.

To remove the entire schedule, tap ***Remove this schedule***.

9.3.10.3 Setting up the quiet mode schedule

To set the schedule for the quiet mode:





1 Go to ***User settings*** » ***Quiet mode***. Tap to change the setting.

2 Tap ***Add quiet mode schedule*** to open a screen with settings, where the time slot for the function is preset to 23:00 to 07:00 for each day (night) of the week.

To remove the entire schedule, tap ***Remove this schedule***.

3 To change the time settings, tap the edit icon to open a time selector for the selected day. Scroll to select a start time and an end time.

4 Tap ***Save*** to save the setting for the selected day, or tap ***Apply for all days*** to save the same setting for all days of the week.

To remove the quiet mode for the selected day, tap ***Clear time slot***.

9.3.10.4 Connecting to Wi-Fi

1 Go to ***User settings*** » ***Wi-Fi***.

2 Tap to set the switch symbol to ON in order to enable the connection.

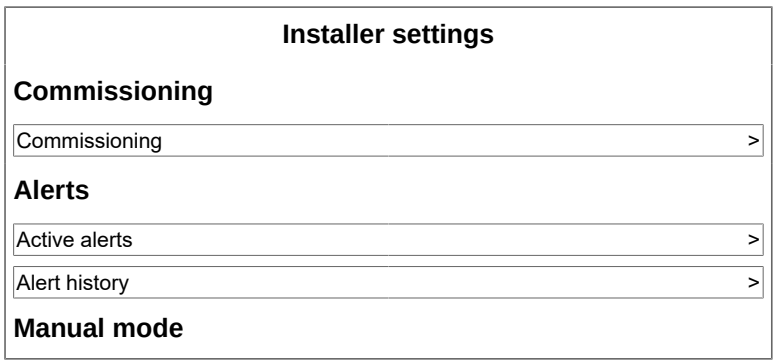
3 – For an open network, select the network in the list that appears and tap ***Join this network***. Enter the password.

Once entered, the connection details will be remembered next time you switch on the Wi-Fi.

A connected network will be indicated by a check mark in front of the network name.

9.3.11 Installer settings

The ***Installer settings*** menu is intended for installers. To reach the menu a four-digit installer PIN code must be entered.



Scroll down to reach the below parameters.

Installer settings parameters

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. – Electric grid protection is OFF – Electric grid protection is ON
Energy meter	– **None** – **ET112** – **ET340**
Basic power consumption settings	Tap to open the power selector. Select kW value by tapping the **+** (plus) and **-** (minus) buttons.

Parameter	Description
Digital input	– **None** – **BMS Modbus Command** – **CS/EGP** – **HS/EGP**
Activation signal type	Tap to select the activation signal type. – **Normally open** – **Normally closed**
SG ready:	
SG ready	Tap the switch symbol to activate or deactivate the function. – SG ready is OFF – SG ready is ON
Encouraged operation temperature settings	Settings for SG ready encouraged operation status. 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.
Forced operation temperature settings	Settings for SG ready forced operation status. 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.
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	Tap to reach settings for the heating season. – **Based on outdoor temperature** – **Based on digital input**

Parameter	Description
Cooling season settings	Tap to reach settings for the cooling season. – **Based on outdoor temperature** – **Based on digital input**
P0 water pump speed setting	Settings for the P0 water pump. Tap to open selectors for **Heating(%)**, **Cooling(%)**, and **DHW(%)**. Select percentage by tapping the **+** (plus) and **-** (minus) buttons.

9.3.11.1 Installer settings submenu: Commissioning

The ***Commissioning*** submenu contains parameters that are configured during the commissioning stage of the heat pump.

Commissioning menu settings

Parameter	Description
Cloud and software:	
Wi-Fi	Connection to Wi-Fi
Ethernet	Connection to Ethernet
ES cloud connection	Registration to the cloud
Software & Updates	Update software
Reset to factory settings	Factory reset
System configuration:	
Outdoor unit	Selection of outdoor unit model
Indoor unit	Selection of indoor unit model
Zones	Configuration of zones
Domestic hot water (DHW)	Configuration of domestic hot water production
Additional inline heating source	Configuration of additional inline heating source
Buffer tank	Configuration of buffer tank
Energy meter	Selection of energy meter
Flow sensor	Selection of flow sensor
System health:	
Active alerts	View active alerts

Parameter	Description
Real time data	View real time data
Manual mode	Selection of manual mode –  Manual mode is OFF –  Manual mode is ON The **Manual mode** menu opens.

9.3.11.2 Installer settings submenu: Manual mode

The ***Manual mode*** submenu contains heat pump functions that can be manually activated and set.

Tap the switch symbol to activate or deactivate the function.

–  Activated
–  Deactivated

Manual mode submenu settings

Parameter	Description
Heat pump control:	
P0 water pump	Activated/Deactivated
P0 water pump speed	Setting of the P0 water pump speed (rpm)
Operation mode	Selected with a check mark ✓. – **Heating** – **Cooling** – **DHW** – **Off**
Compressor	Activated/Deactivated **Additional heating source** selected with a check mark ✓.
Diverting valve:	
Diverting valve to DHW	Activated/Deactivated
Additional heating source:	
Additional inline heating source: Stage 1/2/3	Activated/Deactivated
Additional buffer tank heating source	Activated/Deactivated

Parameter	Description
Additional DHW tank heating source	Activated/Deactivated
Zone 1*/*Zone 2	
P1/P2 water pump	Activated/Deactivated
Mixing valve 1/2 increase	Activated/Deactivated
Mixing valve 1/2 decrease	Activated/Deactivated

9.4 Before leaving the installation site

Before leaving the installation site, perform the following actions.

1. Ensure that all system components are fully functional and that all required features are working as intended.
2. Check that pressures and temperatures are within stated limits and perform a leakage test to identify any possible weak points in the hydraulic system.
3. Clean the site from excess material and debris caused by the installation work.
4. Inform the end user about functions and settings available to the user, and about general care and handling of the equipment.

10 Service and maintenance

10.1 Requirements on service area and personnel

Service personnel and all other people at the service site must be aware and familiar about the character of the maintenance to be carried out. Only trained and approved technicians are authorized to perform commissioning of the heat pump. This ensures that the technicians have the necessary knowledge, skills, and experience to complete the job correctly and in accordance with safety regulations and specifications of Energy Save.

Make sure the service area is not enclosed and provide good ventilation (opening doors and windows). The service area must be properly isolated. Ensure the safety of the working conditions in the service area by controlling any combustible materials.

10.2 Maintenance intervals

We recommend performing maintenance as specified below. However, applicable legislation might require shorter maintenance intervals.

Legend	
IN	Indoor unit / distribution system
OUT	Outdoor unit
IN + OUT	Indoor and outdoor unit
IN / OUT	Indoor or outdoor unit, depending on the heat pump type
SYSTEM	External installation (not included in the heat pump)
*	Or / and according to the local regulations

10.3 Maintenance checklist electrical system

Maintenance check	Applies to:	Annual	Every 2 years	Every 4 years
Visually inspect that all cables and connections are without visible damage.	IN + OUT		x	
Check that all electrical connections are tight.	IN + OUT		x	
Check power supply correct voltage.	IN + OUT		x	
Check the correct working of the RCD protection according to the RCD manufacturer.	SYSTEM		x	

10.4 Maintenance checklist hydraulic system

Maintenance check	Applies to:	Annual	Every 2 years	Every 4 years
Check for any visible damages on the hydraulic / piping system.	IN + OUT	x		
Check for any signs of hydraulic fluid leaks.	IN / OUT	x		
Check the hydraulic system pressure (should be 1,2–1,5 bar).	IN	x		
Clean the dirt and magnetic filter of the hydraulic system.	IN	x		
* Check water quality in the system PH value.	IN + OUT		x	
Check pressure of all expansion vessels.	IN		x	
Check safety valves.	IN / OUT		x	
Clean the plate heat exchanger.	IN / OUT			x
Check the automatic purging valves.	IN / OUT		x	

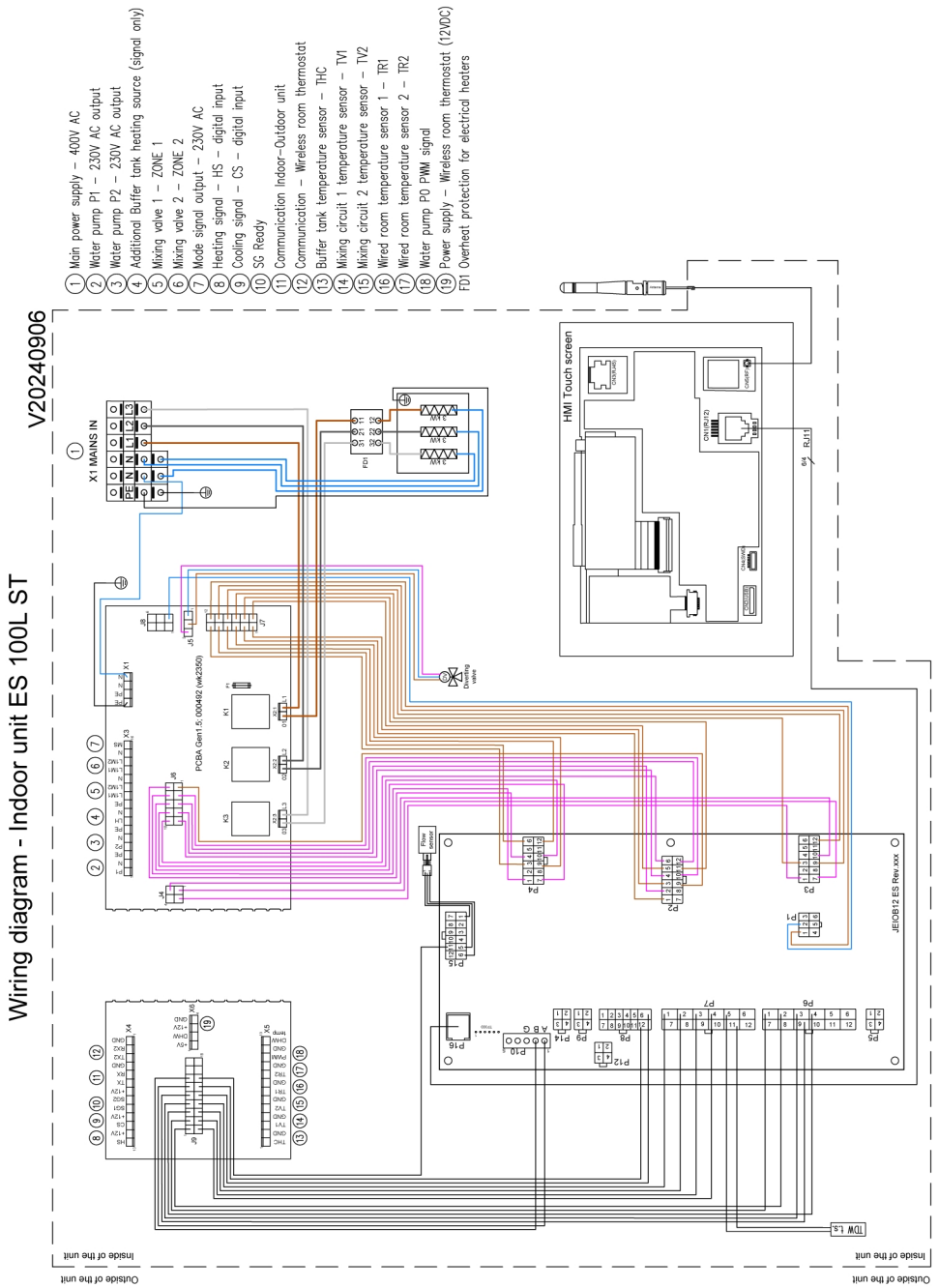
10.5 Other maintenance checks

Maintenance check	Applies to:	Annual	Every 2 years	Every 4 years
Check for strange / unregular sounds while system is working.	IN + OUT	x		
Check positioning of temperature sensors.	IN		x	
Check the anode rod and exchange if needed. (Systems with R32 refrigerant only) **NOTE** Only applies for units with enameled DHW tank. If system with Stainless steel 316 or Duplex tank, no actions required.	IN		x	

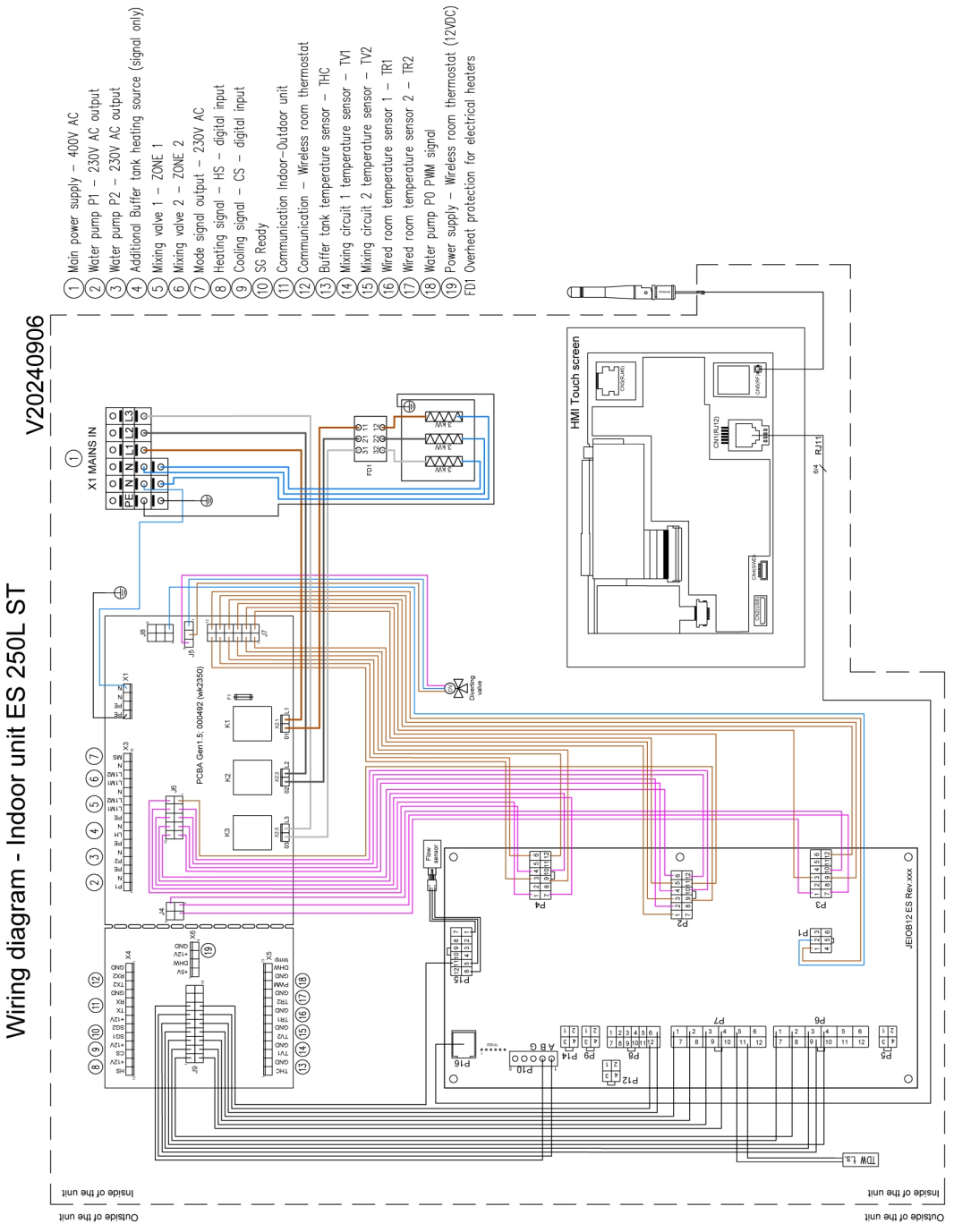
11 Appendix A: Wiring diagrams

11.1 Indoor units

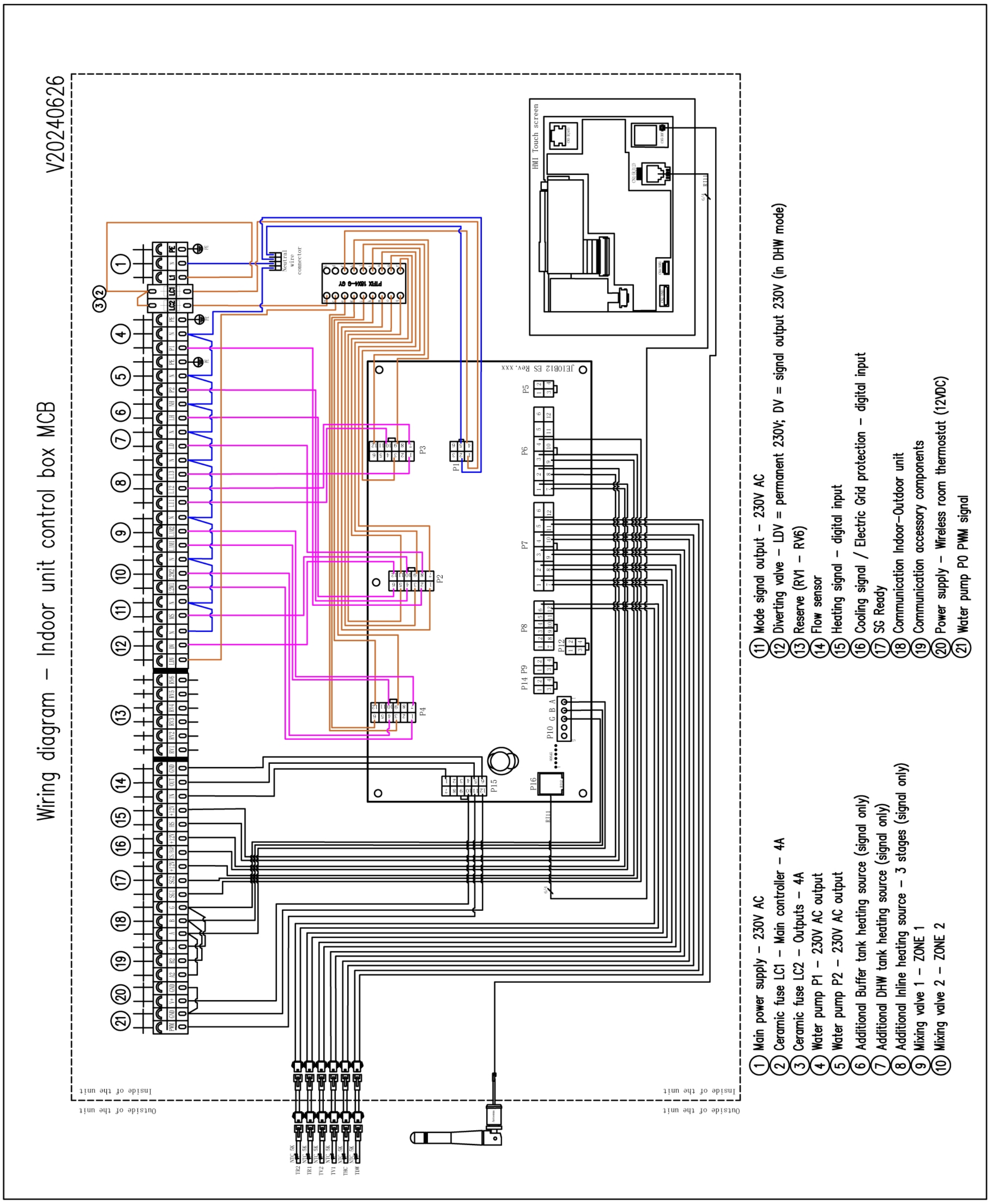
11.1.1 ES 100L ST and ES 100L ST UK



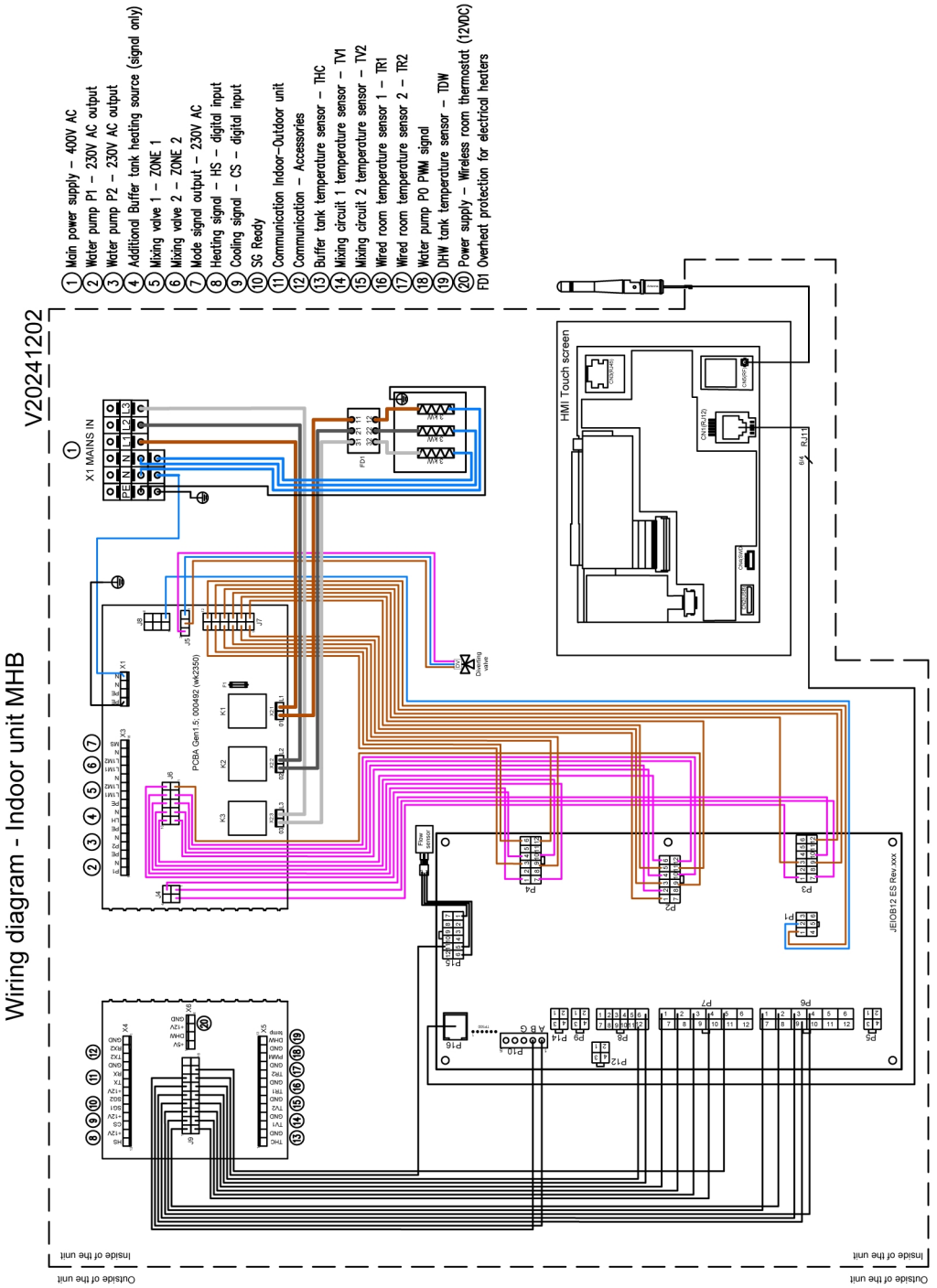
11.1.2 ES 250L ST and ES 250L ST UK



11.1.3 ES MCB

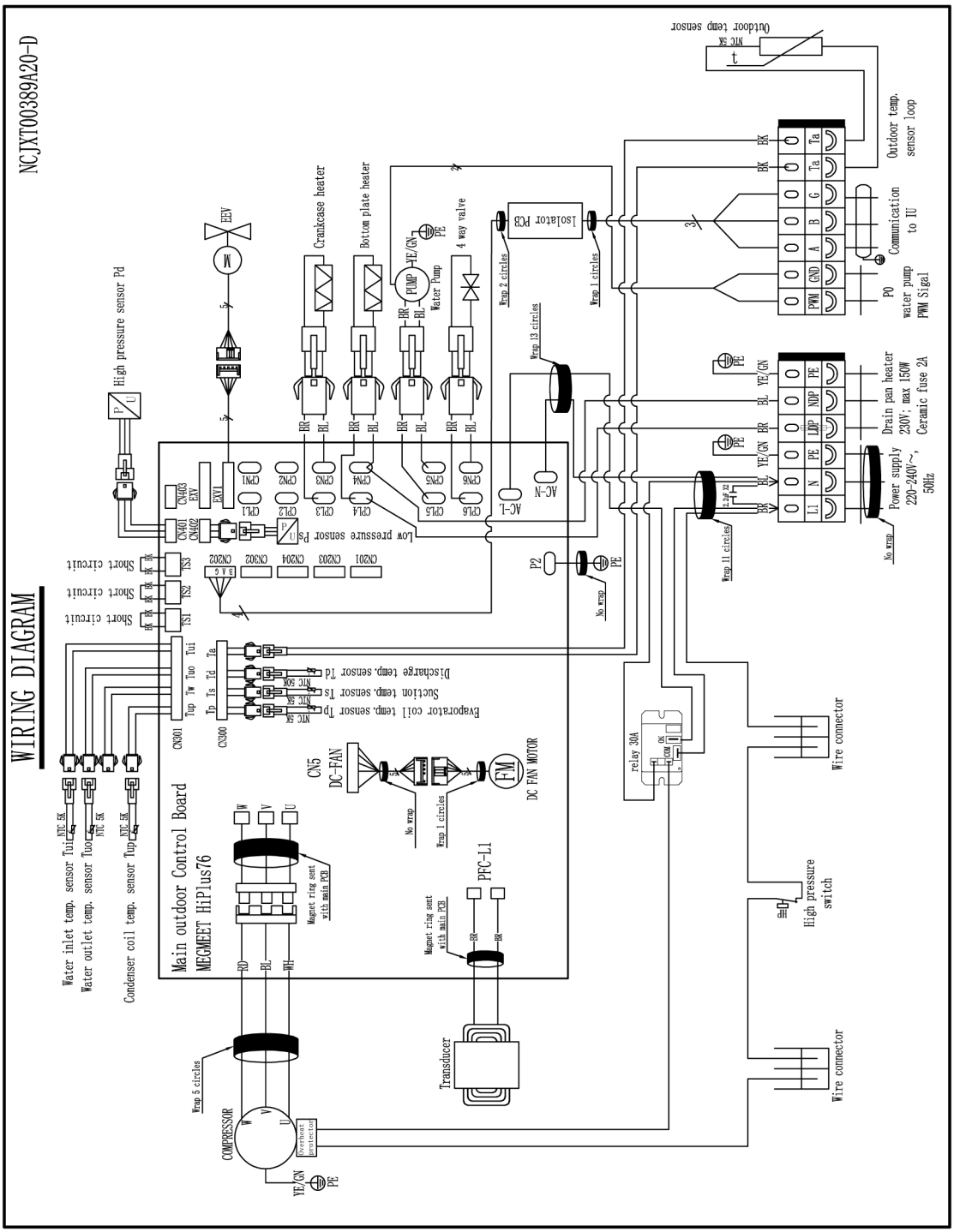

Wiring diagram – Indoor unit control box MCB
V20240626
HMI Touch screen
JE10812 ES Rev. xxx
Inside of the unit
Outside of the unit
① Main power supply – 230V AC
② Ceramic fuse LC1 – Main controller – 4A
③ Ceramic fuse LC2 – Outputs – 4A
④ Water pump P1 – 230V AC output
⑤ Water pump P2 – 230V AC output
⑥ Additional Buffer tank heating source (signal only)
⑦ Additional DHW tank heating source (signal only)
⑧ Additional Inline heating source – 3 stages (signal only)
⑨ Mixing valve 1 – ZONE 1
⑩ Mixing valve 2 – ZONE 2
⑪ Mode signal output – 230V AC
⑫ Diverting valve – LDV = permanent 230V; DV = signal output 230V (in DHW mode)
⑬ Reserve (RV1 – RV6)
⑭ Flow sensor
⑮ Heating signal – digital input
⑯ Cooling signal / Electric Grid protection – digital input
⑰ SG Ready
⑱ Communication Indoor–Outdoor unit
⑲ Communication accessory components
⑳ Power supply – Wireless room thermostat (12VDC)
㉑ Water pump P0 PWM signal

11.1.4 ES MHB

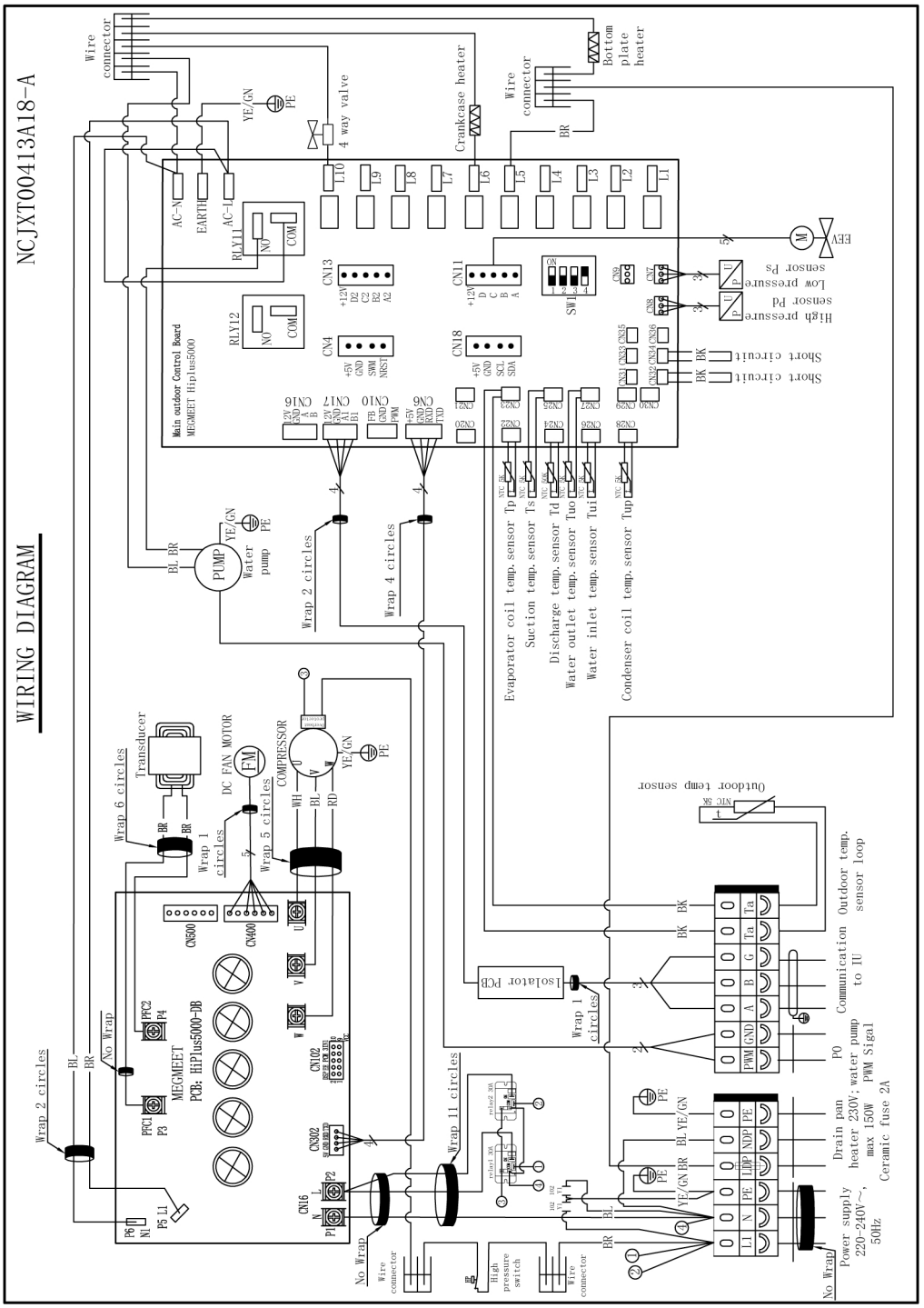

Wiring diagram - Indoor unit MHB
V20241202
1 Main power supply – 400V AC
2 Water pump P1 – 230V AC output
3 Water pump P2 – 230V AC output
4 Additional Buffer tank heating source (signal only)
5 Mixing valve 1 – ZONE 1
6 Mixing valve 2 – ZONE 2
7 Mode signal output – 230V AC
8 Heating signal – HS – digital input
9 Cooling signal – CS – digital input
10 SG Ready
11 Communication Indoor–Outdoor unit
12 Communication – Accessories
13 Buffer tank temperature sensor – THC
14 Mixing circuit 1 temperature sensor – TV1
15 Mixing circuit 2 temperature sensor – TV2
16 Wired room temperature sensor 1 – TR1
17 Wired room temperature sensor 2 – TR2
18 Water pump PO PWM signal
19 DHW tank temperature sensor – TDW
20 Power supply – Wireless room thermostat (12VDC)
FD1 Overheat protection for electrical heaters
X1 MAINS IN
HMI Touch screen
RJ11
PCBA Gen1.5_0004492 (WK2350)
Diverting valve
Flow sensor
JEIOB12 ES Rev.xxx
Outside of the unit
Inside of the unit

11.2 Outdoor units

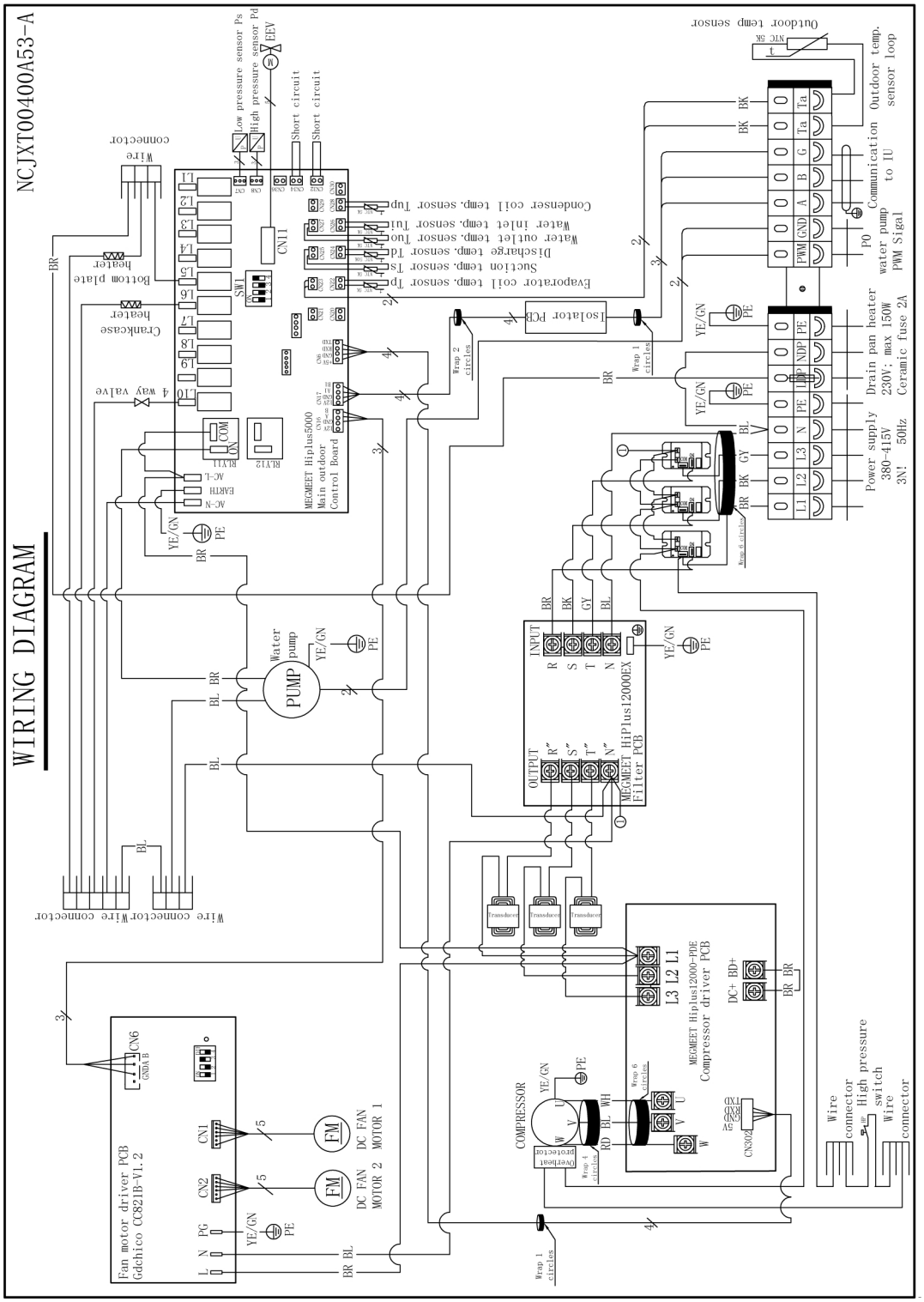
11.2.1 ES M8 R290



11.2.2 ES M12 R290



11.2.3 ES M15 R290 3 PH



12 Appendix B: Hydraulic schematics

The most common setups are presented here. There are more schematics available that can be provided upon request.

12.1 M100L ST, M8/12 R290, DHW, BT100TC-1/BT200TC-1

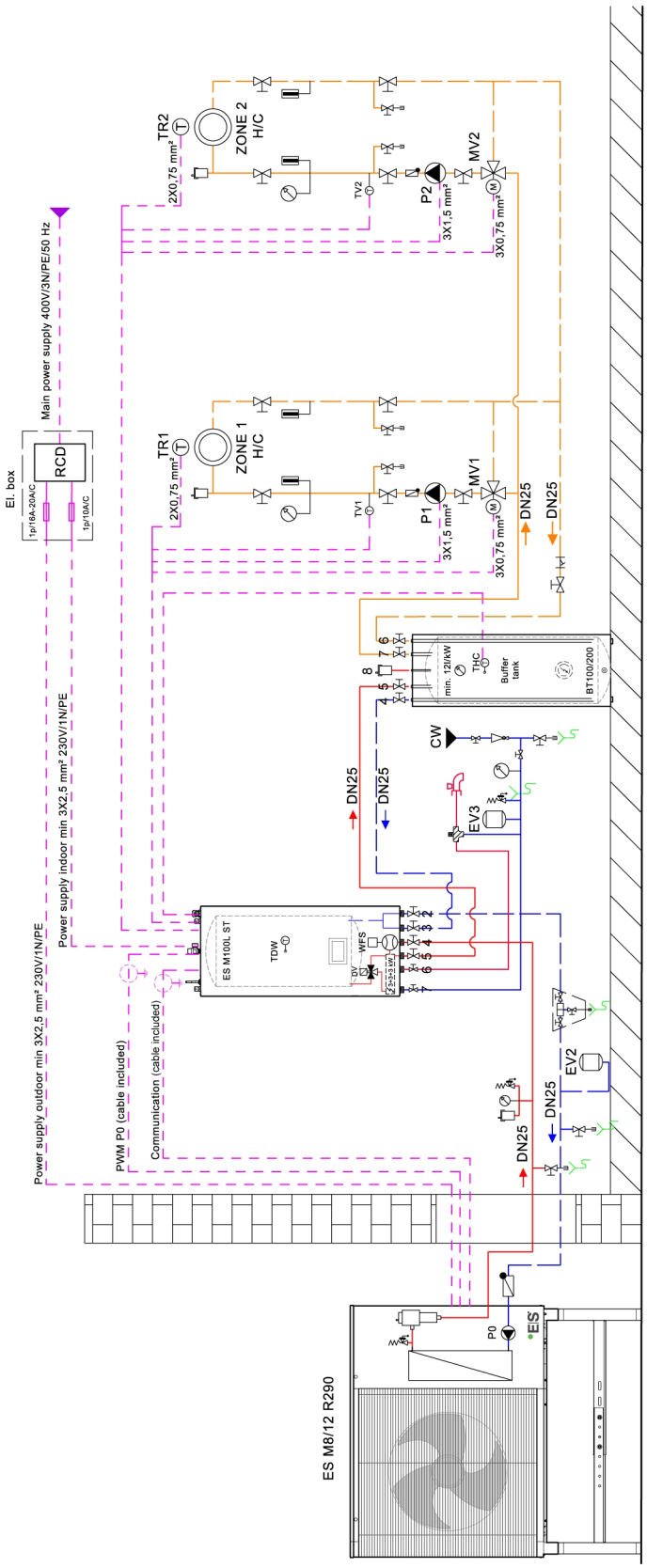


Figure 22: 2 × mixing heating/cooling circuits

12.2 M250L ST, M8/12 R290, BT100TC-1/BT200TC-1

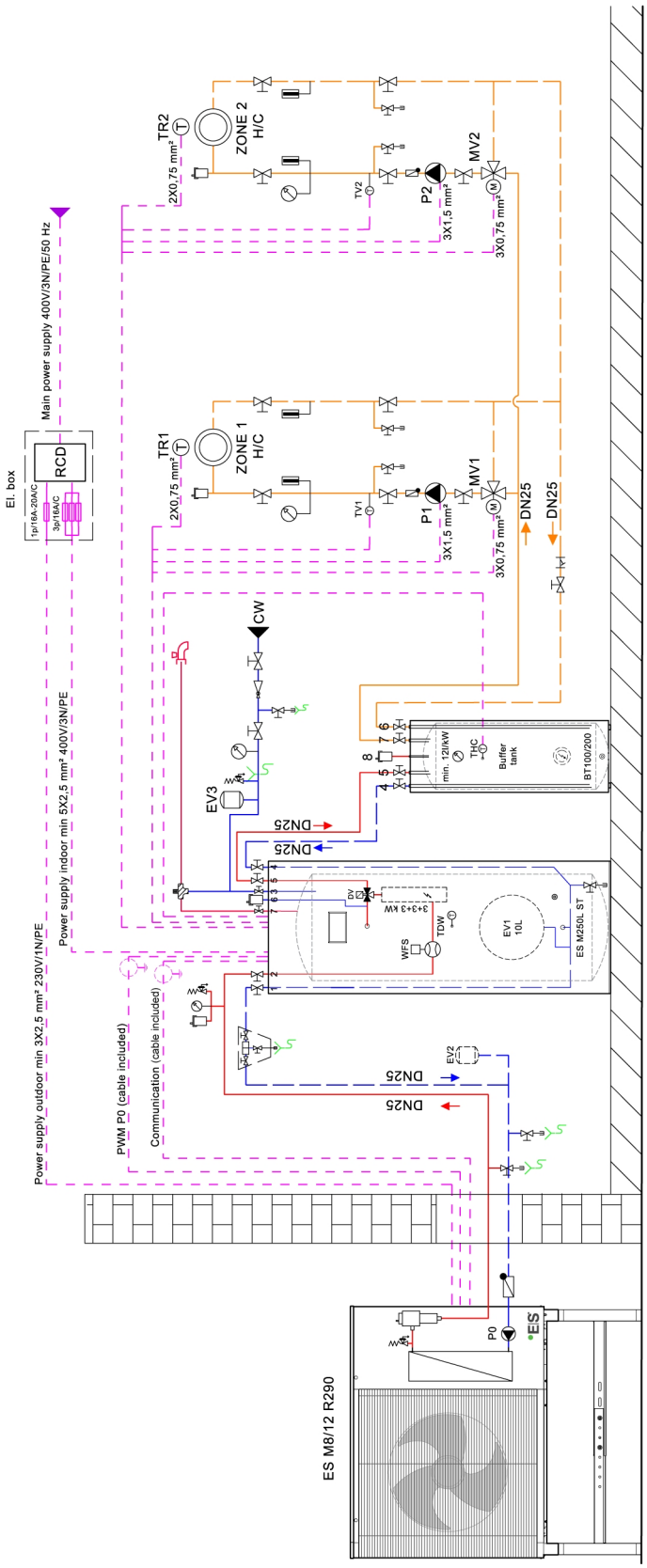


Figure 23: 2 × mixing heating/cooling circuits

12.3 M250L ST, M15 R290, BT100TC-1/BT200TC-1

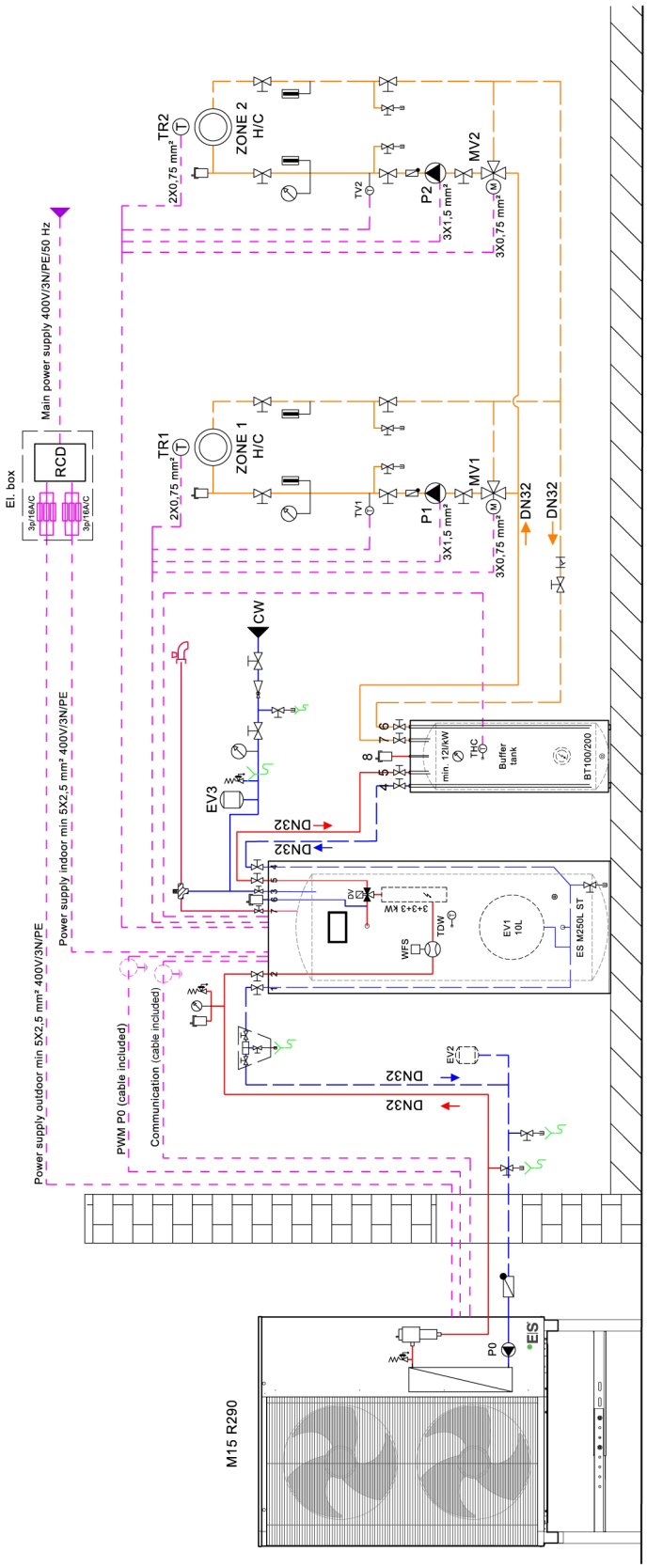


Figure 24: 2 × mixing heating/cooling circuits

12.4 MCB, M15 R290, DHW, BT100TC-1/BT200TC-1

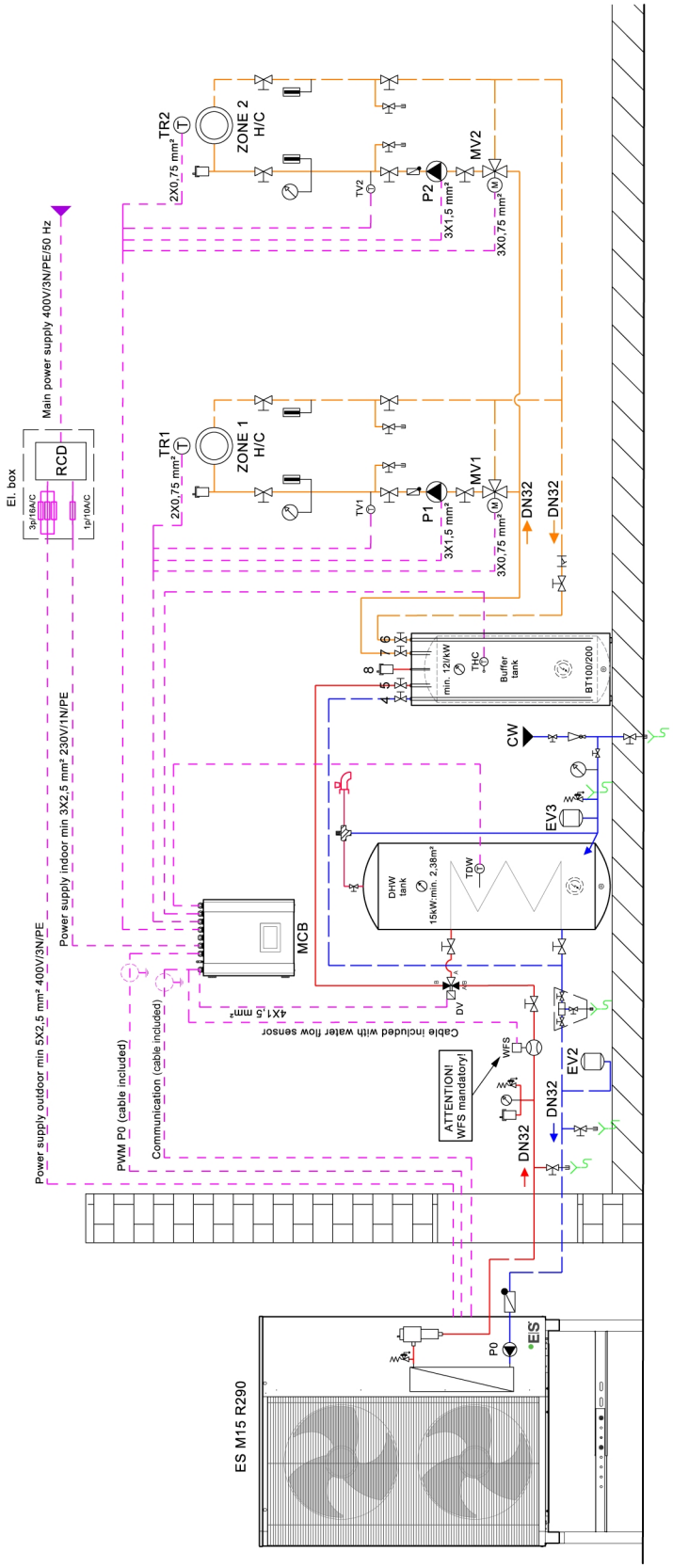


Figure 25: 2 × mixing heating/cooling circuits and DHW production

13 Appendix C: Accessories

13.1 Electrical meter

13.1.1 Connection of electrical meter

There are two versions of the electrical meter:

- ET340
  3 phase (400 V) - can be used for all indoor unit models (two different connection options depending on heat pump indoor unit model)
- ET112
  1 phase (230 V) - 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.

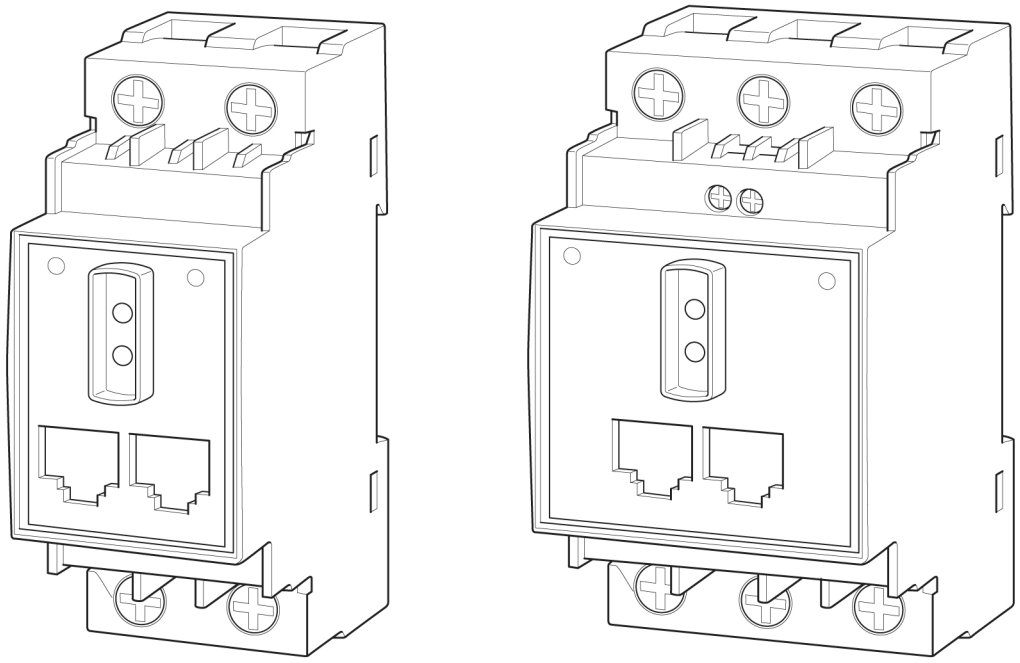


Figure 26: Electrical meters ET112 (left) and ET340 (right)

NOTE

Any additional electrical heaters connected to the system are not to be measured by the electrical meter. The controller can calculate any additional electrical meters that are controlled by the heat pump system, by entering the power of the electrical heater to the dedicated parameter.

ET340, connection for models ES MHB, ES 100L ST, ES 100L ST UK, ES 250L ST, ES 250L ST UK

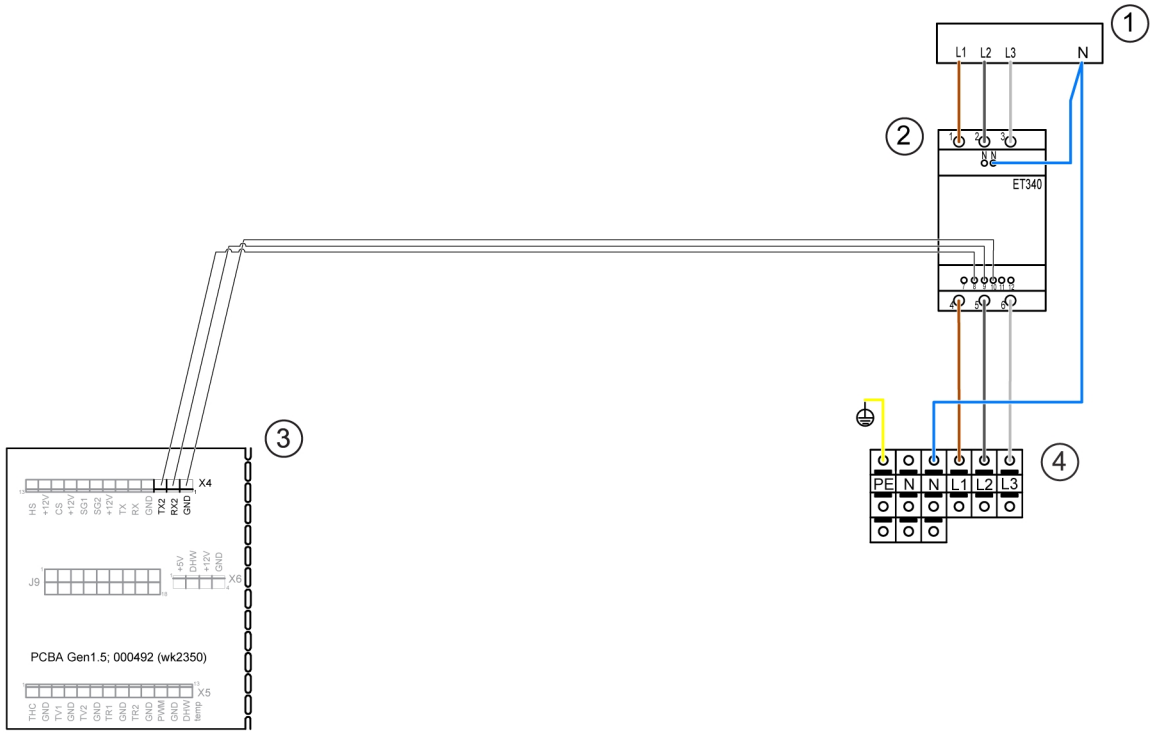


Figure 27: ET340 connection, ES MHB, ES 100L ST, ES 100L ST UK, ES 250L ST, ES 250L ST UK

1 Fuse box, power supply
2 Electrical meter, ET340
3 Indoor unit, PCBA board connections, communication
4 Indoor unit, main power supply terminals

ET340	Indoor unit, PCBA board
8	TX2
9	RX2
10	GND

ET340, connection for model ES MCB

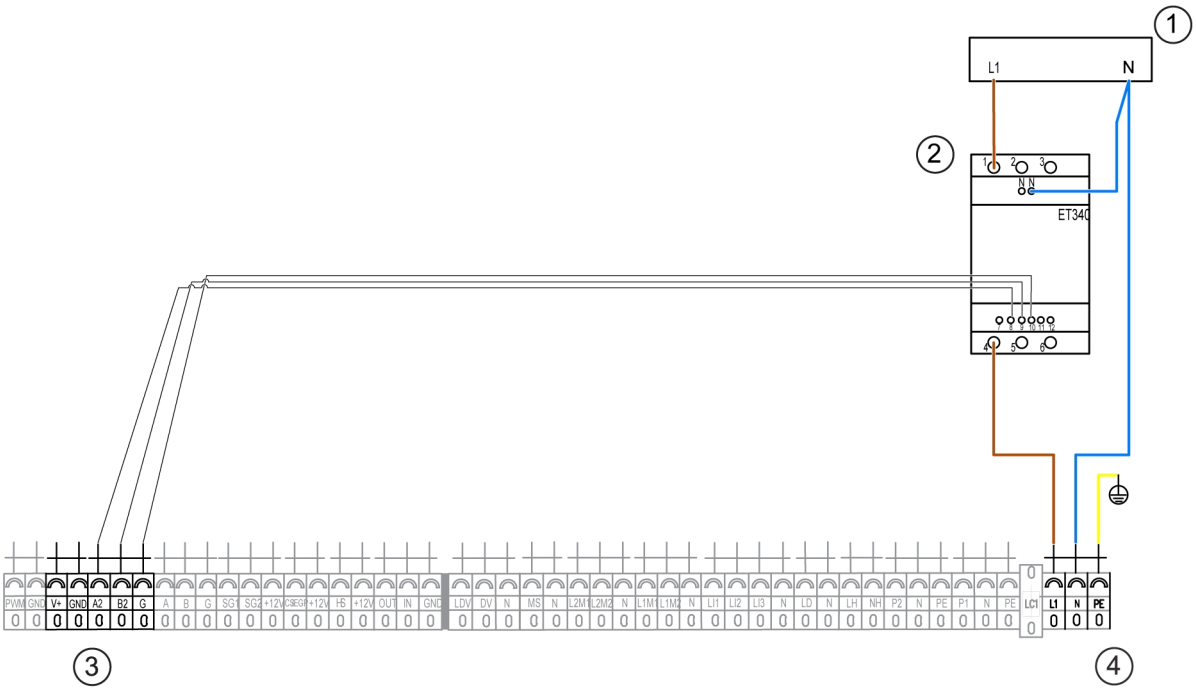


Figure 28: ET340 connection, ES MCB

1 Fuse box, power supply
2 Electrical meter, ET340
3 Indoor unit, terminal connections, communication
4 Indoor unit, main power supply terminals

ET340	Indoor unit, terminal connections
8	A2
9	B2
10	G

ET112, connection for model ES MCB

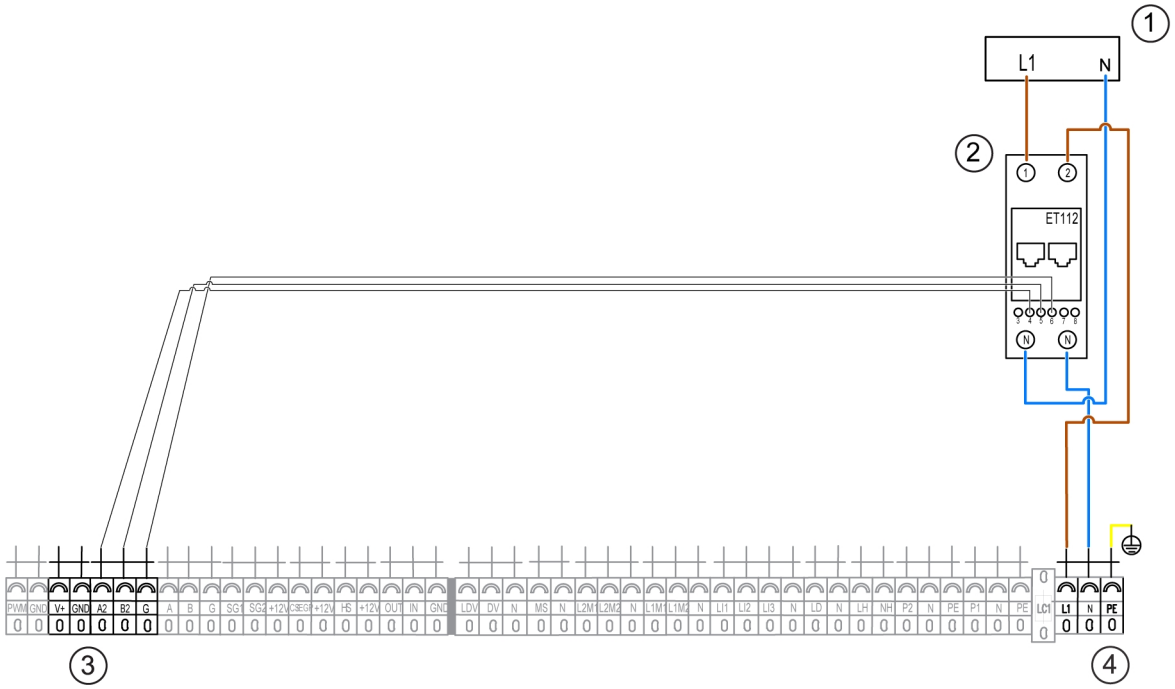


Figure 29: ET112 connection, ES MCB

1 Fuse box, power supply
2 Electrical meter, ET112
3 Indoor unit, terminal connections, communication
4 Indoor unit, main power supply terminals

ET112	Indoor unit, terminal connections
4	A2
5	B2
6	G

It is also possible to connect both the wireless thermostat and the electrical meter in combination, see Section 13.2.2 "Connection of wireless room thermostat combined with electrical meter", page 104.

13.2 Wireless room thermostat

13.2.1 Connection of wireless room thermostat

There is only one wireless room thermostat version which can be used for all indoor unit models (two different connection options depending on heat pump indoor unit model).

The wireless room thermostat comes with a preconnected cable (1 m):

Marking on cable	Color of cable	Additional info on the cable
A	Yellow	Modbus connection +
B	Green	Modbus connection -

Marking on cable	Color of cable	Additional info on the cable
V	Brown	Power supply 12 VDC+
G	White	Power supply 0 VDC-

Connection for models ES MHB, ES 100L ST, ES 100L ST UK, ES 250L ST and ES 250L ST UK

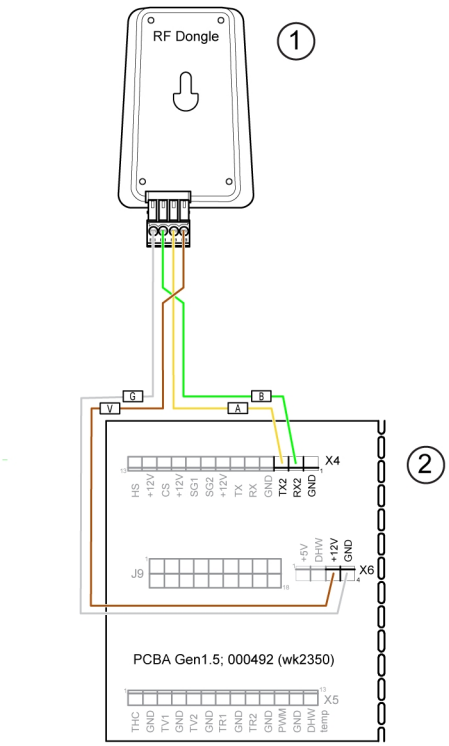


Figure 30: Wireless room thermostat connection, ES MHB, ES 100L ST, ES 100L ST UK, ES 250L ST and ES 250L ST UK

1 Wireless room thermostat RF Dongle

2 Indoor unit, PCBA board connections, communication

ES Wireless room thermostat	Indoor unit, PCBA board
Yellow (A)	TX2
Green (B)	RX2
Brown (V)	+12V
White (G)	GND

Connection for model ES MCB

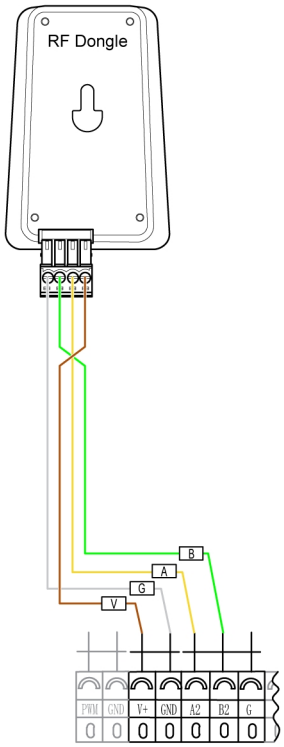


Figure 31: Wireless room thermostat connection, ES MCB

1 Wireless room thermostat RF Dongle

2 Indoor unit, terminal connections, communication

ES Wireless room thermostat	Indoor unit, terminal connections
Yellow (A)	A2
Green (B)	B2
Brown (V)	V+
White (G)	GND

It is also possible to connect both the wireless thermostat and the electrical meter in combination, see Section 13.2.2 "Connection of wireless room thermostat combined with electrical meter", page 104.

13.2.2 Connection of wireless room thermostat combined with electrical meter

Wireless room thermostat and electrical meter ET340, connection for ES MHB, ES 100L ST, ES 100L ST UK, ES 250L ST, ES 250L ST UK

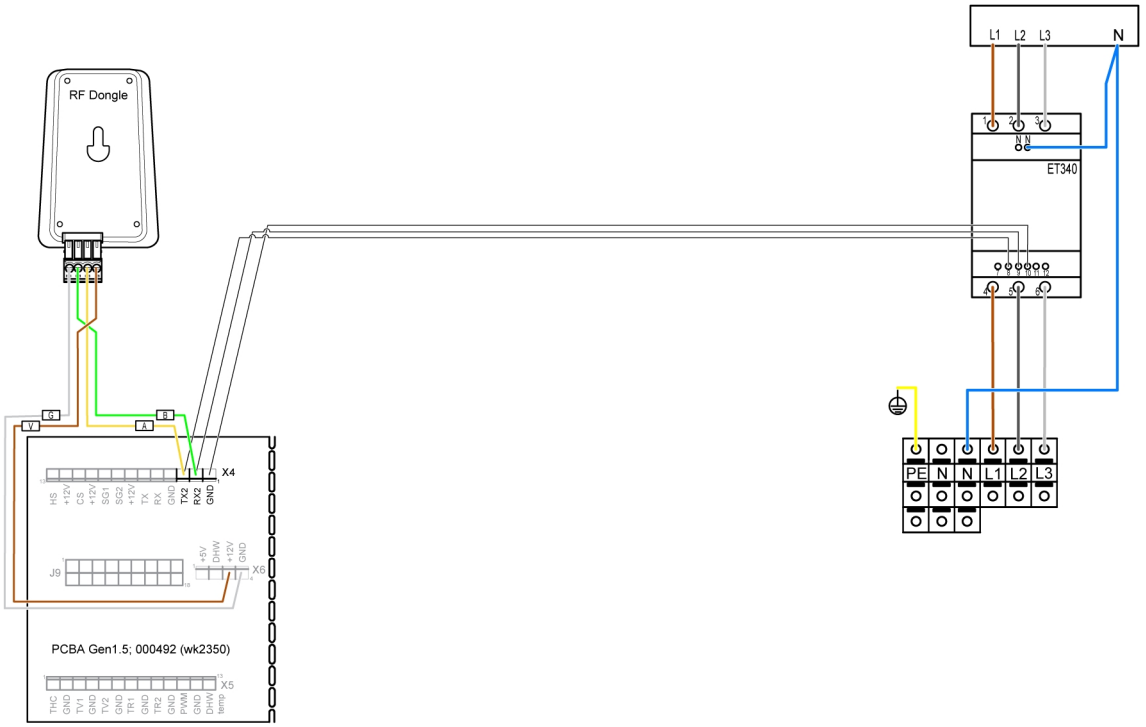


Figure 32: Wireless room thermostat and ET340 connection, ES MHB, ES 100L ST, ES 100L ST UK, ES 250L ST, ES 250L ST UK

1 Fuse box, power supply
2 Electrical meter, ET340
3 Wireless room thermostat RF Dongle
4 Indoor unit, PCBA board connections, communication
5 Indoor unit, main power supply terminals

ES Wireless room thermostat	Indoor unit, PCBA board
Yellow (A)	TX2
Green (B)	RX2
Brown (V)	+12V
White (G)	GND

ET340	Indoor unit, PCBA board
8	TX2
9	RX2
10	GND

Wireless room thermostat and electrical meter and ET340, connection for ES MCB

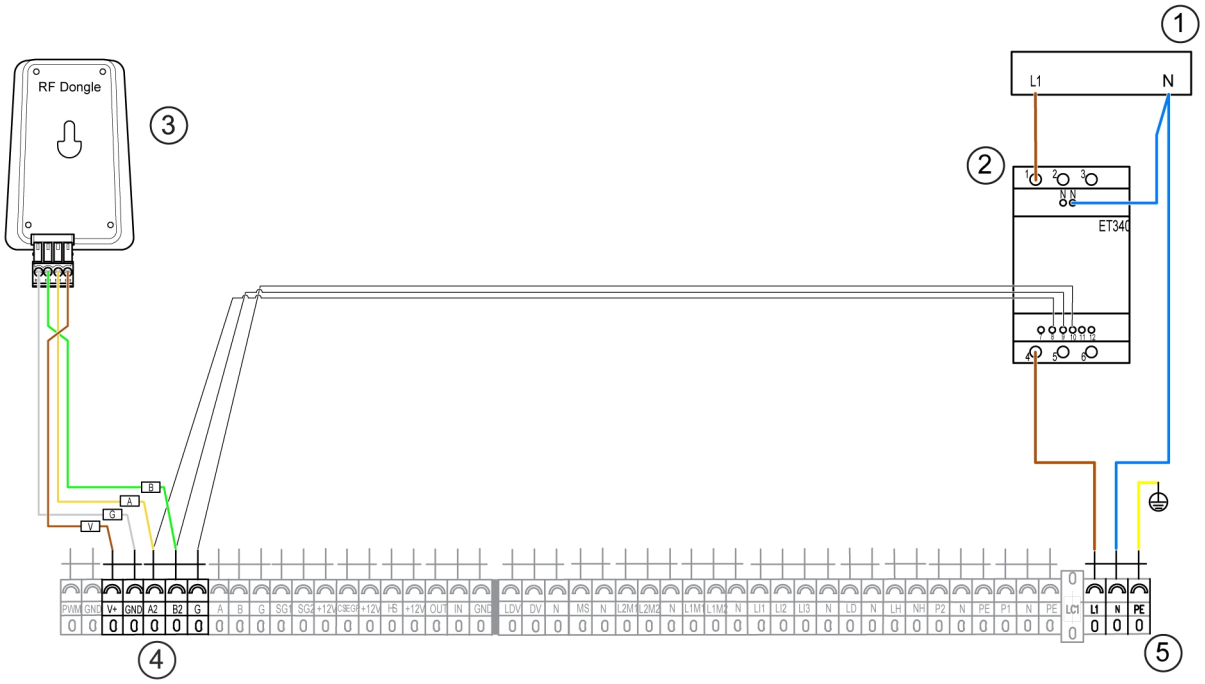


Figure 33: Wireless room thermostat and ET340 connection, ES MCB

1 Fuse box, power supply
2 Electrical meter, ET340
3 Wireless room thermostat RF Dongle
4 Indoor unit, terminal connections, communication
5 Indoor unit, main power supply terminals

ES Wireless room thermostat	Indoor unit, terminal connections
Yellow (A)	A2
Green (B)	B2
Brown (V)	V+
White (G)	GND

ET340	Indoor unit, terminal connections
8	A2
9	B2
10	G

Wireless room thermostat and electrical meter ET112, connection for ES MCB

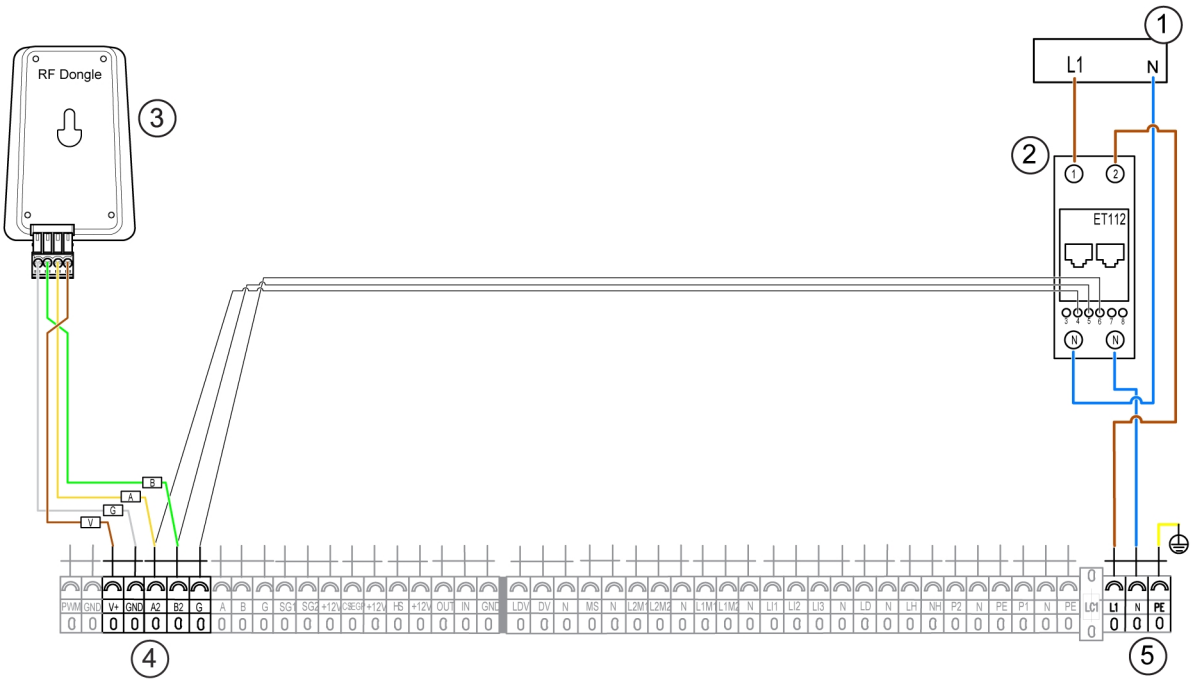


Figure 34: Wireless room thermostat and ET112 connection, ES MCB

1 Fuse box, power supply
2 Electrical meter, ET112
3 Wireless room thermostat RF Dongle
4 Indoor unit, terminal connections, communication
5 Indoor unit, main power supply terminals

ES Wireless room thermostat	Indoor unit, terminal connections
Yellow (A)	A2
Green (B)	B2
Brown (V)	V+
White (G)	GND

ET112	Indoor unit, terminal connections
4	A2
5	B2
6	G

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