



Original operating instructions

WP Max-AirMono F15

As of March 2026

INFORMATION

These operating instructions form part of the technical documentation for the device in accordance with:

- Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
- Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment

These operating instructions are intended for the operator and must be provided to staff who come into contact with the equipment. The operator must ensure that the information contained in the operating instructions and the accompanying documents is read and understood.

NOTE

In case of the slightest doubt, the operating instructions must be consulted and kept in a known and easily accessible place.

The manufacturer accepts no liability for damage to persons, animals, property or the equipment itself resulting from:

- improper use,
- failure to observe instructions,
- insufficient attention

the safety criteria contained herein, or caused by:

- modification of the device,
- the use of unsuitable spare parts.

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ratiotherm

Smart Energy Systems

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For ease of reading, the generic masculine form is used in this original operating manual. The terms used to refer to persons apply to all genders.

Date: 07/10/2024

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1. INFORMATION ABOUT THE DOCUMENT

The following notes serve as a guide to the complete documentation. Additional documents apply in conjunction with these operating instructions. These operating instructions for the specialist installer form an integral part of the ratiotherm WP Max-AirMono F15 heat pump. The ratiotherm WP Max-AirMono F15 air source heat pump must not be operated without this document.

The operating instructions must be made available to the operator and the specialist installer at all times for reference. If the ratiotherm WP Max-AirMono F15 heat pump is sold, the instructions must be supplied with it. ratiotherm GmbH & Co. KG accepts no liability for damage resulting from failure to observe these instructions.

1.1 SAFETY AND WARNING NOTICES

Signal words and colours

The following signal words are based on DIN ISO 3864-2 and are used in this documentation. The safety colours have been adopted from the DIN ISO 3864-1 standard. The design complies with DIN EN 82079-1 and ANSI Z 535.4.

Signal word	Explanation
DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, may result in minor injury or damage to property.
NOTE	Indicates tips for easier operation and cross-references. A note excludes the risk of property damage or injury.

1.2 SAFETY SIGNS

1.2.1 OTHER SYMBOLS IN ACCORDANCE WITH DIN EN ISO 7010

Some of the following special safety symbols in accordance with DIN EN ISO 7010 and DIN ISO 3864 are used at the relevant points in this operating manual and require special attention depending on the combination of signal word and graphic symbol. Please note the distinction between:

- Mandatory signs ⇨ prescribe an action (e.g. use eye protection).
- Warning signs ⇨ depict a source of danger and accompany a warning message.
- Prohibition signs ⇨ prohibit certain actions.

Symbol	Explanation	Symbol	Explanation
	General warning sign		Warning of flammable substances
	Warning of electrical voltage		General prohibition sign
	Warning of hot surfaces		No entry
	Follow instructions		General mandatory sign
	Disconnect before maintenance or repair		Use hand protection

12.2 OTHER SIGNS IN ACCORDANCE WITH DIN ISO 7000

Symbol	Explanation	Symbol	Explanation
	Refer to the user manual (operating instructions)		Service display, Refer to the user manual (operating instructions)
	Instructions use/Operating instructions		

12.3 OTHER SYMBOLS

Symbol	Explanation	Symbol	Explanation
	Recycling		Dispose of packaging material in accordance with regulations

2. IDENTIFICATION AND NOTES

2.1 PRODUCT DATA

Product name: Heat pump (air/water) Type:
WP Max-AirMono F15

Year of manufacture: see type plate

Country of origin: Germany

2.2 INTENDED USE

The WP Max-AirMono F15 unit utilises heat from the ambient air to provide direct heating support and hot water supply. Any other or extended use of the unit is considered improper and therefore inappropriate. In such cases, the unit's safety and protective functions may be compromised. ratiotherm GmbH & Co. KG accepts no liability for any damage resulting therefrom. Intended use also includes:



- following all instructions in this operating manual,
- observing all warnings, and
- adhering to the inspection and maintenance requirements.

The WP Max-AirMono F15 unit is state-of-the-art and manufactured in accordance with recognised safety standards. The unit is intended exclusively for domestic and/or commercial use for hot water production (domestic hot water) and for heating or cooling.



Improper or unauthorised use may result in danger to the life and limb of the user or third parties. Furthermore, damage to the appliance and other property may occur. The WP Max-AirMono F15 unit is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or by persons with a lack of experience and/or knowledge. The risk is borne solely by the operator and the owner.

2.3 TARGET GROUPS

For safety reasons, the design of the device does not permit use by persons with disabilities (e.g. visual impairments).

DANGER Only carry out tasks for which  you are authorised.

2.3.1 TARGET GROUP MATRIX

Tasks	Operators and users	Qualified personnel
Transport/storage		X
Assembly/installation		X
Commissioning/Adjustment		X
Automatic operation (control)	X	X
Set-up/conversion/technical modification		X
Maintenance/inspections/repairs		X
Cleaning	X	X
Troubleshooting/Fault rectification		X
Decommissioning/Dismantling/Disposal		X

2.3.2 TARGET AUDIENCE

Users and operators

A person who has purchased the appliance for use in an existing system for direct heating support and hot water production. The person must have knowledge of the necessary safety devices and protective measures.

Qualification: Of legal age and physically/mentally capable of carrying out work on the appliance

Knowledge of how to operate the product, provided by qualified personnel and the operating instructions

Qualified personnel

A person employed by a qualified specialist company for heating systems and hot water supply. The qualified personnel must have acquired specialist knowledge and experience through professional training. The person must have knowledge of relevant standards, be able to assess the tasks assigned to them (e.g. instructing staff, switching on, programming and switching off) and identify potential hazardous situations.

Qualifications: Of legal age and physically/mentally capable of carrying out work on the appliance

Knowledge and several years' experience in working on heating and hot water systems

2.4 INCORRECT USE

2.4.1 REASONABLY FORESEEABLE MISUSE

Reasonably foreseeable misuse that poses a risk to personnel, third parties or the appliance applies to all operating modes:

- Using the device for purposes other than those for which it is intended
- Using components that are not certified by the manufacturer
- Operating the device outside its physical operating limits
- Modifying the control software without prior consultation with ratiotherm GmbH & Co. KG
- Modifications to the device, as well as additions and alterations, without prior consultation with ratiotherm GmbH & Co. KG
- Operating the device contrary to the provisions of the risk assessment
- Bypassing or deactivating protective and safety devices
- Operating the device with obvious faults
- Operation of the device by persons with reduced physical, sensory or mental capabilities, or by children



DANGER

Unauthorised modifications to the device

Unauthorised modifications pose a risk of death or injury.

Do not make any unauthorised modifications to the appliance without prior approval from ratiotherm GmbH & Co. KG.

2.4.2 UNFORESEEABLE MISUSE/IMPROPER USE

Unforeseeable misuse may occur as a result of:

- disasters,
- the impact of foreign objects and/or
- force majeure.

2.5 WARRANTY, LIABILITY, GUIDELINES, STANDARDS AND LAWS

The “General Terms and Conditions of Sale and Delivery” of ratiotherm GmbH & Co. KG apply in all cases. The “General Terms and Conditions of Sale and Delivery” are made available to the operator no later than upon conclusion of the contract. Warranty and liability claims for personal injury and property damage are excluded if the damage is attributable to one or more of the following causes:

- Improper use of the device
- Improper handling of the device
- Operation of the device with defective safety devices
- Failure to observe the safety and warning instructions in the operating instructions
- Unauthorised structural modifications to the device
- Failure to carry out the specified maintenance measures
- Disasters involving foreign objects or force majeure

The operating instructions must be read before handling the device. The operating instructions familiarise staff with the handling of the device and provide details on all stages of the device’s life cycle.

The operating instructions must be accessible to staff at all times. The safety and warning instructions in the operating instructions and on the unit must be observed and complied with. For any further questions beyond the scope of these operating instructions, please contact ratiotherm GmbH & Co. KG.

For the use of the appliance in Germany, the following directives, standards and laws must be observed in particular:

- VDE and EVU regulations and provisions (in particular VDE 0100)
- Regulations and provisions of the local utility companies
- DVGW Worksheet W 382 “Installation and operation of pressure reducers in drinking water consumption systems”
- DIN 1988 – TRWI Technical Rules for Drinking Water Installations
- DIN 4753 – Water heating systems for drinking and service water
- DIN 8947 – Ready-to-connect heat pumps for water heating with electrically driven compressors
- Accident Prevention Regulations VGB 20 “Refrigeration Systems” with implementation instructions
- Energy Saving Ordinance (EnEV) – Ordinance on energy-saving thermal insulation and energy-saving building services engineering in buildings from 2009



NOTE

Guidelines, standards and laws

Further guidelines, standards and laws, e.g. building regulations, may apply locally. In principle, the statutory guidelines, standards and laws applicable in the respective country must be observed.

2.6 BUILDING DRYING/SCREED HEATING

The WP Max-AirMono F15 heat pump must not be used for screed drying. A heat pump is designed to heat a building efficiently. During building drying, the high moisture content in the structure requires a permanently higher heating output. The ratiotherm heat pump is not designed for this and reaches its performance limits.



NOTE

Should a ratiotherm heat pump nevertheless be used for screed heating, the warranty on the unit will lapse with immediate effect.

3. SAFETY INSTRUCTIONS

DANGER

Read and follow the operating instructions before you start working on or with the unit.

Despite all the precautions taken, residual risks that are not immediately apparent may still exist. You can reduce these residual risks by observing and adhering to the general safety instructions and warnings, as well as by using the appliance for its intended purpose.

3.1 GENERAL SAFETY INSTRUCTIONS

Observe the following general safety instructions:

- The volume of water increases during the heating process. Therefore, never block the safety valve's discharge pipe.
- Hot water may escape from the vent pipe.
- If there are any leaks in the vicinity of the unit, switch it off and isolate it from the rest of the heating system. The leaks must then be repaired immediately.
- To prevent corrosion of the appliance, do not use the following products: sprays, solvents, chlorine-based cleaning agents, paints, adhesives, etc.
- Components that have not been tested with the appliance may cause damage to the appliance or impair its functions. Use only original spare parts and original wear parts.
- Have the assembly/installation/commissioning/adjustment of the unit carried out only by qualified personnel.
- Please observe the applicable regulations, rules and guidelines, as well as local installation requirements.
- To prevent injuries of any kind, general accident prevention regulations must be observed under all circumstances and appropriate personal protective equipment must be used.
- Technical modifications to the system are not permitted. This also applies to the retrofitting of safety devices and to welding on load-bearing parts. Safety devices must not be taken out of service. Only original spare parts and original accessories from the manufacturer must be used.

3.2 ADDITIONAL INFORMATION

Local accident prevention regulations apply to all work carried out on the equipment. Furthermore, the following must be observed:

- applicable mandatory regulations on accident prevention
- recognised technical rules for safe and professional working
- existing environmental protection regulations
- other applicable regulations

The outlet temperature at the hot water taps can reach up to 60 °C. Carefully check the water temperature at the hot water taps before placing your hands fully under the water jet.

Do not make any modifications to the following components:

- Air source heat pump and the pipes for fluids and electricity;
- Safety valve;
- structural conditions that may affect the operational safety of the unit;
- structural conditions in the vicinity of the unit, insofar as these may affect the operational safety of the unit.

3.3 SAFETY INSTRUCTIONS FOR REFRIGERANT R290



WARNING

- This unit operates with the environmentally friendly refrigerant R290 (propane, ODP of 0, GWP of 0.02), which is a flammable gas and must be serviced by an authorised person.
- Fire hazard/flammable material: In the event of a refrigerant leak or if a leak is suspected, switch the unit off at the mains and contact your specialist contractor or ratiotherm customer service.
- Chemicals or flammable materials must not be stored or used near the unit.

3.4 RESIDUAL RISK



WARNING

Interventions/work carried out by unauthorised/unqualified personnel

Measures/work carried out on the unit and/or its components and connections by unauthorised/unqualified personnel pose a serious risk of injury.

In the event of a fault, allow only qualified personnel to carry out work on the device and/or its components and connections.



WARNING

Damaged insulation

Damaged insulation poses a serious risk of burns on hot and/or cold surfaces.

Protect yourself with suitable PPE (e.g. heat- and cold-resistant protective gloves). Allow hot or cold surfaces to cool down or warm up before working on them. Replace damaged insulation.



WARNING

Ignition sources in the danger zone

Ignition sources in the danger zone can cause flammable substances to ignite and/or explode.

Keep ignition sources away from the danger zone.

4. DESIGN AND FUNCTION

4.1 TECHNICAL DATA

Max-AirMono	F15	Unit
Performance data, heating mode		
L2/W35	<i>provisional</i>	
Heating capacity	2.2 to 13.1	kW
Power consumption	0.6 to 4.1	kW
COP at rated capacity	3.2 to 3.6	
Space heating energy efficiency Low-temperature applications with continuous average climatic conditions	180.10	%
Performance data, cooling mode		
W15/A35	<i>provisional</i>	
Cooling capacity	5.9 to 15.2	kW
Power consumption	0.9 to 3.7	kW
EER at rated power	5.7	
Performance data for heating mode according to EN 14511		
A7/W35 (at 40% speed)	<i>provisional</i>	
Heating capacity	7.0	kW
Power consumption	1.5	kW
COP at rated capacity	4.6	
A2/W35 (at 65% speed)	<i>provisional</i>	
Heating capacity	7.5	kW
Power consumption	2.2	kW
COP at rated capacity	3.4	
A-7/W35 (at 75% speed)	<i>provisional</i>	
Heating capacity	8.1	kW
Power consumption	2.6	kW
COP at rated capacity	3.3	
Compressor		
Type	Fully hermetic, rotary piston, inverter	
Speed	900 to 6600	rpm
Start-up current	18	A
Max. operating current	18	A
Blocking current LRA	-	A
Oil volume	1.154	L
Evaporator		
Type	Air heat exchanger	
Material	Aluminium, copper	
Air flow rate	8000	m³/h
Test pressure	35	bar
Operating range	-30 to +50	°C
min. / max. source temperature	-25 to +40	°C
Condenser		
Type	Copper-brazed plate heat exchanger	
Material	Stainless steel, copper	

Max-AirMono	F15	Unit
Water flow rate	0.5 to 3	m³/h
Pressure drop	max. 0.3	bar
Temperature difference	5 to 8	K
Test pressure	45	bar
Operating range	-196 to 200	°C
min./max. cooling temperature	25 to 75	°C
Connection size	1 inch, male	
Separate heat exchanger (optional)		
Design	Copper-brazed plate heat exchanger	
Material	Stainless steel, copper	
Water flow rate	0.5 to 3	m³/h
Pressure drop	max. 0.3	bar
Temperature difference	5 to 8	K
Test pressure	45	bar
Operating range	-196 to 200	°C
min./max. cooling temperature	25 to 75	°C
Connection size, sink	1 1/4 inch, male	
Refrigerant circuit		
Refrigerant	R290	
Filling capacity	2.2	kg
Max. operating pressure	33	bar
Safety class	A3: low toxicity, higher flammability	
Electrical: Outdoor unit		
Mains connection	400 V / 3-phase / 50 Hz	
Fuse: slow-blow	20	A
Max. operating current, compressor	18	A
Max. power consumption of compressor	7.5	kW
Electrical: Indoor unit		
Capacity of integrated heating cartridge	9 kW (3-stage, 3-6-9)	
Mains connection	400 V / 3-phase / 50 Hz	
Fuse (slow-blow)	20	A
Max. operating current	16	kW
Unit data		
Sound pressure level, outdoor unit 5 m distance (free-standing installation at A7/W55)	34	dB(A)
Sound power level, outdoor unit L-WA outdoors (for A7/W55)	55	dB(A)
Dimensions of indoor unit with heat exchanger	660 x 1175 x 202	W x H x D (mm)
Dimensions of outer section	1644 x 1090 x 795 (921 with box)	W x H x D (mm)
Weight of inner unit with partition	53	kg
Weight of outer section	~ 300	kg
Max. operating pressure (water)	6	bar
Max. VL temperature	75	°C

4.2 FUNCTIONAL DESCRIPTION

The monoblock developed by ratiotherm impresses with its high-quality workmanship and features. Thanks to the specially developed large evaporator, the bionic owl-wing fan with low speed and the highly insulated refrigeration circuit, this heat pump is extremely quiet in operation. It is highly efficient and, thanks to high flow temperatures of up to 75 °C, is also ideal for renovation projects. This efficiency is achieved through the use of the environmentally friendly and innovative refrigerant propane (R290). As a result, this generation of heat pumps protects our planet, as R290 does not deplete the ozone layer.

The outdoor unit contains the complete refrigeration circuit and can be connected to two different wall-mounted indoor units. With the standard indoor unit featuring a separation heat exchanger, the outdoor unit is connected via frost-proof pipes filled with brine. The indoor unit allows for convenient operation of the monoblock heat pump, serves as a system separator towards the storage tank or residential building, and also contains an electric heating element. The Slim indoor unit does not contain a separation heat exchanger. In this case, the sink side is directly connected to the condenser in the outdoor unit. The indoor unit includes an electric heating element and, optionally, a display for convenient operation of the heat pump; otherwise, the heat pump can be controlled via a web portal or a mobile app.

Nowadays, the ability to operate the WP Max-AirMono F15 heat pump specifically using surplus PV electricity is a given. The monoblock offers a wide range of interfaces for communication with smart meters or energy management systems. Using the heat pump makes it easy to tap into the energy reserves of the ambient air. No ground or well construction work is required. The refrigerant circuit is pre-charged and ready for operation, meaning no refrigerant certificate is required for installation. The safety valve integrated into the outdoor unit, together with the microbubble separator, ensures that, in the event of a leak, the flammable refrigerant is prevented from entering the boiler room. Thanks to the heat pump's speed control, it covers a wide range of outputs and thus adapts to various loads and conditions. Furthermore, it is ideally suited for utilising fluctuating energy supplies and enables intelligent load control across all energy sectors.



ADVANTAGES

- Simple installation without extensive excavation work
- Maximum flexibility thanks to speed-controlled inverter operation
- Integrated energy management (smart grid-compatible)
- Simple installation thanks to complete pre-assembly at the factory; no refrigeration certificate required
- With ratiotherm components, a fully coordinated, future-proof system

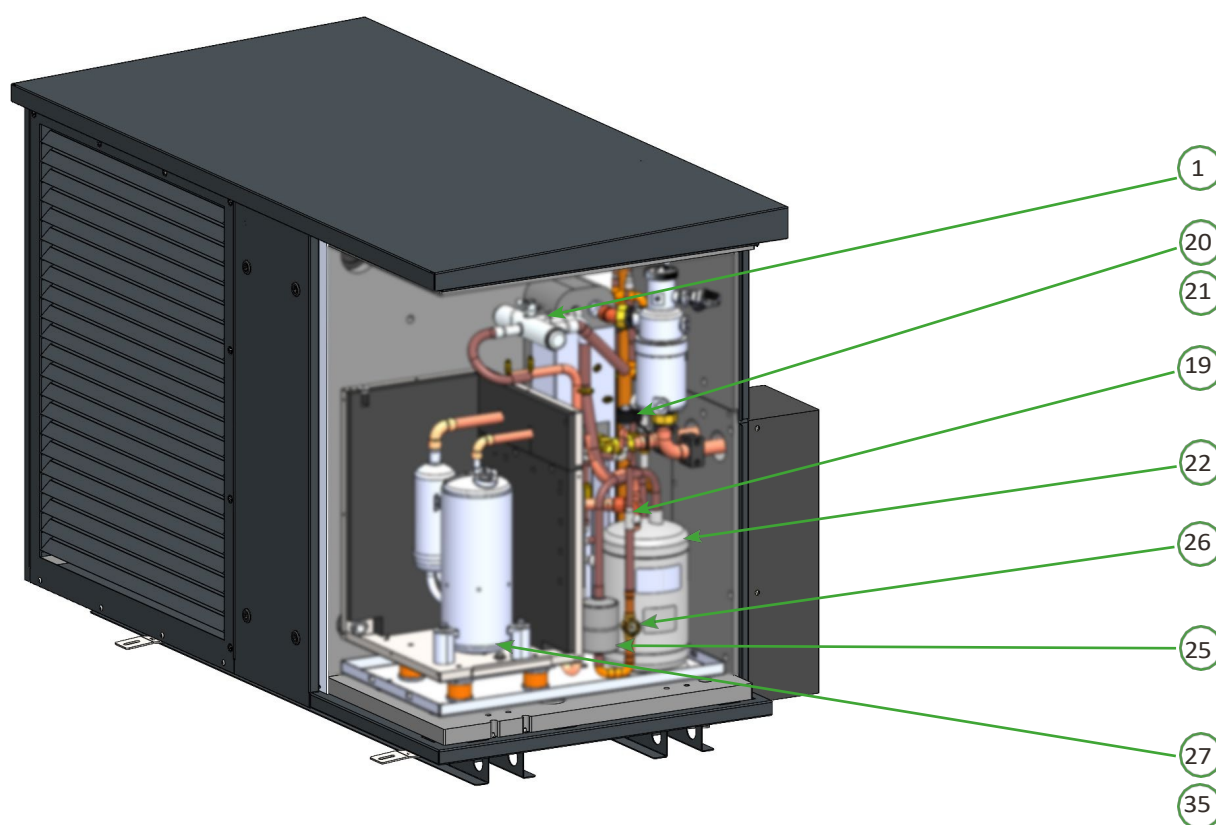
4.3 DESIGN AND SPARE PARTS

The ratiotherm WP Max-AirMono F15 air source heat pump features a complete refrigeration circuit and uses outdoor air as its primary energy source. The air source heat pump is designed to cope with all weather conditions. The outdoor unit is installed outdoors in such a way that air can flow unhindered through the evaporator and does not recirculate. An axial fan conveys the air to the evaporator.

The refrigeration circuit is a hermetically sealed system comprising a rotary piston compressor, a condenser (plate heat exchanger), an evaporator (fin-tube heat exchanger) and electronic expansion valves that control the flow of refrigerant. The natural refrigerant R290 is used. The heat pump is shipped with a fully charged refrigerant circuit and ready for operation. The unit is controlled by the UVR 610 controller from Technische Alternativen. Its display shows all parameters and operating statuses of the heat pump.

The ratiotherm WP Max-AirMono F15 air source heat pump can be operated in conjunction with most electric, gas or oil boilers.

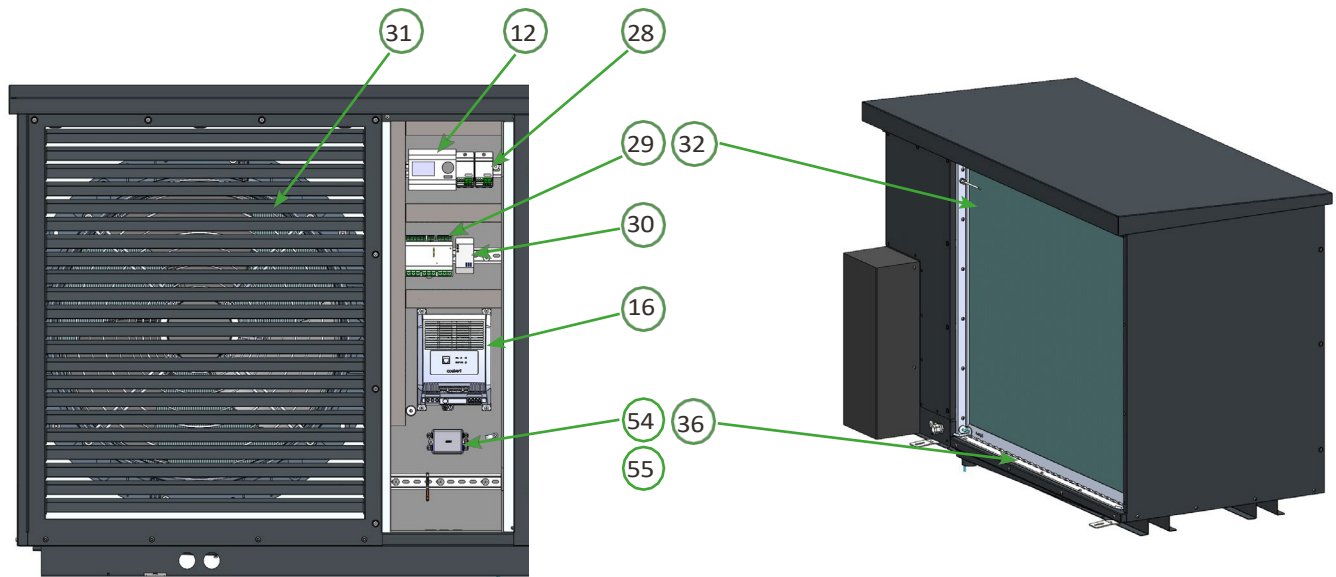
4.3.1 OUTDOOR UNIT



Housing colours

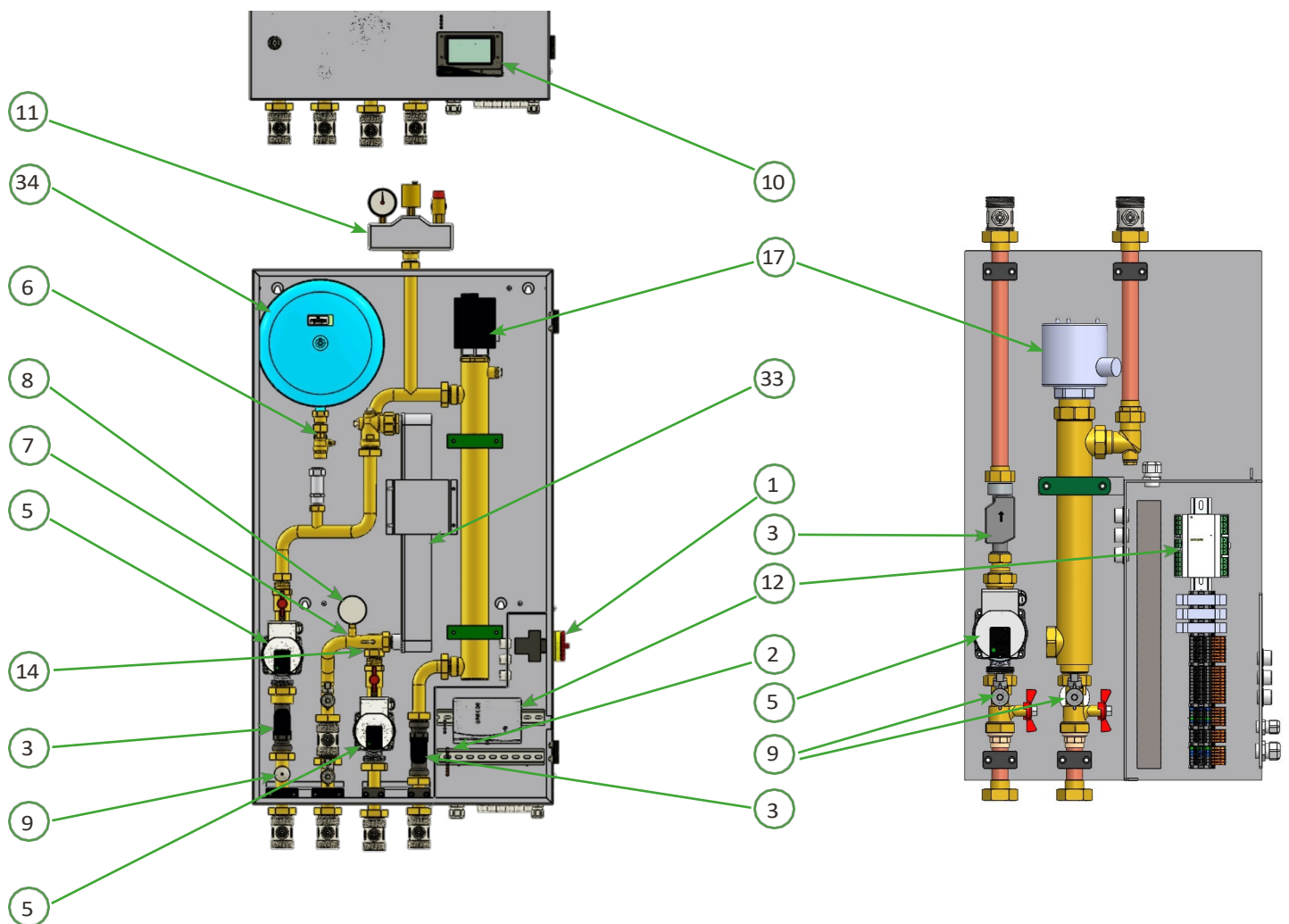
RAL 7016
Anthracite grey

RAL 9016
Traffic white



4.3.2 INDOOR UNIT WITH SEPARATE HEAT EXCHANGER

4.3.3 INDOOR UNIT WITHOUT SEPARATE HEAT EXCHANGER



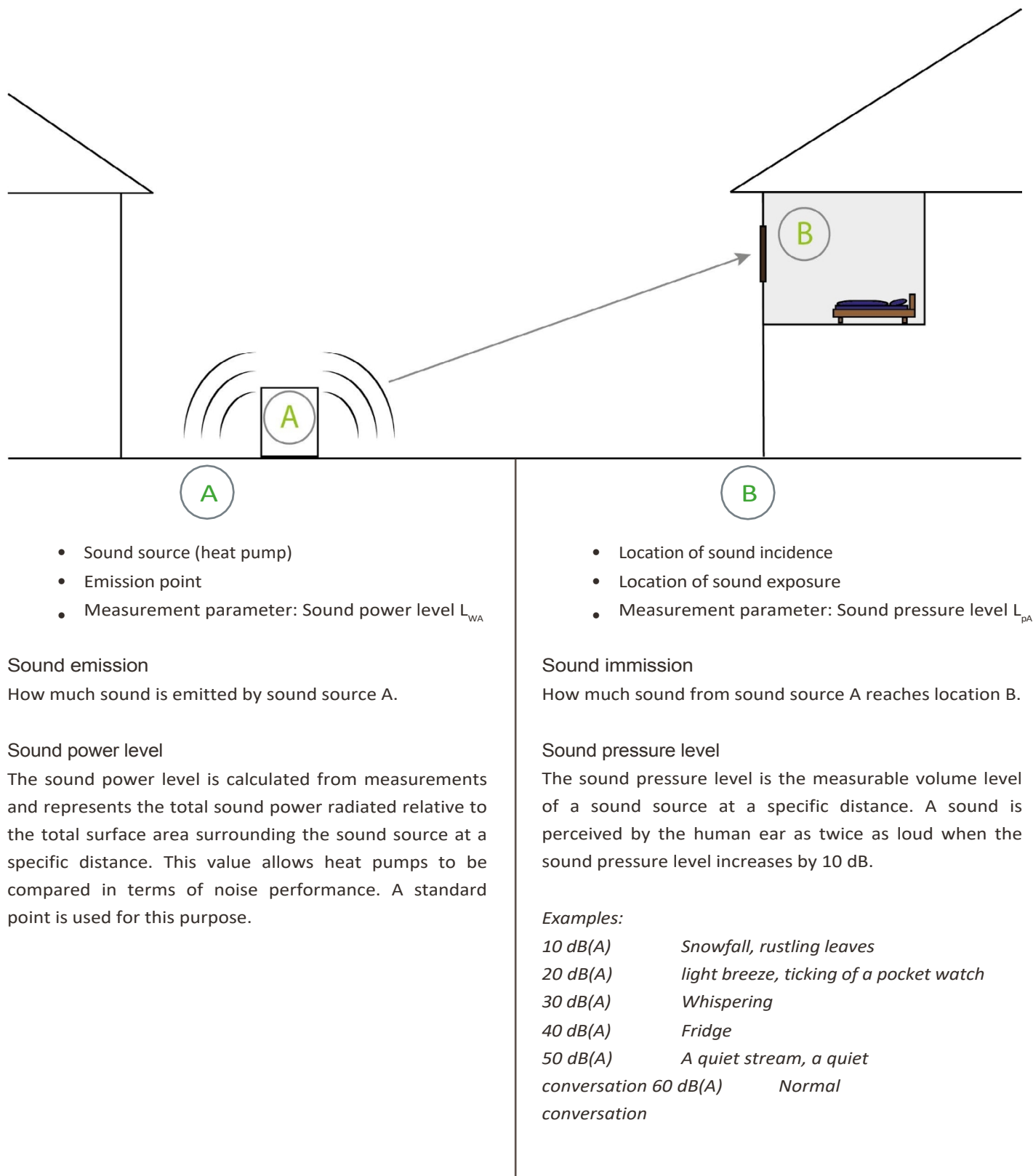
4.3.4 PARTS LIST

Item number	Description	Description	Quantity
1	Main switch	ra/14466	1
2	Terminal 2 Conductor DG	ra/13463	1
3	Air flow sensor	ra/95.85.4525	2
4	E-rod	ra/95.50.0001	1
5	Pump	ra/13310	2
6	Solar cap valve	ra/60.90.KV50	1
7	Temperature sensor	ra/13647	2
8	Pressure gauge	ra/14820	1
9	Pressure sensor	ra/11656	1
10	Screen	ra/95.103212	1
11	Security group	ra/11185	1
12	Universal controller	ra/14414	1
13	Diaphragm safety valve	ra/14712	1
14	Temperature immersion sensor	ra/13612	1
	Temperature sensor	ra/14697	2
16	Inverter	ra/14550	1
17	Filter		1
18	Filter		1
19	Check flap	ra/10528	2
20	Expansion valve	ra/13040	1
21	Expansion valve	ra/13036	1
22	Manifold	ra/14659	1
23	Reverse flap	ra/14624	2
24	4-way reversing valve	ra/10938	1
25	Filter drier	ra/14661	1
26	Sight glass	ra/14660	1
27	Compressor	ra/14418	1
28	Stepper motor control	ra/13047	2
29	UVR610S	ra/14497	1
30	Control component TDI5-DL	ra/13047	1
31	Axial fan		1
32	Evaporator		1
33	Heat exchanger		1
34	Diaphragm expansion tank		1
35	Heating tape (compressor)		1
36	Drip tray with tray heating		1

4.4 SOUND PROPAGATION IN AIR/WATER HEAT PUMPS

4.4.1 SOUND POWER LEVEL AND SOUND PRESSURE LEVEL

Every noise source emits a certain amount of sound. The parameters sound pressure level and sound power level are used to measure the airborne noise of heat pumps.



4.4.2 MEASURES TO REDUCE NOISE LEVELS

The actual noise level of an air-to-water heat pump depends on many different factors and can be significantly influenced, for example, by careful positioning.

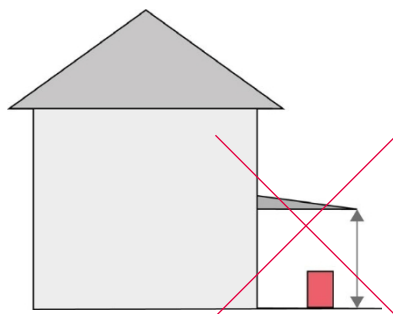
INSTALLATION LOCATION:

To keep the noise emissions from an outdoor heat pump as low as possible, the outdoor unit should be installed as far away from walls as possible. The distance to neighbouring properties must be 3 metres or more; ideally, the outdoor unit should face the street. Installation under a canopy is not recommended. If an ideal installation is not possible, increased noise levels must be expected. Examples as follows:

Installation under a canopy:

Canopy height < 5 m

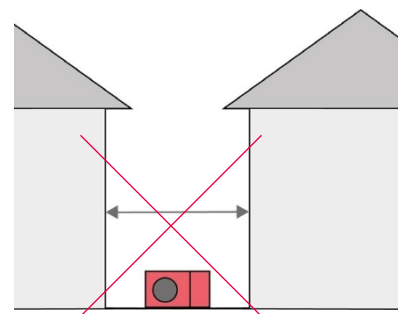
If the outdoor unit is installed under a canopy, the noise level may increase by up to 9 dB(A).



Installation between two walls:

Distance between walls < 5 m

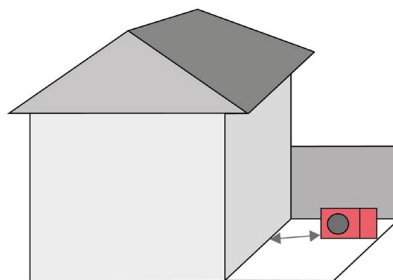
If the outdoor unit is installed between two walls, the noise level may increase by up to 9 dB(A).



Installation in a corner:

Distance to both walls < 3 m

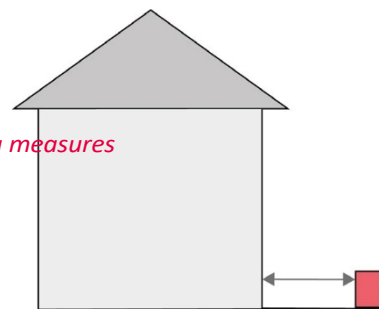
If the outdoor unit is installed in a corner, the noise level may increase by up to 9 dB(A).



Installation near a wall:

Distance from the wall < 3 m

If the outdoor unit is installed near a wall, the noise level may increase by up to 6 dB(A).



PREVENTING STRUCTURAL NOISE TRANSMISSION:

- Decoupling from the ground: We recommend installation on a level and load-bearing surface. Vibrating surfaces (e.g. wooden decking) can transmit structure-borne noise.
- Vibration-decoupled hydraulic connection: Vibrations from the heat pump can be transmitted to the building via pipework. The unit's connections must be acoustically decoupled.

SOUND-REFLECTIVE WALLS:

The smoother a wall is, the more strongly the heat pump's sound waves are reflected. Glass façades and concrete walls, among others, are particularly sound-reflective. Materials such as rock wool and plaster can help to mitigate this.

INTAKE AND EXHAUST SIDES:

The sound radiation from heat pumps is not uniform and is significantly stronger in the direction of the air discharge. The air discharge should not be directed towards rooms requiring protection. Furthermore, air should not be blown directly onto walls, as the reflection also increases the sound pressure level.

PLANTING:

Planting around the heat pump can help to reduce noise levels. Evergreen shrubs such as privet or tall grasses such as bamboo are ideal for this. They should be planted at a distance of 1.5 to 2 metres around the outdoor unit.

REQUIRED CAPACITY:

The more power a heat pump is required to deliver, the higher its sound power output. If a heat pump is undersized, this can result in it frequently having to run at full capacity, leading to increased noise emissions. A second heat generator can provide a solution.

REQUIRED TEMPERATURE:

The higher the temperatures required from a heat pump, the higher the pressure ratio that the compressor must overcome. This leads to increased noise levels. Reducing the hot water temperature or lowering the heating curve can be considered to reduce noise levels.

OUTDOOR TEMPERATURE:

The lower the outside temperature, the lower the evaporation point and the higher the noise level of the outdoor unit.

OTHER SOURCES OF NOISE/HEAT PUMPS:

If other noise sources (e.g. other heat pumps, air conditioning units) are located near the outdoor unit, the sound pressure level will increase. Example: If two outdoor units with the same noise level are installed next to each other, the level is likely to double. This leads to an increase in the perceived noise level of approximately 3 dB(A).

All information in this chapter that does not specifically relate to the ratiotherm heat pump is taken from the "Guide: Sound" published by the German Heat Pump Association (BWP) e. V. For further information on sound propagation in air-to-water heat pumps, we recommend reading this guide.

https://www.waermepumpe.de/fileadmin/user_upload/waermepumpe/08_Sonstige/Filedump/BWP_LF_Schall_2023.pdf

4.5 CONTROL LOGIC AND CONTROL

Control logic in conjunction with the ratiotherm rZR 16x2 central controller:

- The heat pump controller communicates with the rZR via CAN bus.
- The central controller activates the heat pump and sets the corresponding setpoint temperature.
- In heating mode, the heat pump regulates its output independently according to the specified setpoint temperature.
- It is therefore quite possible that the heat pump will run for very long periods at low output. This is intended and does not affect the service life.
- In domestic hot water mode, the compressor runs at a constant speed. The setpoint speed can be adjusted via a fixed value (factory setting 75%).
- Cooling is also activated by the central controller. In cooling mode, the heat pump regulates to the set outlet temperature, which is defined via a fixed value.



Control logic in conjunction with external controllers:

- The request via an external controller takes priority over the ratiotherm controllers (keyword: Power-to-Heat).
- The heat pump can be activated via a digital signal.
- A 0–10 V input is also available. If no 0–10 V signal is present, the heat pump regulates itself to a setpoint temperature. This is set via a fixed value (factory setting 50 °C).
- If a 0–10 V signal is present, the fixed value “0–10 V temperature setpoint” can be used to determine whether a setpoint speed or a setpoint temperature is transmitted (factory setting = off: 0–10 V signal is interpreted as a setpoint speed).
- The setpoint temperature is defined as: 0 V = 0 °C, 10 V = 100 °C
- A digital input is also available, which can be used to activate cooling.
- Here too, the heat pump regulates to a fixed setpoint temperature.

Internal control logic:

- The heat pump is activated via a potential-free digital signal. This triggers the pumps and valves. The compressor starts up after 45 seconds. From model year 20/45 onwards, the heat pump is also activated when a 0–10 V signal is applied to X3.2. This gives the user the choice of whether to activate the system digitally or via 0–10 V.
- Once the system is activated, the minimum running time is 5 minutes. A fault switches the system off immediately.
- The setpoint speed of the compressor or the setpoint outlet temperature (adjustable via a fixed value) can be specified by an external control unit using a 0–10 V signal.
- If no 0–10 V signal is present, the compressor runs at a constant, adjustable speed (factory setting: 75 %).
- If a 0–10 V signal of less than 1.9 V is present, the heat pump is started in cooling mode. If fitted, the 4-way valve is switched and the compressor speed is regulated to the setpoint cooling temperature.
- The compressor speed is limited during the start-up phase, which is why full speed is only reached after 4 x 1.5 minutes.
- If the temperature of the brine circuit within the condenser falls below a settable value (factory setting: 0 °C) for longer than 1 minute, the system is shut down for frost protection reasons. If the condenser temperature is above 55 °C, start-up is also prevented. Once the temperatures return to normal, the unit starts up as normal. In the case of an indoor unit without a separate heat exchanger, the return side is directly connected to the condenser; in this case, the factory setting is 8 °C.

- The condenser pump regulates based on the temperature difference between the heating flow and return (factory setting 6 K).
- If the heating flow temperature rises above 69 °C, the pump begins to increase its speed to prevent shutdown.
- If the heating flow temperature exceeds 75 °C, the system switches off automatically for 20 minutes. If the temperature drops during this time, the system restarts after the 20-minute waiting period.
- If an anomaly is detected (HD, ND, antifreeze), an error is triggered and the system is blocked for 5 or 7 minutes. This cannot be reset using the reset button! If the same error occurs three times within an hour, the system is locked. The lock can be released using the reset button.
- To prevent an anomaly, high pressure, low pressure and compressor temperature are monitored and, if necessary, the speed is reduced for at least 8 minutes.

4.6 SAFETY DEVICES

The unit is equipped with various safety devices. The safety devices are shown in the following diagram:



5. TRANSPORT, ASSEMBLY AND INSTALLATION

5.1 TRANSPORT AND UNPACKING

Storage conditions:

- Ensure that the unit is stored in a frost-free environment.

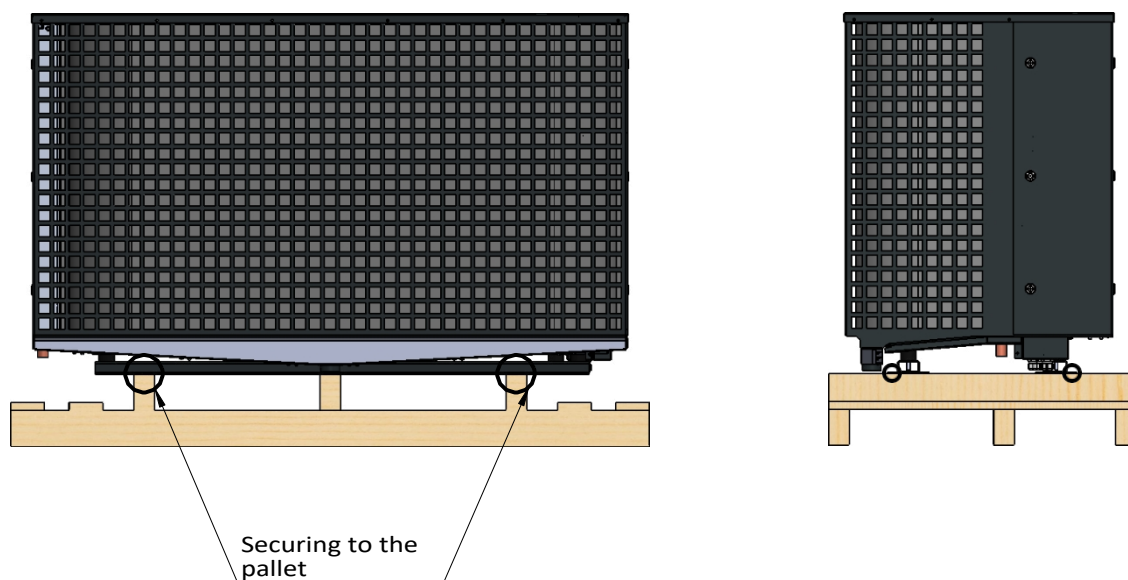
The following instructions regarding the transport of the unit must be observed:

- Only allow qualified personnel to carry out transport.
- Protect yourself with PPE (e.g. safety footwear, etc.).
- Take the weight of the unit (approx. 300 kg) into account when selecting the appropriate lifting equipment (crane, forklift, pallet truck, etc.).
- Take note of the device's centre of gravity.
- Remove all packaging materials.

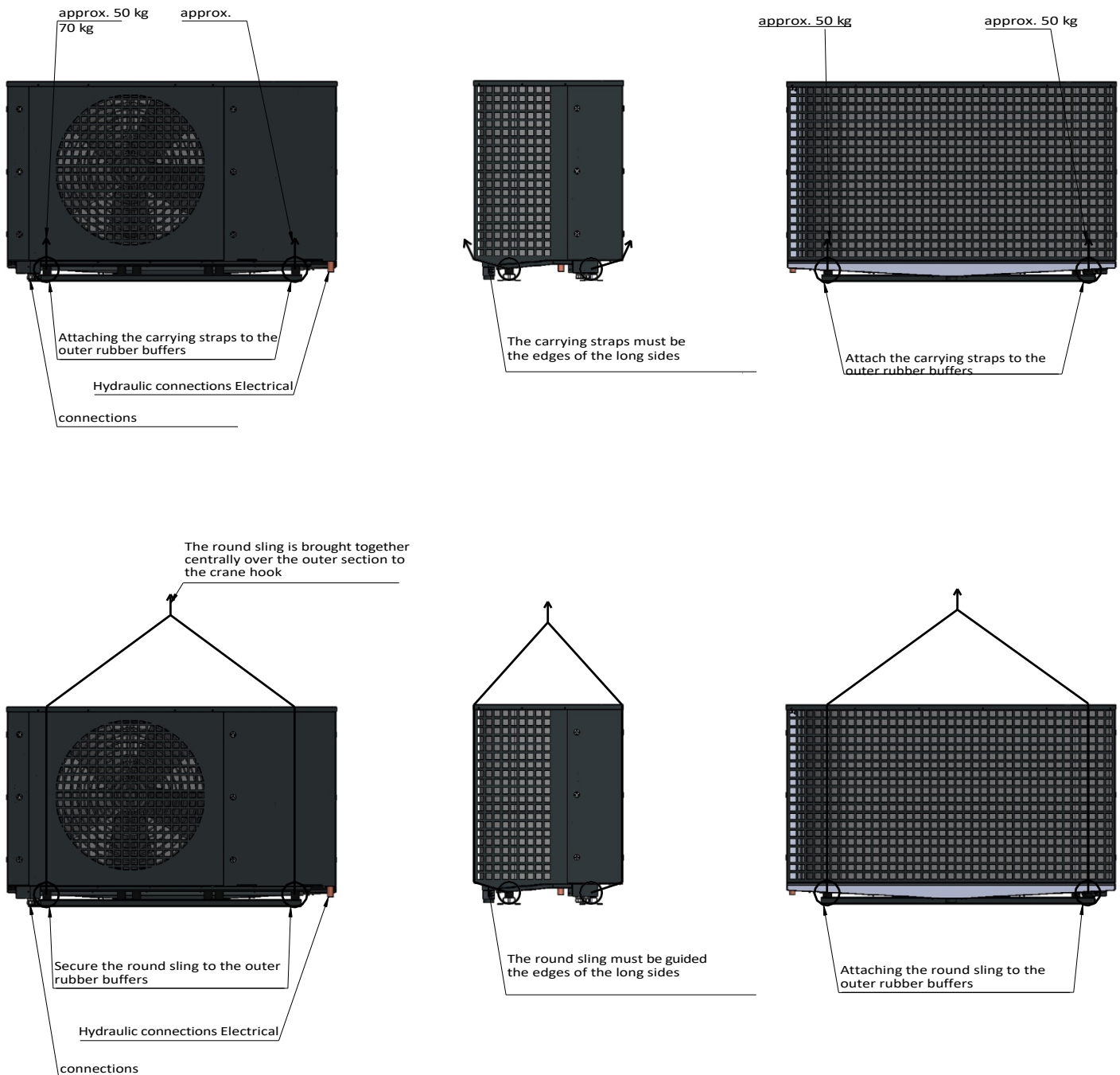
NOTE Do not damage the unit when removing the packaging materials.

- When disposing of the transport and storage packaging, comply with local waste disposal regulations and applicable environmental protection laws.
- When unpacking the unit, check that the delivery is complete.
- Use the delivery notes and packing lists provided to check the contents.

1. On delivery, the unit is secured to the pallet with 4x M6.3x38 screws. These must be loosened (10 mm socket) and can be used for subsequent mounting on the foundation.



2. The supplied lashing straps can be used for transport. The unit can be lifted by crane; however, the supplied lashing straps must not be used for this purpose. Suitable round slings must be used instead of the lashing straps. Crane operations must be carried out by qualified personnel in accordance with the DGUV regulations for cranes.

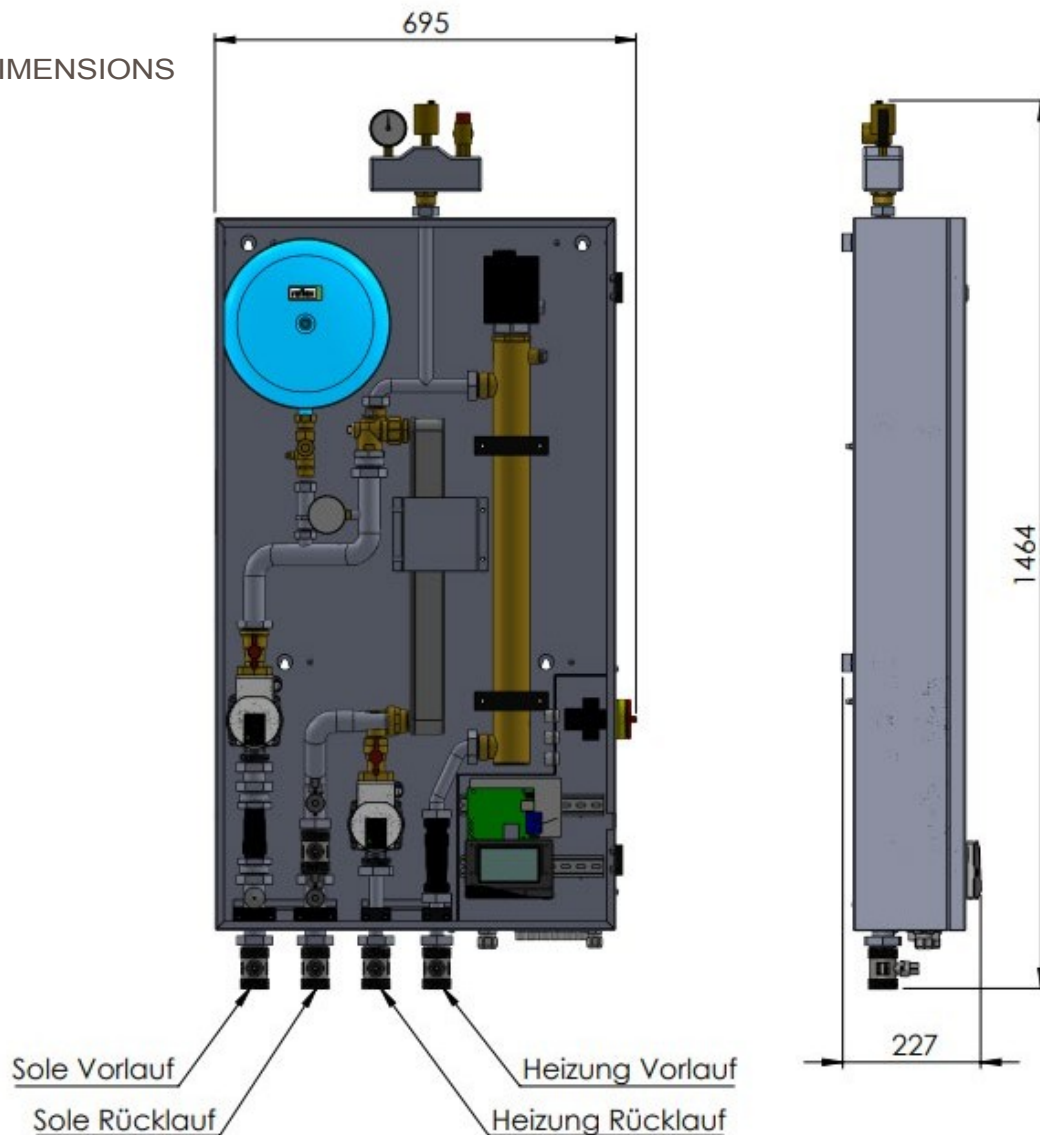


5.2 INSTALLATION OF THE INDOOR UNIT WITH SEPARATE HEAT EXCHANGER

Installation requirements:

- A floor drain must be provided to protect against water damage.
- The indoor unit of the WP Max-AirMono F15 air source heat pump must be installed in a clean, well-ventilated and dry location. The ambient temperature must be consistently $> 10^{\circ}\text{C}$ and $< 35^{\circ}\text{C}$.

5.2.1 DIMENSIONS



The responsible specialist technician (qualified personnel) must ensure the following measures are taken:

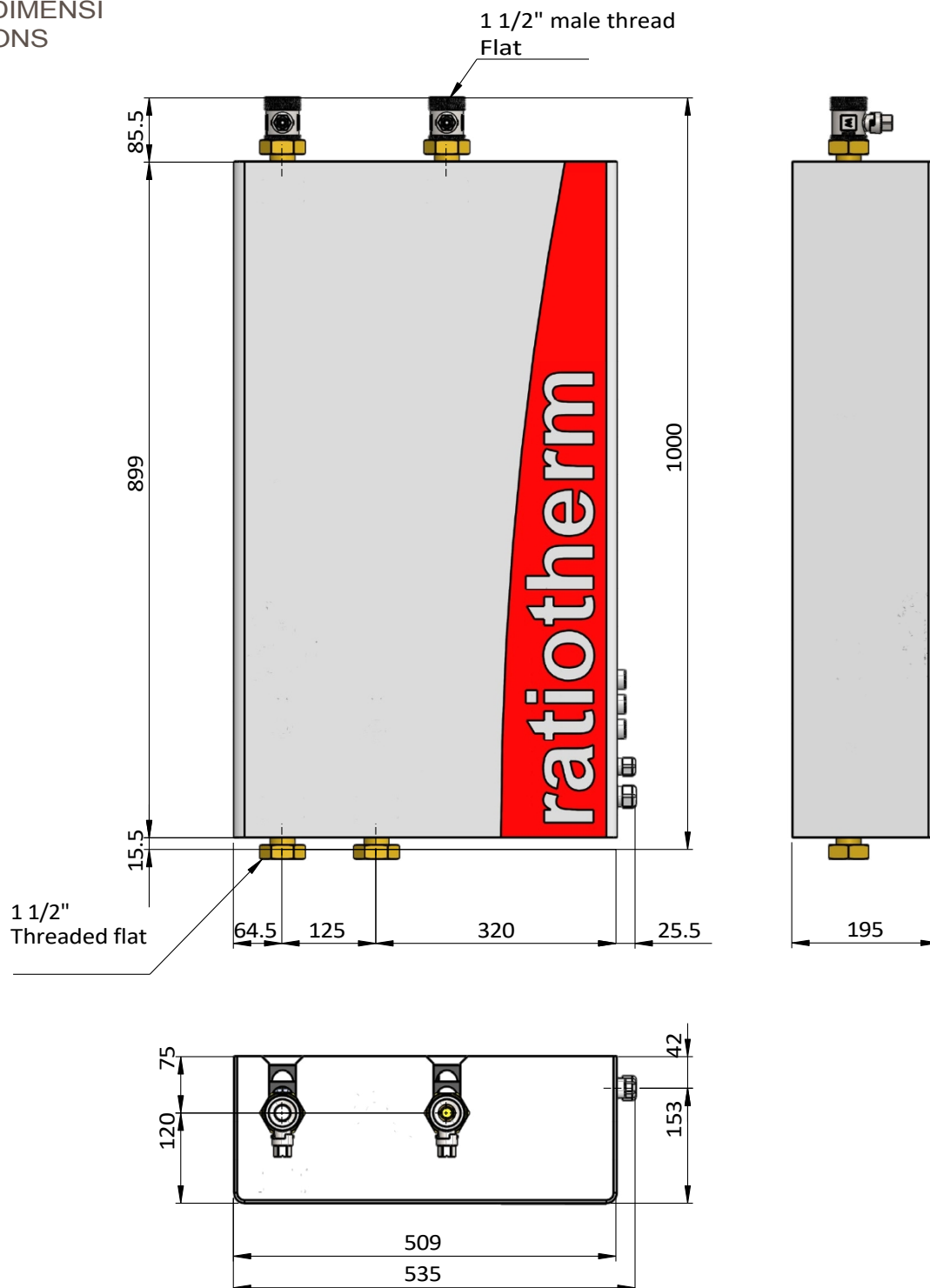
- The work area for assembly and installation must be well lit.
- Personnel must possess the necessary qualifications, have received the necessary training and be instructed by the responsible supervisor.
- Personnel must have read and understood the operating instructions.
- Staff must have access to the operating instructions at all times.
- Local accident prevention and environmental regulations must be implemented and complied with.
- Unauthorised persons must be kept away from the unit.
- The unit must only be handed over and operated in a safe and serviceable condition. Any damage to the heat pump must be repaired immediately or the heat pump must be taken out of service.

5.3 INSTALLATION OF THE INDOOR UNIT WITHOUT A SEPARATE HEAT EXCHANGER

Installation requirements:

- A floor drain must be provided to protect against water damage.
- The indoor unit of the WP Max-AirMono F15 air source heat pump must be installed in a clean, well-ventilated and dry location. The ambient temperature must be consistently > 10 °C and < 35 °C.

5.3.1 DIMENSIONS



5.4 INSTALLATION OF THE OUTDOOR UNIT

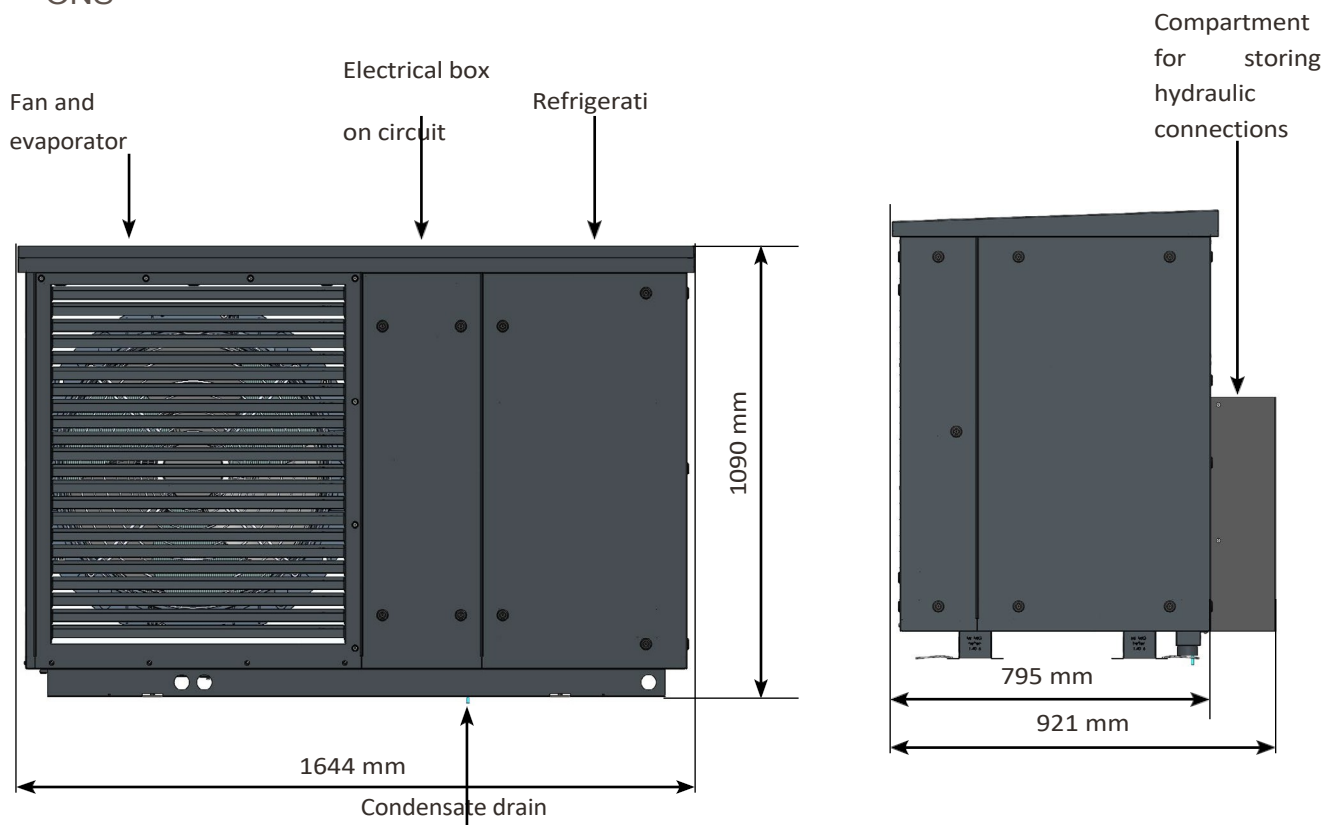
Installation conditions:

- Installation must only be carried out outdoors.
- The minimum clearances must be observed for maintenance, noise and safety reasons. Please note that the minimum clearances vary depending on the installation location.
- Distances for maintenance: sufficient space must be available for any maintenance and repairs.
- Clearances for noise reduction: choosing the correct installation location is important to keep the heat pump's noise emissions as low as possible. Please refer to Section 4.4 for this. Furthermore, we recommend the 'Guideline: Noise' published by the German Heat Pump Association (BWP) e. V. for more detailed information on noise reduction.
- Safety clearances: the heat pump operates using the refrigerant R290 (propane), which is highly flammable and can form explosive mixtures when combined with air. It is contained within hermetically sealed refrigeration circuits in the heat pump, and additional safety measures within the unit prevent the refrigerant from escaping. Nevertheless, safety zones similar to those at a petrol station must be maintained around the heat pump.
- Clearances for air flow: a free air flow (5000 to 8000 m³/h) must be ensured.
- If the unit is installed close to a wall, a minimum distance of 3 metres is recommended to prevent sound reflection.
- Distance of 1 metre from roads and pavements (icing).
- Installation of the heat pump near garages, multi-storey car parks and car parks: This heat pump contains an A3 refrigerant, which means that, in accordance with the Garage and Parking Space Regulations (GaStellV, GaStpIVO, BetrSichV), it must be clarified whether the unit may be installed in these locations. Impact protection may need to be provided outside the safety zone.
- The outdoor unit must not be enclosed or housed.
- The outdoor unit must be positioned at right angles to the prevailing wind direction.
- In the event of sea winds, the outdoor unit must be installed on the side of the building facing away from the sea.
- A suitable foundation must be laid before installing the outdoor unit (see dimensions and foundation plan).
- As heat pump operation generates a quantity of condensate depending on the output and humidity (approx. 3 l/h), a water-permeable surface (e.g. gravel) must be provided. If the ground is not permeable, provision must be made for the condensate to drain away beneath the outdoor unit. A heated condensate drain must be provided for this purpose if necessary. A siphon is essential for safety reasons.
- The snowfall levels at the specific installation site must be taken into account. The heat pump should not be left standing in the snow; if necessary, the foundation can be raised.
- The outdoor unit can be installed up to 20 metres away from the storage tank as standard.

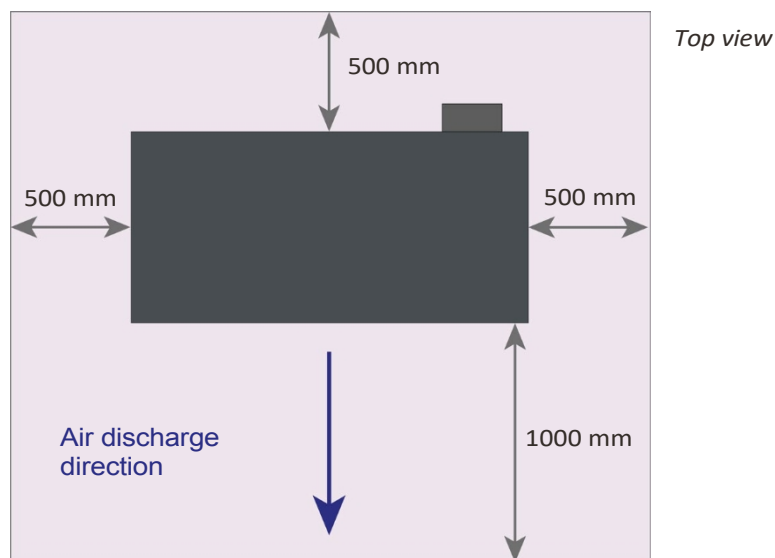
The responsible specialist technician (qualified personnel) must ensure the following measures are taken:

- The work area for assembly and installation must be well lit.
- The personnel must possess the necessary qualifications, have received the necessary training and be instructed by the responsible supervisor.
- Staff must have read and understood the operating instructions.
- Staff must have access to the operating instructions at all times.
- Local accident prevention and environmental regulations must be implemented and complied with.
- Unauthorised persons must be kept away from the unit.
- The unit must only be handed over and operated in a safe and serviceable condition. Any damage to the heat pump must be rectified immediately or the heat pump must be taken out of service.

5.4.2 DIMENSIONS



5.4.1 MAINTENANCE AREA



These clearances must be strictly observed to ensure smooth maintenance. All dimensions are given in millimetres.

5.4.3 SAFETY AND PROTECTION ZONE: GENERAL

The WP Max-AirMono F15 heat pump operates with the flammable refrigerant R290. For this reason, a safety and protection zone must be maintained around the unit at all times.

A safety zone of at least 3 metres must be maintained in the presence of:

- Open flames and sources of sparks (fireplaces, ashtrays, barbecues)

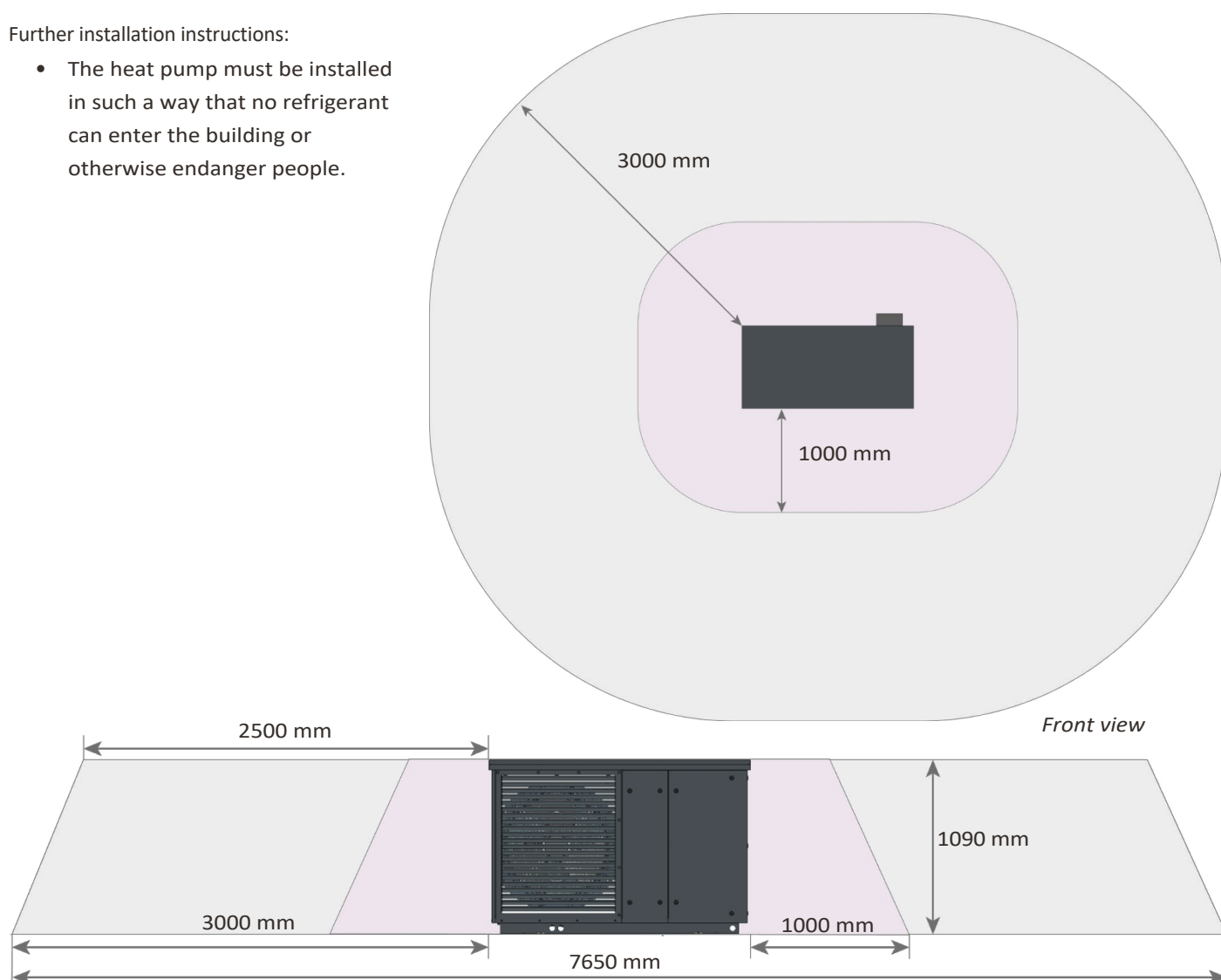
A safety zone of at least 1 metre must be maintained in the presence of:

- Building openings, windows, doors, flat roof windows
- Openings in ventilation systems
- Recesses such as light wells and sewer shafts
- Drains passing through a building
- Recreational areas, terraces
- Electrical installations, sockets, lamps, light switches, domestic electrical connections
- Footpaths and driveways

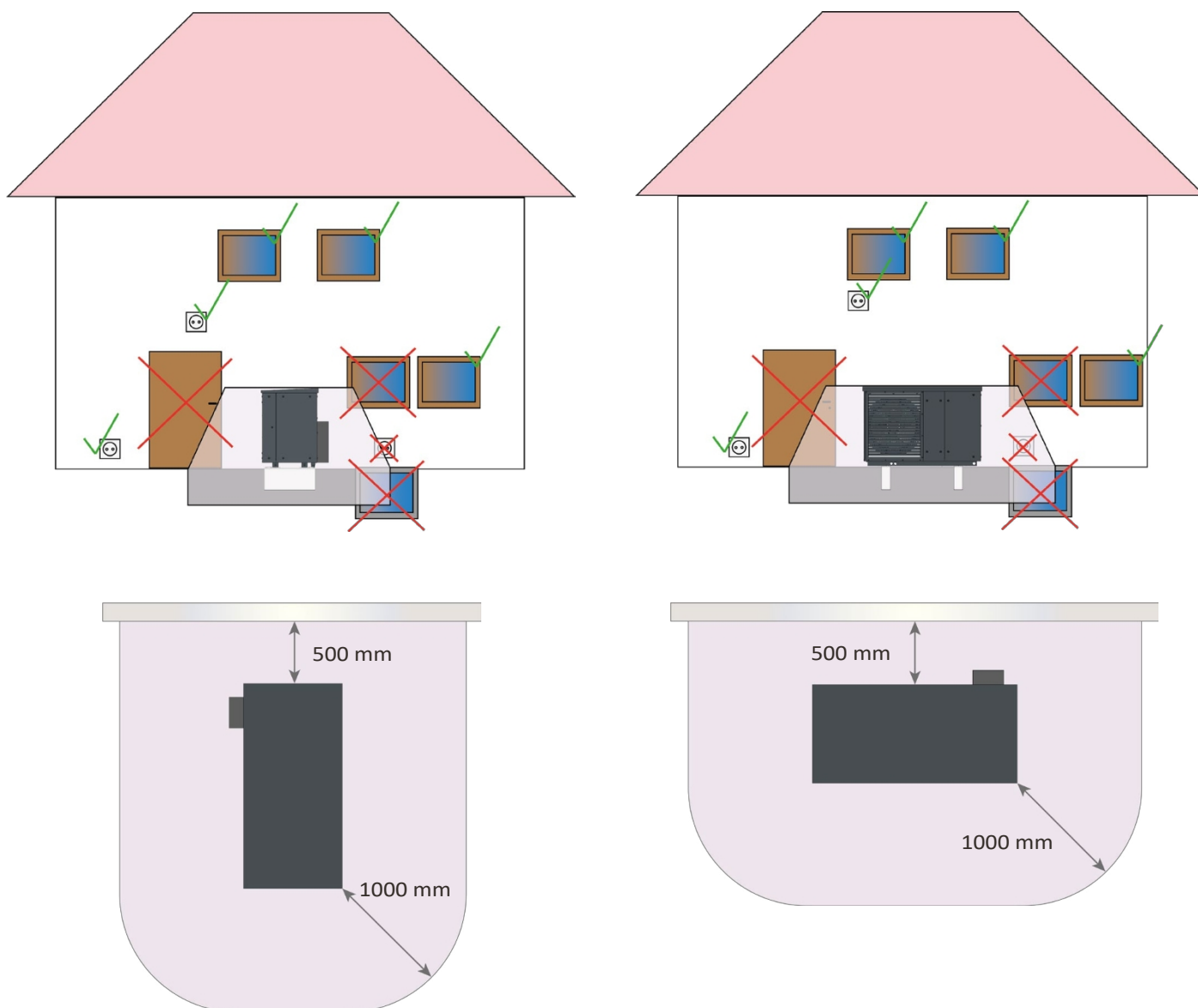
View from above

Further installation instructions:

- The heat pump must be installed in such a way that no refrigerant can enter the building or otherwise endanger people.



5.4.4 SAFETY ZONE: INSTALLATION AGAINST A HOUSE WALL



If the WP Max-AirMono F15 heat pump is installed near a wall or building wall, a minimum distance of 0.5 m must be maintained at all times.

There must be no windows, doors, sockets, light switches, etc. (see previous page) within a radius of 1 metre of the unit.

If the heat pump cannot maintain the safety distance from a light well, a wall must be erected. The height of the wall must be calculated as follows:

$$X = [A * (B + C)] / 0.5 \text{ m}$$

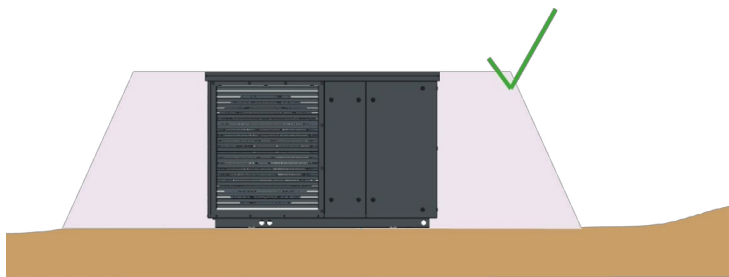
X = wall height [m]

A = Reduction in the safety zone [m]

B = Height of the heat pump [m]

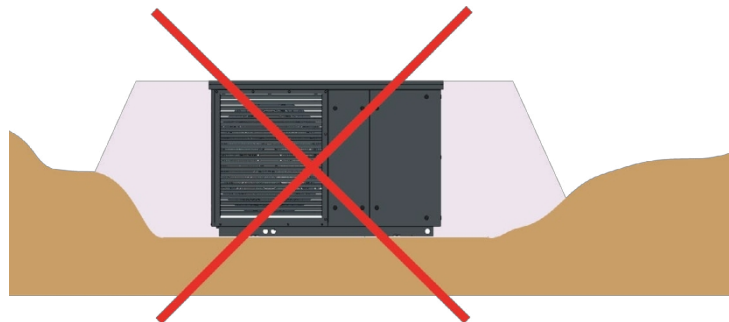
C = Height of the foundation [m]

5.4.5 SAFETY ZONE: FURTHER INSTALLATION REQUIREMENTS



The refrigerant R290 is heavier than air and flammable. For this reason, the heat pump must be installed in such a way that any escaping refrigerant cannot accumulate in the surrounding area or enter a building.

The surrounding terrain should be as flat as possible.

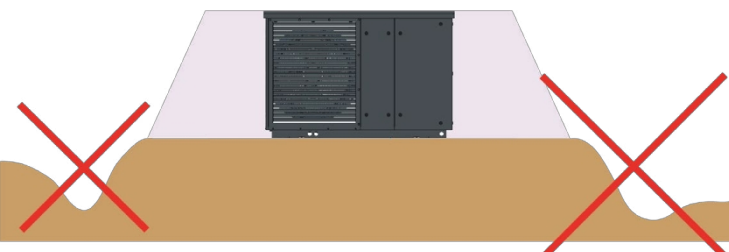


Hollows/depressions:

The heat pump must not be installed in a hollow or depression.

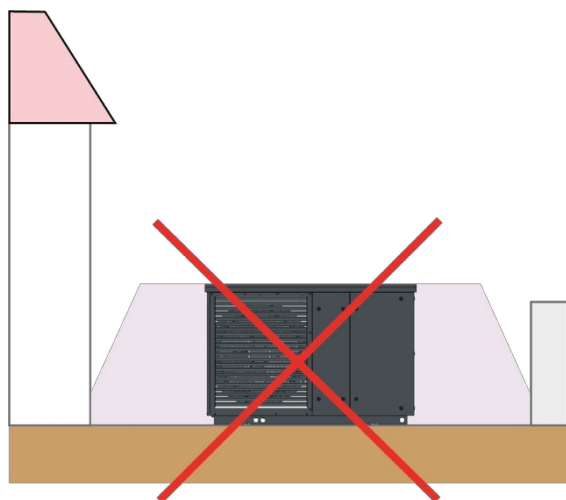


The heat pump must not be installed near a depression. There must be no hollows within a radius of 1 metre.



Elevated ground:

The heat pump must not be installed on raised ground if escaping refrigerant cannot drain freely but may collect in hollows. This also applies to hollows located nearby but outside the safety zone.



Recesses:

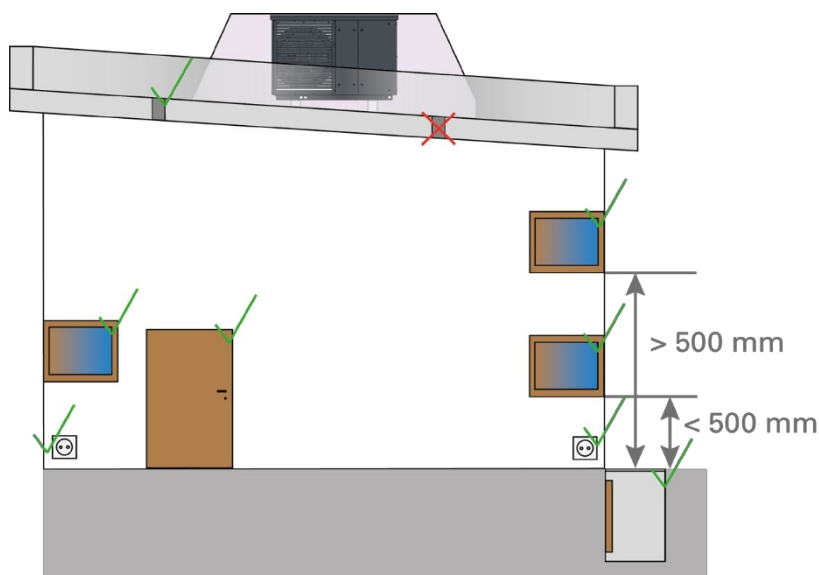
Installation between walls or building walls is not permitted, as refrigerant cannot drain away in niches that are too narrow. It is also not recommended due to a significant increase in noise levels when installed in a niche.

5.4.6 FLAT ROOF INSTALLATION

Similar requirements apply to flat roof installation as to ground-level installation:

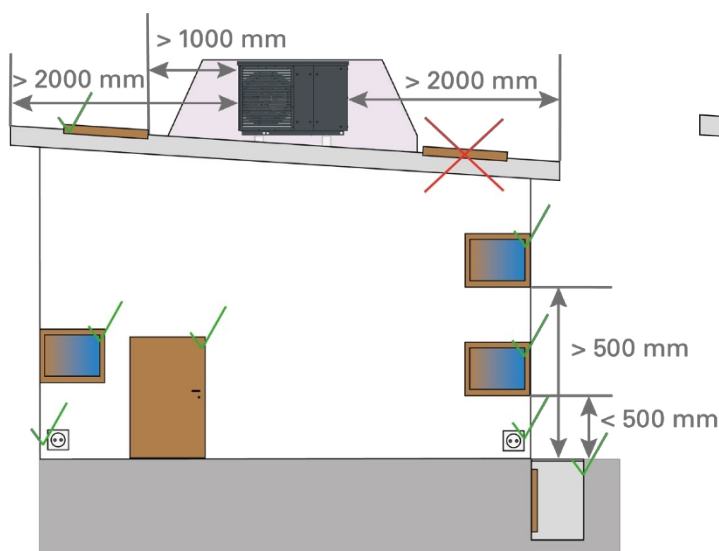
- Roof vents and roof drainage systems must not be located within the protection zone.
- Heat pumps installed on the roof must be integrated into the lightning protection system.
- The condensate drain must not be routed into or through the building. The same rules apply as for ground-level installation. If the condensate is drained from the roof to the outside, no siphon is required.

Roof with parapet: the roof drain must not be located within the protection zone



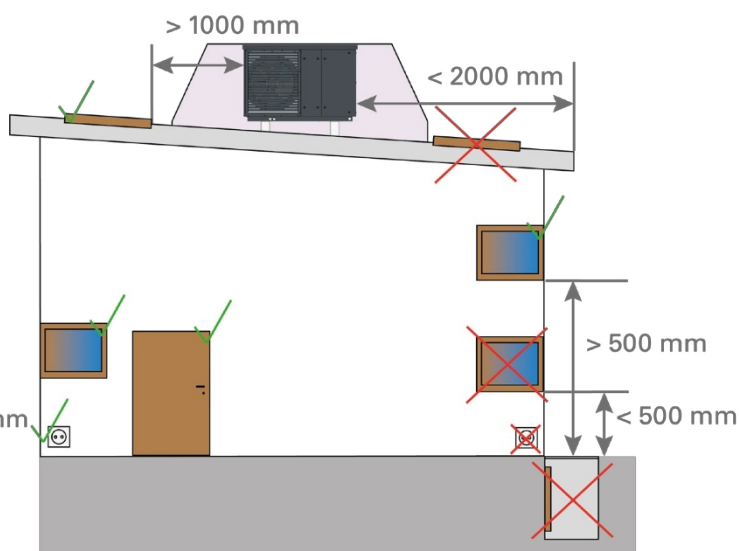
Roof without parapet:

Distances to the edge of the roof are greater than 2 metres



Roof without parapet:

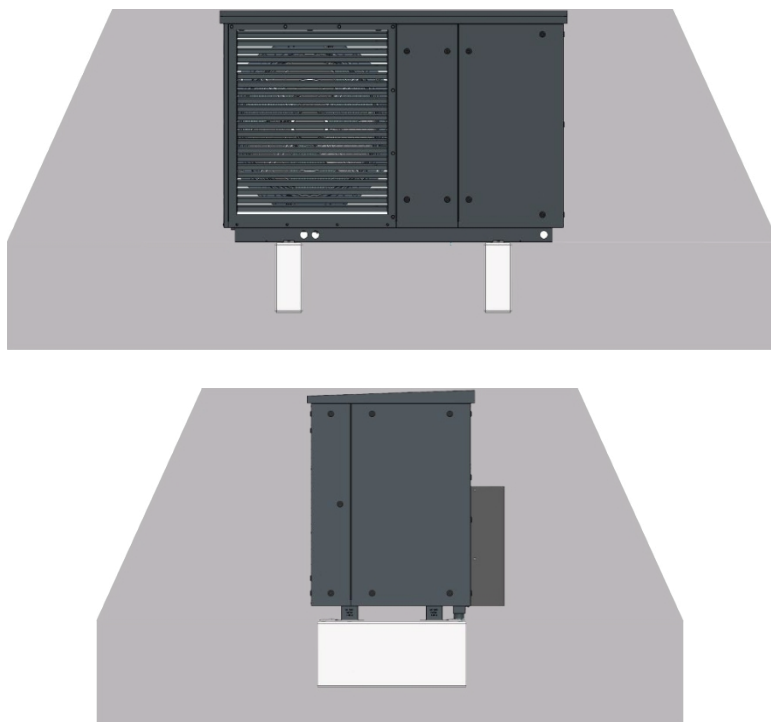
Distances to the edge of the roof are less than 2 metres



5.4.8 SUBSTRATE/FOUNDATION

- The sub-base must be level and firm. We recommend laying a foundation.
- Care must be taken to ensure the foundation has the necessary load-bearing capacity (heat pump weight: approx. 300 kg).
- The heat pump should be installed slightly raised. The distance from the base of the unit to the ground should be 20 cm or more.
- If possible, the foundation should be higher than the expected snowfall depth.

Foundation dimensions:



5.4.7 CONDENSATE DRAINAGE/DEFROSTING PROCESS

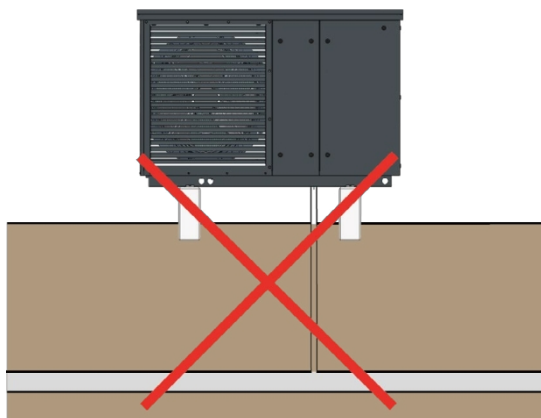
During the operation of air-to-water heat pumps, condensate forms and, at low outdoor temperatures, ice forms on the protective grilles and cladding parts of the heat pump. To address this, there is a defrosting process via cycle reversal, which is carried out automatically by the unit as required. With the Max-AirMono

F15, the amount of condensate can be up to 3 L/h. The unit is equipped with a condensate collection tray, tray heating and drain. The drain is located centrally beneath the heat pump and must be routed frost-free on site. The drain pan heater consists of a heating tape that protrudes approximately 50 cm from the drain and can be continued into the drain pipe. The condensate must not be routed into or through a building.

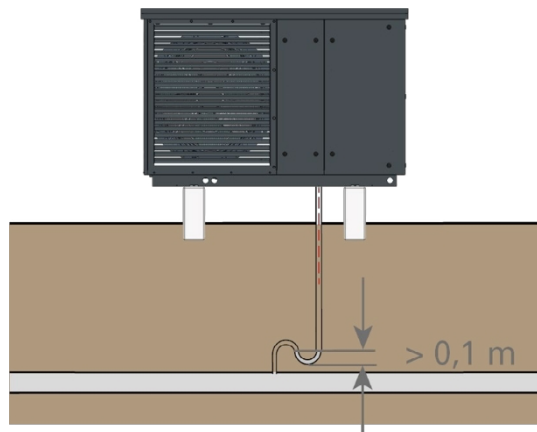


Condensate drain

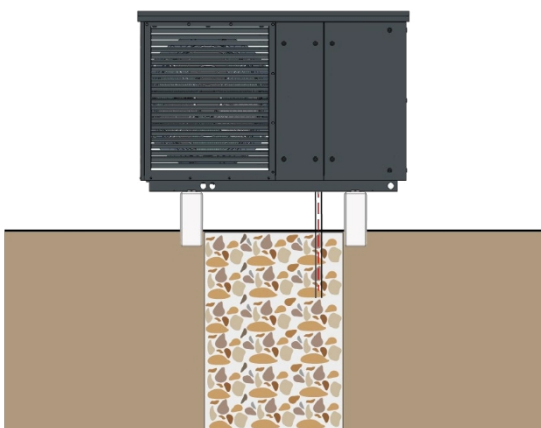
- The condensate collection tray collects most of the condensate and directs it away from the heat pump. This is important for the operation of the unit.
- A hose or pipe can be connected to the drain (Ø50 mm) to drain the condensate collection tray.
- A 50 cm long heating cable extending from the drain is sufficient to prevent the pipe/hose sections from freezing. The condensate drain heater operates during the defrosting process.
- Pipe sections that do not contain a heating cable must be laid in a frost-free location to prevent the pipes from freezing. Insulate the pipe (min. 19 mm insulation) outdoors along its entire length. The insulation must seal tightly against the underside of the condensate collection tray.
- Use a siphon in installations where air circulation may occur in the condensate drain pipe



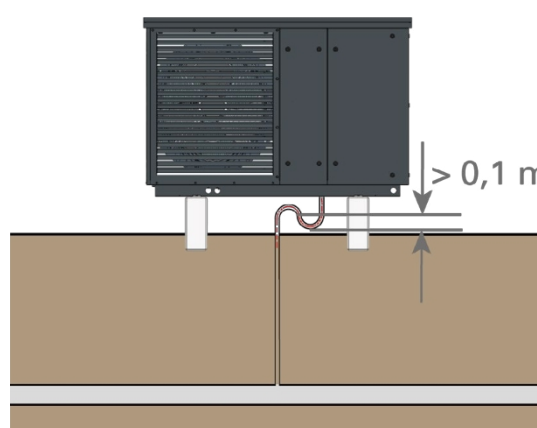
Sewerage: Condensate must not be discharged into waste water pipes leading to the sewerage system without a siphon. The reason for this is that R290 is heavier than air and any escaping refrigerant could otherwise enter the sewerage system.



Sewerage: If the condensate is to be discharged into the sewerage system, a siphon must be installed. Ideally, this should be located below the frost line (90 cm or deeper), or it must be designed to be frost-proof. In this case, the heating cable simply ends after 50 cm.



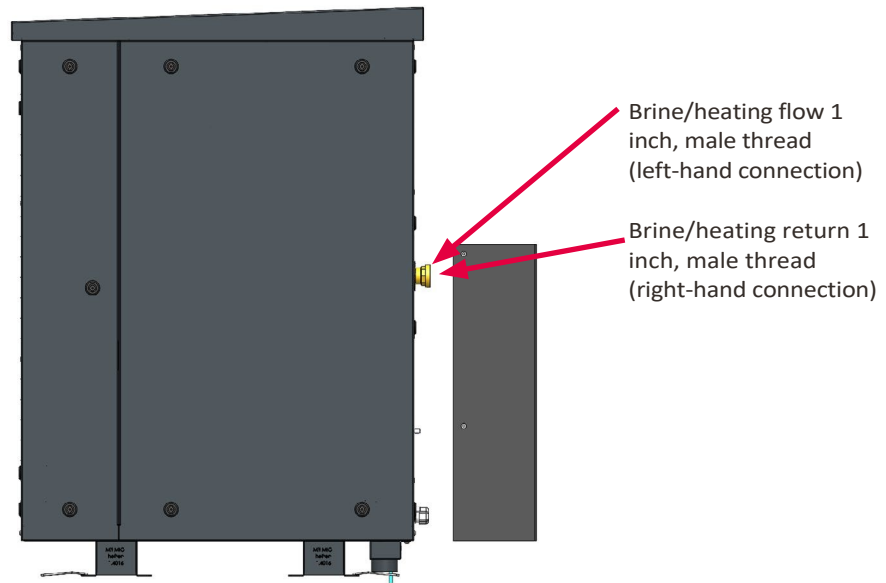
Soil infiltration: If the condensate is to infiltrate into the ground, a water-permeable substrate, such as gravel, must be located beneath the heat pump. The gravel layer must be at least 90 cm deep, or deeper than the frost line, and must be capable of absorbing 100 litres per day. A 50 cm long hose must be attached to the drain, containing the protruding heating tape. The end of the hose can be inserted into the gravel.



Drainage: If the siphon cannot be made frost-proof, a condensate drain heater must be run through the siphon. It is essential that this runs through the entire length of the siphon. If the existing heating tape is too short, an external heating cable must be used.

5.5 HYDRAULIC INSTALLATION

5.5.1 CONNECTION DIMENSIONS

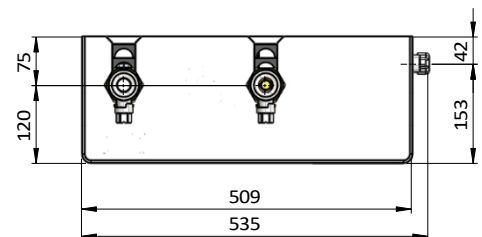
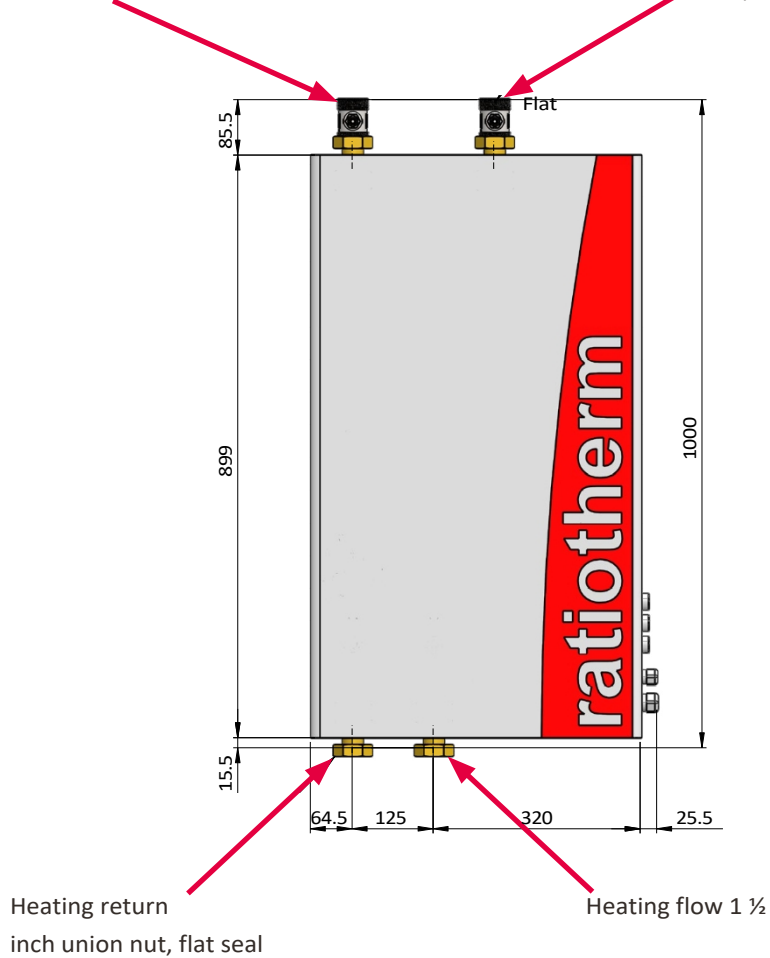


Indoor unit without heat exchanger

1 1/2" male thread, flat seal

Return (back to outdoor unit)

Flow (from the outdoor unit)



Outdoor unit in combination with indoor unit without a heat exchanger

The following instructions must be observed during the hydraulic installation of the system:

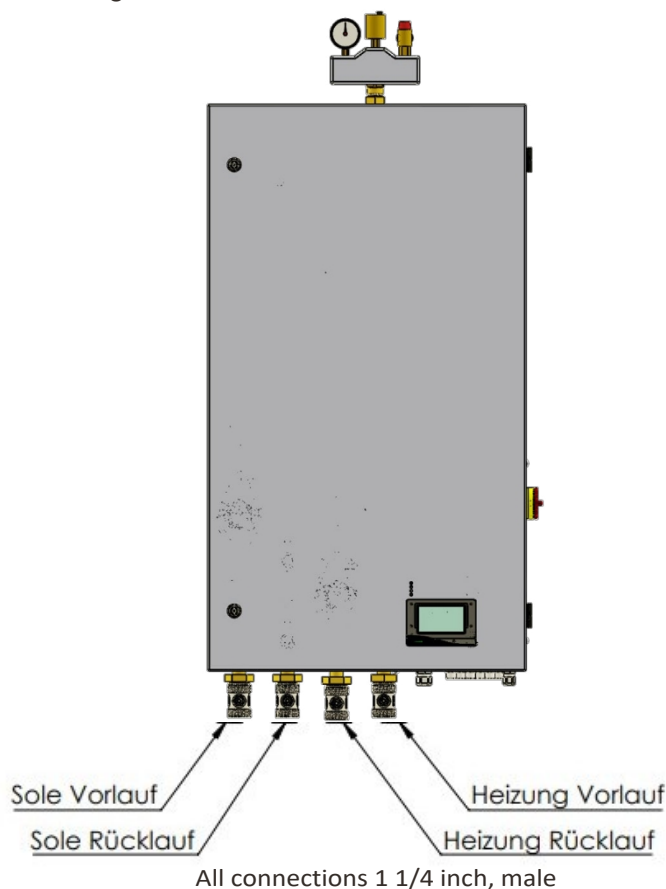
- For safety reasons, no quick-release vent, microbubble separator, safety valve or similar device must be installed between the heat pump and the storage tank. The safety devices are integrated into the heat pump.
- All pipe connections located outdoors must be coated with Fermit to prevent leaks caused by condensation.
- If the hydraulic supply pipe is not laid in the ground or the distance to the building entry point is < 3 m, acoustic decoupling within the pipe is necessary. Recommendation: Eckstein TWS 32
- All pipes and wall penetrations must be thermally insulated and sound-decoupled in accordance with standards. Water-carrying pipes must be frost-proof.
- Shut-off valves and venting (venting at high points) must be provided by the client.
- A drain must be fitted at the lowest point of the pipe between the outdoor unit and the storage tank. In the event of a prolonged power cut, the system can be drained and is thus protected against frost damage.
- A sludge separator and a magnetite separator must also be provided on site.
- The unit must be filled via the return pipe.
- The condenser/sump pump is integrated into the unit.
- When tightening, please hold the connections in place!

The following dimensions must be used:

	DN25	DN32	DN40
F15	up to 3 m	up to 14 m	X

- Simple pipe length with a maximum of 4 x 90° bends
- Available pressure head over the entire length: 10,000 Pa
- Assumed pipe roughness: 0.0070 mm

Inner section with split heat exchanger



Outdoor unit in combination with indoor unit with split heat exchanger

The following points must be observed during the hydraulic installation of the system:

1 Primary side: Outdoor unit to indoor unit

- The circuit between the indoor and outdoor units must be protected with antifreeze down to -16 °C.
Recommendation: Aqua Concept coracon WT 6N-16
- Hold the connections steady whilst tightening.
- All pipe connections located outdoors must be coated with Fermit to prevent leaks caused by condensation.
- For safety reasons, no quick-release vent, microbubble separator, safety valve or similar device must be installed between the indoor and outdoor units. The safety device is integrated into the outdoor unit.
- The built-in diaphragm expansion vessel is filled with a pre-pressure of 1.5 bar. The filling pressure should be 1.8 bar.
- If the hydraulic supply pipe is not laid in the ground or the pipe length to the building entry is less than 3 metres, acoustic decoupling within the pipe is necessary. (Recommendation: Eckstein TWS 32)
- All pipes and wall penetrations must be thermally insulated and sound-decoupled in accordance with standards. Water-carrying pipes must be frost-proof.
- Shut-off valves and venting (venting at high points) must be provided by the client.
- A drain must be fitted at the lowest point of the pipe between the outdoor unit and the storage tank. In the event of a prolonged power cut, the system can be drained and is thus protected against frost damage.
- The unit must be filled via the return pipe.
- The condenser/sump pump is integrated into the unit.
- When tightening, please hold the connections in place!

The following dimensions must be used:

	DN25	DN32	DN40
F15	X	up to 9 m	up to 25 m

- Simple pipe length with a maximum of 4 x 90° bends
- Available pressure drop over the entire length: 10,000 Pa
- Assumed pipe roughness: 0.0070 mm

2 Secondary side: indoor unit to storage tank

- Ventilation must be provided at high points.
- A sludge separator and a magnetite separator must be provided on site.
- The unit must be filled via the return line.

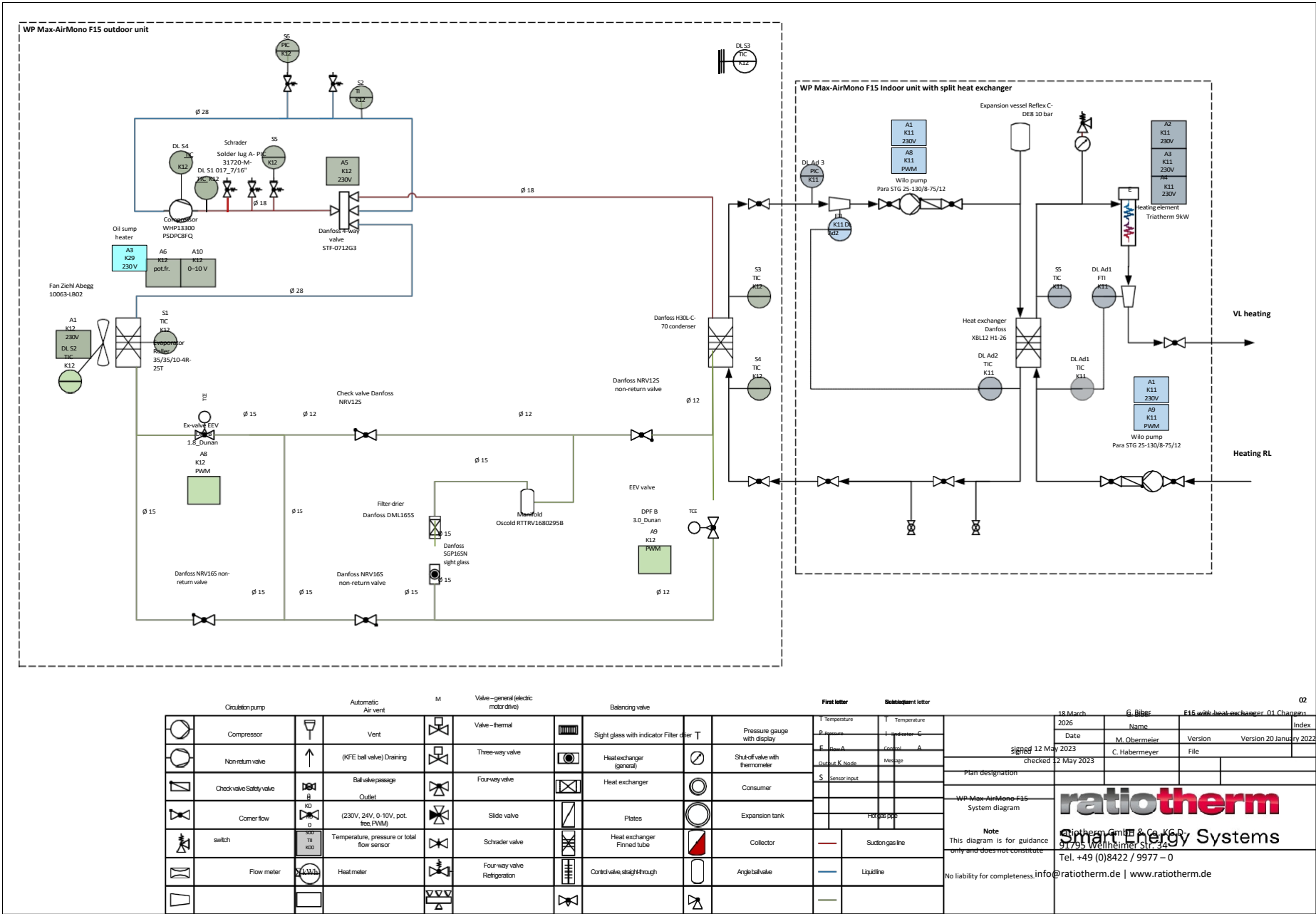
The following dimensions are to be used:

	DN25	DN32	DN40
F15	up to 3 m	up to 14 m	X

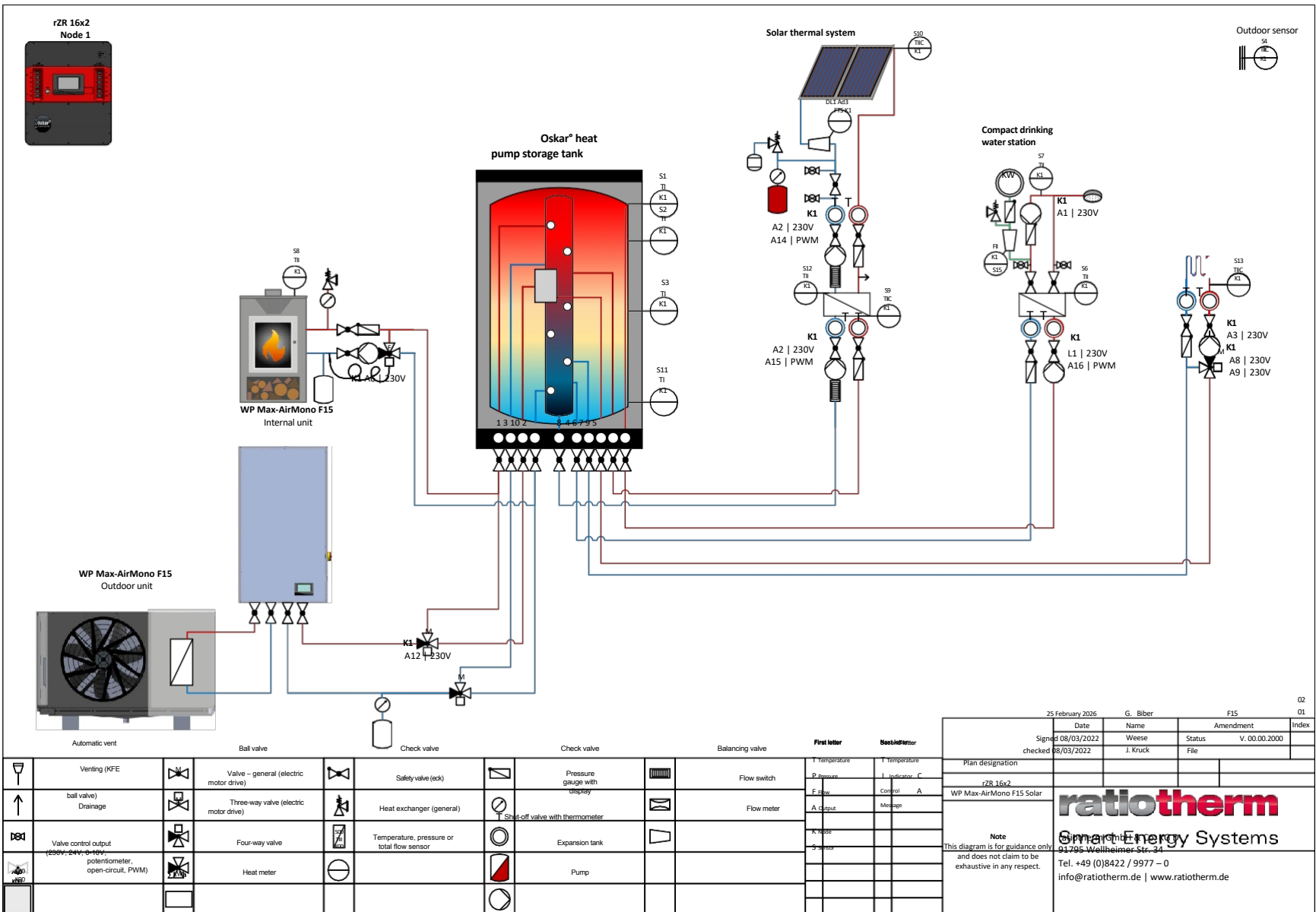
- Simple pipe length with a maximum of 4 x 90° bends
- Available pressure drop over the entire length: 10,000 Pa
- Assumed pipe roughness: 0.0070 mm

5.5.2 HYDRAULIC DIAGRAM

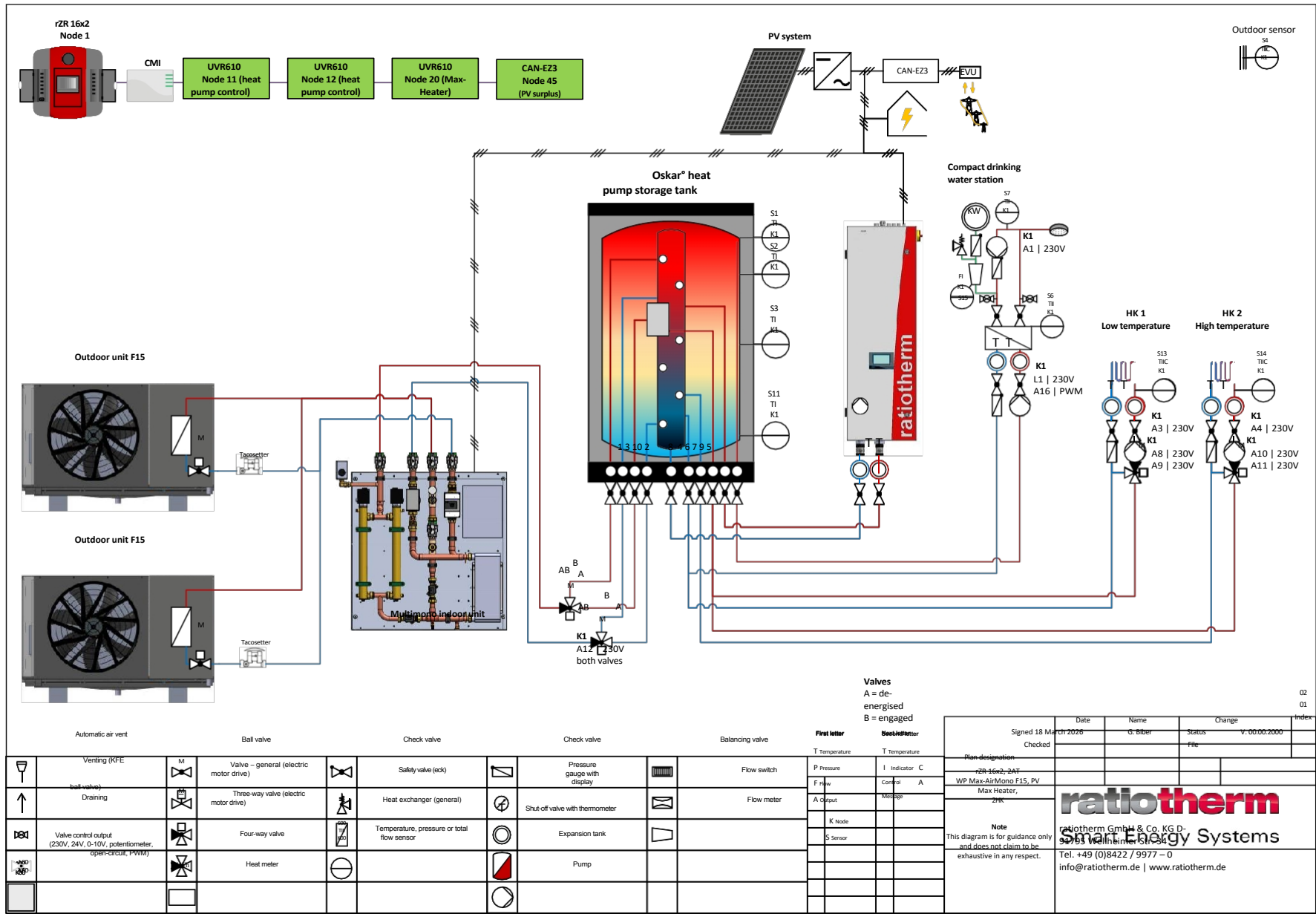
F15 WITH SEPARATE HEAT EXCHANGER



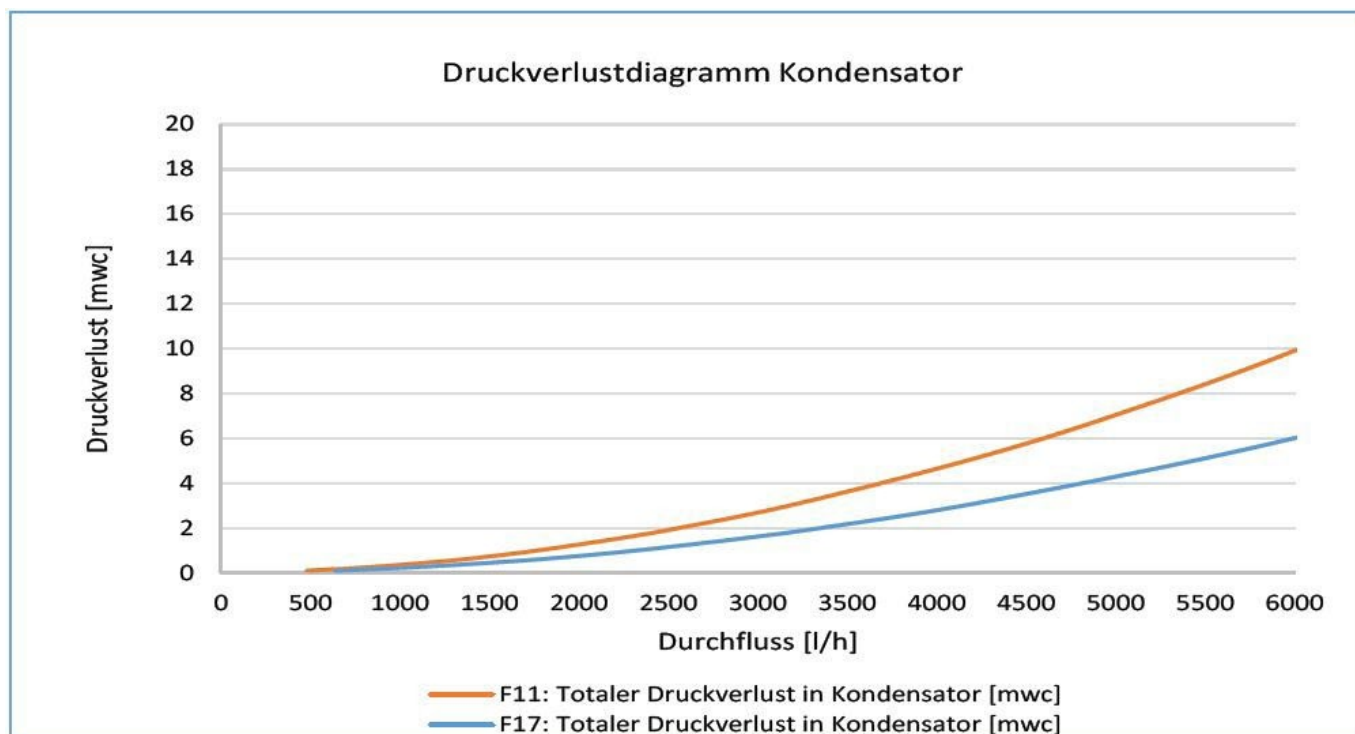
ratiotherm
Smart Energy Systems



5.5.4 HYDRAULIC DIAGRAM: 2 OUTDOOR UNITS WITH SEPARATE HEAT EXCHANGER

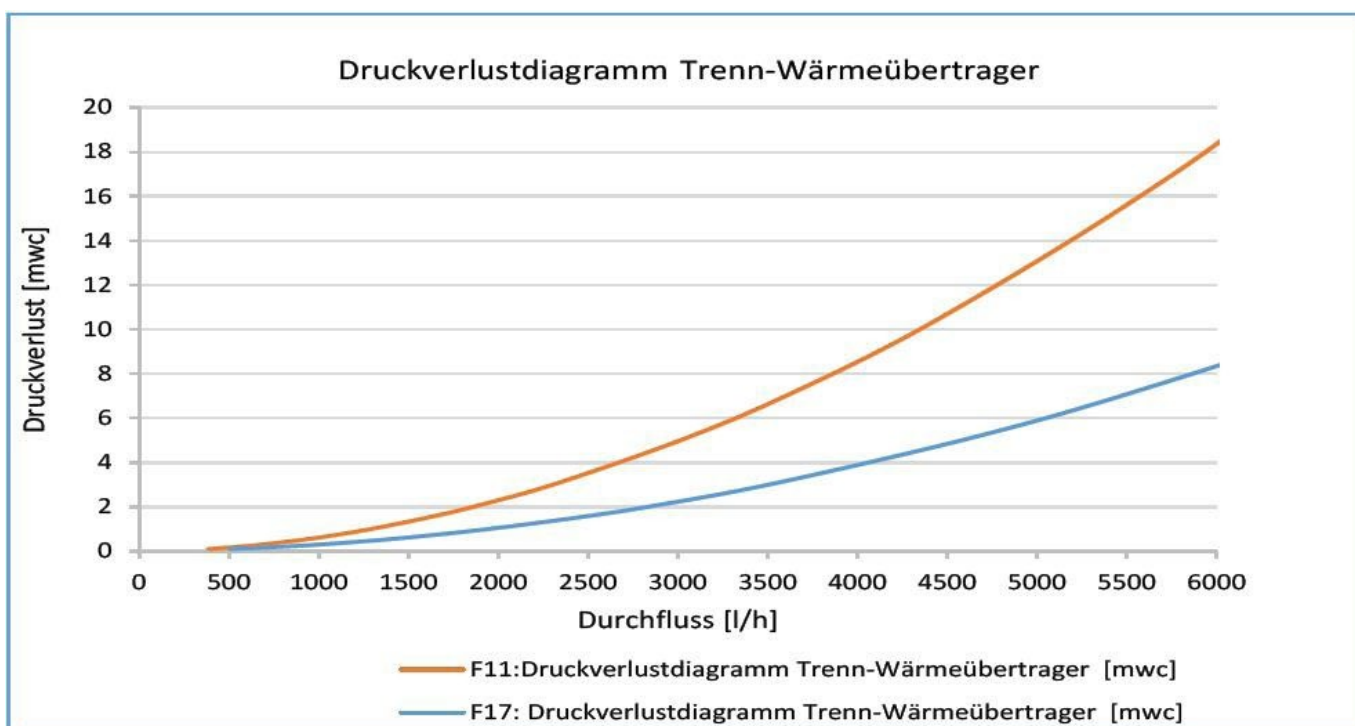


5.5.6 PRESSURE DROP DIAGRAM



The values for F15 are the same as those for F17.

5.5.5 PRESSURE LOSS DIAGRAM – SEPARATE HEAT EXCHANGER



The values for F15 are the same as those for F17.

5.5.7 REQUIREMENTS FOR THE SYSTEM WATER

Parameter	Unit	Concentration	Copper-
pH	/	< 6.0	-
		6.0–7.5	°
		7.5–8.5	+
		8.5–10.0	°
		> 10	°
Conductivity	μS/cm	< 10	+
		10–500	+
		500–1,000	°
		> 1,000	-
Chloride	mg/L	< 10	+
		10–50	+
		50–80	+
		80–100	+
		100–1,000	°
Free chlorine	mg/L	< 0.5	+
		0.5–1.0	+
		1.0–5.0	°
		> 5.0	-
Total hardness	°dH	< 5	+
		5–15	+
		15–30	°
		> 30	-
Ammonia (NH_3 , NH_4^+) ⁴	mg/L	< 2	+
		2–20	°
		> 20	-
Alkalinity (HCO_3^-)	mg/L	< 60	+
		60–300	+
		> 300	°
Sulphate (SO_4^{2-}) ⁴	mg/L	< 100	+
		100–300	°/-
		> 300	-
$\text{HCO}_3^- / \text{SO}_4^{2-}$ ^{3 4}	mg/L	> 1.5	+
Nitrates (NO_3^-) ³	mg/L	≤ 1.5	°/-
		< 100	+
Hydrogen sulphide (H_2S) ²	mg/L	> 100	°
		< 0.05	+
Free carbon dioxide (CO_2)	mg/L	> 0.05	°/-
		< 5	+
		5–20	°
Manganese	mg/L	> 20	-
		< 0.1	+
Iron (Fe)	mg/L	> 0.1	°
		< 0.2	+
Aluminium	mg/L	> 0.2	°
		< 0.2	+

NOTE

- The system water must contain no more than 50% glycol.
- Ensure that the system water meets all requirements. If the properties are not optimal for more than two criteria (°) or if a criterion does not meet the minimum requirement (-), no warranty claim can be made.

5.6 ELECTRICAL INSTALLATION



DANGER

- The power supply to the heater is provided from the building distribution board and must be protected by a separate Type B residual current device (RCD) (external unit) with a tripping current of 300 mA, a 10 ms short-time delay and a suitable rating.
Recommendation: ABB F204B-40/0.3
- A separate RCD must be provided for each outdoor and indoor unit.
- The RCD must be clearly marked separately for the heater, e.g. as “WP”. Please ensure the correct phase/neutral connection during wiring.
- Ensure clockwise rotation.
- The individual phases must be fused separately.
- The unit must be earthed.
- Use cable cross-sections appropriate to the heating unit’s power rating.
- The electrical installation must comply with the applicable standards and generally accepted technical rules.
- Never work on the hydraulics or mechanics of the unit whilst it is live.
- The same applies when filling or subsequently pressurising the system.
- Even if the unit’s main switch is switched off, voltage is still present at the cable terminal.
- To completely disconnect the unit from the mains, the RCD in the control cabinet must be switched off.
- Maintenance work may only be carried out by an authorised person.
- Never short-circuit the heat pump’s safety pressure limiter.

5.6.1 ELECTRICAL CONNECTION SPECIFICATIONS

WARNING

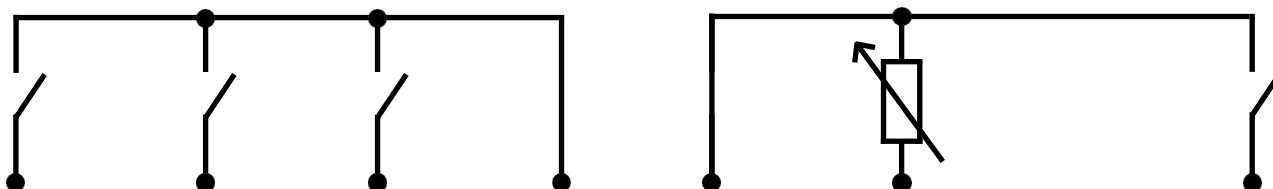
- Have the installation and wiring carried out only by authorised specialist personnel.
- Indoor unit RCD type A and outdoor unit RCD type B.
- We reserve the right to make errors and changes to all specifications, images and drawings.
- The generally applicable and recognised rules of good engineering practice, as well as any local regulations, must be strictly observed!
- Values apply to installation in conduits with a maximum pipe length of 100 m.

WP Max-AirMono F15		
Indoor unit	FI	Type A
	Fuse	B20 3-pole
	Cable cross-section	5G 2.5 mm ²
Outdoor unit	RCD	Type B
	Fuse	B20 3-pole
	Cable cross-section	5G 2.5 mm ²

5.6.2 TERMINAL DIAGRAM AND DESCRIPTION

Internal section:

X1					X2					
L1	L2	L3	N	PE	L1	N	PE	L1	L2	N
400 V mains					230 V fault output			230 V cooling valve output		



X3							
1	2	3	GND	GND	4	5	6
External request	Smart Grid 1 / Utility	Smart Grid 2			External Input (0–10 V)		External requirement Cooling

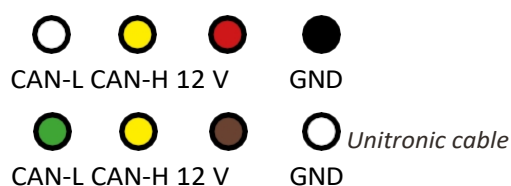
X4							
12 V	CAN-H	CAN-L	GND	12 V	CAN-H	CAN-L	
CAN bus connection to the rZR16x2				CAN bus connection to the outdoor unit			

Outdoor unit:

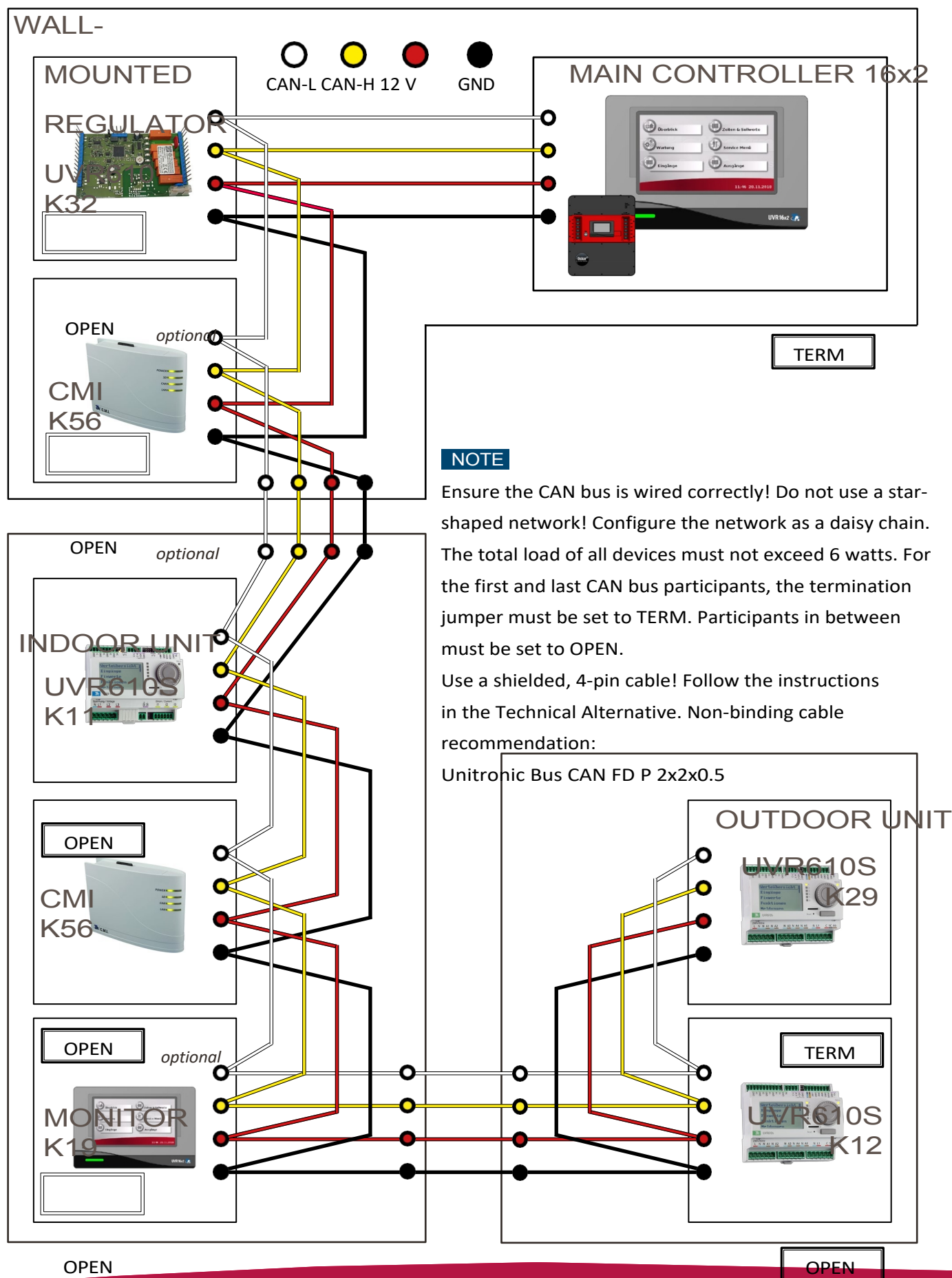
X5					X6			
L1	L2	L3	N	PE	GND	12 V	CAN-H	CAN-L
400 V mains					CAN connection to the indoor unit			

- X3.1, X3.4 and X3.6 are not required when using the rZR 16x2 from ratiotherm as the main controller! However, parallel use for Power-to-Heat is possible.
- X3.2 and X3.3 are used to process a signal from the network operator/energy supplier. X3.2 is backwards compatible with the EVU contact.
- Please wire the EVU contact as a normally open contact (closed when the EVU lock is active).
- When using a relay cut-off by the energy supplier, it is recommended to wire the control circuit separately. To do this, remove the internal jumpers between L1/L1 and N/N.

CAN bus colours:



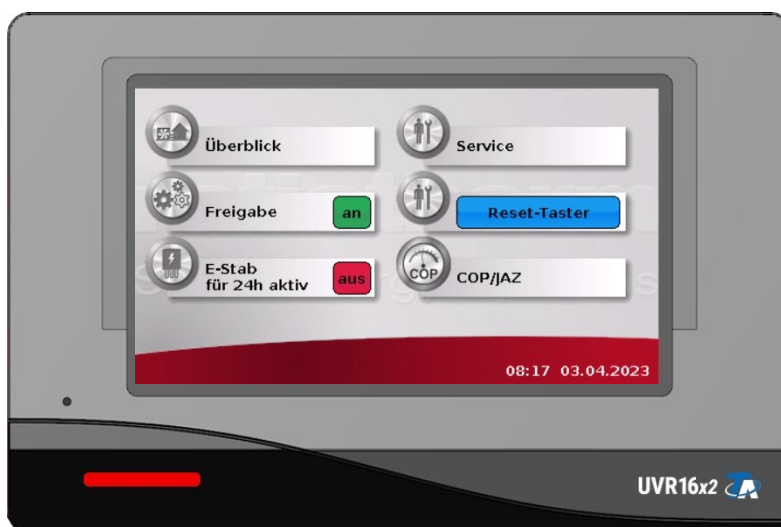
5.6.3 CAN BUS DIAGRAM



Schematic diagram of the CAN bus terminals.

6. OPERATION

6.1 CONTROLLER OPERATION



- The heat pump can be operated via the ratiotherm central controller, via a web portal or via an optional 4.3" touch screen.
- A stylus is provided for easier handling; it is stored above the controller (under the cover).
- The stylus can be used to tap on control areas and to scroll through the display by moving the scroll bar.
- Selecting one of the windows takes you to the corresponding sub-menu.

The indicator light can display various states:

- **Steady red light** – The controller is booting (i.e. start-up routine after switching on, a reset or an update) or a message is displayed that has not yet been cleared.
- **Steady orange light** – Hardware initialisation after booting.
- **Steady green light** – Normal operation of the controller.
- **Green flashing** – After hardware initialisation, the controller waits approx. 30 seconds to receive all the information required for operation (sensor values, network inputs).

Controls:



Main switch:

ON/OFF switch



6.2 MENU STRUCTURE



Enable: ON

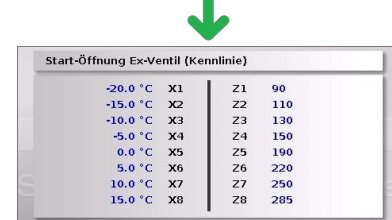
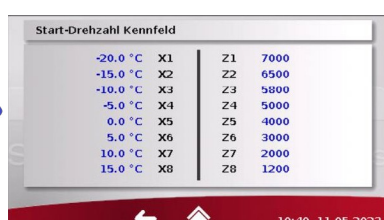
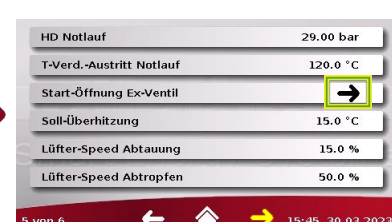
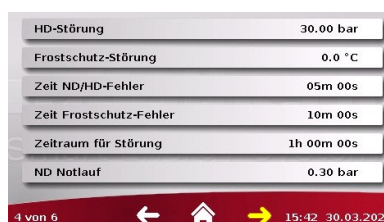
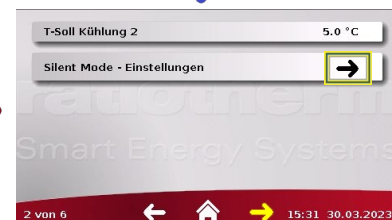
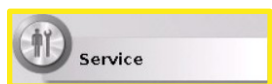
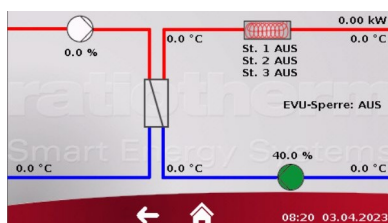
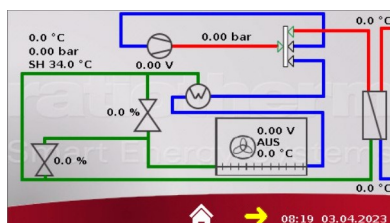
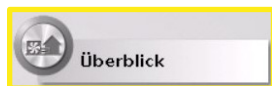
- Heat pump may start up on demand.

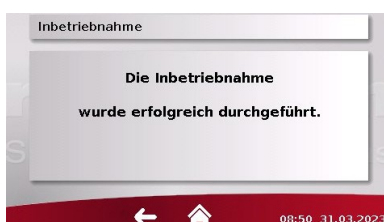
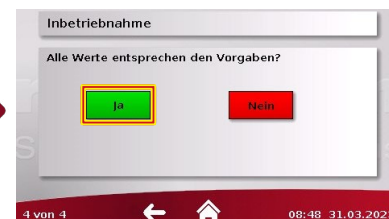
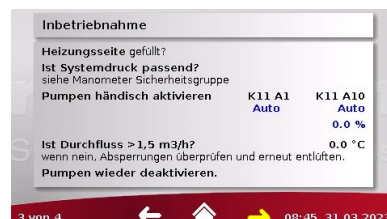
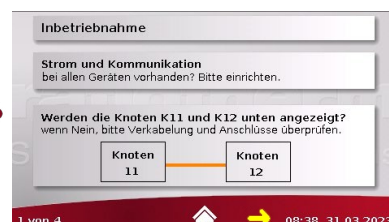
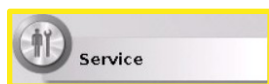
Electric heating element active for 24 hours: ON

- The immersion heater can be switched on regardless of the temperature.

Reset button

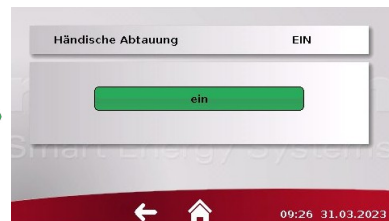
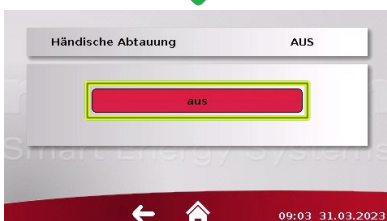
- Pressing the switch unlocks the heat pump if it has been locked due to a fault.



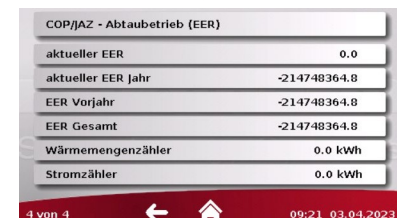
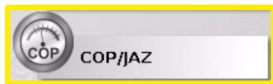


- Tapping 'No' takes you back to the start of commissioning.

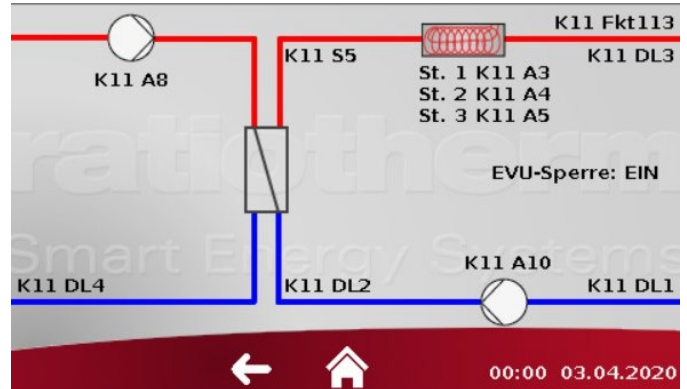
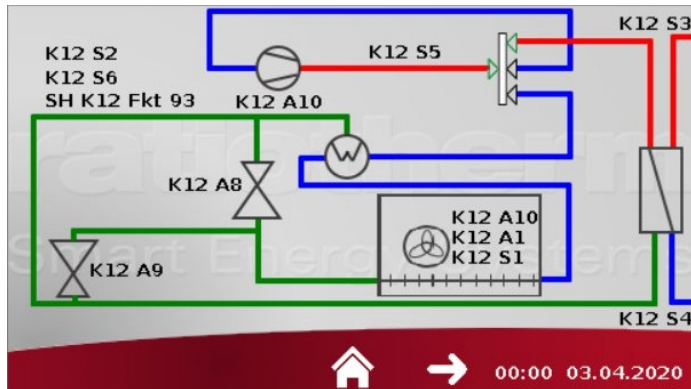
- Manual mode – **NOT ACTIVE**: The heat pump starts only upon a demand signal.
- Manual mode – **ACTIVE**: Forced start of the heat pump regardless of the demand signal.



- Manual defrost – **OFF**: Defrost starts only upon a request signal.
- Manual defrost – **ON**: Forced defrosting of the heat pump regardless of the demand signal.



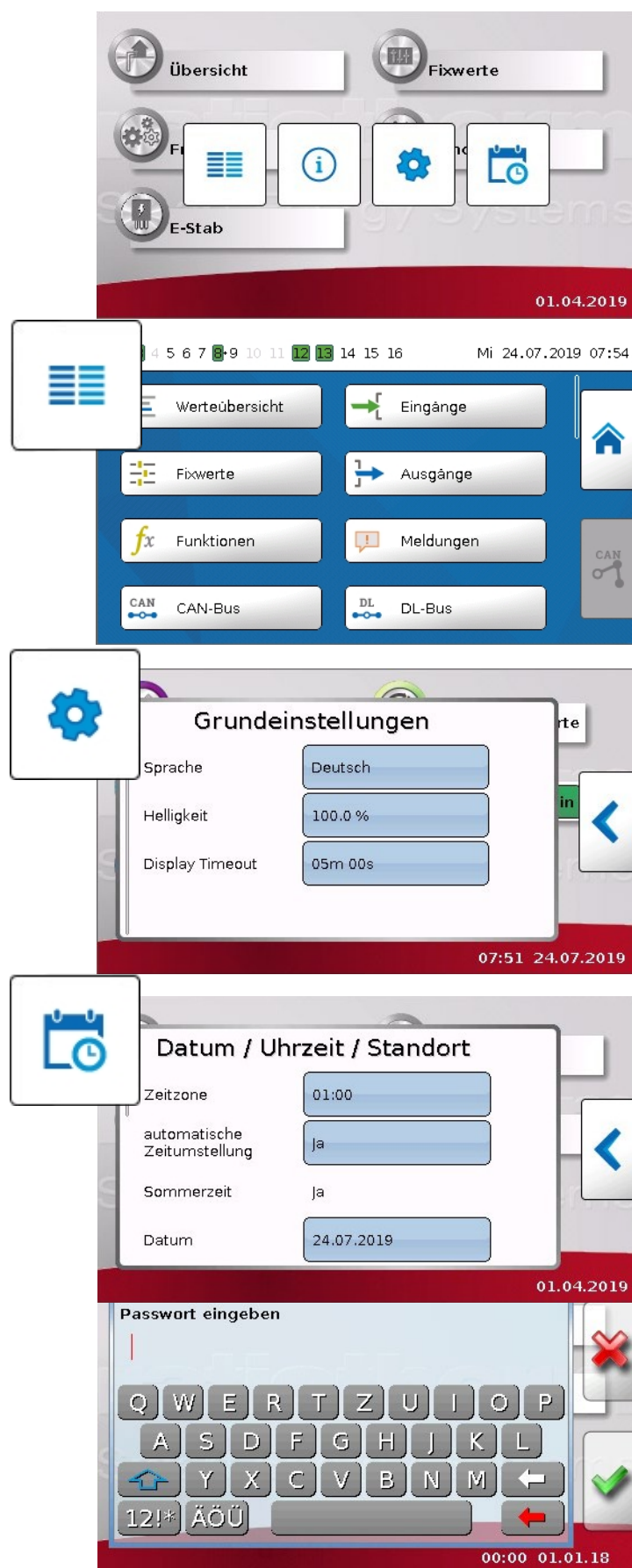
6.2.1 OVERVIEW AND VALUES



K12 S1	Evaporator temperature
K12 S2	Compressor inlet temperature
K12 S3	Brine circuit flow temperature
K12 S4	Brine circuit return temperature
K12 S5	High pressure
K12 S6	Low pressure
SH K12 Fkt 93	Overheating
K12 A1	Fan active
K12 A8	Ex valve
K12 A9	Ex valve, cooling outlet
K12 A10	Compressor 0-10V

K11 S5	Heat pump flow temperature
K11 A3	Heating element stage I
K11 A4	Electric rod stage II
K11 A5	E-Stab Level III
K11 Fkt113	Power WP
K11 DL1	Secondary circuit flow
K11 DL2	Temperature, heat pump return
K11 DL3	Electric heating element flow temperature
K11 DL4	Primary flow

6.3 BASIC SETTINGS



Sub-menu

By pressing and holding the display for 5 seconds, you will enter the intermediate menu, which allows you to make basic settings or switch to the controller menu.

Controller menu

Link to the controller menu

Basic settings

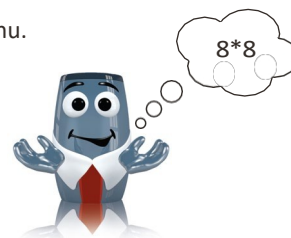
You can set the language, brightness and display timeout

Date/Time/Location

Time zone and date can be set

Enter password

Enter the expert password to access the expert menu.



6.4 FIXED VALUES



Fixwerte

Fixed values	Description	Setting options	Default setting
Operators and users			
Bivalent temperature	Outdoor temperature threshold at which the second energy generator (electric heating element) is activated.	-30 °C to 15 °C	-7 °C
rpm Compressor DHW	Target speed when hot water is required	0% to 100%	70%
rpm Compressor SG Start command	Setpoint speed for Smart Grid start command	0% to 100%	75%
Setpoint T for external start	Setpoint temperature to which the heat pump regulates when requested by external controllers and no 0–10 V signal is present.	8 °C to 55 °C	50 °C
0–10 V Temperature setting	Setting for processing the 0–10 V signal: OFF: 0–10 V signal is interpreted as setpoint speed 0 V = 0 % 10 V = 100% Use for power-to-heat ON: 0–10 V signal is interpreted as setpoint temperature 0 V = 0 °C 10 V = 100 °C	OFF/ON	OFF
T-Setpoint Cooling 2	Setpoint flow temperature in cooling mode, when requested by an external controller	5 °C to 30 °C	16 °C
Fan silent mode	Activation of time-dependent speed limitation for fan speed (when Silent mode, speed level during the day)	OFF/ON	OFF
Fan - Speed Day	Maximum speed level	Speed 100	Speed 55
Fan - Night Speed	Maximum speed setting at night	Levels 30 to 100	Level 45
Setpoint T-diff	Setpoint temperature difference at the condenser	5 °C to 12 °C	6 °C
Max. compressor rpm	Maximum speed	950 rpm to 7200 rpm	F11 = 5400 rpm F17 = 7000 rpm
Setpoint temperature difference, condenser Heating circuit	Setpoint temperature difference at the condenser Heating circuit	5 °C to 12 °C	6 °C
Qualified personnel			
Initial opening of the cooling valve	Start: Opening of the cooling expansion valve or defrost expansion valve	Stages 0 to 500	Level 500
Setpoint superheat Cooling	Setpoint superheat during cooling or defrost	5 °C to 15 °C	12 °C
Setpoint T-diff condenser Hot water	Setpoint temperature difference at the condenser Hot water	5 °C to 30 °C	15 °C
ND fault	Minimum pressure at which an ND fault or an low-pressure fault is triggered.	0.01 bar to 5 bar	0.1 bar
Setpoint temperature	Setpoint temperature difference in the brine circuit	1 °C to 6 °C	2 °C

difference, brine circuit			
---------------------------	--	--	--



Fixed values	Description	Setting options	Default
HD fault	Maximum pressure at which an HD fault or HD fault is triggered.	25 bar to 31 bar	30 bar
Frost protection fault	Minimum temperature at which a frost protection fault or a frost protection fault is triggered.	0 °C to 15 °C	2 °C
Time delay for ND/HD fault	Time delay for restart if an ND/HD fault has occurred.	0 to 24 h	5 min
Time for frost protection fault	Time delay for restart if a frost protection fault has occurred.	0 to 24 h	10 min
Fault period	Time after which the error counter is reset.	0 to 24 h	60 min
ND Emergency operation	Minimum pressure at which a temporary is triggered.	0.01 bar to 10 bar	0.3 bar
HD emergency mode	Maximum pressure at which a temporary reduction is triggered.	22 bar to 31 bar	29 bar
Compressor outlet temperature – emergency mode	Maximum compressor outlet temperature at which a temporary power reduction is triggered	80 °C to 130 °C	110 °C
Manual defrost	Activation of a simple, time-controlled defrost cycle. Only activate in the event of a faulty evaporator sensor !	OFF/ON	OFF
Start opening of expansion valve	Start opening of the expansion valve in the outdoor unit	Levels 0 to 500	depending the outdoor
setpoint superheat	Setpoint superheat of the expansion valve in the outdoor unit during normal operation	5 °C to 15 °C	15 °C
Setpoint superheat Compressor	Setpoint superheat directly at compressor inlet (for delayed PID control)	0 °C to 25 °C	10 °C
Fan speed during defrost	Fan speed during defrost	0% to 100%	15%
Fan speed during defrost	Fan speed after defrosting during the drip phase	0% to 100%	50%
rpm. Compressor Defrost	Compressor speed for defrosting	720 rpm to 7200 rpm	4300 rpm
T-defrost activation	Threshold temperature at which the defrost timer starts if the temperature falls below this level (reference sensor: T-evaporator).	-20 °C to 20 °C	-5 °C
T-defrost Deactivation	Setpoint temperature at which defrosting ends (reference sensor: evaporator temperature).	5 °C to 20 °C	14.5 °C
Blocking time	Time delay for restart when the system is switched /is switched on.	0 to 20 min	5 min
Minimum running time	Minimum running time of the heat pump	0 to 20 min	5 min
Start speed characteristic curve			

7. MAINTENANCE

Regular inspection of the unit by a recognised, qualified and ratiotherm-authorized specialist is essential to ensure continuous operational readiness, operational safety, reliability and a long service life. We recommend having maintenance carried out annually.

NOTE We recommend taking out a maintenance contract.



WARNING

Improper handling

Improper handling of the appliance can result in a serious risk of injury. Never attempt to carry out maintenance work and/or repairs on the appliance yourself.

For maintenance work, commission a recognised, qualified and ratiotherm GmbH & Co. KG-authorized specialist tradesman (qualified personnel).

7.1 TROUBLESHOOTING

7.1.1 HIGH PRESSURE

Error message	HD fault	HD fault
Fault description	The high-pressure protection of the refrigeration circuit has tripped.	
Heat pump behaviour	• System lockout for 5 minutes • If 3 faults occur within 60 minutes, switch to HD fault	• System lockout • Unlock by pressing the reset switch
Cause of fault	• Lack of heat dissipation • Blockage in the refrigeration circuit • Heat sink too hot	
Troubleshooting	• Check the sink temperature or setpoint temperatures • Temperatures below the maximum water temperature stated on the nameplate • Check the heat transfer to the medium (pump, heat exchanger) • Bleeding and checking the heating system pressure • Refrigeration inspection	

7.1.2 LOW PRESSURE

Error message	LP error	LP fault
Error description	The low-pressure protection of the refrigeration circuit has tripped.	
Heat pump behaviour	• System locked for 5 minutes • If 3 faults occur within 60 minutes, switch to high-pressure fault	• System lockout • Unlock by pressing the reset switch
Cause of fault	• Lack of heat absorption • Insufficient refrigerant charge • Blockage in the refrigeration circuit	
Troubleshooting	• Check the sink temperature or setpoint temperatures • Temperatures below the maximum water temperature stated on the nameplate • Check the heat absorption at the evaporator (flow rate, temperature) • Bleed and check the heating pressure • Refrigeration check	

7.1.3 FAN

Error message	Fan fault
Fault description	The fan fault contact does not close.
Behaviour of the heat pump	• Locking of the system • Unlocking by pressing the reset switch
Cause of fault	• No power supply • Fan impeller blockage • Other fan malfunction
Troubleshooting	• Check the power supply • Check that the fan blade is free to rotate • Replace the fan

7.1.4 INVERTER

Error message	Inverter fault
Fault description	The inverter fault contact does not close.
Behaviour of the heat pump	• System lockout • Unlocking by pressing the reset switch
Cause of fault	• No power supply • Other inverter fault
Troubleshooting	• Check the power supply (right-hand rotating field, phase failure) • Check the error code (see appendix)

7.1.5 HOT GAS

Error message	Hot gas
Error description	Compressor outlet temperature is too high for 20 minutes.
Behaviour of the heat pump	• System lockout • Unlock by pressing the reset switch
Cause of fault	• Compressor outlet temperature too high for 20 minutes
Troubleshooting	• Check sensor validity • Refrigeration system check

7.1.6 FROST PROTECTION

Error message	Frost protection	Frost protection fault
Error description	The hydraulic circuit's frost protection limit has been reached	
Heat pump behaviour	• System lockout for 10 minutes • If 3 faults occur within 60 minutes, switch to frost protection fault	• System lockout • Unlock by pressing the reset switch
Cause of fault	• No heat absorption at the indoor unit • Heat source too cold	
Troubleshooting	• Check the heat source (temperatures, pumps, heat exchanger) • Bleed	

7.2 CLEANING

7.2.1 CLEANING THE HEATING SIDE

- Cleaning: to be carried out by a plumber
- Flushing device: connection to the condenser's supply and return
- Condenser: Flush against the normal flow direction (take the gravity brake into account)

7.2.2 CLEANING THE HEAT PUMP

- The units can be cleaned using a standard household cleaner (see below for exceptions).
- Check the air inlets and outlets (regularly check the grilles of the intake and exhaust hoods for leaves and other debris).
- Brush away the dirt. The fan should not be running whilst you are brushing, as the dirt could otherwise be sucked into the unit.



NOTE

Improper cleaning

The wrong cleaning agents can damage the unit's surfaces. Please note the following:

- Do not use abrasive or cleaning agents that could damage the plastic casing, fittings or controls.
- Do not use sprays, solvents or cleaning agents containing chlorine.
- Clean the heat pump casing with a damp cloth and a little soap.
- Avoid placing or leaning objects on or against the heat pump.



NOTE

Limescale deposits

Limescale deposits can cause the safety valve to become stuck.

Operate the heating system's safety valve manually once a month.

7.3 HEAT PUMP LEAK TEST

In accordance with Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases, the heat pump must be checked regularly for leaks. This check may be carried out by a recognised and qualified specialist tradesman (with certification as a refrigeration engineer or a state-certified technician specialising in refrigeration technology). The following must be observed:

- DIN EN 378:2000 "Refrigerating systems and heat pumps – Safety and environmental requirements"
- VDMA Standard Sheet 24243 (August 2005) "Refrigeration machines and systems – Leak-tightness of refrigeration systems and heat pumps – Leak detection/leak testing"



NOTE

Leak test

The test must be carried out in accordance with the system logbook. The results of the test must be documented in accordance with regulations and retained for at least 5 years. A system log is provided for this purpose in the "System Logbook for Heat Pumps".

7.4 SYMBOLS ON THE UNIT

To provide staff with important information and warnings, standardised safety symbols based on the standards DIN EN ISO 7010, DIN ISO 3864 and DIN ISO 7000 have been used.

These safety signs are affixed in a clearly visible position for all to see, must be kept in a recognisable and legible condition, and must be replaced when necessary.

As the design of the device and the complexity of the production processes do not permit the use of persons with disabilities (e.g. with visual impairments) for safety reasons, the manufacturer has refrained from affixing tactile symbols. The requirements for personnel and the technical qualifications required to operate the device are set out in section “2.3 Target groups” on page 6.

7.5 MAINTENANCE SCHEDULE

We recommend annual servicing of your heat pump to ensure safe and efficient operation. Service calls, maintenance and repairs must only be carried out by qualified personnel.

DANGER! Do not operate the unit if any faults are found.

Maintenance work	Measures	Interval
Operators and owners		
Visual and functional inspection	- Check the device for any visible external defects and mechanical damage. - Carry out a visual inspection of the controls. - Carry out a visual and functional inspection of all safety devices.	Monthly
Cleaning the device	Follow the instructions in section “7.2 Cleaning”.	As required
Qualified personnel		
Inspection of electrical components	- Check the electrical components for damage. - Carry out repairs if necessary.	annually
Inspection of hydraulic components	- Check the hydraulic components for damage. - Carry out repairs if necessary.	y
Inspection of refrigeration components	- Check the refrigeration components for damage. - Carry out repairs if necessary.	annually
Inspection of safety devices	- Carry out a visual and functional inspection of all safety devices. - Document these checks.	y
Inspection of symbols on the unit	- Check the symbols on the unit. - Replace the symbols if necessary.	annually
Inspection of third-party components	Follow the manufacturer’s documentation for purchased components.	y
		annually
		annually
		annually

8. DECOMMISSIONING

When the heat pump is taken out of service, the unit must only be dismantled by qualified personnel. Hazardous substances and waste must be disposed of properly. When dismantling the heat pump, observe the instructions at the beginning of the original operating instructions as well as the safety instructions listed below.



DANGER

Fatal electric shock

There is a risk of fatal electric shock from the electrical components.

Disconnect the unit from the power supply before taking it out of service or dismantling it.

Secure the unit to prevent it from being switched on again.

8.1 TEMPORARY TAKING OUT OF SERVICE



NOTE

Improper decommissioning

Improper decommissioning of the device may result in damage to components and impaired functionality. Switch off the device at the main switch.

Please note the following:

- Frost can cause damage to the unit.
- Water freezes at outside temperatures below 0 °C.
- Taking the unit out of service without draining the heating circuit is only permitted at temperatures above 0 °C.

8.2 FINAL DECOMMISSIONING AND DISPOSAL

Only a specialist company may carry out final decommissioning/disposal. Environmental requirements regarding the recovery, reuse and disposal of operating fluids and components in accordance with current standards must be observed.



NOTE

Improper disposal

Improper disposal of the unit may result in environmental pollution and/or damage.

Dispose of electrical and electronic components as well as the heat pump's refrigerant properly and in accordance with applicable local regulations.

9. EC DECLARATION OF CONFORMITY

In accordance with the Low Voltage Directive 2014/35/EU, Annex IV, and the Pressure Equipment Directive (2014/68/EU), Annex IV, we hereby declare, under our sole responsibility:

Manufacturer

ratiotherm GmbH & Co. KG
Wellheimer Straße 34
91795 Dollnstein

Email: info@ratiotherm.de
Telephone: +49 (0) 8422/9977-0
Website: www.ratiotherm.de

that the device:

Device name: **WP Max-AirMono F15**
Year of manufacture: see type plate
Intended use: The heat pump uses ambient heat to provide supplementary heating and hot water supply.

In the version supplied, it complies with the directives

- Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
- Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment

as well as with the harmonised standards and directives listed below, to which this declaration refers:

Technical documentation is available. Name and address of the person authorised to carry out the technical

Harmonised standards applied:

- DIN EN 378-1-4
- DIN EN ISO 12100
- DIN EN 60204-1
- DIN EN 60335-1
- DIN EN 60335-2-40

Applicable EC Directives

- Directive 2014/30/EU
- Directive 2014/35/EU
- Directive 2014/68/EU
- Directive 2009/125/EC
- Directive 2011/65/EU

Documents to be compiled:

Name: Julian Kruck, Head of Heat Pump Technology
Address: ratiotherm GmbH & Co. KG, Wellheimer Straße 34, 91795 Dollnstein

We hereby certify that the certification procedure has been carried out in accordance with the Low Voltage Directive 2014/35/EU, Annex IV, and the Pressure Equipment Directive (2014/68/EU), and that the provisions of standard DIN EN ISO/IEC 17050-1 "Conformity assessment – Supplier's declaration of conformity – Part 1: General requirements" have been observed in issuing this declaration of conformity. This declaration shall cease to be valid in the event of any modification to the equipment not agreed with us. Any unauthorised modification in this regard excludes any liability on our part.

Dollnstein, on _____ Signature of authorised representative: _____ Details of the person authorised to issue this declaration on behalf of the manufacturer or its authorised representative:

Name: _____ Position: _____
Address: ratiotherm GmbH & Co. KG, Wellheimer Straße 34, 91795 Dollnstein

10. NOTES

This image shows a full page of blank graph paper. The grid consists of thin, light gray horizontal and vertical lines that intersect to form small squares across the entire surface. There are no margins, text, or other markings on the paper.



You can find us here



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