

# Original operating instructions

**WP Max-AirMono F67**

As of 2025-09

# INFORMATION

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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

These operating instructions are intended for the operator and must be handed over to personnel who come into contact with the device. The operator must ensure that the information contained in the operating instructions and the accompanying documents is 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, objects, or the device itself caused by:

- improper use,
- non-compliance,
- insufficient attention

the safety criteria contained herein or by:

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

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**ratiotherm**

Smart Energy Systems

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or its legal successor. The content of this operating manual is the intellectual property of ratiotherm GmbH & Co. KG. The company expressly reserves the property rights and copyrights to the information contained in the operating manual. Reprinting and reproduction, even in part, are only permitted with the written consent of the company.

For better readability, the generic masculine form is used in this original operating manual. The personal designations used refer to all genders.

*As of: October 7, 2024*

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# 1. INFORMATION ABOUT THE DOCUMENT

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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 part of the ratiotherm WP Max-AirMono F67 heat pump. The ratiotherm WP Max-AirMono F67 air heat pump must not be operated without this document.

The operating instructions must be made available to the operator and the specialist technician for information at all times. If the ratiotherm WP Max-AirMono F67 heat pump is sold, the instructions must be included. ratiotherm GmbH & Co. KG accepts 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 DIN ISO 3864-1 standard. The design complies with DIN EN 82079-1 and ANSI Z 535.4.

Signal word	Explanation
<b>DANGER</b>	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
<b>WARNING</b>	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
<b>CAUTION</b>	Indicates a hazardous situation which, if not avoided, could result in minor injury or property damage.
<b>NOTE</b>	Indicates operating instructions and cross-references. A note excludes the risk of property damage or injury.

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## 1.2 SAFETY SIGNS

### 1.2.1 OTHER SIGNS IN ACCORDANCE WITH DIN EN ISO 7010

Some of the following special safety signs in accordance with DIN EN ISO 7010 and DIN ISO 3864 are used in the relevant sections of this operating manual and, depending on the combination of signal word and graphic symbol, require special attention. 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
	Follow instructions		General mandatory 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 (operating instructions)		Service indicator, Refer to the operating manual (operating instructions)
	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 DATA

Device designation: Heat pump (air/water) Type:  
WP Max-AirMono F67

Year of manufacture: See type plate

Country of origin: Germany

### 2.2 INTENDED USE

The WP Max-AirMono F67 device uses 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:



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

The WP Max-AirMono F67 device is state-of-the-art and built in accordance with 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 F67 device is not intended for use by persons (including children) with limited physical, sensory, or mental abilities, or by persons with insufficient experience and/or knowledge. The risk is borne solely by the operator and user.

### 2.3 TARGET GROUPS

For safety reasons, the design of the device does not allow it to be used by persons with disabilities (e.g., visual impairments). **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/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 for direct heating support and hot water preparation. The person must have knowledge of the necessary protective devices and protective measures.

**Qualification:** Of legal age and physically/mentally capable of working on the device  
 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 preparation. The specialist personnel must have acquired special 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 personnel, switching on, programs, and switching off) and identify potential hazardous situations.

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

## 24 MISUSE

### 24.1 REASONABLY FORESEEABLE MISUSE

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

- Use of the device contrary to its intended purpose
- Feeding in 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 with limited physical, sensory, or mental capabilities, or by children



#### 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.

### 24.2 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
- Disasters involving foreign objects or force majeure

The operating instructions must be read before using 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 building services in buildings from 2009



### NOTE

Guidelines, standards, and laws

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

## 2.6 BUILDING DRYING/SCREED HEATING

The WP Max-AirMono F67 heat pump must not be used for screed drying. A heat pump is designed to heat a building efficiently. When drying out a building, 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

If a ratiotherm heat pump is used to heat screed, the warranty for the device will be void with immediate effect.

## 3. SAFETY INSTRUCTIONS

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### DANGER

Read and observe the operating instructions before you start working on and with the device.

Despite all precautions taken, residual risks may still exist. 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

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.
- 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.
- To prevent corrosion on the device, do not use the following products: sprays, solvents, chlorine-based 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.
- Have the device assembled/installed/commissioned/adjusted only by qualified personnel.
- 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 deactivated. 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. The following must also be observed:

- applicable binding regulations for accident prevention
- Recognized technical rules for safe and professional work
- existing environmental protection regulations
- 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 following components:

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

### 3.3 SAFETY INFORMATION REGARDING THE REFRIGERANT R290



#### WARNING

- This device 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 authorized person.
- Fire hazard/flammable material: In the event of a refrigerant leak or if you suspect one, switch off the device at the mains and contact your specialist company or ratiotherm customer service.
- Chemicals or flammable materials must not be stored or used near the device.

### 3.4 RESTRICTED RISK



#### WARNING

Measures/work 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 working. 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 area.

## 4. DESIGN AND FUNCTION

### 4.1 TECHNICAL DATA

Max-AirMono	F67	Unit
<b>Performance data Heating mode</b>		
<b>L2/W35</b>		
Heating capacity	13.7 to 82.0	kW
Power consumption	2.9 to 19.8	kW
COP at rated power	4.15 to 4.77	
Space heating energy efficiency Low-temperature applications at average climate conditions	192.2	%
<b>Performance data for cooling mode</b>		
<b>W15/L40</b>		
Cooling capacity	10.0 to 78.0	kW
Power consumption		kW
EER at rated capacity	6.0 to 7.3 (provisional)	
<b>Performance data for heating mode according to EN 14511</b>		
<b>L7/W35 (at 40% speed)</b>		
Heating capacity	51.38	kW
Power consumption	10.06	kW
COP at rated power	5.1	
<b>L2/W35 (at 65% speed)</b>		
Heating capacity	71.08	kW
Power consumption	17.16	kW
COP at rated power	4.14	
<b>L-7/W35 (at maximum speed)</b>		
Heating capacity	63.0	kW
Power consumption	20.1	kW
COP at rated power	2.87	
<b>Compressor</b>		
Design	Fully hermetic, scroll, inverter	
Speed	1740 to 6960	rpm
Max. operating current	29	A
Blocking current LRA	-	A
Oil quantity	1.7	L
<b>Evaporator</b>		
Design	Air heat exchanger	
Material	Aluminum, copper	
Air volume flow	2 x 25,000	m <sup>3</sup> /h
Test pressure	35	bar
Operating range	-30 to +50	°
min. / max. source temperature	-22 to +40	°

## Structure and function

Max-AirMono	F67	Unit
<b>Condenser</b>		
Design	Copper-brazed plate heat exchanger	
Material	Stainless steel, copper	
Water flow rate (in series)	1 to 5.8	m <sup>3</sup> /h
Water flow rate (parallel)	2 to 11.6	m <sup>3</sup> /h
Pressure loss	max. 0.3	bar
Temperature difference	10 to 20	K
Test pressure	45	bar
Application	-196 to 200	°C
min./max. lowering temperature	25 to 72	°C
Connection dimensions	2 inches AG, conical	
Condenser pump	Wilo Stratos PARA-C 40-220-08-T01	
Residual delivery head	4	H / m
Minimum buffer volume Required for defrosting	800	L
<b>Refrigeration circuit</b>		
Working fluid	R290	
Filling capacity	2 x 4.9	kg
Max. operating pressure	31	bar
Safety class	A3: low toxicity, higher flammability	
<b>Electrical: Compressor</b>		
Mains connection	2x 400 V / 3~ / 50 Hz	
Fuse	2x B32	A
Residual current circuit breaker	2x Type B, 10 ms short-term delay, 300 mA	
Max. operating current compressor	2 x 29	A
Max. power consumption compressor	2 x 18.5	kW
<b>Electrical: Control voltage</b>		
Mains connection	400 V / 3~ / 50 Hz	
Fuse protection	B16	A
Residual current circuit breaker	Type A, 30 mA	
Max. power consumption	4.0	kW
<b>Device data</b>		
Sound pressure level, outdoor unit 5 m distance	47 (provisional)	dB(A)
Sound power level, outdoor unit L-WA outdoors (at A7/W55)	56.1	dB
L-WA maximum	67.9	dB(A)
L-WA noise-reduced	58.8	dB(A)
Dimensions of outdoor unit	3301 x 2343 x 1400	WxHxD (mm)
Weight of outdoor unit	1080	kg
Max. operating pressure water	3	bar
Max. VL temperature	72	°C

## 4.2 FUNCTION DESCRIPTION

The WP Max-AirMono F67 is a speed-controlled air/water heat pump in monoblock design for outdoor installation. It uses the natural and environmentally friendly refrigerant propane. The system consists of two independent refrigeration circuits, which are linked via an intelligent cascade control system and combined in a single housing. There is a common hydraulic and electrical connection. Hydraulically, the refrigeration circuits can be connected either in series or in parallel, allowing a water-side spread of up to 20 Kelvin. The generously dimensioned, V-shaped evaporator, which is equipped with alternating and hydrophilic-coated fins, reduces defrost cycles to a minimum. The whisper-quiet premium fans with a diameter of 100 cm prevent disturbing air noise while maintaining a high air flow rate. The triple sound-decoupled compressor also contributes to the low-noise operation of the heat pump. The refrigeration circuits are filled ready for operation, so no refrigeration certificate is required for installation. The safety valve integrated in the outdoor unit and the microbubble separator ensure that, in the event of a leak, the flammable refrigerant does not enter the boiler room. Thanks to its speed control, the heat pump covers a wide range of

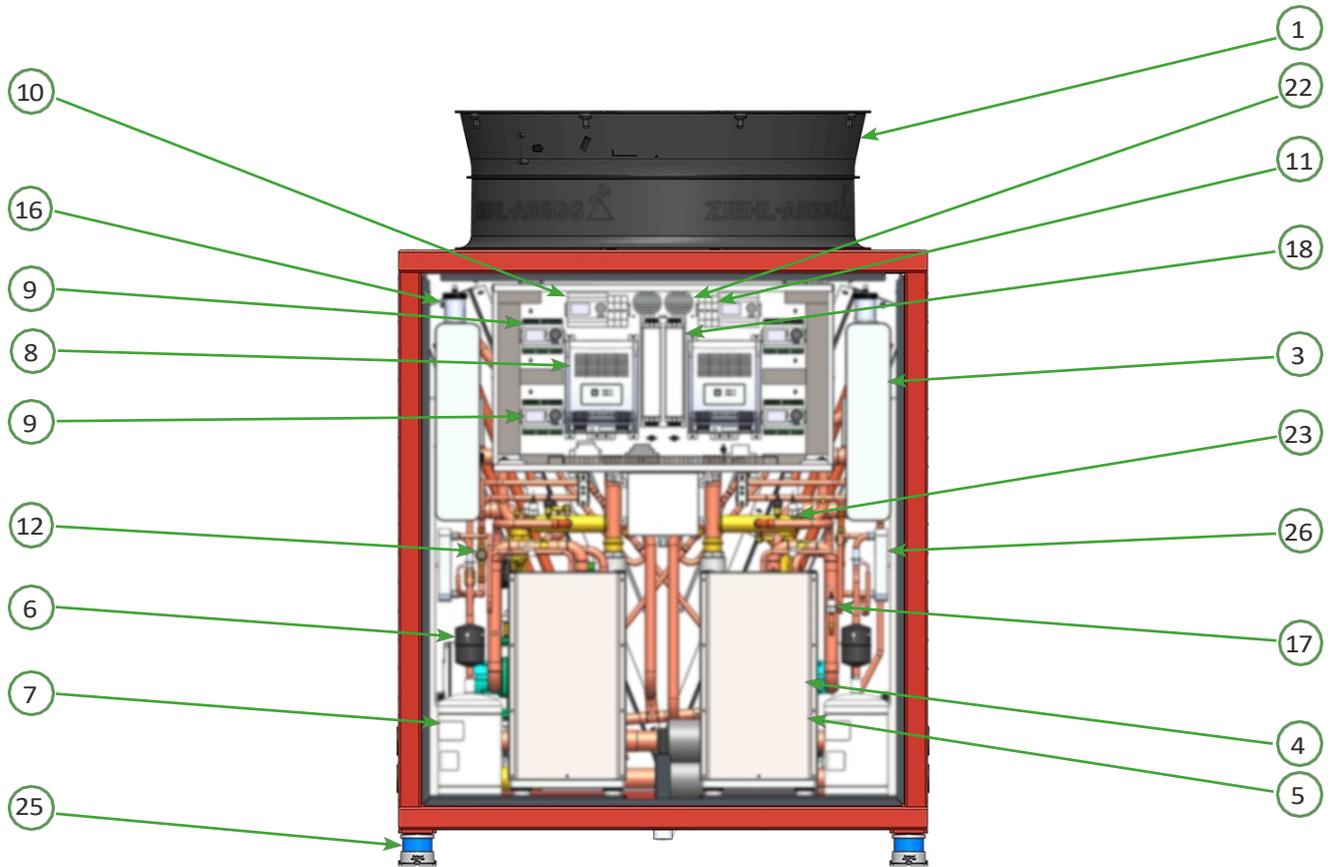
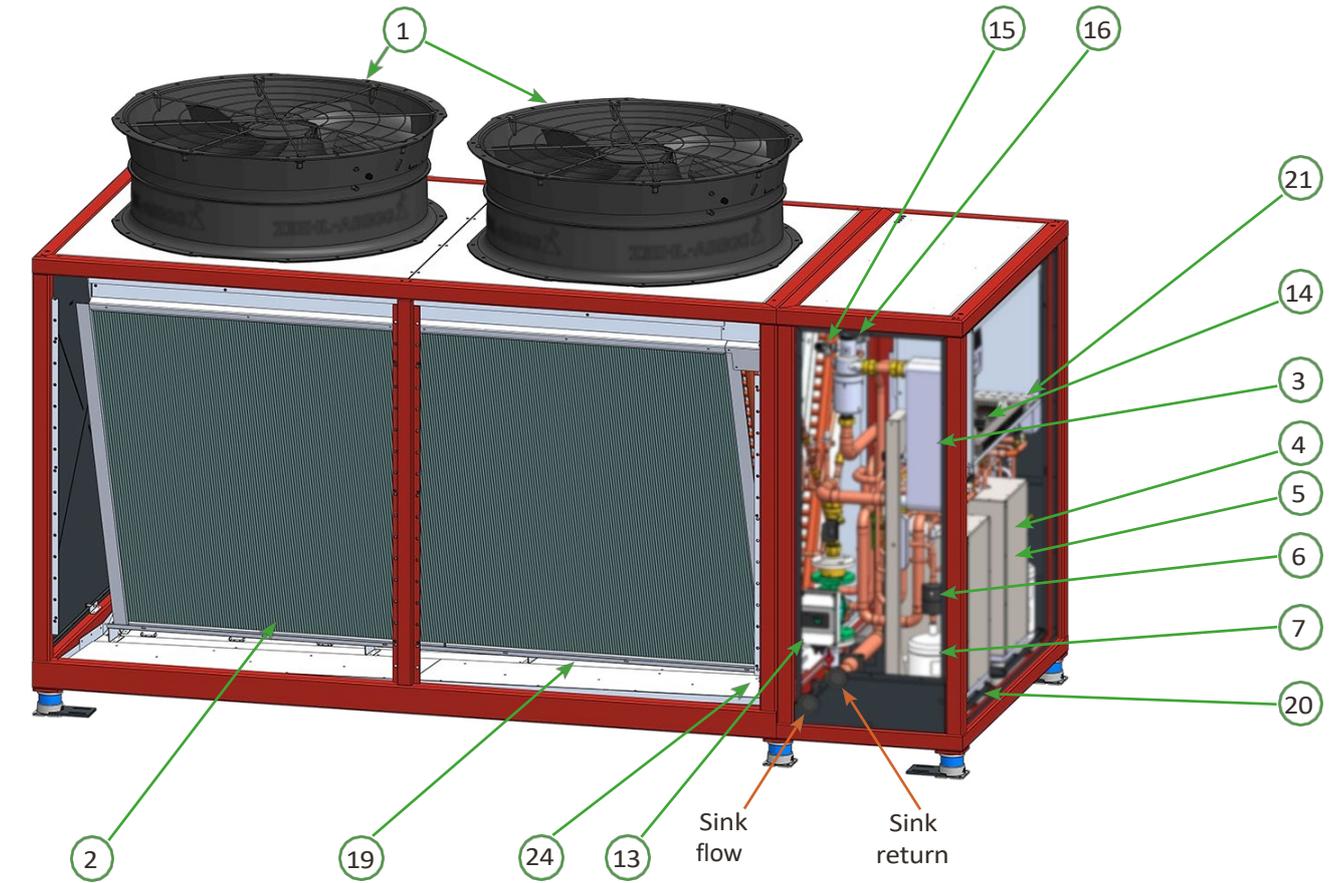
range of power and thus adapts to different loads and conditions. In addition, it is ideally suited for use with fluctuating energy quantities and enables intelligent load control across all energy ranges.



### ADVANTAGES

- Easy installation without costly 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 STRUCTURE AND SPARE PARTS

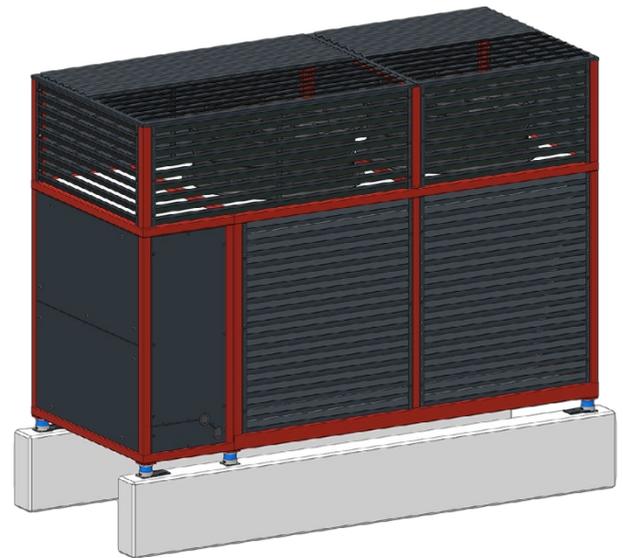


Position number	designation	Description	Quantity
1	Axial fan/blower	ra/10107	2
2	Evaporator	ra/10137 ra/10138	1 1
3	Condenser (plate heat exchanger)	ra/10144	2
4	Compressor	ra/10870	2
5	Heating tape (compressor)	ra/15292	2
6	Filter dryer	ra/14661	2
7	Collector	ra/14665	2
8	Frequency converter	ra/14242	2
9	UVR610S	ra/14658	4
10	CAN-EZ3 Energy Meter	ra/14445 ra/95.10.3225	1 1
11	Circuit breaker	ra/15277	8
12	Expansion valves	ra/13037	10
13	Wilo Stratos PARA-C pump	ra/15146	2
14	C.M.I.	ra/95.10.3218	1
15	Microbubble separator	ra/10140	2
16	Safety valve		2
17	Cartridge pressure switch	ra/14591	2
18	Interference filter	ra/15284	2
19	Tub heating	6 meters 3 meters	2 1
20	Vibration damper	ra/14467	5
21	Control component SMS-14	ra/13047	10
22	Housing fan	ra/14481	2
23	4-way valve	ra/15136 ra/15061	2
24	Blow-off line		
25	Adjustable foot	ra/15288	6
26	Economizer	ra/10110	2
-	Pressure sensor 10 bar	ra/14383	2
-	Pressure sensor 35 bar	ra/10922	4
-	Check valve	ra/14624	7
-	Sight glass	ra/14660	2
-	Contact sensor	ra/12859	2
-	Contact sensor	ra/44.01.12007	4
-	Volume flow sensor	DN32_Metal	2
-	Liquid separator	ra/15296	2
-	Switching power supply	ra/14481	1
-	Heating tape (liquid separator)	ra/14690	2

## Structure and function

### Assembly

The ratiotherm WP Max-AirMono F67 air source heat pump has two complete refrigeration circuits and uses outside air as its primary energy source. The air source heat pump is designed for all weather conditions. The outdoor unit is installed outside so that air can flow freely through the evaporators and does not recirculate. Two axial fans convey the air to the evaporator. The refrigeration circuit is a hermetically sealed circuit consisting of a scroll compressor, a condenser (plate heat exchanger), an evaporator (fin heat exchanger) and five electronic expansion valves that control the flow of refrigerant. The natural refrigerant R290 is used as the working medium. The WP Max-AirMono air source heat pump is



Ready for operation and shipped with fully filled refrigeration circuits. The heat pump can be controlled by the ratiotherm central controller rZR 16x2 or by a third-party controller. If the device is controlled by a third party, an external display can be installed in the boiler room to show all parameters and operating states at a glance.

The ratiotherm air heat pump can be operated in combination with most electric, gas, or oil boilers.

Design of the WP Max-AirMono F67 air source heat pump:

- Sturdy, attractive, insulated, and powder-coated steel housing, crane-liftable
- 2 x factory-ready refrigeration circuits (no refrigeration certificate required)
- 2 x soundproofed, fully hermetic scroll compressors with EVI injection
- 2 x highly efficient, remotely readable frequency converters including mains filter to comply with the EMC Directive
- 2 x copper-brazed stainless steel plate heat exchangers as condensers
- 2 x evaporators with alternating and hydrophobic coated fins (fin spacing 4.3 mm)
- Drip tray with heating tape to ensure condensate drainage
- 2 x premium fans featuring the latest technology with a diameter of 100 cm
- 10 x electronic expansion valves
- Energy-efficient defrosting through cycle reversal integrated as standard
- Economizer to increase the COP
- Pressure and temperature monitoring of the refrigeration and hydraulic circuits
- Power-to-heat and smart grid capable
- Remote maintenance/interface module (ModBus TCP)
- Optional: external display
- Optional: interface extension (ModBus RTU)

Housing colors

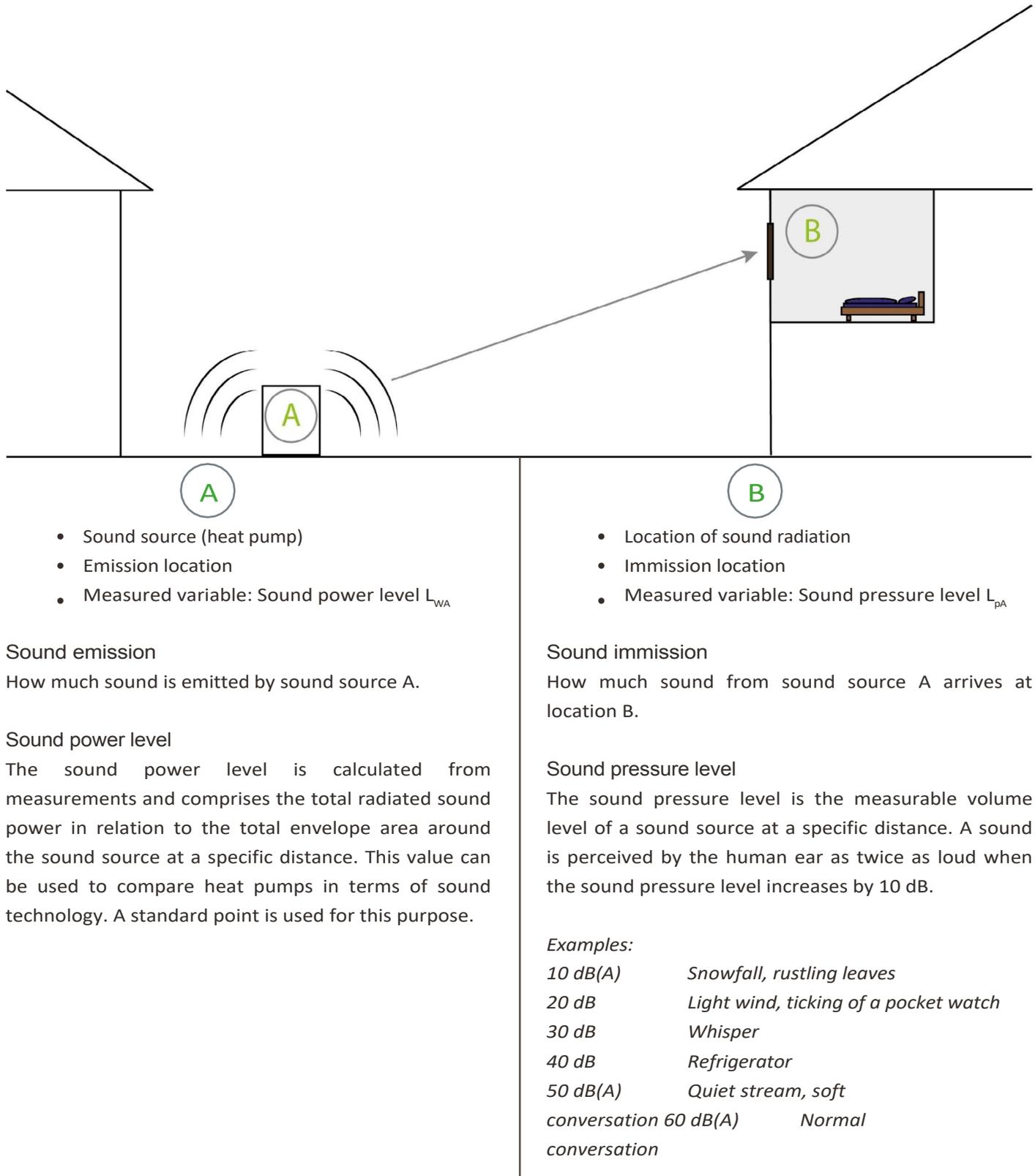
RAL 7016  
Anthracite gray

RAL 3000  
Fire red

## 4.4 SOUND PROPAGATION IN AIR/WATER HEAT PUMPS

### 4.4.1 SOUND POWER LEVEL AND SOUND PRESSURE LEVEL

Every source of noise emits a certain amount of sound. Sound pressure level and sound power level are used as measures of the airborne noise emitted by heat pumps.



#### 4.4.2 MEASURES TO REDUCE SOUND POWER

The actual noise level of an air/water heat pump depends on many different factors and can be significantly influenced by factors such as clever installation.

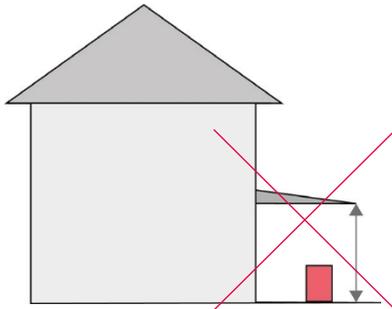
##### INSTALLATION LOCATION:

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

##### Installation under a canopy:

Height of canopy < 5 m

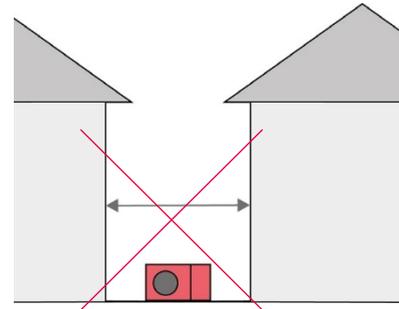
When installing the outdoor unit under a canopy, the noise level can increase by up to 9 dB(A).



##### Installation between 2 walls:

Distance between walls < 5 m

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

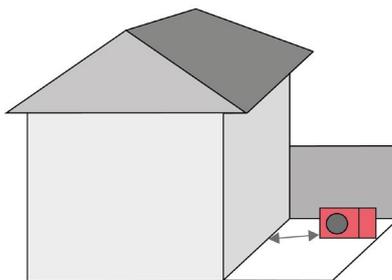


*Installation NOT recommended*

##### Installation in a corner:

Distance to both walls < 3 m

When installing the outdoor unit in a corner, the noise level can increase by up to 9 dB(A).

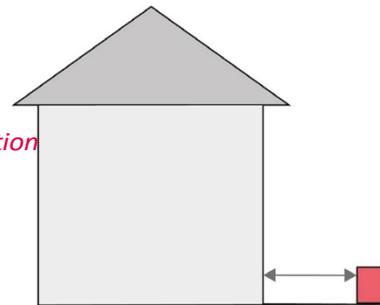


*Structural sound insulation measures required*

##### Installation near a wall:

Distance to wall < 3 m

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



##### AVOIDING STRUCTURAL NOISE TRANSMISSION:

- Decoupling of the substrate: We recommend installation on a level and load-bearing floor. Vibrating floors (e.g., wooden terraces) can transmit structure-borne noise.
- Vibration-isolated hydraulic connection: Vibrations from the heat pump can be transmitted to the building through pipes. The connections of the device must be acoustically isolated.

##### SOUND-REFLECTIVE WALLS:

The smoother a wall is, the more strongly the sound waves from the heat pump are reflected. Glass facades and concrete walls, among other things, are particularly sound-reflective. Materials such as rock wool and plaster can help to remedy this.

#### INTAKE AND OUTLET SIDE:

The sound radiation from heat pumps is not homogeneous and is significantly stronger in the exhaust direction. The exhaust direction should not point towards rooms that require protection. Furthermore, no walls should be blown on directly, as the reflection also increases the sound pressure level.

#### PLANTING:

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

#### REQUIRED POWER:

The more power a heat pump is required to deliver, the higher its sound power level. If a heat pump is undersized, it may have to run at full capacity frequently, resulting in increased noise emissions. A second heat generator can remedy this situation.

#### 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 the noise level.

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

All information in this chapter that does not specifically relate to the ratiotherm heat pump can be found in the Taken from "Guide: Sound" 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](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 ratiotherm central controller rZR 16x2:

- The heat pump controller communicates with rZR via CAN bus.
- The central controller requests the heat pump and specifies the corresponding target temperature.
- In heating mode, the heat pump automatically regulates its output according to the specified setpoint 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 set-point 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 activated 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 setting" can be used to determine 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 target temperature.

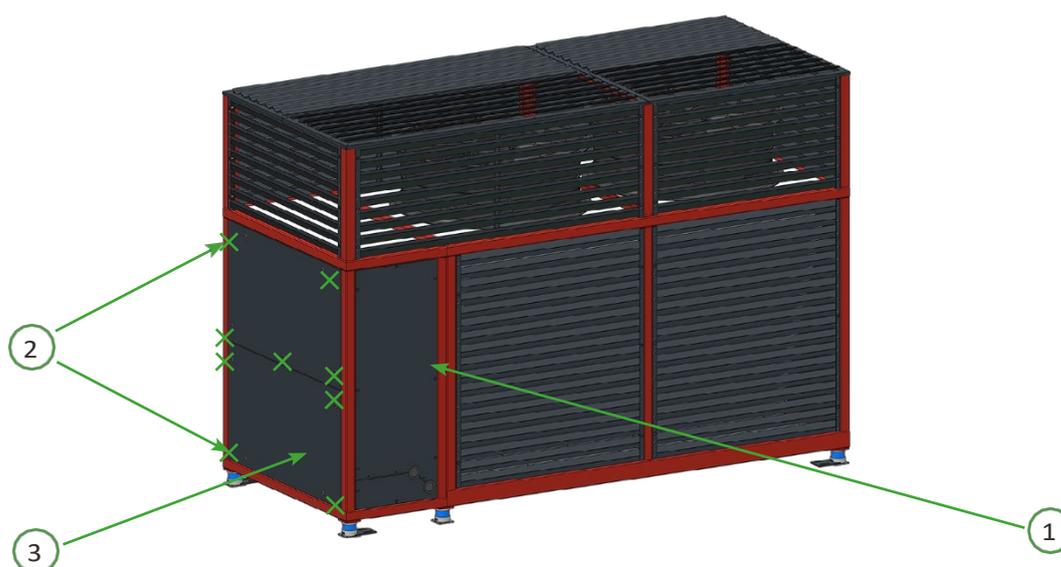
### Internal control logic:

- The heat pump is activated via a potential-free digital signal. This activates the pumps and valves. After 45 seconds, the compressor starts up. 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.
- When the system is activated, the minimum running time is 5 minutes. An error immediately switches off the system.
- The target speed of the compressor or the target outlet temperature (adjustable via a fixed value) can be specified by an external control system using a 0-10 V signal.
- If there is no 0-10 V signal, the compressor runs at a constant, adjustable speed (factory setting: 75 %).
- If a 0-10 V signal lower than 1.9 V is present, the heat pump is started in cooling mode. If available, the 4-way valve is switched and the compressor speed is regulated to the target 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 source temperature inside the evaporator falls below an adjustable value (factory setting: 11 °C) for longer than 1 minute, the system is shut down for frost protection reasons. If the evaporator temperature is above 55 °C, start-up is also prevented. Once the temperatures return to normal, the machine starts up as usual.
- The condenser pump regulates the deltaT 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 it from switching off.
- If the heating flow temperature exceeds 72 °C, the system automatically switches off for 20 minutes. If the temperature drops during this time, the system restarts after the 20-minute waiting period.
- If an anomaly is detected (HP, LP, frost protection), an error is triggered and the system is blocked for 5 or 7 minutes. This cannot be acknowledged with 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 anomalies, 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 device is equipped with various safety devices. The safety devices are shown in the following illustration:



- 1 Protective enclosure or housing
- 2 Mechanical locks (9 pieces) X
- 3 Protective door
- 4 Pressure and temperature monitoring of the refrigeration and hydraulic circuits (internal)
- 5 Pressure relief for hydraulic circuit: Safety valve and blow-off line (internal) (see chapter *Design and spare parts*: Points 15, 16, 24)

## 5. TRANSPORT, ASSEMBLY, AND INSTALLATION

### 5.1 TRANSPORT AND UNPACKING

Storage conditions:

- Ensure frost-free storage.

The following instructions for transporting the device must be observed:

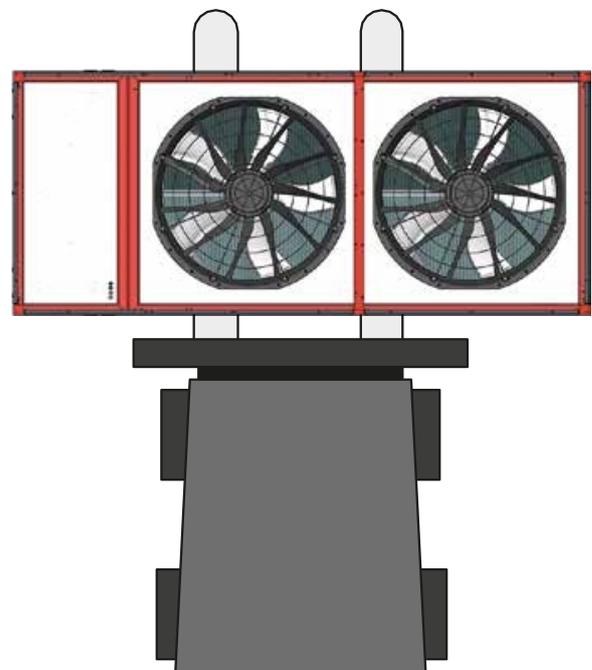
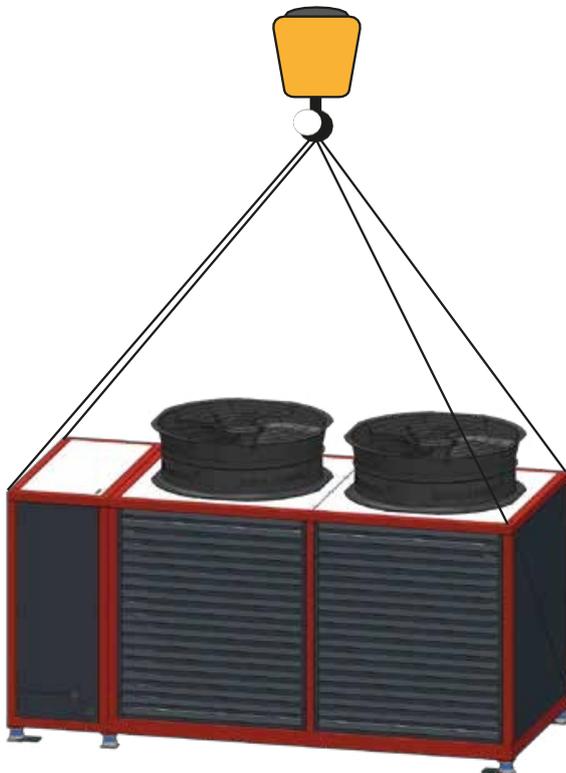
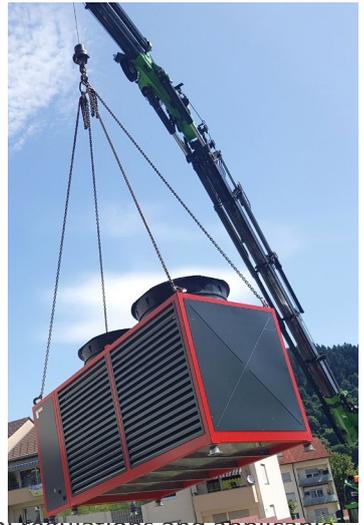
- Only allow qualified personnel to carry out transport.
- Protect yourself with PPE (e.g., safety shoes, etc.).
- Take the weight of the device (approx. 1080 kg) into account when selecting the appropriate lifting equipment (crane, forklift, pallet truck, etc.).
- Take the center of gravity of the device into account.
- 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 for verification purposes.

- The device can be lifted by crane. Crane operation must be carried out by qualified personnel and in accordance with DGUV regulations for cranes.

- The device can only be driven under from the long side. The length of the forklift fork must be at least 1400 mm.



All dimensions are given in millimeters.

## 5.2 INSTALLATION OF THE HEAT PUMP

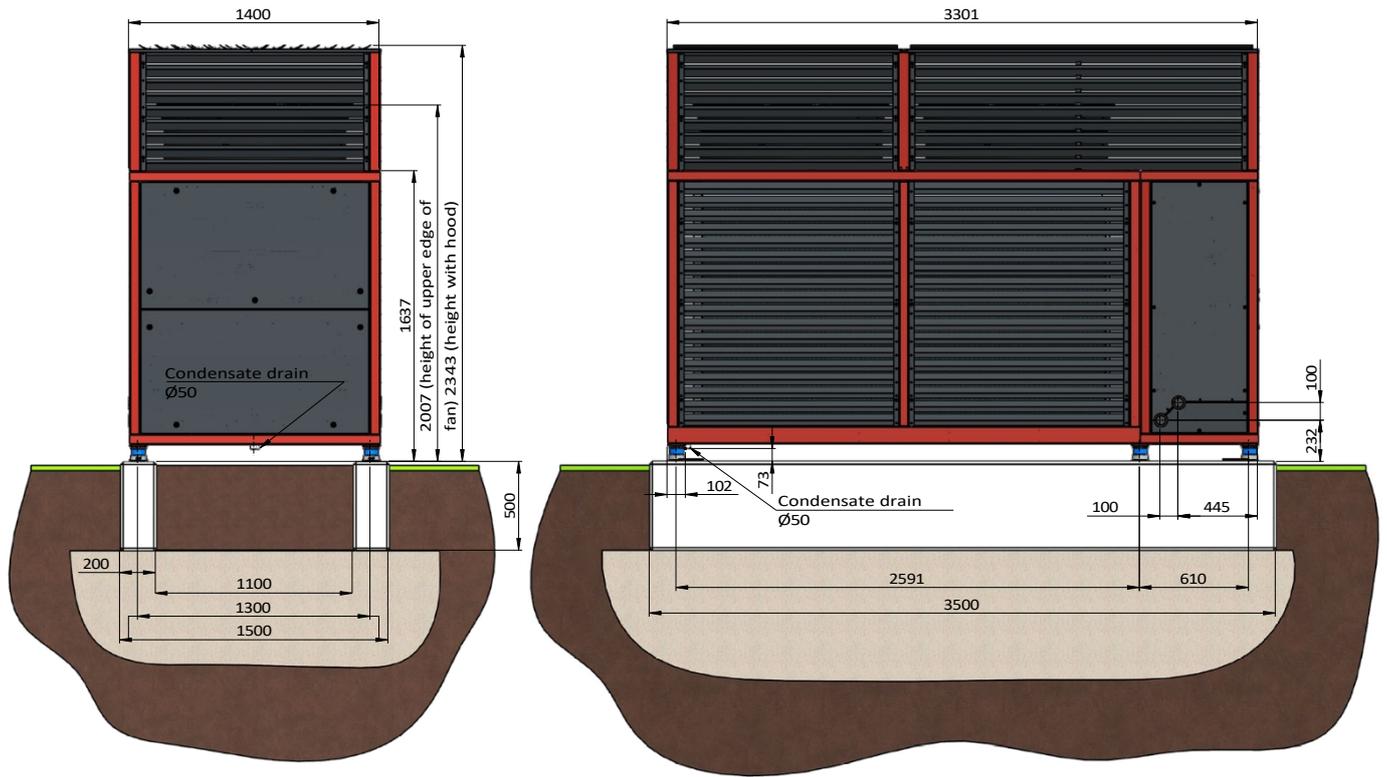
### Installation conditions:

- The unit may only be installed outdoors.
- The minimum distances must be observed for maintenance, noise, and safety reasons. Please note that different minimum distances apply depending on the installation location.
- Distances for maintenance: Sufficient space must be available for maintenance and repairs.
- Distances for noise reduction: Choosing the right installation location is important in order to keep the noise emissions of the heat pump as low as possible. Please refer to section 4.6 for more information. We also recommend the "Guideline: Noise" published by the German Heat Pump Association (BWP) for more detailed information on noise reduction.
- Safety distances: The heat pump operates with the refrigerant R290 (propane), which is highly flammable and can form explosive mixtures when combined with air. It is contained in hermetically sealed refrigeration circuits within the heat pump, and additional safety measures within the device prevent the refrigerant from escaping. Nevertheless, safety zones similar to those at a gas station must be maintained around the heat pump.
- Distances for air flow: a free air flow (50,000 m<sup>3</sup>/h) must be ensured.
- If the device is installed close to a wall, a minimum distance of 3 meters must be maintained (sound reflection).
- Distance of 1 meter from roads and sidewalks (icing).
- Installation of the heat pump near garages, parking garages, parking lots: This heat pump contains an A3 refrigerant, which means that, in accordance with garage and parking space regulations (GaStellV, GaStplVO, BetrSichV), it must be clarified whether the unit may be installed in these locations. It may be necessary to provide impact protection outside the protected area.
- The outdoor unit must not be enclosed or covered.
- The main wind direction does not need to be taken into account for this device.
- The outdoor unit must be installed on the side of the building facing away from the sea breeze.
- Before installing the outdoor unit, a suitable foundation must be constructed (see dimensions and foundation plan).
- Since heat pump operation produces a certain amount of condensate depending on the output and humidity (approx. 12 l/h), a water-permeable floor (e.g., gravel) must be provided. If the ground is not permeable, a means of draining the condensate must be provided below the outdoor unit. A heated condensate drain may be required for this purpose. A siphon is essential for safety reasons.
- The amount of snowfall at the installation site must be taken into account. The heat pump should not be exposed to snow; if necessary, the foundation can be built higher.
- The outdoor unit can be installed at a standard distance of 20 meters from the storage tank.

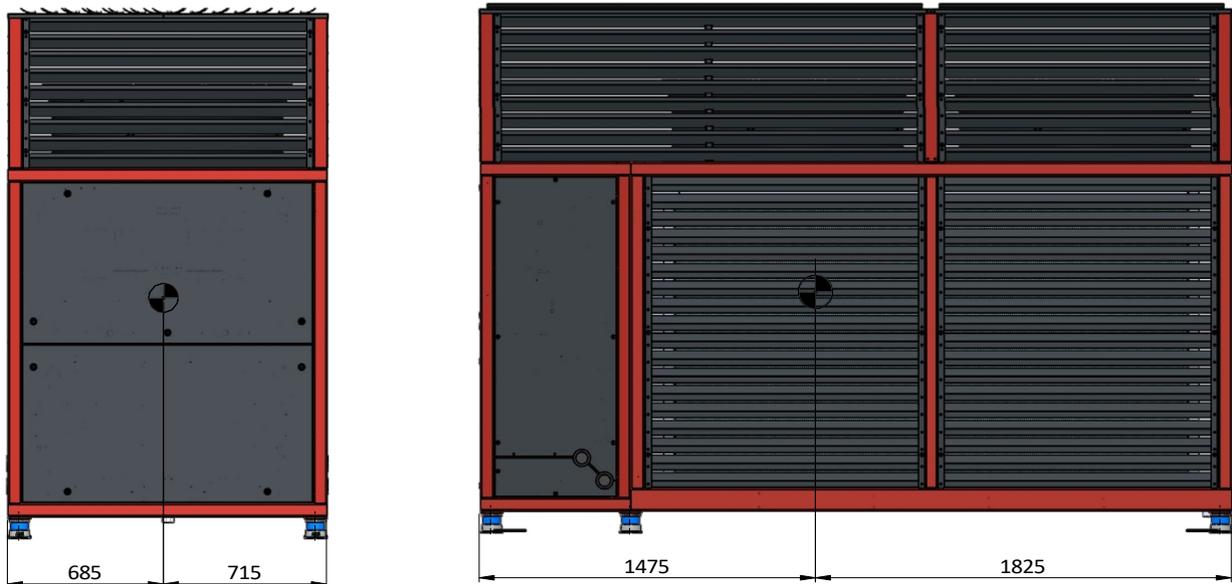
### The responsible specialist technician (qualified personnel) must ensure the following measures are taken:

- The danger zone for assembly and installation must be well lit.
- Personnel must have the necessary qualifications, have received the necessary training, and be instructed by the responsible supervisor.
- Personnel must have read and understood the operating instructions.
- Personnel must have access to the operating instructions at all times.
- Local accident prevention and environmental regulations must be implemented and complied with.
- Unauthorized persons must be kept away from the device.
- The device may only be handed over and operated in a safe and functional condition. Damage to the heat pump must be repaired immediately or the heat pump must be shut down.

## 5.2.1 DIMENSIONS



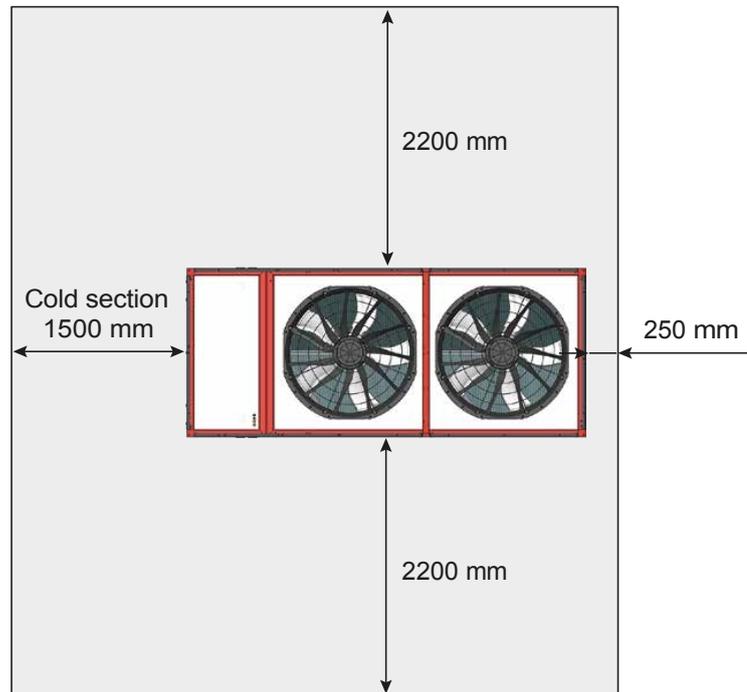
## 5.2.2 HEAT PUMP CENTER OF GRAVITY



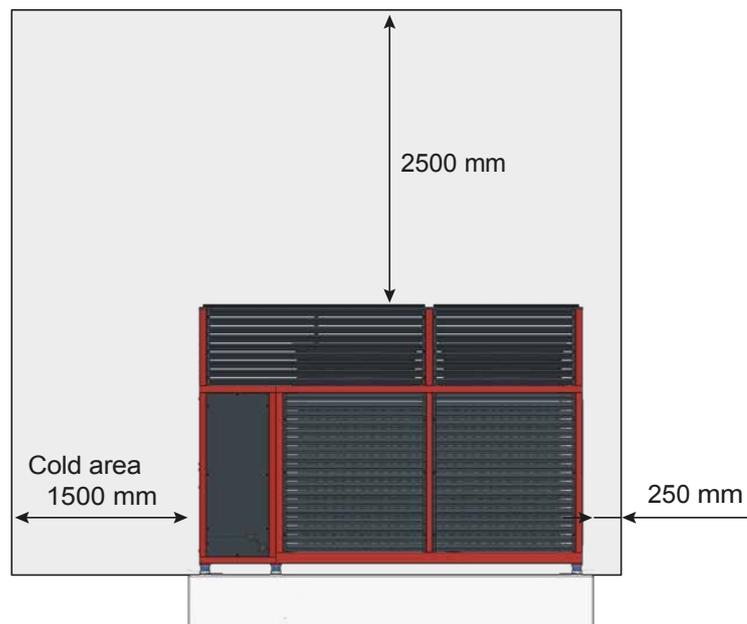
All dimensions are given in millimeters.

### 5.2.3 MAINTENANCE AREA

Top view



Front view



These distances must be strictly observed to ensure smooth maintenance. All dimensions are given in millimeters.

## 5.2.4 SAFETY AND PROTECTION AREA: GENERAL

The WP Max-AirMono F67 heat pump operates with the flammable refrigerant R290. For this reason, a safety and protection area must be maintained around the device at all times.

A protection area of at least 3 meters must be maintained for:

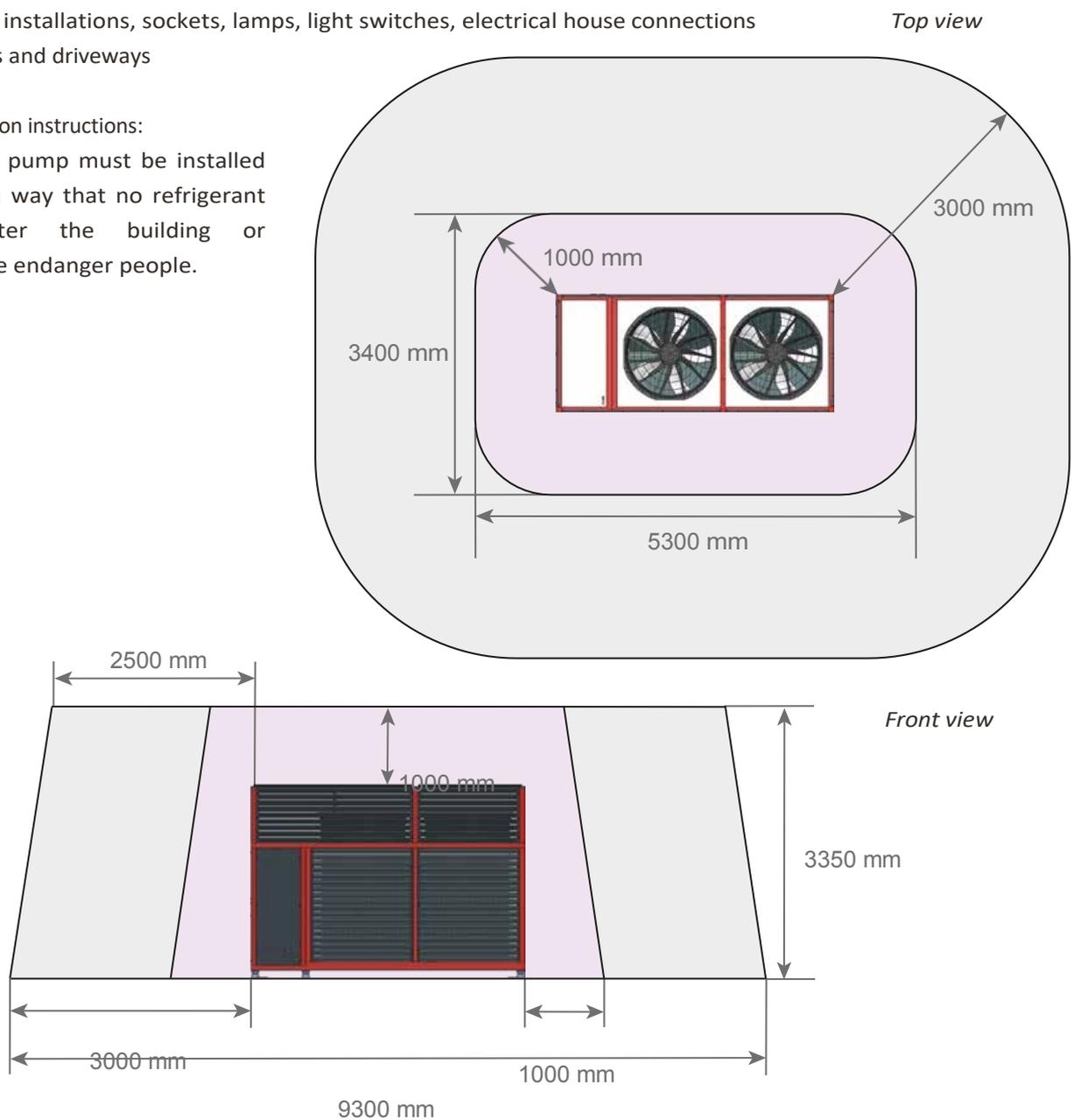
- Open flames and sources of sparks (fireplaces, ashtrays, barbecues)

A protective area of at least 1 meter must be maintained for:

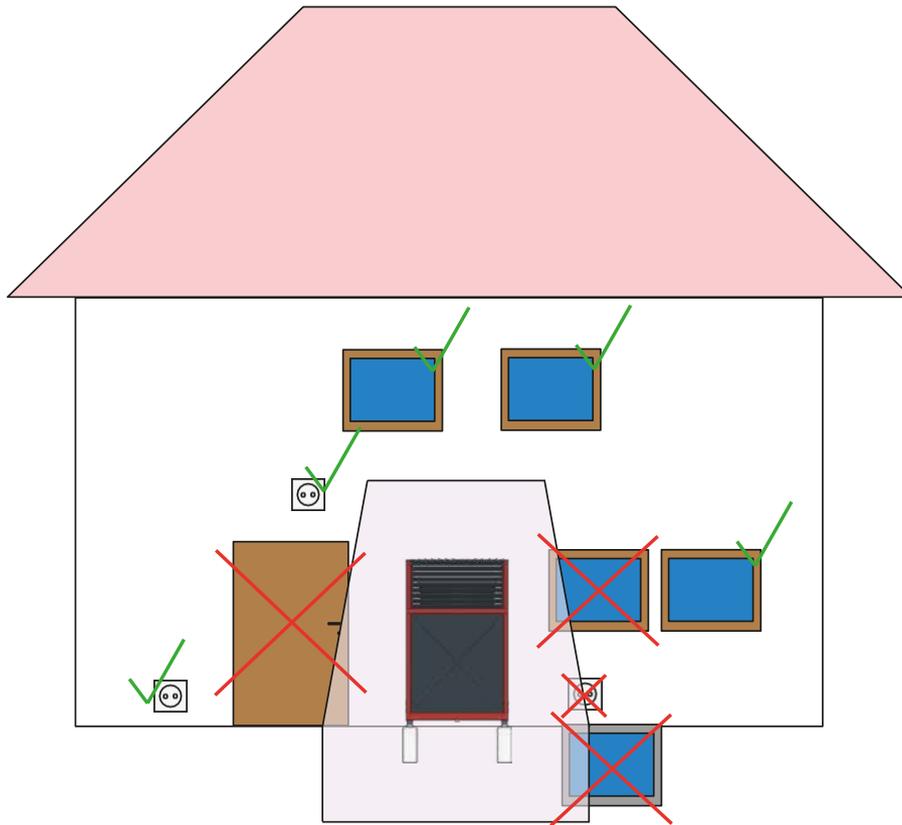
- Building openings, windows, doors, flat roof windows
- Openings in ventilation systems
- Recesses such as light wells and sewer shafts
- Drains that run through a building
- Recreation areas, terraces
- Electrical installations, sockets, lamps, light switches, electrical house connections
- Walkways and driveways

Further installation instructions:

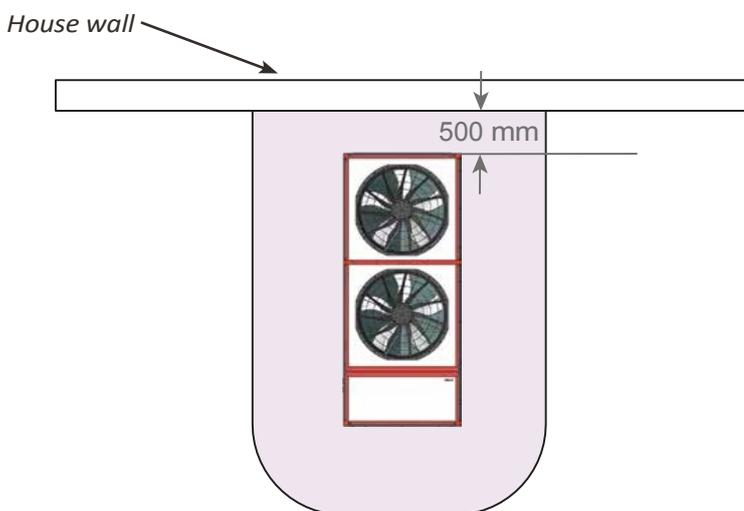
- The heat pump must be installed in such a way that no refrigerant can enter the building or otherwise endanger people.



5.2.5 SAFETY AREA: INSTALLATION ON A HOUSE WALL



The WP Max-AirMono F67 heat pump may only be installed with the *short evaporator side* close to a wall/house wall. The minimum distance for the safety area must be at least 0.5 meters.



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

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

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

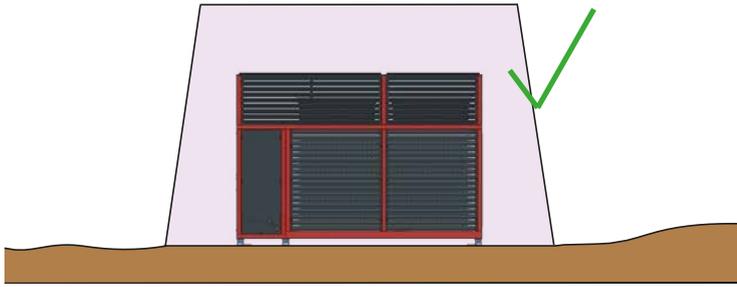
X = Wall height [m]

A = Reduction of the safety zone [m]

B = Height of the heat pump [m]

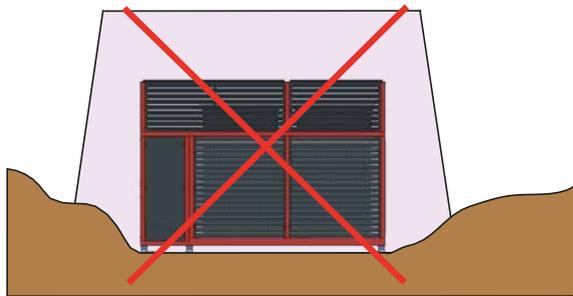
C = Height of the foundation [m]

## 5.2.6 SAFETY AREA: ADDITIONAL INSTALLATION REQUIREMENTS



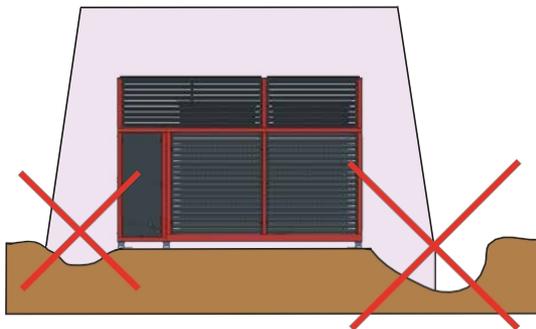
The refrigerant R290 is heavier than air and flammable. For this reason, the heat pump must be installed in such a way that any refrigerant that escapes cannot collect in the surrounding area or enter a building.

The surrounding area should be as flat as possible.

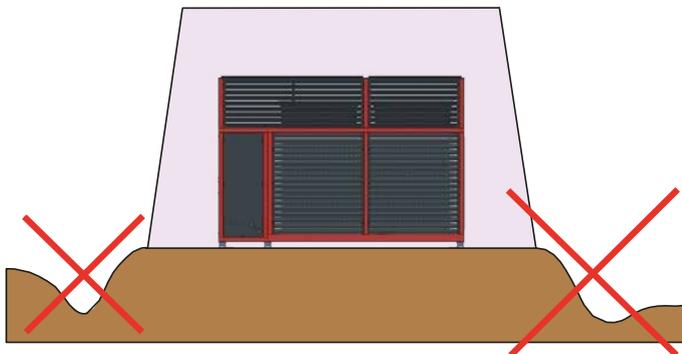


Hollows/depressions:

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

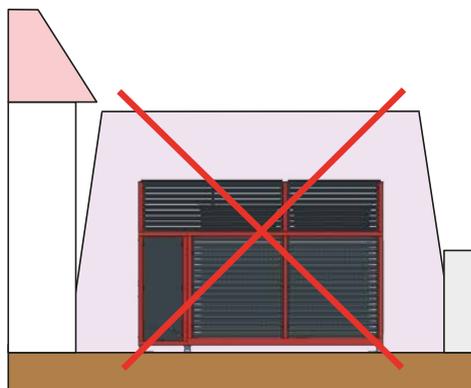


The heat pump must not be installed near a depression. There must be no hollows within a radius of 1 meter.



Elevated terrain:

The heat pump must not be installed in an elevated position if escaping refrigerant cannot drain freely but can collect in depressions. This also applies to depressions that are located nearby but outside the protected area.



Niches:

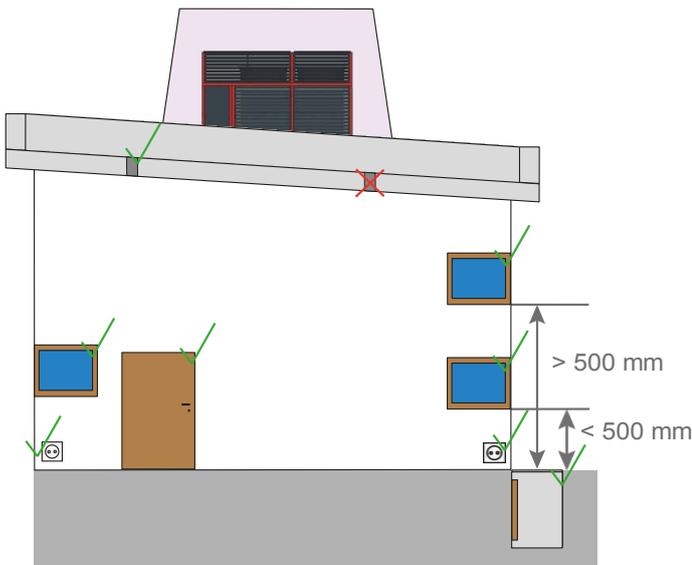
Installation between walls/house walls is not permitted, as the refrigerant cannot drain away in niches that are too narrow. Installation in a niche is also not recommended due to the significant increase in noise levels.

## 5.2.7 FLAT ROOF INSTALLATION

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

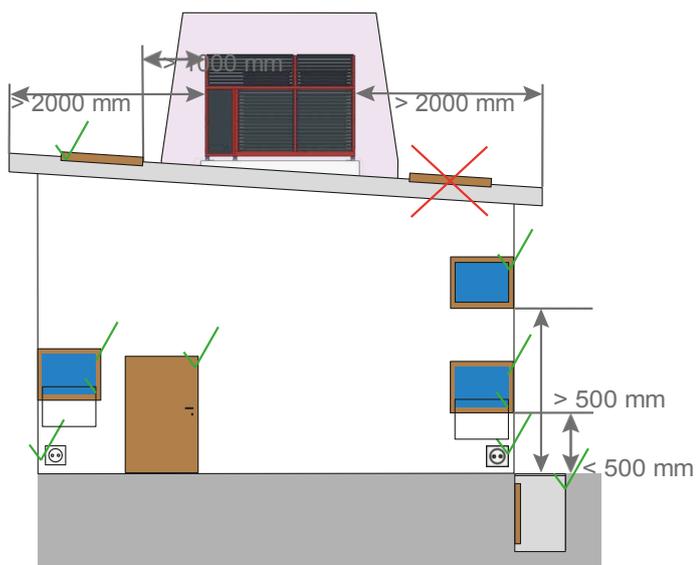
- Roof vents and roof drainage systems must not be located within the protected area.
- Heat pumps installed on roofs must be integrated into the lightning protection system.
- The condensate drain must not be routed into or through the building. The same rules apply as for ground-level installation (see section 5.2.10). If the condensate is drained from the roof to the outside, no siphon is necessary.

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



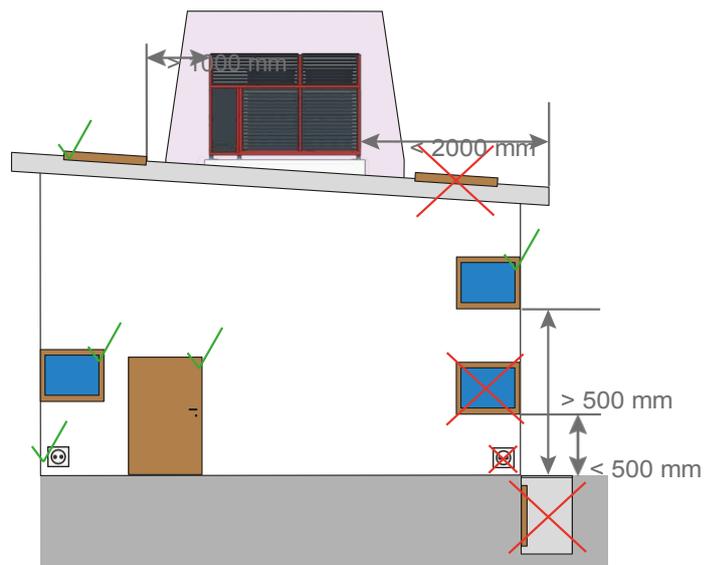
Roof without parapet:

Distances to the roof edge are greater than 2 meters

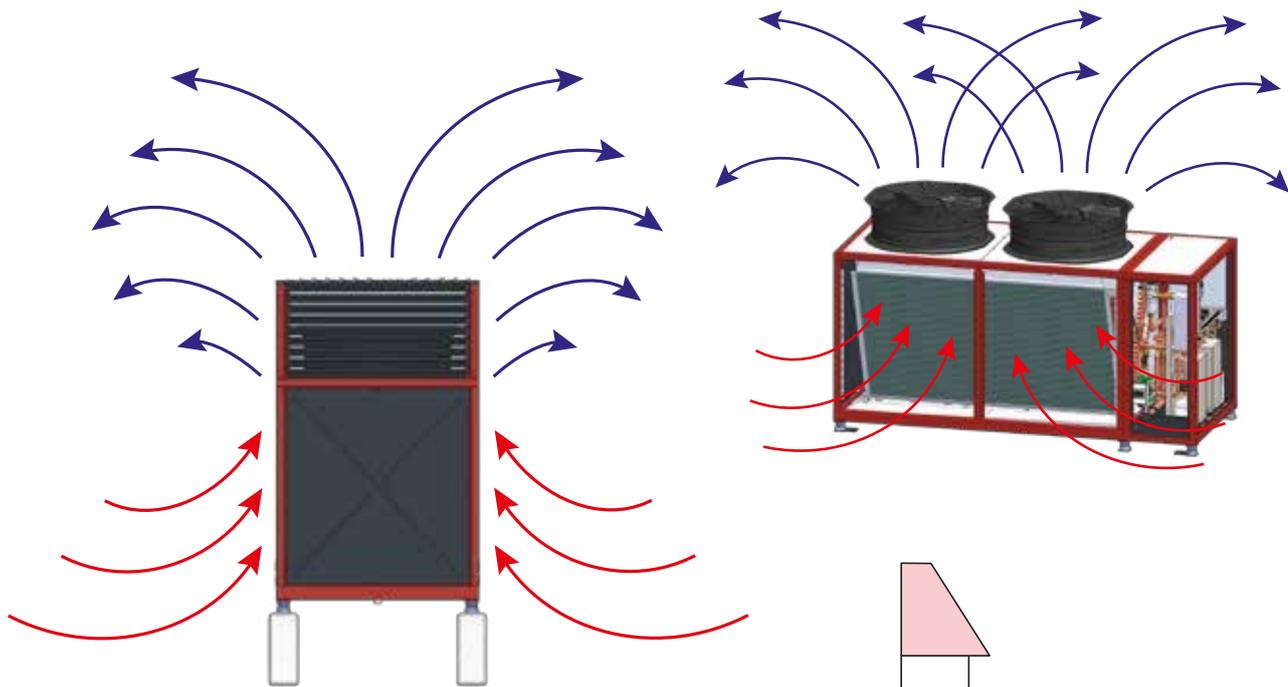


Roof without parapet:

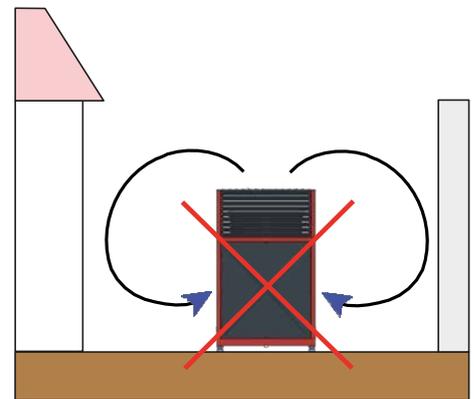
Distances to the roof edge are less than 2 meters



## 5.2.8 AIR INTAKE AND AIR OUTLET



The WP Max-AirMono F67 draws in air from the side and blows it out again at the top. When installing the system, it must be ensured that there is a sufficiently large air flow (50,000 m<sup>3</sup>/h) for the heat pump. If this is not the case, air short circuits may occur.

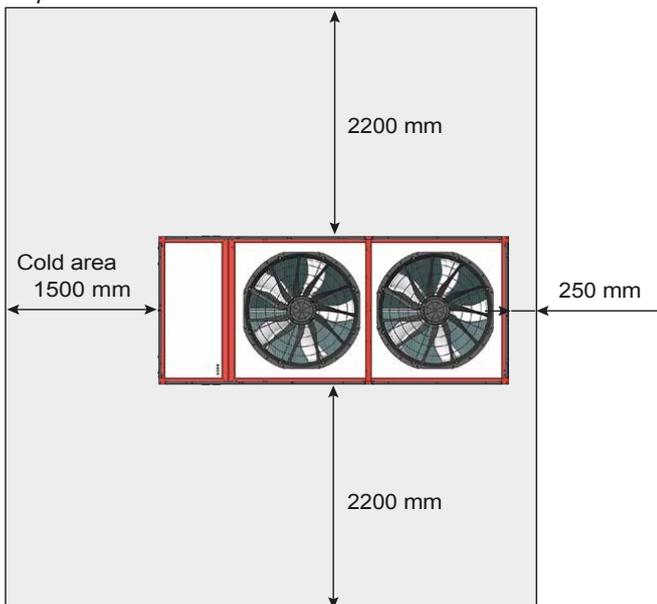


*Air short circuit:*

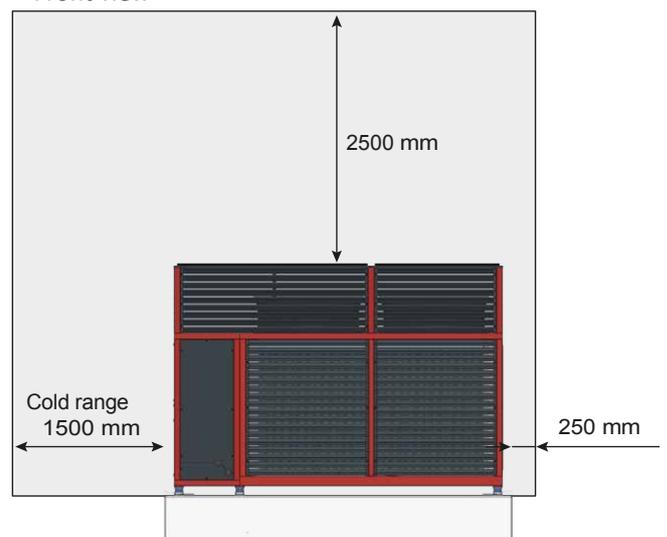
*Air expelled from the heat pump is sucked back in again.*

Minimum distances to ensure free air flow:

*Top view*



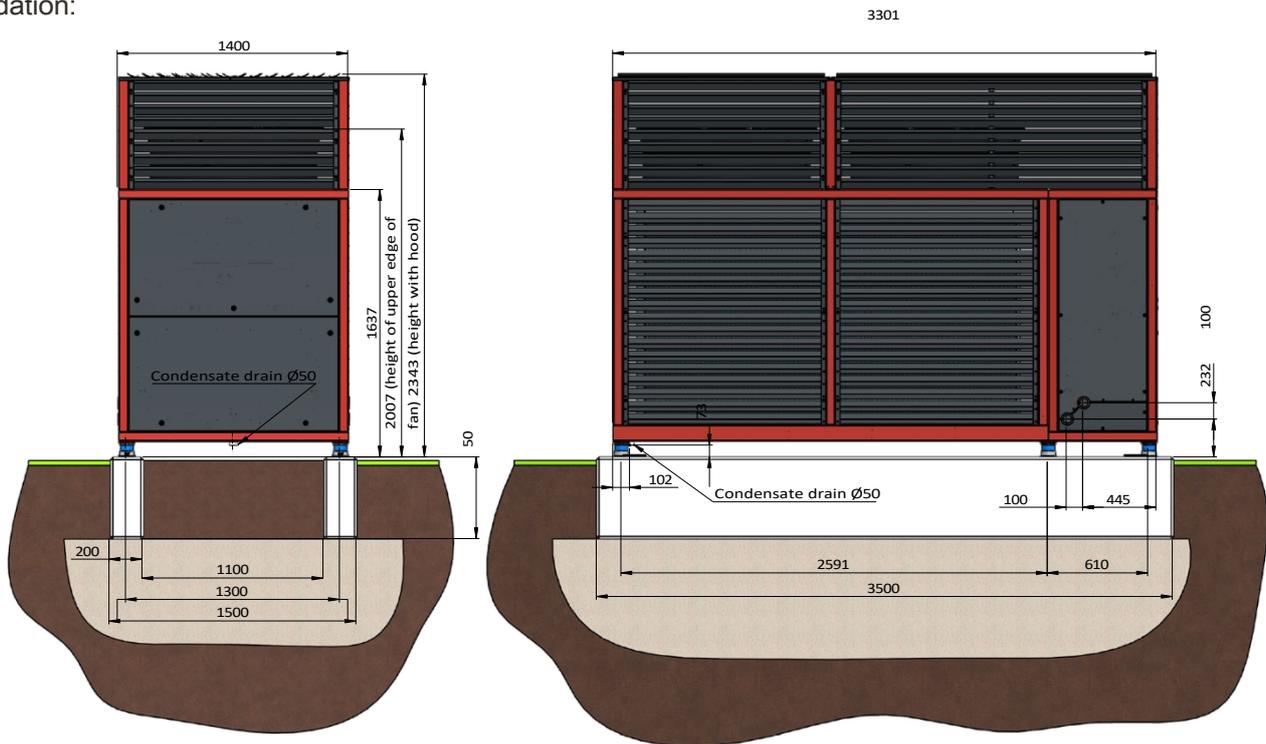
*Front view*



## 5.2.9 SUBSTRATE/FOUNDATION

- The ground must be level and firm. We recommend constructing a foundation.
- The necessary load-bearing capacity of the foundation must be taken into account (weight of heat pump: approx. 1080 kg).
- The heat pump should be installed slightly elevated. The distance from the feet of the device to the ground should be 20 cm or more.
- If possible, the foundation should be higher than the expected amount of snowfall.

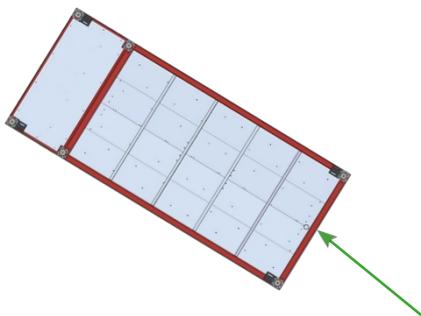
Dimensions of the foundation:



## 5.2.10 CONDENSATE DRAIN/DEFROSTING PROCESS

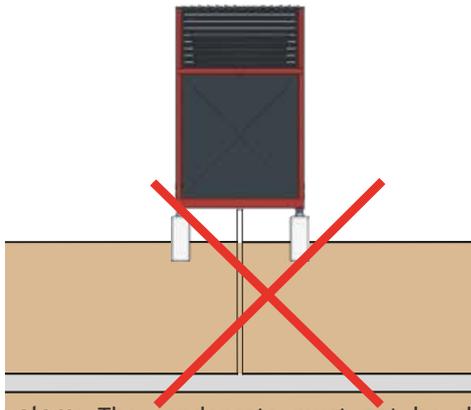
During operation of air/water heat pumps, condensate forms and, at low outside temperatures, ice forms on the protective grilles and cladding parts of the heat pump. For this purpose, there is a defrosting process using cycle reversal, which is carried out automatically by the device itself when necessary. With the Max-AirMono F67

, the amount of condensate water can be up to 12 L/h. The device is equipped with a condensate collection tray, tray heater, and drain. The drain is located on the short side of the heat pump (which does not contain the refrigeration circuit) and must be kept frost-free on site. The tray heater consists of a heating tape that protrudes approximately 50 cm from the drain and can be continued in the drain pipe. The condensate must not be led into or through a building.

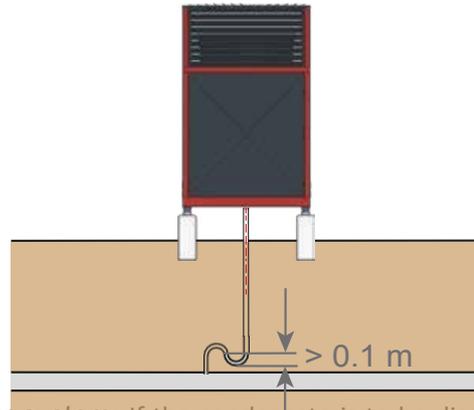


Underside of the heat pump

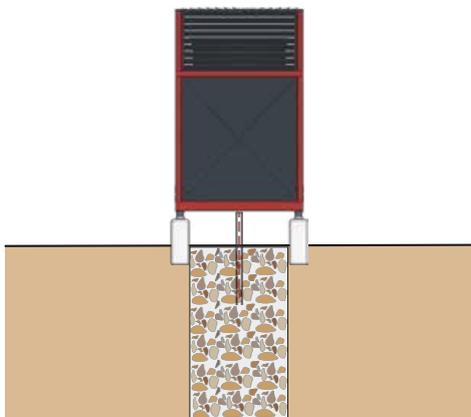
- The condensate collection tray collects most of the condensate and directs it away from the heat pump. This is important for the functioning of the device.
- A hose or pipe can be attached to the drain (Ø50 mm) to drain the condensate collection tray.
- A 50 cm long heating cable is sufficient from the drain to prevent the pipe/hose sections from freezing. The condensate drain heater runs during the defrosting process.
- Pipe sections that do not contain a heating cable must be laid frost-free to prevent the pipes from freezing. Insulate the pipe (at least 19 mm insulation) along its entire length in outdoor areas. The insulation must fit tightly to the underside of the condensate collection tray.
- Use a siphon for installations where air circulation can occur in the condensate drain pipe.



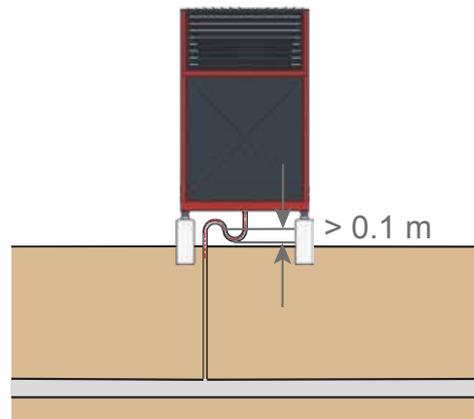
Sewer system: The condensate must not be discharged into sewage pipes leading to the sewer system without a siphon. The reason for this is that R290 is heavier than air and any refrigerant that escapes could otherwise enter the sewer system.



Sewer system: If the condensate is to be discharged into the sewer system, a siphon must be installed. Ideally, this should be located below the frost line (90 cm or deeper) or it must be frost-proof. The heating tape simply ends after 50 cm.

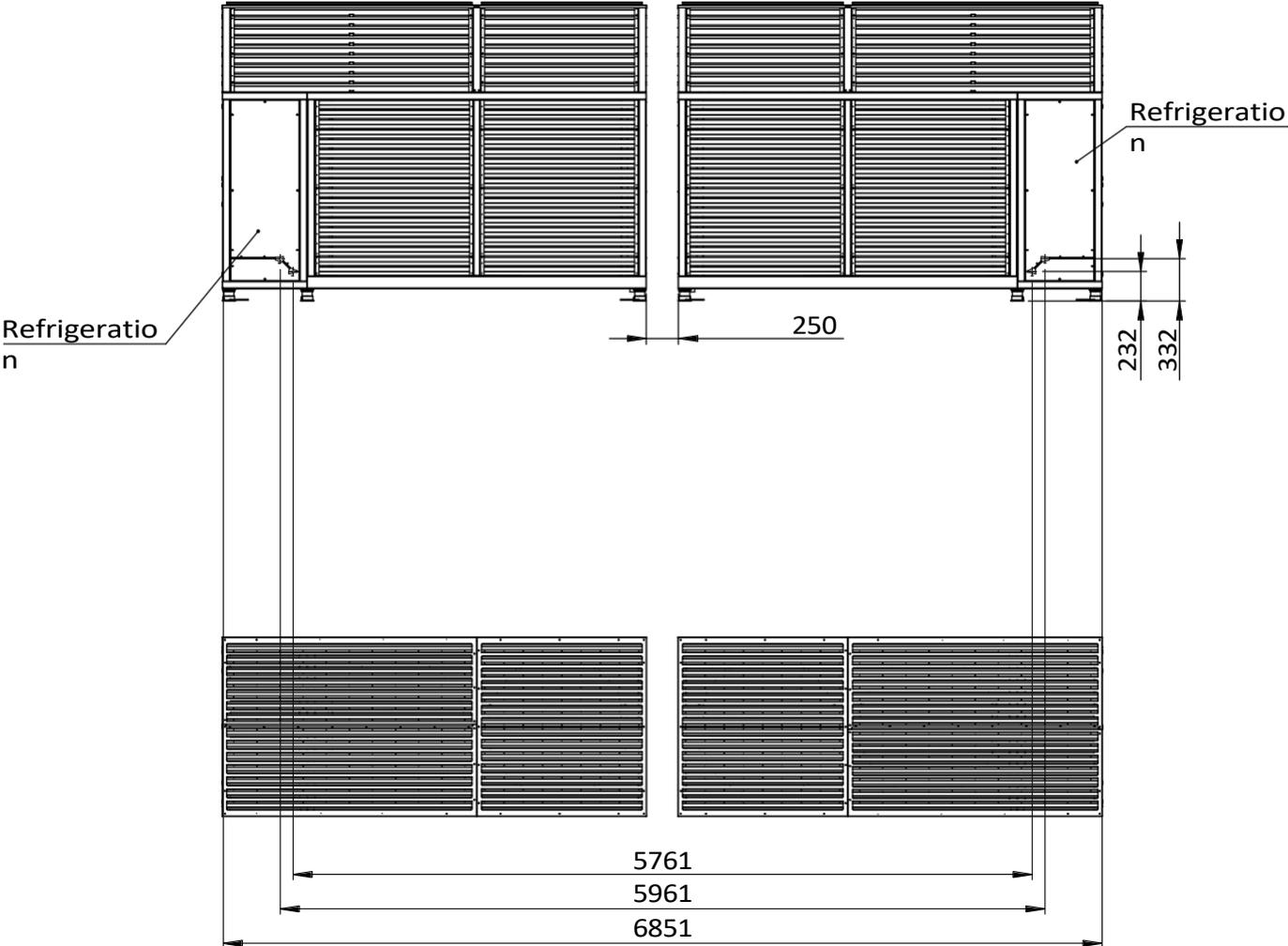


Infiltration: If the condensate is to infiltrate into the ground, there must be a water-permeable soil, such as gravel, beneath the heat pump. The gravel layer must be at least 90 cm deep or deeper than the frost line and be able to absorb 100 L per day. A 50 cm long hose must be attached to the drain, which contains the protruding heating tape. The end of the hose can be inserted into the gravel.

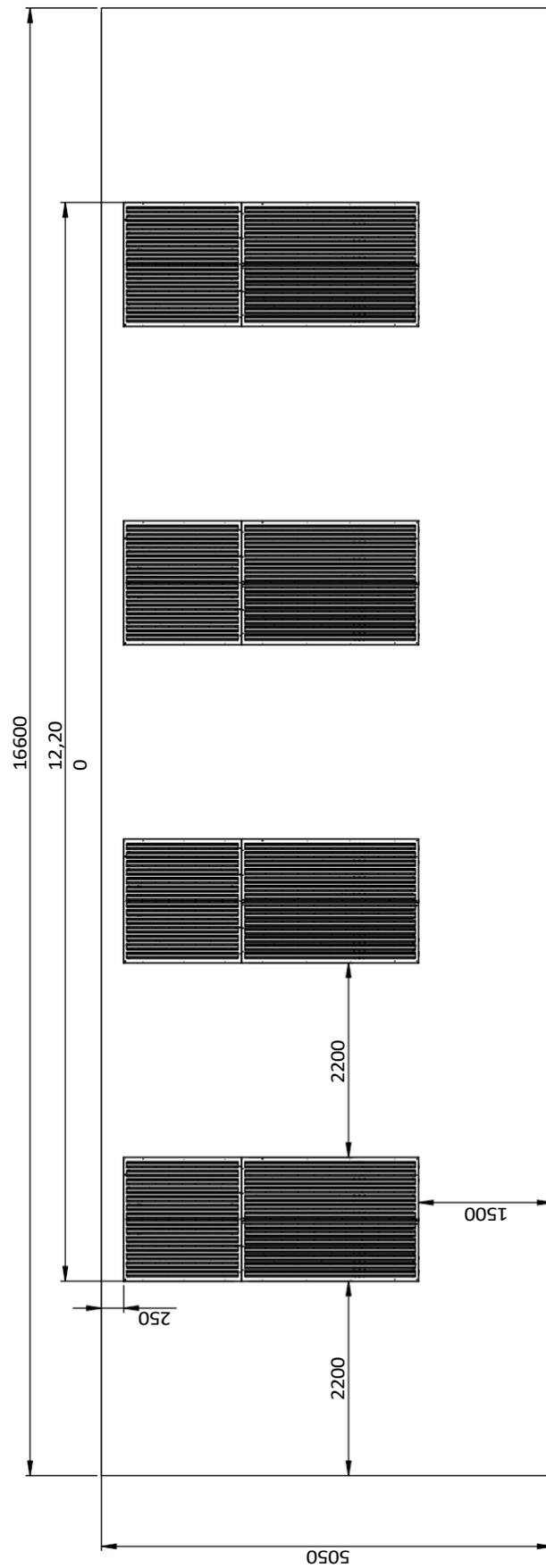


Sewer system: If the siphon cannot be made frost-proof, a condensate drain heater must be run through the siphon. This must run through the entire siphon. If the existing heating tape is too short, an external heating cable must be used.

52.11 INSTALLATION OF MULTIPLE HEAT PUMPS



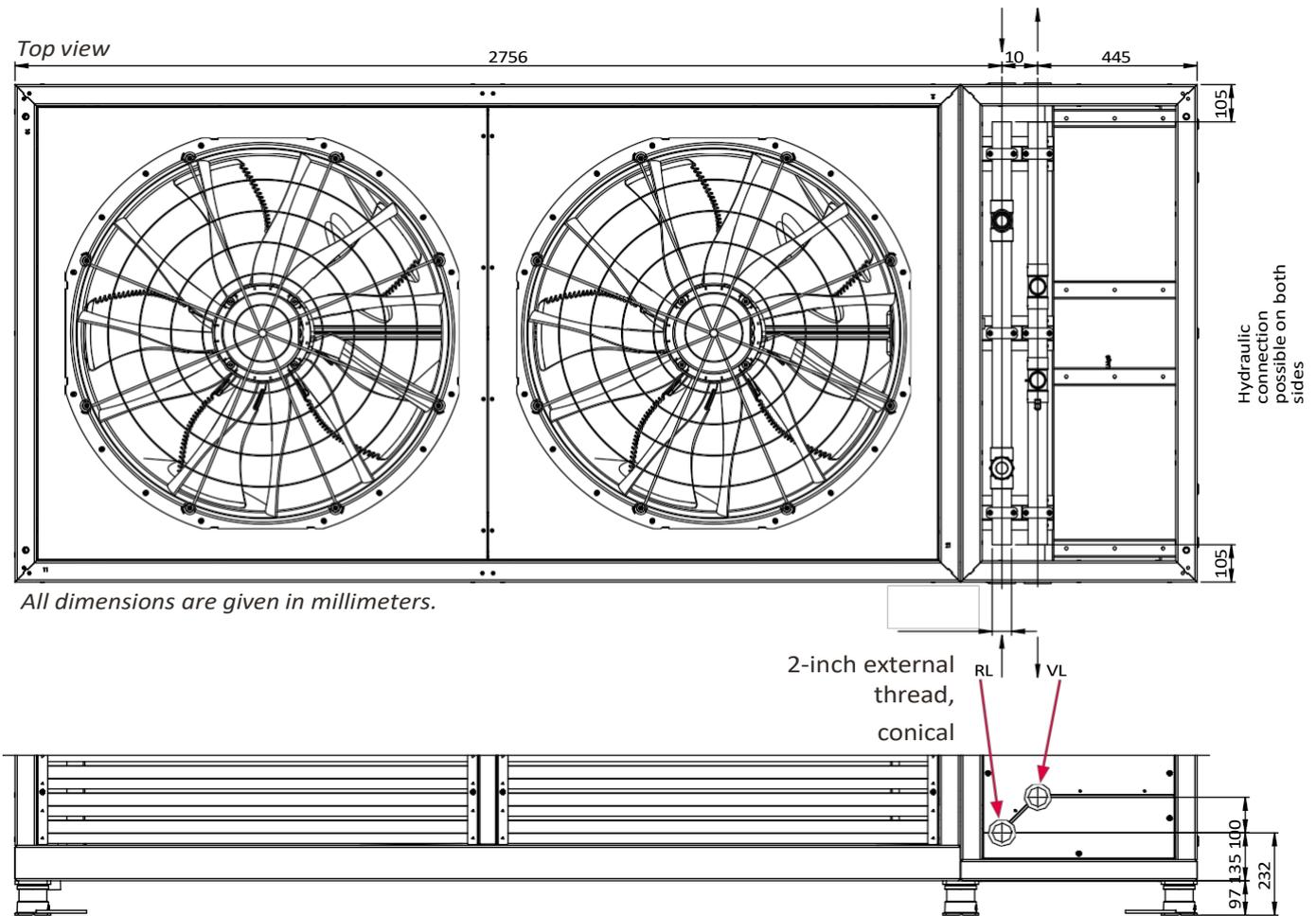
All dimensions are given in millimeters.



All dimensions are given in millimeters.

## 5.3 HYDRAULIC INSTALLATION

### 5.3.1 CONNECTION DIMENSIONS AND DIMENSIONS



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

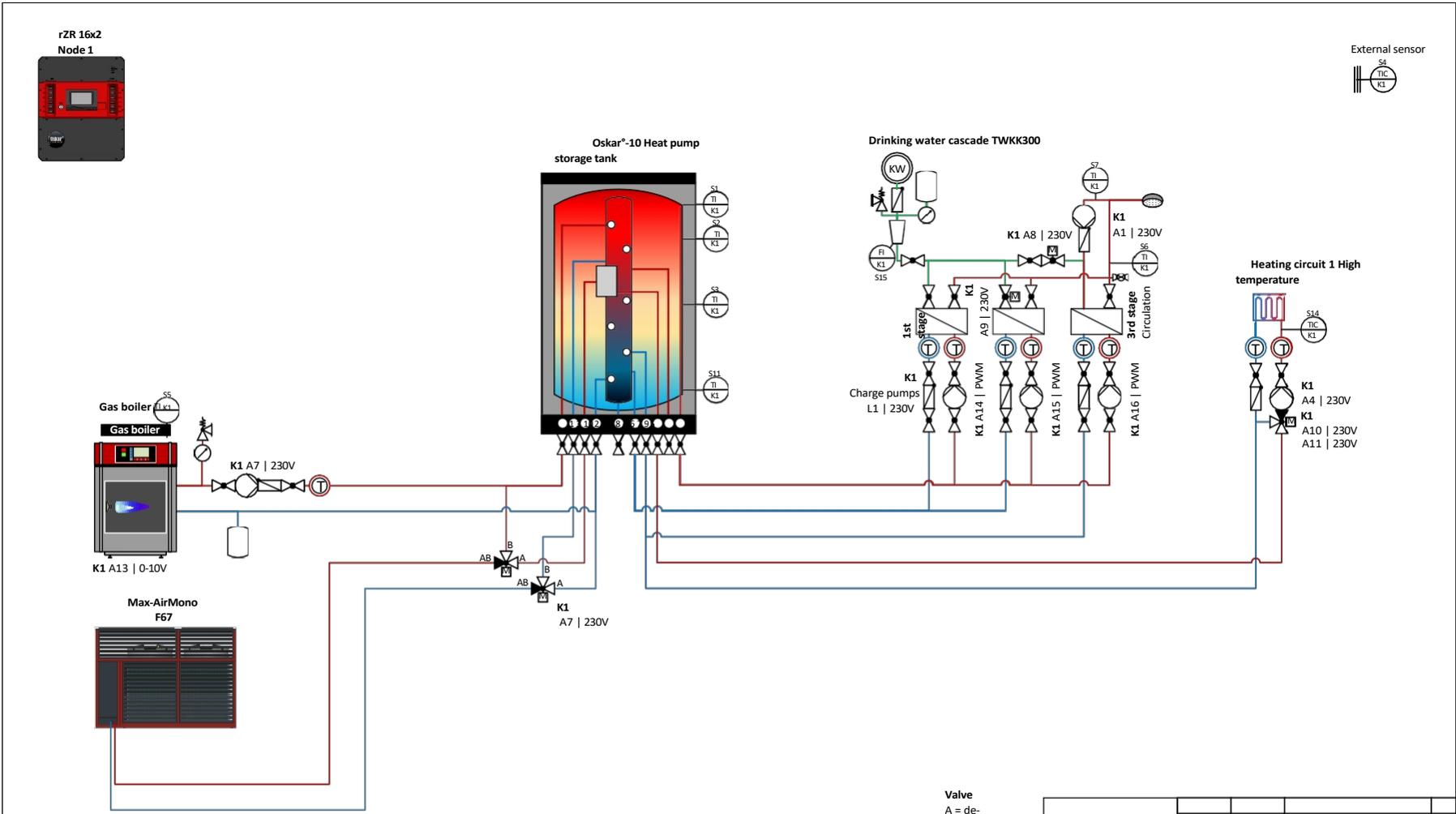
- For safety reasons, no quick air vent, microbubble separator, safety valve, or similar device may be installed between the heat pump and the storage tank. The safety devices are integrated into the heat pump.
- If the hydraulic supply line is not laid underground or the distance to the house connection is less than 3 m, sound decoupling in the pipe is necessary. Recommendation: Cornerstone TWS 50
- Shut-off valves and vents (vents at high points) must be provided on site.
- A drain must be installed at the lowest point of the pipe between the outdoor unit and the storage tank. In the event of a prolonged power failure, the system can be drained and is thus protected against frost damage.
- Sludge separators and magnetite separators must also be provided on site.
- The unit must be filled via the return line.
- The condenser/sink pump is integrated into the device.
- When tightening, please hold the connections in place!

The following dimensions must be used:

	DN40	DN50	DN60
Refrigeration circuits in series	6 m	30 m	-
Refrigeration circuits in parallel	-	8 m	20 m

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

5.3.2 HYDRAULIC DIAGRAM



	Automatic vent		Ball valve		Check valve		Check valve		Balancing valve
	Ventilation		Valve - general (electromotive drive)		Safety valve (corner)		Pressure gauge with display		Flow switch
	(KFE ball valve) Drainage		Three-way valve (electromotive drive)		Heat exchanger (general)		Shut-off valve with thermometer		Flow meter
	Valve regulating passage		Four-way valve		Temperature, pressure, or full-flow sensor		Expansion vessel		
	Output (230V, 24V, 0-10V, potential-free, PWM)		Heat meter				Pump		

**Valve**  
A = de-energized  
B = energized

Date	Name	Change	Index
Signed 06/14/2025	G.	Stand	
Reviewed	Biber	file	

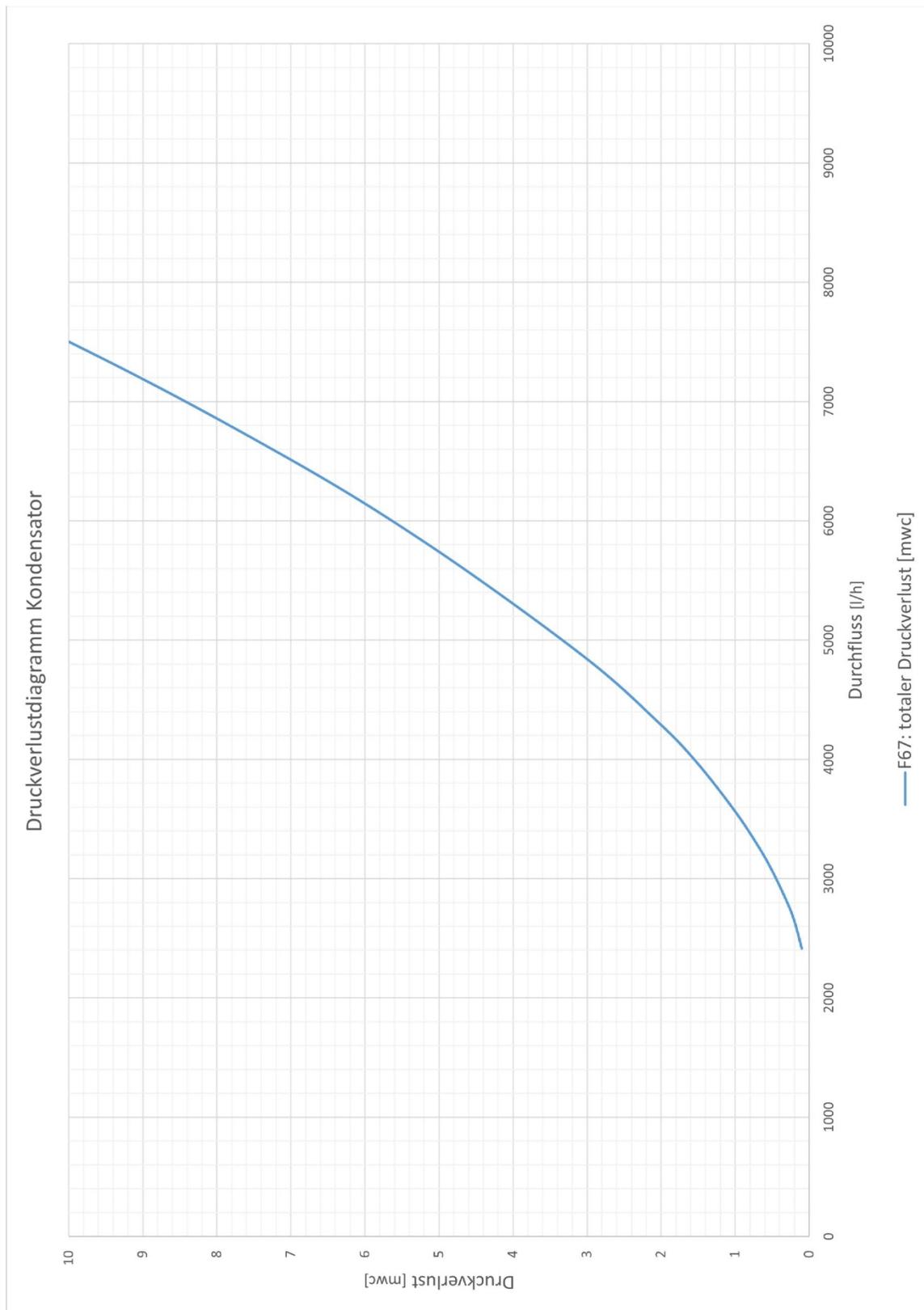
Plan designation: System diagram with WP Max-AirMono F67

**Attention**  
This diagram is only a recommendation and does not claim to be complete in any respect.

**ratiotherm**  
Smart Energy Systems

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### 5.3.3 PRESSURE LOSS DIAGRAM FOR CONDENSER



### 5.3.4 REQUIREMENTS FOR 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 <sub>3</sub> , NH <sub>4</sub> <sup>+</sup> )	mg/L	< 2	+
		2 - 20	°
		> 20	-
Alkalinity (HCO <sub>3</sub> <sup>-</sup> )	mg/L	< 60	+
		60 - 300	+
		> 300	°
Sulfate (SO <sub>4</sub> <sup>2-</sup> )	mg/L	< 100	+
		100 - 300	°/-
		> 300	-
HCO <sub>3</sub> <sup>-</sup> / SO <sub>4</sub> <sup>2-</sup>	mg/L	> 1.5	+
		< 1.5	°/-
Nitrates (NO <sub>3</sub> <sup>-</sup> )	mg/L	< 100	+
		> 100	°
Hydrogen sulfide (H <sub>2</sub> S)	mg/L	< 0.05	+
		> 0.05	°/-
Free carbon dioxide (CO <sub>2</sub> )	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	°

#### NOTE

- The system water may contain a maximum of 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.

## 5.4 ELECTRICAL INSTALLATION



### DANGER

- The power supply to the heater comes from the building distribution system and must be protected by separate residual current devices:
  - The two cooling circuits must each be protected by a type B residual current device with a tripping current of 300 mA (RCD), a 10 ms short-time delay, and the appropriate power rating. Recommendation: ABB F204B-40/0.3;
  - The control voltage must be protected with a type A residual current device with a tripping current of 30 mA (RCD) and with the appropriate power rating. Recommendation: ABB F204A-40/0.03.
- The RCDs must be labeled separately for the heating device, e.g., as "WP: Compressor 1"; "WP: Control voltage." Please ensure that the phase/neutral conductor is correctly assigned during wiring.
- Ensure that the rotating field is clockwise.
- The device must be grounded.
- Use cable cross-sections 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 live.
- The same applies when filling or subsequently pressurizing.
- To completely disconnect the device from the mains, the RCDs 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 ELECTRICAL CONNECTION POWER

#### WARNING

- Only allow authorized specialists to carry out installation and wiring.
- Errors and changes to all information, images, and drawings are reserved.
- The generally applicable and recognized rules of technology and any local regulations must be observed!
- Values apply to installation in conduits up to 100 m in length.

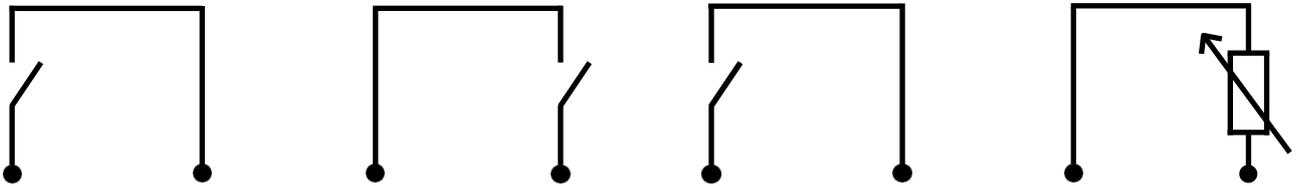
#### WP Max-AirMono F67

Compressor 1	FI	Type B
	Fuse	B32 3-pole
	Cable cross-section	5G 6 mm <sup>2</sup>
Compressor 2	FI	Type B
	Fuse	B32 3-pole
	Cable cross-section	5G 6 mm <sup>2</sup>
Control voltage	FI	Type A
	Fuse	B16 3-pole
	Cable cross-section	5G 2.5 mm <sup>2</sup>

### 5.4.2 TERMINAL DIAGRAM AND DESCRIPTION

X1.1					X1.2				
L1	L2	L3	N	PE	L1	L2	L3	N	PE
400 V mains Compressor 1 (B32, 5G6)					400 V mains Compressor 2 (B32, 5G6)				

X1.3							
L1	L1	L2	L3	N	N	PE	PE
400 V mains control voltage (B16, 5G2.5)							



X3							
1	GND	GND	2	3	GND	GND	4
External request (potential-free)		Smart Grid 1 / EVU		Smart Grid 2		External request (0 - 10 V)	

CAN bus wire colors Version 1:

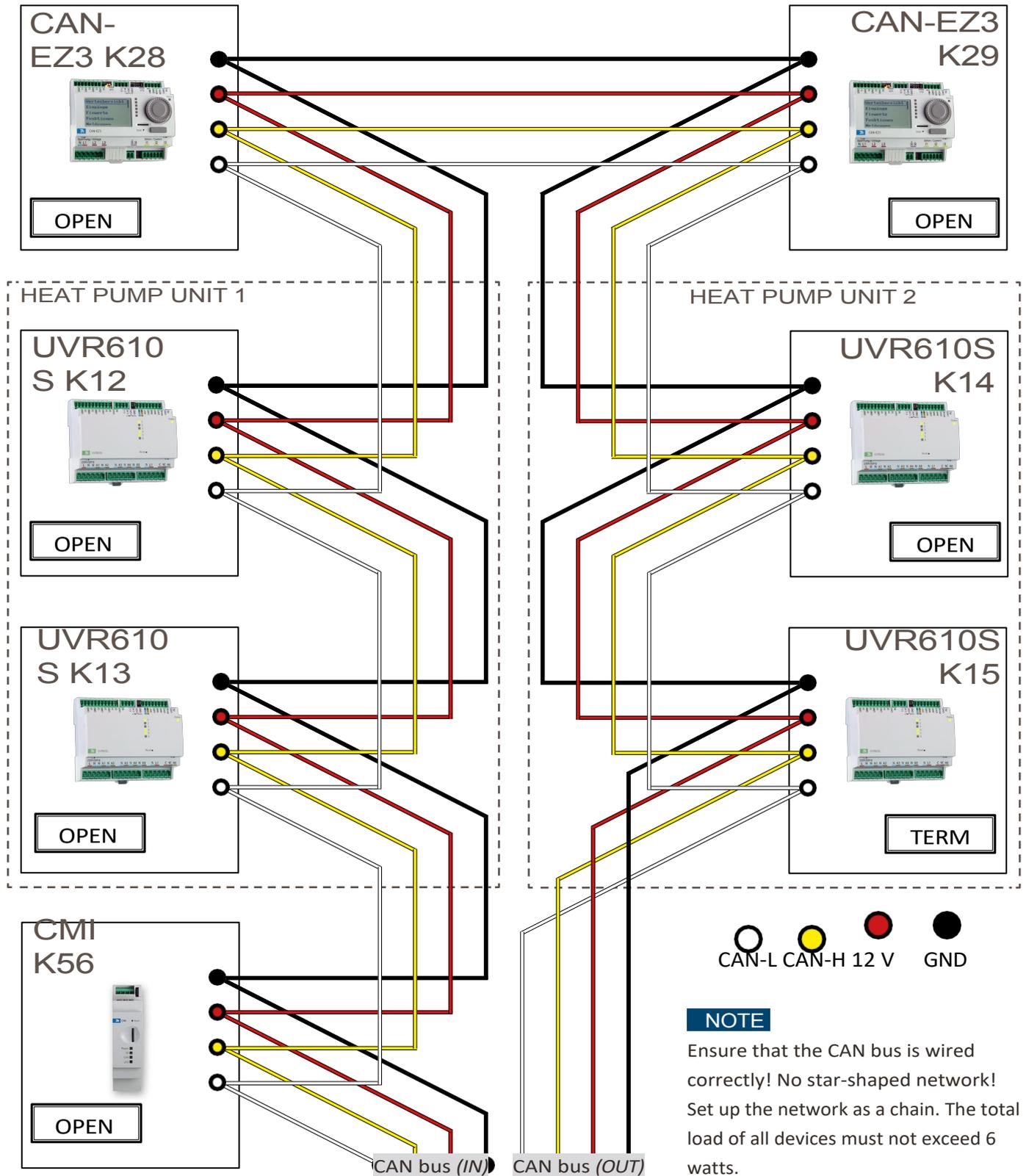
X4							
GND	12	CAN-H	CAN-L	GND	12 V	CAN-H	CAN-L
CAN bus (CAN-IN) <i>Unitronic cable colors</i>				CAN bus (CAN-OUT) <i>Cable colors from Unitronic</i>			

CAN bus wire colors version 2:

X4							
GND	12	CAN-H	CAN-L	GND	12 V	CAN-H	CAN-L
CAN bus (CAN-IN)				CAN bus (CAN-OUT)			

- Recommended fuse protection for the outdoor unit: 2 x 3-pole B32 and 1 x 3-pole B16.
- X3.1 and X3.4 are not necessary 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 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).

5.4.3 CAN BUS PLAN



participants, the jumper for the termination must be set to TERM. Participants in between must be set to OPEN. One end at the outdoor unit (K15), the other end at the rZR 16x2. If no ratiotherm central controller is used, the jumper on the C.M.I. must be set to TERM.

Use a shielded, 4-pin cable! Recommended cable: Unitronic Bus CAN FD P 2x2x0.5





## 6. OPERATION

### 6.1 CONTROL OPERATION



- The heat pump can be operated via the ratiotherm central controller, via a web portal, or via an optional 4.3" touch screen.
- For easier handling, a stylus is available, which is inserted above the controller (under the cover).
- The stylus can be used to tap control surfaces and scroll further through the display view 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 cleared.
- **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 information necessary for operation (sensor values, network inputs).

Control elements:



Previous page

Main menu

Next page

## 6.2 BASIC SETTINGS



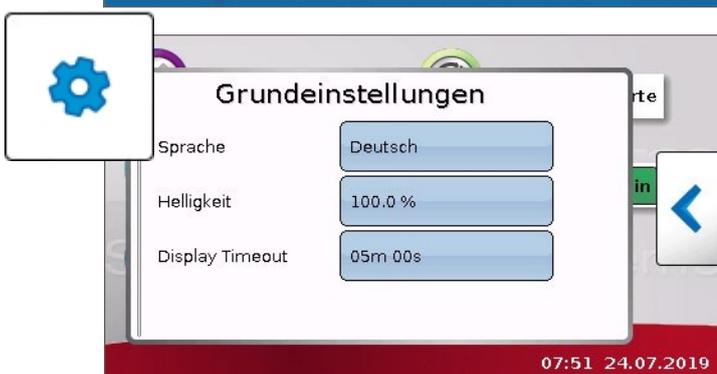
### Intermediate menu

Press and hold the display for 5 seconds to access the intermediate menu, which allows you to configure basic settings or switch to the control menu.



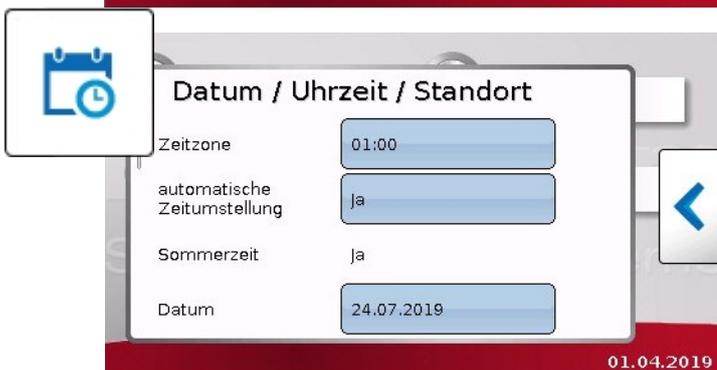
### Controller menu

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



### Enter password

Enter the specialist password to access the specialist menu.

## 7. MAINTENANCE

Regular inspection of the device by a recognized, qualified, and ratiotherm-authorized specialist is a prerequisite for long-term 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 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 fault
Error description	High pressure protection of the refrigeration circuit	
Heat pump behavior	<ul style="list-style-type: none"> <li>System locked for 5 minutes</li> <li>If 3 errors occur within 60 minutes, switch to HD fault</li> </ul>	<ul style="list-style-type: none"> <li>Lock the system</li> <li>Unlock by pressing the reset switch</li> </ul>
Cause of error	<ul style="list-style-type: none"> <li>Lack of heat dissipation</li> <li>Blockage of the refrigeration circuit</li> <li>Heat sink too hot</li> </ul>	
Troubleshooting	<ul style="list-style-type: none"> <li>Check the sink temperature or setpoint temperatures</li> <li>Temperatures below max. water temperature according to type plate</li> <li>Check heat dissipation to the medium (pump, heat exchanger)</li> <li>Vent and check the heating pressure</li> <li>Refrigeration check</li> </ul>	

### 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	<ul style="list-style-type: none"> <li>System locked for 5 minutes</li> <li>If 3 errors occur within 60 minutes, switch to HD fault</li> </ul>	<ul style="list-style-type: none"> <li>System lockout</li> <li>Unlock by pressing the reset switch</li> </ul>
Cause of error	<ul style="list-style-type: none"> <li>Insufficient heat absorption</li> <li>Insufficient refrigerant charge</li> <li>Blockage of the refrigeration circuit</li> </ul>	
Troubleshooting	<ul style="list-style-type: none"> <li>Check the sink temperature or target temperatures</li> <li>Temperatures below max. water temperature according to type plate</li> <li>Check heat absorption at the evaporator (flow rate, temperature)</li> <li>Vent and check the heating pressure</li> <li>Refrigeration check</li> </ul>	

## 7.1.3 FAN

Error message	Fan malfunction
Error description	Fan fault contact does not close.
Behavior of the heat pump	<ul style="list-style-type: none"> <li>• System lock</li> <li>• Unlocking by pressing the reset switch</li> </ul>
Cause of error	<ul style="list-style-type: none"> <li>• No power supply</li> <li>• Blockage of the fan wheel</li> <li>• Other fan malfunction</li> </ul>
Troubleshooting	<ul style="list-style-type: none"> <li>• Check the power supply</li> <li>• Check that the fan wheel is free to move</li> <li>• Replace the fan</li> </ul>

## 7.1.4 INVERTER

Error message	Inverter malfunction
Error description	Inverter fault contact does not close.
Behavior of the heat pump	<ul style="list-style-type: none"> <li>• System lockout</li> <li>• Unlocking by pressing the reset switch</li> </ul>
Cause of error	<ul style="list-style-type: none"> <li>• No power supply</li> <li>• Other inverter malfunction</li> </ul>
Troubleshooting	<ul style="list-style-type: none"> <li>• Check the power supply (right-hand field, phase failure)</li> <li>• Check the error code (see appendix)</li> </ul>

## 7.1.5 HOT GAS

Error message	Hot gas
Error description	Compressor outlet temperature is too high for 20 minutes.
Behavior of the Heat pump	<ul style="list-style-type: none"> <li>• Locking of the system</li> <li>• Unlock by pressing the reset switch</li> </ul>
Cause of error	<ul style="list-style-type: none"> <li>• Compressor outlet temperature too high for 20 minutes</li> </ul>
Troubleshooting	<ul style="list-style-type: none"> <li>• Check sensor plausibility</li> <li>• Refrigeration check</li> </ul>

## 7.1.6 FROST PROTECTION

Error message	Frost protection	Frost protection malfunction
Error description	Frost protection limit of the hydraulic circuit has been reached	
Behavior of the heat pump	<ul style="list-style-type: none"> <li>• System locked for 10 min</li> <li>• If 3 errors occur within 60 minutes, switch to frost protection malfunction</li> </ul>	<ul style="list-style-type: none"> <li>• Locking the system</li> <li>• Unlocking by pressing the reset switch</li> </ul>
Cause of error	<ul style="list-style-type: none"> <li>• Lack of heat absorption in the inner part</li> <li>• Heat source too cold</li> </ul>	
Troubleshooting	<ul style="list-style-type: none"> <li>• Check the heat source (temperatures, pumps, heat exchangers)</li> <li>• Vent</li> </ul>	

## 7.2 CLEANING

### 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
- 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

Using the wrong cleaning agents can damage the appliance 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 stick.

Operate the safety valve on the heating system 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 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 "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 asset register. The results of the test must be documented in accordance with regulations and retained for at least 5 years. An asset log for this purpose can be found in the "Asset Register for Heat Pumps."

## 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 signs are clearly visible to everyone, must be kept in a recognizable and legible condition, and must 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
<b>Operators and users</b>		
Visual and functional inspection	<ul style="list-style-type: none"> <li>Check the device for visible external defects and mechanical damage.</li> <li>Perform a visual inspection of the operating elements.</li> <li>Perform a visual and functional inspection of all safety devices.</li> </ul>	Monthly
Cleaning the device	<ul style="list-style-type: none"> <li>Please observe the information in section "7.2 Cleaning."</li> </ul>	As required
<b>Qualified personnel</b>		
Inspection of electrical components	<ul style="list-style-type: none"> <li>Check the electrical components for damage.</li> <li>Make repairs if necessary.</li> </ul>	Annual
Inspection of hydraulic components	<ul style="list-style-type: none"> <li>Check the hydraulic components for damage.</li> <li>Carry out repairs if necessary.</li> </ul>	ly
Inspection of refrigeration components	<ul style="list-style-type: none"> <li>Check the refrigeration components for damage.</li> <li>Carry out repairs if necessary.</li> </ul>	Annual
Inspection of safety devices	<ul style="list-style-type: none"> <li>Perform a visual and functional inspection of all safety devices.</li> </ul>	ly
Checking symbols on the device	<ul style="list-style-type: none"> <li>Document these checks.</li> <li>Check the symbols on the device.</li> </ul>	Annual
Checking purchased components	<ul style="list-style-type: none"> <li>Replace the symbols if necessary.</li> <li>Observe the manufacturer's documentation for purchased components.</li> </ul>	ly
		Annually
		Annually
		Annually

## 8. DECOMMISSIONING

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When the heat pump is no longer in use, it must 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 original operating manual 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 decommissioning/dismantling.

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 functional impairments.

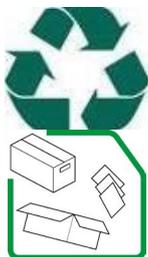
Switch off the device at the main switch.

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 the 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	Email	info@ratiotherm.de
Wellheimer Straße 34	Phone	+49 (0) 8422/9977-0
91795 Dollnstein	Website	www.ratiotherm.de

that the device:

Device name:	<b>WP Max-AirMono F67</b>
Year of manufacture:	see type plate
Intended use:	The heat pump uses environmental heat to provide direct heating support and hot water preparation.

in the version supplied complies with the guidelines

- 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

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

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

### Applied harmonized standards:

- 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:

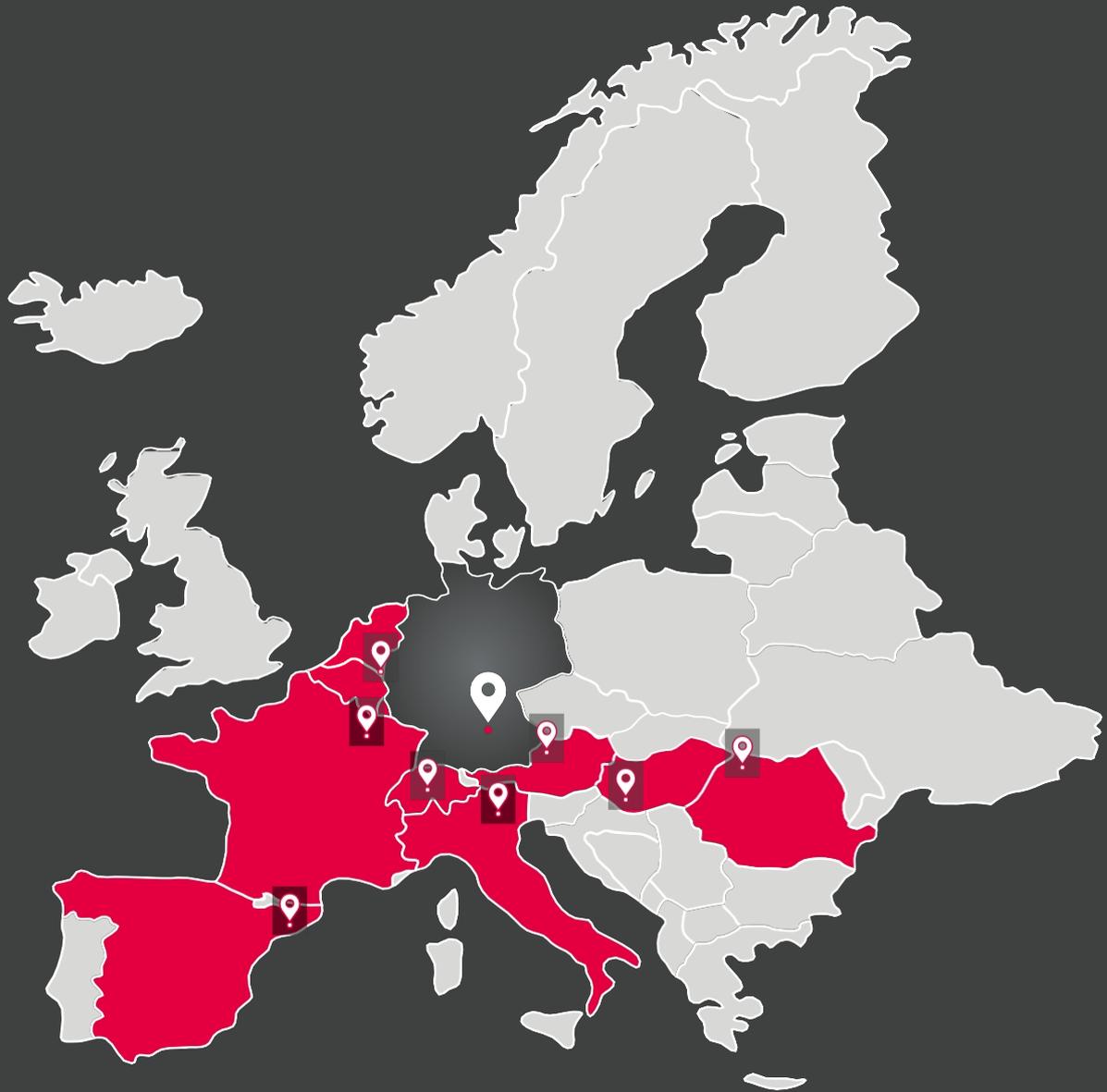
Name:	Julian Kruck, Head of Heat Pump Technology
Address:	ratiotherm GmbH & Co. KG, Wellheimer Straße 34, 91795 Dollnstein

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 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

# You can find us here



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