ES ENERGY SAVE

Installation Manual

Air/Water Heat Pump R290 Series

ES M100L ST / ES M100L ST UK
ES M250L ST / ES M250L ST UK
ES MCB
ES MHB
ES M8 R290
ES M12 R290
ES M15 R290 1 PH
ES M15 R290 3 PH

V5.0 2026-01-14

Table of Contents

1 Document History

Version	Release	Version Information
1.0	October 3, 2024	First release
2.7	December 13, 2024	Restructure and updates of the entire manual
3.3	May 22, 2025	General improvements and updated information in the entire manual
4.1	July 4, 2025	Added and updated KEYMARK related information
5.0	January 14, 2026	Additional explanations and wiring diagrams on SG Ready, Wireless Thermostat and Electrical Meter. Updated hydraulic schematics. More detailed information on internet connection needs. Circulation pump performance data added.

2 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 hot water, 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
TR1/TR2		Room temperature sensors
TV1/TV2		Mixing circuit temperature sensors

3 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 M100L ST	ES M15 R290 1 PH
ES M100L ST UK	ES M15 R290 3 PH
ES M250L ST	
ES M250L 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.

3.1 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.

3.2 Conformity to safety regulations

If unsure of what installation procedures to use, please contact your local distributor for information and/or advice. 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.

4 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: energysave.se/contact/

4.1 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.

4.2 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.
- The installation place must not have any fire risk.
- The available indoor units with storage tanks include a safety cutoff on all live conductors, including phase(s) and neutral if temperature becomes too high. If installer uses external heat sources connected to the system water, it is mandatory to have a safety function to simultaneously cut off all live conductors, including phase(s) and neutral if the temperature reaches above 80 °C.

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.

4.3 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.

4.4 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.

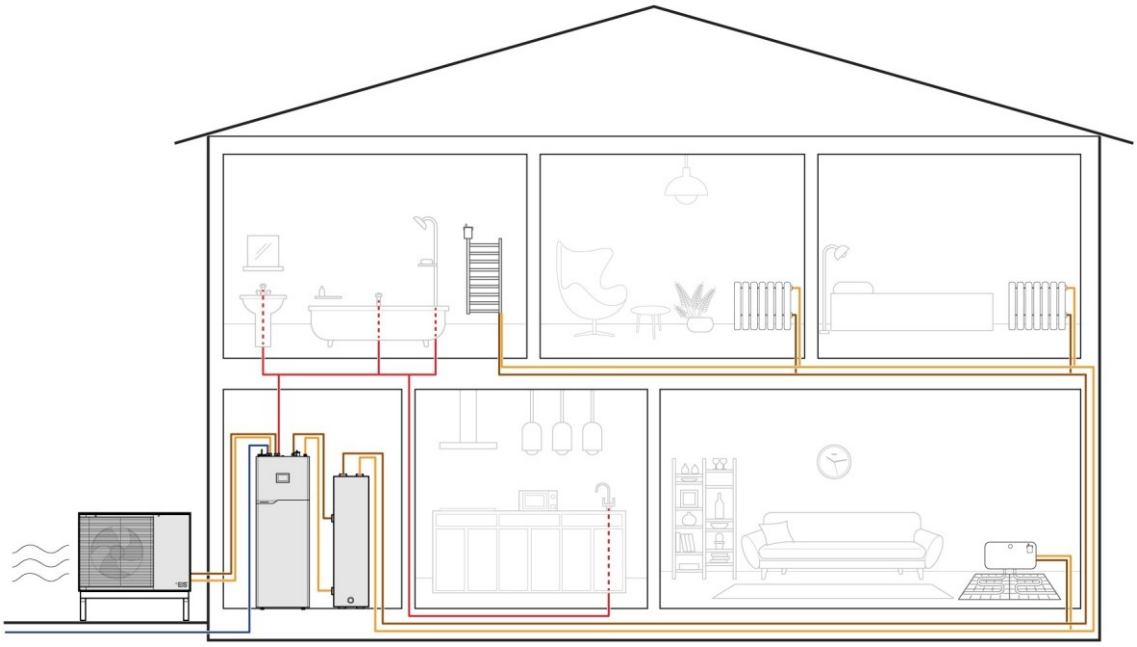
During the work:

- 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.

5 System description

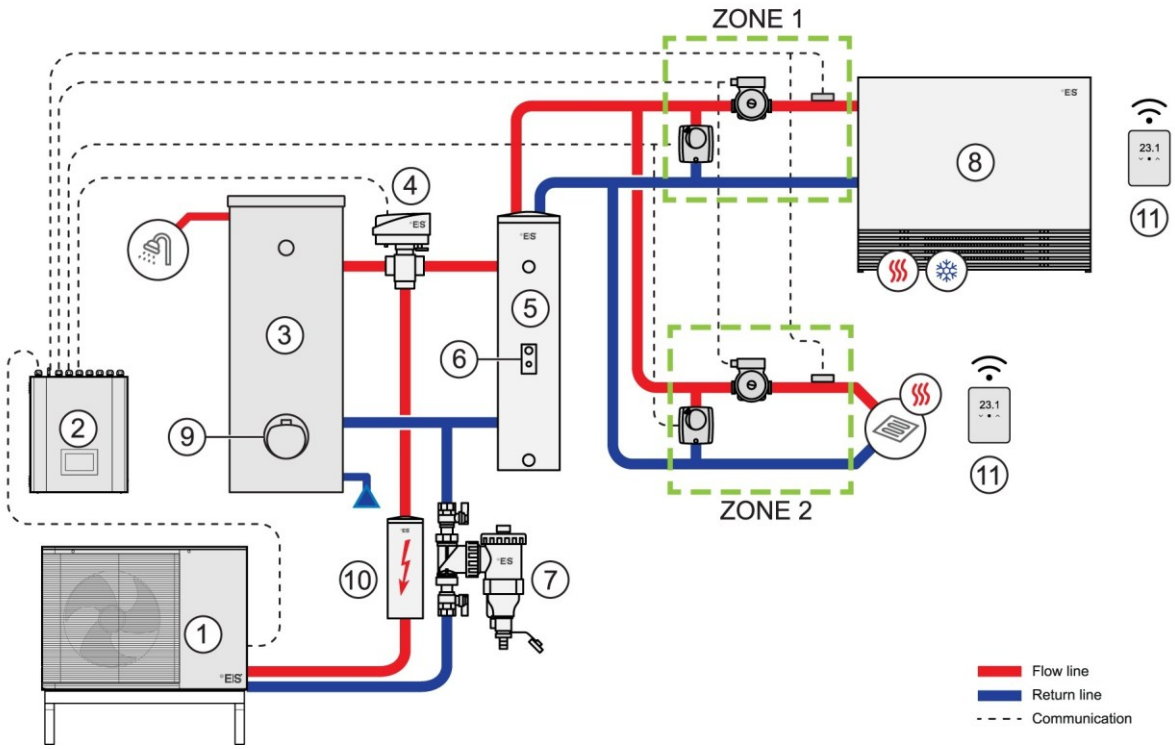


An air-to-water heat pump takes advantage of the energy in the outdoor air, using it to heat water for use in the household and for different types of space heating.

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.

5.1 Generic flow diagram



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

5.2 Configuration of indoor and outdoor units

Indoor unit	DHW tank	Buffer tank	8 kW	12 kW	15 kW
ES M100L ST ES M100L ST UK	100-litre tank integrated	Recommended	✓	✓	✗
ES M250L ST ES M250L UK	250-litre tank integrated	Recommended	✓	✓	✓
ES MCB	Optional*	Recommended	✓	✓	✓
ES MHB	Optional*	Recommended	✓	✓	✓

*If the installation requires domestic hot water.

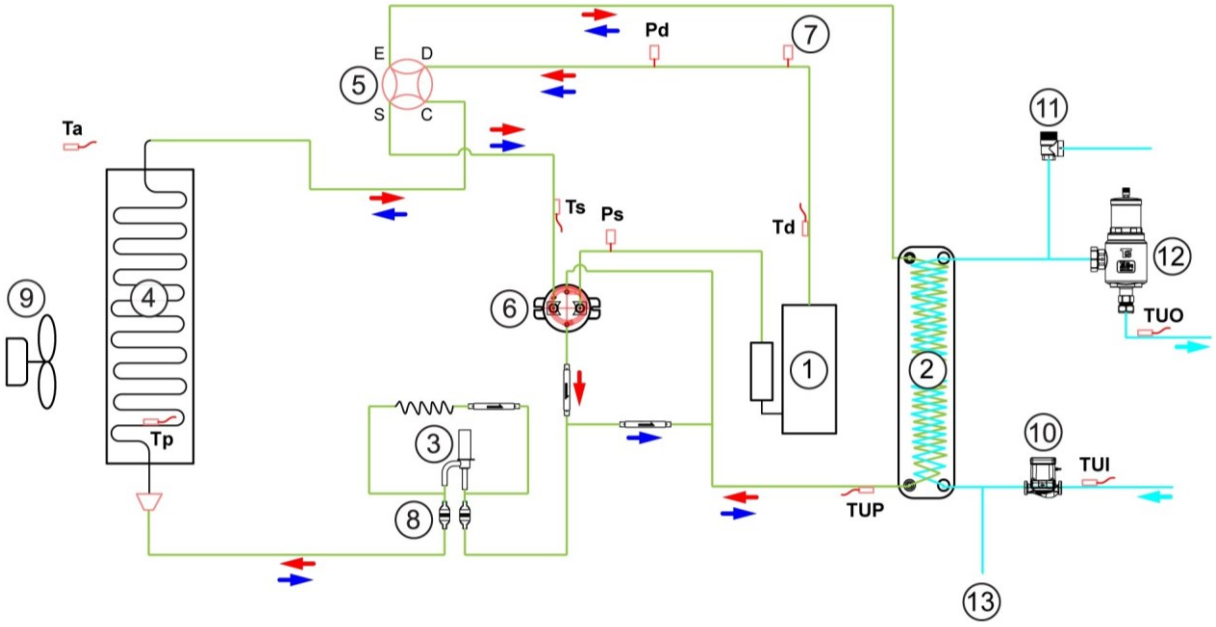
5.3 Included in the package

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 unit	1 pc	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 ES M15 R290 1 PH	Magnet ring for power supply cable	1 pc	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	Recommended alternative is Unitronic LiYY 2 × 2 × 0.5 or equivalent cable.
	PWM speed control cable for circulation pump between indoor and outdoor unit	1 × 15 m	Recommended alternative is Unitronic LiYY 2 × 2 × 0.5 or equivalent cable.
	Antenna for Wi-Fi	1 pc	
	Magnet ring for communication cable	1 pc	
ES MHB	THC (BT)Temperature sensor	1 × 5 m Extension cable	
	TV1 (BT)Temperature sensor	1 × 5 m Extension cable	
	TV2 (BT)Temperature sensor	1 × 5 m Extension cable	
	TDW (BT)Temperature sensor	1 × 5 m Extension cable	
	TR1 (BT) Temperature sensor	1 × 5 m Extension cable	
	Communication cable between indoor and outdoor unit The magnet ring is installed on the communication cable in the factory	1 × 15 m	Recommended alternative is Unitronic LiYY 2 × 2 × 0.5 or equivalent cable.
	PWM speed control cable for circulation pump between indoor and outdoor unit	1 × 15 m	Recommended alternative is Unitronic LiYY 2 × 2 × 0.5 or equivalent cable.
	Antenna for Wi-Fi	1 pc	

ES M100L ST ES M100L ST UK ES M250L ST ES M250L ST UK	THC (BT)Temperature sensor	1 x 5 m Extension cable	
	TV1 (BT)Temperature sensor	1 x 5 m Extension cable	
	TV2 (BT)Temperature sensor	1 x 5 m Extension cable	
	TR1 (BT) Temperature sensor	1 x 5 m Extension cable	
	Communication cable between indoor and outdoor unit The magnet ring is installed on the communication cable in the factory	1 x 15 m	Recommended alternative is Unitronic LiYY 2 x 2 x 0.5 or equivalent cable.
	PWM speed control cable for circulation pump between indoor and outdoor unit	1 x 15 m	Recommended alternative is Unitronic LiYY 2 x 2 x 0.5 or equivalent cable.
	Antenna for WI-FI	1 pc	

5.4 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 à E for high pressure flow	D à C for high pressure flow
C à S for low pressure flow	E à S for low pressure flow

NOTE

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

5.4.1 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

5.4.2 Safety valve (water side - outdoor units)

The outdoor units are equipped with a 2.5-bar safety 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.

NOTE

If the system has an existing additional safety valve that is placed indoor on the heating system, then the relief setting of the indoor safety valve must be higher than the setting of the supplied outdoor safety valve. This is to prevent propane going into the building in the unlikely event of a gas leakage within the plate exchanger.

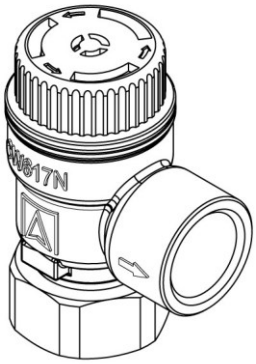


Figure 2: Safety valve

6 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 M100L ST and ES M250L 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.

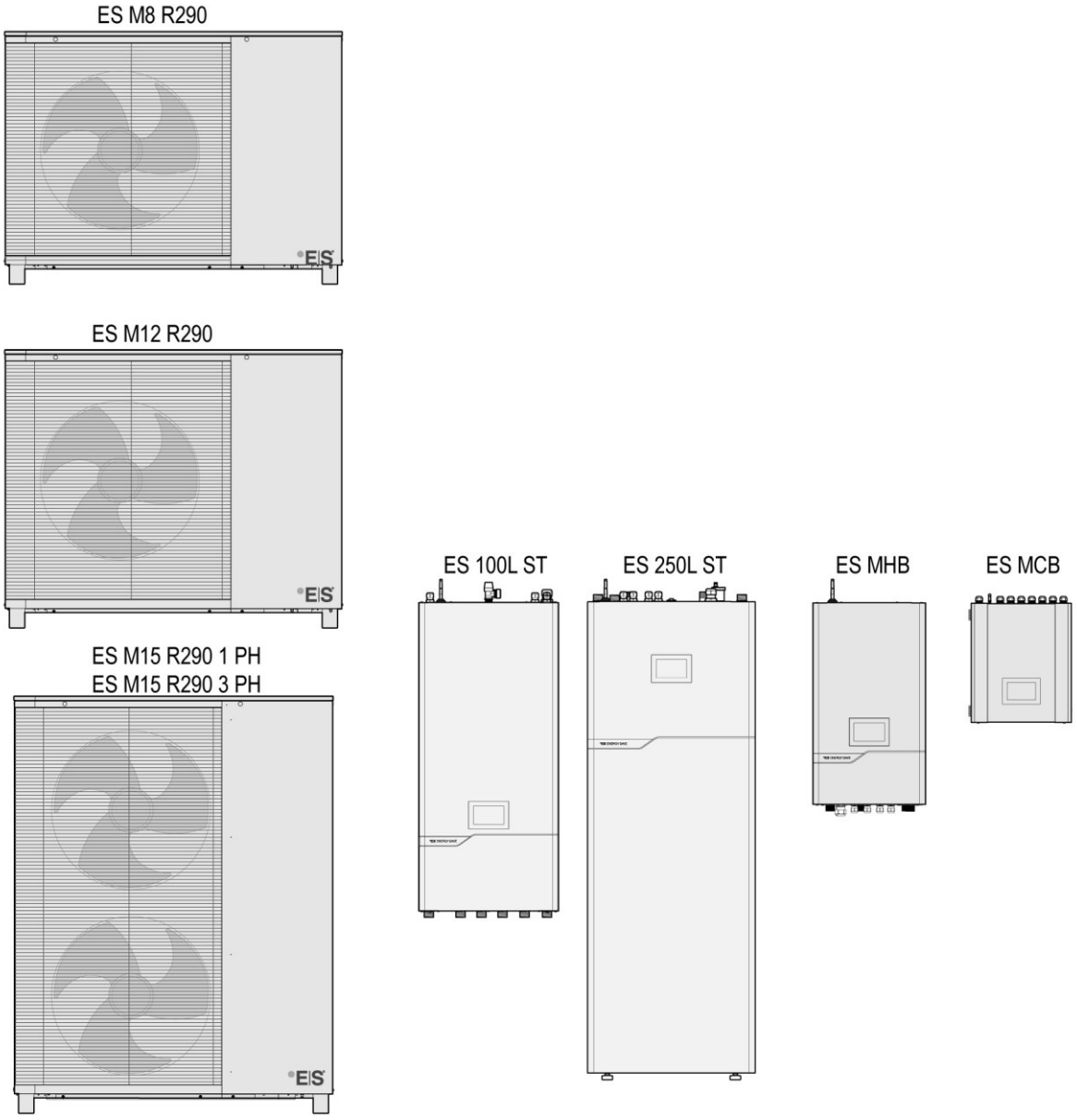


Figure 3: The ES M R290 product range

6.1 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.

6.2 Placement

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

6.2.1 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 M250L ST and ES M250L ST UK have adjustable feet.

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

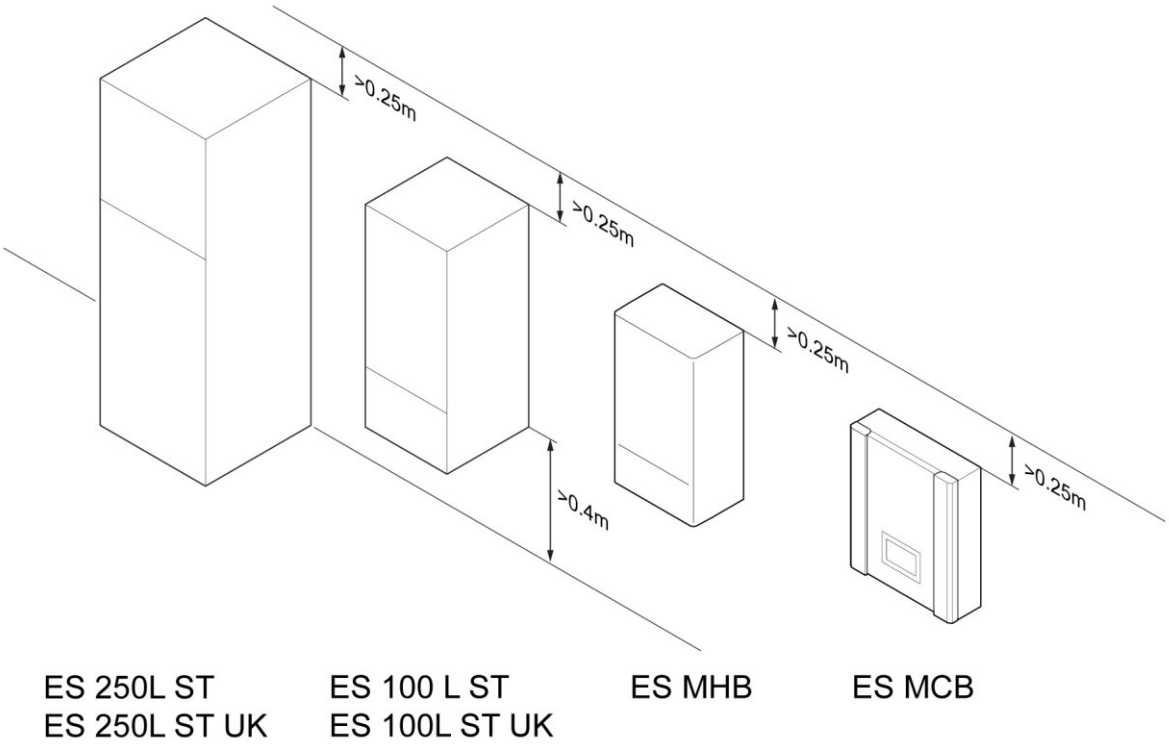


Figure 4: Space requirement for indoor units

6.2.2 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.

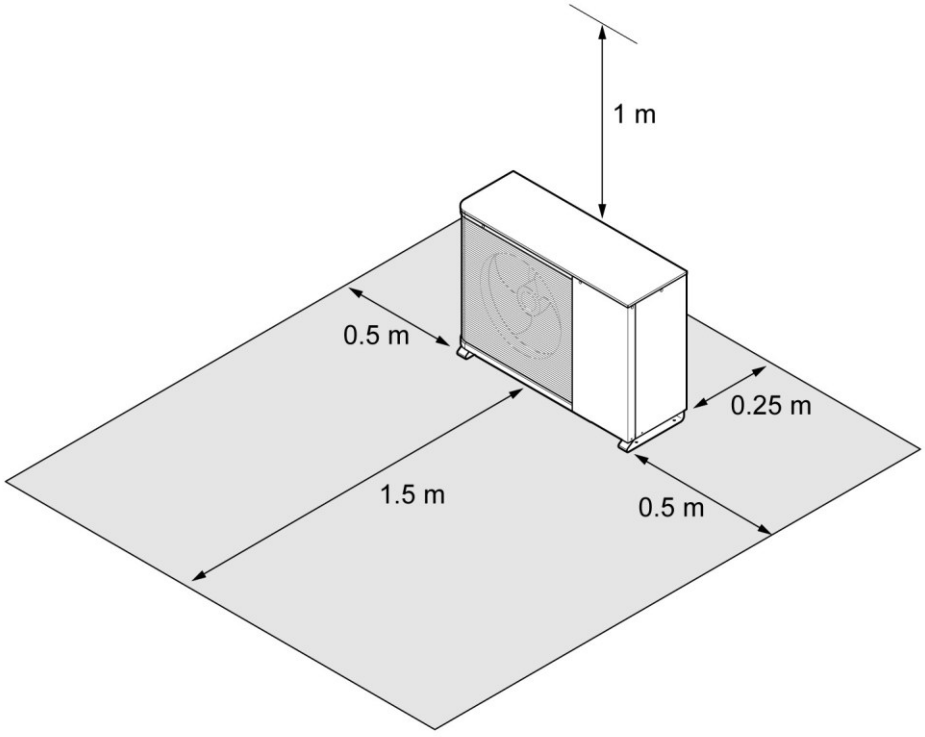


Figure 5: Space requirement for sufficient air flow around the heat pump

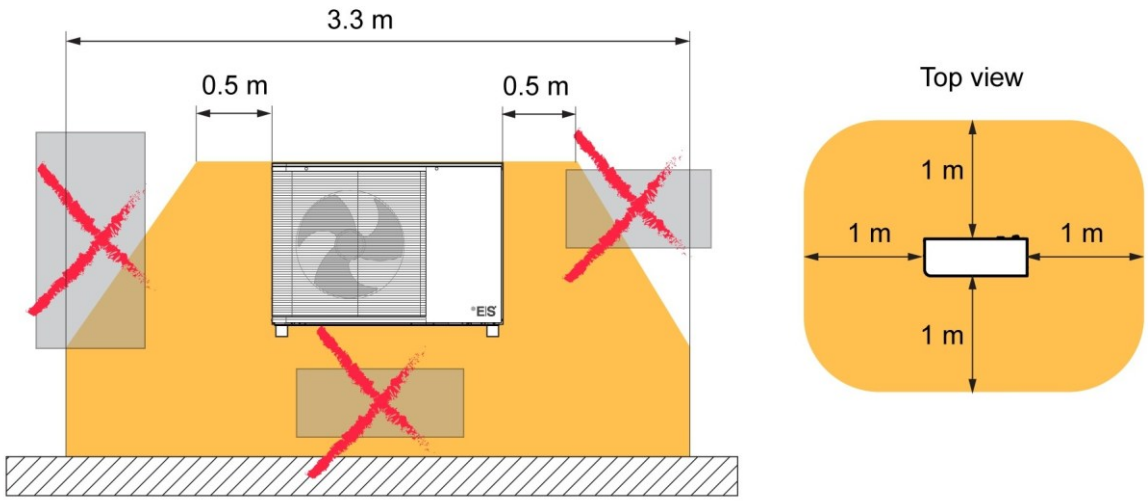


Figure 6: Protected area clear from windows, doors, and air inlets/outlets

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

6.3 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.

6.3.1 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

6.3.2 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.

6.3.3 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.

Conditions when a buffer tank must be installed

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

6.4 Indoor unit technical data

	Unit	ES MCB	ES MHB	ES M100L ST	ES M250L ST
Article number		120715	202184	202163	202028
Article number, UK		/	/	202182	202181
ErP Energy efficiency class		/	/	A	A+ / A[1]
DHW tap profile		/	/	M	L / XL[2]
IP rating		IP31	IPX1	IPX1	IPX1
DHW tank					
Type		/	/	DHW storage	
Volume	l	/	/	100	250
Material		/	/	SUS316, DUPLEX stainless steel	
Power supply					
Indoor unit	V/ph/Hz	230 / 1N / 50	380 – 415 / 3N / 50		
Fuse indoor unit	Type/A	1p/10	3p/16		
Controller					
Type		LCD touchscreen			
LCD size		5”			
Internet connection		Wi-Fi and Ethernet			
Connection type					
Type of connection between indoor and outdoor unit		Hydraulic			
Key components					
Electric heater (heating system)	kW	/	3 x 3		
3-way diverting valve for DHW tank		/	Pre-installed		
Expansion vessel heating water	l	/	14	/	10
Flow sensor		In the package	Pre-installed		
Dimensions and packaging					
Net dimensions (L x W x H)	mm	380 x 115 x 480	400 x 260 x 800	500 x 500 x 1100	600 x 670 x 1720
Net weight	kg	9	27	75	127
Packaging dimensions (L x W x H)	mm	410 x 210 x 500	300 x 450 x 800	800 x 600 x 1355	800 x 700 x 1965
Gross weight	kg	10	30	90	142

[1] ErP Energy efficiency class with ES M8 R290 or ES M12 R290: A+. ErP Energy efficiency class with ES M15 R290: A.
[2] DHW tap profile with ES M8 R290 or ES M12 R290: L. DHW tap profile with ES M15 R290: XL.

6.5 Outdoor unit technical data

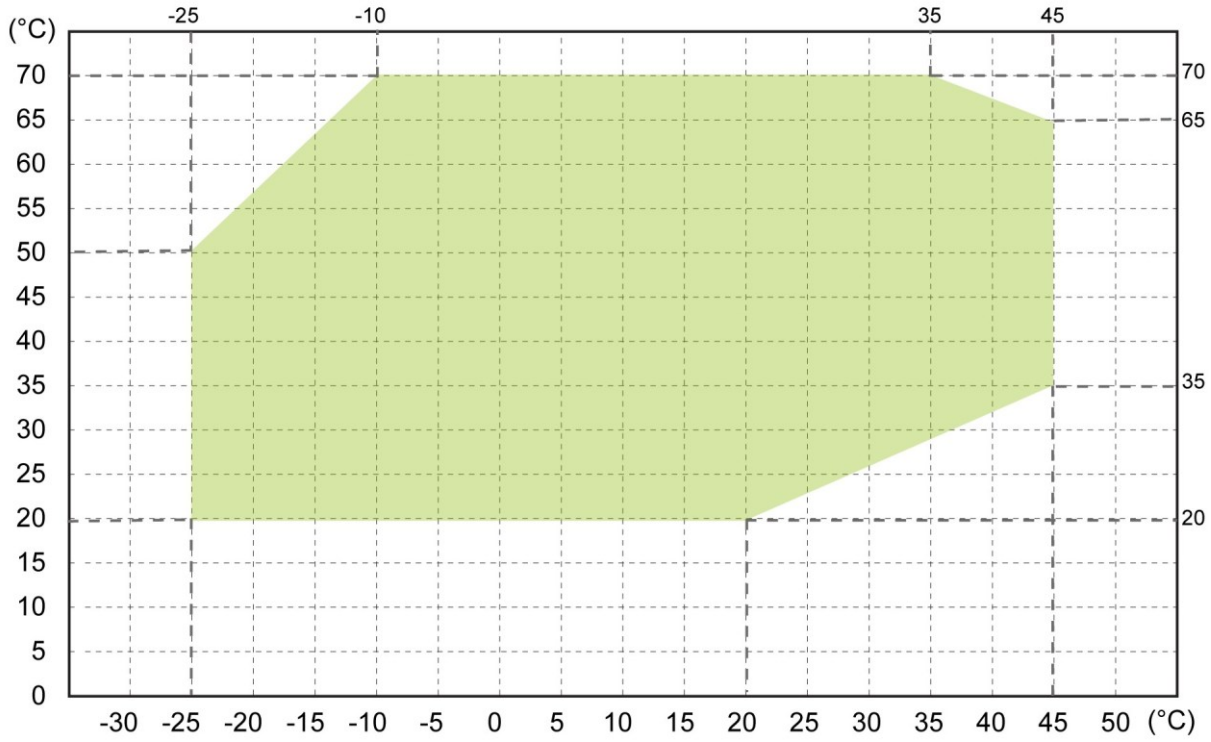
	Unit	ES M8 R290	ES M12 R290	ES M15 R290 1 PH	ES M15 R290 3 PH
Article number		120702	120703	120707	120704
IP rating		IPX4			
SEER min/max	W	3.83 / 6.22	3.61 / 6.36	/	
Average climate, 35 °C[3]					
ErP energy efficiency class		A+++			
SCOP	W	4.93	4.85	4.54	
Average climate, 55 °C[4]					
ErP energy efficiency class		A++	A+++	A++	A++
SCOP	W/W	3.72	3.94	3.61	
Heating mode (A7/W35)[5]					
Min/max heating capacity	kW	3.1 – 9.3	4.1 – 11.2	6.0 – 16.4	
Min/max input power	kW	0.6 – 2.0	0.8 – 2.9	1.2 – 4.1	
COP min/max	W/W	4.58 / 5.19	3.85 / 4.91	4.00 / 5.17	
Heating mode (A7/W55)[6]					
Min/max heating capacity	kW	2.5 – 8.6	3.7 – 11.0	5.3 – 15.0	
Min/max input power	kW	0.9 – 2.8	1.2 – 3.8	1.7 – 5.4	
COP min/max	W/W	2.80 / 3.20	2.86 / 3.03	2.76 / 3.06	
Cooling mode (A35/W18)[7]					
Min/max cooling capacity	kW	2.4 – 8.0	5.0 – 10.2	6.6 – 13.5	6.9 – 13.2
Min/max input power	kW	0.8 – 2.1	1.4 – 2.8	1.5 – 3.7	1.5 – 3.7
EER	W/W	3.80 / 4.00	3.60 / 3.90	3.60 / 4.37	3.65 / 4.40
Cooling mode (A35/W7)[8]					
Min/max cooling capacity	kW	1.8 – 6.0	3.6 – 7.5	4.3 – 10.1	4.3 – 10.8
Min/max input power	kW	0.7 – 1.9	1.2 – 2.7	1.5 – 3.5	
EER	W/W	2.90 / 3.05	2.75 / 2.90	2.85 / 3.32	2.85 / 3.05
Temperature and flow specifications					
Min/max ambient working temperature in heating mode	°C	-25 – 45			
Min/max ambient working temperature in cooling mode	°C	8 – 45			
Max flow temperature in heating mode	°C	70			
Min flow temperature in heating mode	°C	20			

[3] According to EN 14825.
[4] According to EN 14825.
[5] Water inlet/outlet temperature: 30 °C / 35 °C; ambient temperature: DB 7 °C / WB 6 °C.
[6] Water inlet/outlet temperature: 50 °C / 55 °C; ambient temperature: DB 7 °C / WB 6 °C.
[7] Water inlet/outlet temperature: 23 °C / 18 °C; ambient temperature: DB 35 °C / WB 34 °C.
[8] Water inlet/outlet temperature: 12 °C / 7 °C; ambient temperature: DB 35 °C / WB 34 °C.

Min flow temperature in cooling mode		°C	7			
Nominal water flow (heating mode)		m^3/h – l/m	1.38 / 23.00	2.06 / 34.30	2.58 / 43.00	2.58 / 43.00
Power supply						
Outdoor unit		V/ph/Hz	230 / 1N / 50			400 / 3N / 50
Fuse outdoor unit		Type/A	1p / 16	1p / 20	1p / 32	3p/ 16
Refrigerant specifications						
Type			R290			
Charge		kg	0,7	0,9	1.5	
GWP		CO_2/kg	3			
Type of connection between indoor and outdoor unit			Hydraulic			
Dimensions of refrigerant pipe connectors			G1”		G1¼”	
Sound power level						
Sound power level L_{WA}, 55 °C		dB(A)	53	54	57	
Sound power level at a distance	1 m	dB(A)	45	46	49	49
	5 m	dB(A)	31	32	35	35
	10 m	dB(A)	25	26	29	29
	15 m	dB(A)	21	22	25	25
Key components						
Plate heat exchanger						
Manufacturer			Kelvion		SWEP	
Water pressure drop		kPa	8	15	23	
Pipe connection		Inch	G1”		G1¼”	
Fan						
Manufacturer			Nidec			
Quantity		pcs	1		2	
Airflow		m^3/h	3150	3300	6300	
Rated power		W	62	62	62 x 2	
Blade diameter		mm	550			
Compressor						
Manufacturer			Highly			
Flow switch			Included			
Safety valve (water side)		bar	2.5			
Dimensions and packaging						
Net dimensions (L x W x H)		mm	1207 x 437 x 903	1207 x 437 x 995	1142 x 428 x 1492	
Net weight		kg	123	138	187	
Packaging dimensions (L x W x H)		mm	1275 x 515 x 1073	1275 x 515 x 1165	1198 x 503 x 1647	
Gross weight		kg	143	159	209	

6.6 Operating range diagrams

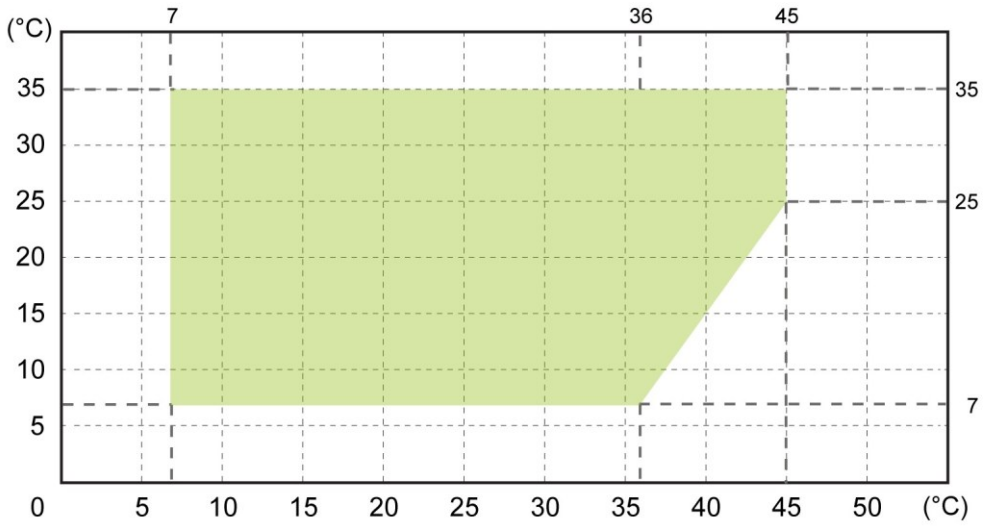
6.6.1 Heating mode



NOTE

Tested at ambient temperature -25 °C and water outlet +48 °C.

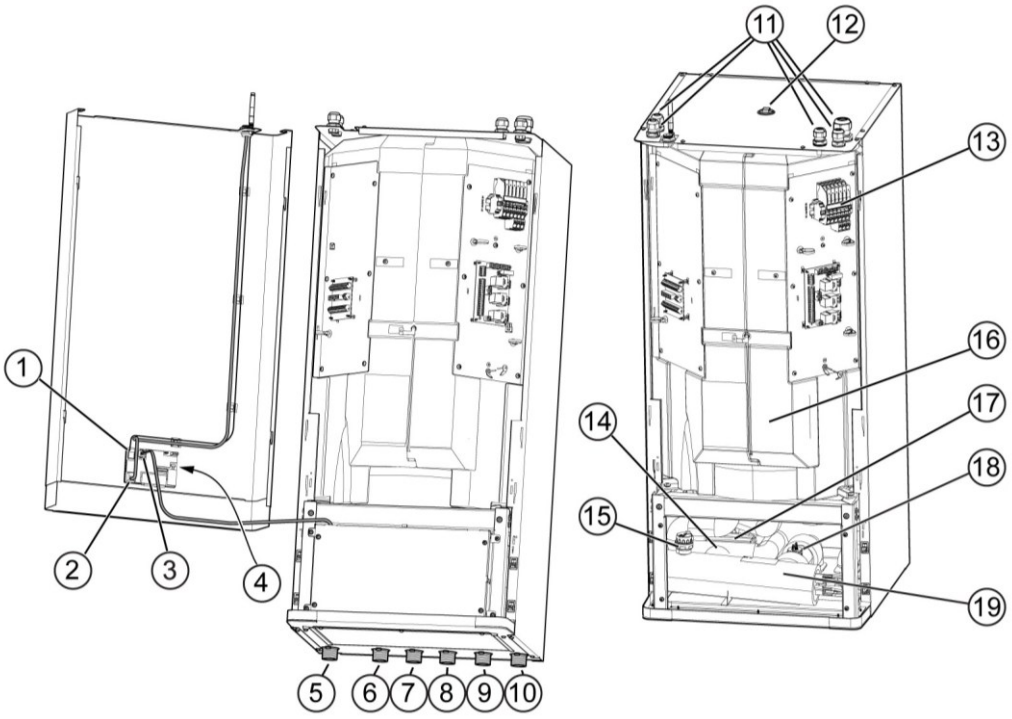
6.6.2 Cooling mode



6.7 Product overview

6.7.1 Indoor units product overview

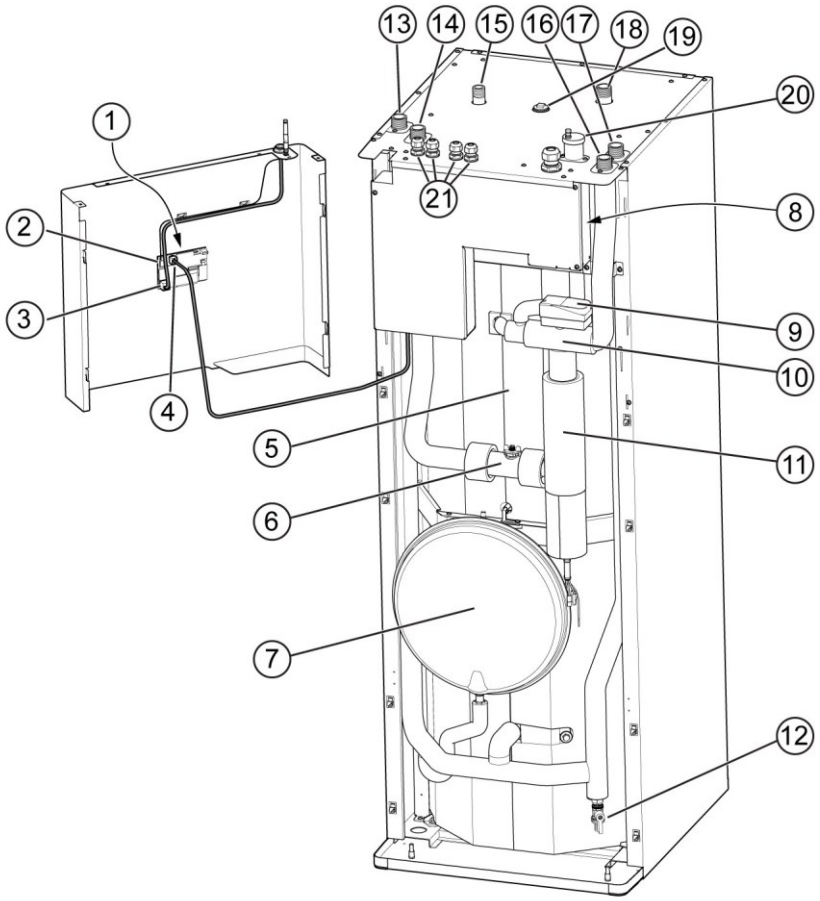
ES M100L ST and ES M100L ST UK



1	Antenna cable	11	Cable glands
2	Ethernet/LAN cable	12	Connector for temperature and pressure relief valve[9]
3	RJ11 cable (communication display – controller)	13	Electrical box
4	Display	14	Diverting valve (3-way valve)
5	Cold domestic water inlet (G1” male)	15	Automatic air purging valve
6	Hot domestic water outlet (G1” male)	16	DHW storage tank 100L
7	Flow line heating system (G1” male)	17	Diverting valve (3-way valve) actuator
8	Water inlet from outdoor unit (G1” male)	18	Flow sensor
9	Return line heating system (G1* male)	19	Additional inline heating source
10	Water outlet from outdoor unit (G1” male)		

[9] Valve preinstalled for the UK only.

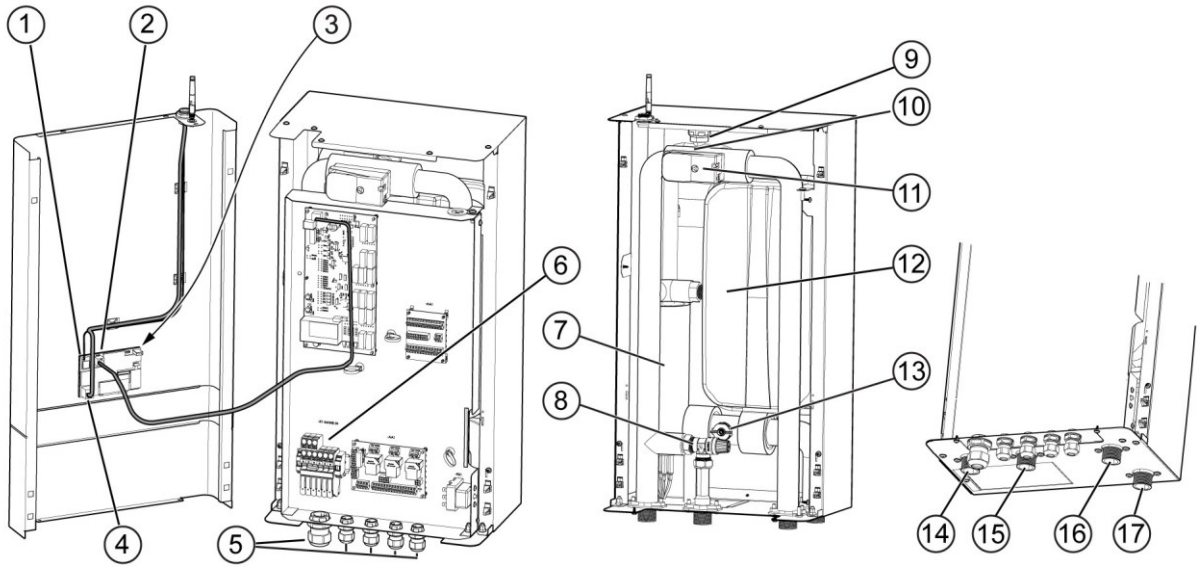
ES M250L ST and ES M250L ST UK



1	Display	12	Drainage valve
2	Antenna cable	13	Water outlet to outdoor unit (G1" male)
3	Ethernet/LAN cable	14	Water inlet from outdoor unit (G1" male)
4	RJ11 cable (communication display – controller)	15	Cold domestic water inlet (G¾" male)
5	DHW storage tank 250L	16	Flow line heating system (G1" male)
6	Flow sensor	17	Return line heating system (G1" male)
7	Expansion vessel (10L)	18	Hot domestic water outlet (G1" male)
8	Electric box	19	Connector for temperature and pressure relief valve[10]
9	Diverting valve (3-way valve) actuator	20	Automatic air purging valve
10	Diverting valve (3-way valve)	21	Cable glands
11	Additional inline heating source		

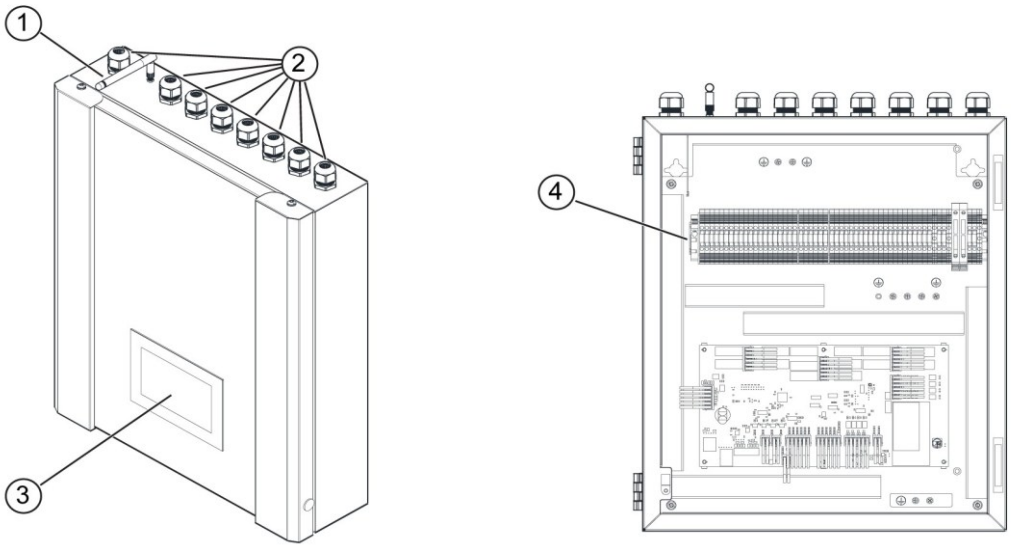
[10] Valve preinstalled for the UK only.

ES MHB



1	Antenna cable	10	Diverting valve (3-way valve)
2	Ethernet/LAN cable	11	Diverting valve (3-way valve) actuator
3	Display	12	Expansion vessel (14L)
4	RJ11 cable (communication display – controller)	13	Flow sensor
5	Cable glands	14	Flow line heating system (G1” male)
6	Electrical box	15	Drain from safety valve (G1” male)
7	Additional inline heating source	16	Flow line to DHW tank (G1” male)
8	Safety valve 3,0 bar heating system	17	Water inlet from outdoor unit (G1” male)
9	Automatic air purging valve		

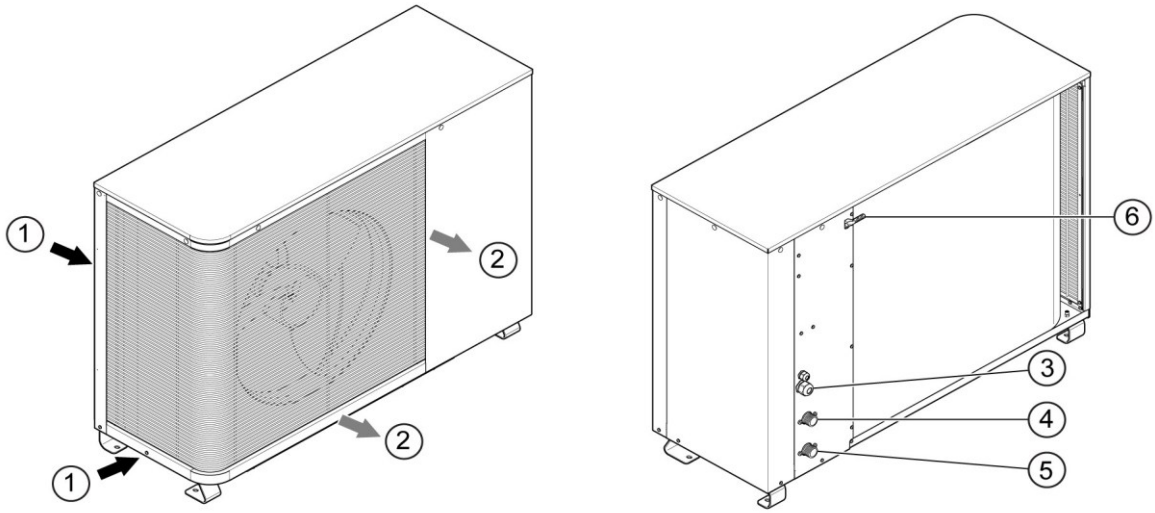
ES MCB



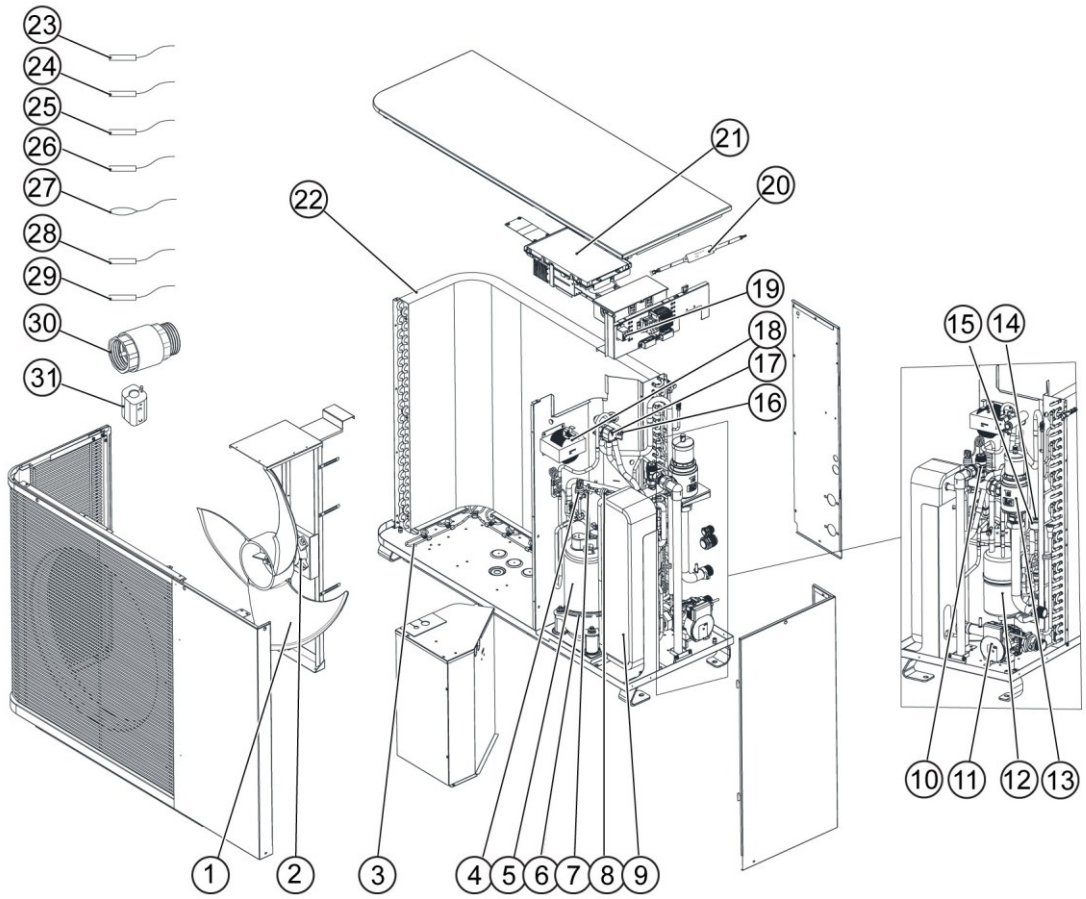
1	Antenna	3	Display
2	Cable glands	4	Electrical box

6.7.2 Outdoor units product overview

ES M8 R290

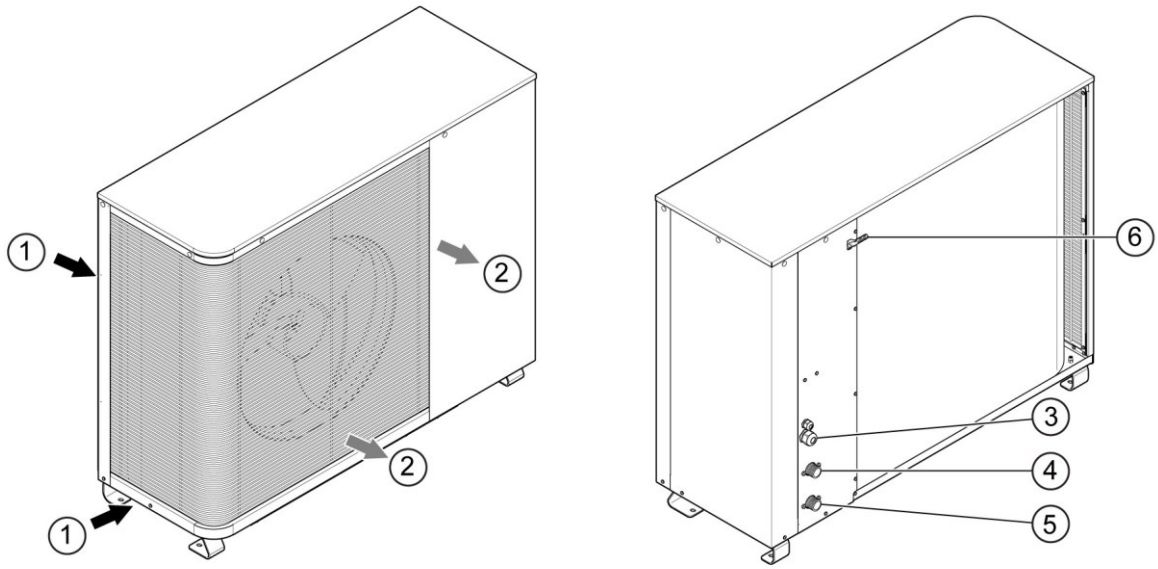


1	Air inlet	4	Water outlet (G1” male)
2	Air outlet	5	Water inlet (G1” male)
3	Cable gland	6	Outdoor temperature sensor

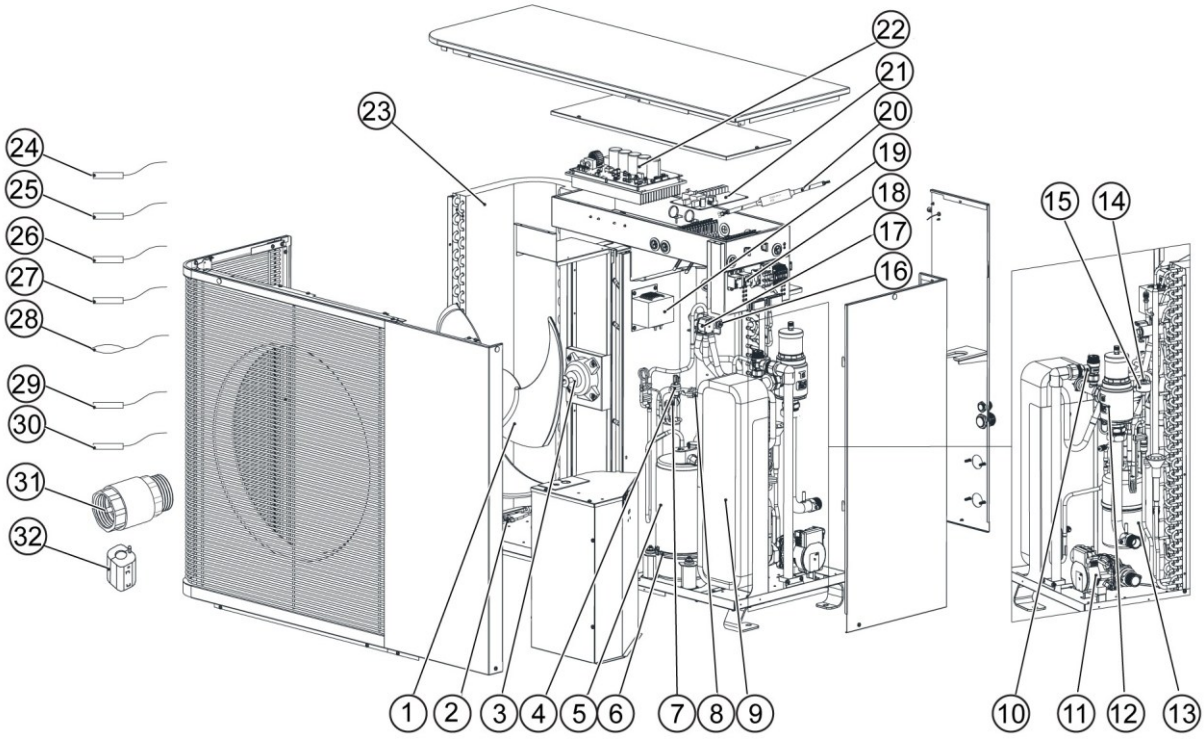


1	Fan blade
2	DC motor
3	Bottom plate heater
4	High pressure sensor
5	Compressor
6	Crankcase heater
7	High pressure switch
8	Low pressure sensor
9	Plate heat exchanger
10	Safety valve
11	Water pump
12	Liquid separator
13	Gas separator
14	EEV
15	EEV coil
16	Four-way valve
17	Four-way valve coil
18	Reactor
19	Relay
20	Isolator PCB
21	Outdoor main PCB
22	Evaporator
23	Discharge temp. sensor
24	Suction temp. sensor
25	Outdoor coil temp. sensor
26	Indoor coil temp. sensor
27	Ambient temp. sensor
28	Water inlet temp. sensor
29	Water outlet temp. sensor
30	Check valve
31	Magnetic ring

ES M12 R290



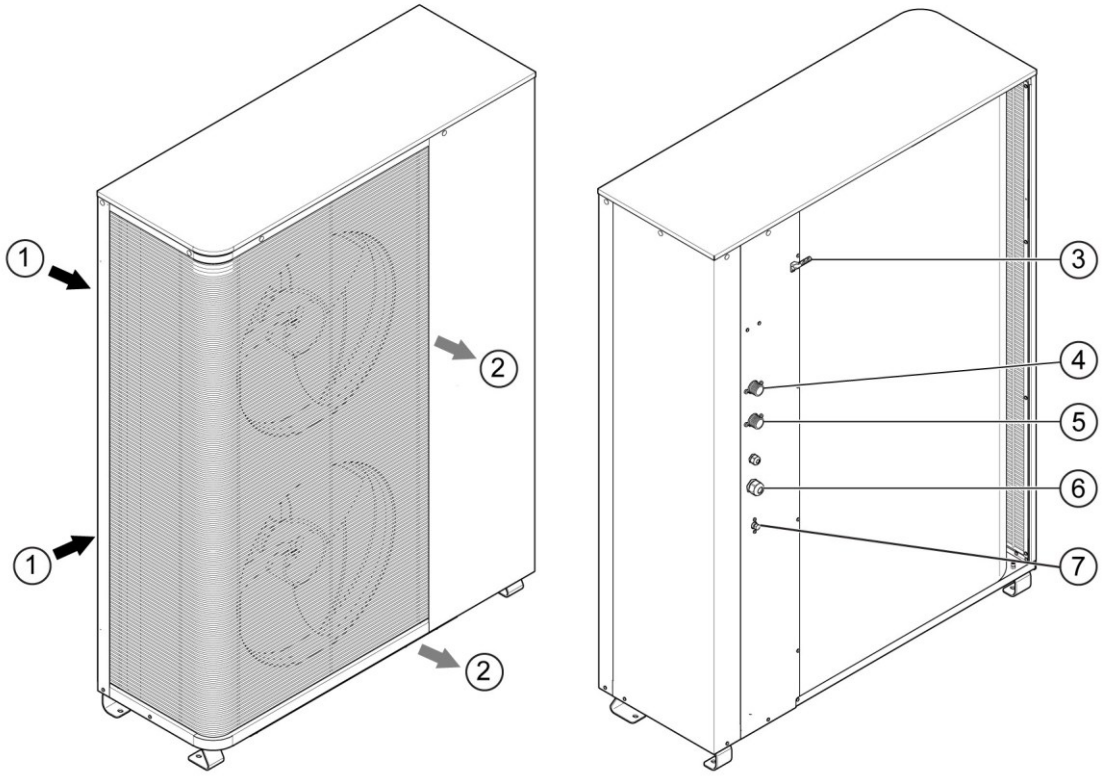
1	Air inlet	4	Water outlet (G1” male)
2	Air outlet	5	Water inlet (G1” male)
3	Cable gland	6	Outdoor temperature sensor



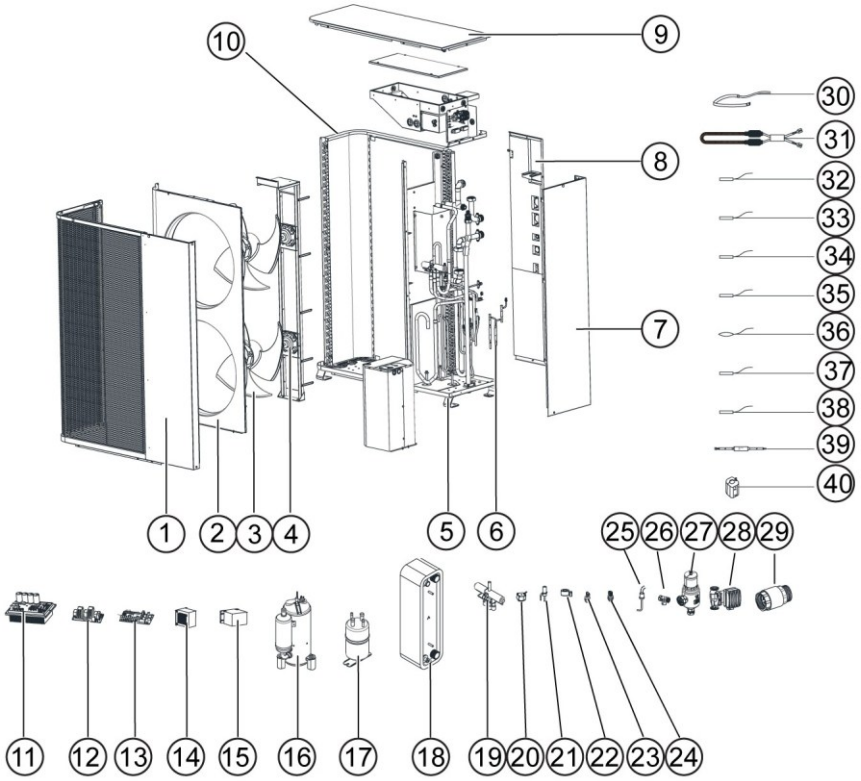
1	Fan blade	17	Four-way valve coil
2	Bottom plate heater	18	Relay
3	DC motor	19	Reactor

4	High pressure sensor	20	Isolator PCB
5	Compressor	21	Outdoor main PCB
6	Crankcase heater	22	Compressor driver PCB
7	High pressure switch	23	Evaporator
8	Low pressure sensor	24	Discharge temp. sensor
9	Plate heat exchanger	25	Suction temp. sensor
10	Safety valve	26	Outdoor coil temp. sensor
11	Water pump	27	Indoor coil temp. sensor
12	Gas separator	28	Ambient temp. sensor
13	Liquid separator	29	Water inlet temp. sensor
14	EEV	30	Water outlet temp. sensor
15	EEV coil	31	Check valve
16	Four-way valve	32	Magnetic ring

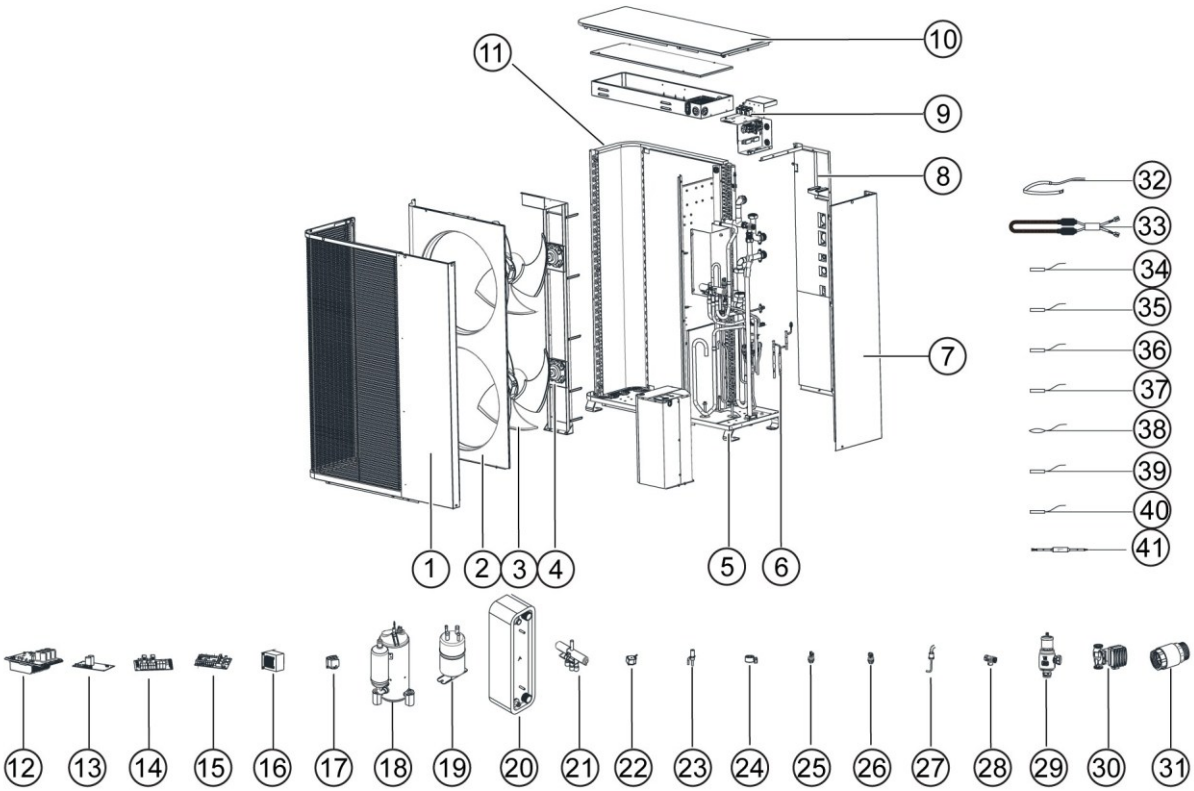
ES M15 R290 1 PH and ES M15 R290 3 PH



1	Air inlet	5	Water inlet (G1¾" male)
2	Air outlet	6	Cable gland
3	Outdoor temperature sensor	7	Water drainage
4	Water outlet (G1¾" male)		



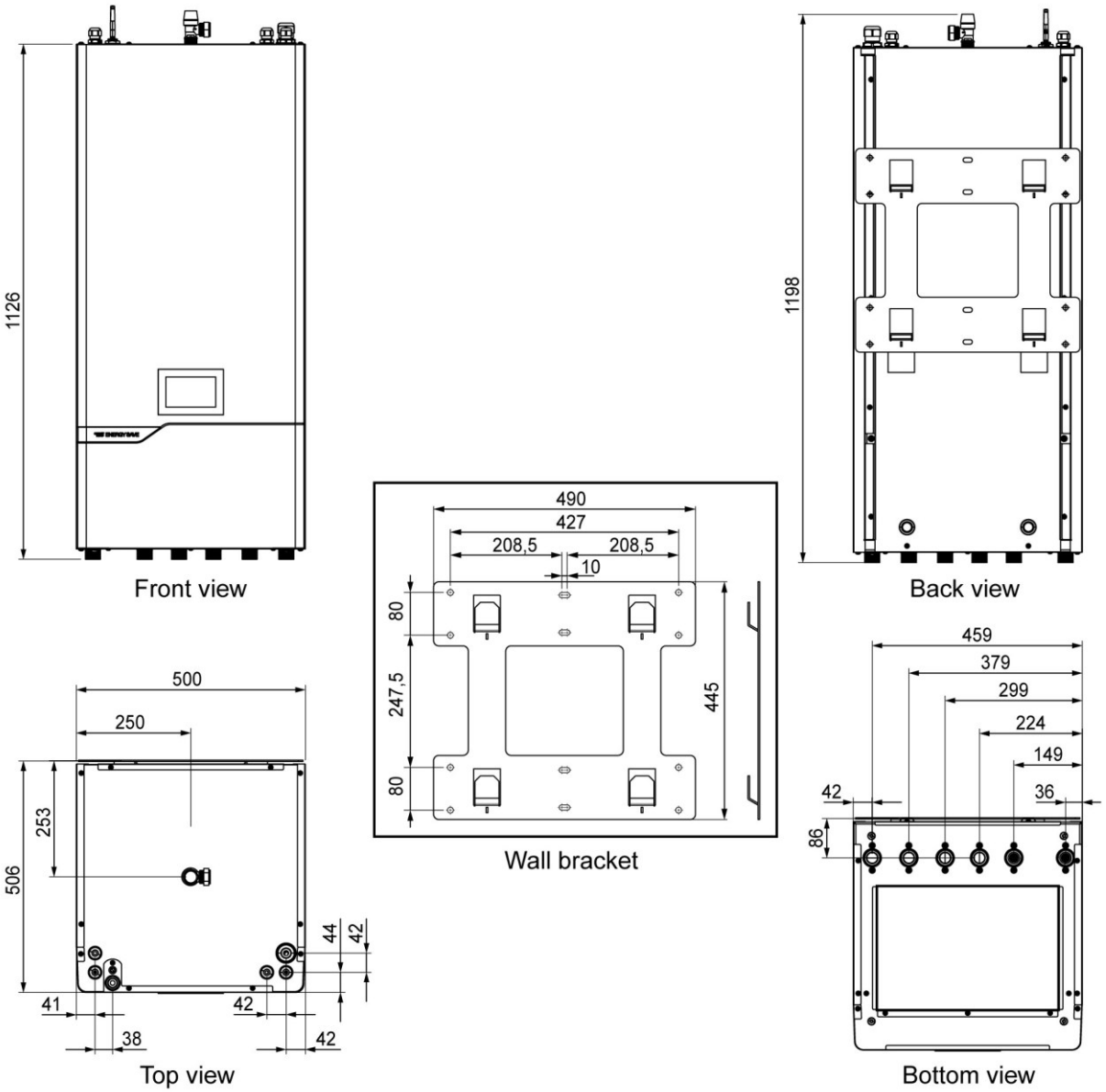
1	Front panel component	21	EEV
2	Air guide components	22	EEV coil
3	Fan blade	23	Low pressure sensor
4	DC motor	24	High pressure sensor
5	Feet	25	High pressure switch
6	Check valve (refrigerant system)	26	Safety valve
7	Right side panel component	27	Exhaust valve
8	Left side panel component	28	Water pump component
9	Top panel component	29	Check valve (water system)
10	Evaporator	30	Crankcase heater
11	Compressor driver board	31	Bottom plate heater
12	Filter PCB	32	Discharge temp. sensor
13	Main PCB	33	Suction temp. sensor
14	Reactor	34	Evaporating temp. sensor
15	AC contactor	35	Ambient temp. sensor
16	Compressor	36	Condensing temp. sensor
17	Liquid separator	37	Water inlet temp. sensor
18	Plate heat exchanger	38	Water outlet temp. sensor
19	Four-way valve	39	Isolator PCB
20	Four-way valve coil	40	Magnetic ring



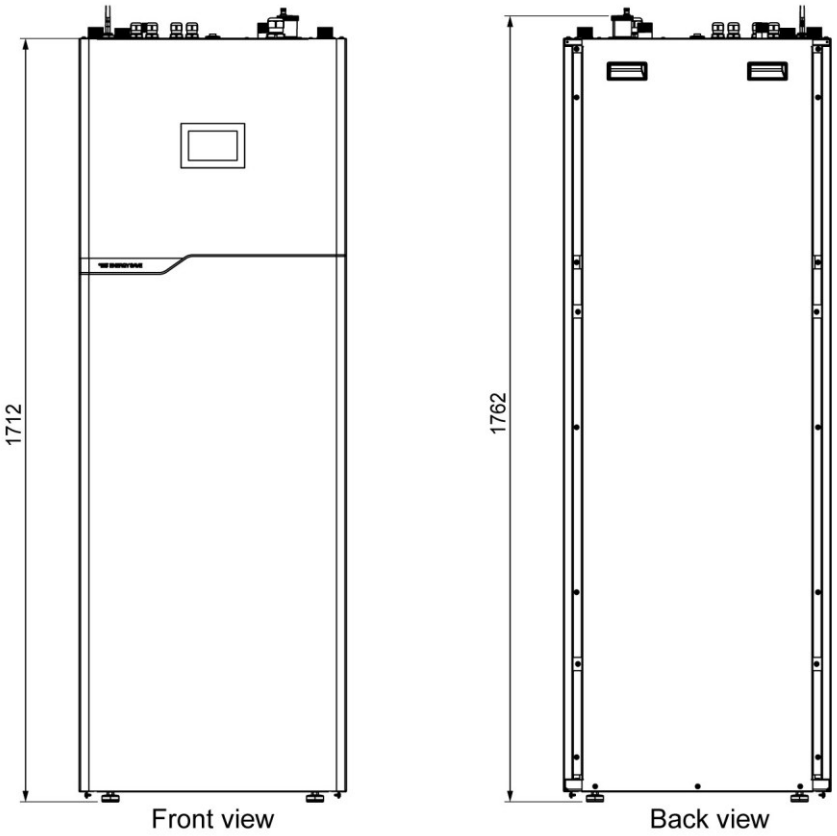
1	Front panel component	22	Four-way valve coil
2	Air guide components	23	EEV
3	Fan blade	24	EEV coil
4	DC motor	25	Low pressure sensor
5	Feet	26	High pressure sensor
6	Check valve (Refrigerant system)	27	High pressure switch
7	Right side panel component	28	Safety valve
8	Left side panel component	29	Exhaust valve
9	Relay	30	Water pump component
10	Top panel component	31	Check valve (water system)
11	Evaporator	32	Crankcase heater
12	Compressor driver board	33	Bottom plate heater
13	Fan motor PCB	34	Discharge temp. sensor
14	Filter PCB	35	Suction temp. sensor
15	Outdoor main PCB	36	Evaporating temp. sensor
16	Reactor 1	37	Condensing temp. sensor
17	Reactor 2	38	Ambient temp. sensor
18	Compressor	39	Water inlet temp. sensor
19	Liquid separator	40	Water outlet temp. sensor
20	Plate heat exchanger	41	Outdoor main PCB
21	Four-way valve		

6.8 Indoor unit dimensions

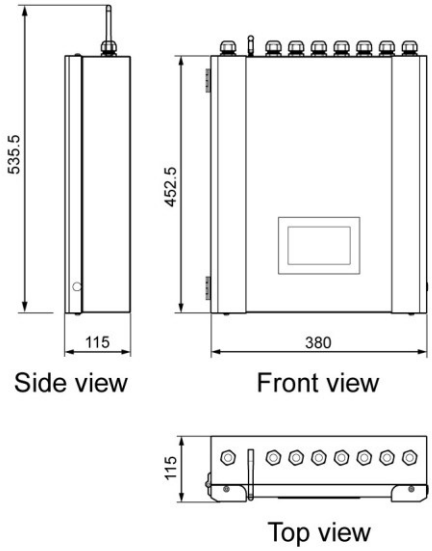
6.8.1 ES M100L ST and ES M100L ST UK



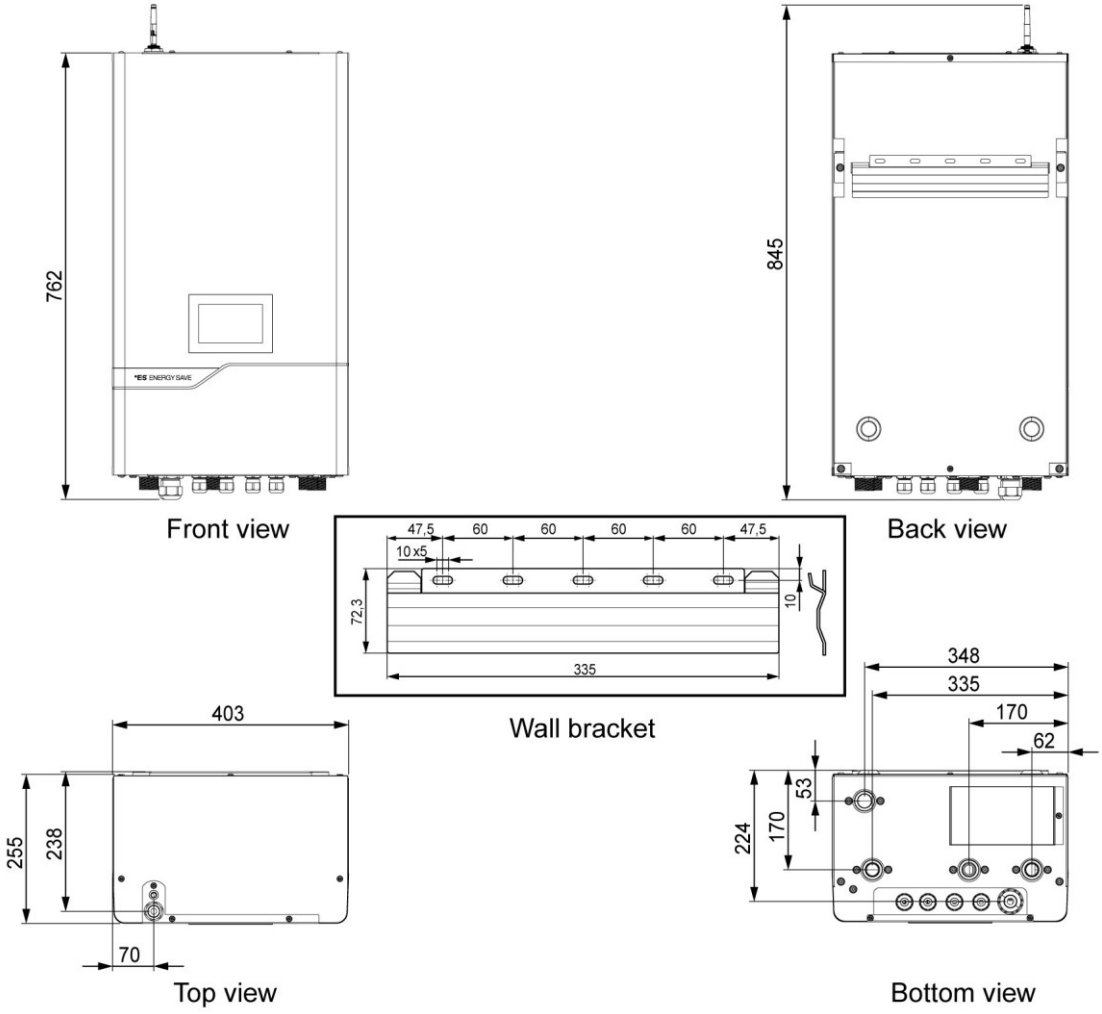
6.8.2 ES M250L ST and ES M250L ST UK



6.8.3 ES MCB

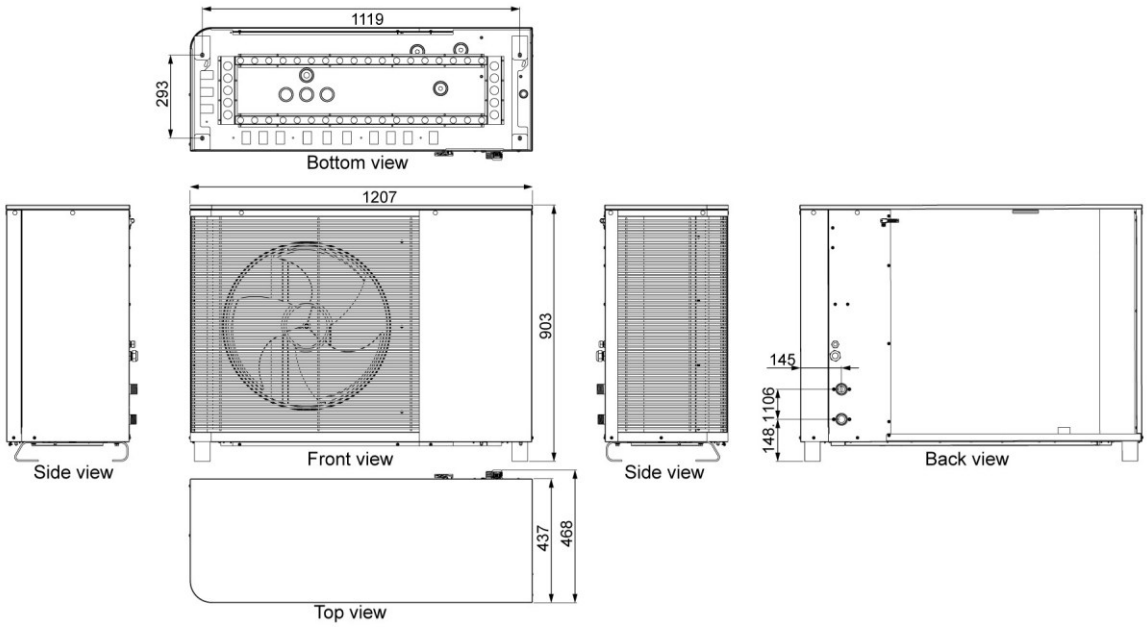


6.8.4 ES MHB

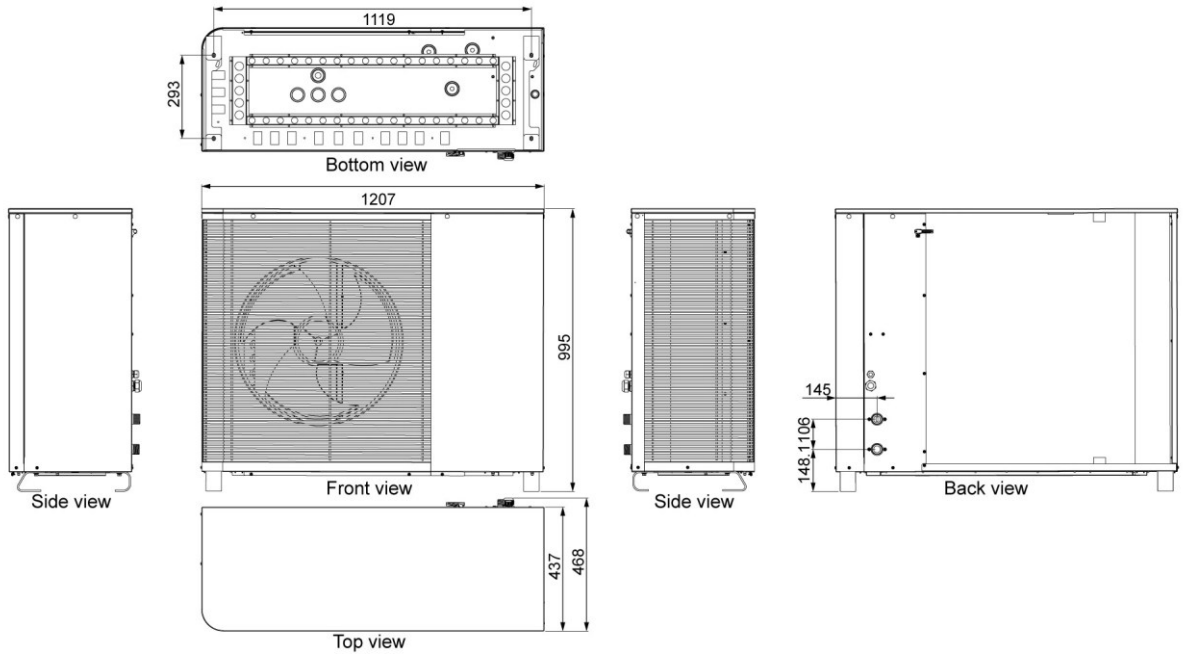


6.9 Outdoor unit dimensions

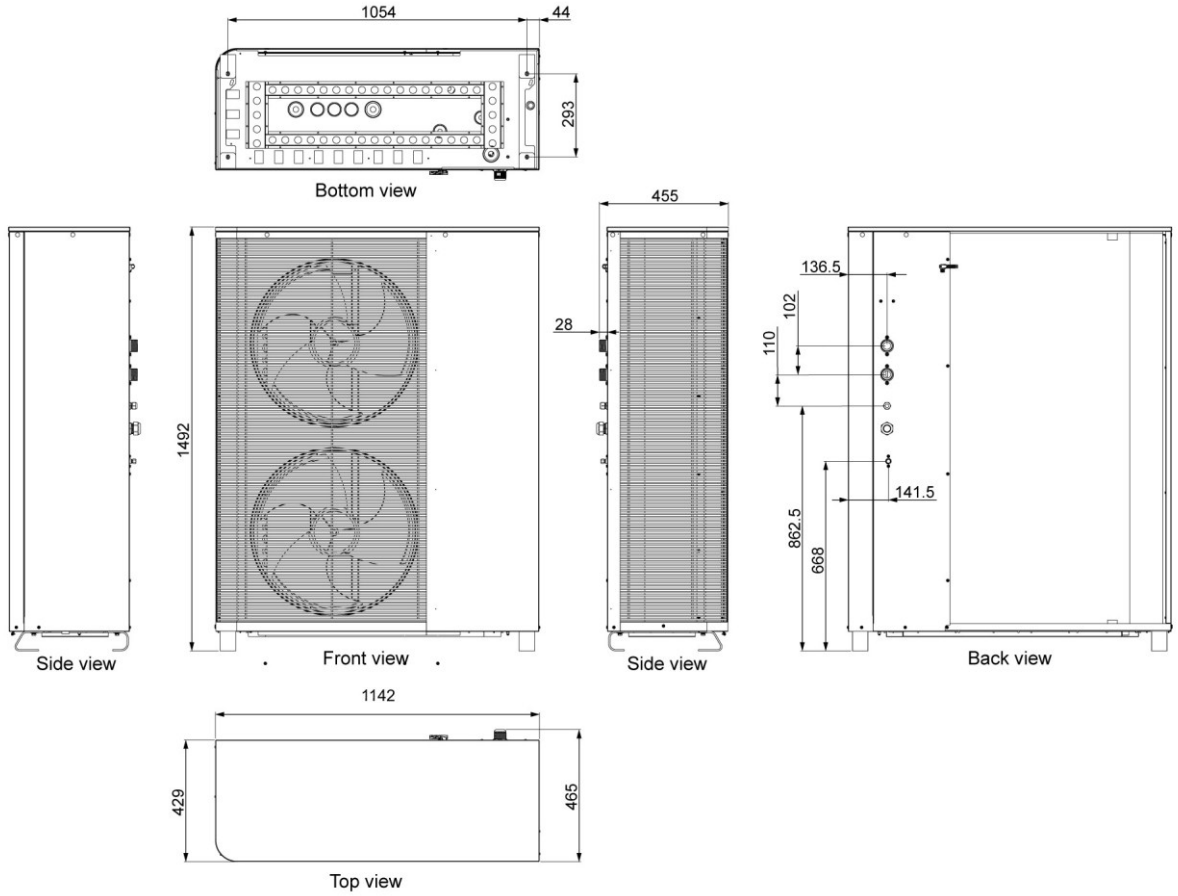
6.9.1 ES M8 R290



6.9.2 ES M12 R290



6.9.3 ES M15 R290



7 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.

7.1 Outdoor installation options

For the outdoor units there are three different installation setups:

- Out of the box, with feet on a solid flat foundation.
- With the outdoor stand accessory (refer to the *Outdoor Stand Accessory Manual*).
- With both the outdoor stand and the drain pan accessory (refer to the *Drain Pan Accessory Manual*).

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.

7.2 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.

7.3 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, notify the relevant transport company or local distributor immediately.

The below specifies the environment in which the units can be operated and transported and stored.

	Storage & Transport	Operation
Minimum temperature	-20 °C	10 °C
Minimum humidity	20 % RH	30 % RH
Maximum temperature	55 °C	45 °C
Maximum humidity	95 % RH, non-condensing	95 % RH, non-condensing
Maximum altitude	2000 m	2000 m

7.4 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.

7.5 Drainage preparation

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

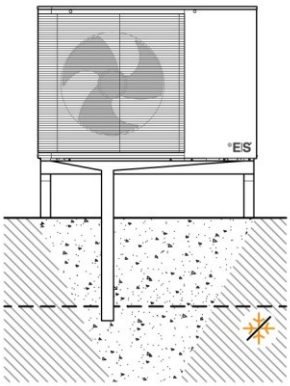
- Make sure that the outlet of the condensation water pipe is correctly positioned.
- If the water pipes are at risk for exposure to frost, they must be provided with a suitable heating cable.
- Make sure that local regulations are followed for the drainage.
- Check the condensate drainage regularly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

The following alternatives are recommended drainage solutions.

NOTE

Both of these drainage solutions require that the outdoor unit has been equipped with a drain pan.

Stone caisson

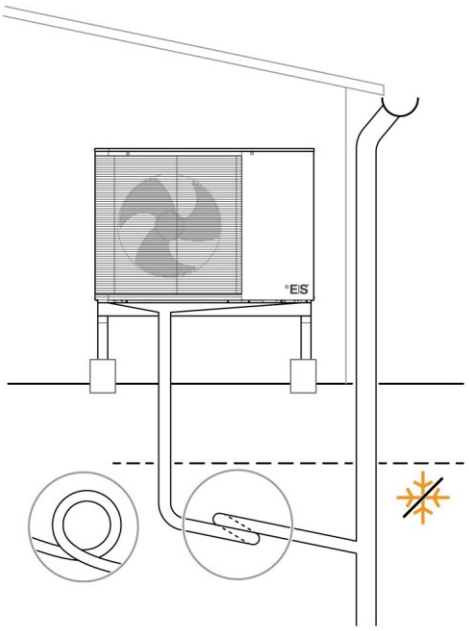


For the stone caisson it is important to make sure that it is placed in such a way that the condensation water is not transported towards the cellar of the building. If there is no cellar, then the stone caisson can be placed underneath the outdoor unit.

NOTE

The drainage is only centralised when the ES Drain Pan is installed.

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.

NOTE

The drainage is only centralised when the ES Drain Pan is installed.

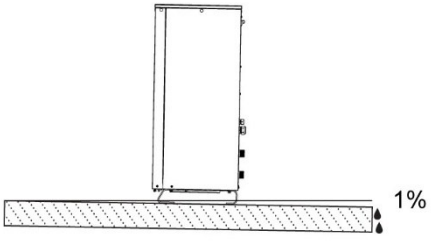
For more information, refer to the *Drain Pan Accessory Manual*.

7.6 Placing the outdoor unit

For information regarding outdoor unit placement, see Section 6.2.2 "Outdoor unit placement".

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. This also applies when installing a drain pan.



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 when installing it without an outdoor stand. Otherwise, the outdoor stand will be anchored to the ground, and the unit anchored to the stand.

6. It is recommended to install a drain pan 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.

For more information, refer to *Drain Pan Accessory Manual* and *Outdoor Unit Stand Accessory Manual*.

7.7 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/cm^2) 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.

7.8 Mechanical installation

7.8.1 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	DN 25 / DN 32	Yes	6	20 m / 30 m
ES M100L ST ES M100L ST UK ES M250L ST ES M250L ST UK ES MHB ES MCB	DN 25 / DN 32	No	6	10 m / 15 m
ES M12 R290	DN 25 / DN 32	Yes	6	20 m / 30 m
ES M100L ST ES M100L ST UK ES M250L ST ES M250L ST UK ES MHB ES MCB	DN 25 / DN 32	No	6	10 m / 15 m
ES M15 R290 1 PH ES M15 R290 3 PH	DN 32 / DN 40	Yes	6	20 m / 30 m
ES M100L ST ES M100L ST UK ES M250L ST ES M250L ST UK ES MHB ES MCB	DN 32 / DN 40	No	6	10 m / 15 m

7.8.2 Installation height

The maximum installation height is limited by the hydrostatic pressure it creates, which must not cause the pressure at the outdoor unit to exceed 2.5 bar. This pressure limit is critical because of a required 2.5 bar safety valve designed to prevent the R290 refrigerant from contaminating the building's water system in case of a rupture of the plate heat exchanger to the water side.

Hydrostatic pressure is the pressure a fluid at rest exerts due to the force of gravity. This pressure increases with depth because the deeper you go, the more fluid there is above that point, and therefore the greater its weight. It acts equally in all directions at a given depth.

For every 1 m of height difference, the hydrostatic pressure of water changes by approx. 0.1 bar.

Example:

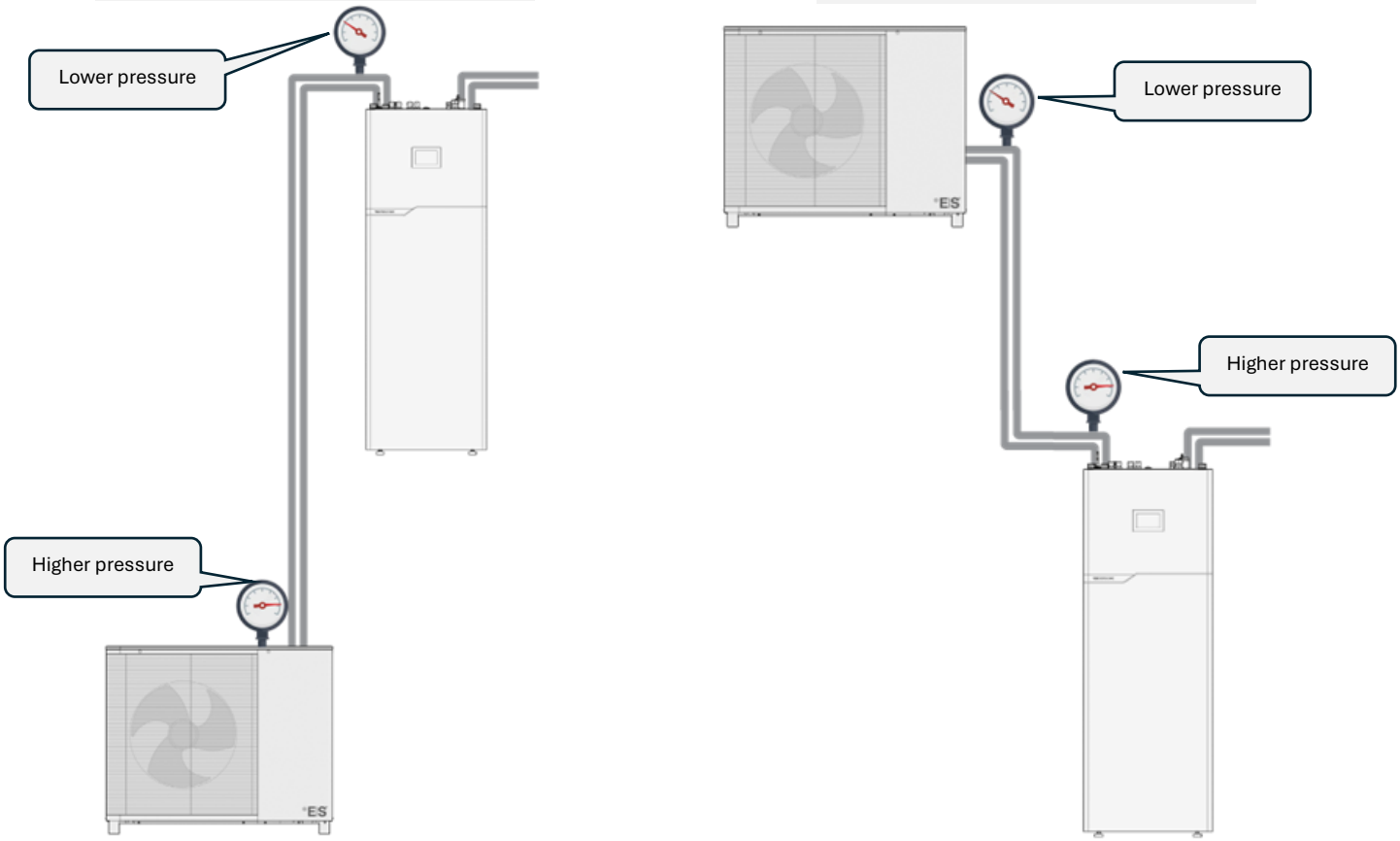
- If the height difference is 5 m, the pressure changes for 0.5 bar.
- If the height difference is 10 m, the pressure changes for 1.0 bar.
- If the height difference is 15 m, the pressure changes for 1.5 bar.

NOTE

If the installation height exceeds this limit—and the hydrostatic pressure would push the outdoor unit's pressure above 2.5 bar—you must install a plate heat exchanger along with a buffer tank. This setup effectively separates the hydraulic circuits, ensuring the pressure on the heat pump side remains stable and below 2.5 bar.

If the indoor unit is higher than the outdoor unit, the pressure at the indoor unit is smaller than at the outdoor unit.

If the outdoor unit is higher than the indoor unit, the pressure at the outdoor unit is smaller than at the indoor unit.



If the outdoor unit is lower than the indoor unit, the pressure at the outdoor unit is higher than at the indoor unit.

In this installation variant, the water pressure at the outdoor unit cannot exceed 2.5 bar!

If the indoor unit is lower than the outdoor unit, the pressure at the indoor unit is higher than at the outdoor unit.

In this installation variant, there is NO risk that the safety valve would open at 2.5 bar, since it is located in the outdoor unit.

Figure 7: Diagram explaining how installation heights need to be considered.

7.9 Placement of additional components

7.9.1 Filters

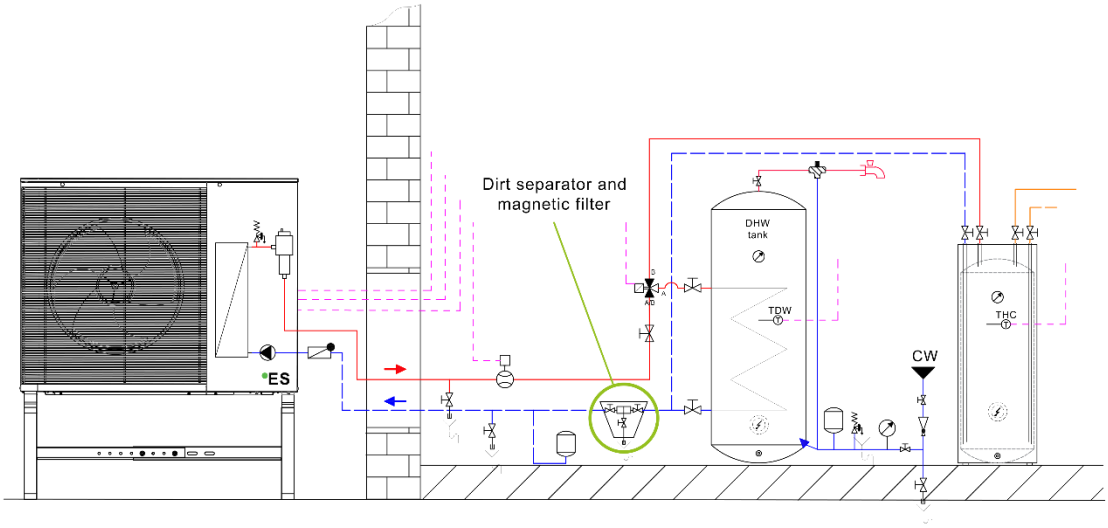


Figure 8: Dirtmagplus filter

7.9.2 Temperature sensors

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

NOTE

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

	Temperature sensor name	Sensor mark	Temperature sensor type	Sensor position	Pre-installed
1	Heating / Cooling water temperature THC	THC	NTC 5 kΩ	Buffer tank (flow line)	/
2	DHW tank temperature TDW	TDW	NTC 5 kΩ	Domestic hot water tank	ES M100 L, ES M250 L
3	Room temperature 1 sensor	TR1	NTC 5 kΩ	Living area (ZONE 1)	/
4	Room temperature 2 sensor	TR2	NTC 5 kΩ	Living area (ZONE 2)	/
5	Mixing circuit 1 temperature TV1	TV1	NTC 5 kΩ	Mixing circuit 1, after mixing valve and water pump.	/
6	Mixing circuit 2 temperature TV2	TV2	NTC 5 kΩ	Mixing circuit 2, after mixing valve and water pump.	/
7	Condenser inlet water temperature TUI	TUI	NTC 5 kΩ	Outdoor unit hydraulic line, before the plate heat exchanger	All outdoor units
8	Condenser outlet water temperature TUO	TUO	NTC 5 kΩ	Outdoor unit hydraulic line, after the plate heat exchanger	All outdoor units
9	Condensing temperature TUP	TUP	NTC 5 kΩ	Outdoor unit refrigerant line, after the plate heat exchanger	All outdoor units
10	Evaporating temperature TP	TP	NTC 5 kΩ	Outdoor unit refrigerant line, on the evaporator distribution	All outdoor units
11	Outdoor temperature sensor	TA	NTC 5 kΩ	Outdoor unit back side	All outdoor units

12	Compressor suction temperature TS	TS	NTC 5 kΩ	Outdoor unit refrigerant line, compressor suction line	All outdoor units
13	Compressor discharge temperature TD	TD	NTC 50 kΩ	Outdoor unit refrigerant line, compressor discharge line	All outdoor units

NOTE

If a temperature sensor is not pre-installed, it is up to the installer to position it in accordance with the installation type.

NOTE

Instead of wired room temperature sensors, the ES Wireless Thermostat can be used.

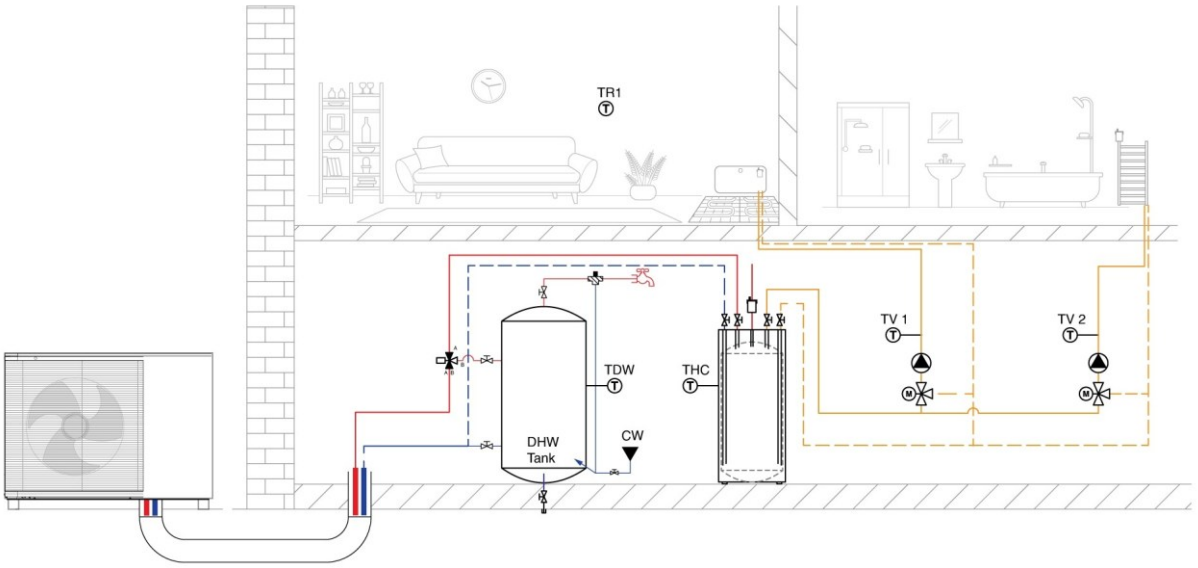
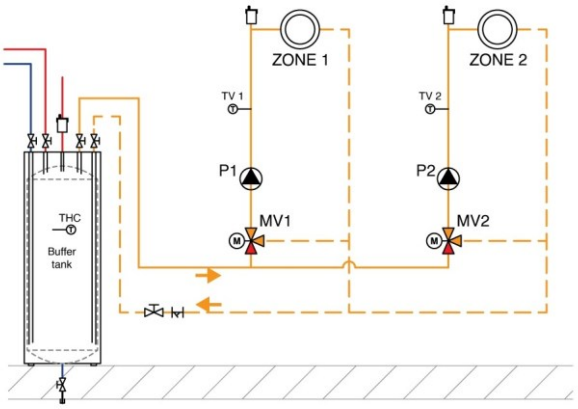


Figure 9: Example of room temperature sensor positioning

7.9.3 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.

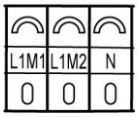
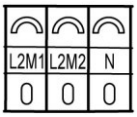
For each circuit (zone) the mixing valve must be enabled in the menu ***Zone 1*** (if used for circuit 1) and ***Zone 2*** (if used for circuit 2).

Description		Position
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	

Type of mixing valve actuator

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

Markings on the cable terminals:

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
			

7.10 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 tank can 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	1.12 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

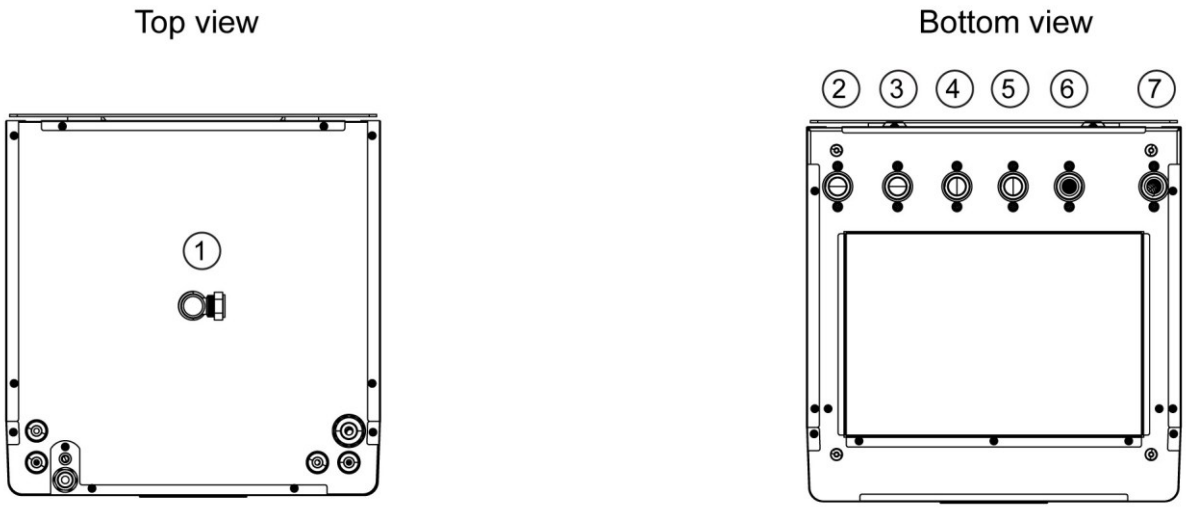
8 Hydraulic installation

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.

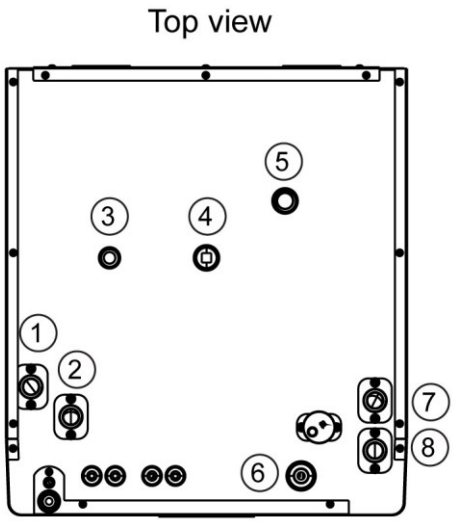
8.1 Piping

8.1.1 Hydraulic connections for ES M100L ST and ES M100L ST UK



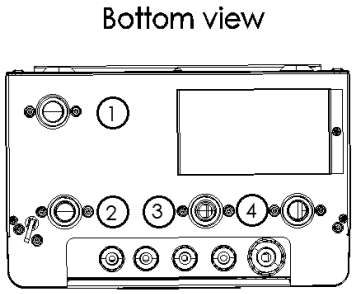
Connection		Size	Connection		Size
1	Temperature and pressure relief valve, TPRV placement (UK only)		5	Flow line heating system	G1” male
2	Water outlet to outdoor unit	G1” male	6	Hot domestic water outlet	G1” male
3	Return line heating system	G1” male	7	Cold domestic water inlet	G1” male
4	Water inlet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

8.1.2 Hydraulic connections for ES M250L ST and ES M250L ST UK



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

8.1.3 ES MHB



Connection		Size	Connection		Size
1	Water inlet from outdoor unit	G1” male	3	Drain from safety valve	G1” male
2	Flow line to DHW tank	G1” male	4	Flow line heating system	G1” male

9 Wiring

CAUTION

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

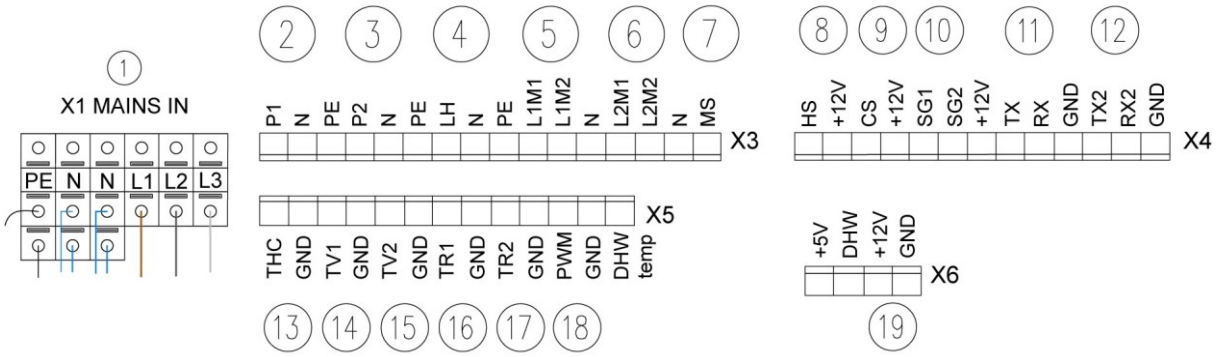
CAUTION

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

9.1 Indoor units wiring connections

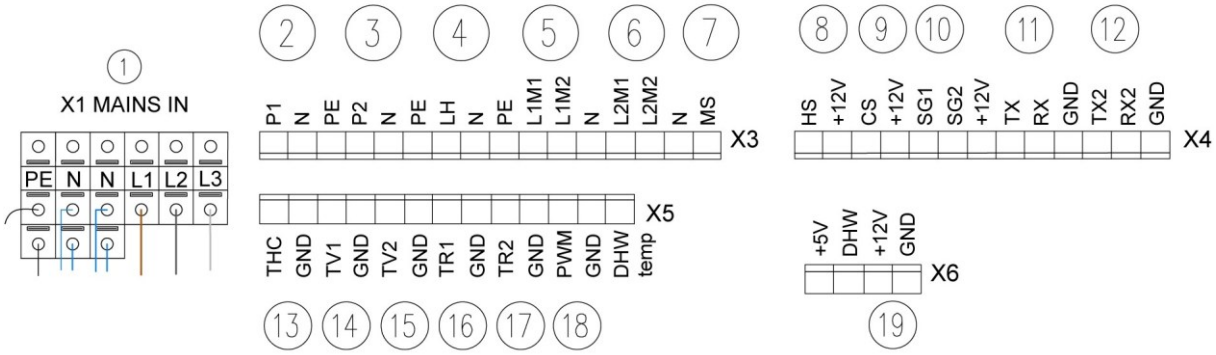
9.1.1 ES M100L ST and ES M100L ST UK



	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	L2M1, L2M2, N	Mixing valve 2 - ZONE 2
7	MS, N	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

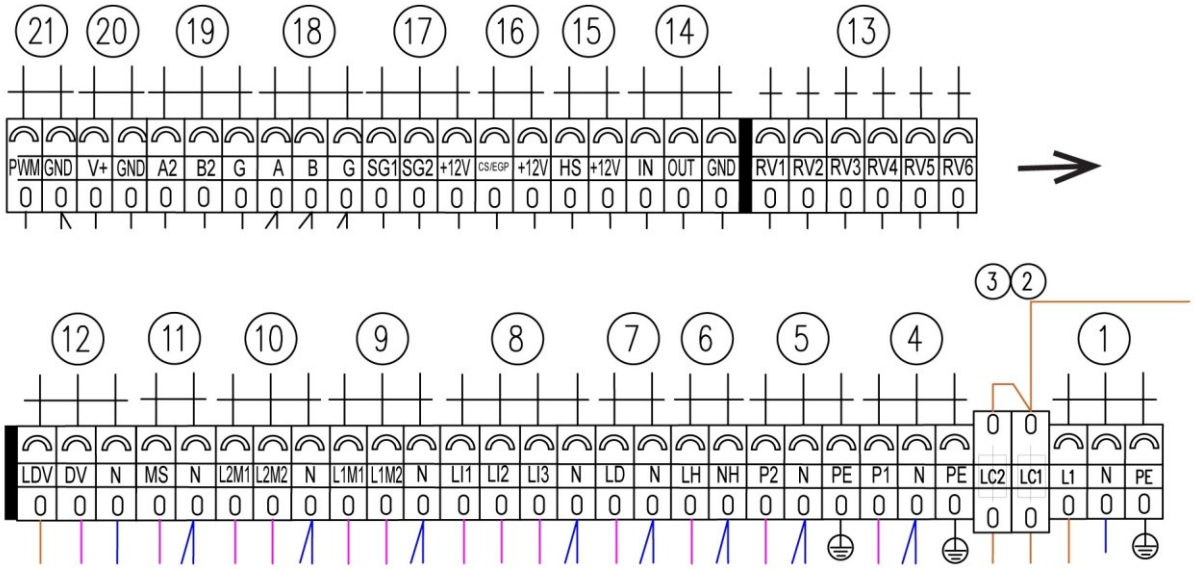
15	TV2, GND	Mixing circuit 2 temperature sensor - TV2
16	TR1, GND	Wired room temperature sensor 1 - TR1
17	TR2, GND	Wired room temperature sensor 2 - TR2
18	PWM, GND	Water pump P0 PWM signal
19	12V+, GND	Power supply - wireless thermostat (12 V DC)

9.1.2 ES M250L ST and ES M250L ST UK



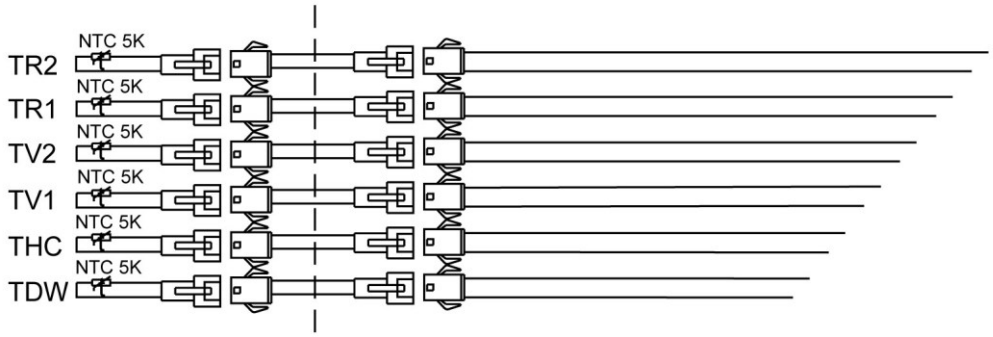
	Connections	Description
1	PE, N, N, L1, L2, L3	Main power supply - 400 V AC
2	P1, N, PE	Water pump P1 - 230 V AC output
3	P2, N, PE	Water pump P2 - 230 V AC output
4	LH, N, PE	Additional buffer tank heating source (signal only)
5	L1M1, L1M2, N	Mixing valve 1 - ZONE 1
6	L2M1, L2M2, N	Mixing valve 2 - 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
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 thermostat (12 V DC)

9.1.3 ES MCB



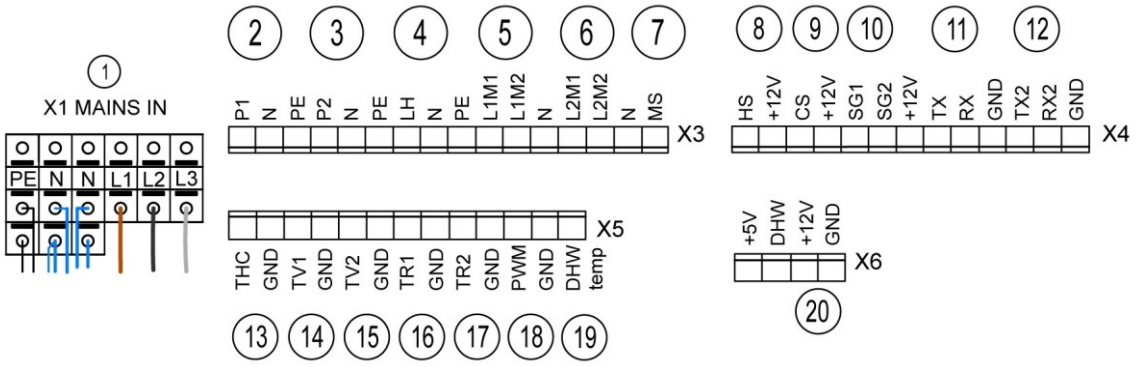
	Connections	Description
1	PE, L1, N	Main power supply - 230 V AC
2	LC1	Ceramic fuse LC1 - Main controller - 4A
3	LC2	Ceramic fuse LC2 - Outputs - 4A
4	PE, P1, N	Water pump P1 - 230 V AC output
5	PE, P2, N	Water pump P2 - 230 V AC output
6	NH, LH	Additional buffer tank heating source (signal only)
7	LD, 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
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 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

9.1.4 ES MHB

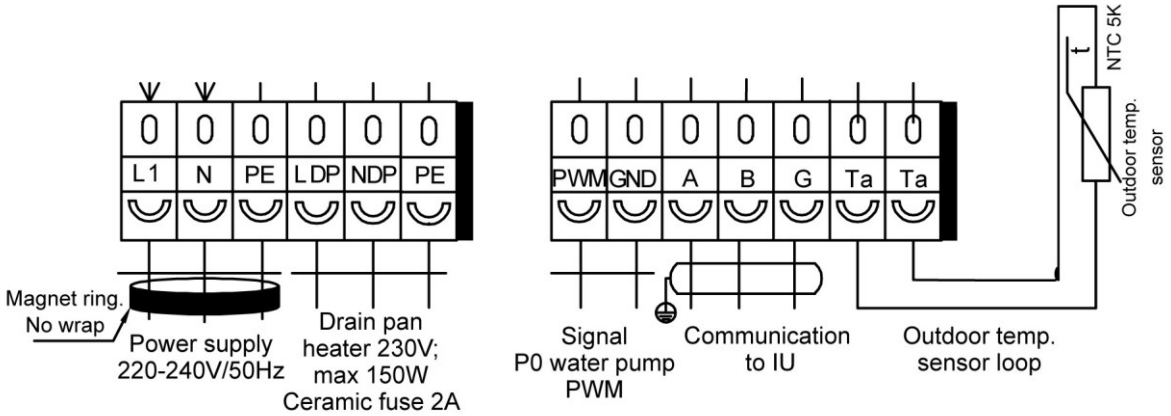


	Connections	Description
1	PE, N, N, L1, L2, L3	Main power supply - 400 V AC
2	P1, N, PE	Water pump P1 - 230 V AC output
3	P2, N, PE	Water pump P2 - 230 V AC output
4	LH, N	Additional buffer tank heating source (signal only)
5	L1M1, L1M2, N	Mixing valve 1 - ZONE 1
6	L2M1, L2M2, N	Mixing valve 2 - ZONE 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 thermostat

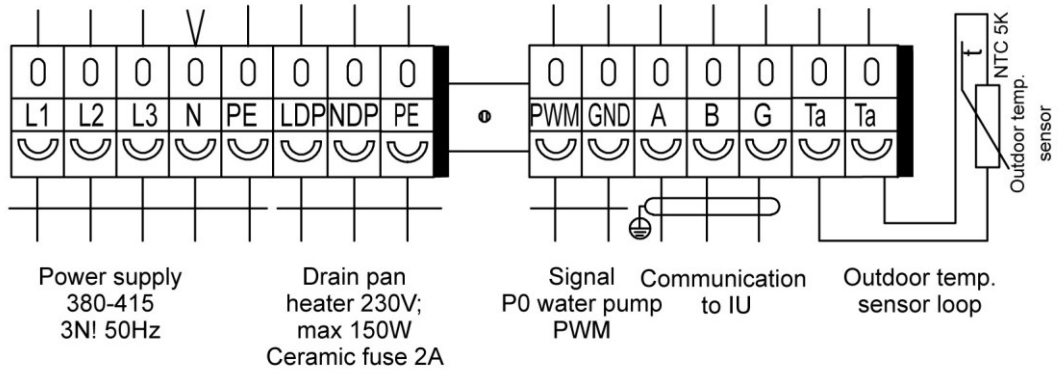
9.2 Outdoor units wiring connections

9.2.1 ES M8 R290 and ES M12 R290



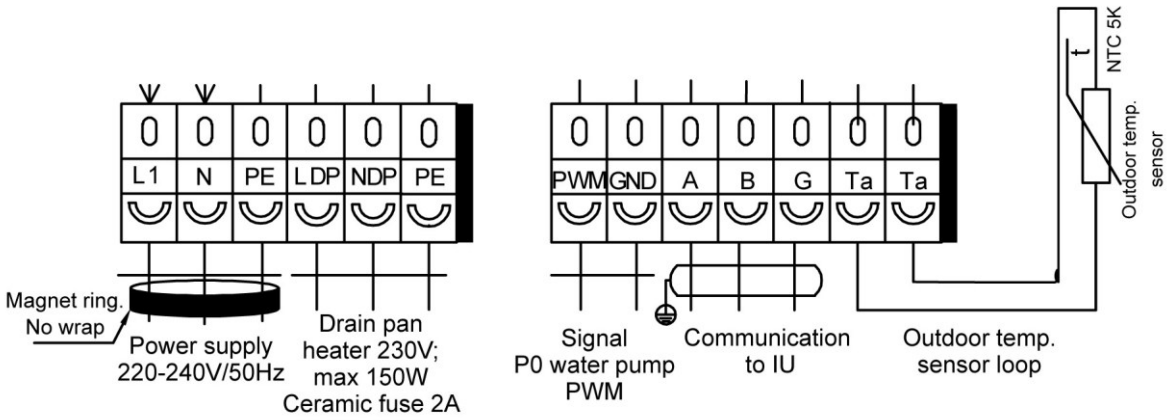
	Connections	
Power supply 220 – 240 V/50 Hz	L1, N, PE	Provided magnet ring must be added, see Section 9.2.3 “Installing magnet rings”.
Drain pan heater 230 V, max 150 W (for connecting an external drain pan heater)	LDP, NDP, PE	
Signal P0 water pump PWM	PWM, GND	
Communication to indoor unit	A, B, G	
Outdoor temperature sensor (pre-installed)	Ta, Ta	

9.2.2 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
Communication to indoor unit	A, B, G
Outdoor temperature sensor (pre-installed)	Ta, Ta

9.2.3 ES M15 R290 1 PH



	Connections	
Power supply 220 – 240 V/50 Hz	L1, N, PE	Provided magnet ring must be added, see Section 9.2.3 “Installing magnet rings”.
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	

9.2.4 Installing magnet rings

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

- A magnet ring for the communication cable is required for all installations and is installed on the communication cable in the outdoor unit. For ES MHB 100L and 250L models, the magnet ring is pre-installed on the cable, while for ES MCB models, it is not.

- A magnet ring for the power supply cable is required for all installations, except when the ES M15 R290 3PH is installed. The magnet ring for the power supply cable is installed on the power supply cable in the outdoor unit.

9.2.4.1 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.

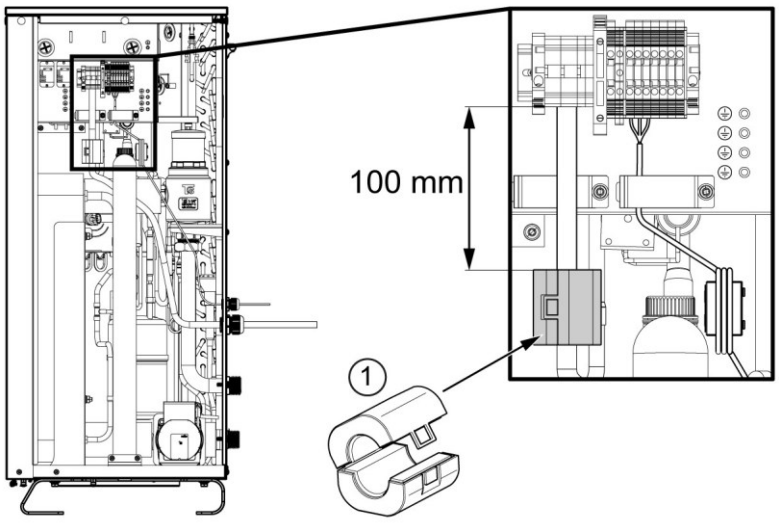


Figure 10: Installation of a magnet ring (ES M8 R290 and ES M12 R290)

1 F9 SCRC 200D

For ES M15 R290 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.

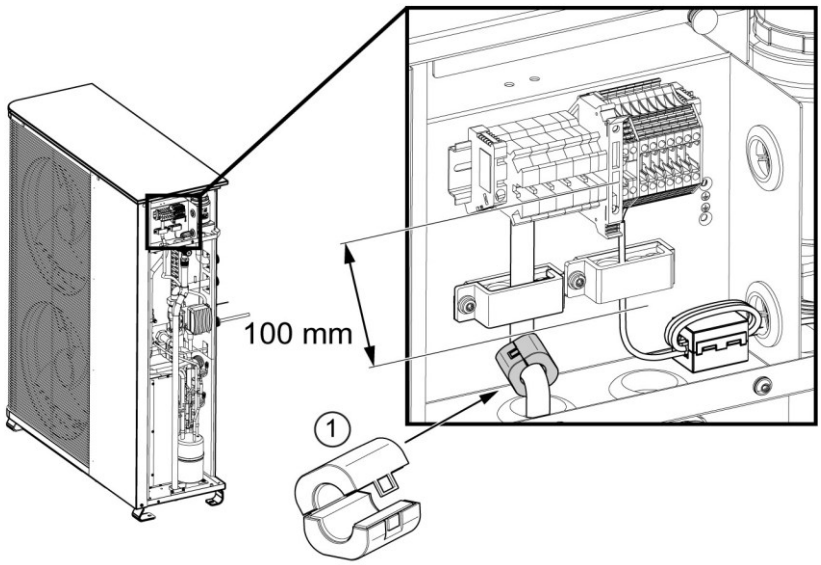


Figure 11: Installation of the magnet ring (ES M15 R290 1 PH)

1 F9 SCRC 200D

9.2.4.2 Installing magnet rings on the communication cable

For ES M8 R290 and ES M12 R290 installations

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.

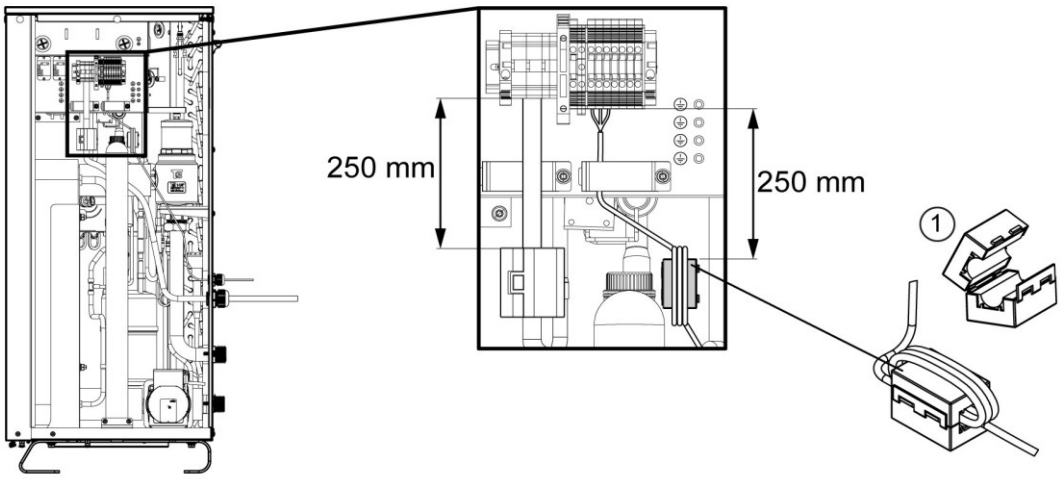


Figure 12: Installation of magnet ring (ES M8 R290 and ES M12 R290)

1 F9 SCNF 130A

For ES M15 R290 1 PH and ES M15 R290 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.

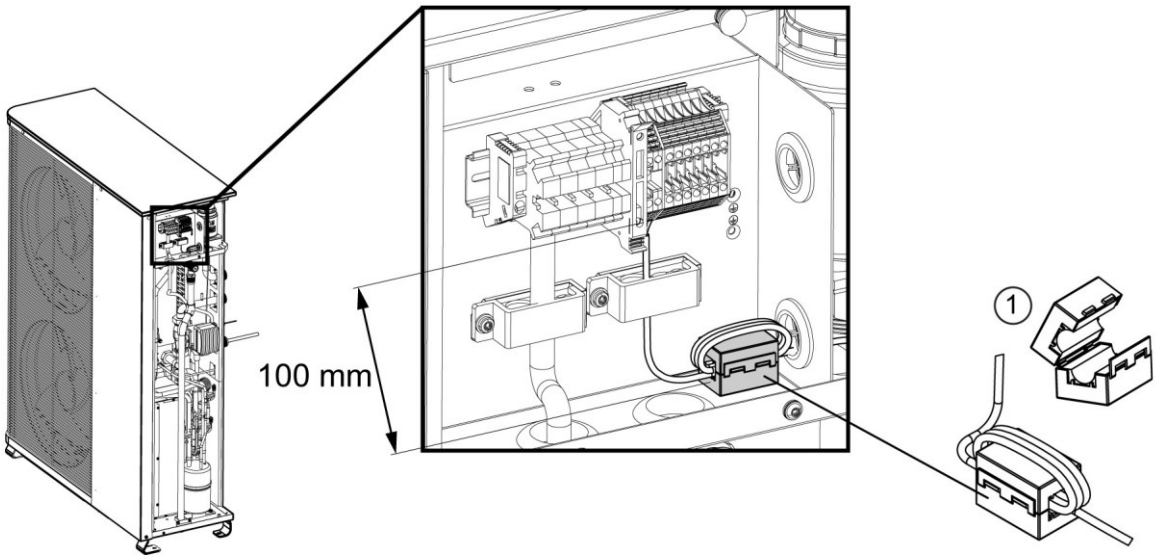


Figure 13: Installation of magnet ring (ES M15 R290 1 PH and ES M15 R290 3 PH)

10 Commissioning and configuration

10.1 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
- ES's own wish to promote getting device connected and register device on the fleet manager

1 Update software manually via USB

If your indoor unit display software version is older than 1.6.11, perform a manual USB update to the latest software. Otherwise, proceed with step 2.

Installer settings » ***Commissioning*** » ***Software & Updates*** or ***User settings*** » ***Software & Updates***.

1.1 Download the latest software from the Partner Portal.

1.2 Unzip and place the file "DISPFRC.BF" on an empty USB-stick.

1.3 Power off your heat pump.

1.4 Plug in the USB-stick in the back of the indoor unit display.

1.5 Power on your heat pump.
The update procedure starts and finishes automatically. The indoor unit display takes about 10 minutes, and the indoor unit controller takes about 30 minutes.

1.6 Check ***Menu*** » ***User settings*** » ***Software & Updates*** on the display to see that the new versions are ongoing or done.

1.7 Remove the USB-stick.

1.8 **Only for updates of indoor unit display version 0.1.6.9 or older:** After the software update has finished, perform a factory reset via ***Menu*** » ***Installer settings*** » ***Commissioning*** » ***Reset to factory settings*** (Cloud and software section).

2 Connect to internet

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

Connect to internet via Wi-Fi, see Section 10.4.10.4 "Connecting to Wi-Fi". Alternatively connect to internet via Ethernet.

NOTE

When the previous steps (1 to 5) are completed, your system will be registered and connected, with the latest software and default values.

NOTE

It is recommended to connect the unit to the internet in order to always get the latest software updates. This will ensure the efficient operation of the unit.

3 Software update

NOTE

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

This step could be skipped if you have already updated the system to the latest software in step 1.

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

Update the software via FOTA (internet connection is required).
Alternatively use USB to update.

4 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 10.3 "Warranty" for more information about warranty and registration.

5 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***

6 Install wireless thermostat and pair (optional)

Install the wireless thermostat and RF Gateway and finish pairing. Refer to the *Wireless Room Thermostat Accessory Manual* for more information.

7 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**.

8 Other system settings in installer settings, and user settings

Installer settings

User settings

Configure other installer settings and user settings as necessary.

9 Start operation

Operation

Start system operation.

10.2 Internet connection requirements

The heat pump should be connected to a private network behind a firewall not accessible from the public internet, ideally on a separate VLAN.

The firewall needs to allow the heat pump to make outbound connections to

- Ports: 80, 443 and 8883
- ICMP

10.3 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.

10.4 User interface

10.4.1 Status indications

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

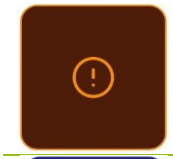
1	Menu icon	4	Internet connection status
2	Current date and time	5	Current outdoor temperature
3	Energy Save Cloud connection status		

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.

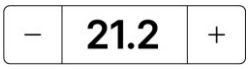
Alert symbols

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

	**WARNING**	Tap to view information.
	**INFORMATION**	Tap to view information.

10.4.2 Menu navigation

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

Symbol	Description	Action
	**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 activate or deactivate a specific function.
	**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 different setting modes.
	**Edit** icon	Tap to edit a setting.
	**Add icon**	Tap to add a setting.
	**Apply to all** icon	Tap to apply a changed setting to all instances.
	**Bin** icon	Tap to remove a setting.

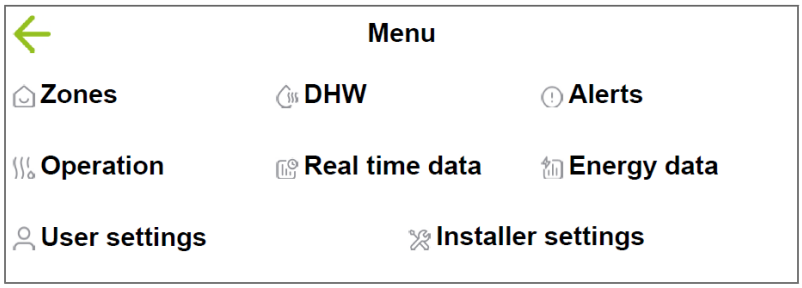
NOTE

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.

10.4.3 Main menu

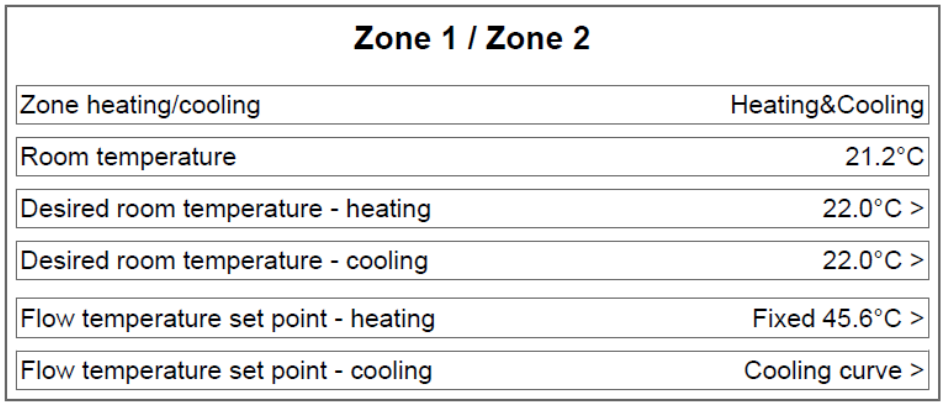
To access the main menu, tap the ***Menu*** icon on the top bar of the display.

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



10.4.4 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)
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)

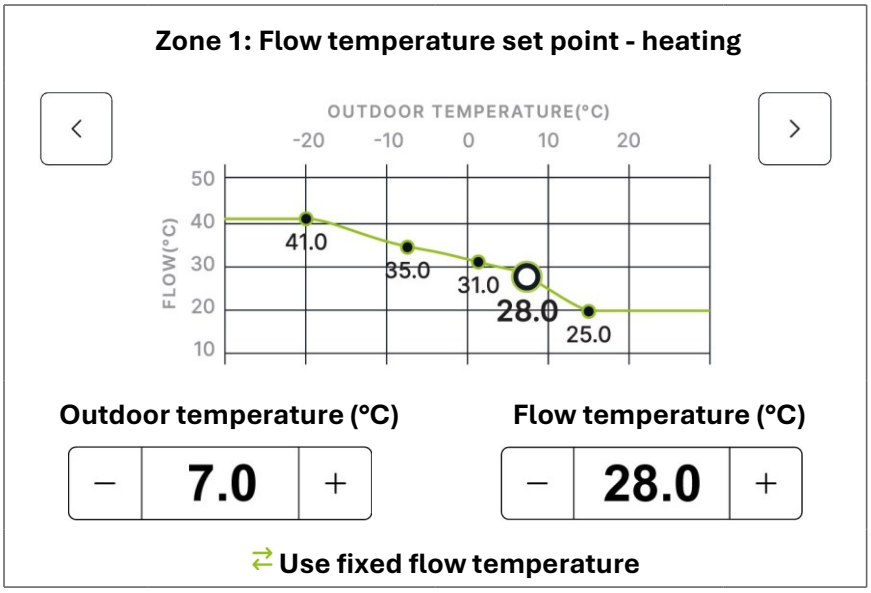
10.4.4.1 Installing magnet rings on the communication cable

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

- < or > Tap 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***.

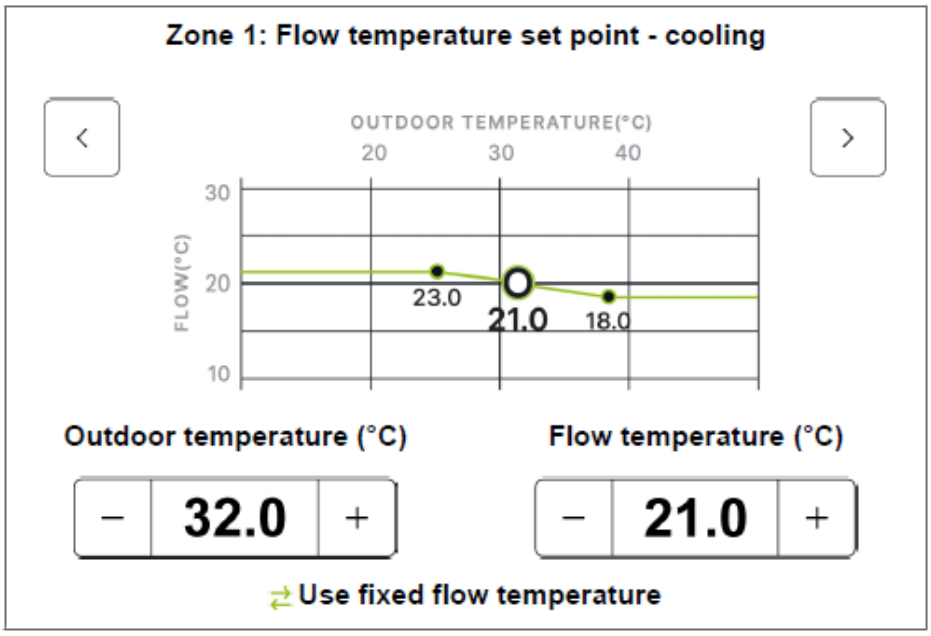
10.4.4.2 Cooling curve settings

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

- < or > Tap 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

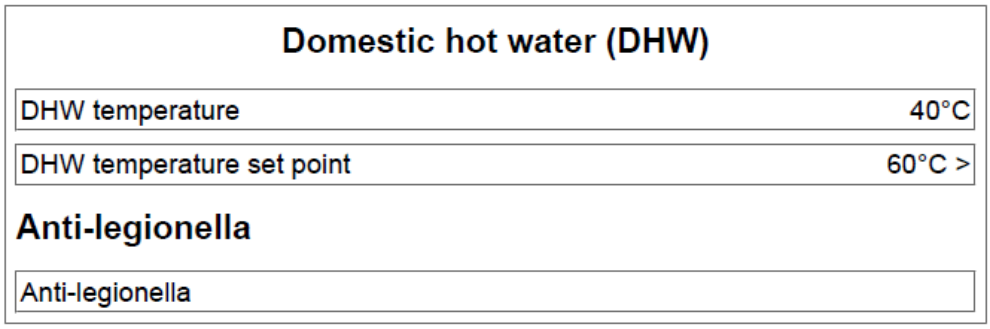
- To switch to using a fixed flow temperature instead of a heating curve, tap ***Use fixed flow temperature***.

- 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 cooling curve again, tap ***Use cooling curve***.

10.4.5 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.

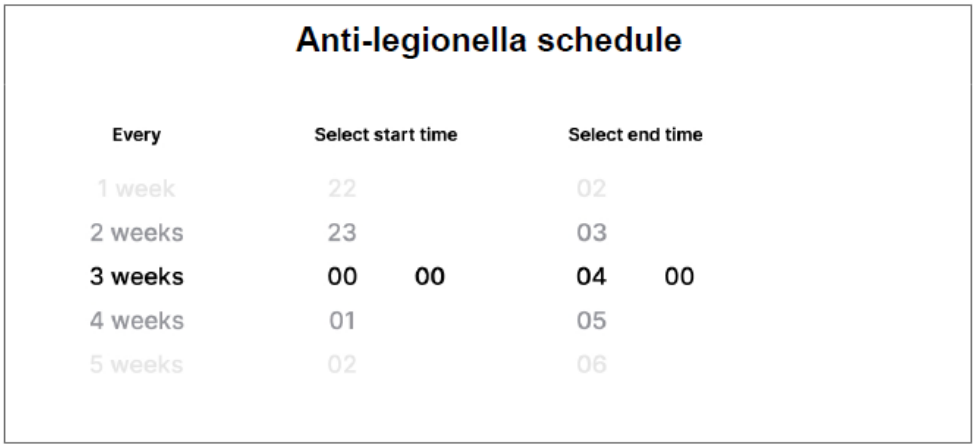


Domestic hot water (DHW) settings

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 valve 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).
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).
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).
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.

10.4.5.1 Setting up the anti-legionella treatment

To set the schedule for the anti-legionella treatment:



- Go to ***Domestic hot water (DHW)*** » ***Anti-legionella*** » ***Anti-legionella schedule*** and tap to change the setting.
- Under ***Every***, scroll to select how frequently the anti-legionella program should run. Range: every week to every 8 weeks.
- 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.

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.

10.4.6 Alerts

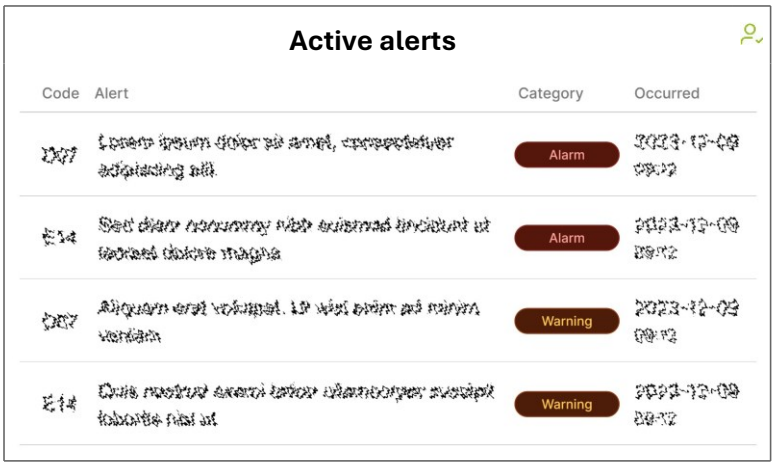
If there is an active alert an icon is displayed in the lower left of the main screen.

Example:

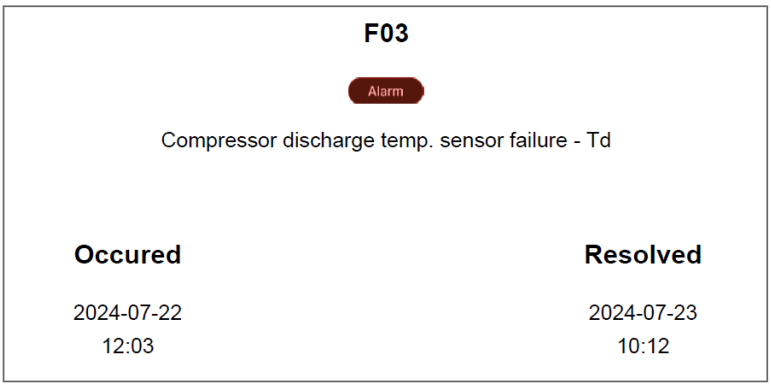
Tapping the icon opens the ***Active alerts*** list.

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***.



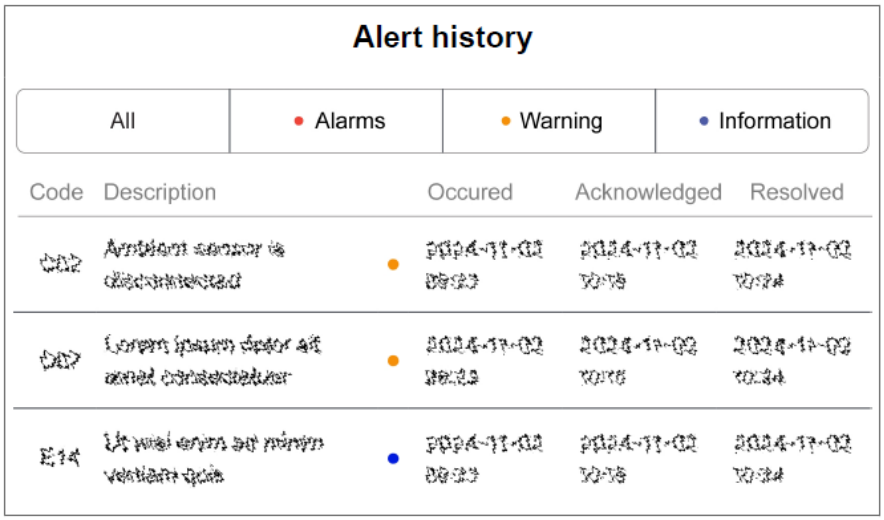
Tapping the alert symbol for the specific alert opens up detailed information about the alert.



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

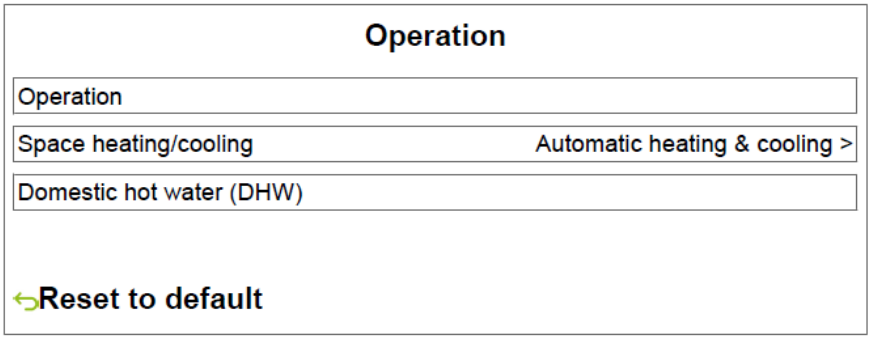
Alert history

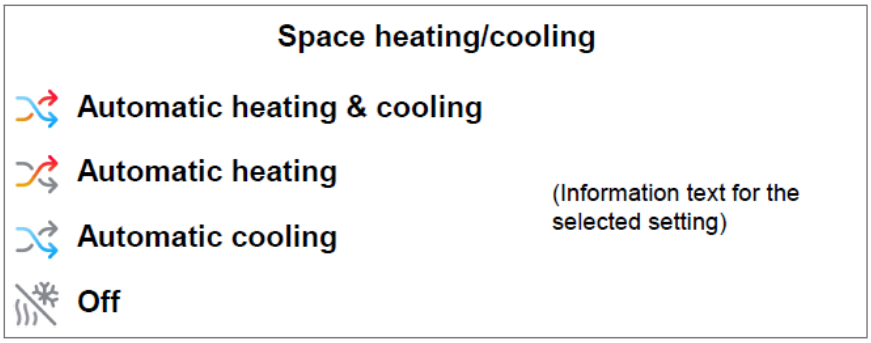
To view the alert history list, go to ***Installer settings*** » ***Alert history***. Installer level access is required.



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.

10.4.7 Operation



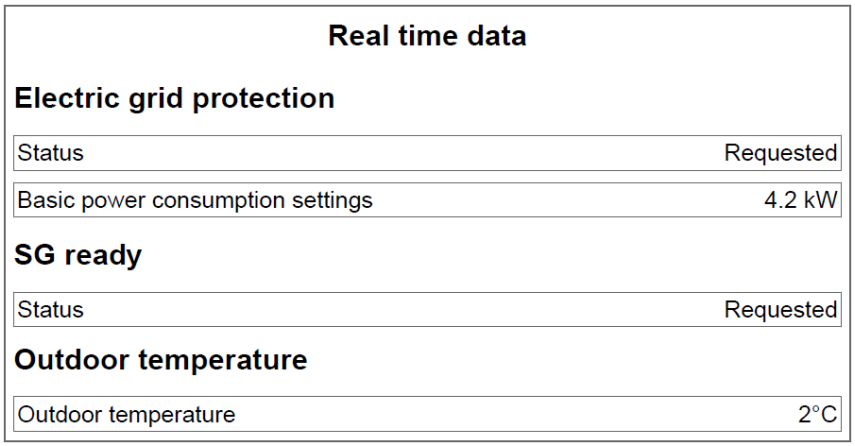


Parameter	Description

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 o 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 seasonal 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 cooling mode. No heating.
Off	Selected with a check mark ✓. Heating and cooling are both off.

10.4.8 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.

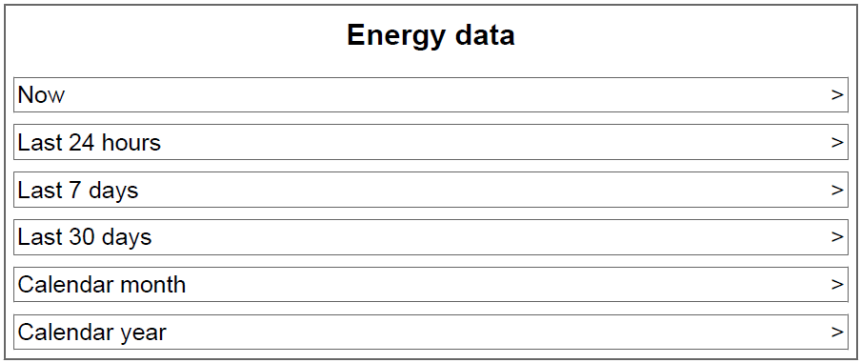


Scroll down to reach the below parameters.

Parameter	Description
Electric grid protection	
Status	- Requested - Active - Inactive
Basic power consumption settings	(kW)
SG Ready	- Normal - Encouraged – Increased heat production – Stage 1 - Forced – Increased heat production – Stage 2 - Blocked – Compressor blocked for working
Status	
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	
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 TDW	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)
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	
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

10.4.9 Energy data



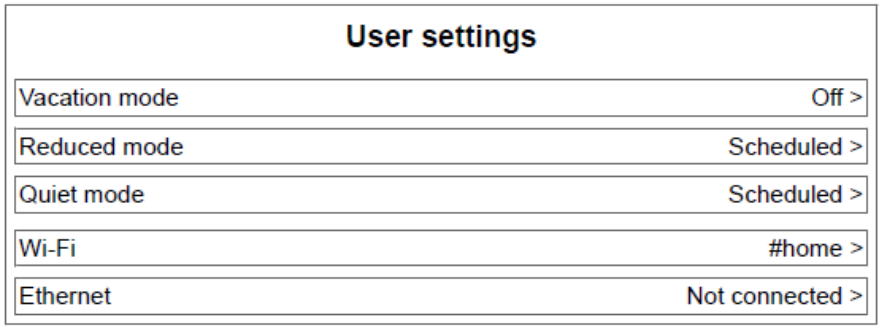
Scroll down to reach the below parameters.

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 while 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

10.3.10 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.



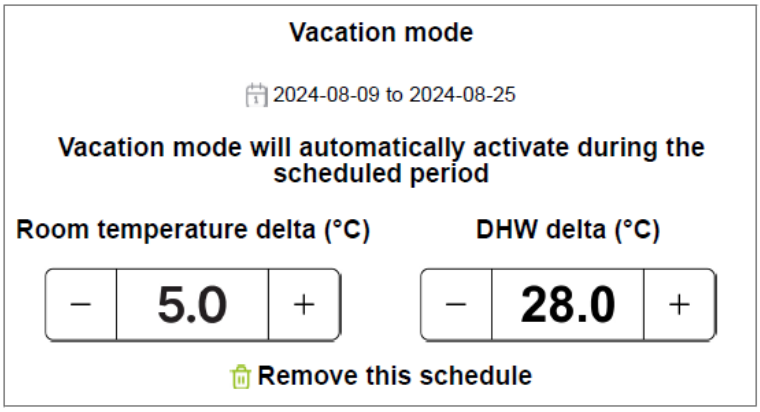
Scroll down to reach the below parameters.

Parameter	Description
Vacation mode	Scheduling or 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.
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.
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 83 for scheduling.
Wi-Fi	Connection to a wireless network. Tap to set the switch symbol to ON in order to enable the connection.
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 painting, 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 our 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.
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.

10.4.10.1 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.

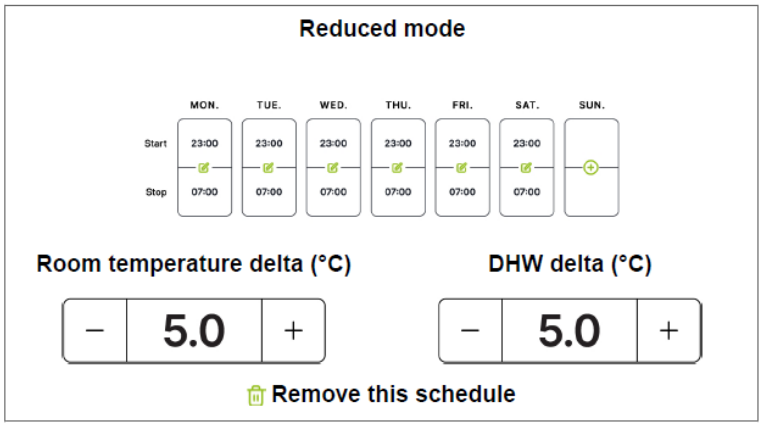
NOTE

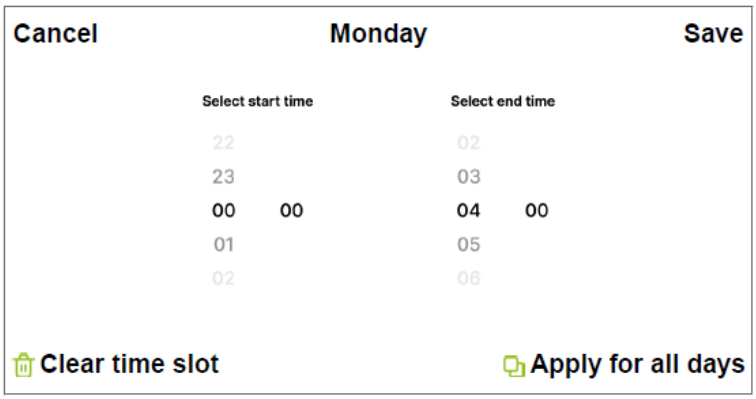
The temperature drop for ***Room temperature delta (°C)*** refers to the room temperature, not to be confused with the flow temperature.

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

10.4.10.2 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.

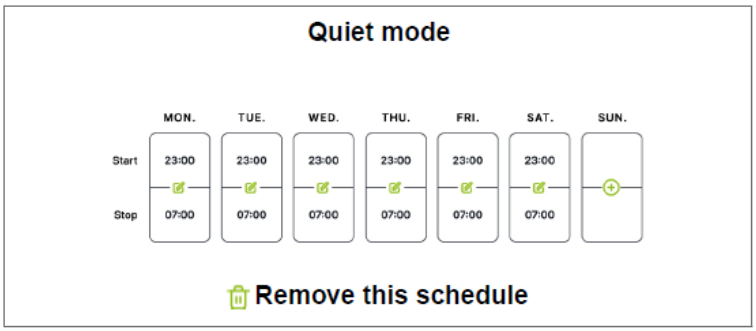
4. Tap ***Save*** to save the setting for the selected day, or tap ***Apply for all days*** to save the same setting for all days of the week.
   To remove the reduced mode for the selected day, tap ***Clear time slot***.

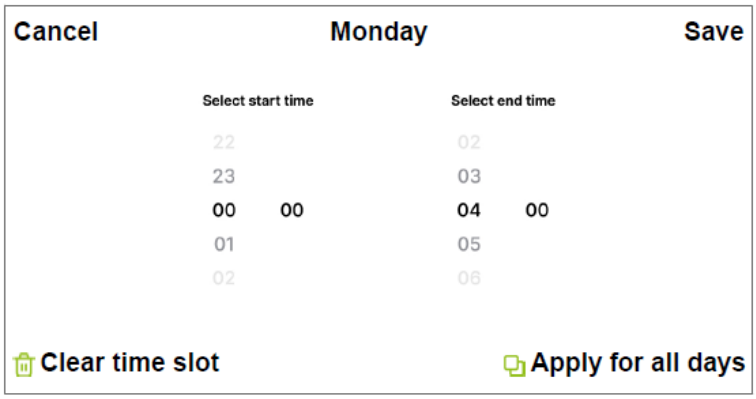
5. Back in the reduced mode schedule, select the temperature drop in the temperature selectors for ***Room temperature delta (°C)*** and ***DHW delta (°C)*** by tapping the **+** (plus) and **-** (minus) buttons.

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

10.4.10.3 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***.

10.4.10.4 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.

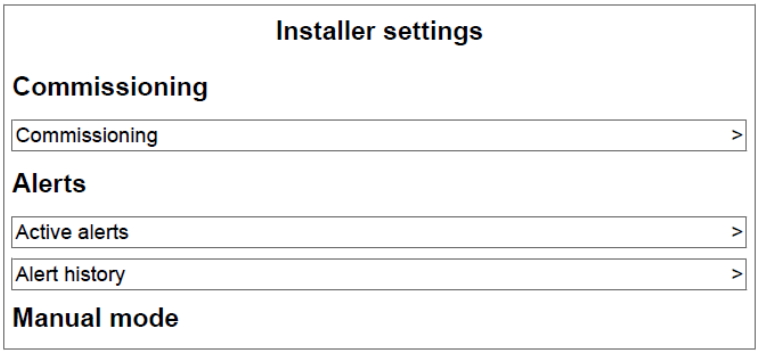
3 For an open network, select the network in the list that appears and tap ***Join this network***. Enter the password.

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.

10.4.10.5 Energy data

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.

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 to switch the 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.
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.

	Settings for SG ready forced operation status.
Forced operation temperature settings	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 and thresholds	
Outdoor temperature threshold	Outdoor temperature threshold for additional heating source to activate.
Heat balance threshold for heating	Heat balance threshold 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
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.

10.4.11.1 Installer settings submenu: Commissioning

Parameter	Description
Cloud and software	
Wi-Fi	Connection to Wi-Fi
Ethernet	Connection to Ethernet
ES Cloud connection	Registration to the cloud.
Software & Updates	View software version and manually check for updates.
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. Setup of the number of zones, heating and/or cooling, thermostats, circuit type (direct or mixing), and more.
Domestic hot water (DHW)	Configuration of domestic hot water, anti-legionella program, and additional heating source.
Additional inline heating source	Configuration of additional inline heating source.
Buffer tank	Configuration of buffer tank and additional heating source.
Energy meter	Selection of energy meter.
Flow sensor	Selection of flow sensor.
System health	
Active alerts	View active alerts.
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.

10.4.11.2 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

Parameter	Description
Air purge	
Air purge DHW pipeline	Function that carries out an air purging cycle of the DHW pipe. Tap **Start**. A bar shows the progress of the purging cycle (0–100%). Tap **Cancel** to abort the procedure. **NOTE** The heat pump system must be switched off before performing this function.
Air purge heating/cooling pipeline	Function that carries out an air purging cycle of the heating/cooling pipe. Tap **Start**. A bar shows the progress of the purging cycle (0-100%). Tap **Cancel** to abort the procedure. **NOTE** The heat pump system must be switched off before performing this function.
P0 water pump	
P0 water pump	Activated/Deactivated
P0 water pump speed setting	Setting of the P0 water pump speed. Tap to open the speed selector. Select speed (0–100%) by tapping the **+** (plus) and **-** (minus) buttons.
Diverting valve	
Diverting valve to DHW	Activated/Deactivated
Zone 1	
P1 water pump	Activated/Deactivated
Mixing valve increase	Activated/Deactivated

Mixing valve decrease	Activated/Deactivated
Zone 2	
P2 water pump	Activated/Deactivated
Mixing valve increase	Activated/Deactivated
Mixing valve decrease	Activated/Deactivated
Additional heating source	
Additional inline heating source: Stage 1/2/3	Activated/Deactivated
Additional buffer tank heating source	Activated/Deactivated
Additional DHW tank heating source	Activated/Deactivated
Advanced	
Operation	Selected with a check mark - Off - Heating - Cooling **CAUTION** Handle the manual operation of the compressor with care!
Compressor speed	Setting of the compressor speed. Tap to open the speed selector. Select speed by tapping the **+** (plus) and (minus) buttons. Range: 0–10, where 10 = 100% compressor speed.

10.4.11.3 Digital season switching (HS & CS)

Normally, your heat pump automatically switches between heating, neutral, and cooling seasons based on the outdoor temperature and its associated settings. However, you can also control this season switching using two digital inputs (HS for Heating Season and CS for Cooling Season) located on the indoor unit.

How to Configure Digital Season Switching

To set up digital season switching, you'll need to configure each season individually:

- Heating Season Switch: Navigate to: **Menu → Installer settings → Others... → Heating season settings**
    - Based on outdoor temperature (default): This is the standard setting where the heat pump uses outdoor temperature readings to determine the heating season.
    - Based on digital input heating & cooling signal: Choose this option to enable control via the HS digital input.
- Cooling Season Switch: Navigate to: **Menu → Installer settings → Others... → Cooling season settings**
    - Based on outdoor temperature (**default**): This is the standard setting where the heat pump uses outdoor temperature readings to determine the cooling season.

- Based on digital input heating & cooling signal: Choose this option to enable control via the CS digital input.

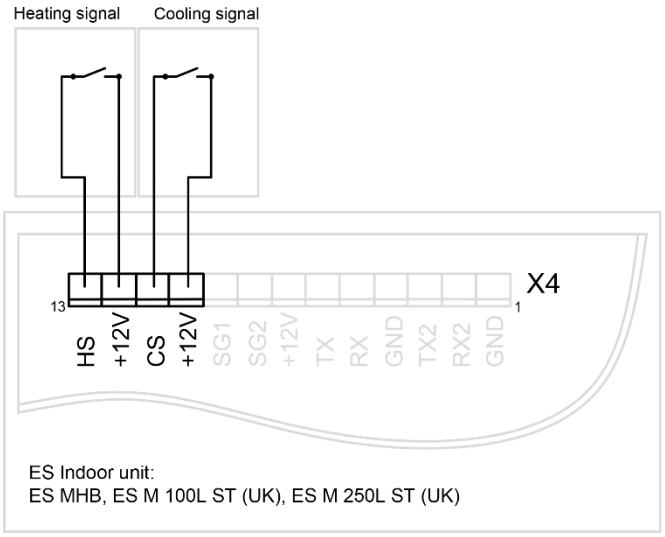
Important Considerations

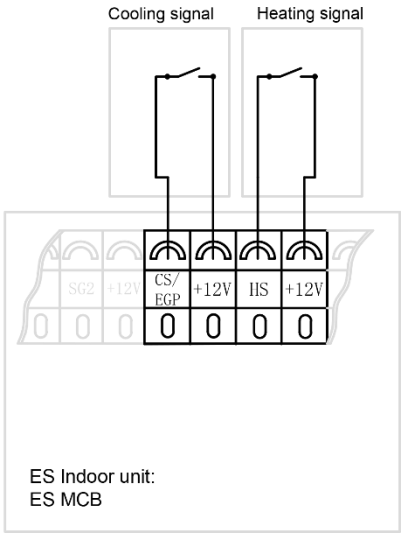
- Flexible Configuration: You can mix and match! For instance, you could configure the heating season to be controlled by the digital input while the cooling season still relies on outdoor temperature, or vice-versa.
- EGP System Limitation: If you're using an EGP (Energy Grid Protection) system, one of the two digital inputs will be occupied. This means you can only use the digital season switch function for *either* heating or cooling, not both.
- Signal Requirement: When digital season switching is enabled, the heat pump will only operate in heating or cooling mode when it receives the dedicated digital signal (HS or CS).
- Avoid Simultaneous Signals: It's crucial that both digital signals (HS and CS) are not active at the same time. If both receive a signal simultaneously, the heat pump will remain in "Neutral" season and will not activate heating or cooling.

Checking the Current Season

To see which season your unit is currently operating in, navigate to: Real time data → Season → Current season.

Wiring





10.4.11.4 Electric grid protection (EGP)

Ensuring compliance and power management.

The EGP function is designed to comply with **Germany's §14a regulation**, which governs grid interaction. For in-depth information on this regulation, please refer to the bundesnetzagentur.de website.

Function description

At its core, EGP limits your system's power draw by **reducing compressor speed** and **disabling additional electrical heating sources**. This function can be activated either through a potential-free digital input or a Modbus TCP command.

- **With an Electrical Meter:** When an electrical meter is installed, EGP operates at its full potential. It precisely monitors real-time power consumption and intelligently adjusts the system to stay within your predefined consumption limit.
- **Without an Electrical Meter:** If no electrical meter is present, EGP will not limit to a specific consumption value. Instead, it enforces a fixed **compressor speed limitation of 60%** of the absolute maximum.

In both configurations, all additional electrical heating sources are **blocked from operating**. For the system to respond, the EGP activation signal must persist for a minimum of **5 seconds** to stop electrical heating, and **10 seconds** to initiate compressor slowdown (if needed). After EGP becomes inactive, a specific delay is required before it can be reactivated.

Digital input settings

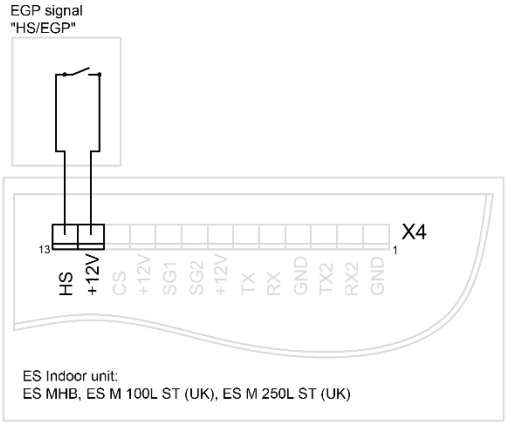
The digital input for EGP must be configured.

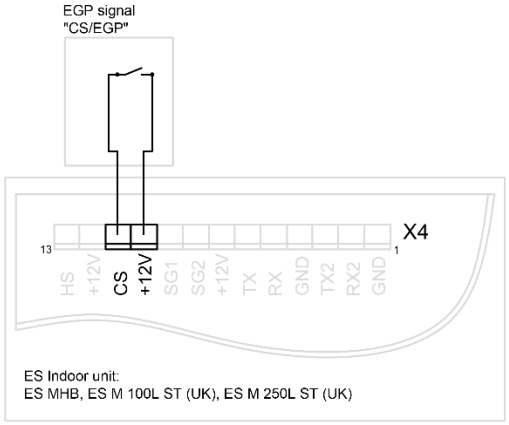
The HS, +12V or the CS, +12V digital inputs can be configured to be used for EGP.

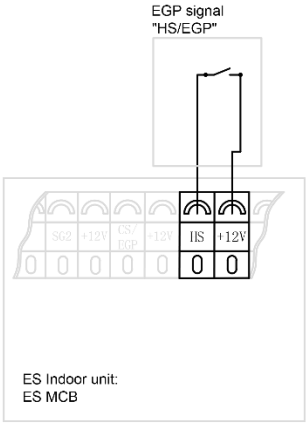
Menu → Installer settings → Electric grid protection → Digital input

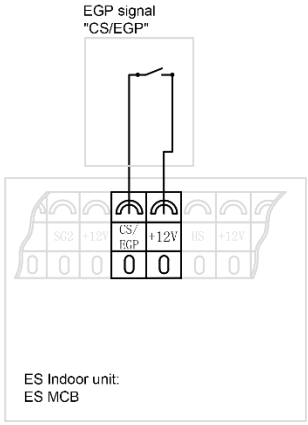
- None
- BMS Modbus Command
- CS/EGP **(default setting)**
- HS/EGP

Wiring









10.4.11.5 MS – Mode Signal Output

Automatic Cooling Season Indicator

The indoor unit features a **230V digital output (MS - Mode Signal output)** that automatically activates when the system is in its **cooling season**. This output is designed to help manage separate heating and cooling distribution systems within a single zone.

Function description

When the cooling season begins, the MS output provides a continuous **230V AC signal**. This allows you to automatically control components like different switching or open/close valves to seamlessly switch between your heating and cooling distribution systems.

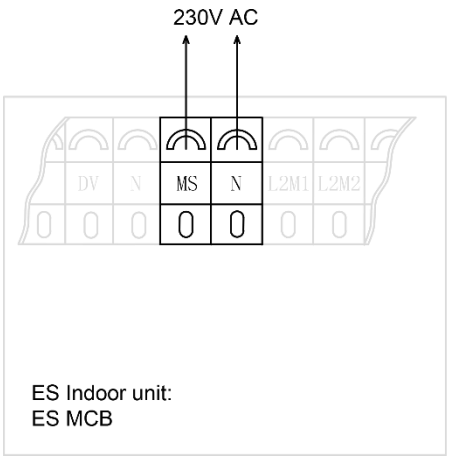
Important considerations:

This 230V AC output is **not adjustable or modifiable**; it is present throughout the entire cooling season.

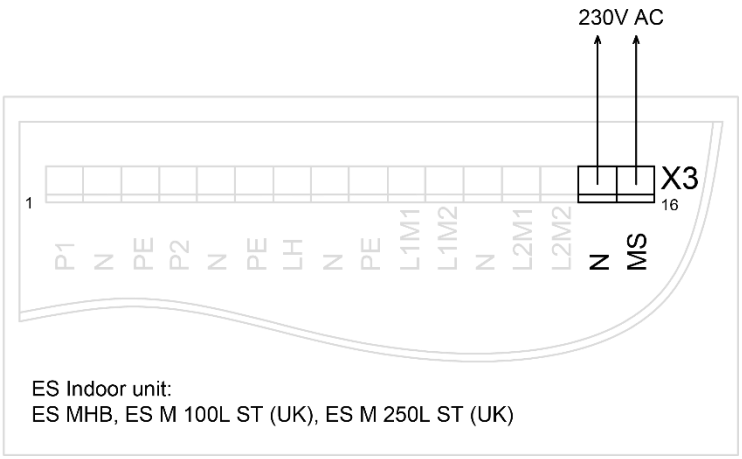
The **maximum load** for this output is **2A**.

To confirm if the unit is currently in cooling season, navigate to: **Real time data → Season → Current season**.

Wiring



ES Indoor unit:
ES MCB



ES Indoor unit:
ES MHB, ES M 100L ST (UK), ES M 250L ST (UK)

10.5 Before leaving the installation site

Before leaving the installation site, perform the following actions.

Ensure that all system components are fully functional and that all required features are working as intended.

Check that pressures and temperatures are within stated limits and perform a leakage test to identify any possible weak points in the hydraulic system.

Clean the site from excess material and debris caused by the installation work.

Inform the end user about functions and settings available to the user, and about general care and handling of the equipment.

11 Service and maintenance

11.1 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.

11.2 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

11.3 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	

11.4 Maintenance checklist hydraulic system

Maintenance check	**Applies to:**	**Annual**	**Every 2 years**	**Every 4 years**
Check for any visible damage in 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 expansion vessels (visual inspection).	IN	X			
Check safety valves.	IN / OUT			X	
Clean the plate heat exchanger.	IN / OUT				X
Check the automatic purging valves.	IN / OUT			X	

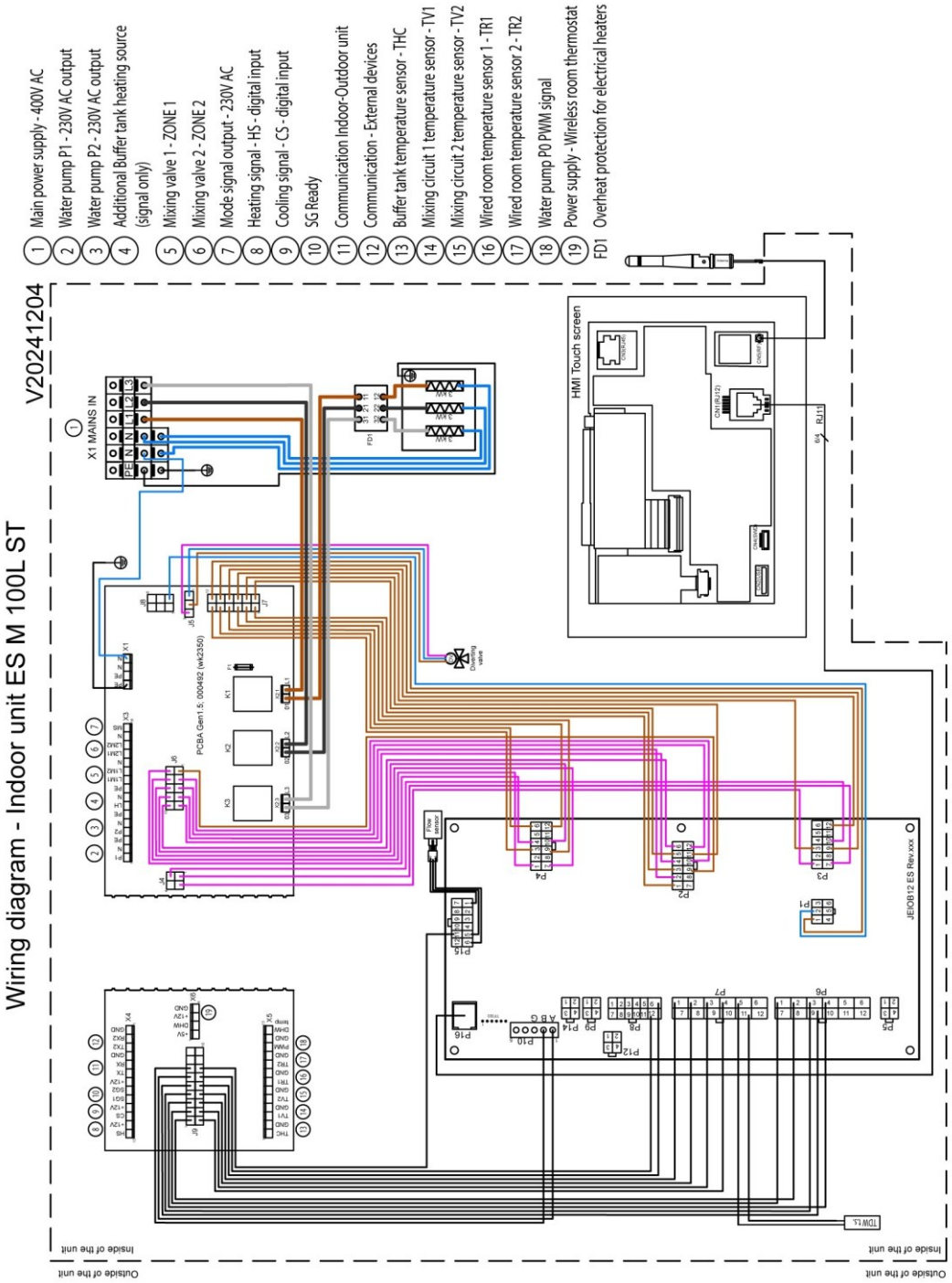
11.5 Other maintenance checks

Maintenance check	Applies to:	Annual	Every 2 years	Every 4 years
Check for strange/irregular sounds while the system is running.	IN + OUT	X		
Check the positioning of the temperature sensors.	IN		X	
Check the anode rod and exchange if needed. **NOTE** Applies only to systems using an anode rod.	IN		X	

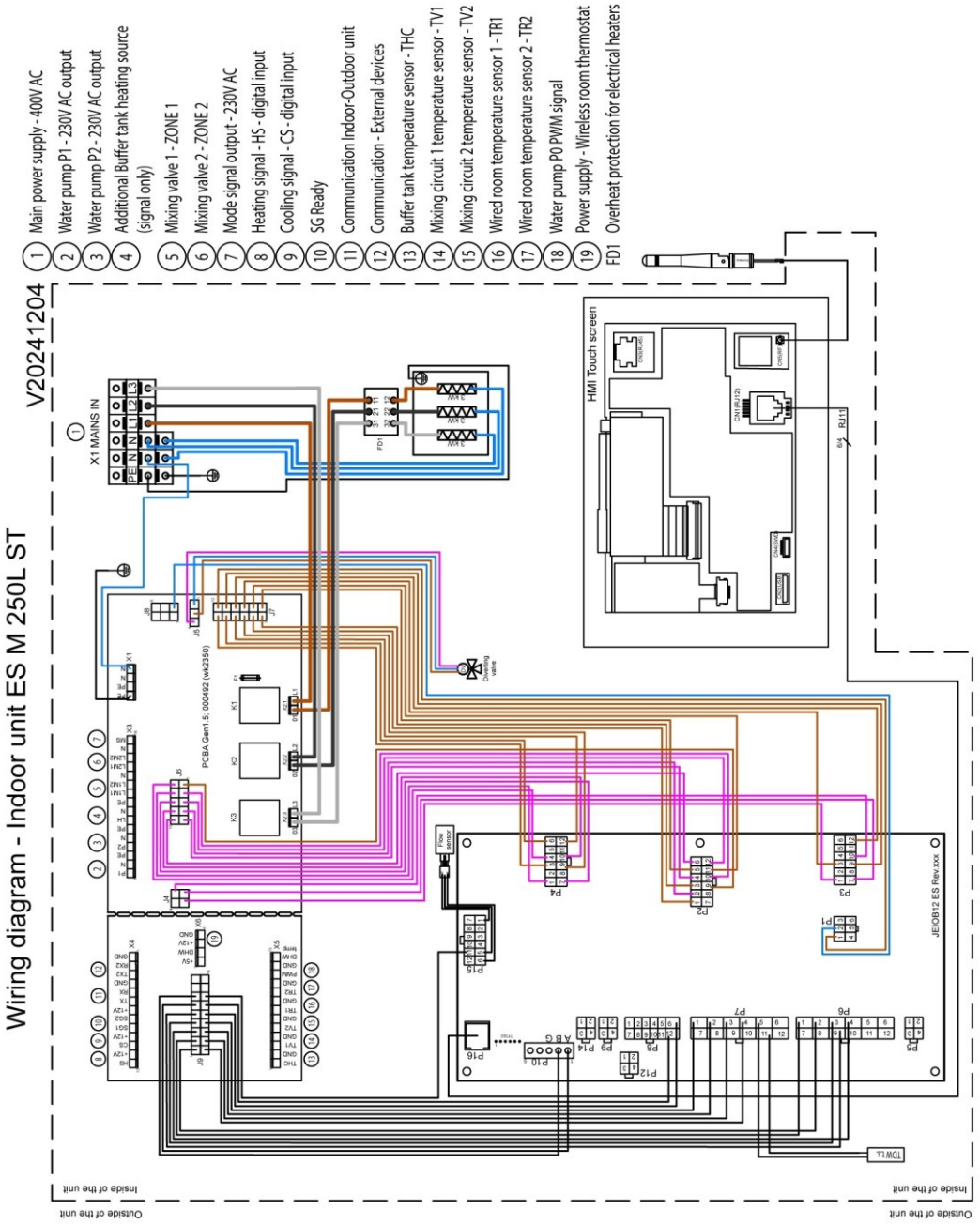
12 Appendix A: Wiring diagrams

12.1 Indoor units

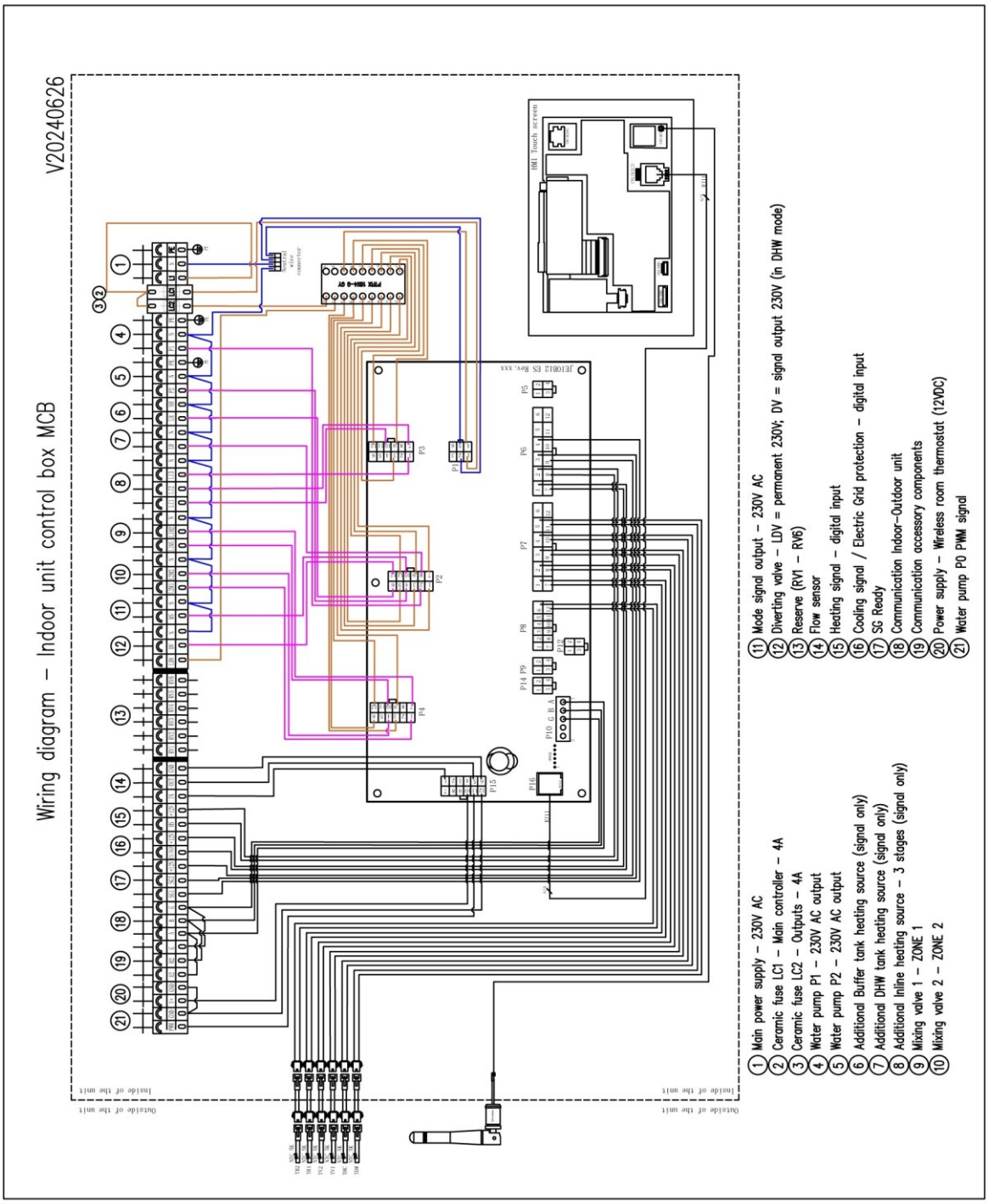
12.1.1 ES M100L ST and ES M100L ST UK



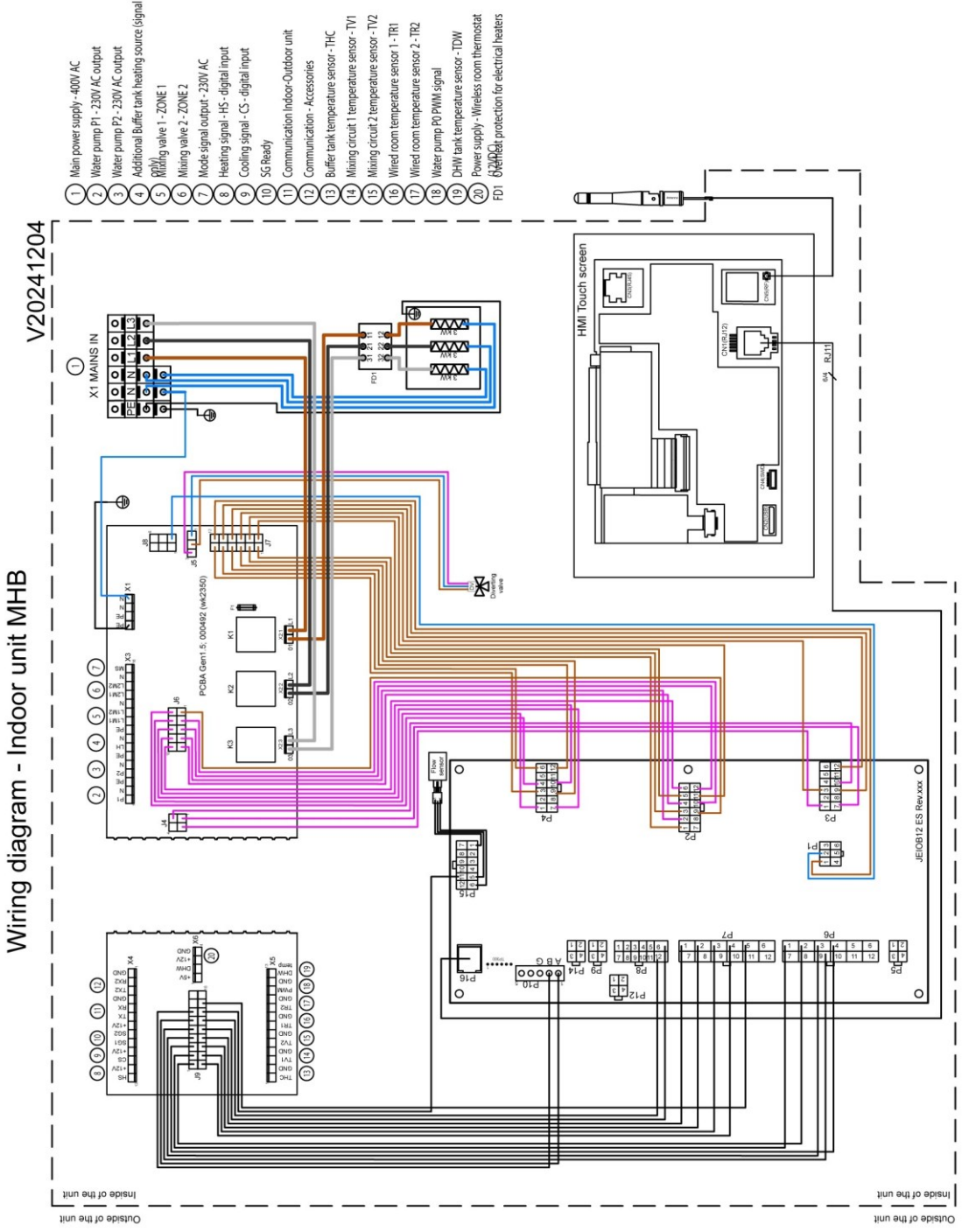
12.1.2 ES M250L ST and ES M250L ST UK



12.1.3 ES MCB

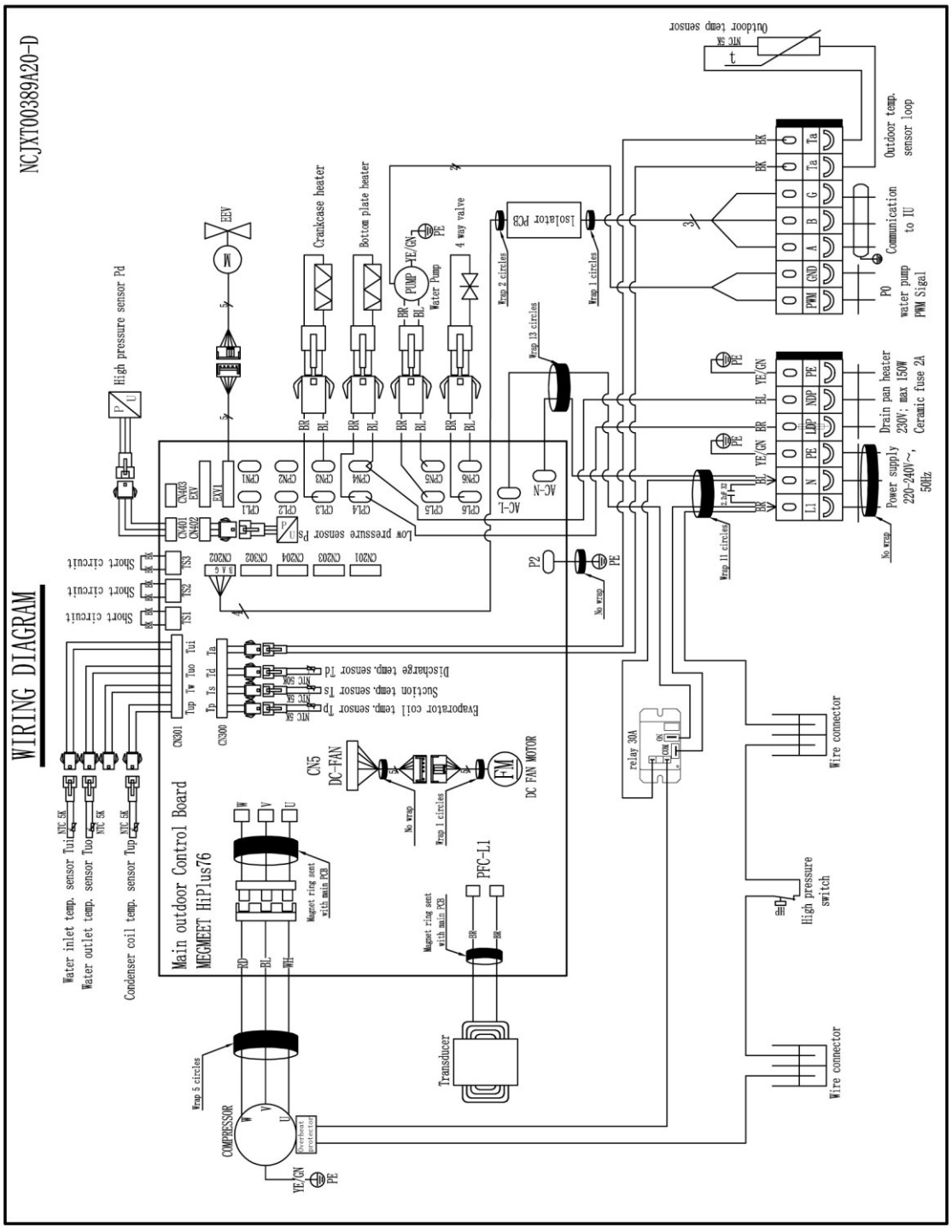

Wiring diagram – Indoor unit control box MCB
V20240626
Outside of the unit
Inside of the unit
(1) Main power supply – 230V AC
(2) Ceramic fuse LC1 – Main controller – 4A
(3) Ceramic fuse LC2 – Outputs – 4A
(4) Water pump P1 – 230V AC output
(5) Water pump P2 – 230V AC output
(6) Additional Buffer tank 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 PO PWM signal

12.1.4 ES MHB

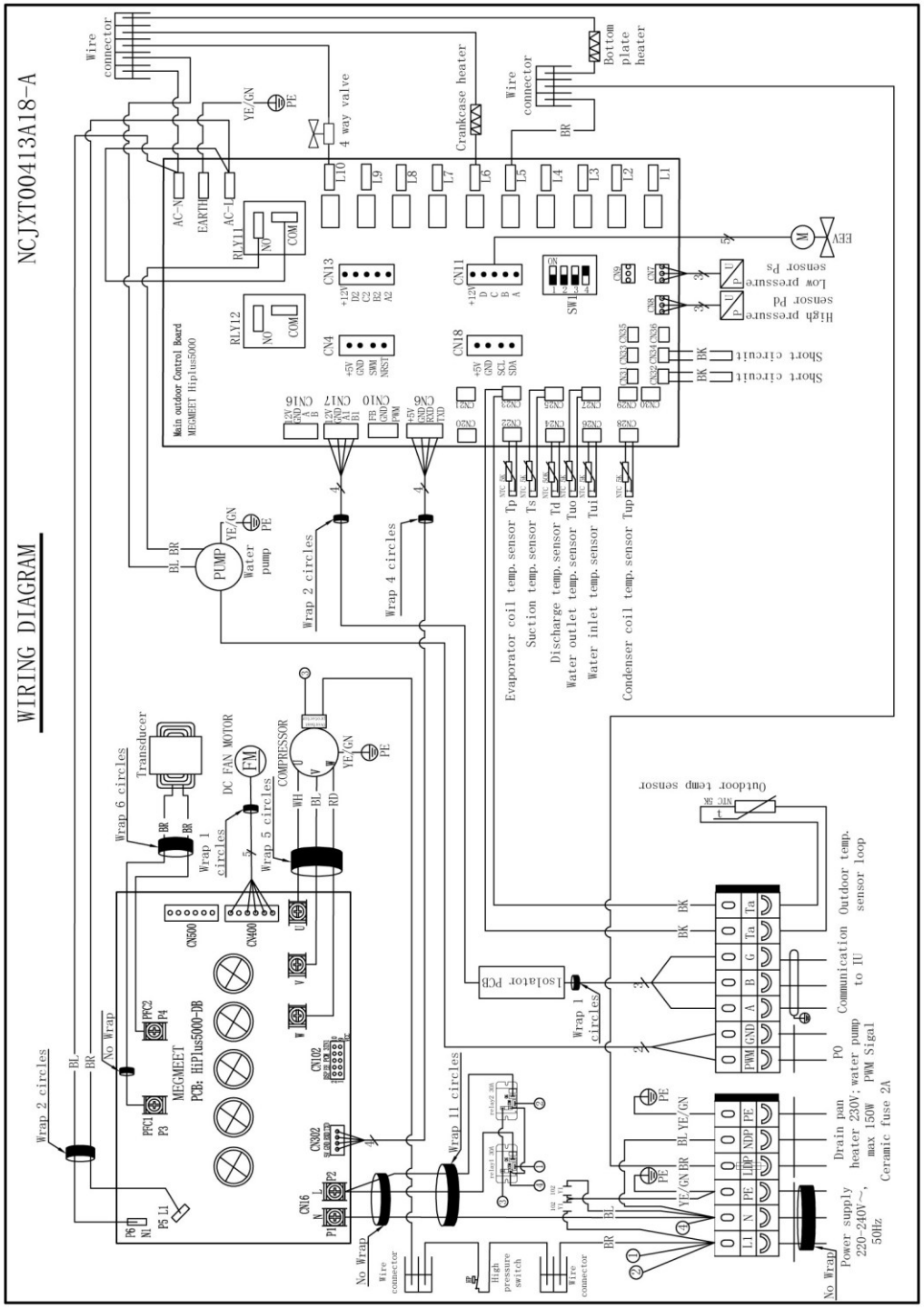

Wiring diagram - Indoor unit MHB
V20241204
1 Main power supply - 400V AC
2 Water pump P1 - 230V AC output
3 Water pump P2 - 230V AC output
4 Additional Buffer tank heating source (signal only)
5 Mixing valve 1 - ZONE 1
6 Mixing valve 2 - ZONE 2
7 Mode signal output - 230V AC
8 Heating signal - HS - digital 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 P0 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
PCBA Gen1.5: 000492 (wk2350)
JE/OB12 ES Rev.xxx
Outside of the unit
Inside of the unit

12.2 Outdoor units

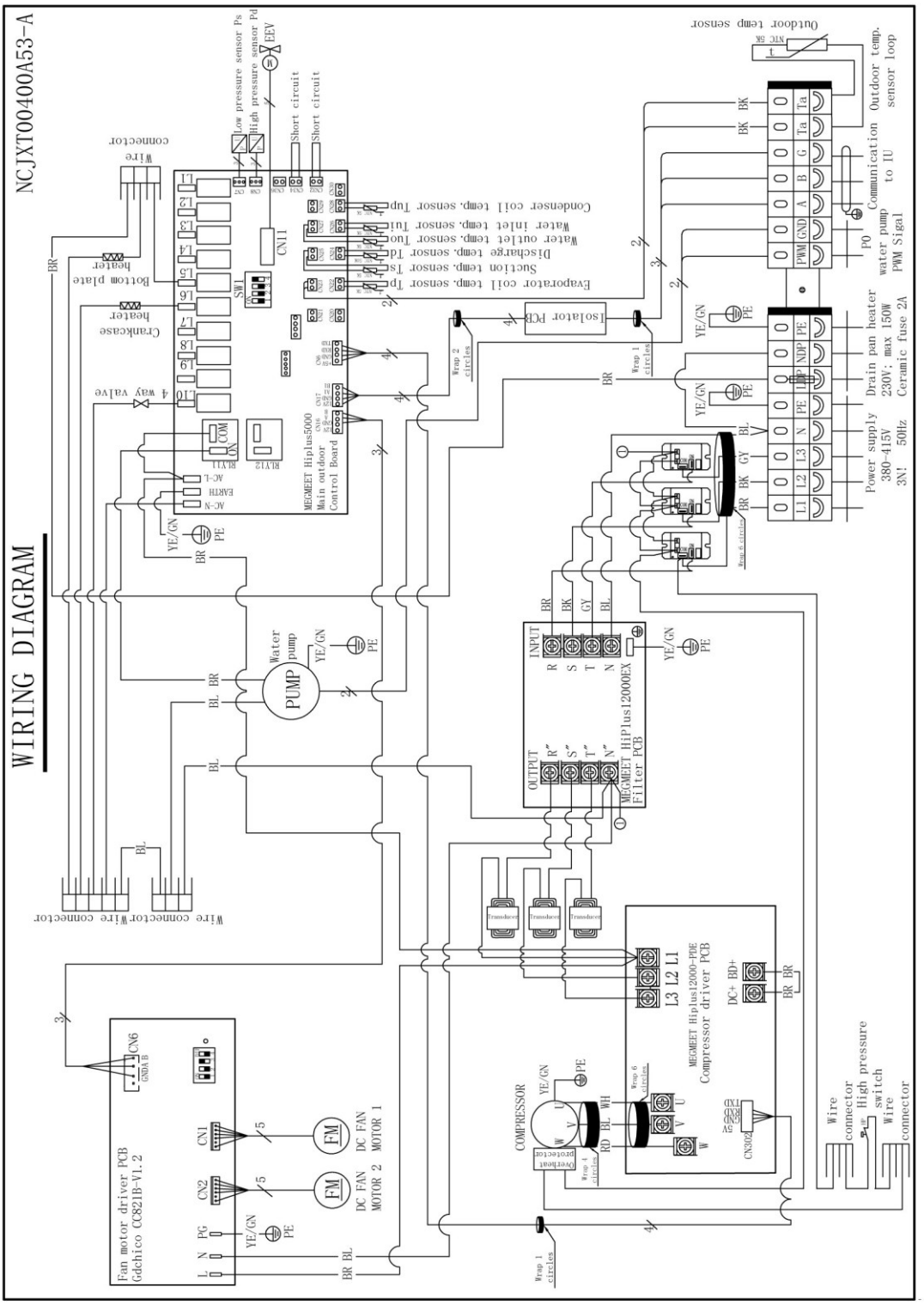
12.2.1 ES M8 R290



12.2.2 ES M12 R290



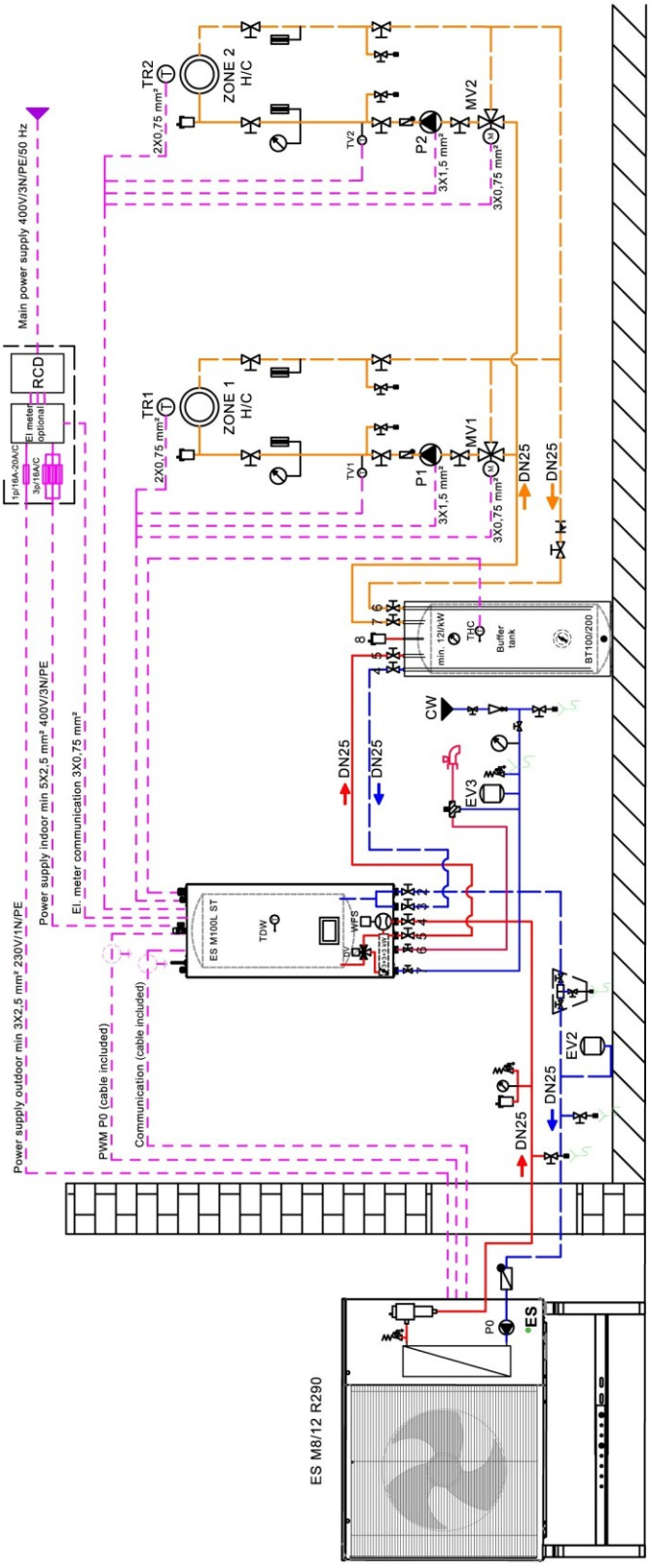
12.2.3 ES M15 R290 3 PH



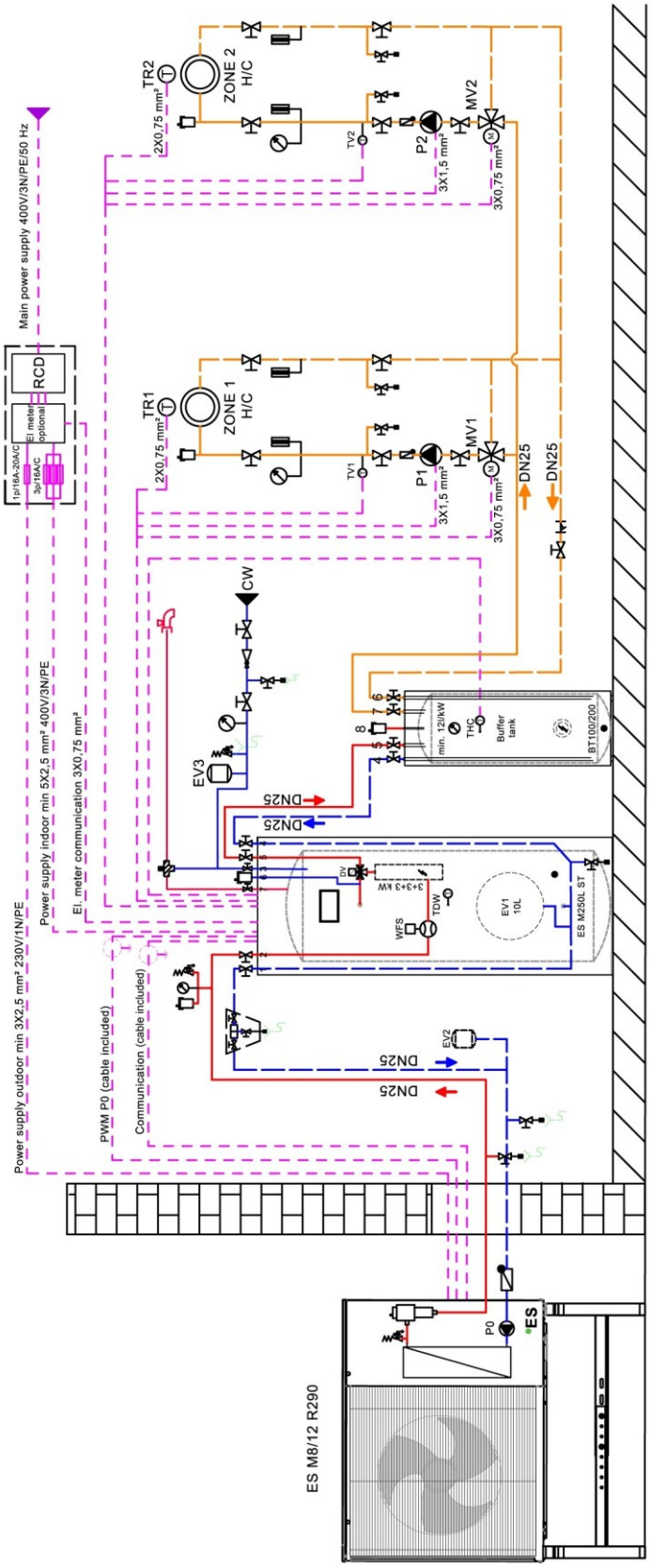
13 Appendix B: Hydraulic schematics

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

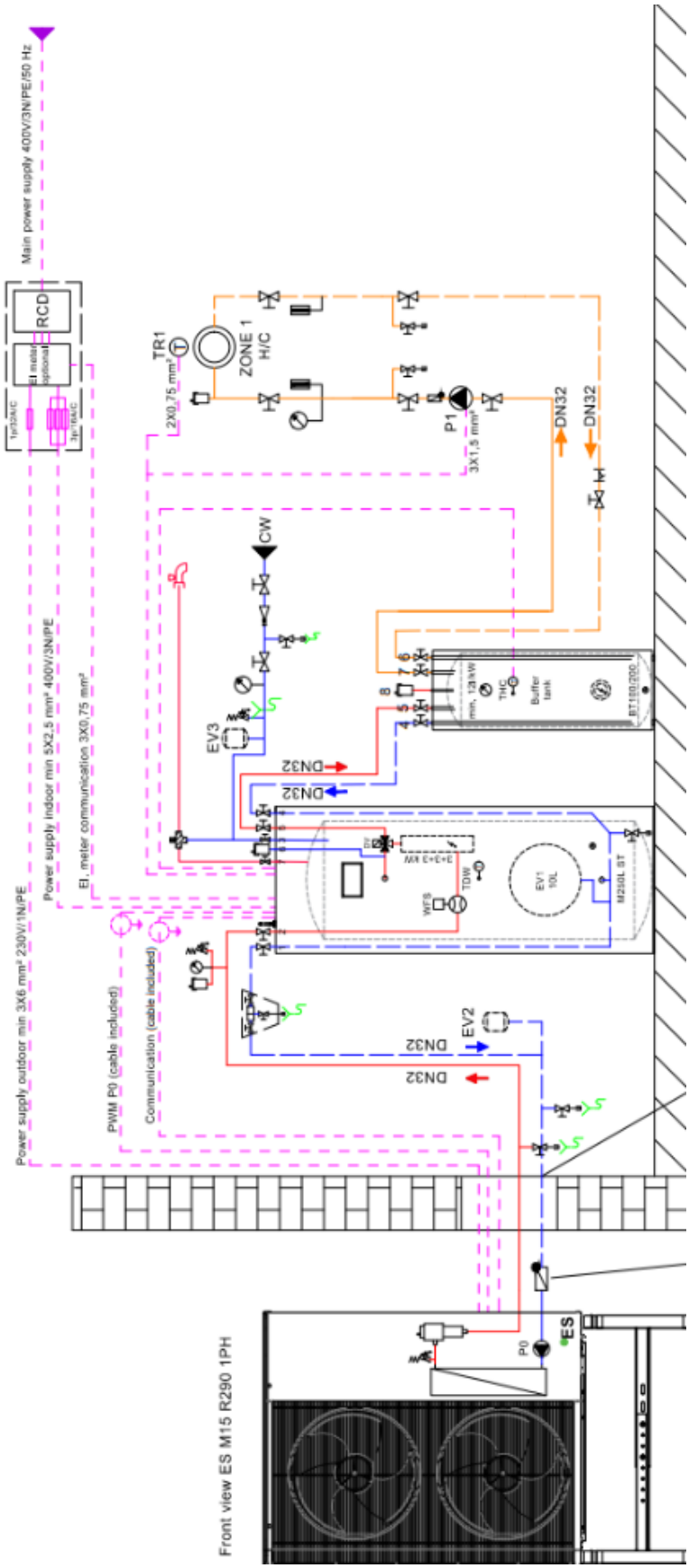
13.1 ES M100 L ST, ES M8/12 R290, DHW, BT100TC-1/BT200TC-1



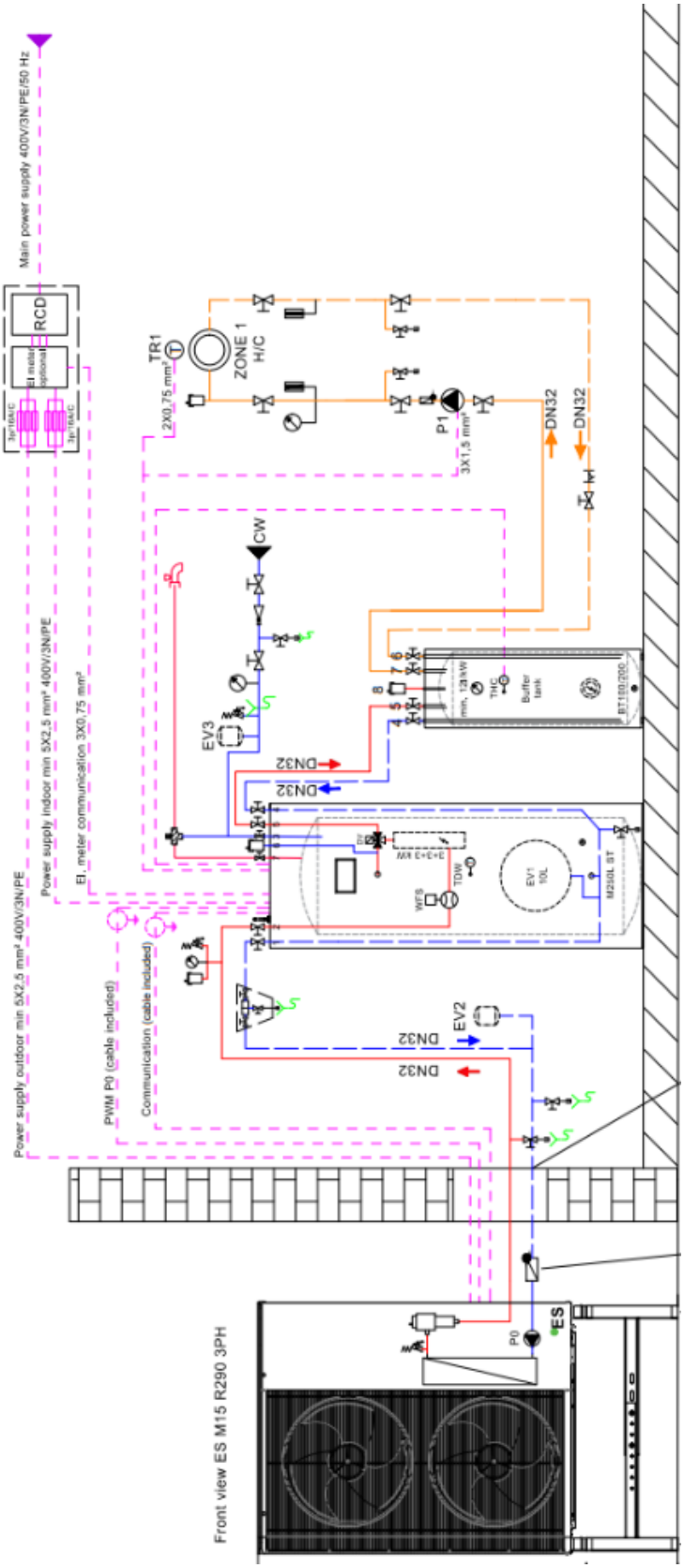
13.2 ES M250 L ST, ES M8/12 R290, BT100TC-1/BT200TC-1



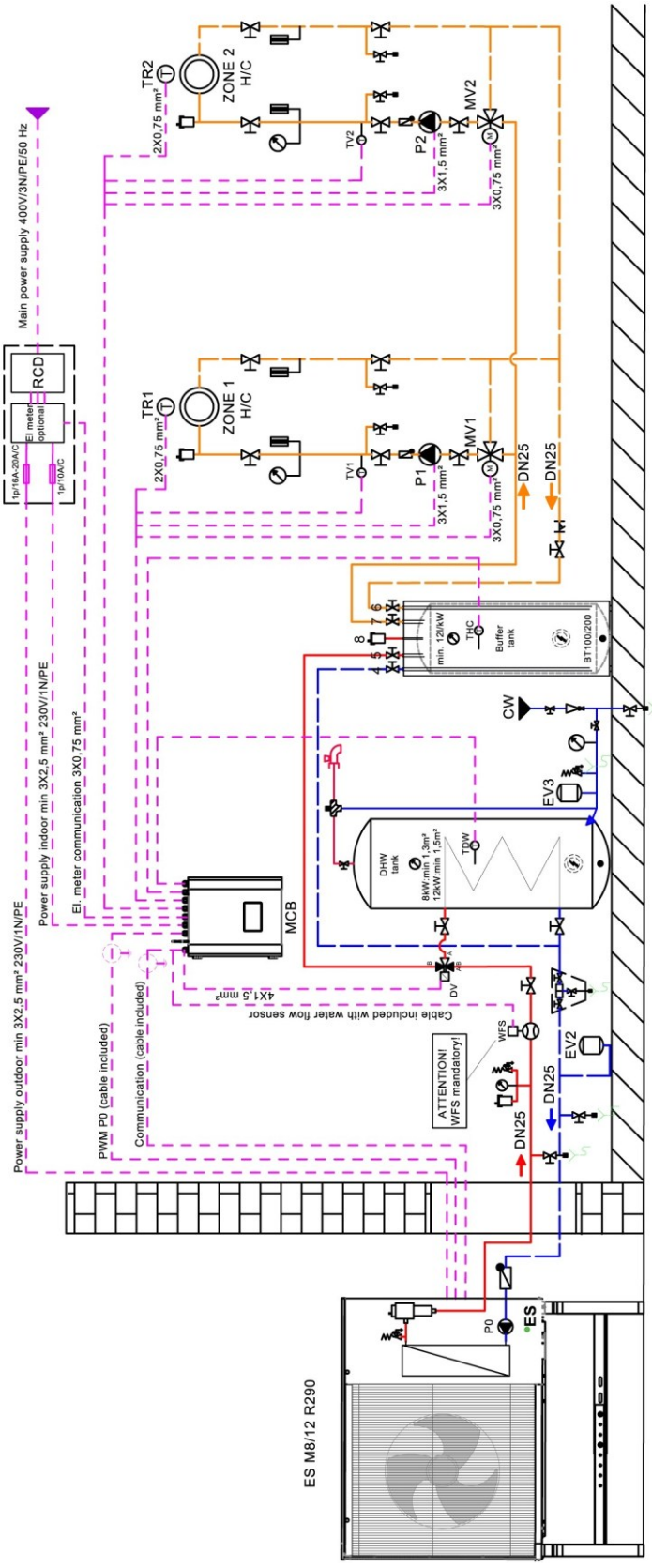
13.3 ES M250L ST, ES M15 R290 1 PH, BT100TC-1/BT200TC-1



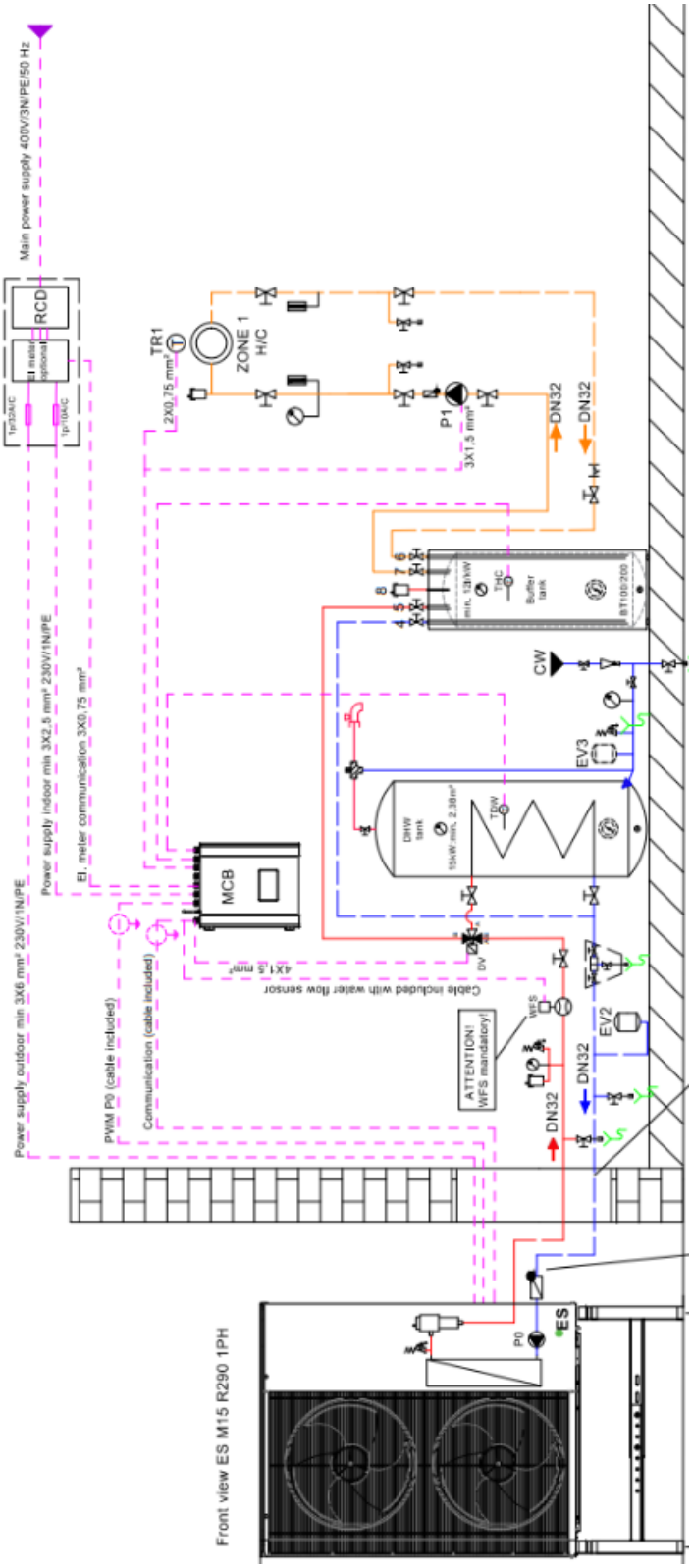
13.4 ES M250L ST, ES M15 R290 3 PH, BT100TC-1/BT200TC-1



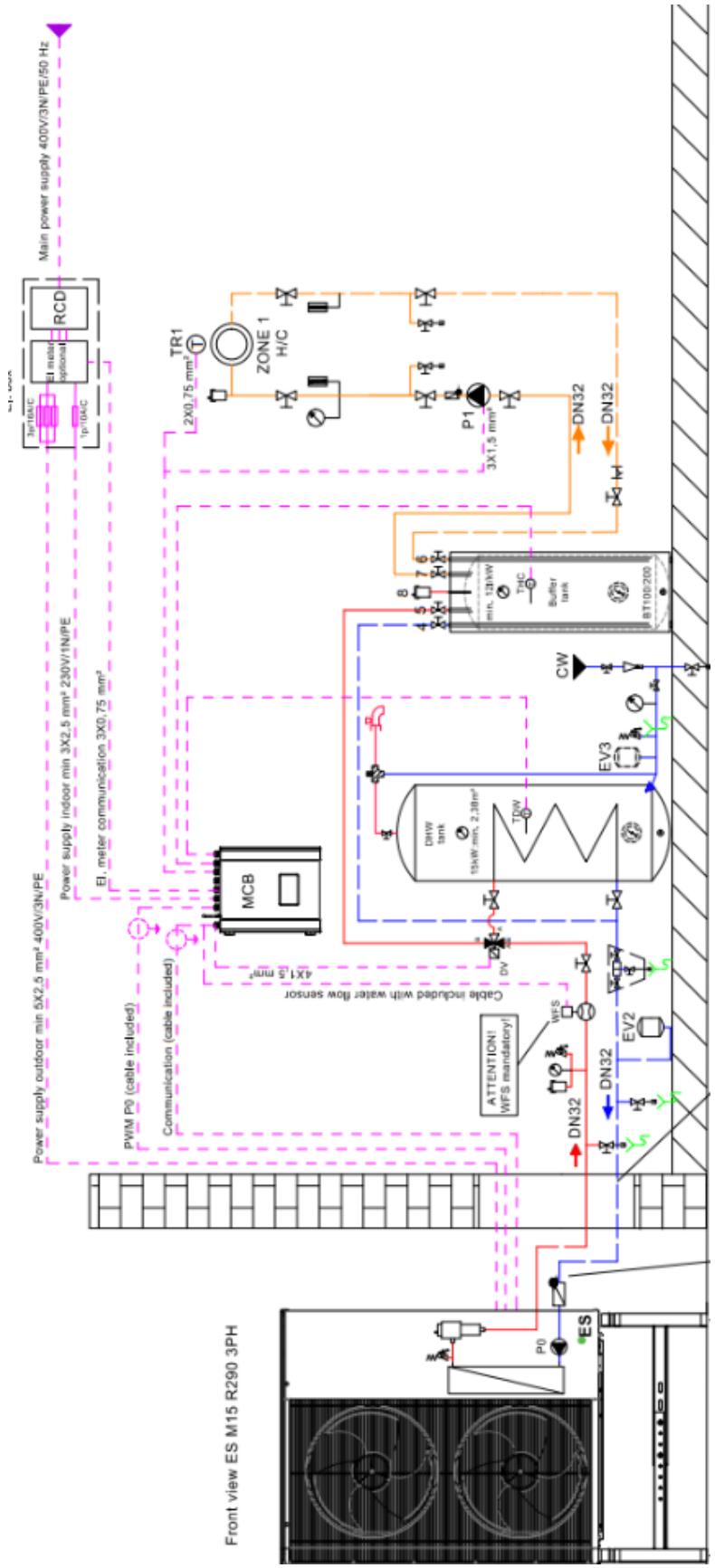
13.5 ES MCB, ES M8/12 R290, DHW, BT100TC-1/BT200TC-1



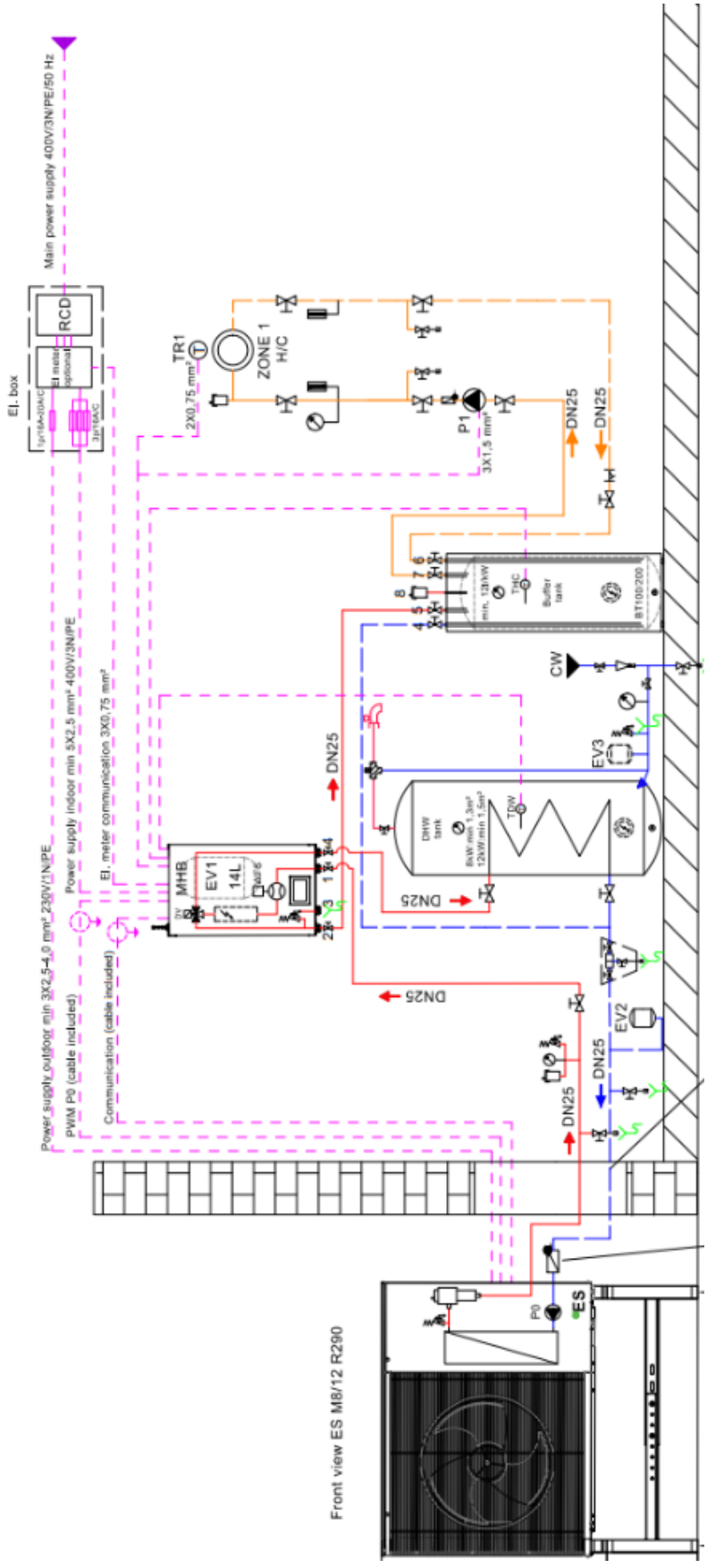
13.6 ES MCB, ES M15 R290 1 PH, DHW, BT100TC-1/BT200TC-1



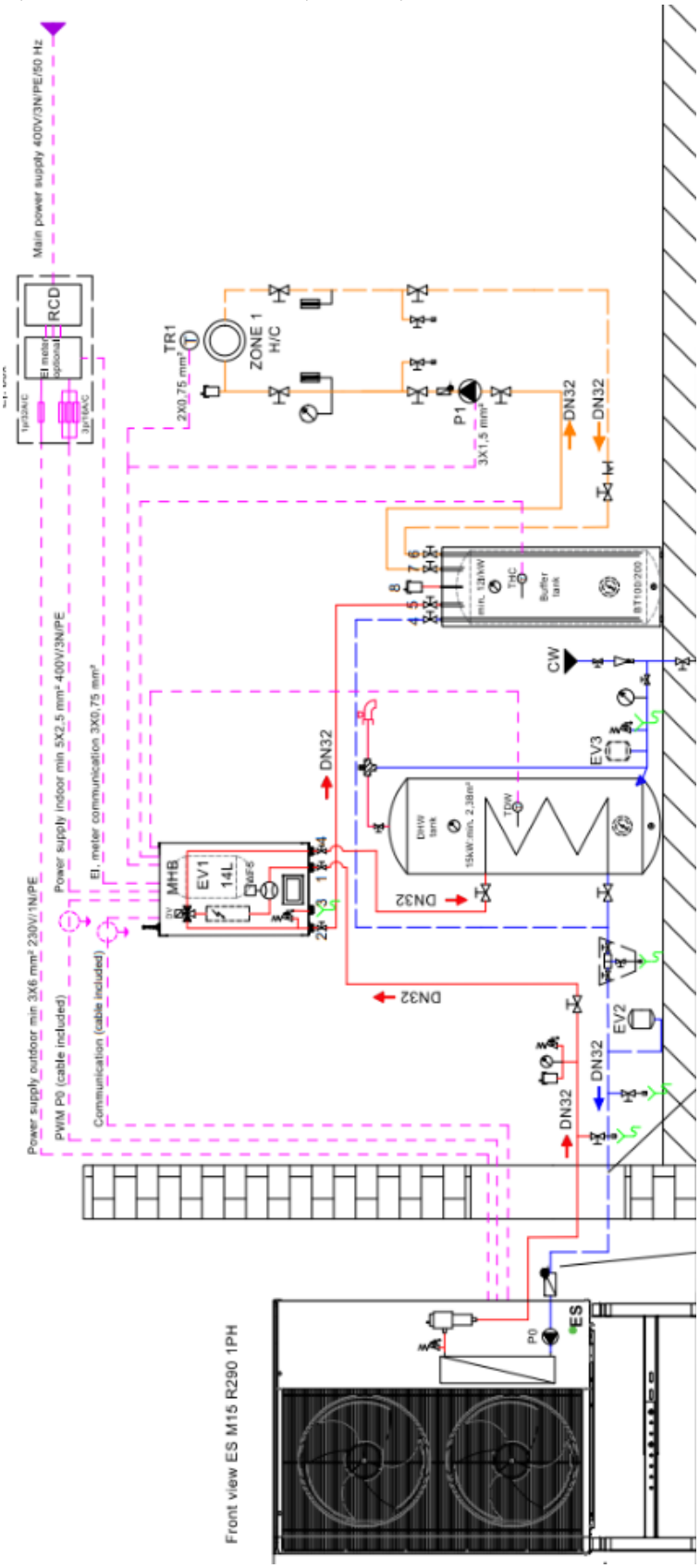
13.7 ES MCB, ES M15 R290 3 PH, DHW, BT100TC-1/BT200TC-1



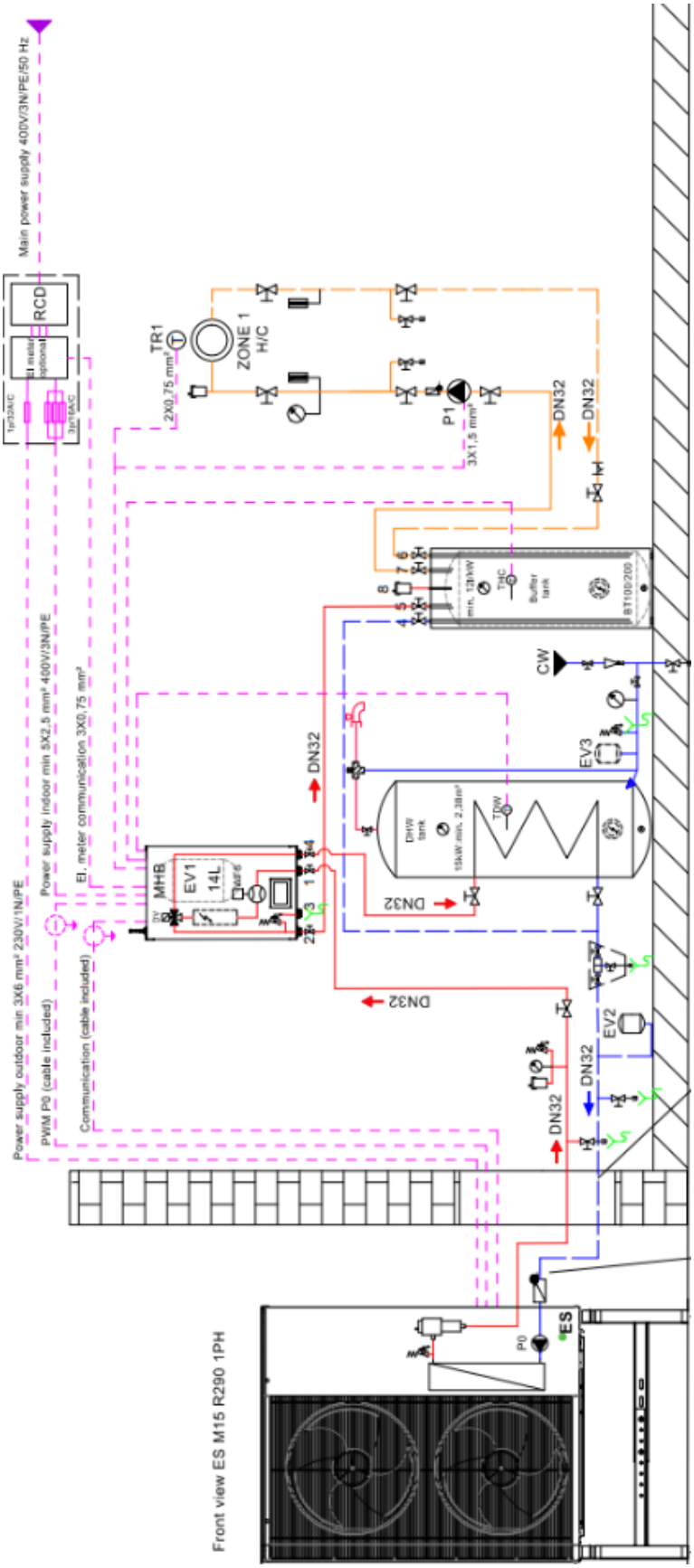
13.8 ES MHB, ES M8/12 R290, DHW, BT100TC-1/BT200TC-1



13.9 ES MHB, ES M15 R290 1 PH, DHW, BT100TC-1/BT200TC-1



13.10 ES MHB, ES M15 R290 3 PH, DHW, BT100TC-1/BT200TC-1



14 Appendix C: Accessories

14.1 Electrical meter

There are two versions of the electrical meter:

- EM 3P (ET340)
  3-phase (400 V) – can be used for all indoor unit models (two different connection options depending on the heat pump indoor unit model)

- EM 1P (ET112)
  1-phase (230V) – can only be used for systems that work with 1-phase power supply.

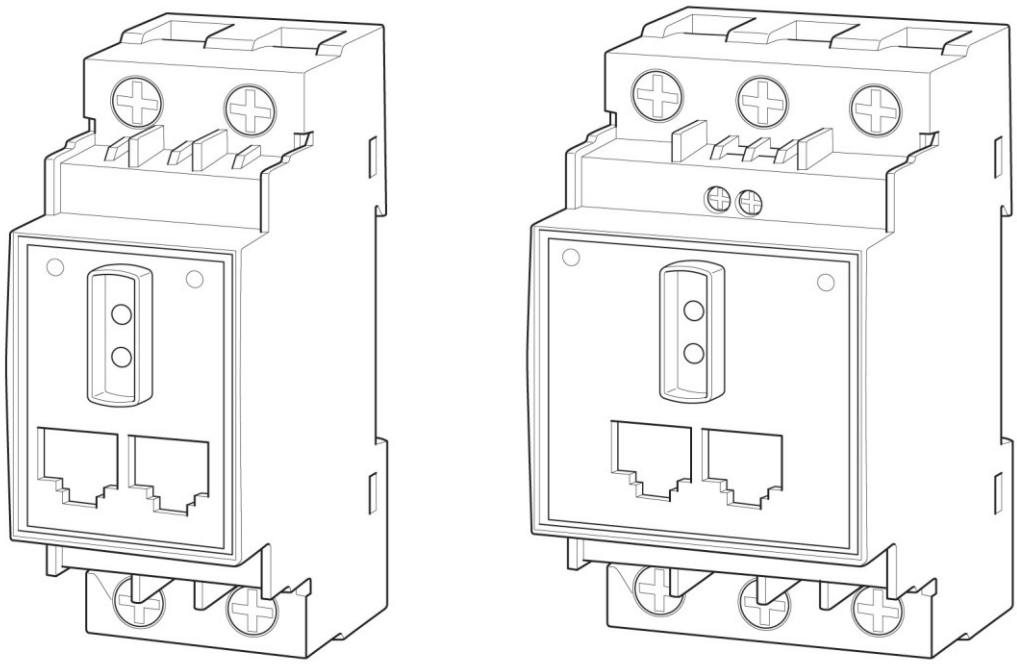


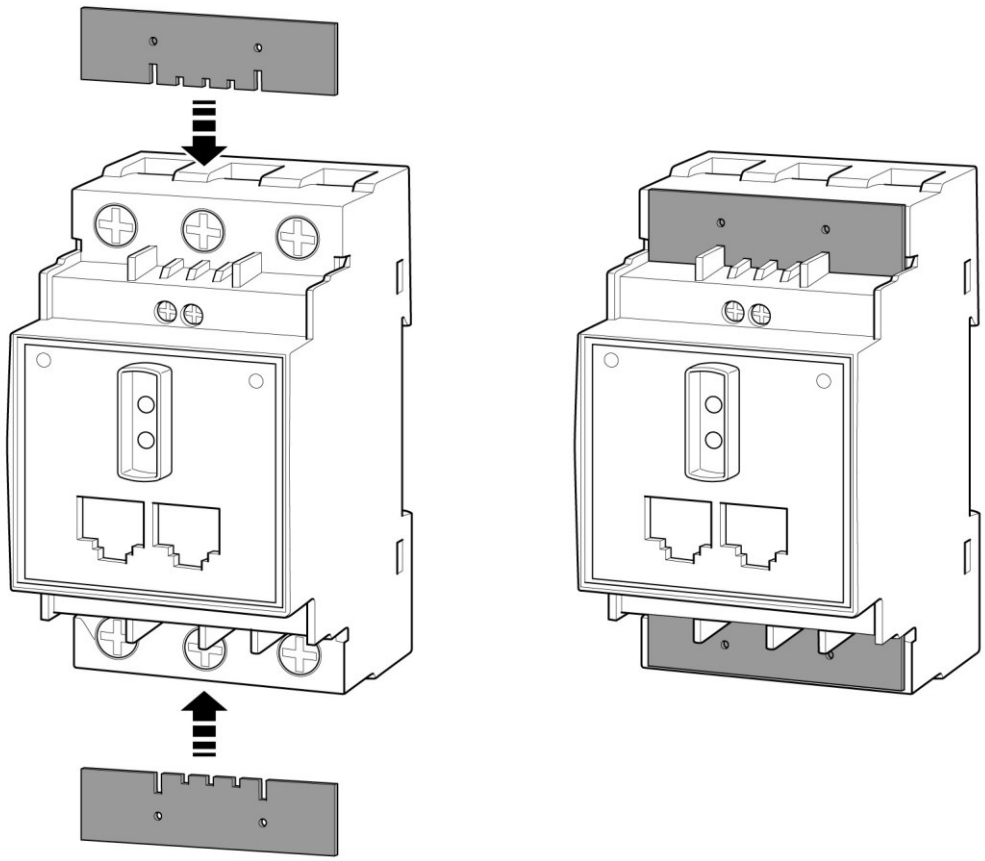
Figure 14: Electrical meters EM 1P (ET112) (left) and EM 3P (ET340) (right)

14.1.1 Attaching the terminal protection covers

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

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

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



14.1.2 Connection of electrical meter

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

WARNING

Live parts, heart attack, burns and other injuries.

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

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

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

NOTE

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

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

- **1-6:** 2.5-1.6 mm^2, torque 2.8 Nm

- **7-12, N:** 1.5 mm^2, torque 0.4 Nm

EM 3P (ET340), connection for models ES MHB, ES M100L ST, ES M100L ST UK, ES M250L ST, ES M250L ST UK

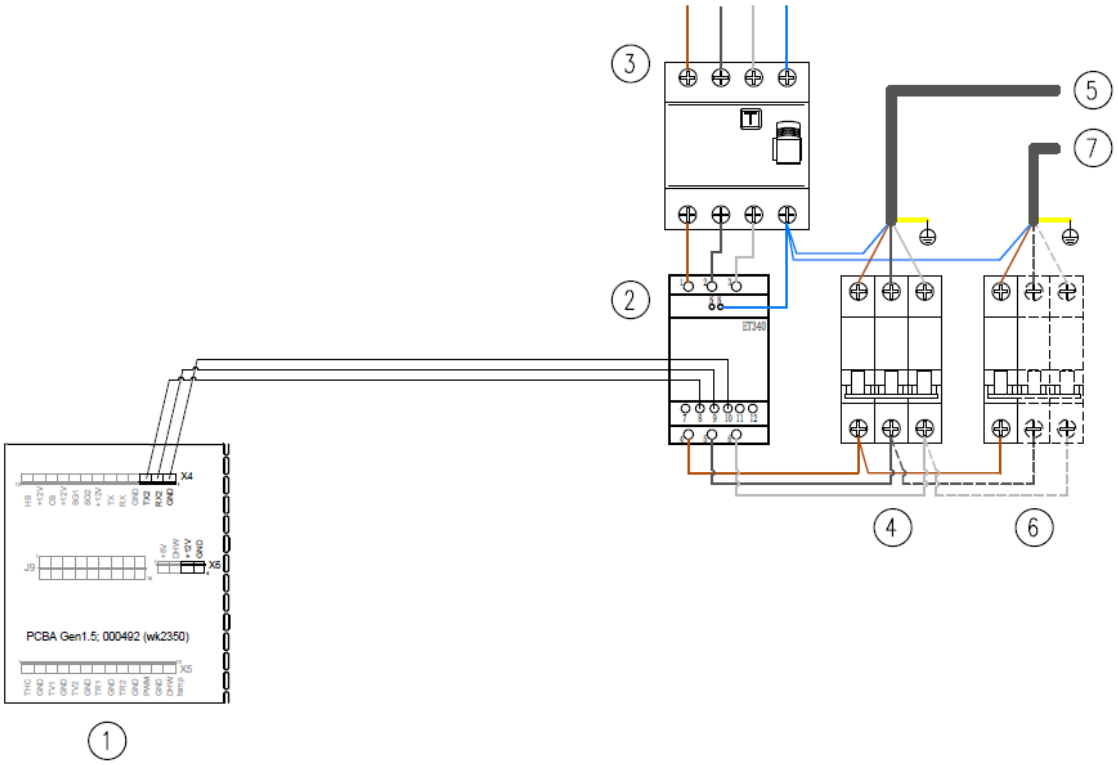


Figure 15: ET340 connection, ES MHB, ES M100L ST, ES M100L ST UK, ES M250L ST, ES M250L ST UK

1	Indoor unit – PCBA board connections – communication	5	Power supply to the indoor unit
2	Electrical meter EM 3P (ET340)	6	Fuse for the outdoor unit
3	RCD (residual-current device)	7	Power supply to the outdoor unit (1 PH or 3 PH – model dependent)
4	Fuse for the indoor unit		

EM 3P (ET340)	Indoor unit, PCBA board
8	TX2
9	RX2
10	GND

EM 3P (ET340), connection for model ES MCB

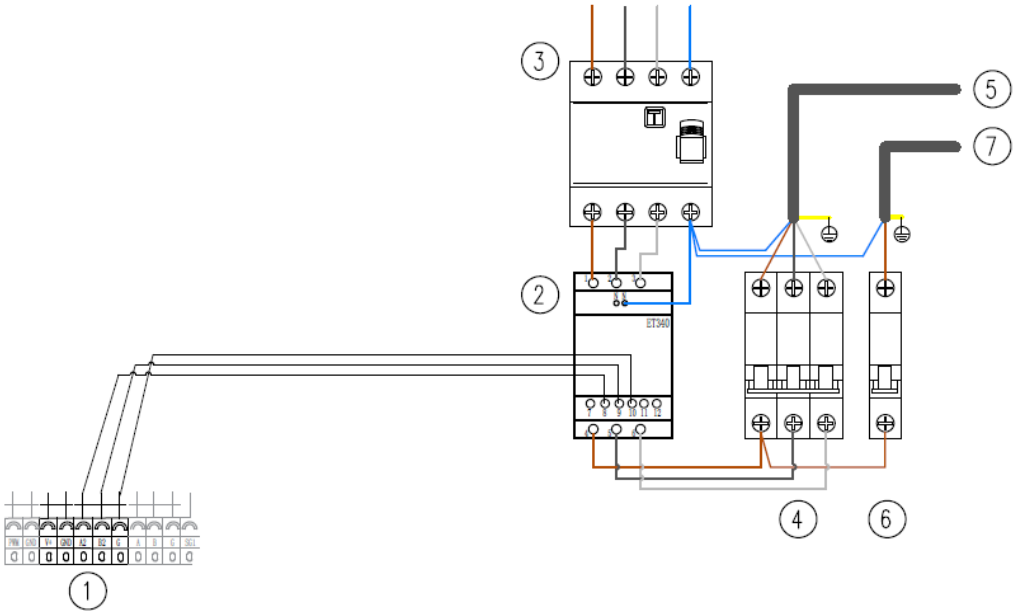


Figure 16: ET340 connection, ES MCB

1	Indoor unit terminals – communication	5	Power supply to the outdoor unit
2	Electrical meter EM 3P (ET340)	6	Fuse for the indoor unit
3	RCD (residual-current device)	7	Power supply to the indoor unit
4	Fuse for the outdoor unit (1 PH or 3 PH – model dependant)		

EM 3P (ET340)	Indoor unit, PCBA board
8	A2
9	B2
10	G

EM 1P (ET112), connection for model ES MCB

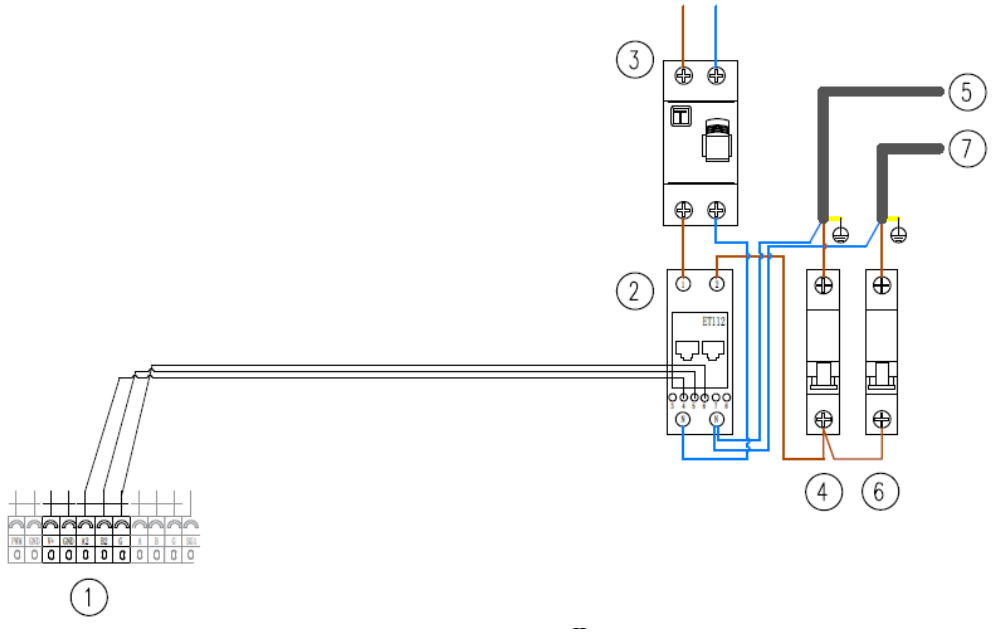


Figure 17: ET112 connection, ES MCB

1	Indoor unit terminals - communication	5	Power supply to the outdoor unit
2	Electrical meter EM 1P (ET112)	6	Fuse for the indoor unit
3	RCD (residual-current device)	7	Power supply to the indoor unit
4	Fuse for the outdoor unit		

EM 1P (ET112)	Indoor unit, PCBA board
4	A2
5	B2
6	G

NOTE

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

It is also possible to connect both the wireless thermostat and the electrical meter in combination, see Section 14.2.2 "Connection of wireless thermostat and electrical meter".

14.1.3 Activating the electrical meter

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

1 Go to the ***Installer settings*** menu.

2 Enter the four-digit installer PIN code.

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

Parameter	Description
Commissioning	
Commissioning	Tap to enter the **Commissioning** menu.
Alarms	
Active alerts	Tap to view the **Active alerts** list for installers.
Alert history	Tap to view the **Alert history** list.
Manual mode	
Manual mode	Tap to enter the **Manual mode** menu.
Electric grid protection	
Electric grid protection	Tap the switch symbol to activate or deactivate the function.  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.
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 threshold for additional heating source to activate.
Heat balance threshold for heating	Heat balance threshold 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
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.

14.2 Wireless thermostat

14.2.1 Connection to RF Gateway

EM 1P (ET112)	Indoor unit, PCBA board	Additional info on the cable
A	Yellow	Modbus connection +
B	Green	Modbus connection -
V	Brown	Power supply 12 VDC+
G	White	Power supply 0 VDC-

RF Gateway connection to ES MHB, ES M100L ST, ES M100L ST UK, ES M250L ST, ES M250L ST UK

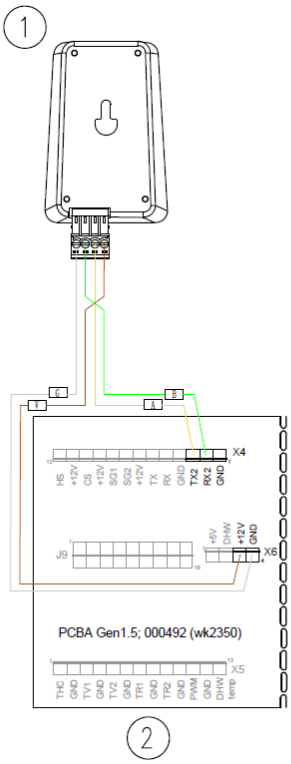


Figure 18: RF Gateway connection for ES MHB, ES M100L ST, ES M100L ST UK, ES M250L ST, and ES M250L ST UK

1	RF Gateway	2	Indoor unit, PCBA board connections, communication

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

RF Gateway connection to ES MCB

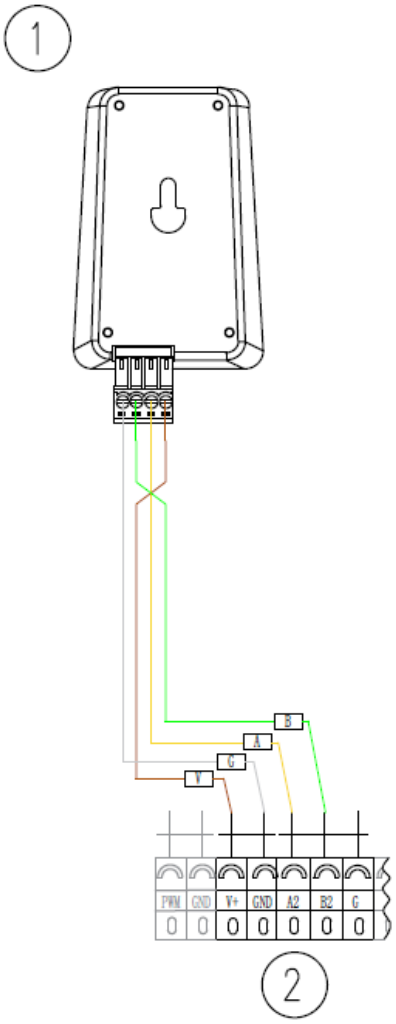


Figure 19: RF Gateway connection for ES MCB

1	RF Gateway	2	Indoor unit - terminal connections - communication

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

14.2.2 Connection of wireless thermostat and electrical meter

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

RF Gateway and electrical meter EM 3P (ET340) – connection for ES MHB, ES M100L ST, ES M100L ST UK, ES M250L ST, ES M250L ST UK

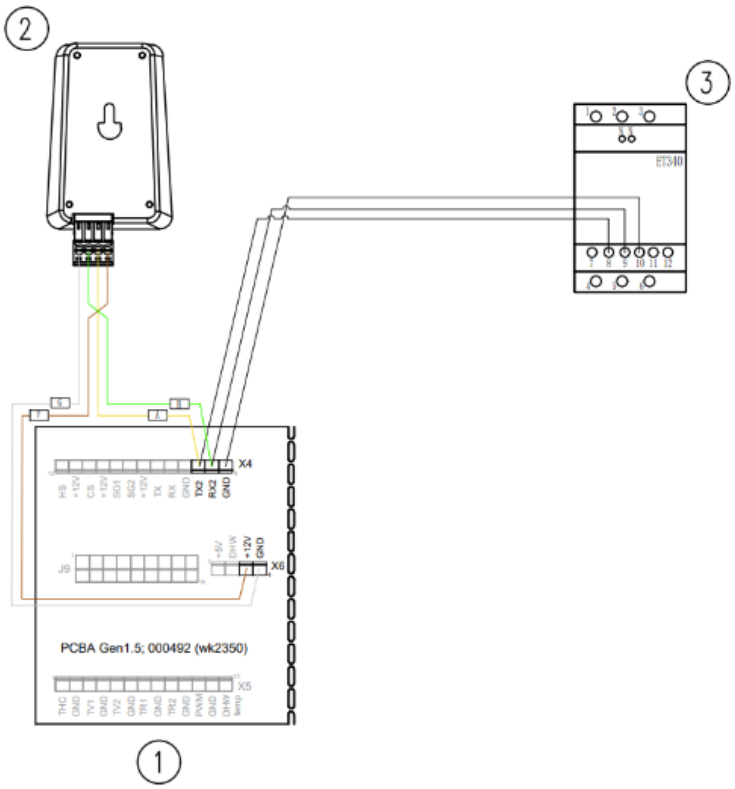


Figure 20: RF Gateway and EM 3P (ET340) connection for ES MHB, ES M100L ST, ES M100L ST UK, ES M250L ST, ES M250L ST UK

1	Indoor unit – PCBA board connections - communication	3	Electrical meter ET340
2	RF Gateway		

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

EM 3P(ET340)	Indoor unit, PCBA board
8	TX2
9	RX2
10	GND

RF Gateway and electrical meter EM 3P (ET340)– connection for ES MCB

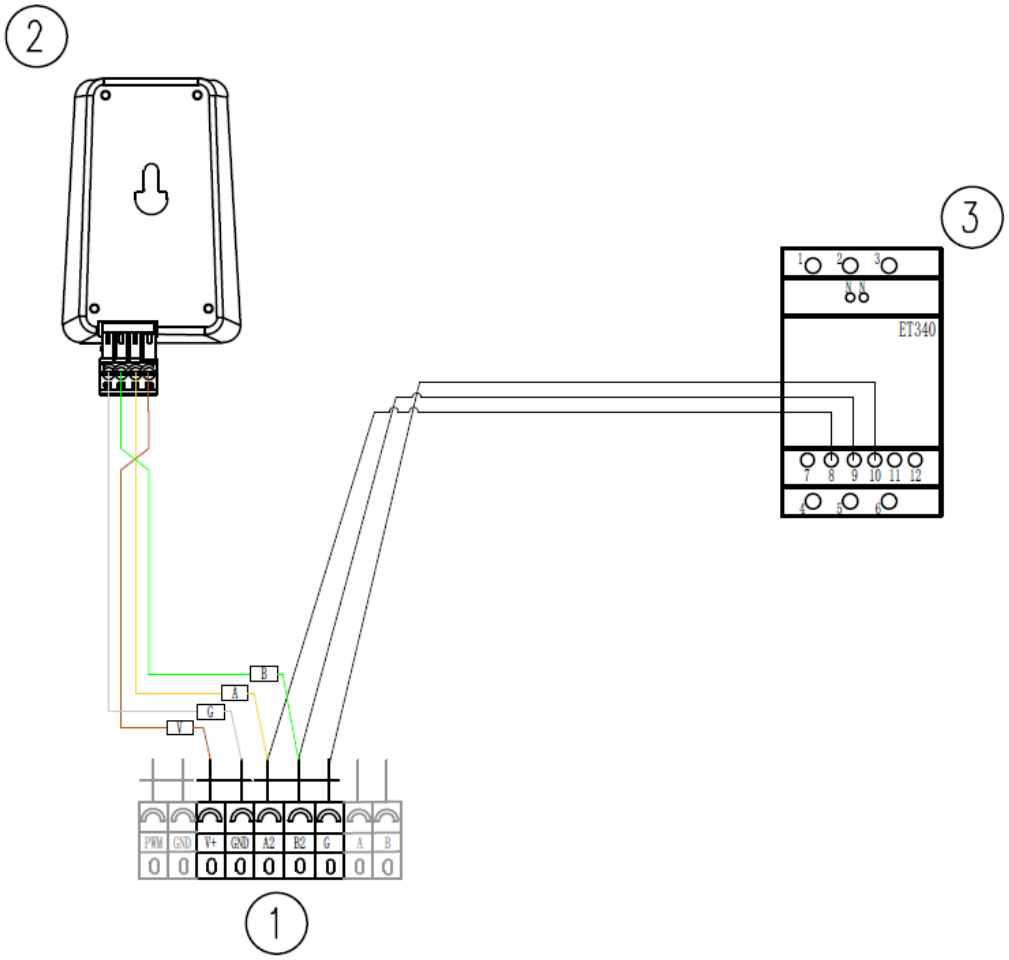


Figure 21: RF Gateway and EM 3P (ET340) connection for ES MCB

1	Indoor unit terminals – communication	3	Electrical meter EM 3P (ET340)
2	RF Gateway		

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

EM 3P (ET340)	Indoor unit, terminal connections
8	A2
9	B2
10	G

RF Gateway and electrical meter EM 1P (ET112) – connection for ES MCB

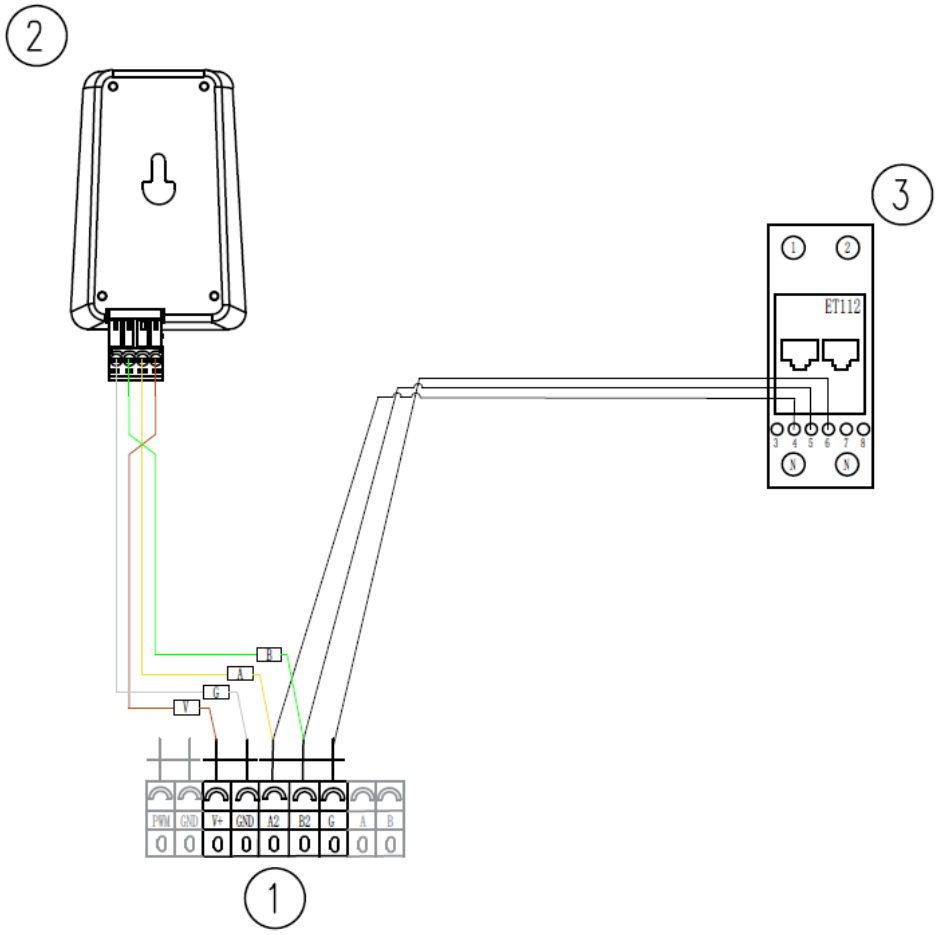


Figure 22: RF Gateway and EM 1P (ET112) connection for ES MCB

1	Indoor unit terminals – communication	3	Electrical meter ET340
2	RF Gateway		

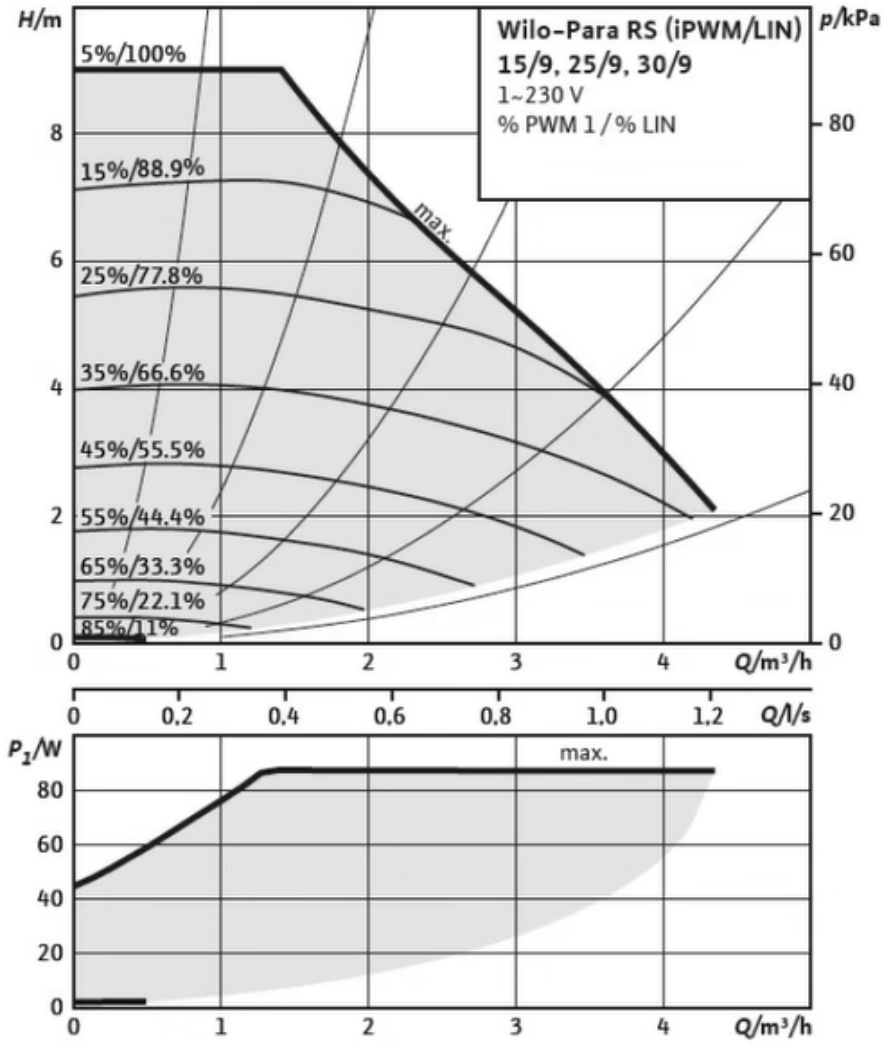
RF Gateway	Indoor unit, terminal connections
Yellow (A)	A2
Green (B)	B2
Brown (V)	V+
White (G)	GND

EM 1P (ET112)	Indoor unit, terminal connections
4	A2
5	B2
6	G

15 Appendix D: Circulation pump performance data

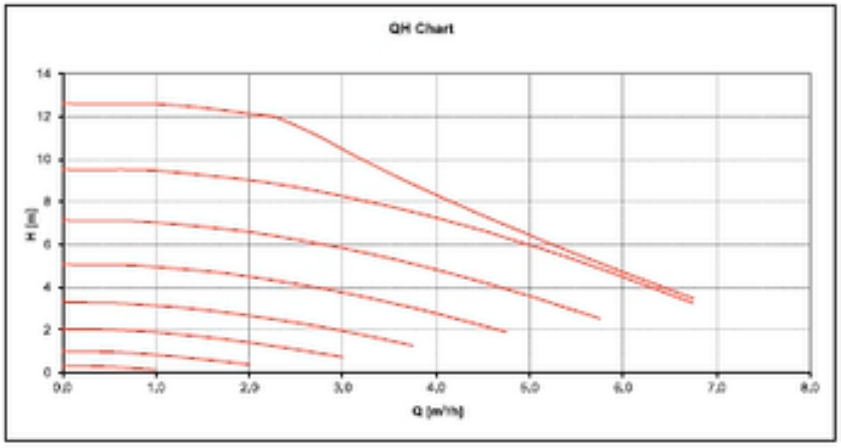
15.1 Wilo Para 25-130/9-87/IPWM1

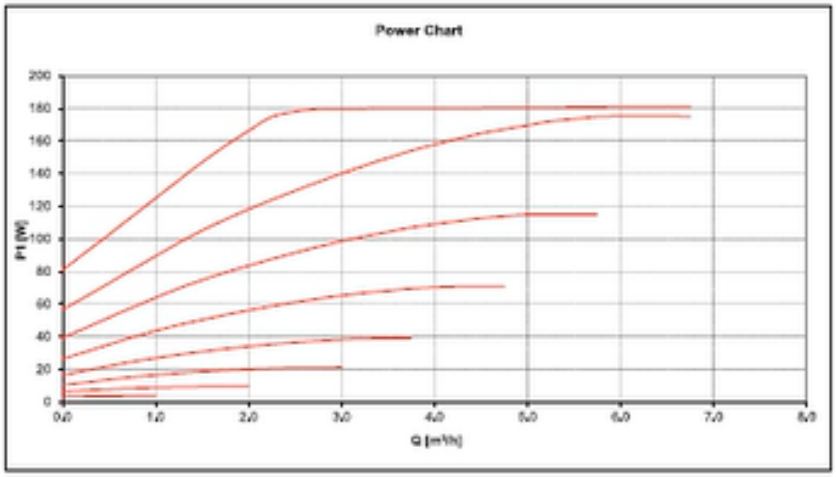
This circulation pump is used in the ES M8 R290 and ES M12 R290.

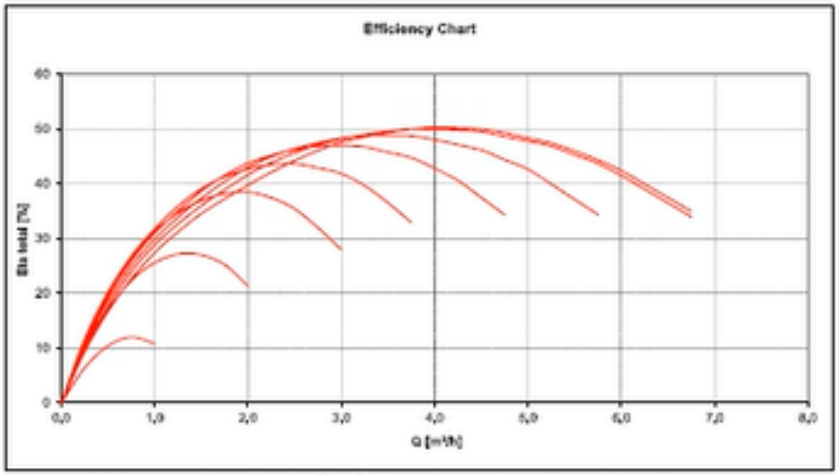


15.2 Grundfos UPMXL GEO 25-125 130P PWM

This circulation pump is used in the ES M15 R290 1 PH and ES M15 R290 3 PH.

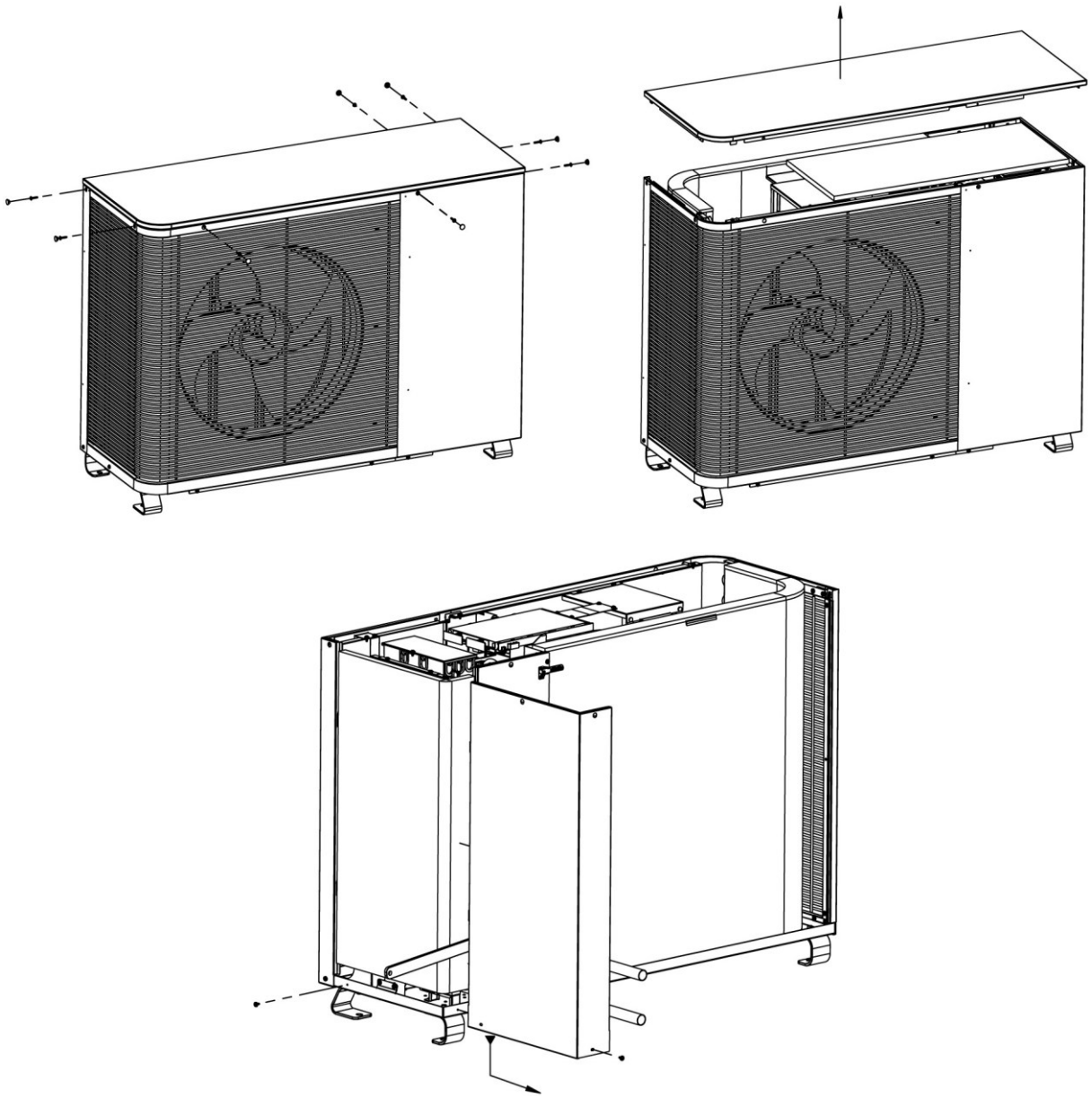


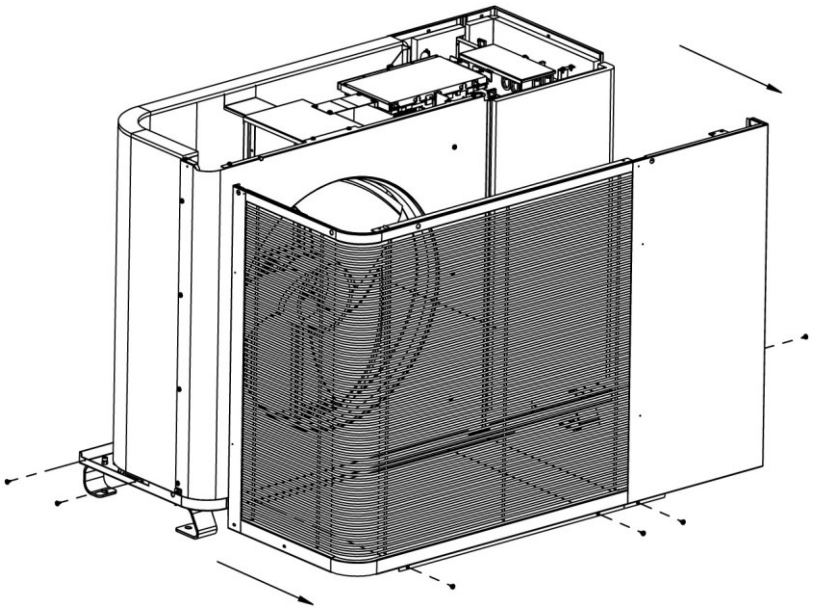


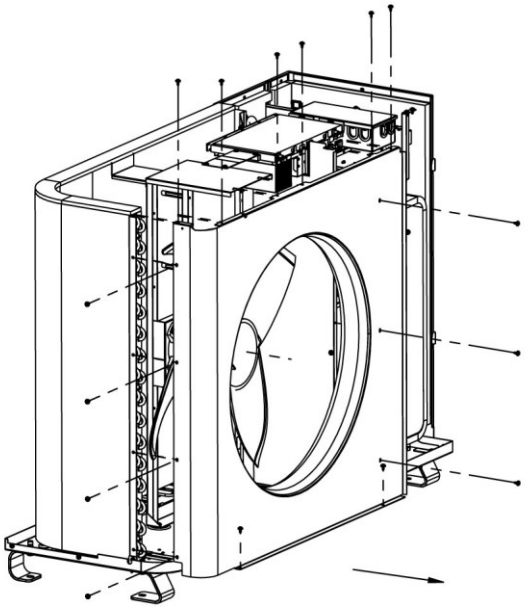


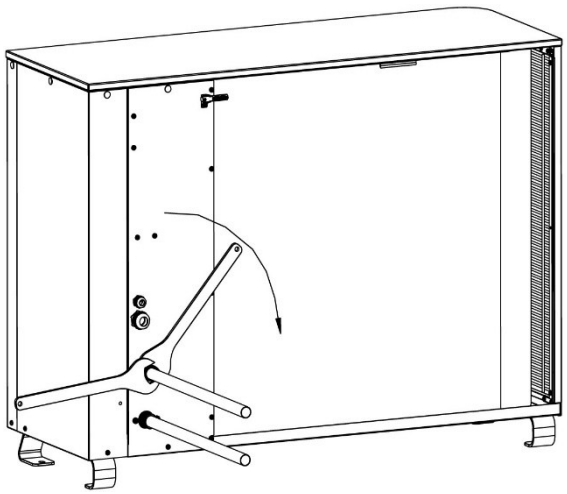
16 Appendix E: Removal descriptions

16.1 Removing panels for ES M8 R290

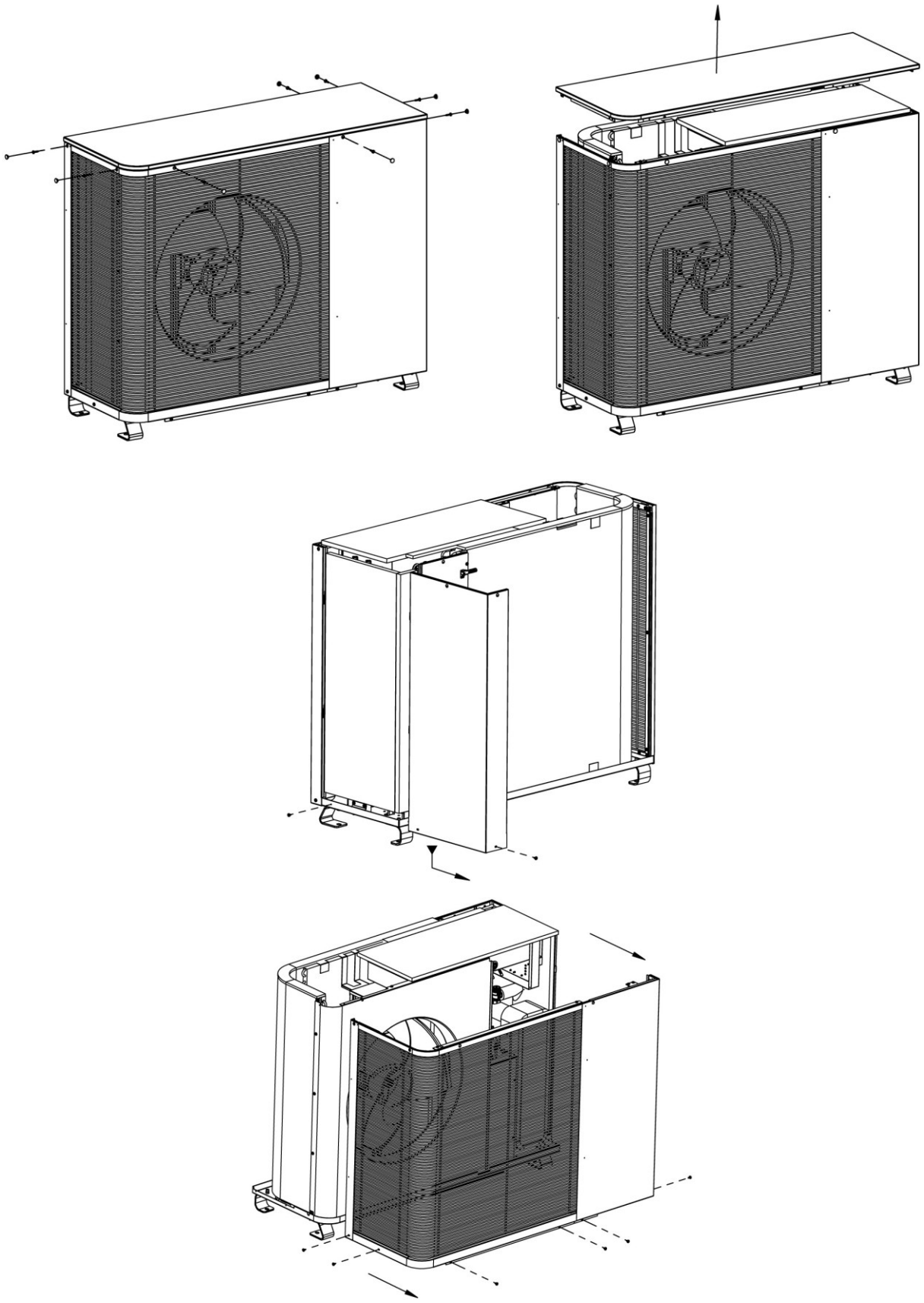


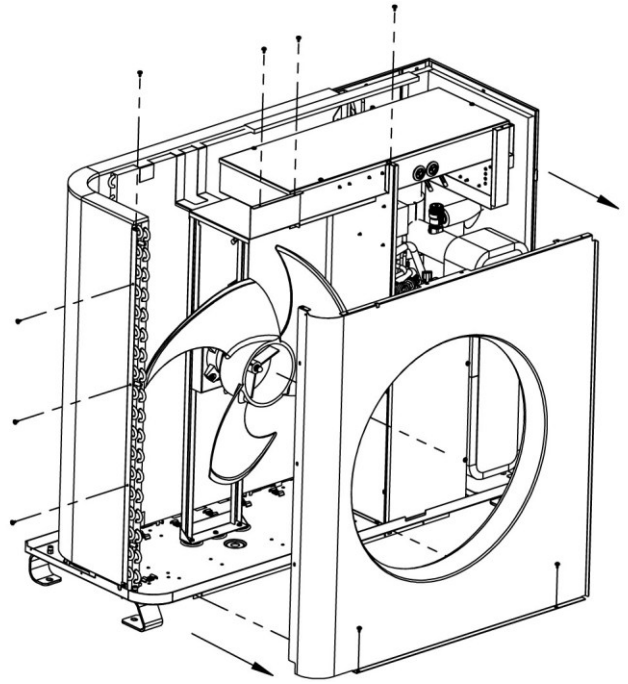


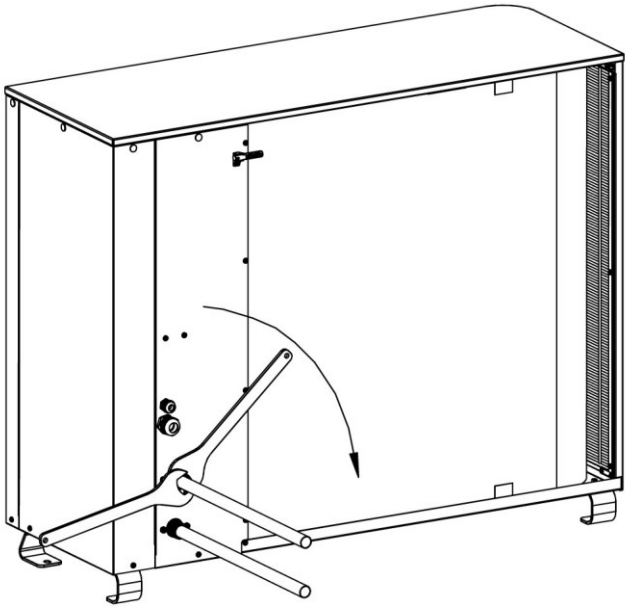




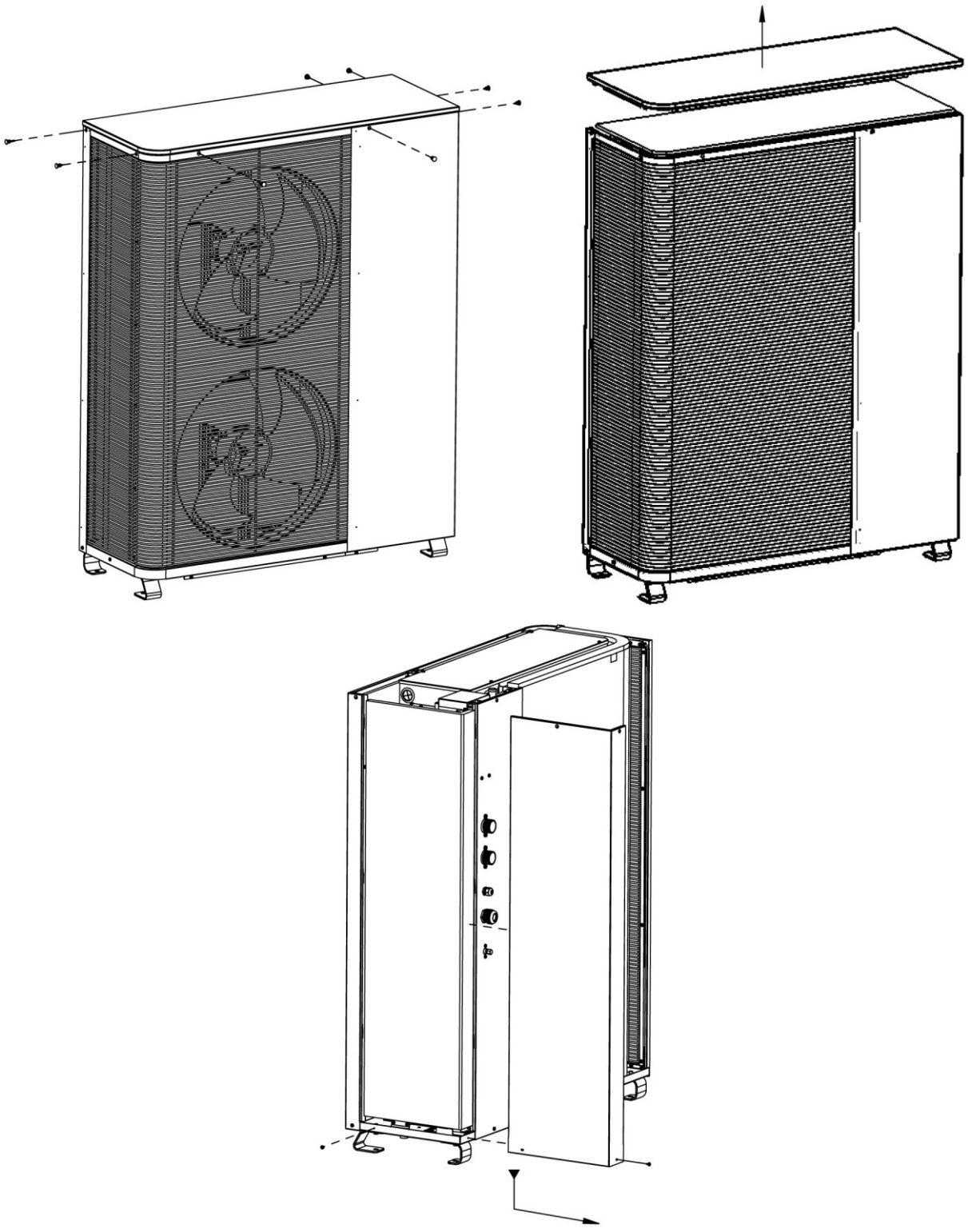
16.2 Removing panels for ES M12 R290

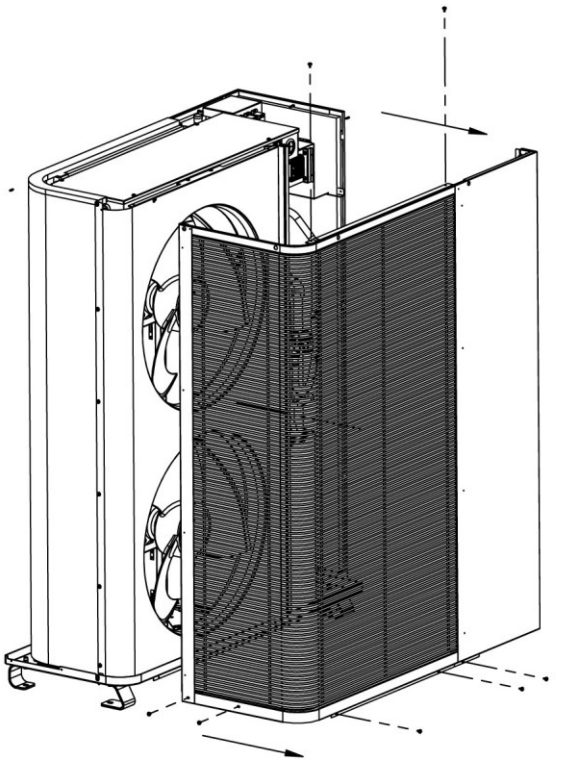


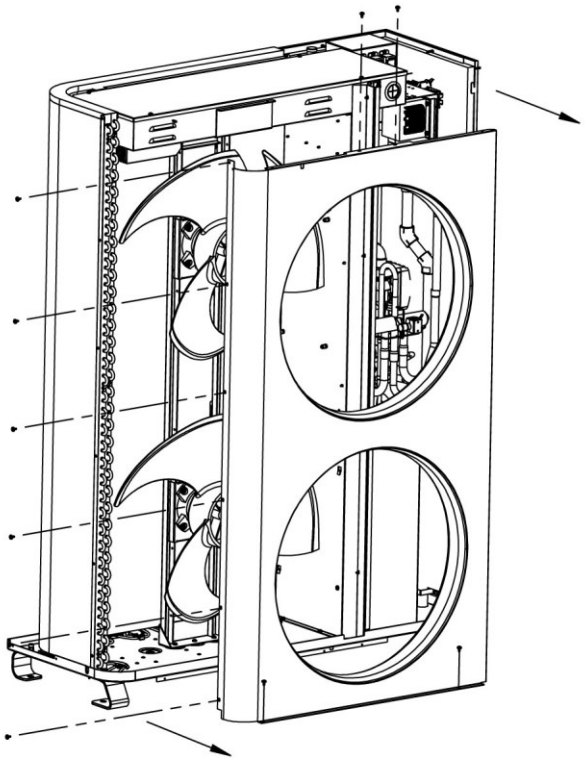


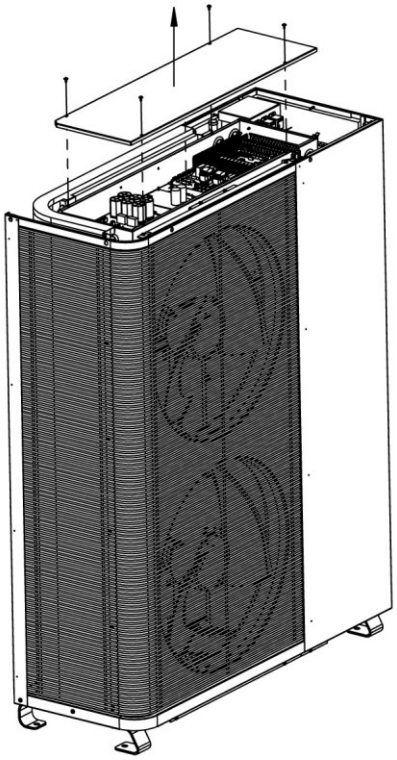


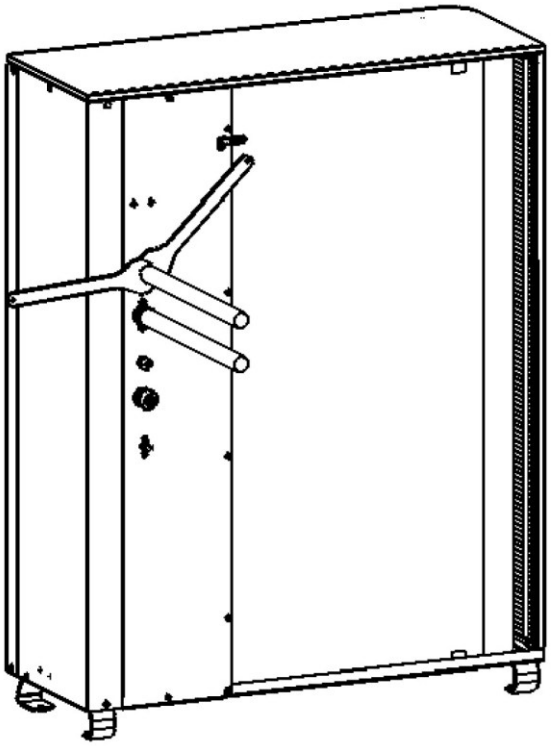
16.3 Removing panels for ES M15 R290









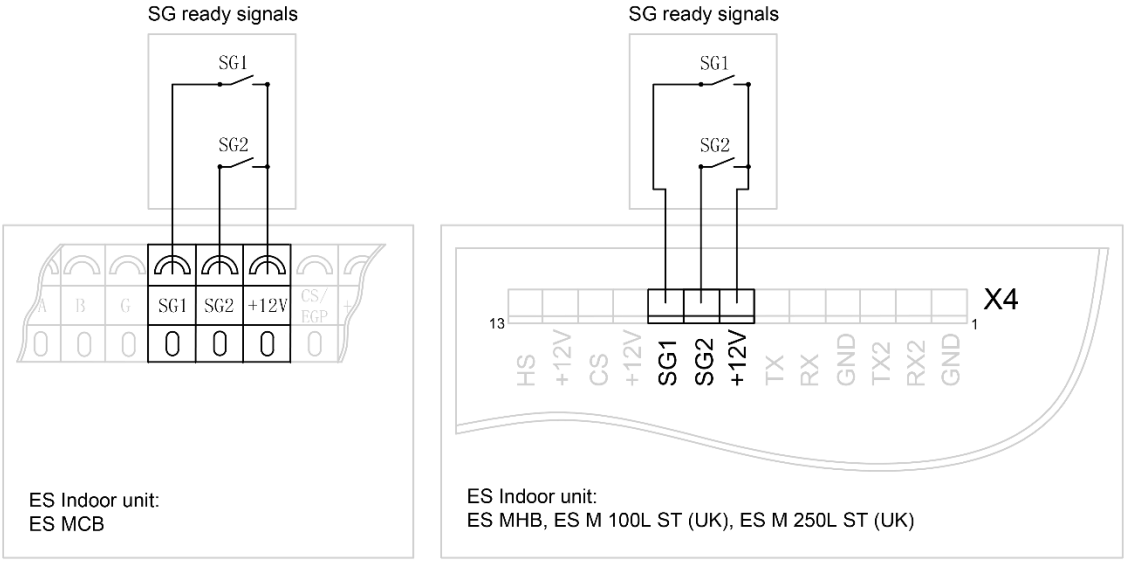


17 Appendix F: SG Ready – Detailed Information

SG Ready	The SG ready function has 4 operation modes: - Mode 1 – **Normal operation** (SG1:0; SG2:0). - Mode 2 – **Blocked operation** (SG1:1; SG2:0): The operation for the heat pump is blocked for a maximum of two hours per day and not more than 3 times a day. - Mode 3 – **Encouraged operation** (SG1:0; SG2:1). - Mode 4 – **Forced operation** (SG1:1; SG2:1). Each mode is active min 10min, even if signal disconnects and any next mode start is delayed for 10 min. All modes need a closing signal (NO – Normally Open).
Encouraged operation temperature settings	The primary purpose is to store surplus electricity as thermal energy. The function will: - In DHW mode: Increase the DHW tank temperature based on **user setting.** - In heating mode: Increase the buffer tank temperature based on **user setting.** - In cooling mode: Decrease the buffer tank temperature based on **user setting.** **Settings**: - **DHW delta** → set how much to increase the DHW temperature. - **Buffer tank delta**: **Heating** → set how much to increase the Buffer tank temperature in heating mode. - **Buffer tank delta**: **Cooling** → set how much to decrease the Buffer tank temperature in cooling mode. When digital signal is active, the **Encouraged operation** is **active!** **Connections** in the indoor units (all models): SG1, +12V The digital signal needs to have a **potential free contact!**
Forced operation temperature settings	The primary purpose is to store surplus electricity as thermal energy. The function will: - In DHW mode: Increase the DHW tank temperature based on **user setting.** - In heating mode: Increase the buffer tank temperature to the max limit (*Flow temperature max limit – heating*). - In cooling mode: Decrease the buffer tank temperature to the min limit (*Flow temperature min limit – cooling*). - In heating mode: Increase the supply line temperature based on **user setting.** - In cooling mode: Decrease the supply line temperature based on **user setting.** - In heating and DHW mode: turn ON the electrical additional heating sources – user setting (enable/disable). **Settings**: - **DHW delta** → set how much to increase the DHW temperature. - **Supply line delta**: **Heating** → set how much to increase the supply line temperature in heating mode. - **Supply line delta**: **Cooling** → set how much to decrease the supply line temperature in cooling mode. - **Allow additional heating sources** → enable or disable the electrical additional heating sources to run during active function. **Connections** in the indoor units (all models): SG2, +12V The digital signal needs to have a **potential free contact!**

17.1 SG Ready wiring explanation

SG1:0; SG2:0 → **Normal operation**
SG1:1; SG2:0 → **Blocked operation**
SG1:0; SG2:1 → **Encouraged operation**
SG1:1; SG2:1 → **Forced operation**



18 Appendix G: KEYMARK

18.1 Keymark approved units and combinations

KEYMARK is a European certification showing that the units and their approved combinations have been independently tested to meet EU standards for quality and performance.

Registration number	Subtype	Model
007-DQ0202	Air/water HP R290 Monobloc outdoor unit 230 V 8 kW	ES M8 R290 HP 8kW R290
007-DQ0203	Air/water HP R290 Monobloc outdoor unit 230 V 8 kW + Air/water/tank 6-12 kW Monobloc indoor unit	ES M8 R290 + ES M100L ST ES M8 R290 + ES M100L ST UK HP 8kW R290 + HP M100L ST HP 8kW R290 + HP M100L ST UK
007-DQ0204	Air/water HP R290 Monobloc outdoor unit 230 V 8 kW + Air/water/tank 6-15 kW Monobloc indoor unit	ES M8 R290 + ES M250L ST ES M8 R290 + ES M250L ST UK HP 8kW R290 + HP M250L ST HP 8kW R290 + HP M250L ST UK
007-DQ0205	Air/water HP R290 Monobloc outdoor unit 230 V 12 kW	ES M12 R290 HP 12kW R290
007-DQ0206	Air/water HP R290 Monobloc outdoor unit 230 V 12 kW + Air/water/tank 6-12 kW Monobloc indoor unit	ES M12 R290 + ES M100L ST ES M12 R290 + ES M100L ST UK HP 12kW R290 + HP M100L ST HP 12kW R290 + HP M100L ST UK
007-DQ0207	Air/water HP R290 Monobloc outdoor unit 230 V 12 kW + Air/water/tank 6-15 kW Monobloc indoor unit	ES M12 R290 + ES M250L ST ES M12 R290 + ES M250L ST UK HP 12kW R290 + HP M250L ST HP 12kW R290 + HP M250L ST UK
007-DQ0208	Air/water HP R290 Monobloc outdoor unit 400V/3N 15 kW	ES M15 R290 3PH HP 15kW R290 3PH
007-DQ0209	Air/water HP R290 Monobloc outdoor unit 400V/3N 15kW + Air/water/tank 6-15 kW Monobloc indoor unit	ES M15 R290 3PH + ES M250L ST ES M15 R290 3PH + ES M250L ST UK HP 15kW R290 3PH + HP M250L ST HP 15kW R290 3PH + HP M250L ST UK

007-DQ0210	Air/water HP R290 Monobloc outdoor unit 230V 15 kW	ES M15 R290 1PH HP 15kW R290 1PH
007-DQ0211	Air/water HP R290 Monobloc outdoor unit 230V 15 kW + Air/water/tank 6-15 kW Monobloc indoor unit	ES M15 R290 1PH + ES M250L ST ES M15 R290 1PH + ES M250L ST UK HP 15kW R290 1PH + HP M250L ST HP 15kW R290 1PH + HP M250L ST UK

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