Original operating instructions

WP Max-AirMono F11/F17

As of 2025-04

ratiotherm
Smart Energy Systems

INFORMATION

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

- Directive 2014/35/EU of the European Parliament and of the Council of February 26, 2014, on the harmonization of the laws of 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 May 15, 2014, on the harmonization of the laws of Member States relating to the making available on the market of pressure equipment

This operating manual is intended for the operator, who must hand it over to the personnel who come into contact with the device. The operator must ensure that the information contained in the operating manual and the accompanying documents has been read and understood.

NOTE: If in doubt, consult the operating instructions, which must be kept in a known and easily accessible location.

The manufacturer accepts no liability for damage to persons, animals, or property, or to the device itself, resulting from improper use, failure to observe or insufficient observance of the safety criteria contained in these operating instructions, or from modification of the device or the use of unsuitable spare parts. The copyright for these operating instructions is held exclusively by the company:

ratiotherm

Smart Energy Systems

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91795 Dollnstein Germany

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1. INFORMATION ABOUT THE DOCUMENT

The following notes serve as a guide through the entire documentation. Other documents are also valid in conjunction with these operating instructions. These operating instructions for specialist tradesmen are an integral part of the ratiotherm WP Max-AirMono air source heat pump. The ratiotherm WP Max-AirMono air source heat pump must not be operated without these operating instructions.
The operating instructions must be made available to the operator and the specialist installer for information at all times. If the ratiotherm WP Max-AirMono air source heat pump is sold, the instructions must be included. We accept no liability for damage caused by failure to observe these instructions.

1.1 SAFETY AND WARNING NOTICES

Signal words and colors

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

Signal word	Explanation
DANGER	Indicates a dangerous situation that will result in death or serious injury if ignored. .
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, could result in minor injury or property damage. damage.
NOTE	Indicates operating instructions and cross-references. A note indicates a risk of property damage or risk of injury.

1.2 SAFETY SYMBOLS

1.2.1 OTHER SYMBOLS ACCORDING TO DIN ISO 7010

Some of the following special safety signs according to DIN EN ISO 7010 and DIN ISO 3864 are used in the relevant sections of 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 supplement a warning notice.
- 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

Symbol	Explanation	Symbol	Explanation
	Follow instructions		General command sign
	Disconnect before maintenance or repair		Use hand protection

1.2.2 OTHER SYMBOLS ACCORDING TO DIN ISO 7000

Symbol	Explanation	Symbol	Explanation
	Observe the operating manual (instructions for use)		Service indicator, Refer to the operating manual (instructions for use)
	Instructions for use/operating instructions (operating manual)		

1.2.3 OTHER SYMBOLS

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

2. IDENTIFICATION AND NOTES

2.1 PRODUCT

Device designation: Heat pump (air/water) Type:
WP Max-AirMono F11 / F17

Year of manufacture: See type plate

Country of origin: Germany

2.2 INTENDED USE

The WP Max-AirMono F11/F17 device is designed to use environmental heat from the ambient air to provide direct heating support and hot water preparation. Any other or extended use of the device is considered improper and therefore inappropriate. In this case, the safety and protective functions of the device may be impaired. ratiotherm GmbH & Co. KG is not liable for any damage resulting from this. Intended use also includes:

- Compliance with all instructions in this operating manual,
- Observing all warnings and
- Compliance with the inspection and maintenance conditions.

The WP Max-AirMono F11/F17 device is built according to the latest technology and recognized safety regulations. The device is intended exclusively for domestic and/or commercial use for hot water preparation (domestic water) and for heat or cold generation.

Improper or unintended use may result in danger to the life and limb of the user or third parties. In addition, damage to the device and other property may occur. The WP Max-AirMono F11/F17 device is not intended for use by persons (including children) with limited physical, sensory or mental abilities, or persons with insufficient experience and/or knowledge. The risk is borne solely by the operator and user.

2.3 ZIELGRUPPEN

For safety reasons, the design of the device does not allow it to be used by persons with disabilities (e.g., visually impaired persons). **⚠ DANGER!** Only perform tasks for which you are authorized.

2.3.1 TARGET GROUP MATRIX

Tasks	Operators and users	Specialist personnel
Transport/storage		X
Assembly/installation		X
Commissioning/adjustment		X
Automatic operation (control)	X	X
Setup/conversion/technical modification		X
Maintenance/inspections/repairs		X
Cleaning	X	X
Troubleshooting and fault repair		X
Decommissioning/dismantling/disposal		X

2.3.2 TARGET GROUP DEFINITION

Operators and users

A person who has purchased the device for use in an existing system fo
direct heating support and hot water preparation. The person must ha
knowledge of the necessary protective devices and protective measure
Qualifications for operators and users:

- Of legal age and physically/mentally capable of performing work on the device.
- Knowledge of how to operate the product, imparted by qualified personnel and the operating instructions.

Specialist personnel

A person from a qualified specialist company for heating and hot wate
special knowledge and experience through professional training. The p
to assess the work assigned to them (e.g., instruction of personnel, swi
potential hazardous situations.
Qualification of qualified personnel:

- Of legal age and physically/mentally capable of performing work on the device.
- Knowledge: several years of experience working on heating systems and hot water preparation

2.4 MISUSE

2.4.1 REASONABLY FORESEEABLE MISUSE

Reasonably foreseeable misuse that poses a risk to personnel, third parties, or the device includes the following for all operating modes:

- Using the device contrary to its intended use.
- Supplying 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 conversions 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 (including children) with limited physical, sensory, or mental abilities.

⚠ DANGER

Unauthorized modifications to the device

Unauthorized modifications pose a risk of death or injury.

Do not make any unauthorized modifications to the device without the prior approval of ratiotherm GmbH & Co. KG.

2.4.2 UNFORESEEABLE MISUSE/ABUSE

Unforeseeable misuse can occur due to:

- 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 principle. The "General Terms and Conditions of Sale and Delivery" have been available to the operator since the conclusion of the contract at the latest. 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 protective devices,
- Failure to observe the safety and warning instructions in the operating manual,
- Unauthorized structural modifications to the device,
- Inadequate implementation of the specified maintenance measures, and
- disasters involving foreign objects or force majeure.

The operating instructions must be read before handling the device. The operating instructions familiarize personnel with the handling of the device and provide information on all phases of the device's life cycle.
The operating instructions must be accessible to personnel at all times. The safety and warning instructions in the operating instructions and on the device must be observed and complied with. If you have any further questions that go beyond the scope of these operating instructions, please contact ratiotherm GmbH & Co. KG.

The following guidelines, standards, and laws must be observed when using the device in Germany:

- VDE and EVU regulations and provisions (in particular VDE 0100)
- Regulations and provisions of 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 Accident prevention regulations "Refrigeration systems" with implementation instructions
- Energy Saving Ordinance EnEV – Ordinance on energy-saving thermal insulation and energy-saving system technology in buildings from 2009

NOTE

Guidelines, standards, and laws

Additional local guidelines, standards, and laws, such as building regulations, may apply. **As a general rule, the applicable legal guidelines, standards, and laws in the respective country must be observed.**

3. SAFETY INSTRUCTIONS

DANGER! Read and observe the operating instructions before working on and with the device.
Despite all precautions taken, there may still be some residual risks that are not immediately apparent. You can reduce the existing residual risks by observing and complying with the general safety instructions and warnings as well as the intended use.

3.1 GENERAL SAFETY INSTRUCTIONS

Please observe the following general safety instructions:

- The volume of water increases during the heating process. Therefore, never close the blow-off line of the safety valve.
- Please note that hot water may escape from the blow-off line.
- If there are leaks in the area of the device, switch off the device and shut off the connection to the rest of the heating system. The leaks must then be repaired immediately.
- Do not use the following products to prevent corrosion on the device: sprays, solvents, chlorinated cleaning agents, paints, adhesives, etc.
- Components that have not been tested with the device may cause damage to the device or impair its functions. Only use original spare parts and original wear parts.
- Only allow qualified personnel to perform assembly/installation/commissioning/adjustment of the device.
- Observe the existing regulations, rules, and guidelines as well as the local installation requirements.
- To avoid injuries of any kind, the 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 welding on load-bearing parts.
  Safety devices must not be taken out of service. Only original spare parts and original accessories from the manufacturer may be used.

3.2 ADDITIONAL INFORMATION

Local accident prevention regulations apply to all work on the device. Please also observe the

- Applicable binding regulations on accident prevention,
- Recognized technical rules for safe and proper working practices,
- Existing regulations on environmental protection, and
- Other applicable regulations.
- The outlet temperature at the hot water taps can be up to 60 °C. Carefully check the water temperature at the hot water taps before placing your hands completely under the water jet.
- Do not make any changes to the components:
  - On the air heat pump and the water and electricity lines;
  - On the safety valve;
  - Structural conditions that may affect the operational safety of the device;
  - Structural conditions in the vicinity of the device, insofar as these may affect the operational safety of the device.

3.3 RESIDUAL RISK

⚠ WARNING

Measures/work carried out by unauthorized/unqualified personnel

Measures/work on the device and/or its components and connections by unauthorized/unqualified personnel pose a serious risk of injury.

In the event of malfunctions, only allow qualified personnel to carry out measures/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 starting work. 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	F11	F17	Unit
Performance data Heating mode			
L2/W35			
Heating output	1.9 to 11.3	2.6 to 15.5	kW
Power consumption	0.8 to 3.0	0.7 to 3.8	kW
COP at rated power	4.48	4.32	
Space heating energy efficiency Low-temperature applications under average climate conditions	193.60	180.60	
Performance data for cooling mode			
W15/A35			
Cooling capacity	5.1 to 14.5	6.7 to 19	kW
Power consumption	0.8 to 3.0	1.1 to 4.4	kW
EER at rated power	5.61	5.72	
Performance data for heating mode according to EN 14511			
A7/W35 (at 40% speed)			
Heating capacity	4.5	8.2	kW
Power consumption	0.88	1.72	kW
COP at rated power	5.09	4.75	
A+2/W35 (at 65% speed)			
Heating capacity	6.2	10.8	kW
Power consumption	1.38	2.5	kW
COP at rated power	4.48	4.32	
A-7/W35 (at 75% speed)			
Heating capacity	5.99	7.28	kW
Power consumption	1.71	2.82	kW
COP at rated power	3.51	2.58	kW
Compressor			
Design	Fully hermetic, rotary piston, inverter		
Speed	960 to 5400	1200 to 7000	rpm
Max. operating current	12	18	A
Blocking current LRA			A
Oil quantity	0.84	1.154	L
Evaporator (outdoor unit)			
Design	Air heat exchanger		
Material	Aluminum, copper		
Air flow rate	5000	8000	m^3/h
Test pressure	35	35	bar
Operating range	-30 to +50	-30 to +50	°
min./max. source temperature	-25 to +40	-25 to +40	°C

Max-AirMono	F11	F17	Unit
Condenser			
Design	Copper-brazed plate heat exchanger		
Material	Stainless steel / copper		
Water flow rate	0.5 to 2	0.5 to 3	m^3/h
Pressure loss	max. 0.3	max. 0.3	bar
Temperature difference	5 to 8	5 to 8	K
Test pressure	45	45	bar
Operating range	-196 to +200	-196 to 200	°
Min./max. lowering temperature	25 to 75	25 to 75	°C
Connection dimension	1", AG	1", AG	/
Separate heat exchanger			
Design	Copper-brazed plate heat exchanger		
Material	Stainless steel / copper		
Water flow rate	0.5 to 2	0.5 to 3	m^3/h
Pressure loss	max. 0.3	max. 0.3	bar
Temperature difference	5 to 8	5 to 8	K
Test pressure	45	45	°C
Operating range	-196 to 200	-196 to 200	°
Min./max. lowering temperature	25 to 75	25 to 75	/
Connection dimensions	1 1/4", AG	1 1/4", AG	/
Refrigeration circuit			
Working fluid	R290		
Filling quantity	2.2	2.2	kg
Max. operating pressure	33		bar
Electrical outdoor unit			
Mains connection	230 V / 1~ / 50 Hz	400 V / 3~ / 50 Hz	/
Slow-blow fuse	20	20	A
Max. operating current compressor	12	18	A
Max. power consumption Compressor	3.0	7.5	kW
Electrical indoor unit			
Integrated heating cartridge output	9 kW (3 stages, 3-6-9)		/
Power connection	400 V / 3~ / 50 Hz		/
Slow-blow fuse	20		A
Max. operating current	16		A

Max-AirMono	F11	F17	Unit
Device data			
Sound pressure level Interior at a distance of 1 m	/	/	dB(A)
Sound power level interior	/	/	dB(A)
Sound pressure level, outdoor unit at a distance of 5 m (free installation A7/W55)	33	34	dB(A)
Sound power level, outdoor unit L-WA outdoors (A7/W55)	54	55	dB(A)
Dimensions indoor unit	660 x 1175 x 202		W x H x D (mm)
Dimensions of outer section	1583 x 923 x 718		W x H x D (mm)
Weight of inner unit	51	53	kg
Weight of outer unit	210	220	kg
Max. operating pressure water	6		bar
Max. VL temperature	75		°C

4.2 FUNCTION DESCRIPTION

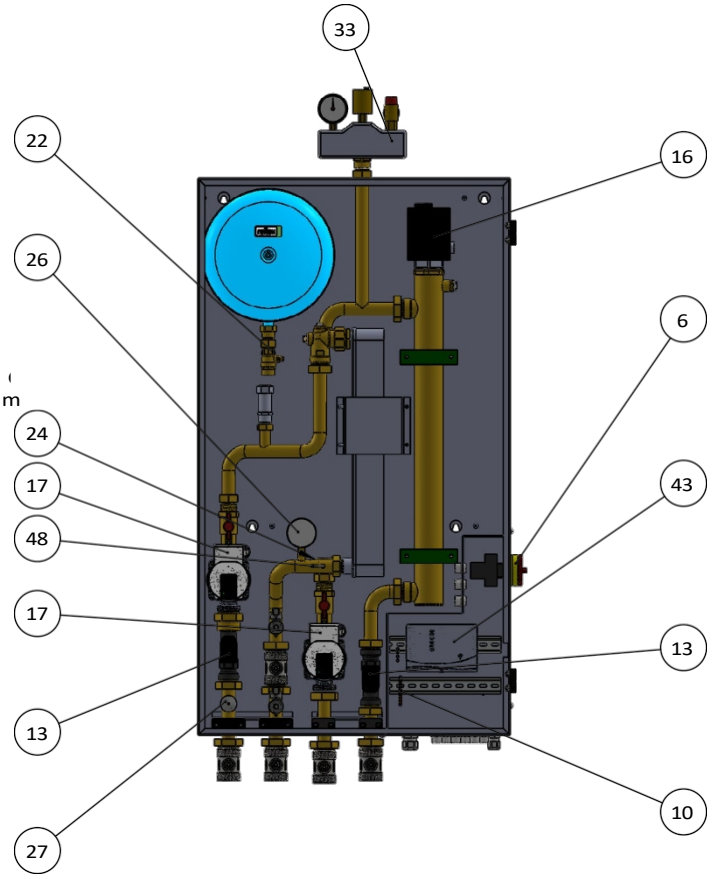
The ratiotherm WP Max-AirMono air source heat pump is designed as a monoblock heat pump and is characterized by its very quiet operation. The heat pump makes it easy to tap into the energy reserves of the ambient air. No ground or well construction work is necessary.
The maximum flow temperature is 75 °C. Its variable-speed compressor allows for continuous power control, making it particularly efficient. This feature is complemented by its smart grid capability, making it perfect for power-to-heat applications and grid-connected applications.

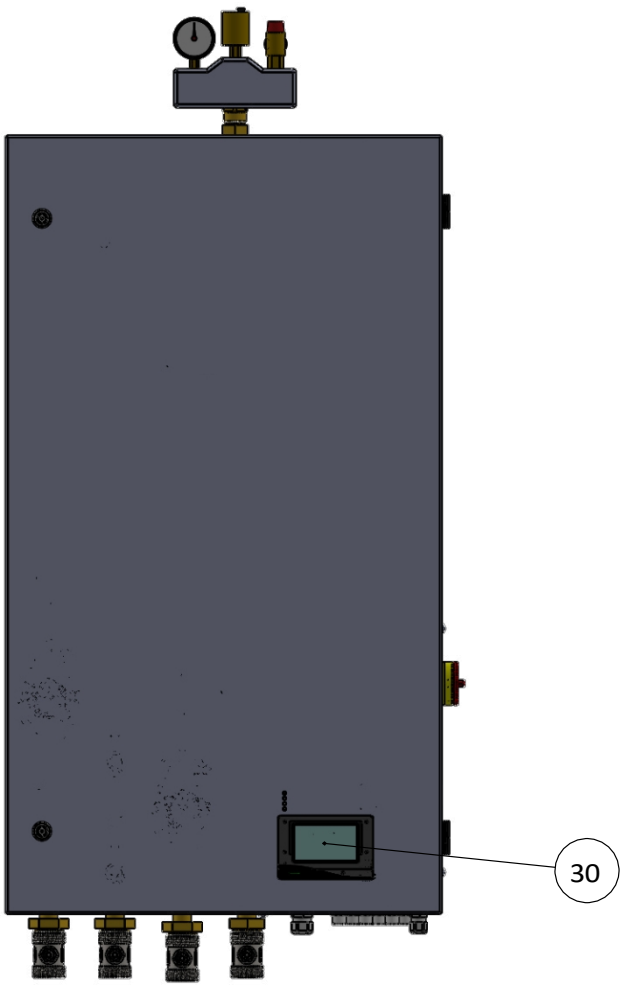
ADVANTAGES

- Easy installation without time-consuming excavation work
- Maximum flexibility thanks to speed-controlled inverter operation
- Integrated energy management (smart grid-compatible)
- Very quiet outdoors
- With ratiotherm components, a fully coordinated, future-proof system

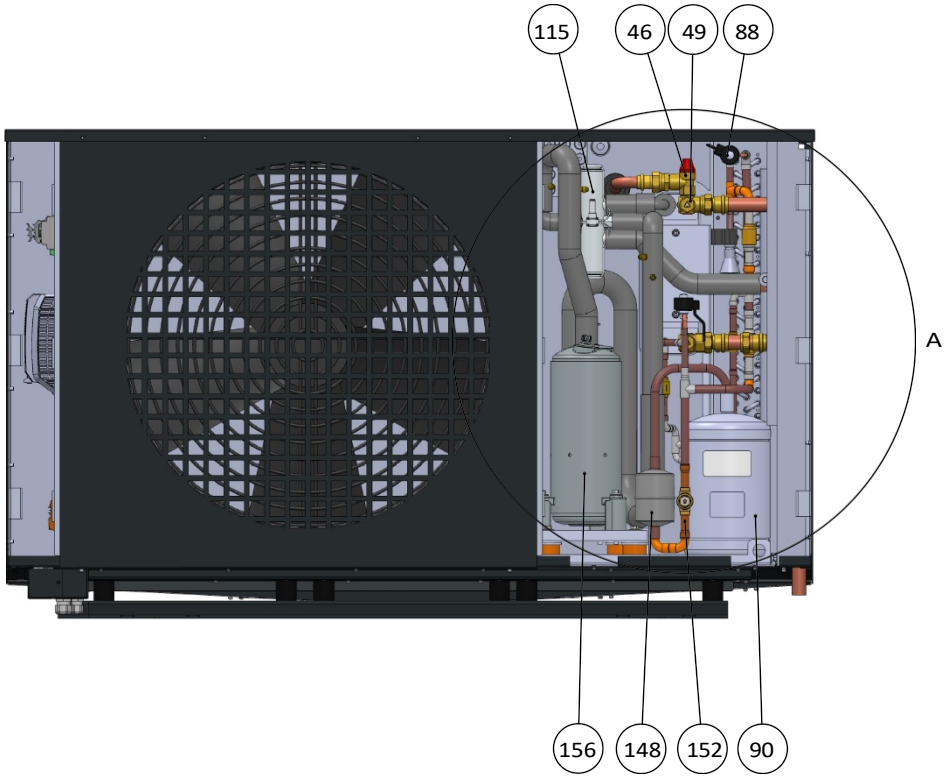
4.3 DESIGN AND SPARE PARTS

The ratiotherm WP Max-AirMono air source heat pump has a complete refrigeration cycle and uses outside air as its primary energy source. The air heat pump is designed for all weather conditions. The outdoor unit is installed outdoors in such a way that air can flow freely through the evaporator and does not recirculate. An axial fan transports the air to the evaporator.
The refrigeration circuit is a hermetically sealed circuit consisting of a rotary piston compressor, a condenser (plate heat exchanger), an evaporator (fin heat exchanger), and an electronic expansion valve that controls the flow of refrigerant. The natural refrigerant R290 is used as the working medium. The ratiotherm WP Max-AirMono air source heat pump is shipped fully filled and ready for operation. The ratiotherm WP Max-AirMono air source heat pump is controlled by the UVR 610 controller from Technische Alternativen. Its display shows all parameters and operating states of the air source heat pump.
The ratiotherm WP Max-Air air heat pump can be operated in combination with most electric, gas, or oil boilers.





Item number	Designation	Description	Quantity
6	Main switch	ra/14466	1
10	Terminal 2 Conductor DG	ra/13463	1
13	Volume flow sensor	ra/95.85.4525	2
16	E-rod	ra/95.50.0001	1
17	Pump	ra/13310	2
22	Solar cap valve	ra/60.90.KV50	1
24	Temperature sensor	ra/13647	2
26	Pressure gauge	ra/14820	1
27	Pressure sensor	ra/11656	1
30	UVR 16x2	ra/95.103212	1
33	Safety group	ra/11185	1
43	Universal controller	ra/14414	1
46	Diaphragm Safety valve	ra/14712	1
48	Temperature Immersion sensor	ra/13612	1
49	Temperature sensor	ra/14697	2
52	Inverter	ra/14550	1
54	Filter		1
55	Filter		1
86	Check valve valve	ra/10528	2
87	Expansion valve	ra/13040	1
88	Expansion valve	ra/13036	1
90	Collector	ra/14659	1
91	Check valve	ra/14624	2
115	4-way Changeover valve	ra/10938	1
148	Filter dryer	ra/14661	1
152	Sight glass	ra/14660	1
156	Compressor	ra/14418	1
176	Stepper motor control	ra/13047	2
192	UVR610S	ra/14497	1
193	Control component component TDI5-DL	ra/13047	1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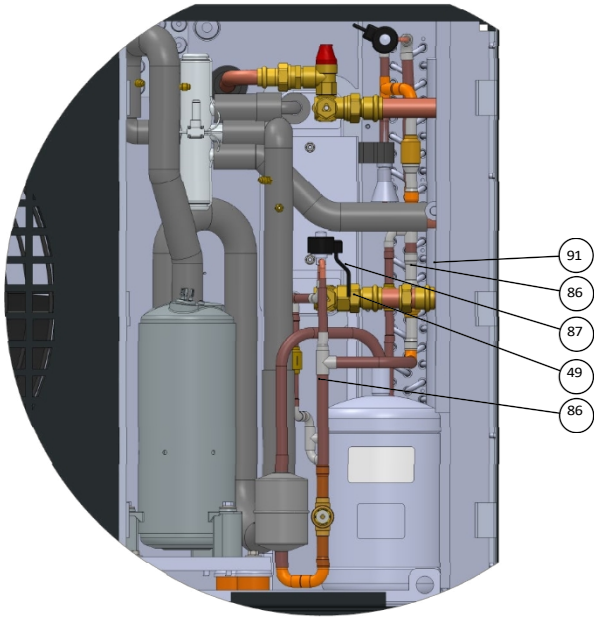
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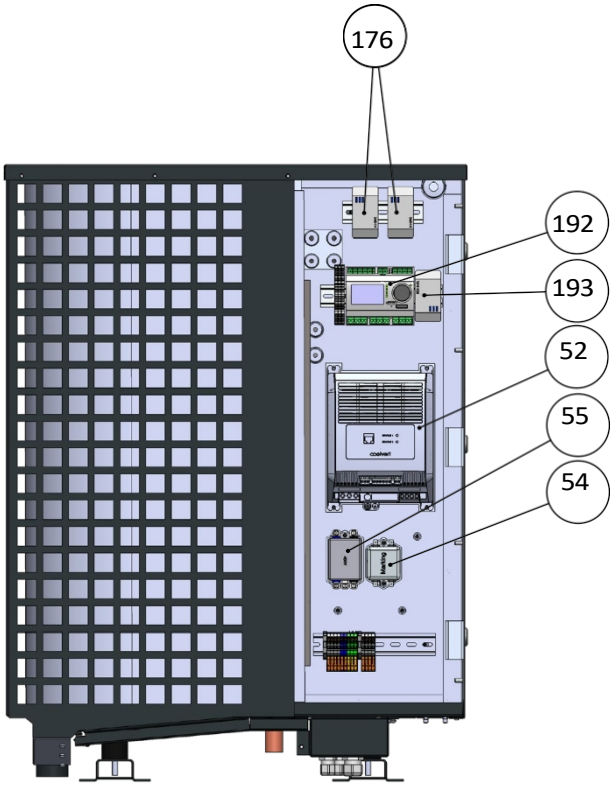
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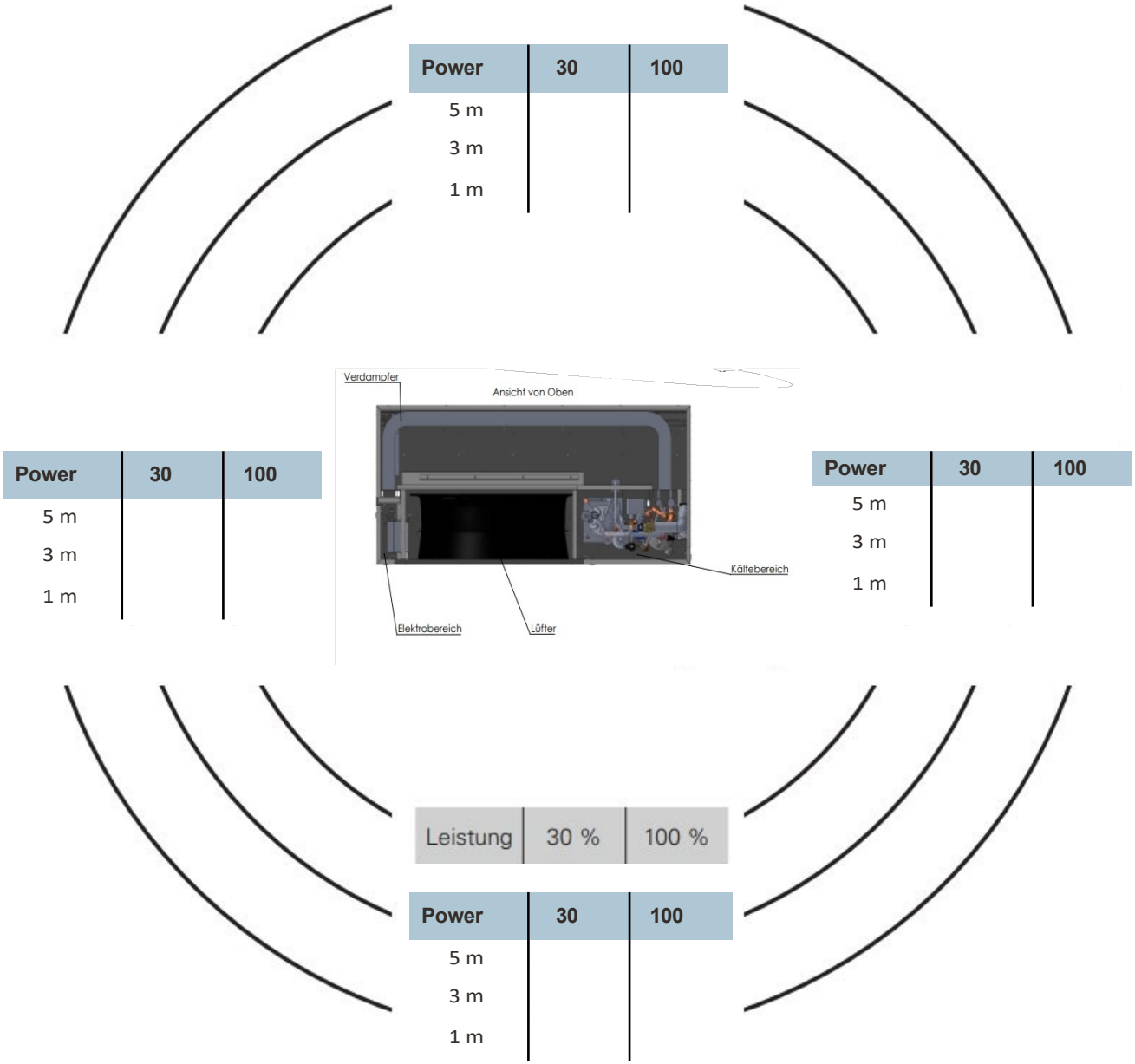
4.4 NOISE POLLUTION FROM THE OUTDOOR UNIT



The Max-AirMono is often installed on a house wall. The resulting noise propagation must be taken into account. When installing and aligning the unit, ensure that noise pollution is kept to a minimum.

Sound pressure levels are modified by additional walls, masonry, differences in terrain height, etc., and should therefore only be considered as a guideline.

The Max-AirMono operates at low or high fan speed depending on the outside temperature.

4.5 CONTROL LOGIC AND CONTROL

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

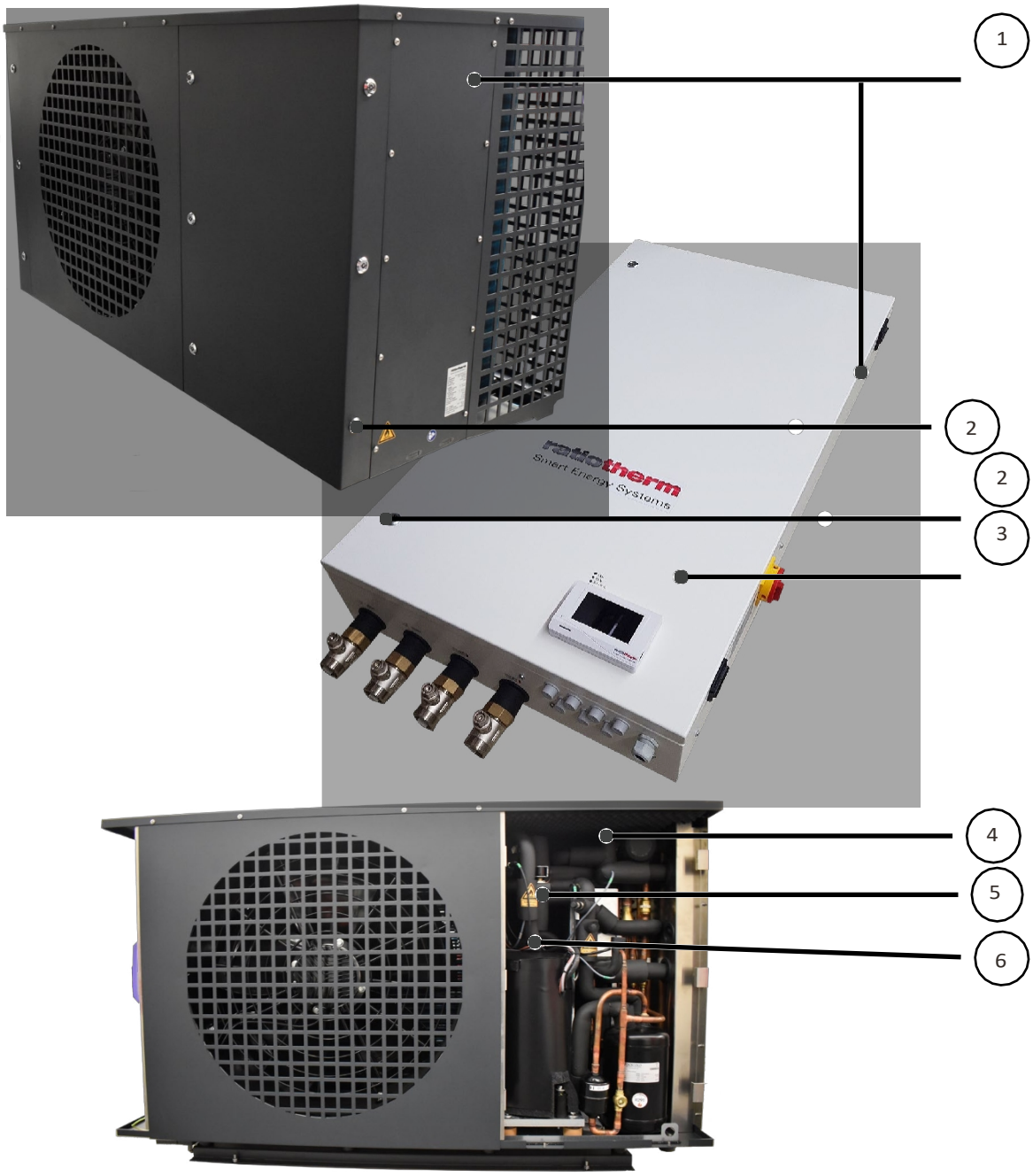
- The heat pump controller communicates with rZR via CAN bus.
- The central controller activates the heat pump and sets the corresponding target temperature.
- In heating mode, the heat pump automatically regulates its output according to the specified target temperature.
- It is therefore possible that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

Control logic in conjunction with external controllers:

- The request via external controllers has priority over the ratiotherm controllers (keyword: Power-to-Heat).
- The heat pump can be requested via a digital signal.
- A 0-10 V input is also available. If there is no 0-10 V signal, the heat pump automatically 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 whether a set speed or a set temperature is transferred (factory setting = off: 0-10 V signal is evaluated as set speed).
- The setpoint temperature is defined as: 0 V = 0 °C 10 V = 100 °C
- A digital input is also available to activate cooling.
- Here too, the heat pump regulates itself to a fixed setpoint temperature.

4.6 SAFETY DEVICES

The device is equipped with various safety devices. The safety devices are shown in the following illustration:



1	Protective enclosure or housing	**4**	Pressure relief device for hydraulic circuit: Safety valve and blow-off line
2	Mechanical lock	**5**	Pressure switch for refrigeration circuit
3	Safety door	**6**	Thermostat for compressor

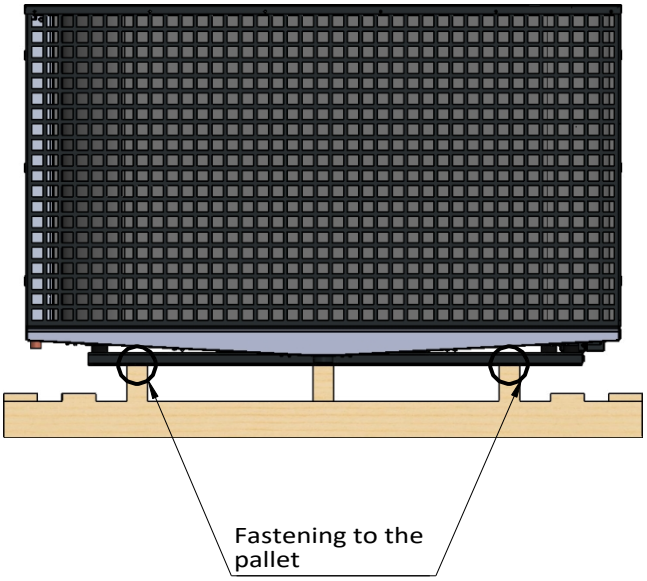
5. TRANSPORT, ASSEMBLY, AND INSTALLATION

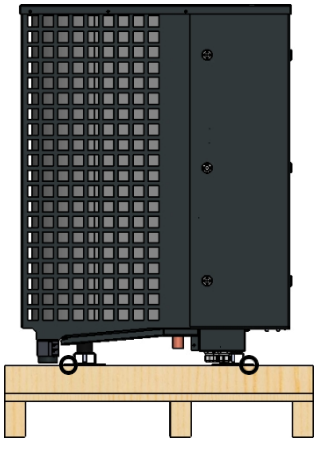
5.1 TRANSPORT AND UNPACKING

The following instructions for transporting the device must be observed:

- Transportation must only be carried out by qualified personnel.
- Protect yourself with PPE (e.g., safety shoes, etc.).
- Take the weight of the device (approx. 250 kg) into account when selecting the appropriate lifting equipment (forklift truck, pallet truck, etc.).
- Note the center of gravity of the device.
- Remove all packaging materials.
  NOTE: Do not damage the device when removing the packaging materials.
- When disposing of the transport and storage packaging, comply with local disposal regulations and applicable environmental protection laws.
- When unpacking the device, check that the delivery is complete.
- Use the delivery notes and packing lists provided to check the contents.

1. The device is secured to the pallet with 4x M6.3x38 screws upon delivery. These must be loosened (10 mm socket) and can be used for later installation on the foundation.

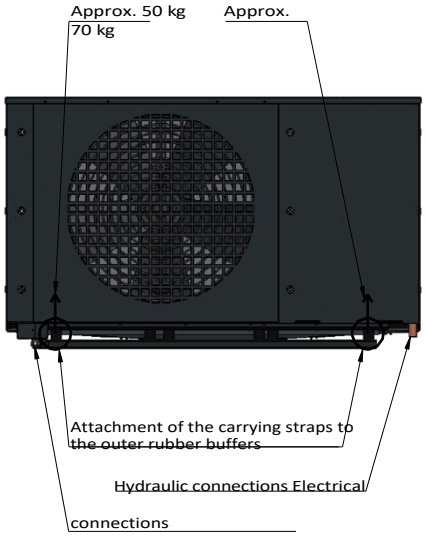


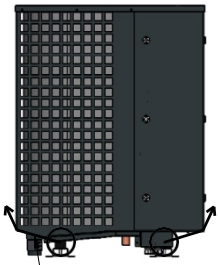


2. The supplied tension belts can be used for transport.

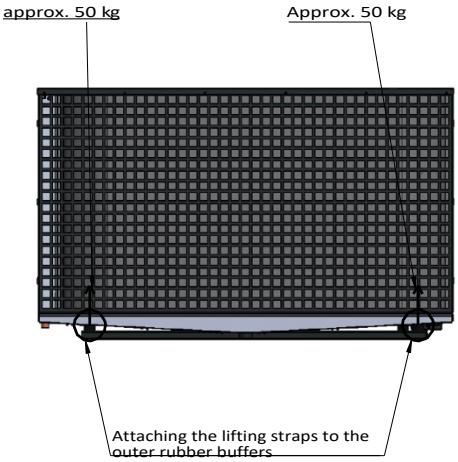
The device can be lifted by crane, but the supplied tension belts must not be used for this purpose. Suitable round slings must be used instead of the tension belts.

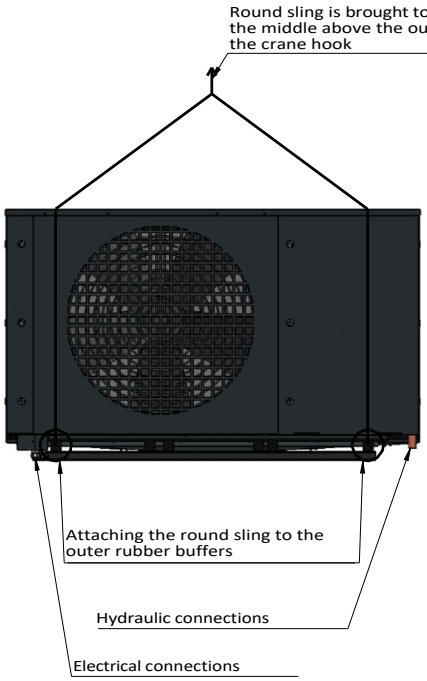
Crane operation must be carried out by qualified personnel and in accordance with DGUV regulations for cranes.

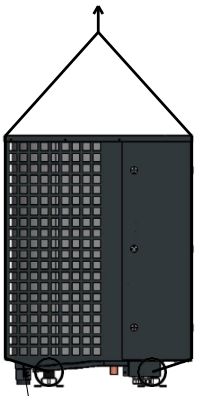




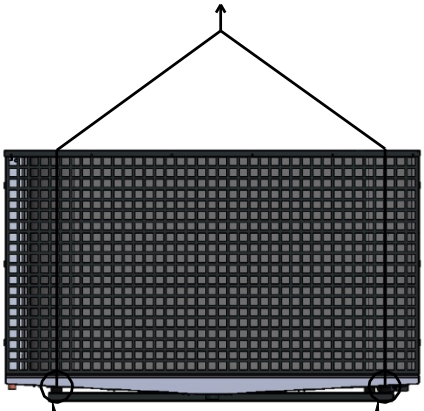
The carrying straps must be routed over
be guided upwards over the edges of the long sides







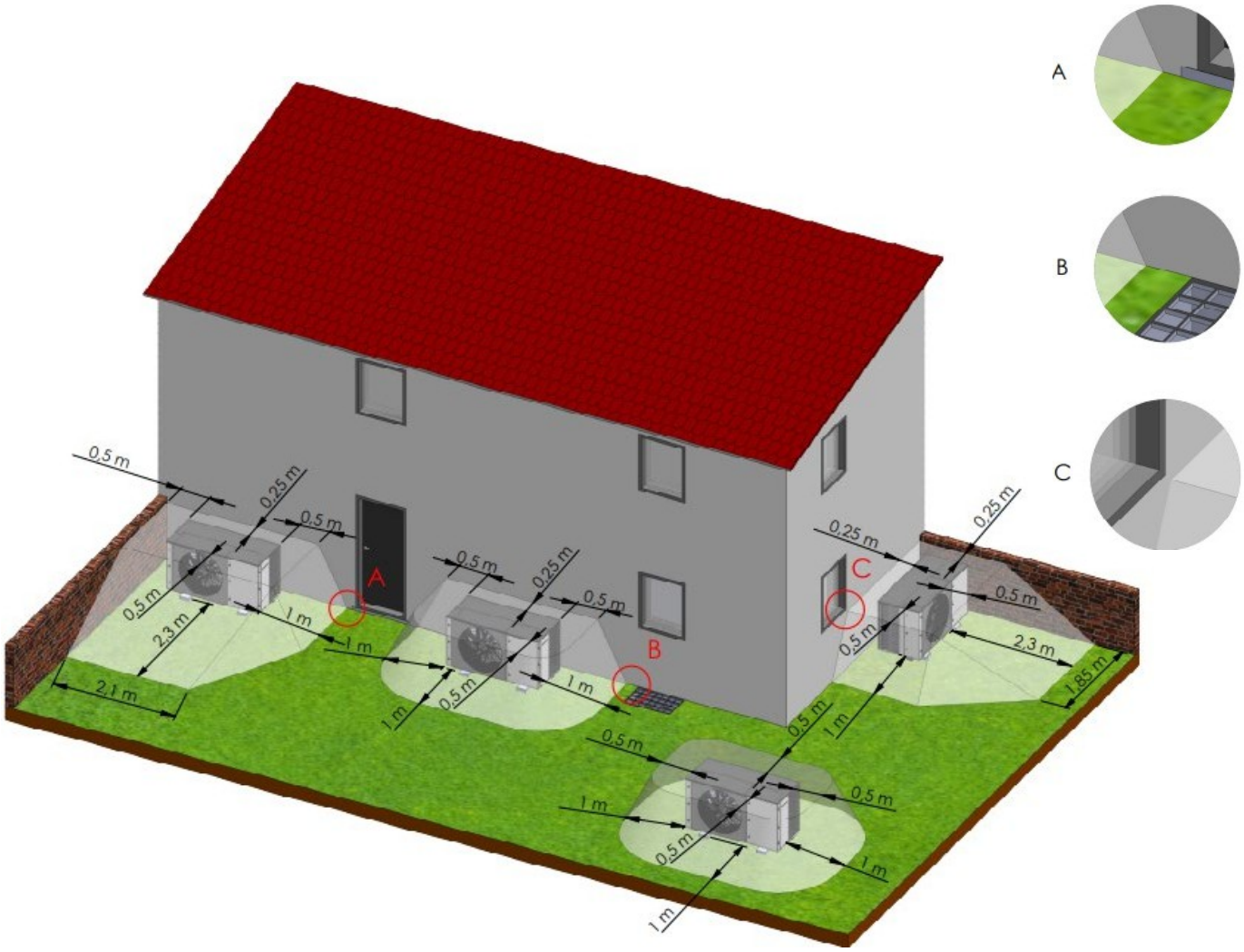
The round sling must be guided over the edges of the long sides facing upwards

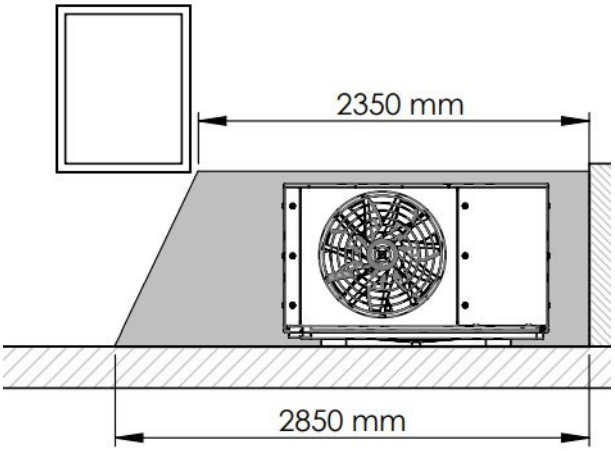


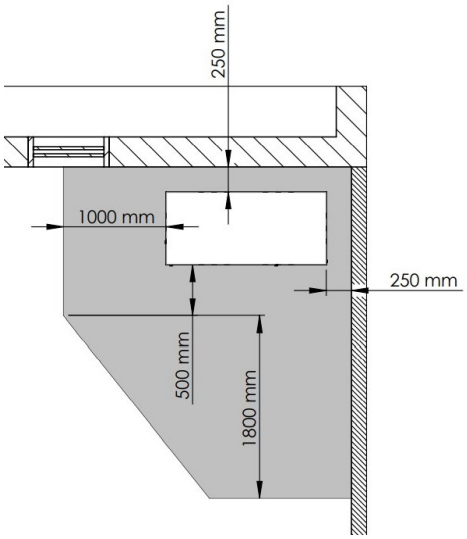
5.2 SAFETY AND PROTECTION AREA

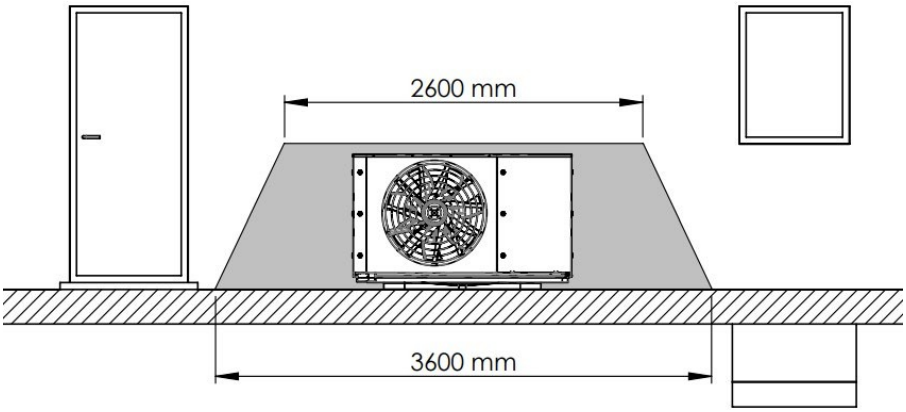
The following information regarding safety and protection areas must be observed:

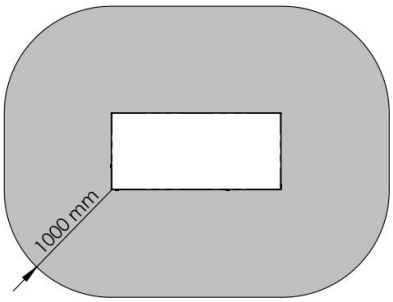
- The outdoor unit must be installed in such a way that **no refrigerant** can enter **the building** or otherwise endanger people.
- No **ignition sources** may be present in these protection areas, either permanently or temporarily, such as:
  - Open flames or spark-producing tools
  - Electrical systems, sockets, lamps, light switches, electrical house connections
  - Objects with high surface temperatures.
- The following must not be present within protective areas:
  - Building openings, windows, doors, light wells, flat roof windows
  - Openings in ventilation systems
  - Property boundaries or neighboring properties, walkways and driveways, depressions or ground cavities.
  - Pump shafts, sewer inlets, and sewage shafts, etc.
- The specified safety distance must **be maintained at all times.**

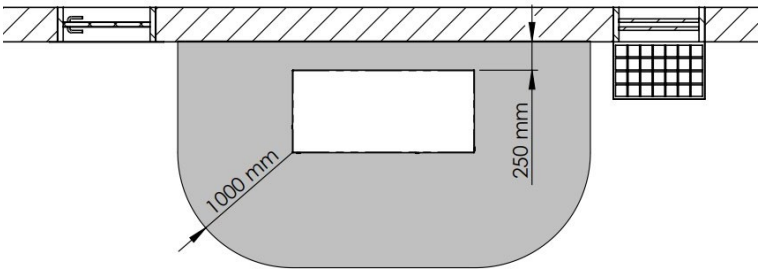



2350 mm
2850 mm


250 mm
1000 mm
250 mm
500 mm
1800 mm


2600 mm
3600 mm


1000 mm


250 mm
1000 mm

If the Max-AirMono cannot maintain the required distance from a light well, a wall must be erected. The height of the wall must be calculated as follows:

Wall height X [m] = Reduction of the safety area [in m] * Height of heat pump (+ foundation height) [in m]/ 0.50 m

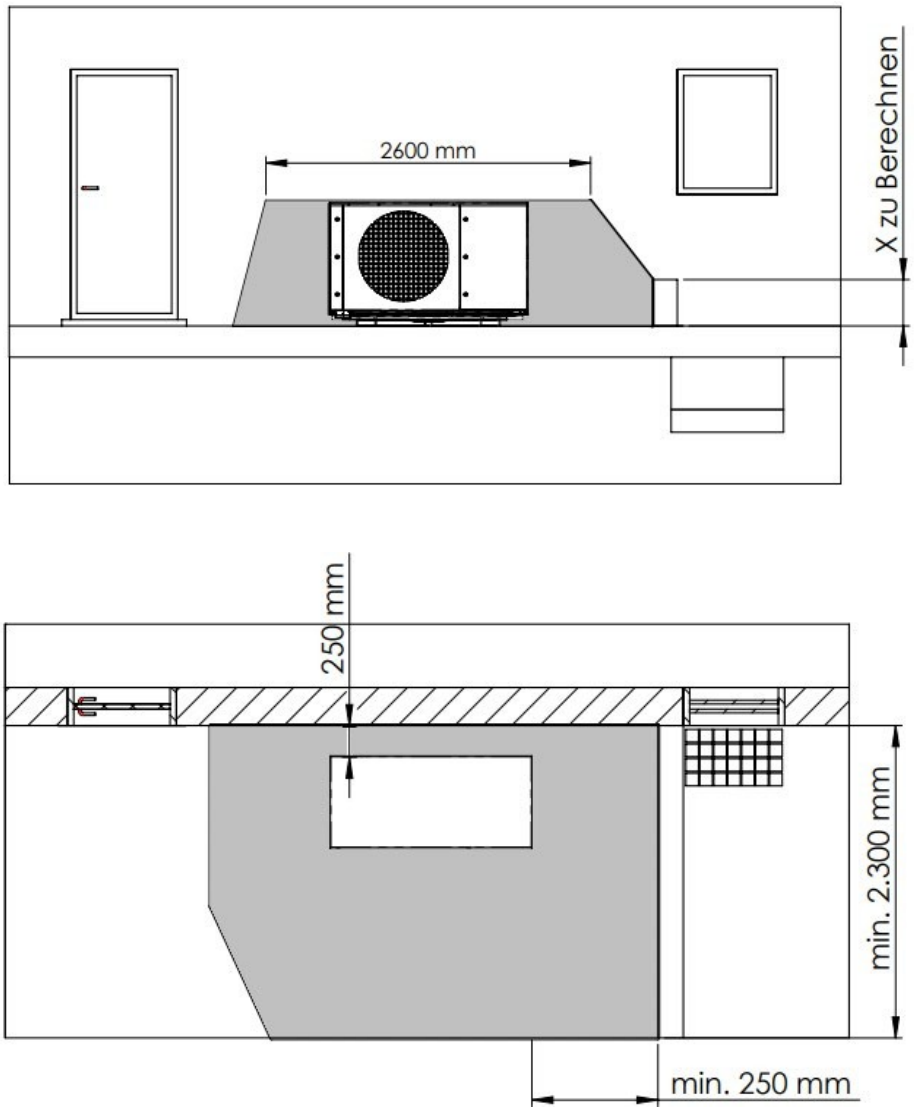
Example:

Reduction of the safety area: 0.20 m Foundation height:
0.25 m

Wall height X = 0.20 m * (0.92+0.25) m / 0.50 m = 0.47 m

A wall length of at least 2300 mm is mandatory.

The maintenance areas must still be observed.



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

- Illuminate the danger zone for assembly and installation with additional lighting units if necessary.
- The personnel have the necessary qualifications and receive the necessary training.
- The personnel have read and understood the operating instructions.
- The personnel have access to the operating instructions at all times.
- Local accident prevention and environmental regulations are implemented and complied with.
- The personnel are instructed by the responsible supervisor and unauthorized persons are kept away from the device.
- The device is only handed over and operated in a safe and functional condition, and damage to the heat pump is repaired immediately or the damaged heat pump is shut down immediately.

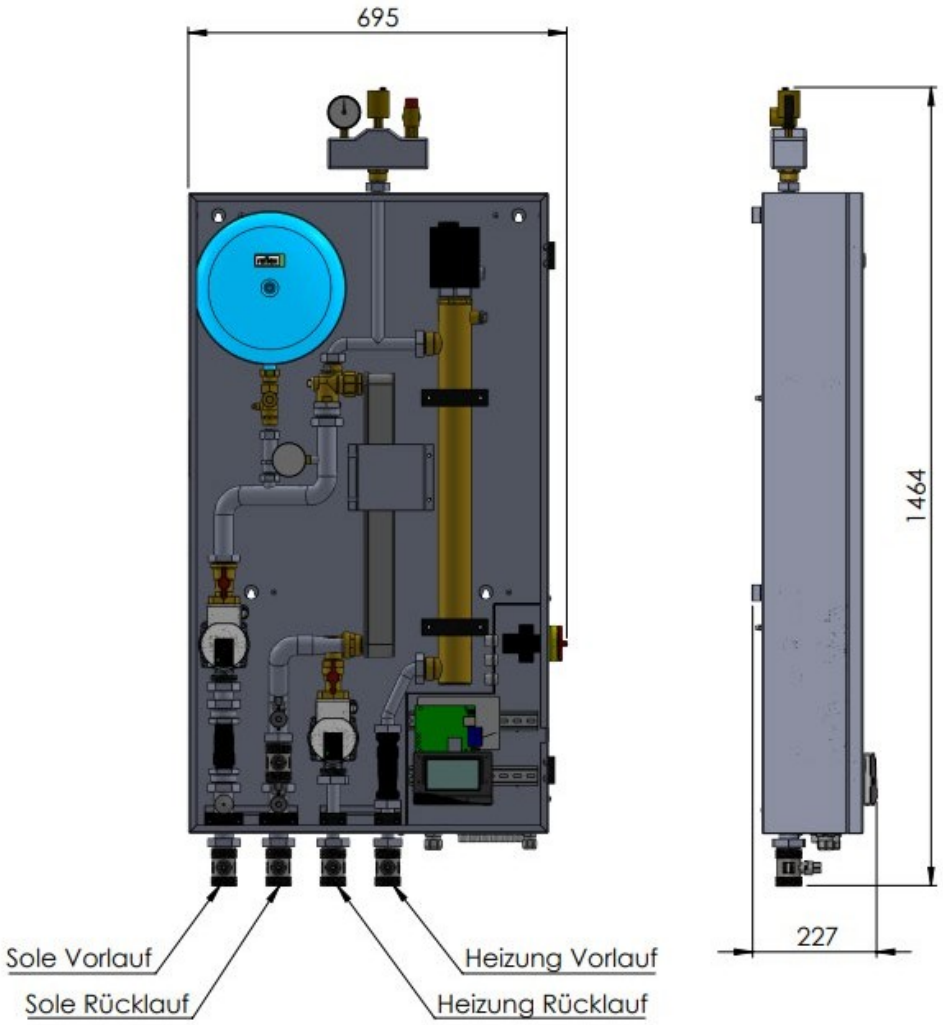
5.2.1 INDOOR UNIT

Storage conditions:

- Ensure frost-free storage.

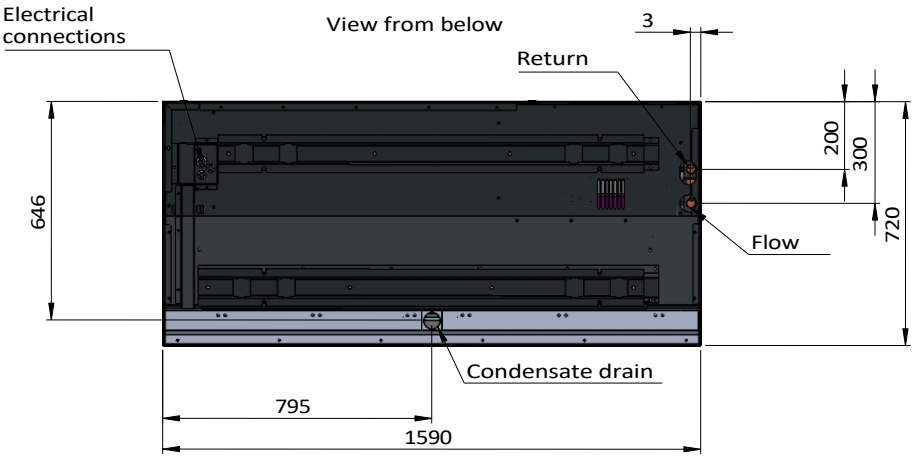
Installation conditions:

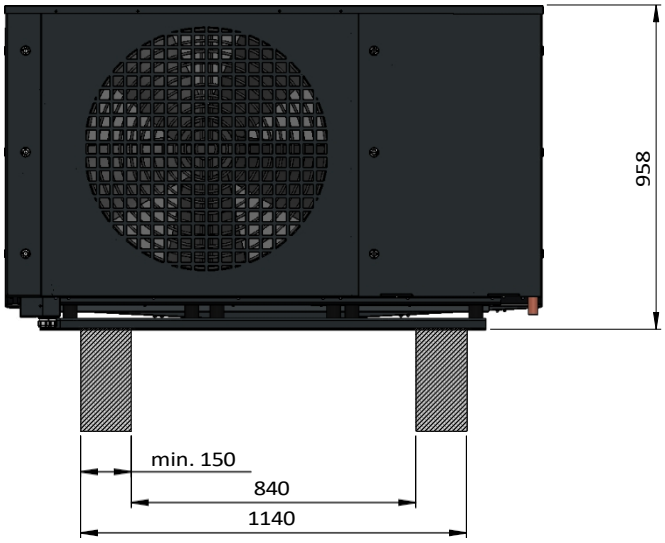
- A floor drain must be provided to protect against water damage.
- The indoor unit of the WP Max-AirMono air source heat pump must be installed in a clean, ventilated, and dry location. The ambient temperature must be permanently > 10 °C and < 35 °C.



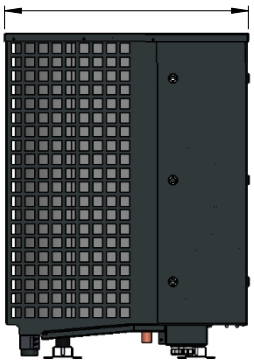
5.2.2 OUTDOOR UNIT

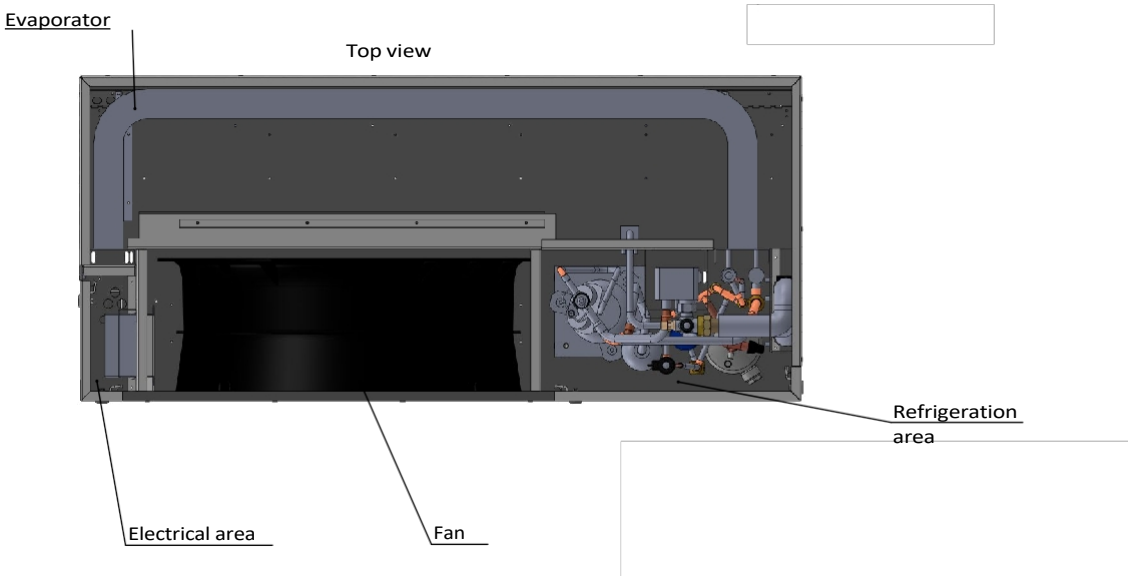
- If the outdoor unit is installed close to a wall, a **minimum distance** of 0.25 meters must be maintained (sound reflection).
- A **free air flow** (5000 to 8000 ^{m3}/h) must be ensured. The outdoor unit must not be enclosed or covered.
- The outdoor unit must be positioned perpendicular to the main wind direction.
- If there is a sea breeze, the outdoor unit must be installed on the side of the building facing away from it.
- Before installing the outdoor unit, a suitable **foundation** must be constructed (see dimensions of outdoor unit and foundation plan).
- Since heat pump operation produces a certain **amount of condensate** depending on the output and humidity (approx. 3 l/h), a drain must be provided for the condensate to flow away if the ground beneath the outdoor unit is impermeable. Alternatively, a heated condensate drain can be installed if necessary. A siphon must be provided for safety reasons.
- The outdoor unit can be installed at a **maximum** distance **of 20 m** (single pipe length) from the indoor unit as standard; longer pipe lengths are only possible after consultation with ratiotherm.



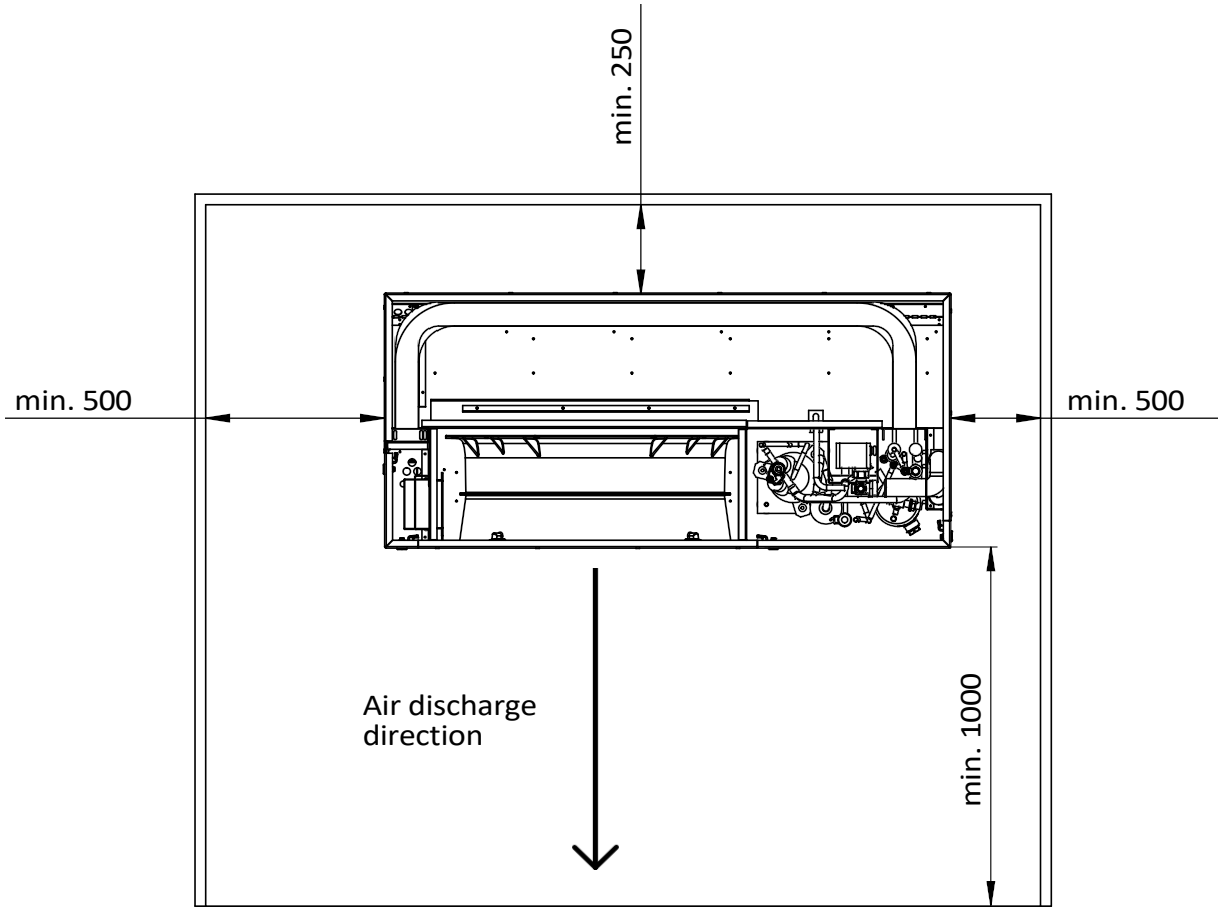


View from left 720

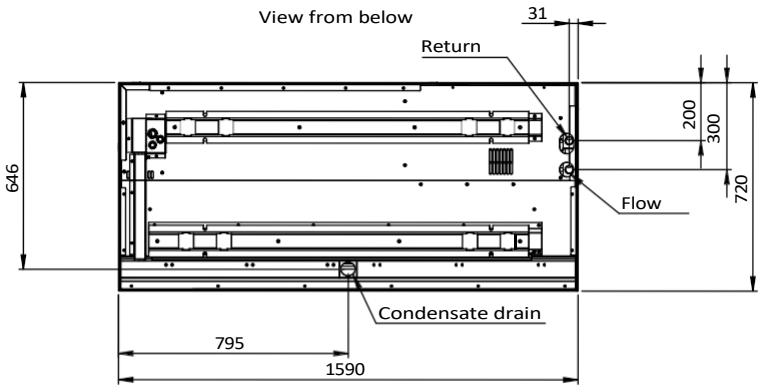


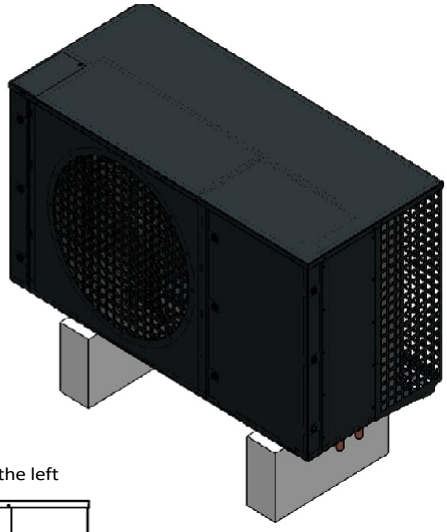


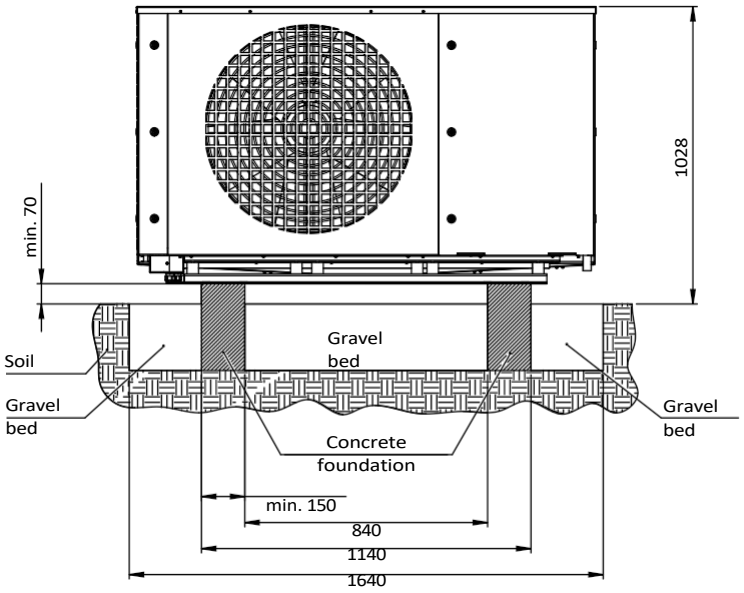
5.2.3 MAINTENANCE AREAS

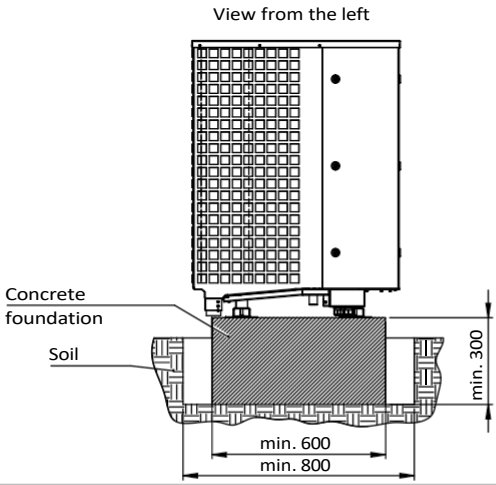


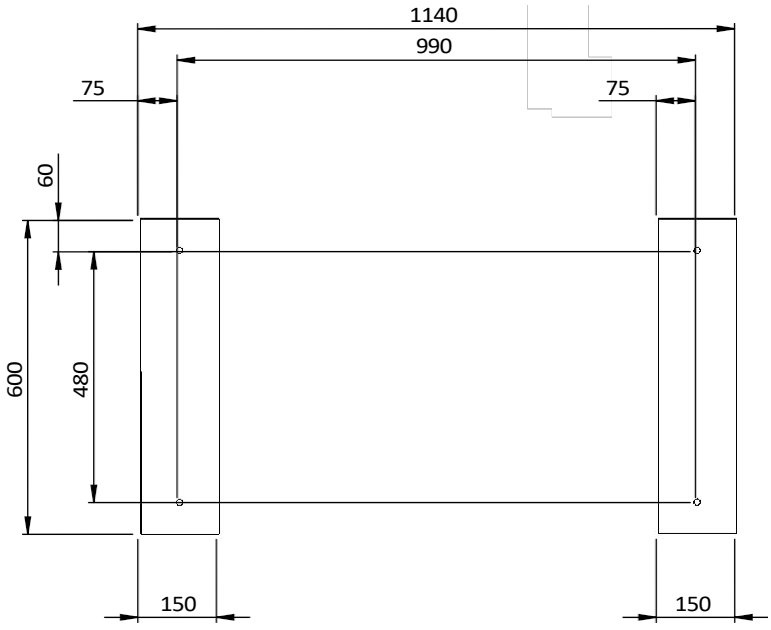
5.2.4 FOUNDATION











Concrete foundations Top view
Positioning of the drill holes

5.2.5 CONDENSATE COLLECTION TRAY

The condensate collection tray collects most of the condensate and drains it from Max-AirMono.

NOTE

For the air collector module to function properly, it is important that the condensate is drained correctly and that the outlet of the condensate hose is positioned so that it cannot damage the building.

NOTE

A pipe with heating cable for draining the condensate collection tray is not included in the scope of delivery.

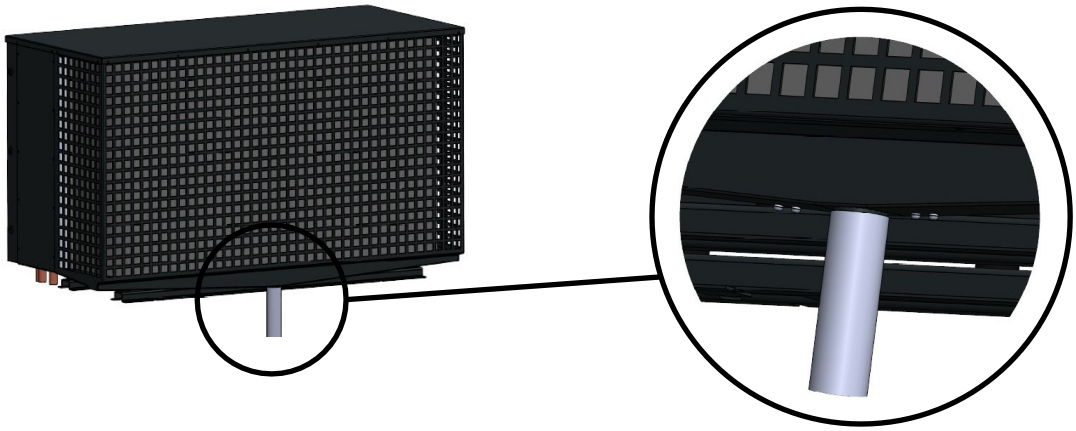
NOTE

Electrical installation and cable routing must be carried out under the supervision of a qualified electrician.

CAUTION!

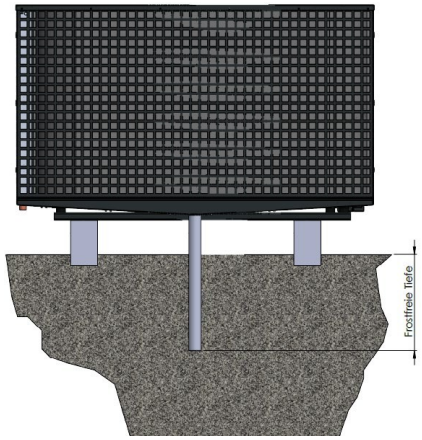
If none of the recommended alternatives are used, sufficient condensation drainage must be provided by other means.

- The condensation collected in the tank (max. 100 l/day) must be drained via a pipe to a suitable drain, whereby the shortest possible distance is recommended in outdoor areas.
- The section of pipe that is not laid in a frost-free location must be heated with a heating cable to prevent the risk of frost.
- Install it with a slope of Max-AirMono.
- The condensate pipe connection must be located at a frost-free depth or indoors. (Local regulations and requirements apply.)
- Use a siphon for installations where air circulation may occur in the condensate pipe.
- Insulate the pipe (at least 19 mm insulation) along its entire length in outdoor areas.
- This insulation must be tightly sealed at the bottom of the condensate collection tray.



Attach the drainage hose to the connection under the Max-AirMono (recommended dimension: 50 mm HT pipe).

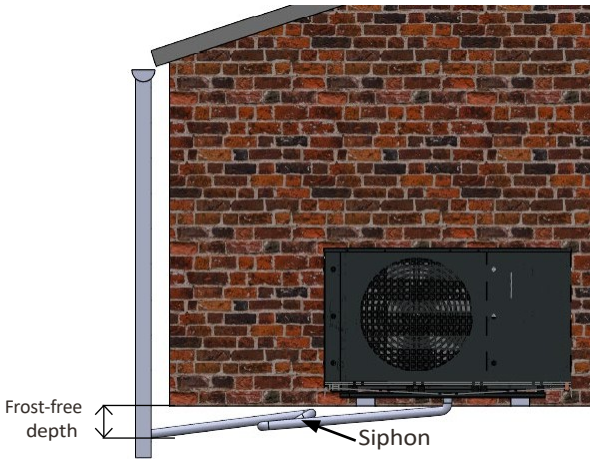
Recommended alternative
Gravel backfill



If the house has a basement, the gravel backfill must be placed in such a way that the condensate water does not cause damage to the building. Otherwise, the gravel backfill can be placed directly under the heat pump.

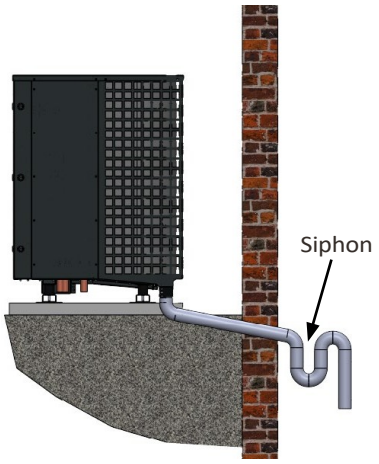
The outlet of the condensate pipe must be at a frost-free depth.

Outlet in the interior



The condensation water is directed to the drain indoors (depending on local regulations and requirements).
Install the Max-AirMono with a slope.
The condensation pipe must have a siphon to prevent air circulation and thus the formation of odors in the pipe.

Downpipe outlet



The outlet of the condensation pipe must be at a frost-free depth.
Lay the pipe with a slope of Max-AirMono.
The condensation pipe must have a siphon to prevent air circulation and thus the formation of odors in the pipe.

5.3 HYDRAULIC INSTALLATION

The following instructions must be observed:

1. Primary side: Outdoor unit to indoor unit

- The circuit between the indoor and outdoor units must be protected with antifreeze up to -16°C. Recommendation: Aqua Concept coracon WT 6N-16
- Hold the connections in place when tightening.
- For safety reasons, no quick vent, microbubble separator, safety valve, or similar device may be installed between the indoor and outdoor units. The protection is integrated into the outdoor unit.
- The integrated diaphragm expansion tank is filled with 1.5 bar pre-pressure. The filling pressure should be **1.8 bar** .
- If the hydraulic supply line is **not laid underground** or is **less than 3 m** long **up to the house connection**, **sound decoupling in the pipe** is necessary. (Recommendation: Eckstein TWS32)

The following dimensions must be used:

	DN25	DN32	DN40
F11	up to 6 m	up to 21 m	up to 56 m
F17	X	up to 9 m	up to 25 m

* Simple cable length
* with a maximum of 4 x 90° bends
* 4k spread, at max. power at L2/W35
* Available pressure drop over entire length: 10000 PA, assumed pipe roughness 0.0070 mm

2. Secondary side:

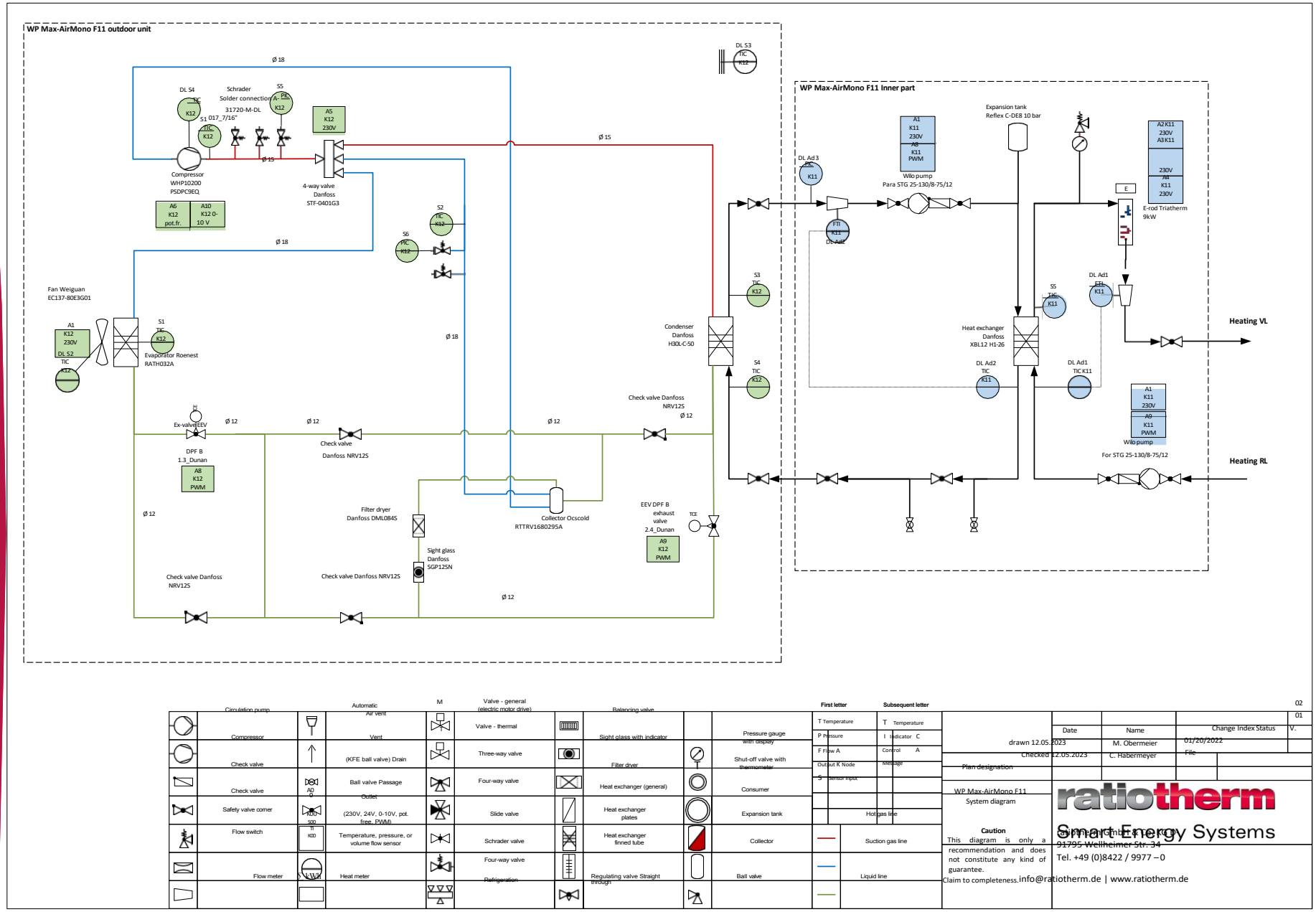
- Ventilation must be provided at high points.
- Sludge separators and magnetite separators must be provided on site.
- The device must be filled via the return flow. The

following dimensions must be used:

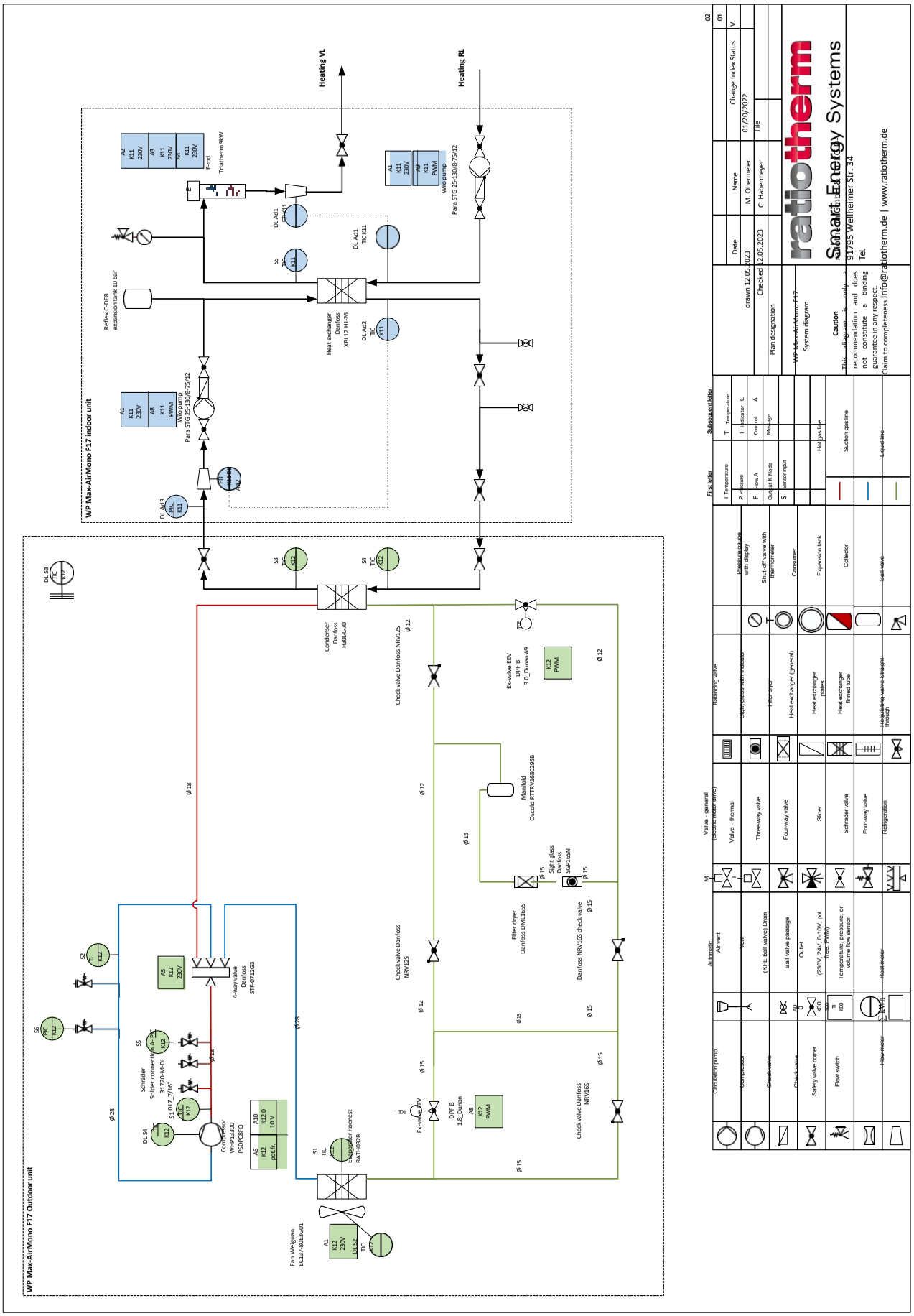
	DN25	DN32
F11	up to 9 m	up to 31 m
F17	up to 3 m	up to 14 m

* Simple cable length
* with a maximum of 4 x 90° bends
* 5k spread, at max. power at L2/W35
* Available pressure drop over entire length: 10000 PA, assumed pipe roughness 0.0070 mm

5.3.1 HYDRAULIC DIAGRAM F11

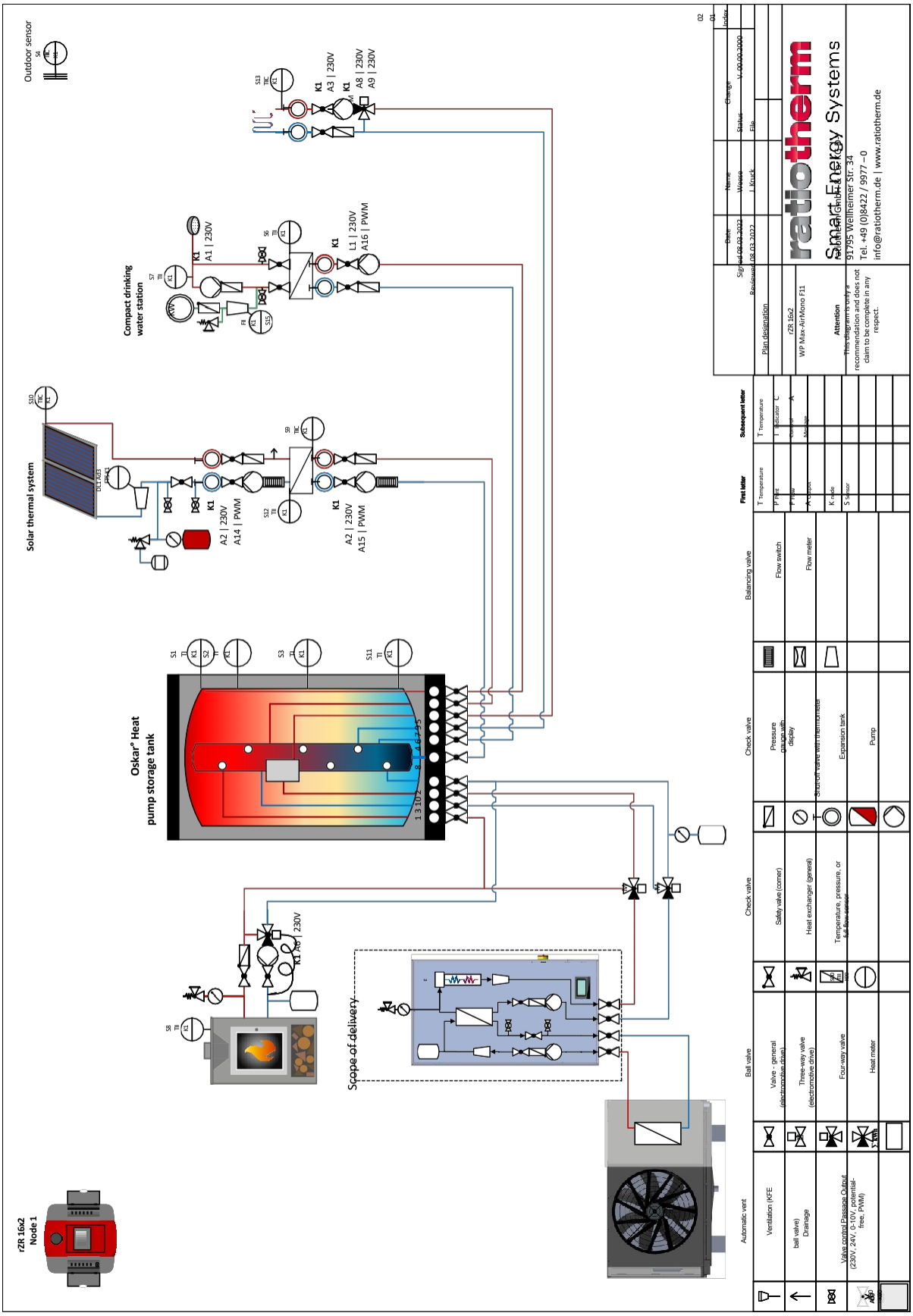


5.3.2 HYDRAULIC DIAGRAM F17

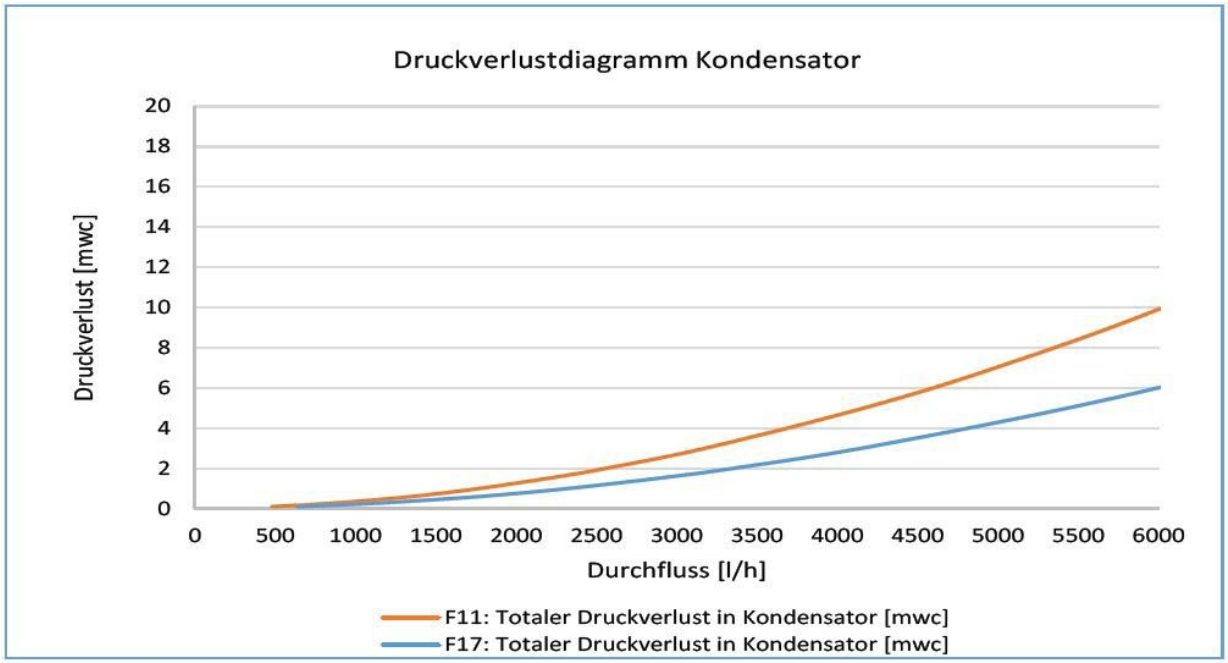


5.3.3 HYDRAULIC DIAGRAM: STANDARD WITH SOLAR

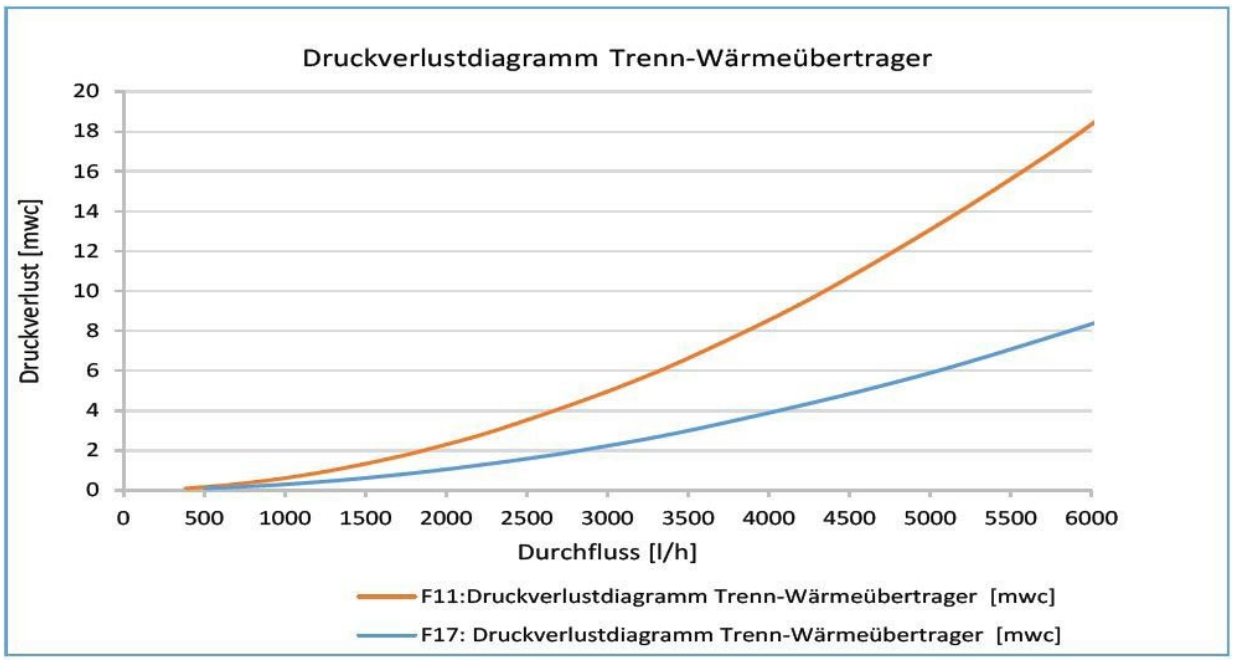
Connection HK RL UP 6



5.3.4 PRESSURE LOSS DIAGRAM



5.3.5 PRESSURE LOSS DIAGRAM SEPARATION HEAT TRANSFERABLE



5.3.6 WATER REQUIREMENTS

NOTE: The system water may contain a maximum of 50% glycol.

NOTE: Ensure that the device water meets all requirements. If the properties are not optimal (°) for more than two criteria or if one criterion does not meet the minimum requirement (-), **no** warranty claim can be made.

Parameters	Unit	Concentration	Copper soldered
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 > 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^+)	mg/L	< 2 2 - 20 > 20	+ ○ -
Alkalinity (HCO_3)	mg/L	< 60 60 - 300 > 300	+ + ○
Sulfate (SO_4^{2-})	mg/L	< 100 100 - 300 > 300	+ ○/- -
HCO_3 / SO_4^{2-}	mg/L	> 1.5 < 1.5	+ ○/-
Nitrates (NO_3)	mg/L	< 100 > 100	+ ○
Hydrogen sulfide (H_2S)	mg/L	< 0.05 > 0.05	+ ○/-
Free carbon dioxide (CO_2)	mg/L	< 5 5 - 20 > 20	+ ○ -
Manganese	mg/L	< 0.1 > 0.1	+ ○
Iron (Fe)	mg/L	< 0.2 > 0.2	+ ○
Aluminum	mg/L	< 0.2 > 0.2	+ ○

5.4 ELECTRICAL INSTALLATION

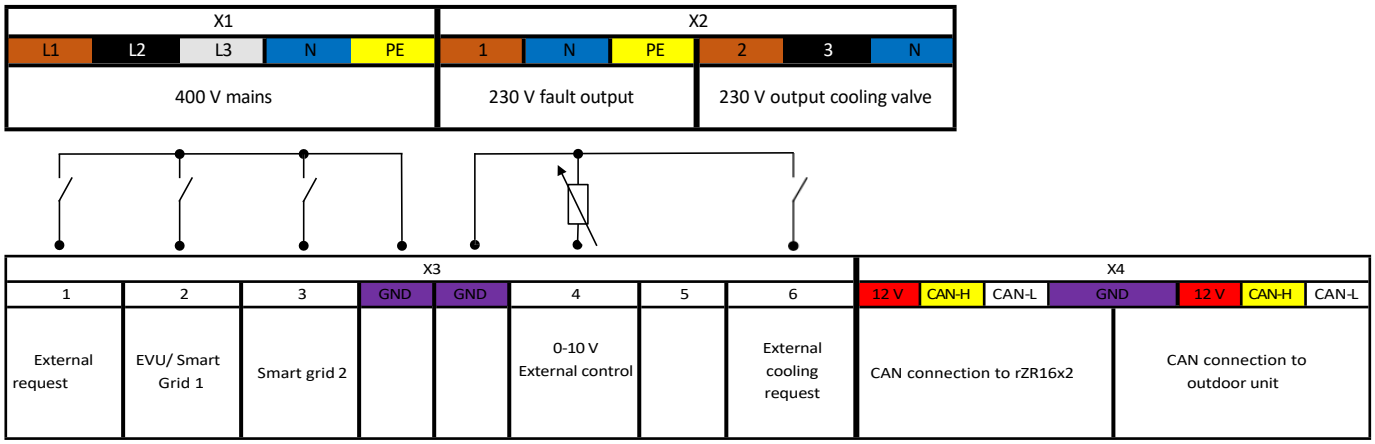
DANGER!

- The power supply to the heater comes from the control cabinet and must be protected by a separate type B residual current device with a **tripping current of 300 mA (RCD), 10 ms short-time delay**, and suitable power rating. Recommendation: ABB F204B-40/0.3
- A separate RCD must be provided for each outdoor and indoor unit!
- The RCD must be marked separately for the heater, e.g., as "WP." Please ensure that the phase/neutral conductor is correctly assigned during wiring.
- Ensure that the rotating field is clockwise.
- The device must be earthed.
- Use a cable cross-section that is appropriate for the power rating of the heater.
- The electrical installation must comply with the applicable standards and generally accepted rules of technology.
- Never work on the hydraulics or mechanics of the device while it is under pressure.
- The same applies when filling or subsequently pressurizing.
- Even if the main switch of the device is turned off, the cable terminal is still live.
- To disconnect the device galvanically from the mains, the RCD in the control cabinet must be switched off.
- Maintenance work may only be carried out by an authorized person.
- Never short-circuit the safety pressure limiter of the heat pump.

5.4.1 TERMINAL DIAGRAM AND DESCRIPTION

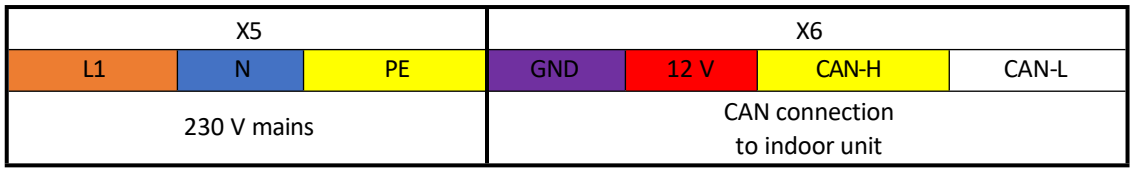
- X3.1, X3.4, and X3.6 are not necessary when using the rZR 16x2 from ratiotherm as the main controller! Parallel use for power-to-heat is possible, however.
- X3.2 and X3.3 are used to process a signal from the grid operator/energy supplier. X3.2 is backward compatible with the EVU contact.
- Please wire the EVU contact as a normally open contact (closed when EVU lock is active).
- Ensure correct wiring of the CAN bus! No star-shaped network! Use shielded, 4-pin cable! Follow the instructions for the technical alternative. One end at the outdoor unit, the other end at the rZR16x2.
- When using a relay switch-off by the power supply company, it is recommended to wire the control circuit separately. To do this, remove the internal bridges between L1/L1 and N/N.

Interior

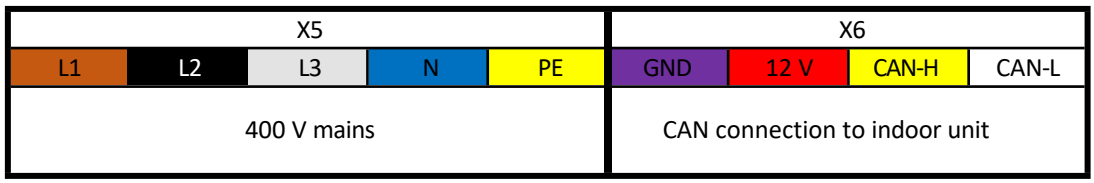


Outdoor unit

F11:



F17:



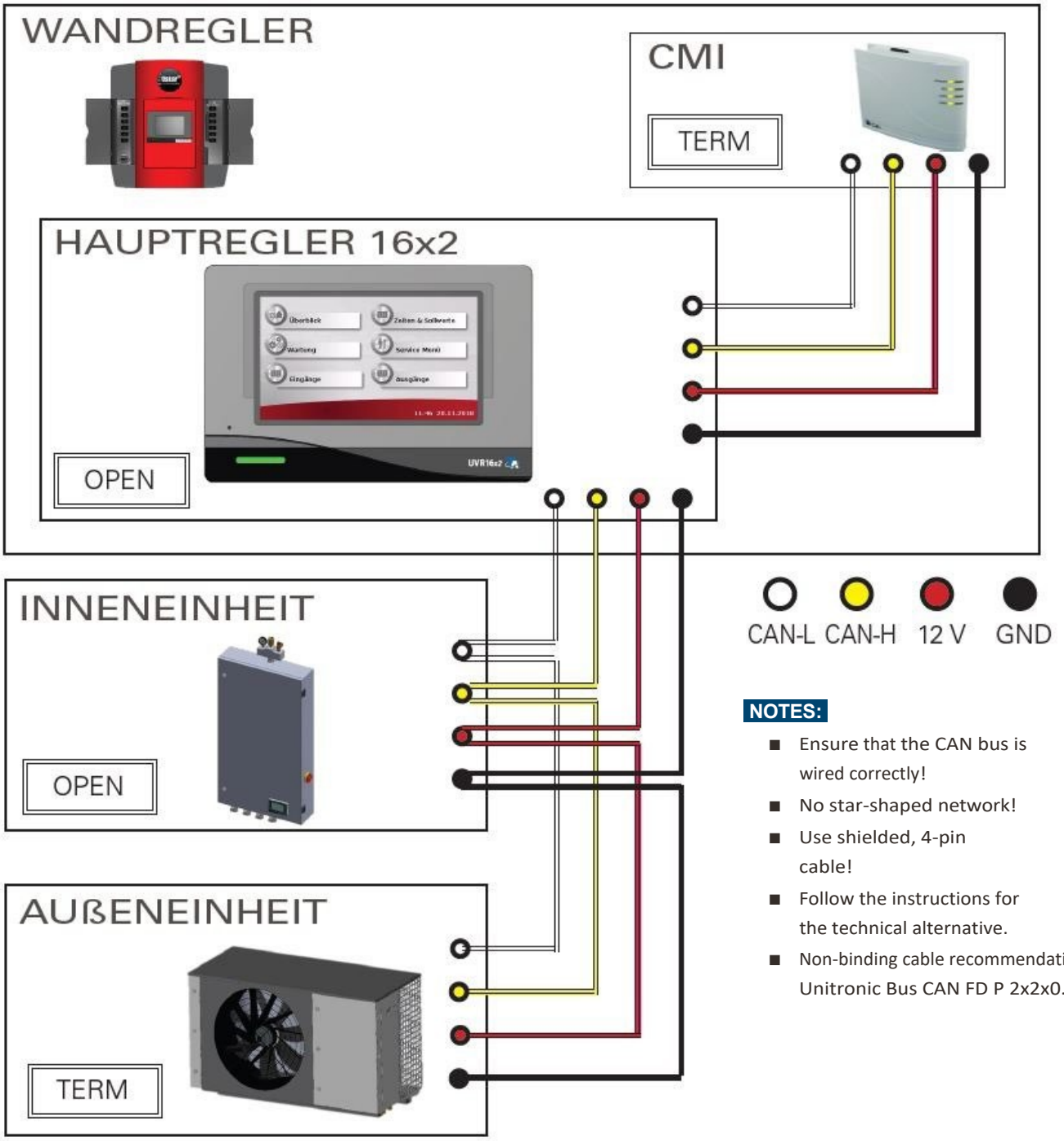
5.4.2 ELECTRICAL CONNECTION RATINGS

WARNING! Only authorized personnel should perform installation and wiring.

- Indoor unit FI type A and outdoor unit FI type B.
- All information, images, and drawings are subject to change without notice.
- The generally applicable and recognized rules of technology as well as any local regulations Must be strictly observed! Values apply to installation in conduits up to 100 m in length.

	Typ	F11	F17
Indoor unit	Fuse:	B20 3-pole	B20 3-pole
	Cable cross-section:	5G 2.5 mm²	5G 2.5 mm²
Outdoor unit	Fuse:	B20 1-pole	B20 3-pole
	Cable cross-section:	3G 2.5 mm²	5G 2.5 mm²

5.4.3 CAN BUS PLAN



NOTES:

- Ensure that the CAN bus is wired correctly!
- No star-shaped network!
- Use shielded, 4-pin cable!
- Follow the instructions for the technical alternative.
- Non-binding cable recommendation: Unitronic Bus CAN FD P 2x2x0.5

6. OPERATION

6.1 CONTROLLER OPERATION

The rZR16x2 is operated via a 4.3" touch screen. For easier handling, a stylus is provided, which is inserted above the controller (under the cover). The stylus can be used to tap on control surfaces and scroll through the display by sliding the scroll bar. Selecting one of the windows takes you to the corresponding submenu.

The indicator light can display different statuses:

- Red steady light - The controller is booting up (=startup routine after power-up, reset, or update) or displaying a message that has not yet been deleted.
- Orange steady light - Hardware initialization after booting.
- Green steady light - Normal operation of the controller.
- Green flashing - After hardware initialization, the controller waits approx. 30 seconds to receive all the information necessary for operation (sensor values, network inputs).

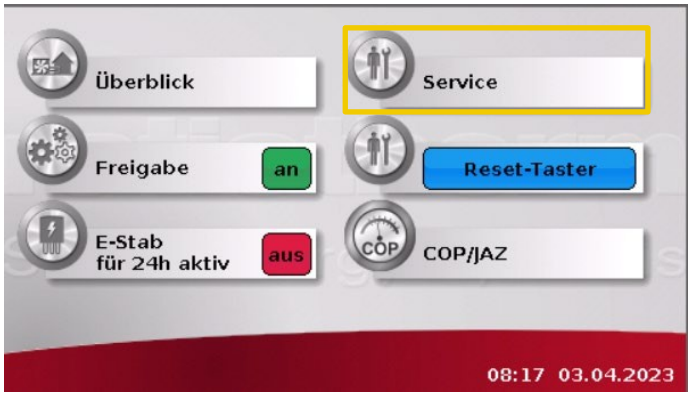
Previous page | Main menu | Next page

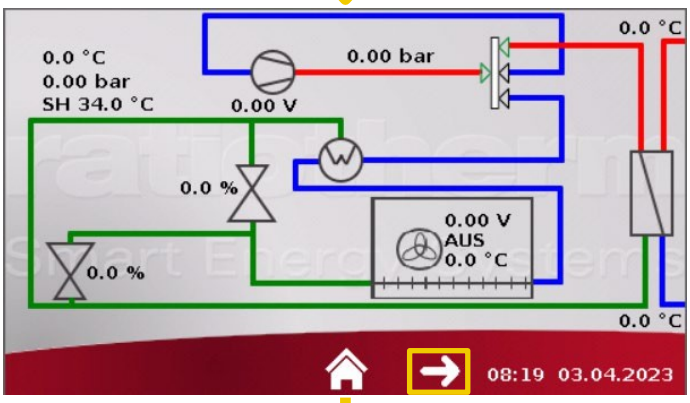
6.1.2 MAIN SWITCH

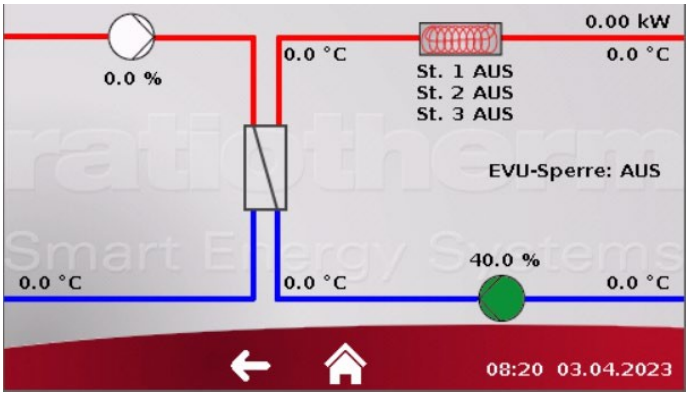
ON/OFF switch

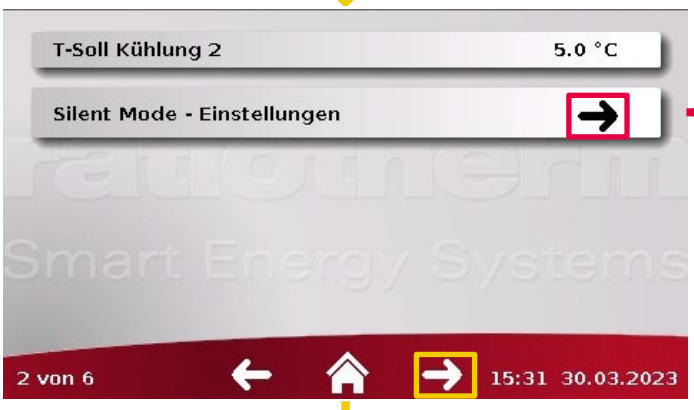
6.1.3 MENU STRUCTURE

Designation	Symbol		Description
On this surface Press			Yellow frame/ Red frame
Shows the path			Yellow arrow/ Red arrow
Shows the path on the next page Yellow line/			Yellow line/red line

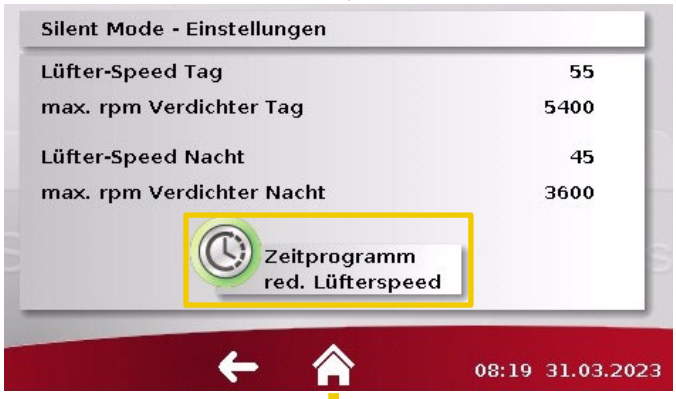






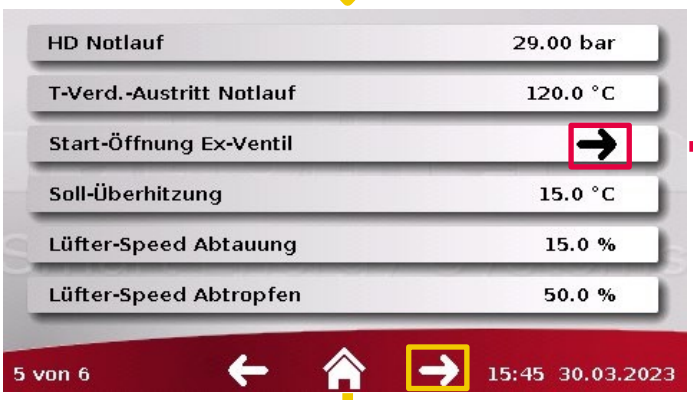


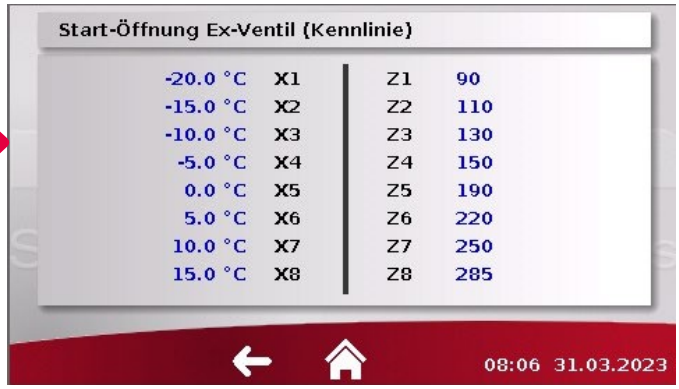

Start-Öffnung Kühlventil 0
Soll-Überhitzung Kühlung 5.0 °C
Soll-T-Diff Kondensator 2.0 °C
Soll-T-Diff Kondensator WW 5.0 °C
Soll-T-Diff Solekreis 1.0 °C
ND-Störung 0.10 bar
3 von 6
15:39 30.03.2023


Silent Mode - Einstellungen
Lüfter-Speed Tag 55
max. rpm Verdichter Tag 5400
Lüfter-Speed Nacht 45
max. rpm Verdichter Nacht 3600
Zeitprogramm
red. Lüfterspeed
08:19 31.03.2023

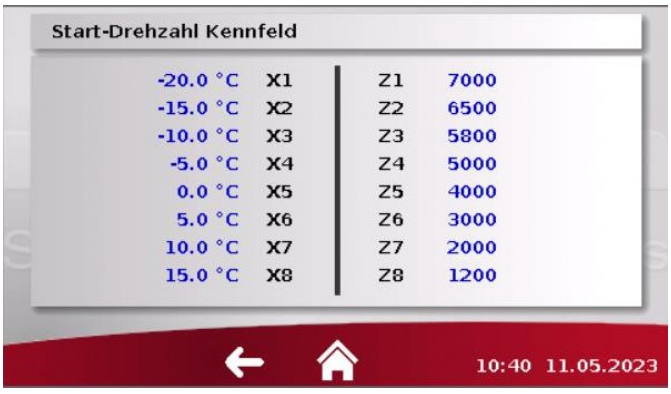

HD-Störung 30.00 bar
Frostschutz-Störung 0.0 °C
Zeit ND/HD-Fehler 05m 00s
Zeit Frostschutz-Fehler 10m 00s
Zeitraum für Störung 1h 00m 00s
ND Notlauf 0.30 bar
4 von 6
15:42 30.03.2023


Zeitprog. 1 - Geräuschreduzierung
Mo Di Mi Do Fr Sa So
22:00 - 06:00
00:00 - 00:00
00:00 - 00:00
1 von 3

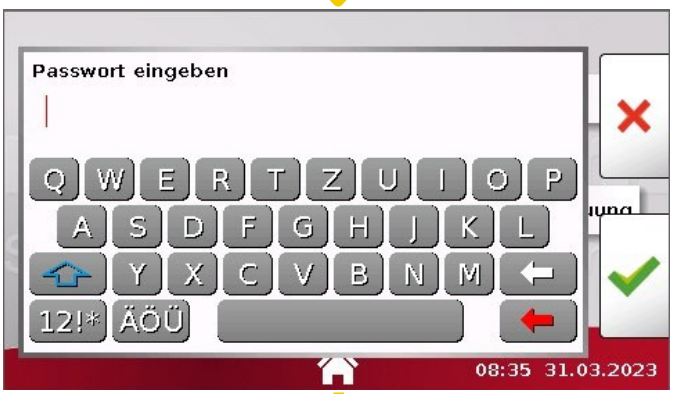

HD Notlauf 29.00 bar
T-Verd.-Austritt Notlauf 120.0 °C
Start-Öffnung Ex-Ventil
Soll-Überhitzung 15.0 °C
Lüfter-Speed Abtauung 15.0 %
Lüfter-Speed Abtropfen 50.0 %
5 von 6
15:45 30.03.2023

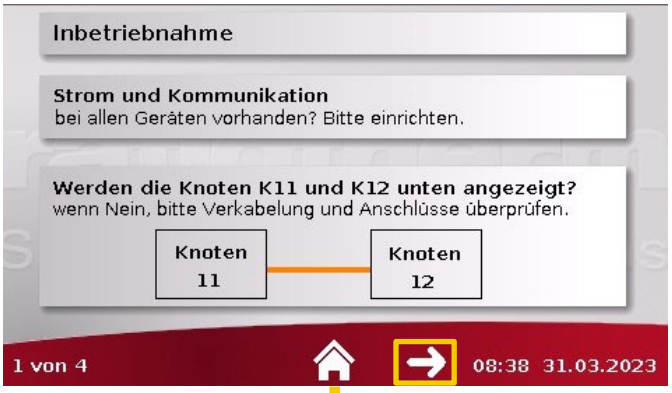

Start-Öffnung Ex-Ventil (Kennlinie)
-20.0 °C X1 Z1 90
-15.0 °C X2 Z2 110
-10.0 °C X3 Z3 130
-5.0 °C X4 Z4 150
0.0 °C X5 Z5 190
5.0 °C X6 Z6 220
10.0 °C X7 Z7 250
15.0 °C X8 Z8 285
08:06 31.03.2023

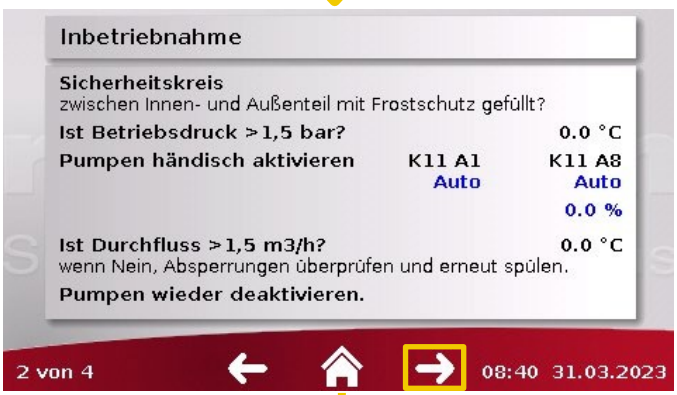

rpm Verd. Abtauung 4300
T-Abtauung Aktivierung -5.0 °C
T-Abtauung Deaktivierung 14.5 °C
Blockadezeit 1s
Mindestlaufzeit 1s
Start-Drehzahl Kennfeld
6 von 6
09:33 31.03.2023

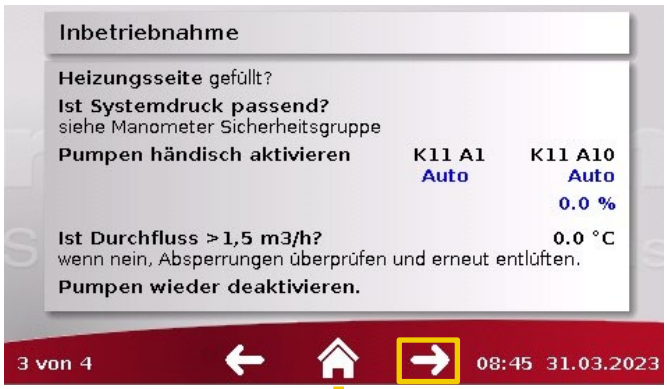

Start-Drehzahl Kennfeld
-20.0 °C X1 Z1 7000
-15.0 °C X2 Z2 6500
-10.0 °C X3 Z3 5800
-5.0 °C X4 Z4 5000
0.0 °C X5 Z5 4000
5.0 °C X6 Z6 3000
10.0 °C X7 Z7 2000
15.0 °C X8 Z8 1200
10:40 11.05.2023

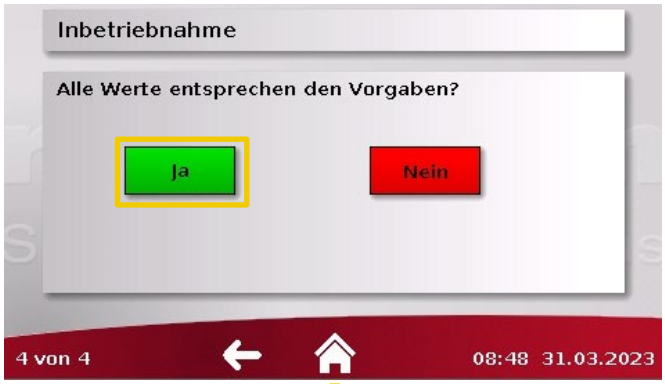

Fixwerte
Handbetrieb
Inbetriebnahme starten
Händische Abtauung
08:31 31.03.2023

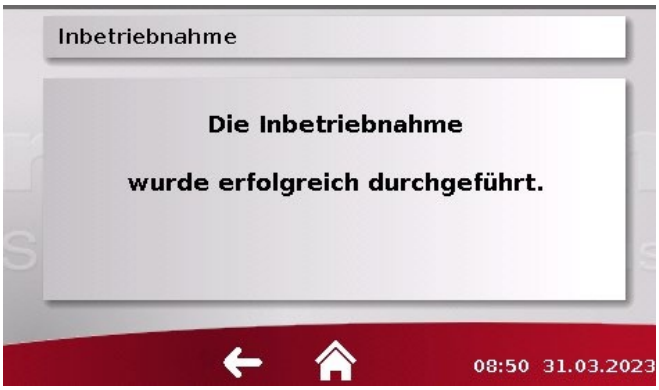

Passwort eingeben
08:35 31.03.2023


Inbetriebnahme
Strom und Kommunikation
bei allen Geräten vorhanden? Bitte einrichten.
Werden die Knoten K11 und K12 unten angezeigt?
wenn Nein, bitte Verkabelung und Anschlüsse überprüfen.
Knoten 11
Knoten 12
1 von 4
08:38 31.03.2023


Inbetriebnahme
Sicherheitskreis
zwischen Innen- und Außenteil mit Frostschutz gefüllt?
Ist Betriebsdruck >1,5 bar? 0.0 °C
Pumpen händisch aktivieren K11 A1 Auto K11 A8 Auto
0.0 %
Ist Durchfluss >1,5 m3/h? 0.0 °C
wenn Nein, Absperrungen überprüfen und erneut spülen.
Pumpen wieder deaktivieren.
2 von 4
08:40 31.03.2023

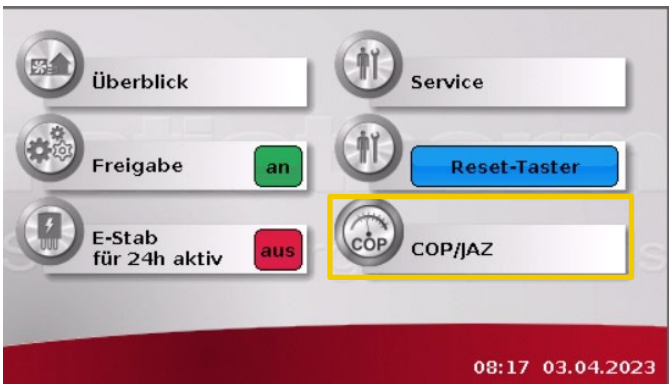

Inbetriebnahme
Heizungsseite gefüllt?
Ist Systemdruck passend?
siehe Manometer Sicherheitsgruppe
Pumpen händisch aktivieren K11 A1 Auto K11 A10 Auto
0.0 %
Ist Durchfluss >1,5 m3/h? 0.0 °C
wenn nein, Absperrungen überprüfen und erneut entlüften.
Pumpen wieder deaktivieren.
3 von 4
08:45 31.03.2023


Inbetriebnahme
Alle Werte entsprechen den Vorgaben?
Ja
Nein
4 von 4
08:48 31.03.2023


Inbetriebnahme
Die Inbetriebnahme
wurde erfolgreich durchgeführt.
08:50 31.03.2023

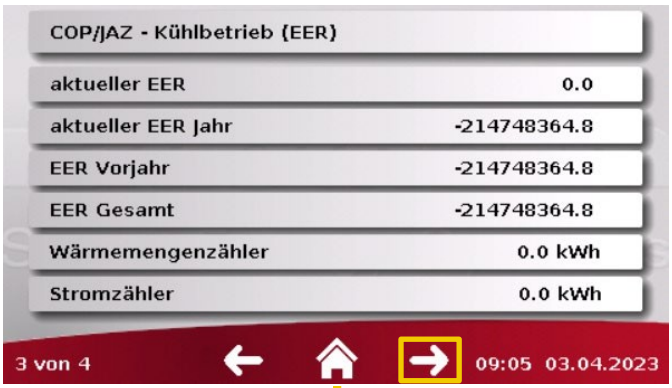

Fixwerte
Handbetrieb
Inbetriebnahme starten
Händische Abtauung
08:31 31.03.2023
Passwort eingeben
08:35 31.03.2023
Handbetrieb
AUS
nicht aktiv
08:54 31.03.2023

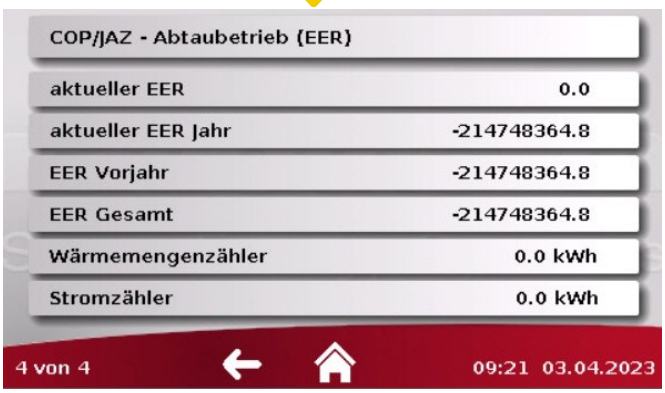

Fixwerte
Handbetrieb
Inbetriebnahme starten
Händische Abtauung
08:31 31.03.2023
Passwort eingeben
08:35 31.03.2023
Händische Abtauung
AUS
aus
09:03 31.03.2023


Überblick
Service
Freigabe
an
Reset-Taster
E-Stab
für 24h aktiv
aus
COP/JAZ
08:17 03.04.2023


COP/JAZ - Heizbetrieb Heizung
Zähler-Historie
aktueller COP 0.0
aktuelle Jahresarbeitszahl -214748364.8
Jahresarbeitszahl Vorjahr -214748364.8
Jahresarbeitszahl Gesamt -214748364.8
Wärmemengenzähler 0.0 kWh
Stromzähler 0.0 kWh
1 vom 4
09:01 03.04.2023

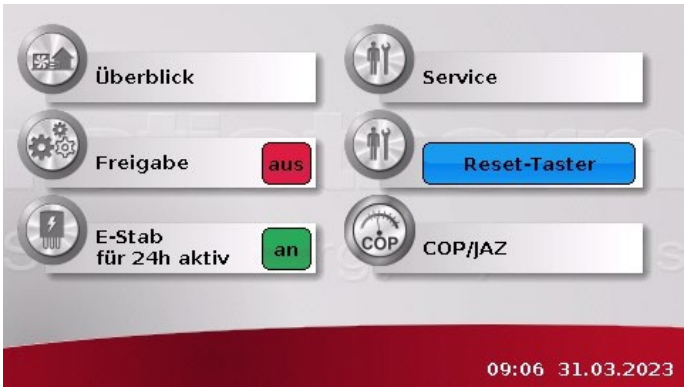

COP/JAZ - Heizbetrieb Warmwasser
Zähler-Historie
aktueller COP 0.0
aktuelle Jahresarbeitszahl -214748364.8
Jahresarbeitszahl Vorjahr -214748364.8
Jahresarbeitszahl Gesamt -214748364.8
Wärmemengenzähler 0.0 kWh
Stromzähler 0.0 kWh
2 von 4
09:03 03.04.2023


COP/JAZ - Kühlbetrieb (EER)
aktueller EER 0.0
aktueller EER Jahr -214748364.8
EER Vorjahr -214748364.8
EER Gesamt -214748364.8
Wärmemengenzähler 0.0 kWh
Stromzähler 0.0 kWh
3 von 4
09:05 03.04.2023

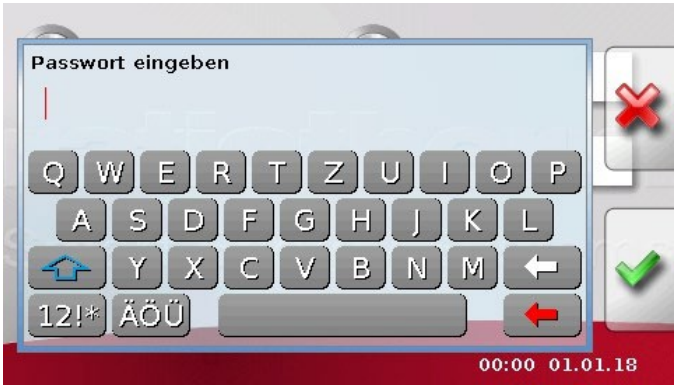

COP/JAZ - Abtaubetrieb (EER)
aktueller EER 0.0
aktueller EER Jahr -214748364.8
EER Vorjahr -214748364.8
EER Gesamt -214748364.8
Wärmemengenzähler 0.0 kWh
Stromzähler 0.0 kWh
4 von 4
09:21 03.04.2023

6.1.4 MENU DESCRIPTION

- Enable: ON
- Heat pump may start when requested.

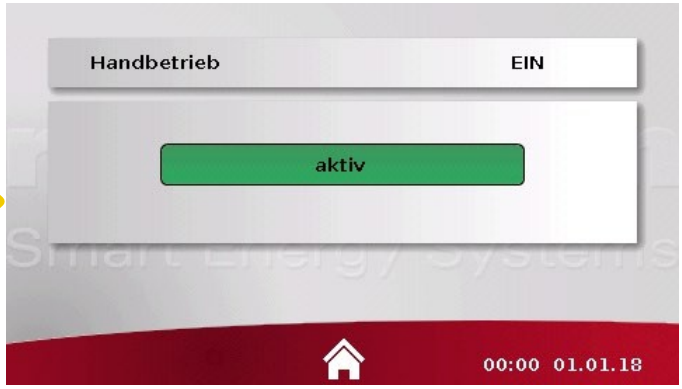


- Electric heating element active for 24 hours: ON
- The electric heater can be switched on regardless of the bivalence temperature.

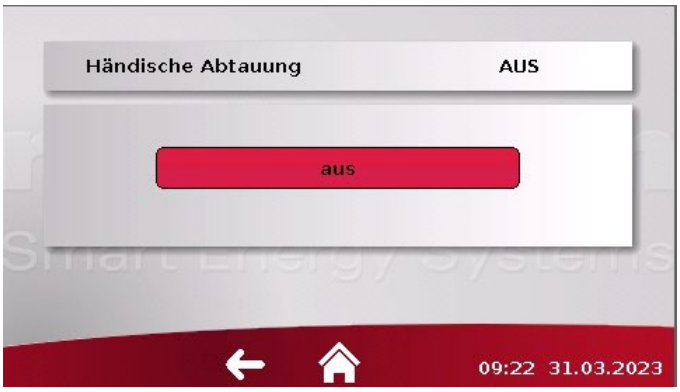


- Enter password
- Enter the specialist password to access the specialist menu.

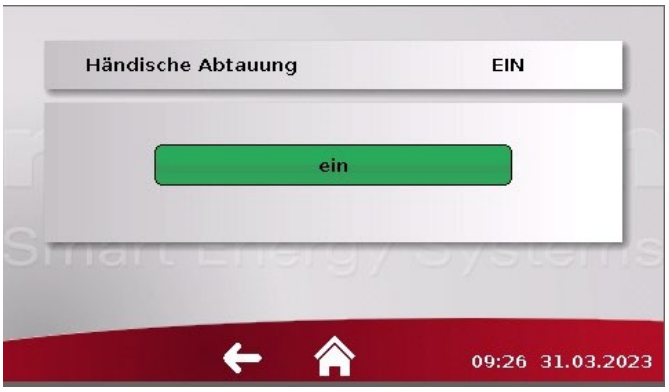
- Manual mode: OFF
- Start the heat pump only after receiving a request signal.



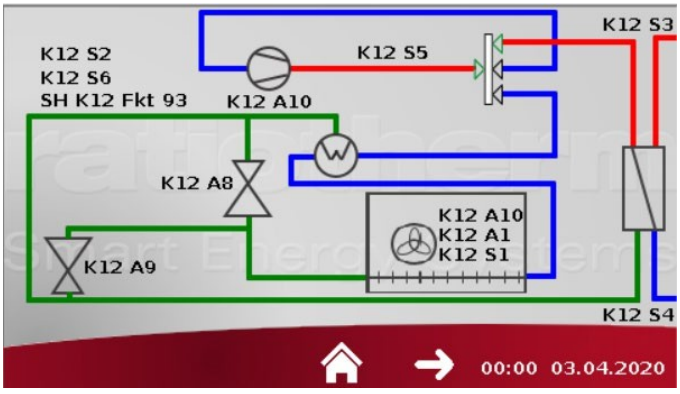
- Manual mode: ON
- Forced start of the heat pump regardless of the demand signal.

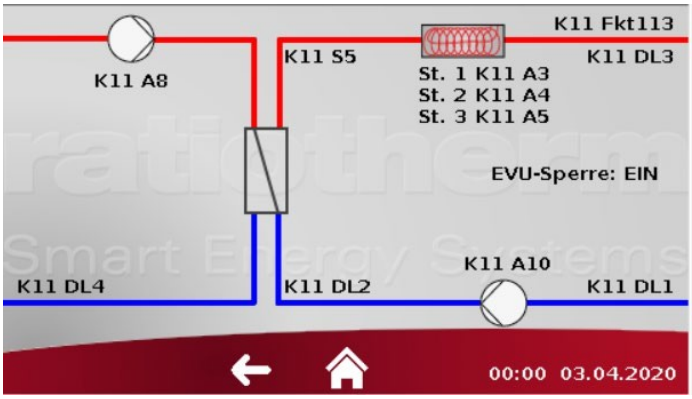


- Manual operation: OFF
- Defrosting only starts after a request signal.



- Manual defrost: ON
- Forced defrosting of the heat pump regardless of the request signal.

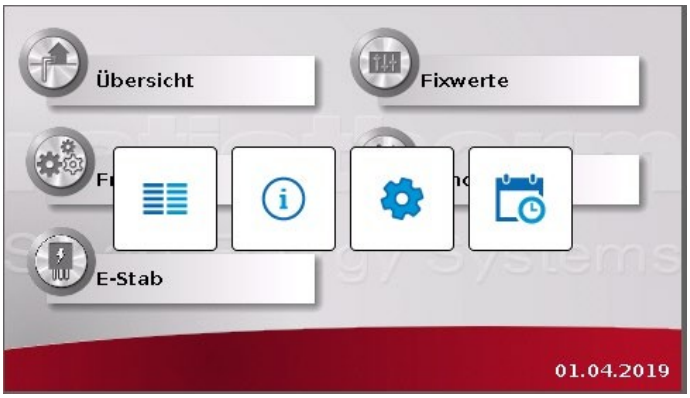


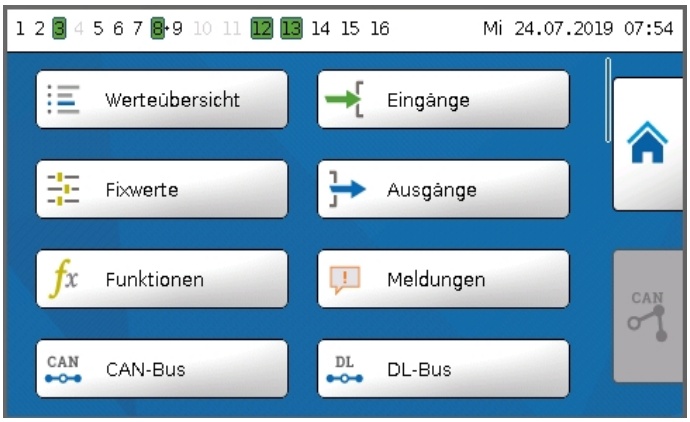


K12 S1	Temperature evaporator
K12 S2	Temperature compressor inlet
K12 S3	Temperature brine circuit flow
K12 S4	Temperature brine circuit return flow
K12 S5	High pressure
K12 S6	Low pressure
SH K12 Fkt 93	Overheating
K12 A1	Fan active
K12 A8	Ex valve
K12 A9	Ex valve cooling
K12 A10	Compressor 0-10V

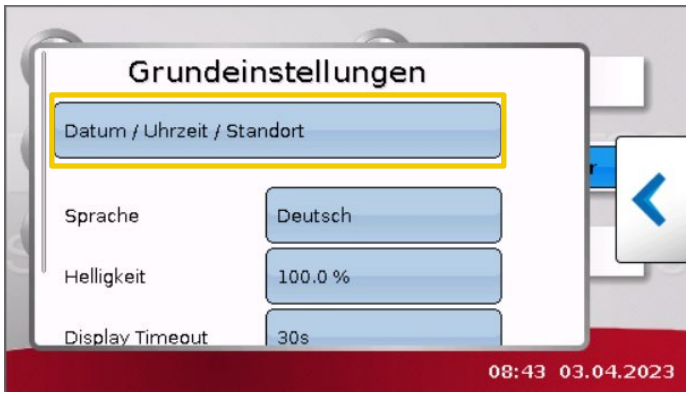
K11 S5	Heat pump flow temperature
K11 A3	E-rod stage I
K11 A4	E-rod stage II
K11 A5	E-rod Level III
K11 Fkt113	WP power
K11 DL1	Flow rate secondary circuit
K11 DL2	Temperature WP return
K11 DL3	E-rod temperature flow
K11 DL4	Primary flow

- Intermediate menu
- Press and hold the display for 5 seconds to access the intermediate menu, which allows you to make basic settings or switch to the controller menu.

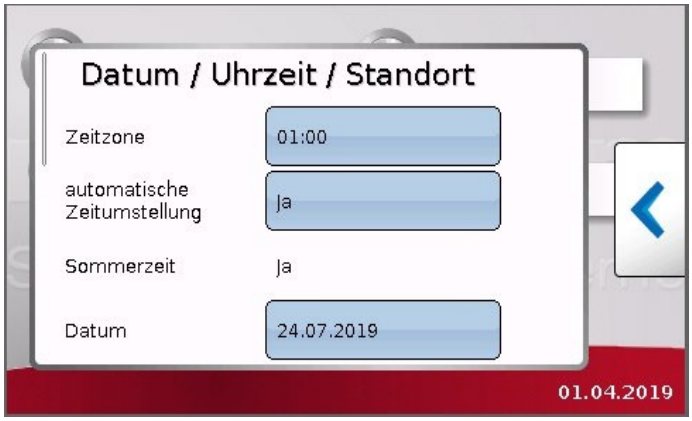




- Controller menu
- Link to the controller menu.



- Basic settings
- You can set the language, brightness, and display timeout.



- Date/time/location
- Set the time zone and date.

6.2 SETTINGS

Fixed values	Description	Setting options	Default setting
Operators and users			
Bivalence temperature	Outdoor temperature threshold at which the second energy source (electric heating element) is activated.	-30 °C to 15 °C	-7 °C
rpm Dist. WW	Target speed for hot water demand	0% to 100%	70
rpm Compressor SG Start command	Target speed with Smart Grid start command	0% to 100	75
T.Setpoint for external start	Target temperature to which the heat pump adjusts 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 evaluated as target speed 0 V = 0% 10 V = 100% Use for power-to-heat ON: 0-10 V signal is evaluated as target temperature 0 V = 0 °C 10 V = 100 °C	OFF/ON	OFF
T-setpoint cooling 2	Setpoint flow outlet temperature in cooling mode when request by external controller	5 °C to 30 °C	16 °C
Fan silent mode	Activation of time-dependent speed limitation for fan speed (when Si-mode is active) mode speed level during the day)	OFF/ON	OFF
Fan speed during the day	Maximum speed level	Level 100	Level 55
Fan - Night speed	Maximum speed setting at night	Levels 30 to 100	Level 45
Target T-Diff	Target temperature difference at the condenser	5 °C to 12 °C	6 °C
Max. rpm compressor	Maximum speed	950 rpm to 7200 rpm	F11 = 5400 rpm F17 = 7000 rpm

Fixed values	Description	Setting options	Default
Target T-Diff Condenser Heating circuit	Target temperature difference at condenser heating circuit	5 °C to 12 °C	6 °C
Qualified personnel			
Start opening of cooling valve	Start: Opening of the cooling expansion valve or defrost expansion valve	Levels 0 to 500	Level 500
Setpoint superheat Cooling	Setpoint superheat for cooling or defrosting	5 °C to 15 °C	12 °C
Target T-Diff condenser Hot water	Target temperature difference at condenser Hot water	5 °C to 30 °C	15 °C
ND fault	Minimum pressure at which an ND error or ND fault is triggered is triggered.	0.01 bar to 5 bar	0.1 bar
Setpoint T-Diff brine circuit	Setpoint temperature difference at the brine circuit	1 °C to 6 °C	2 °C
HD fault	Maximum pressure at which an HD error or HD fault is triggered is triggered.	25 bar to 31 bar	30 bar
Frost protection malfunction	Minimum temperature at which a frost protection error or frost protection protection fault is triggered.	0 °C to 15 °C	2 °C
Time ND/HD error	Time lock for restart if ND/HD error has occurred is.	0 to 24 h	5 min
Time for frost protection error	Time lock for restart if frost protection error has occurred .	0 to 24 hours	10 min
Period for fault	Time after which the error counter is reset.	0 to 24 h	60 min
ND Emergency operation	Minimum pressure at which a temporary power reduction is triggered.	0.01 bar to 10 bar	0.3 bar
HD emergency operation	Maximum pressure at which a temporary reduction in performance is triggered is triggered.	22 bar to 31 bar	29 bar
T.-Verd.-Outlet Emergency mode	Maximum discharge temperature of the compressor at which a temporary reduction in performance is triggered .	80 °C to 130 °C	110 °C
Manual defrost	Activation of a pure, time-controlled defrost. Only activate in the event of a defective 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 on the AT

Fixed values	Description	Setting options	Default
Target overheating	Target superheat of the expansion valve in the outdoor unit during normal operation	5 °C to 15 °C	15 °C
Target superheat compressor	Target superheat directly at compressor inlet (for delayed PID control)	0 °C to 25 °C	10 °C
Fan speed defrost	Fan speed during defrosting	0% to 100%	15
Fan speed during drip	Fan speed after defrosting during the drip phase	0% to 100%	50
rpm. Compressor Defrost	Speed of compressor to defrosting	720 rpm to 7200 rpm	4300 rpm
T-defrost activation	Threshold temperature at which the defrost timer starts when the temperature falls below this value (reference sensor: T-evaporator).	-20 °C to 20 °C	-5 °C
T-defrost Deactivation	Target temperature at which defrosting is terminated (reference sensor: T-evaporator).	5 °C to 20 °C	14.5 °C
Start speed map			
Blocking time	Time block for restart when system switches off/on .	0 to 20 min	5 min
Minimum running time	Minimum runtime of the heat pump	0 to 20 min	5 min

7. MAINTENANCE

Regular inspection of the device by a recognized, qualified, and ratiotherm-authorized specialist is a prerequisite for continuous operational readiness and 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 device can result in serious injury. **Never attempt to perform maintenance and/or repairs on the device yourself.**

For maintenance work, hire a recognized, qualified specialist (qualified personnel) authorized by ratiotherm GmbH & Co. KG.

7.1 TROUBLESHOOTING

7.1.1 HIGH PRESSURE

Error message	HD error	HD malfunction
Error description	**High pressure protection of the refrigeration circuit has been triggered.**	
Heat pump behavior	■ System locked for 5 minutes ■ If 3 errors occur within 60 minutes, switch to HD fault	■ Lock the system ■ Unlock by pressing the reset switch
Cause of error	■ Lack of heat dissipation ■ Blockage of cooling circuit ■ Heat sink too hot	
Troubleshooting	■ Check the sink temperature or target temperatures ■ Temperatures below max. water temperature according to type plate ■ Check heat dissipation to the medium (pump, heat exchanger) ■ Vent and check the heating pressure ■ Refrigeration check	

7.1.2 LOW PRESSURE

Error message	ND error	ND fault
Error description	**Low pressure protection of the refrigeration circuit has been triggered.**	
Heat pump behavior	■ System locked for 5 minutes ■ If 3 errors occur within 60 minutes, switch to low pressure fault	■ Lock the system ■ Unlock by pressing the reset switch
Cause of error	■ Insufficient heat absorption ■ Insufficient refrigerant charge ■ Blockage of the heating circuit	
Troubleshooting	■ Check heat absorption at the evaporator (flow rate, temperature); vent if necessary ■ Refrigeration check	

7.1.3 FROST PROTECTION

Error message	Frost protection error	Frost protection malfunction
Error description	**The hydraulic circuit's frost protection limit has been triggered.**	
Behavior of the heat pump	■ System lockout for 10 min ■ If 3 errors occur within 60 minutes, switch to frost protection fault	■ Lock the system ■ Unlock by pressing the reset switch
Cause of error	■ Lack of heat absorption in the inner section ■ Heat source too cold	
Troubleshooting	■ Check the heat source (temperatures, pumps, heat exchangers) ■ Vent	

7.1.4 FAN

Error message	Fan malfunction
Error description	**Fan fault contact does not close.**
Behavior of the heat pump	■ System lockout ■ Unlocking by pressing the reset switch
Cause of error	■ No power supply ■ Blockage of the fan wheel ■ Other fan malfunction
Troubleshooting	■ Check the power supply ■ Checking the fan wheel for free movement ■ Replacing the fan

7.1.5 INVERTER

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

7.1.6 HOT GAS

Error message	Hot gas
Error description	**Compressor outlet temperature too high for 20 minutes**
Behavior of the heat pump	■ System lockout ■ Unlocking by pressing the reset switch
Cause of error	■ Compressor outlet temperature too high for 20 minutes.
Troubleshooting	■ Check the sensor plausibility. ■ Check the refrigeration system.

7.2

7.2.1 CLEANING THE HEATING SIDE

- Cleaning: to be carried out by an installer
- Flushing device: connection to the condenser's flow and return pipes
- Condenser: flush against the normal flow direction (note gravity brake)

7.2.2 CLEANING THE HEAT PUMP

- The devices can be cleaned with a standard household cleaner (see below for exceptions).
- Check the air inlets and outlets (regularly check the intake and exhaust hood grilles for adhering leaves and other dirt).
- Sweep away any dirt. The fan should not be running while sweeping, as otherwise the dirt could be sucked into the device.

NOTE

Improper cleaning

Incorrect cleaning agents can damage the appliance surfaces.

Please observe the following instructions.

- Do not use abrasive or cleaning agents that could damage the plastic trim, 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

Limescale deposits can cause the safety valve to stick.

Operate the safety valve on the heating system manually once a month.

7.3 LEAK TEST FOR THE HEAT PUMP

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

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

NOTE

Leak testing

The inspection must be carried out in accordance with the asset register. The results of the inspection must be documented in accordance with regulations and retained for at least 5 years. The "Asset register for heat pumps" contains an asset log for this purpose.

7.4 SYMBOLS ON THE DEVICE

In order to provide personnel with important information and warnings, standardized safety symbols based on the DIN EN ISO 7010, DIN ISO 3864, and DIN ISO 7000 standards have been used. These safety symbols are:

- They must be clearly visible to all,
- Must be kept in a recognizable/legible condition, and
- be replaced if necessary.

Since the design of the device and the complexity of the production processes do not allow the use of persons with disabilities (e.g., with visual impairments) for safety reasons, the manufacturer has decided not to affix tactile symbols. The requirements for personnel and the technical qualifications required to operate the device are described in chapter "2.3 Target groups" on page 6.

7.5 MAINTENANCE PLAN

DANGER! Do not operate the device if there are any defects.

Maintenance work	Measures	Interval
Operators and users		
Visual and functional inspection	■ Check the device for visible defects and mechanical damage. ■ Perform a visual inspection of the operating elements. ■ Perform a visual and functional inspection of all safety devices.	Monthly
Cleaning the device	■ Observe the information in Chapter "7.2 Cleaning" on page 54.	As required
Qualified personnel		
Checking electrical components	■ Check the electrical components for damage. ■ Make repairs if necessary.	Annually
Inspection of hydraulic components	■ Check the hydraulic components for damage. ■ Carry out repairs if necessary.	Annual
Check refrigeration components	■ Check the refrigeration components for damage. ■ Carry out repairs if necessary.	Annually
Inspection of safety devices	■ Perform a visual and functional inspection of all safety devices. ■ Document these checks.	Annually
Check symbols on device	■ Check the symbols on the device. ■ Renew the symbols if necessary.	Annually
Check Purchased components	■ Observe the manufacturer's documentation for the purchased components.	Annually

8. DECOMMISSIONING

When the heat pump is taken out of service, the device may only be dismantled by qualified personnel. Hazardous materials and waste must be disposed of properly. When dismantling the heat pump, observe the instructions at the beginning of the technical documentation and the safety instructions listed below.

DANGER

Fatal electric shock

There is a risk of fatal electric shock from electrical equipment.

Disconnect the device from the power supply before taking it out of service/dismantling it.

Secure the device against being switched back on.

8.1 TEMPORARY DECOMMISSIONING

NOTE

Improper decommissioning

Improper decommissioning of the device can result in damage to components and impaired functionality.

Switch off the device at the main switch.

Please note the following information:

- Frost can cause damage to the device.
- Water freezes at outdoor temperatures below 0 °C.
- Decommissioning 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 materials and components in accordance with current standards must be observed.

NOTE

Improper disposal

Improper disposal of the device can cause environmental pollution and/or damage.

Dispose of electrical and electronic components and the refrigerant from the heat pump 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 Phone +49 (0) 8422/9977-0 Website www.ratiotherm.de

that the device:

Device name: **WP Max-AirMono F11/F17**

Year of manufacture: 2022

Intended use: The WP Max-AirMono F11/F17 device is used to utilize environmental heat from the ambient air to provide direct heating support and hot water preparation.

The version supplied complies with the directives

- Directive 2014/35/EU of the European Parliament and of the Council of February 26, 2014, on the harmonization of the laws of 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 May 15, 2014, on the harmonization of the laws of Member States relating to the making available on the market of pressure equipment

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

Applied harmonized standards:	Applicable EC directives
■ DIN EN 378-1-4	■ Directive 2014/30/EU
■ DIN EN ISO 12100	■ Directive 2014/35/EU
■ DIN EN 60204-1	■ Directive 2014/68/EU
■ DIN EN 60335-1	■ Directive 2009/125/EC
■ DIN EN 60335-2-40	■ Directive 2011/65/EU

Technical documentation is available. Name and address of the person authorized to compile the technical documentation:

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 the standard DIN EN ISO/IEC 17050-1 "Conformity assessment – Declaration of conformity by suppliers – Part 1: General requirements" have been observed in issuing this declaration of conformity. This declaration loses its validity if the device is modified without our consent. Any unauthorized modification in this sense excludes any liability on our part.

Dollnstein, _____ Signature of authorized representative: _____

Details of the person authorized to issue this declaration on behalf of the manufacturer or its authorized representative:

Name: _____ Position: _____

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

10. NOTES

You can find us here

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