



# Original operating instructions

**WP Max-HiQ pF67 & WP Max-LoQ pF67**  
**Outdoor Installation**

As at July 2026

# INFORMATION

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

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

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

## NOTE

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

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

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

of the safety guidelines contained herein, or caused by:

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

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**ratiotherm**

**Smart Energy Systems**

ratiotherm GmbH & Co. KG

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

*Date: 7 October 2024*

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# 1. INFORMATION ABOUT THIS DOCUMENT

The following notes serve as a guide through the complete documentation. Other documents are valid in conjunction with these operating instructions. These operating instructions for specialist fitters form an integral part of the ratiotherm WP Max-HiQ/LoQ pF67 heat pump. The ratiotherm WP Max-HiQ/LoQ pF67 heat pump must not be operated without this document.

The operating instructions must be made available to the operator and the qualified installer at all times for reference. Should the ratiotherm WP Max-HiQ/LoQ pF67 heat pump be sold, the instructions must be supplied with it. ratiotherm GmbH & Co. KG accepts no liability for damage resulting from failure to comply with these instructions.

## 1.1 SAFETY AND WARNING NOTICES

### Signal words and colours

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

| Signal word    | Explanation                                                                                                      |
|----------------|------------------------------------------------------------------------------------------------------------------|
| <b>DANGER</b>  | Indicates a dangerous situation which, if ignored, will result in death or serious injury.                       |
| <b>WARNING</b> | Indicates a dangerous situation which, if ignored, may result in death or serious injury.                        |
| <b>CAUTION</b> | Indicates a hazardous situation which, if ignored, may result in minor injuries and damage to property.          |
| <b>NOTE</b>    | Indicates tips for easier operation and cross-references. A note excludes the risk of property damage or injury. |

## 1.2 SAFETY SYMBOLS

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

Some of the following specific safety symbols in accordance with DIN EN ISO 7010 and DIN ISO 3864 are used at the relevant points in 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 accompany a warning message.
- Prohibition signs   ⇨    prohibit certain actions.

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

## 12.2 OTHER SIGNS IN ACCORDANCE WITH DIN ISO 7000

| Symbol                                                                              | Explanation                                              | Symbol                                                                              | Explanation                                                               |
|-------------------------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
|  | Please refer to the user manual (operating instructions) |  | Service display,<br>Referring to the User Manual (Operating Instructions) |
|  | User Guide / Operating Instructions (Operating Manual)   |                                                                                     |                                                                           |

## 12.3 OTHER SYMBOLS

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

## 2. IDENTIFICATION AND NOTES

### 2.1 PRODUCT DATA

Product designation: Heat pump (brine/water); Heat pump (water/water) Type:  
WP Max-HiQ pF67; WP Max-LoQ pF67

Year of manufacture: see type plate

Country of origin: Germany

### 2.2 INTENDED USE

The WP Max-HiQ/LoQ pF67 unit utilises environmental heat from various possible sources to provide direct heating support and domestic hot water supply. Any other or extended use of the unit is considered improper and therefore incorrect. In such cases, the unit's safety and protective functions may be compromised. ratiotherm GmbH & Co. KG accepts no liability for any damage resulting therefrom. Intended use also includes:



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

The WP Max-HiQ/LoQ pF67 unit incorporates the latest state-of-the-art technology and has been manufactured in accordance with recognised safety standards. The unit is intended exclusively for domestic and/or commercial use for hot water supply (domestic hot water) and for heating or cooling.

Improper or unauthorised use may result in risks to the life and limb of the user or third parties.



Furthermore, damage to the appliance and other property may occur. The WP Max-HiQ/LoQ pF67 unit is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or by persons with a lack of experience and/or knowledge. The risk is borne solely by the operator and the owner.

### 2.3 TARGET GROUPS

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

**DANGER** Only carry out tasks for which  you are authorised.

#### 2.3.1 TARGET GROUP MATRIX

| Tasks                                    | Operators and users | Qualified personnel |
|------------------------------------------|---------------------|---------------------|
| Transport/storage                        |                     | X                   |
| Assembly/Installation                    |                     | X                   |
| Commissioning/Adjustment                 |                     | X                   |
| Automatic operation (control)            | X                   | X                   |
| Set-up/Conversion/Technical Modification |                     | X                   |
| Maintenance/inspections/repairs          |                     | X                   |
| Cleaning                                 | X                   | X                   |
| Troubleshooting/Fault rectification      |                     | X                   |
| Decommissioning/Dismantling/Disposal     |                     | X                   |

## 2.3.2 TARGET AUDIENCE DEFINITION

### Users and operators

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

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

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

### Qualified personnel

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

Qualifications: Of legal age and physically and mentally fit to carry out work on the appliance

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

## 2.4 INCORRECT USE

### 2.4.1 REASONABLY FORESEEABLE MISUSE

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

- Using the equipment 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 equipment, as well as additions and alterations, without prior consultation with ratiotherm GmbH & Co. KG
- Operating the device contrary to the provisions of the risk assessment
- Bypassing or deactivating protective and safety devices
- Operating the device whilst it is clearly malfunctioning
- Operating the appliance by persons with reduced physical, sensory or mental capabilities, or by children



#### DANGER

Unauthorised modifications to the equipment

Unauthorised modifications pose a risk of death or injury.

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

### 2.4.2 UNFORESEEABLE INCORRECT USE/MISUSE

Unforeseeable misuse may occur as a result of:

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

## 2.5 WARRANTY, LIABILITY, GUIDELINES, STANDARDS AND LAWS

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

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

The operating instructions must be read before handling the equipment. The operating instructions familiarise staff with the handling of the equipment and provide details on all stages of the equipment's service life.

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

When using the appliance in Germany, the following directives, standards and laws must be observed in particular:

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



### NOTE

Guidelines, standards and legislation

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

## 2.6 BUILDING DRYING/SCREED HEATING

The WP Max-HiQ/LoQ pF67 heat pump must not be used for screed drying. A heat pump is designed to heat a building efficiently. During building drying, the high moisture content in the structure requires a consistently higher heating output. The ratiotherm heat pump is not designed for this and will reach its performance limits.



### NOTE

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

## 3. SAFETY INSTRUCTIONS

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### **DANGER**

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

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

### 3.1 GENERAL SAFETY INSTRUCTIONS

Observe the following general safety instructions:

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

### 3.2 ADDITIONAL NOTES

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

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

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

Do not make any modifications to the following components:

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

### 3.3 SAFETY INSTRUCTIONS FOR REFRIGERANT R290



#### WARNING

- This unit operates using the environmentally friendly refrigerant R290 (propane, ODP of 0, GWP of 0.02), which is a flammable gas and must be serviced by an authorised person.
- R290 is non-toxic, but odourless and colourless. A refrigerant leak can only be detected using a gas detector.
- Fire hazard/flammable material: In the event of a refrigerant leak, check that the unit has switched to safety mode (i.e. all non-safety-related components within the heat pump switch off, whilst the fan continues to run and ventilate the refrigeration compartment). Check that there are no sources of ignition nearby and contact your specialist contractor or ratiotherm customer service immediately.
- Chemicals or flammable materials must not be stored or used near the unit.

### 3.4 RESIDUAL RISK



#### WARNING

Interventions/work carried out by unauthorised/unqualified personnel

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

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



#### WARNING

Damaged insulation

Damaged insulation poses a serious risk of burns from 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 carrying out any work. Replace any damaged insulation.



#### WARNING

Ignition sources in the hazard zone

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

Keep ignition sources away from the hazard area.

## 4. DESIGN AND FUNCTION

### 4.1 TECHNICAL SPECIFICATIONS

|                                                                                                    | WP Max-HiQ pF67                    | WP Max-LoQ pF67 | Unit   |
|----------------------------------------------------------------------------------------------------|------------------------------------|-----------------|--------|
| Performance data – heating mode                                                                    |                                    |                 |        |
|                                                                                                    | W10/W35                            | S0/W35          |        |
| Heating capacity                                                                                   | 21.3 to 145.5                      | 15.1 to 121.8   | kW     |
| Power consumption                                                                                  | 2.9 to 26.2                        | 2.9 to 26.3     | kW     |
| COP at rated capacity                                                                              | 5.54 to 7.28                       | 4.63 to 5.22    |        |
| Space heating energy efficiency for low-temperature applications under average climatic conditions | 242.9                              | 193.7           | %      |
| Performance data – cooling mode                                                                    |                                    |                 |        |
| W15/L40                                                                                            |                                    |                 |        |
| Cooling capacity                                                                                   | 17.0 to 90.0                       |                 | kW     |
| Power consumption                                                                                  | 2.7 to 19.9                        |                 | kW     |
| EER at rated output                                                                                | 6.0                                |                 |        |
| Compressor                                                                                         |                                    |                 |        |
| Type                                                                                               | Fully hermetic, scroll, inverter   |                 |        |
| Speed                                                                                              | 1740 to 6960                       |                 | rpm    |
| Max. operating current                                                                             | 29                                 |                 | A      |
| Starting current                                                                                   | 29                                 |                 | A      |
| Lock-up current LRA                                                                                | -                                  |                 | A      |
| Oil volume                                                                                         | 1.7                                |                 | litres |
| Evaporator                                                                                         |                                    |                 |        |
| Type                                                                                               | copper-brazed plate heat exchanger |                 |        |
| Material                                                                                           | Stainless steel, copper            |                 |        |
| Flow rate (water or brine)                                                                         | 4 to 20                            |                 | m³/h   |
| Pressure drop                                                                                      | max. 0.3                           |                 | bar    |
| Test pressure                                                                                      | 45                                 |                 | bar    |
| Operating range                                                                                    | -196 to 200                        |                 | °C     |
| min./max. swelling temperature                                                                     | 10 to 55                           | -25 to 30       | °C     |
| Source connection size                                                                             | 2 1/2-inch male thread, tapered    |                 |        |
| Source pump                                                                                        | Wilo Stratos PARA-C 50-240-08-T21  |                 |        |
| Residual head                                                                                      | 4                                  |                 | H/m    |
| Capacitor                                                                                          |                                    |                 |        |
| Type                                                                                               | Copper-brazed plate heat exchanger |                 |        |
| Material                                                                                           | Stainless steel, copper            |                 |        |
| Water flow rate (parallel)                                                                         | 2 to 11.6                          |                 | m³/h   |
| Pressure drop                                                                                      | max. 0.3                           |                 | bar    |
| Temperature difference                                                                             | 10                                 |                 | K      |
| Test pressure                                                                                      | 45                                 |                 | bar    |
| Operating range                                                                                    | -196 to 200                        |                 | °C     |
| min./max. cooling temperature                                                                      | 25 to 72                           |                 | °C     |
| Connection size, sink                                                                              | 2-inch male thread, tapered        |                 |        |

|                                                                  | WP Max-HiQ pF67                        | WP Max-LoQ pF67 | Unit       |
|------------------------------------------------------------------|----------------------------------------|-----------------|------------|
| Condensate pump                                                  | Wilo Stratos PARA-C 40-220-08-T21      |                 |            |
| Residual head                                                    | 4                                      |                 | H / m      |
| Refrigeration circuit                                            |                                        |                 |            |
| Refrigerant                                                      | R290                                   |                 |            |
| Filling quantity                                                 | 2 x 4.9                                |                 | kg         |
| Max. operating pressure                                          | 31                                     |                 | bar        |
| Safety class                                                     | A3: low toxicity, higher flammability  |                 |            |
| Electrical system: compressor                                    |                                        |                 |            |
| Mains connection                                                 | 2 x 400 V / 3-phase / 50 Hz            |                 |            |
| Fuse protection                                                  | 2x B32                                 |                 | A          |
| Residual current circuit breaker                                 | 2x Type B, 10 ms instantaneous, 300 mA |                 |            |
| Max. operating current of compressor                             | 2 x 29                                 |                 | A          |
| Start-up current                                                 | 2 x 29                                 |                 | A          |
| Max. compressor power consumption                                | 2 x 18.5                               |                 | kW         |
| Electrical: Control voltage                                      |                                        |                 |            |
| Mains connection                                                 | 400 V / 3-phase / 50 Hz                |                 |            |
| Fuse rating                                                      | B16                                    |                 | A          |
| Residual current circuit breaker                                 | Type A, 30 mA                          |                 |            |
| Max. power consumption                                           | 4.0                                    |                 | kW         |
| Unit data                                                        |                                        |                 |            |
| Sound pressure level,<br>outdoor unit<br>at a distance of 5 m    | 43 (provisional)                       |                 | dB(A)      |
| Sound power level of outdoor unit<br>L-WA outdoors (for W10/W55) | 52.1                                   |                 | dB(A)      |
| Maximum L-WA                                                     | 63.9                                   |                 | dB(A)      |
| L-WA (noise-reduced)                                             | 54.8                                   |                 | dB(A)      |
| Outdoor unit dimensions                                          | 1400 x 1637 x 1115                     |                 | WxHxD (mm) |
| Weight of outdoor unit                                           | 750                                    |                 | kg         |
| Max. operating water pressure                                    | 3                                      |                 | bar        |
| Max. VL temperature                                              | 72                                     |                 | °C         |

## 4.2 FUNCTIONAL DESCRIPTION

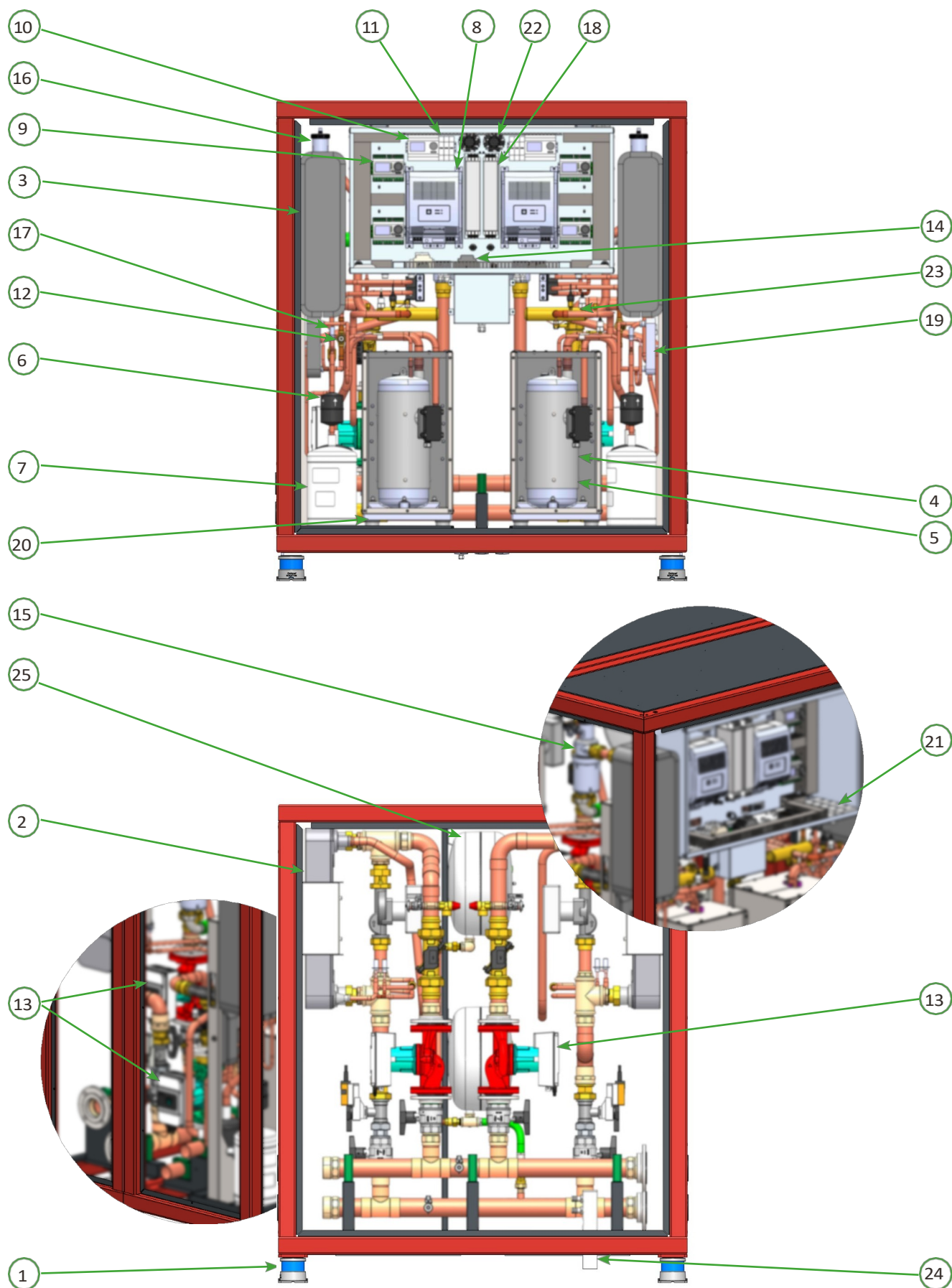
The WP Max-HiQ/LoQ pF67 is a speed-controlled heat pump in a monoblock design for outdoor installation. The unit is designed for water-to-water or brine-to-water applications and uses the natural and environmentally friendly refrigerant R290 (propane). The WP Max-LoQ pF67 heat pump allows for source temperatures ranging from -25 to +30 degrees Celsius, whilst the WP Max-HiQ pF67 is suitable for widely varying source temperatures in the range from +10 to +55 degrees Celsius. Thanks to several patented processes, the heat pump is able to consistently achieve the optimum operating point and maximum operational reliability despite fluctuating source temperatures. This makes the unit suitable for a wide variety of sources such as ground probes, waste heat, groundwater or PVT (photovoltaic thermal). The system comprises two independent refrigeration circuits, which are linked via an intelligent cascade control system and housed in a single enclosure. They share a common hydraulic and electrical connection. Hydraulically, the refrigeration circuits can be connected either in series or in parallel, enabling a water-side temperature spread of up to 20 Kelvin. The refrigeration circuits are filled ready for operation, meaning no refrigerant certificate is required for installation. The safety valve and microbubble separator integrated into the outdoor unit ensure that, in the event of a leak, the flammable refrigerant is prevented from entering the boiler room. Thanks to the heat pump's speed control, it covers a wide performance range and thus adapts to various loads and conditions. Furthermore, it is ideally suited for utilising fluctuating energy supplies and enables intelligent load control across all energy ranges. Optionally, the unit can be ordered as an AllQ version with a significantly extended source range.



### ADVANTAGES

- Flow temperatures of up to 72 °C possible
- Maximum flexibility thanks to speed-controlled inverter operation
- Capable of utilising highly fluctuating energy sources
- Integrated energy management (Smart Grid-compatible)
- Simple installation thanks to complete pre-assembly at the factory; no refrigeration licence required
- With ratiotherm components, a fully coordinated, future-proof system

## 4.3 CONSTRUCTION AND SPARE PARTS



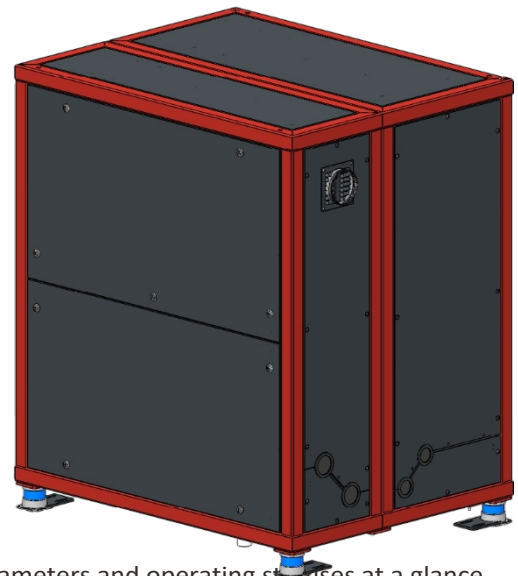
| Item no. | Description                                            | Description                 | Quantity |
|----------|--------------------------------------------------------|-----------------------------|----------|
| 1        | Adjustable foot                                        | ra/15288                    | 6        |
| 2        | Evaporator (plate heat exchanger)                      | ra/15371                    | 2        |
| 3        | Condenser (plate heat exchanger)                       | ra/10111                    | 2        |
| 4        | Compressor                                             | ra/10870                    | 2        |
| 5        | Heating tape (compressor)                              | ra/15292                    | 2        |
| 6        | Filter drier                                           | 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                    | 1        |
|          |                                                        | ra/95.10.3225               | 1        |
| 11       | Circuit breaker                                        | ra/15277                    | 8        |
| 12       | Expansion valves                                       | ra/13037                    | 10       |
| 13       | <i>Parallel</i>                                        |                             |          |
|          | Wilo Stratos PARA-C-40 pump                            | ra/15146 (sink)             | 2        |
|          | Wilo Stratos PARA-C-50 pump                            | ra/14838 (supply, optional) | 2        |
|          | <i>Series</i>                                          |                             |          |
|          | Wilo Stratos PARA-C-40 pump                            | ra/15146 (sink)             | 1        |
|          | Wilo Stratos PARA-C-50 pump                            | ra/14838 (source, optional) | 2        |
|          | <i>HiQ or AllQ</i>                                     |                             |          |
|          | Wilo Para Maxo 1-8                                     | ra/14838                    | 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 suppression filter                        | ra/15284                    | 2        |
| 19       | Economiser                                             | ra/10110                    | 2        |
| 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                    | 2        |
|          |                                                        | ra/15061                    |          |
| 24       | Discharge pipe                                         |                             |          |
| 25       | 18-litre diaphragm expansion vessel (source, optional) |                             | 2        |
| -        | Pressure sensor 10 bar                                 | ra/14383                    | 2        |
| -        | Pressure sensor 35 bar                                 | ra/10922                    | 4        |
| -        | Non-return valve                                       | ra/14624                    | 7        |
| -        | Sight glass                                            | ra/14660                    | 2        |
| -        | Contact sensor                                         | ra/12859                    | 2        |
| -        | Contact probe                                          | ra/44.01.12007              | 4        |
| -        | Volume flow sensor                                     | ra/15182                    | 2        |
| -        | Liquid separator                                       | ra/15296                    | 2        |
| -        | Switched-mode power supply                             | ra/14481                    | 1        |
| -        | Heating tape (liquid separator)                        | ra/14690                    | 2        |
| -        | Propane detector                                       | ra/10232                    | 1        |
| -        | Safety fan (optional)                                  |                             | 1        |

## Design

The ratiotherm WP Max-HiQ/LoQ pF67 heat pump has two complete refrigeration circuits and can be powered by a wide variety of energy sources. The monoblock heat pump is designed for indoor installation.

The refrigeration circuit is a hermetically sealed system comprising a scroll compressor, a condenser (plate heat exchanger), an evaporator (plate heat exchanger) and five electronic expansion valves, which control the flow of refrigerant. The natural refrigerant R290 is used. The WP Max-HiQ/LoQ pF67 heat pump is shipped ready for operation with fully charged refrigeration circuits. The heat pump can be controlled by the ratiotherm rZR 16x2 central controller or by a third-party controller. If the unit is controlled by a third-party system, an external

display can be fitted in the boiler room to provide an overview of all parameters and operating statuses at a glance.



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

Design of the WP Max-HiQ/LoQ pF67 heat pump:

- sturdy, attractively designed, insulated and powder-coated steel casing, suitable for lifting by crane
- 2 x factory-prepared refrigeration circuits (no refrigeration licence required)
- 2 x sound-insulated, fully hermetic scroll compressors with EVI injection
- 2 x highly efficient, remotely readable variable-frequency drives, including mains filters to comply with the EMC Directive
- 4 x copper-brazed stainless steel plate heat exchangers acting as condensers and evaporators
- Condensate drain for safety valve and blow-off pipe
- 10 x electronic expansion valves
- Economiser to increase the COP
- Pressure and temperature monitoring of the refrigeration and hydraulic circuits
- C.M.I.: Remote maintenance/interface module (ModBus TCP; C.M.I. is always the master)
- Power-to-Heat and Smart Grid-compatible

Casing colours:

RAL 7016  
Anthracite grey

RAL 3000  
Fire red

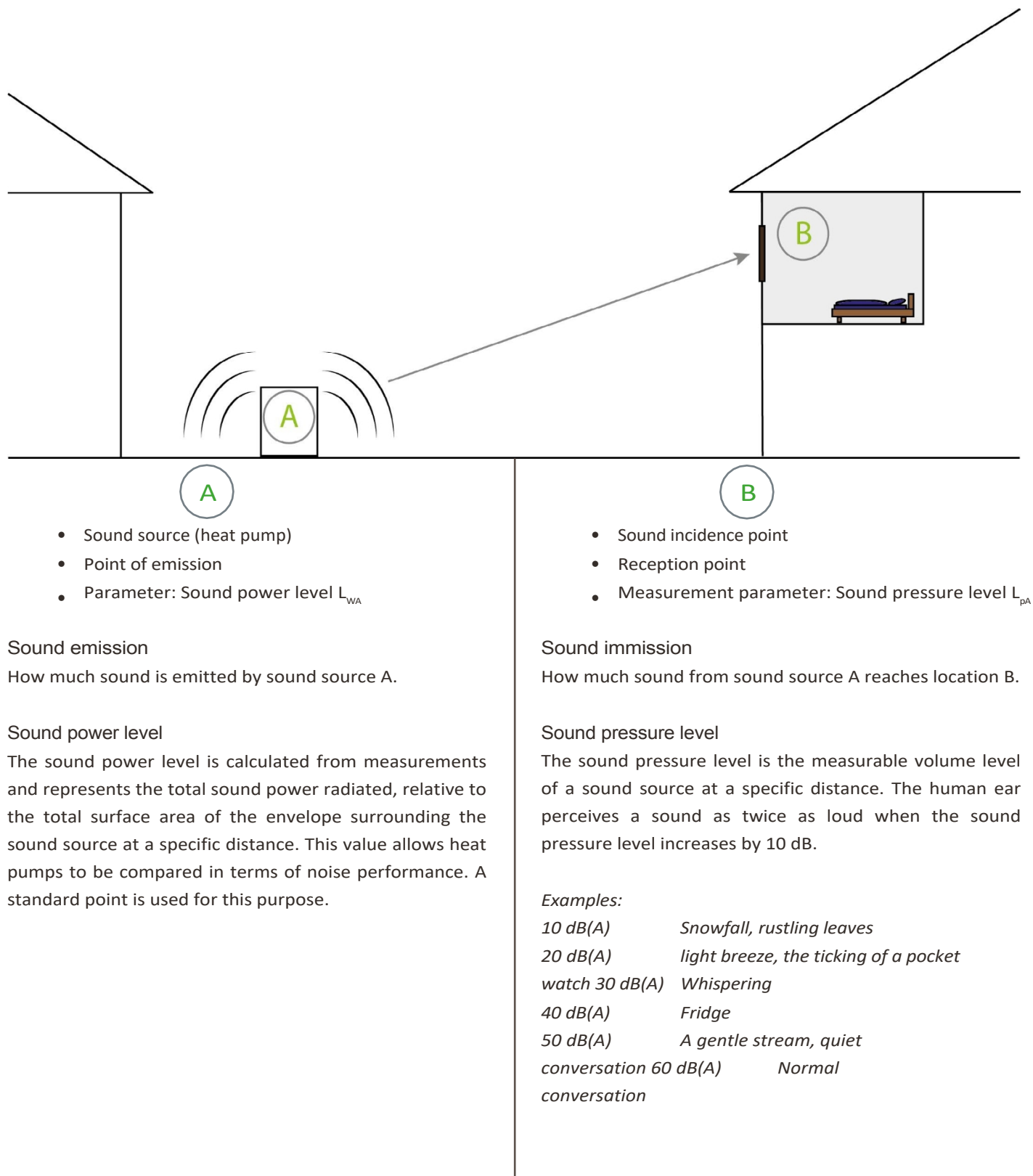
## 4.4 OPTIONAL EQUIPMENT

- CAN-MTx2 external display: On-site operation of the system
- ModBus RTU interface extension: Option to control the heat pump via ModBus RTU
- AllQ source temperature extension: with this extension, source temperatures can range from -25 to +55 °C. This enables, for example, the use of PVT (photovoltaic-thermal) as a heat source all year round
- Wilo Stratos PARA-C-50 source pump: 2 source pumps installed inside the housing
- Diaphragm expansion vessels: 2 MAGs, each with a capacity of 18 litres, installed inside the housing for the source circuit

## 4.5 SOUND PROPAGATION FOR OUTDOOR HEAT PUMPS

### 4.5.1 SOUND POWER LEVEL AND SOUND PRESSURE LEVEL

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



## 4.5.2 MEASURES TO REDUCE NOISE LEVELS

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

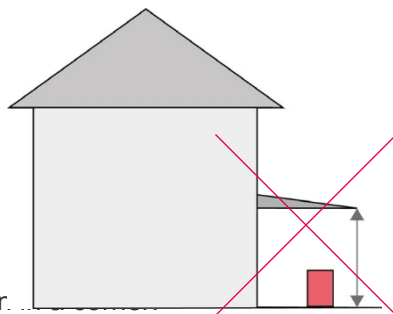
### INSTALLATION LOCATION:

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

#### Installation under a canopy:

Canopy height < 5 m

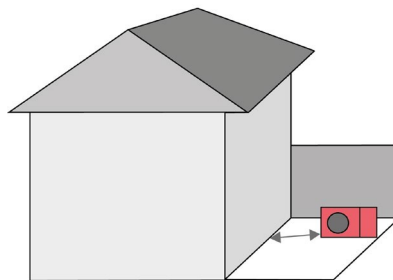
If the outdoor unit is installed under a canopy, the noise level may increase by up to 9 dB(A).



Installation:

Distance from both walls < 3 m

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

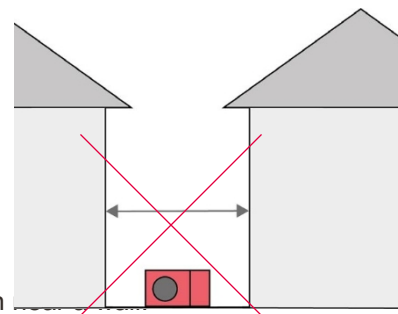


*Installation NOT  
recommended*

#### Installation between two walls:

Distance between walls < 5 m

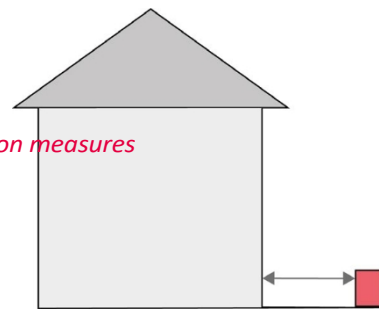
If the outdoor unit is installed between two walls, the noise level may increase by up to 9 dB(A).



Installation:

Distance from the wall < 3 m

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



*Structural sound insulation measures  
required*

### PREVENTING STRUCTURAL NOISE TRANSMISSION:

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

### SOUND-REFLECTIVE WALLS:

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

#### PLANTING:

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

#### REQUIRED CAPACITY:

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

#### 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 domestic hot water temperature or lowering the heating curve can be considered as a means of reducing noise levels.

#### SOURCE TEMPERATURE:

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

#### OTHER SOURCES OF NOISE/HEAT PUMPS:

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

All information in this chapter that does not specifically relate to the ratiotherm heat pump is taken from the 'Guide: Noise' published by the German Heat Pump Association (BWP) e. V. For further information on noise propagation in 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)

## 4.6 CONTROL LOGIC AND OPERATION

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

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



### Control logic in conjunction with external controllers:

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

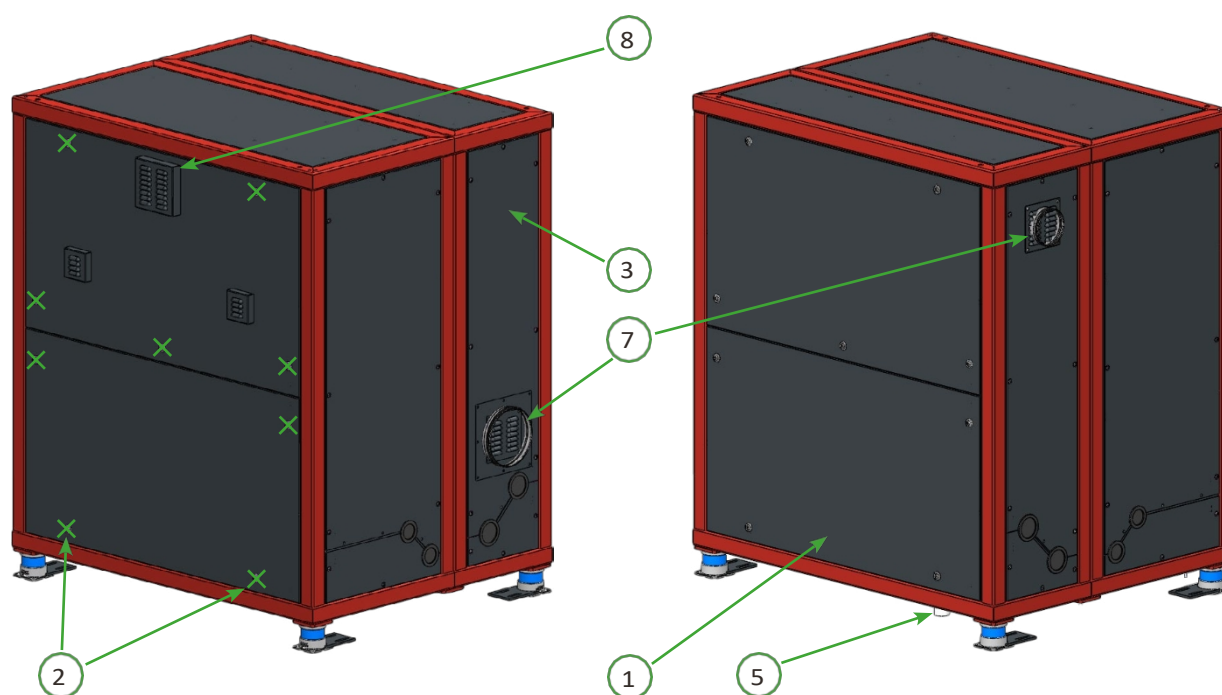
### Internal control logic:

- 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 a 0–10 V signal.
- Once the system is activated, the minimum running time is 5 minutes. A fault will switch the system off immediately.
- The setpoint speed of the compressor or the setpoint outlet temperature (adjustable via a fixed value) can be specified by an external control system using a 0–10 V signal.
- If no 0–10 V signal is present, the compressor runs at a constant, adjustable speed (factory setting: 75 per cent).
- If a 0–10 V signal of less than 1.9 V is present, the heat pump is started in cooling mode. If fitted, the 4-way valve is activated and the compressor speed is regulated to the setpoint cooling temperature.
- The compressor speed is limited during the start-up phase, which is why full speed is only reached after 4 x 1.5 minutes.
- If the source temperature within the evaporator falls below a settable value (factory setting: 11 °C) for longer than 1 minute, the system is shut down to prevent frost damage. If the evaporator temperature exceeds 55 °C, start-up is also prevented. Once the temperatures return to normal, the machine starts up as usual.
- If the temperature on the supply side drops below 8 °C for water/water systems or below a settable value for brine/water systems, a frost protection fault is triggered and the system is blocked for 7 minutes or, if the fault occurs repeatedly, shut down.

- The condenser pump is controlled by the temperature difference ( $\Delta T$ ) 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 the system from shutting down.
- If the heating flow temperature exceeds 72 °C, the system switches off automatically for 20 minutes. If the temperature drops during this time, the system restarts after the 20-minute waiting period.
- The evaporator pump is controlled by the temperature difference ( $\Delta T$ ) between the source inlet and outlet (factory setting 3 K).
- If an anomaly is detected (high pressure, low pressure, antifreeze), a fault is triggered and the system is blocked for 5 or 7 minutes. This cannot be reset using the reset button! If the same fault occurs three times within an hour, the system is locked. The lock can be released using the reset button.
- To prevent an anomaly, high-pressure, low-pressure and compressor temperature are monitored and, if necessary, the speed is reduced for at least 8 minutes.

## 4.7 SAFETY DEVICES

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



- 1 Protective enclosure or housing
- 2 Mechanical locks (9) ✕
- 3 Safety door
- 4 Pressure and temperature monitoring of the refrigeration and hydraulic circuits (internal)
- 5 Pressure relief for the hydraulic circuit: safety valve, microbubble separator (internal) and vent pipe (see chapter 'Construction and Spare Parts': points 15, 16, 24)
- 6 Propane detector (internal)
- 7 Ventilation of the refrigeration circuit (to be fitted on site) with optional internal fan
- 8 Isolated electrical compartment with permanent overpressure (internal)



#### NOTE

##### Potential risk to life due to faulty safety devices

- Before starting work, all safety devices must be checked to ensure they are functioning correctly.
- Never disable safety devices.
- All safety devices must be fully installed before the unit is put into operation.
- The power supply to the unit must not be interrupted, as this will render the safety devices inactive. The power supply may only be interrupted if an external propane sensor and external ventilation are in use.
- If the heat pump is to be left idle for a prolonged period, the unit must only be authorised to restart. The system must not be switched off or disconnected from the power supply. Even when not in use, e.g. during the summer months, the safety devices must remain active. If the system is left idle during the winter months, the sump must be drained.

Normal operation of the heat pump: Safety fans run at 40 per cent of the specified air flow rate in accordance with EN 378 and ventilate the refrigeration area.

Gas sensor detects a refrigerant leak: Safety fans run at 100 per cent and ventilate the refrigeration area; all other electronic devices switch off; an alarm sounds (optional); notification emails are sent (optional).

##### Procedure in the event of leaks:

- There is a possibility that propane may leak into the surrounding area.
- Keep all ignition sources away from the hazard area or deactivate them.
- Keep a safe distance from the unit.
- Notify a service technician.

## 5. TRANSPORT, ASSEMBLY AND INSTALLATION

### 5.1 TRANSPORT AND UNPACKING

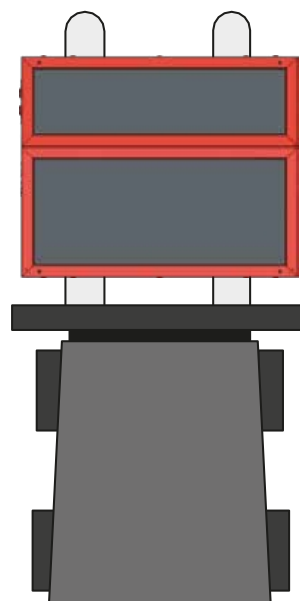
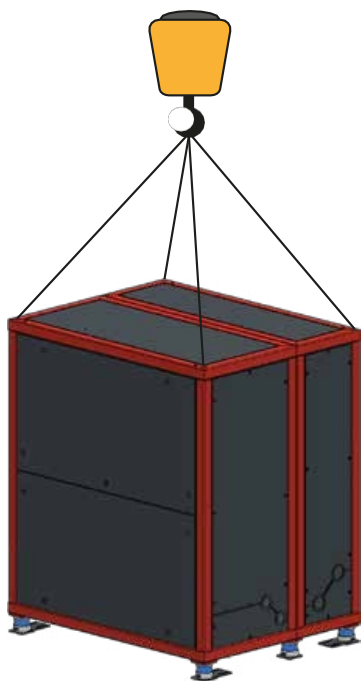
The following instructions for transporting the unit must be observed:

- Only allow qualified specialist personnel to carry out the transport.
- Protect yourself by wearing PPE (e.g. safety footwear, etc.).
- Take the unit's weight (approx. 750 kg) into account when selecting the appropriate lifting equipment (crane, forklift, pallet truck, etc.).
- Take the device's centre of gravity into account.
- Remove all packaging materials.

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

- When disposing of the transport and storage packaging, comply with local waste disposal regulations and applicable environmental protection laws.
- When unpacking the unit, check that the delivery is complete.
- Use the delivery notes and packing lists supplied to check the contents.
- The unit may be tilted by a maximum of 45° in any direction. After tilting, the unit must be left to stand undisturbed for 6 hours before being put into operation. Excessive tilting may damage the refrigeration circuit.

- The unit can be lifted by crane. Crane operations must be carried out by qualified personnel in accordance with the DGUV regulations for cranes.
- The unit can be accessed from the long side.



All dimensions are given in millimetres.

Storage conditions:

- Care must be taken to ensure frost-free storage.
- The unit must only be stored outdoors or in well-ventilated rooms; storage in enclosed or underground spaces is not permitted.
- Do not store the device near sources of ignition.
- If the unit has been damaged during transport, it must not be stored.

## 5.2 INSTALLATION OF THE HEAT PUMP

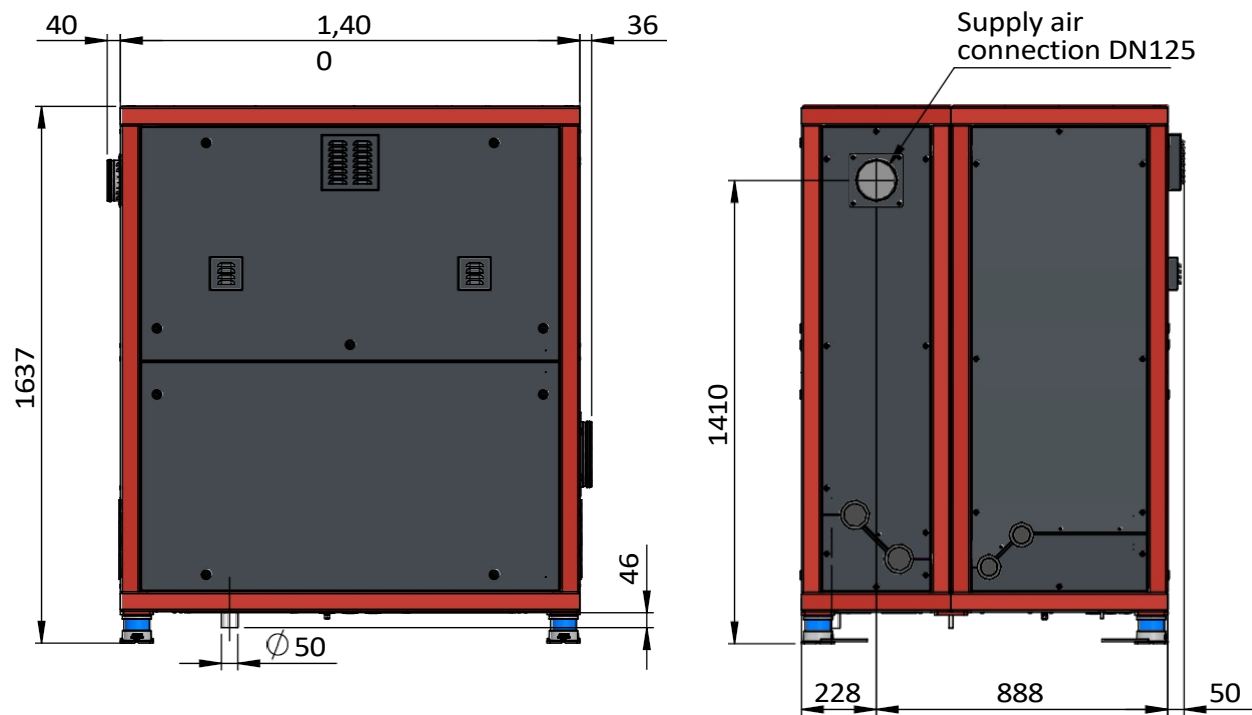
Installation requirements:

- Installation must only take place outdoors.
- The minimum clearances must be observed for maintenance, noise and safety reasons. Please note that the minimum clearances may vary depending on the installation location.
- Distances for maintenance: sufficient space must be available for any maintenance and repairs.
- Clearances for noise reduction: Choosing the correct installation site is important to keep the heat pump's noise emissions as low as possible. Please refer to Section 4.6 for this. Furthermore, we recommend the 'Guideline: Noise' published by the German Heat Pump Association (BWP) e. V. for more detailed information on noise reduction.
- Distance requirements for safety: the heat pump operates using the refrigerant R290 (propane), which is highly flammable and can form explosive mixtures when combined with air. It is contained within hermetically sealed refrigeration circuits in the heat pump, and additional safety measures within the unit prevent the refrigerant from escaping. Nevertheless, safety zones similar to those at a petrol station must be maintained around the heat pump. The safety zone must not extend beyond property boundaries or footpaths and roadways.
- The minimum distances specified in EN 62305 must be observed in relation to an external lightning protection system.
- If the unit is installed close to a wall, a minimum distance of 3 metres must be maintained at all times (sound reflection).
- Installation of the heat pump near garages, multi-storey car parks and car parks: This heat pump contains an A3 refrigerant, which means that, in accordance with the Garage and Parking Space Regulations (GaStellV, GaStplVO, BetrSichV), it must be clarified whether the unit may be installed in these locations. Impact protection may need to be provided outside the safety zone.
- The outdoor unit must not be enclosed or encased.
- If there is a sea breeze, the outdoor unit must be installed on the side of the building facing away from the sea.
- A suitable foundation must be laid before installing the outdoor unit (see dimensions and foundation plan).
- The snowfall levels at the specific installation site must be taken into account. The heat pump should not be left standing in the snow; if necessary, the foundation can be built higher.
- As standard, the outdoor unit can be installed at a distance of up to 20 metres from the storage tank.

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

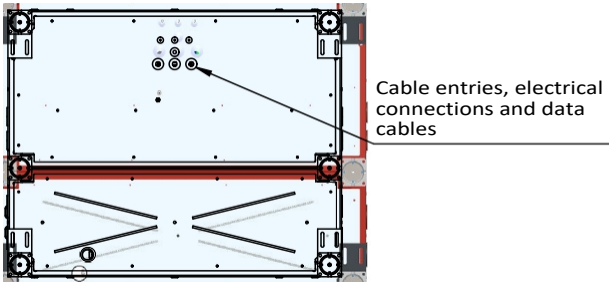
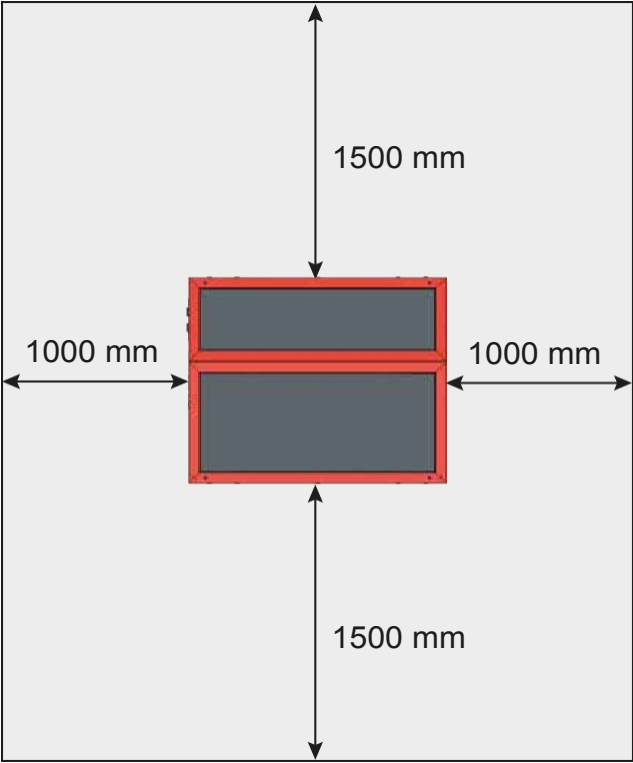
- The work area for assembly and installation must be well lit.
- Staff must possess the necessary qualifications, have received the required training and be briefed by the relevant supervisor.
- Staff must have read and understood the operating instructions.
- Staff must have access to the operating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

5.2.2 DIMENSIONS



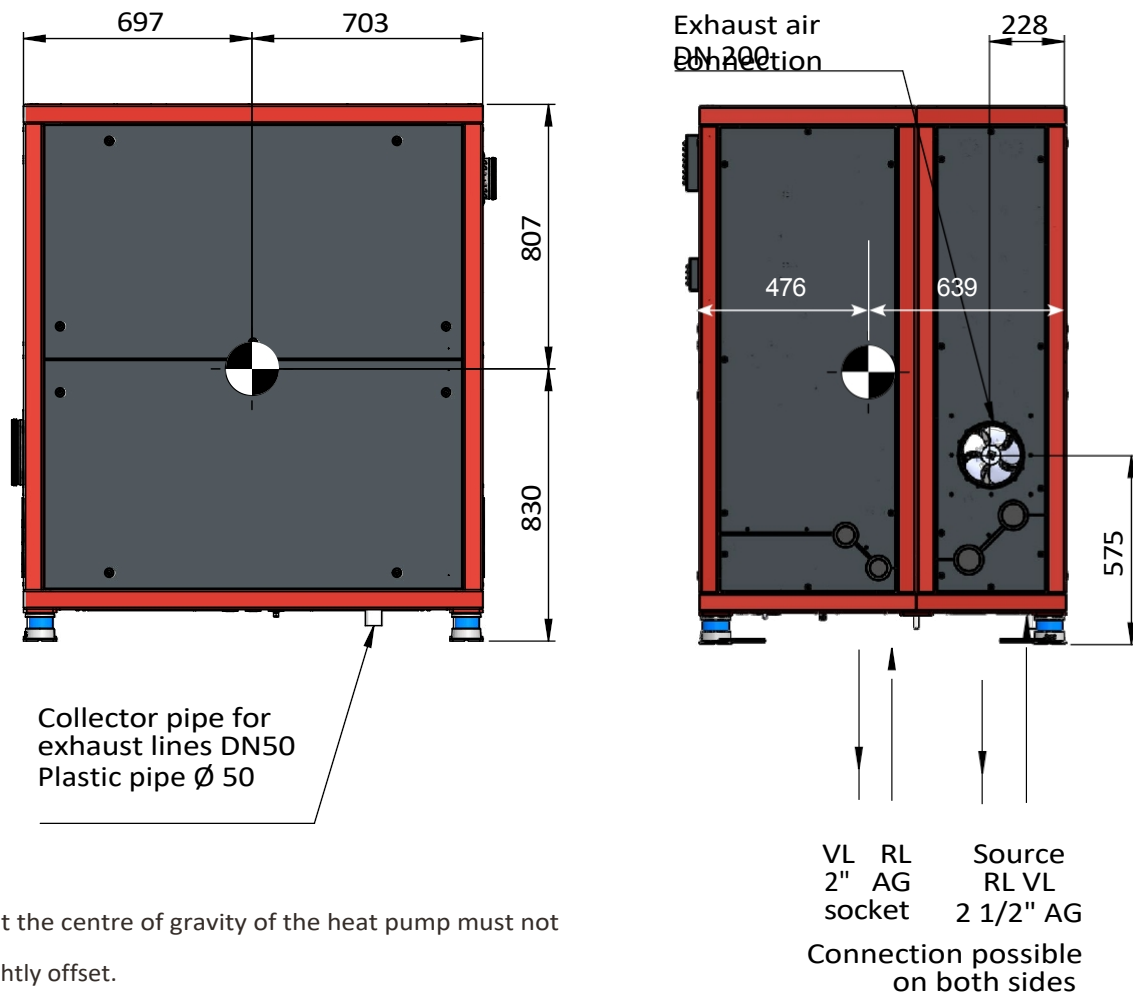
5.2.1 MAINTENANCE AREA

Top view



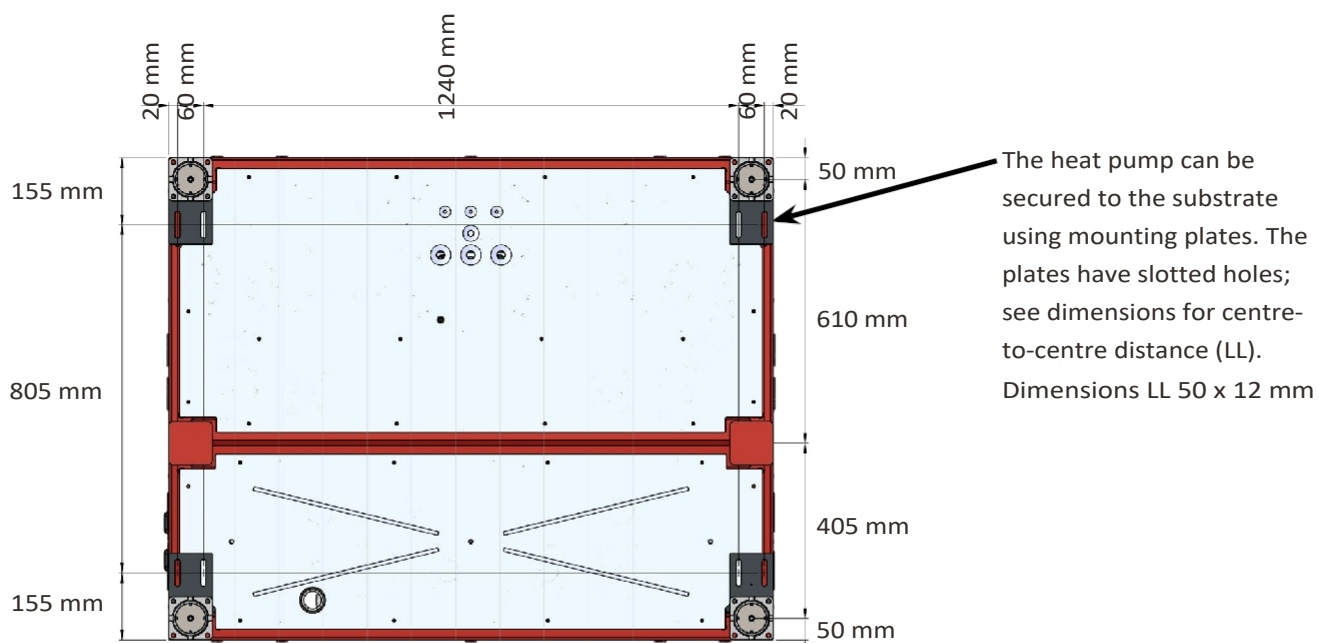
These clearances must be strictly observed to ensure smooth maintenance.  
All dimensions are given in millimetres.

### 5.2.3 HEAT PUMP CENTRE OF GRAVITY



Please note that the centre of gravity of the heat pump must not be centred, but slightly offset.  
All dimensions are given in millimetres.

### 5.2.4 FASTENING OPTIONS



### 5.2.5 SAFETY AND PROTECTION ZONE: GENERAL

The WP Max-HiQ/LoQ pF67 heat pump operates using the flammable refrigerant R290. For this reason, a safety and protection zone must be maintained around the unit at all times.

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

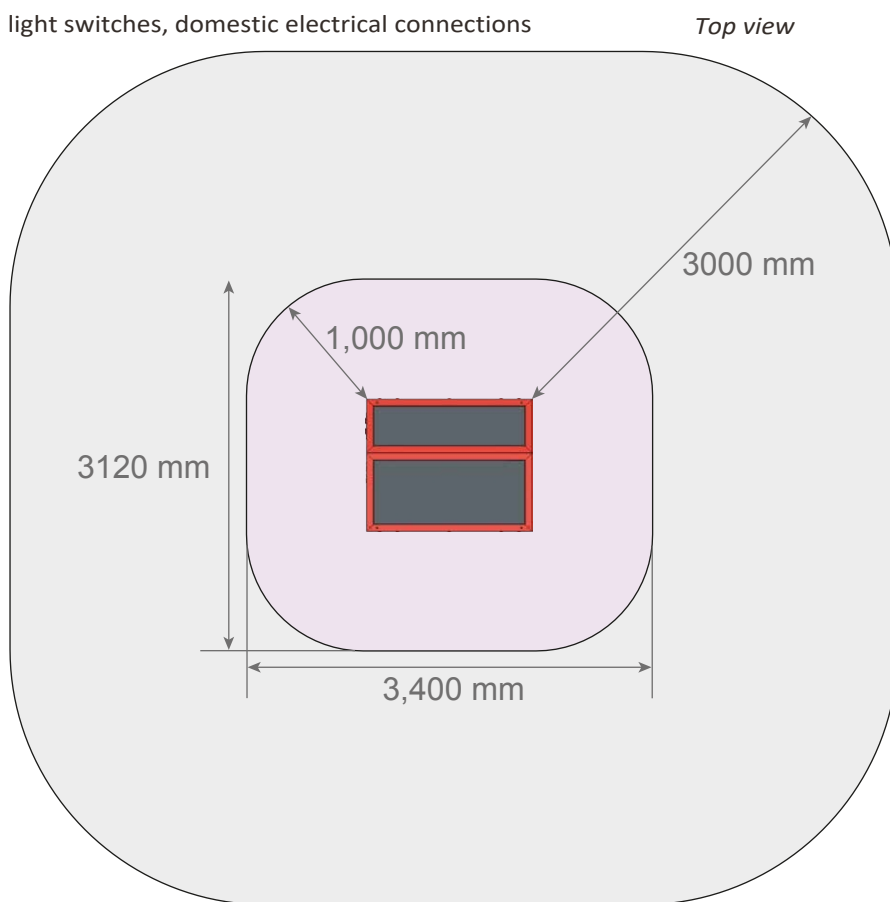
- Open flames and sources of sparks (fireplaces, ashtrays, barbecues)

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

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

Further installation instructions:

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



*Front view*

2500 mm

500 mm

500 mm

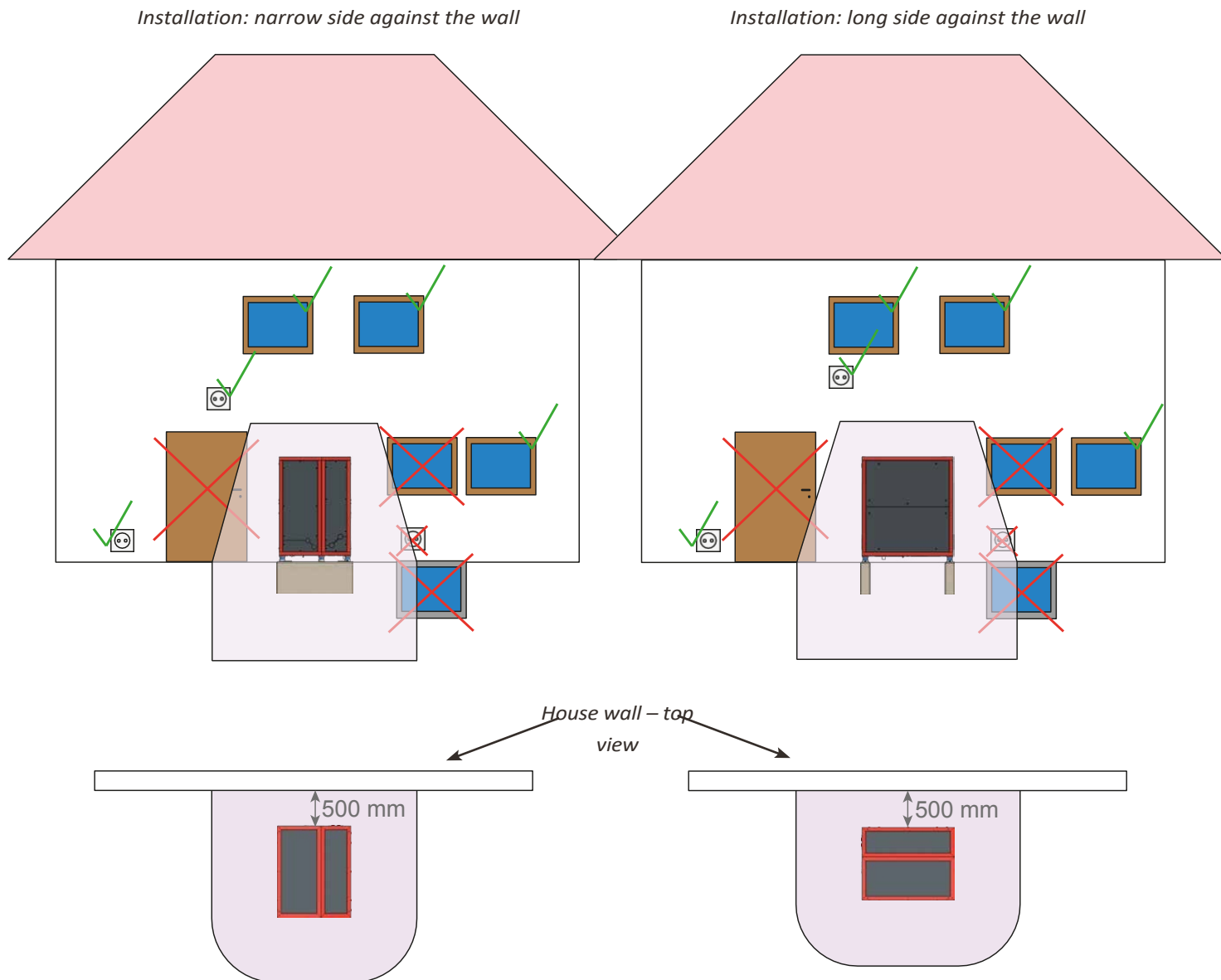
2140 mm

3000 mm

1,000 mm

7,400 mm

## 5.2.6 SAFETY ZONE: INSTALLATION AGAINST A HOUSE WALL



The WP Max-HiQ/LoQ pF67 heat pump may be installed close to a wall or house wall. In this case, the minimum distance for the safety zone must be at least 0.5 metres.

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

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

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

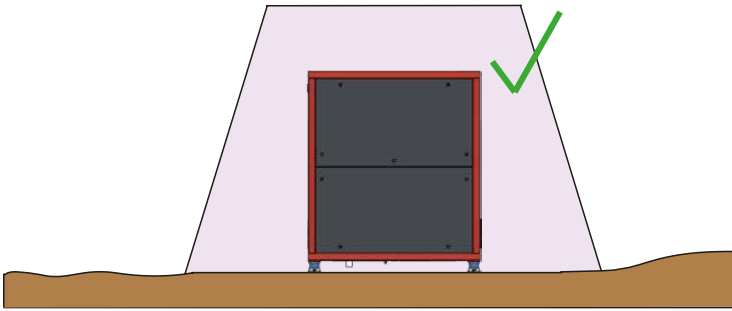
X = wall height [m]

A = Reduction in the safety zone [m]

B = Height of the heat pump [m]

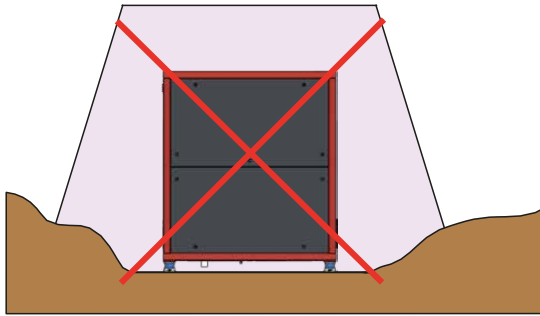
C = Height of the foundation [m]

## 5.2.7 SAFETY ZONE: FURTHER INSTALLATION REQUIREMENTS



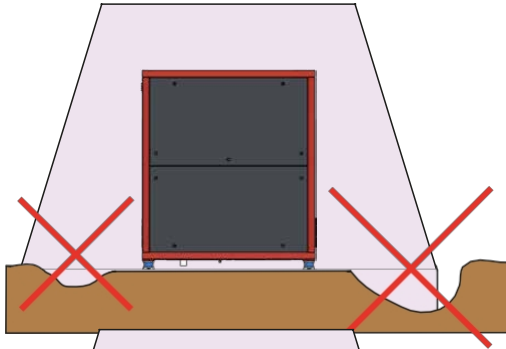
The refrigerant R290 is heavier than air and flammable. For this reason, the heat pump must be installed in such a way that any escaping refrigerant cannot accumulate in the surrounding area or enter a building.

The surrounding terrain should be as flat as possible.

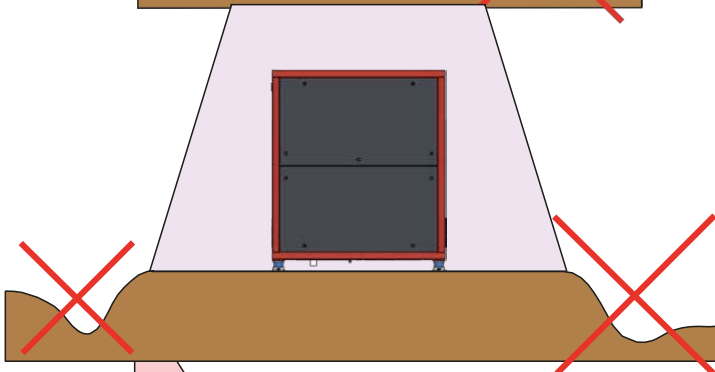


Hollows/depressions:

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

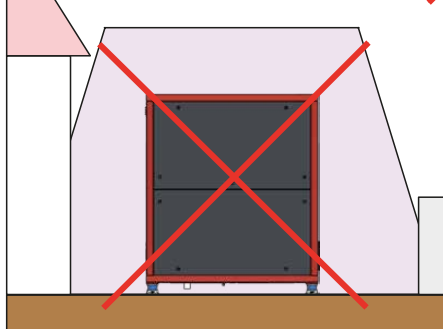


The heat pump must not be installed near a depression. There must be no hollows within a radius of 1 metre.



Elevated ground:

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



Recesses:

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

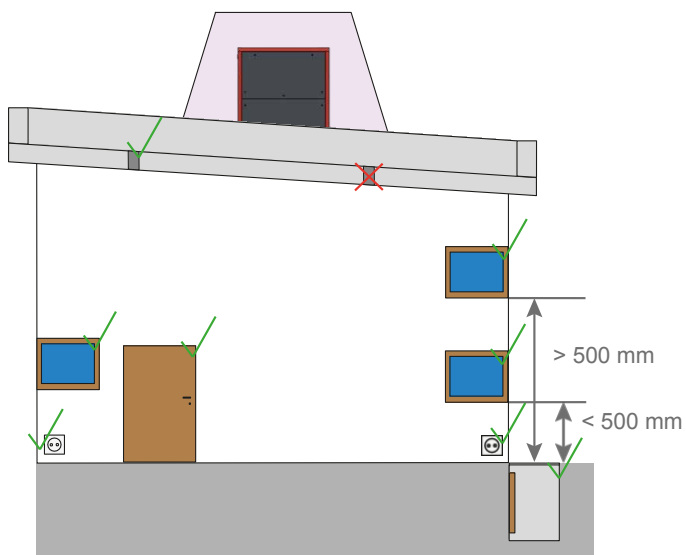
## 5.2.8 FLAT ROOF INSTALLATION

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

- Roof vents and roof drainage systems must not be located within the protection zone.
- Heat pumps installed on the roof must be integrated into the lightning protection system.
- The wind load acting on the unit must be taken into account. Additional fixings or anchoring may be required on site.

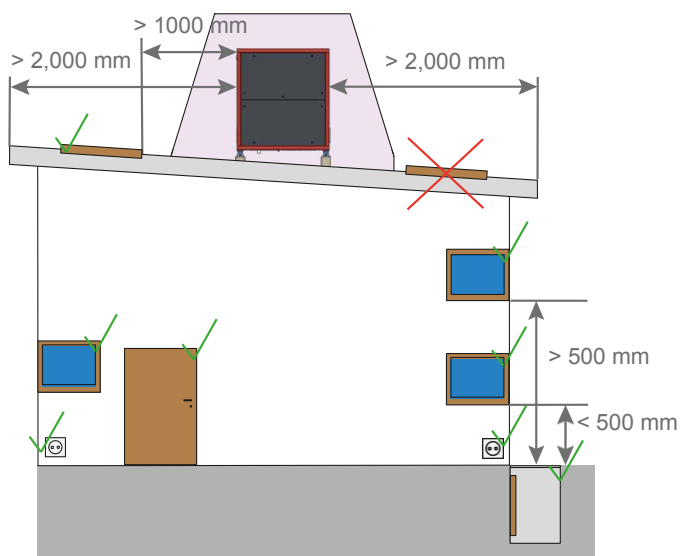
Roof with parapet:

The roof drain must not be located within the protection zone



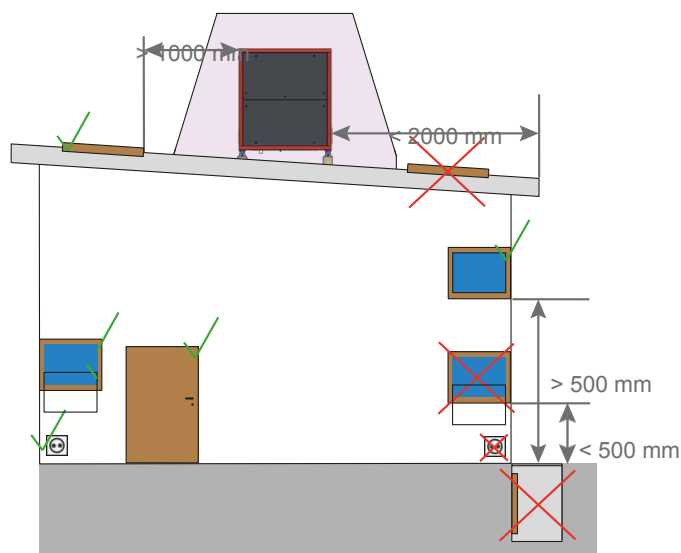
Roof without parapet:

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



Roof without parapet:

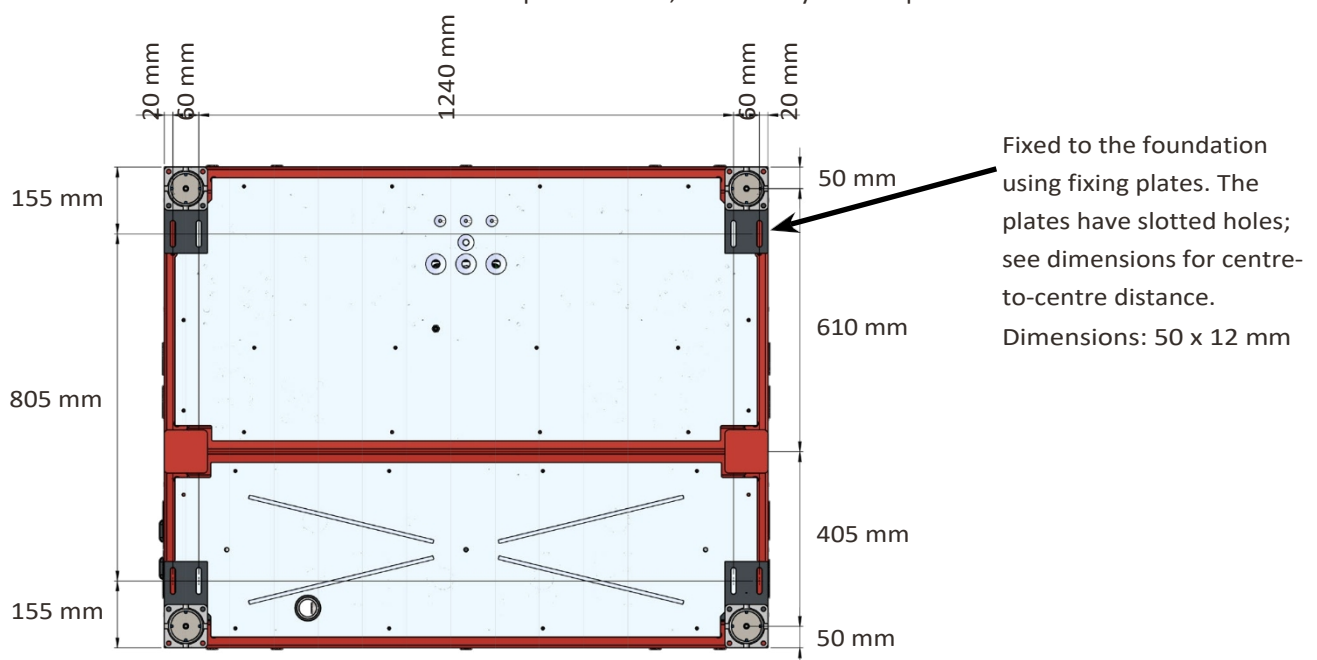
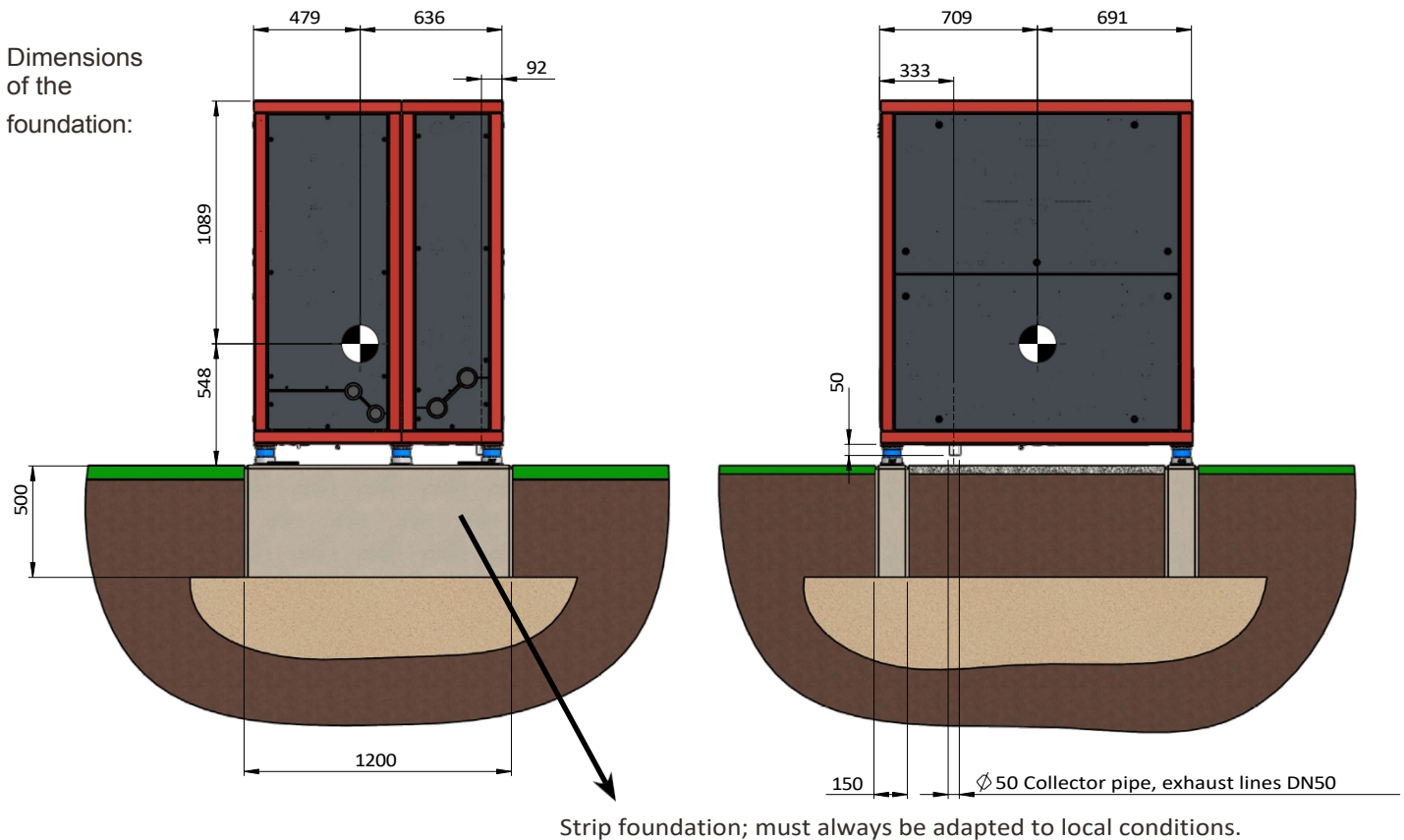
Distances to the edge of the roof are less than 2 metres



### 5.2.9 SUBSTRATE/FOUNDATION

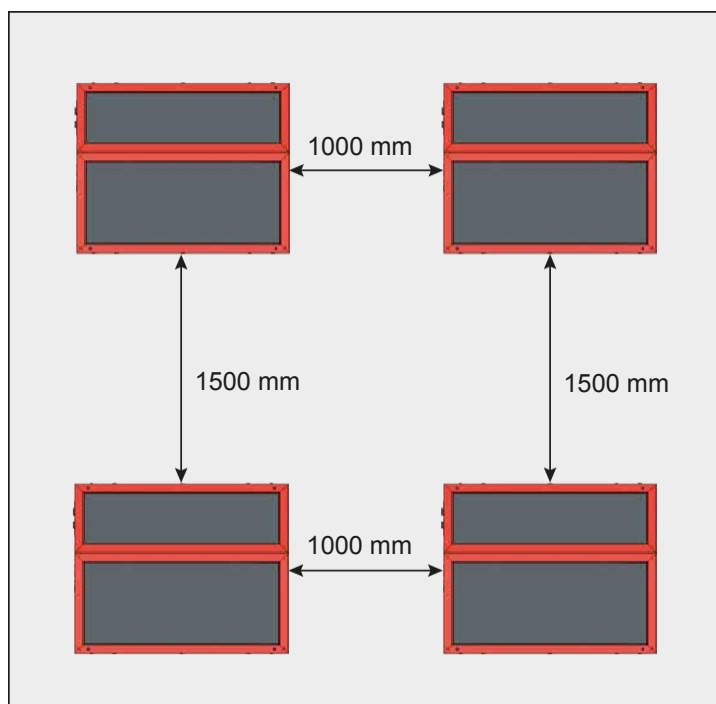
- The ground must be level and firm. We recommend laying a foundation.
- Care must be taken to ensure the foundation has the necessary load-bearing capacity (heat pump weight: approx. 750 kg).
- The heat pump should be installed slightly raised off the ground. The distance from the unit's feet to the ground should be 20 cm or more.
- If possible, the foundation should be higher than the expected snow depth.
- The foundation must be constructed in accordance with the dimensional drawing. It must not be constructed as a continuous ring, as this would create a depression, which is not permitted.

Dimensions  
of the  
foundation:



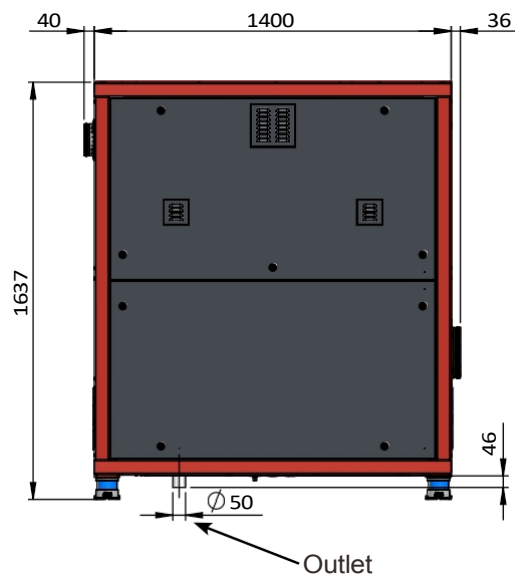
## 5.2.10 INSTALLATION OF MULTIPLE HEAT PUMPS

If two or more WP Max-HiQ/LoQ pF67 heat pumps are installed, the distance between the heat pumps must be at least equal to the length of the maintenance area.



## 5.2.11 SAFETY VALVE VENT

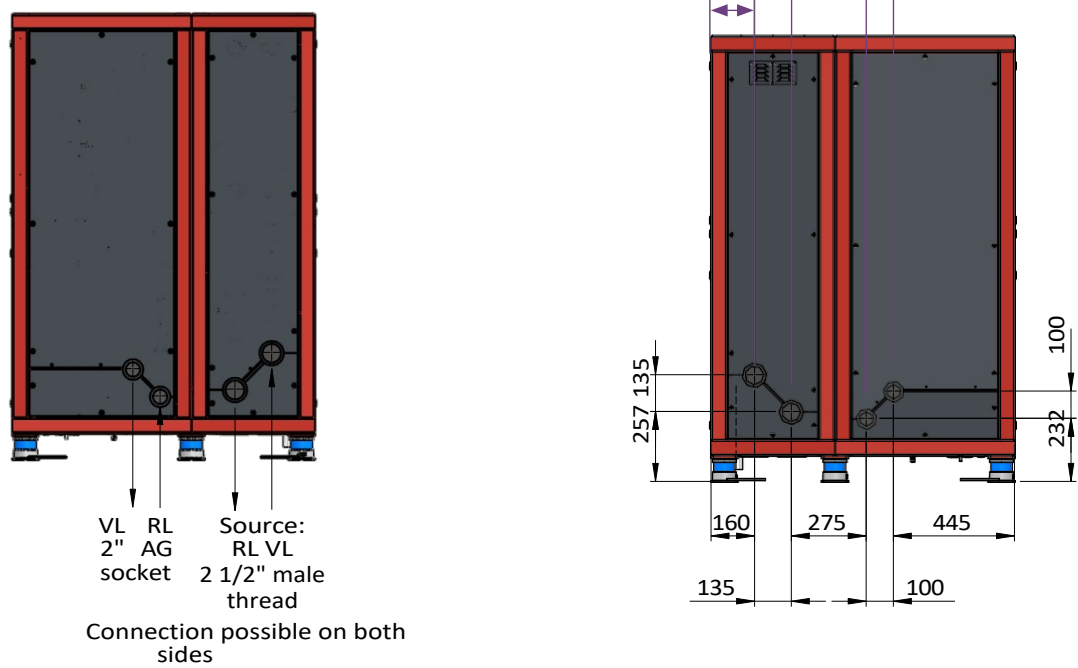
The outlet for the 4 safety valves is located on the underside of the heat pump. When the unit is installed outdoors in accordance with all installation requirements, the outlet may lead to the open air. No pipe, hose or siphon needs to be fitted to the outlet.



5.3 HYDRAULIC INSTALLATION

5.3.1 CONNECTION DIMENSIONS AND SIZES

Views from the left and right.  
All dimensions are given in millimetres.



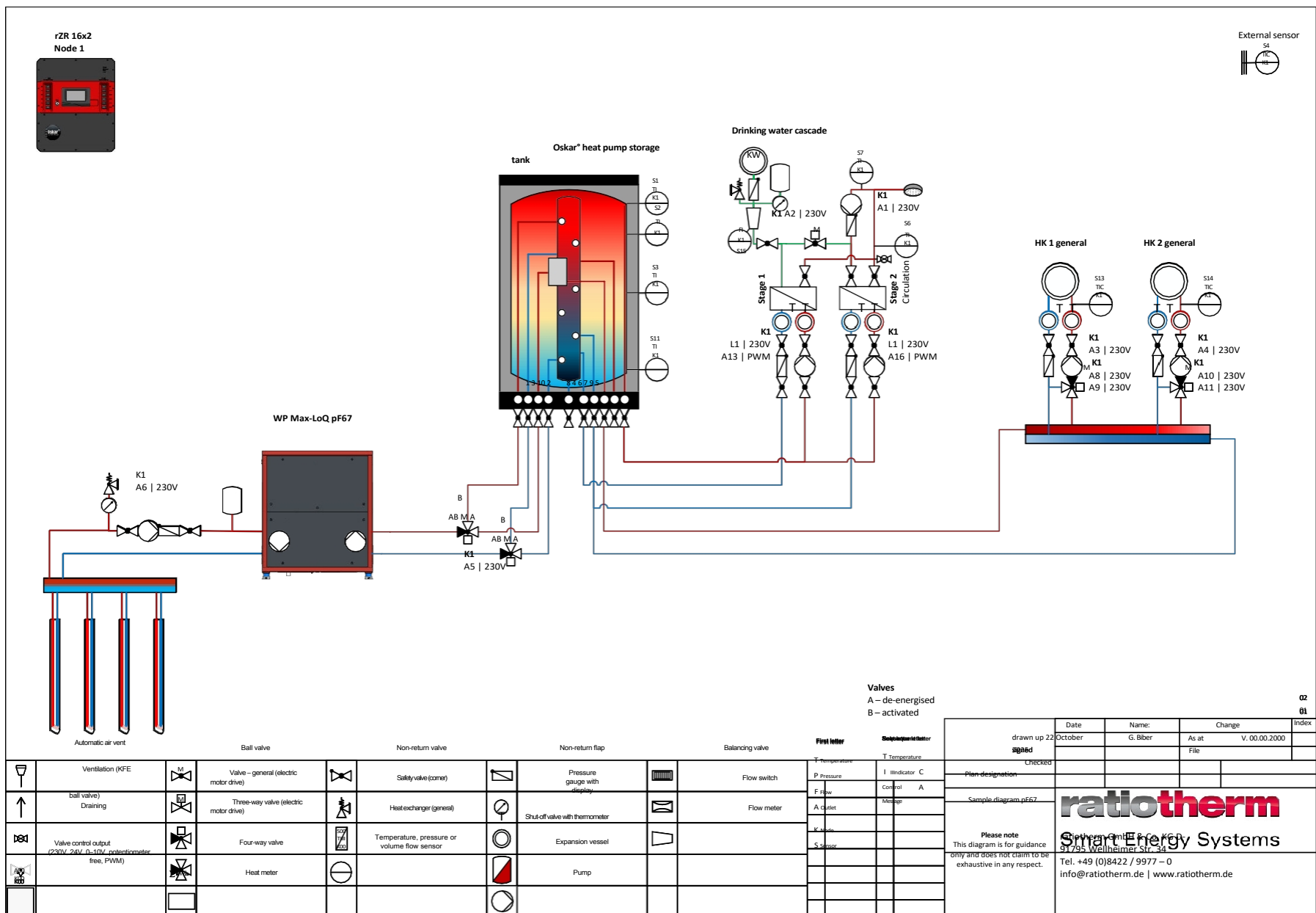
The following instructions must be observed during the hydraulic installation of the system:

- For safety reasons, no quick-release vent, microbubble separator, safety valve or similar device must be installed between the heat pump and the storage tank. The safety devices are integrated into the heat pump.
- All pipe connections located outdoors must be coated with Fermit or a similar product to prevent leaks caused by condensation.
- If the hydraulic supply pipe is not laid underground or the distance to the building entry point is less than 3 m, acoustic decoupling within the pipe is required. Recommendation: Eckstein TWS 50
- Shut-off valves and venting points (at high points) must be provided by the client.
- A drain must be fitted at the lowest point of the pipe between the outdoor unit and the storage tank. In the event of a prolonged power cut, the system can be drained and is thus protected against frost damage.
- A sludge separator and a magnetite separator must also be provided on site.
- The unit must be filled via the return pipe.
- The condenser/drain pump is integrated into the unit.
- When tightening, please hold the connections in place!

The following dimensions must be used:

| Heat pump <—> storage tank         | DN40 | DN50 | DN60 |
|------------------------------------|------|------|------|
| Refrigeration circuits in series   | 6 m  | 30 m | -    |
| Refrigeration circuits in parallel | -    | 8 m  | 20 m |
| Source <—> Heat pump               |      | DN60 | DN70 |
|                                    |      | 10 m | 30 m |

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



## 5.3.3 REQUIREMENTS FOR SYSTEM WATER

| Parameter                                                | Unit  | Concentration | Copper- |
|----------------------------------------------------------|-------|---------------|---------|
| pH value                                                 | /     | < 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 ( $\text{NH}_3$ , $\text{NH}_4^+$ ) <sub>4</sub> | mg/L  | < 2           | +       |
|                                                          |       | 2–20          | °       |
|                                                          |       | > 20          | -       |
| Alkalinity ( $\text{HCO}_3^-$ )                          | mg/L  | < 60          | +       |
|                                                          |       | 60–300        | +       |
|                                                          |       | > 300         | °       |
| Sulphate ( $\text{SO}_4^{2-}$ ) <sub>4</sub>             | mg/L  | < 100         | +       |
|                                                          |       | 100–300       | °/-     |
|                                                          |       | > 300         | -       |
| $\text{HCO}_3^- / \text{SO}_4^{2-}$ <sub>3 4</sub>       | mg/L  | > 1.5         | +       |
| Nitrates ( $\text{NO}_3^-$ ) <sub>3</sub>                | mg/L  | < 1.5         | °/-     |
|                                                          |       | < 100         | +       |
| Hydrogen sulphide ( $\text{H}_2\text{S}$ ) <sub>2</sub>  | mg/L  | > 100         | °       |
|                                                          |       | < 0.05        | +       |
| Free carbon dioxide ( $\text{CO}_2$ )                    | mg/L  | > 0.05        | °/-     |
|                                                          |       | < 5           | +       |
|                                                          |       | 5–20          | °       |
| Manganese                                                | mg/L  | > 20          | -       |
|                                                          |       | < 0.1         | +       |
| Iron (Fe)                                                | mg/L  | > 0.1         | °       |
|                                                          |       | < 0.2         | +       |
| Aluminium                                                | mg/L  | > 0.2         | °       |
|                                                          |       | < 0.2         | +       |

**NOTE**

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

## 5.3.4 REQUIREMENTS FOR GROUNDWATER

| Parameter                                               | Unit  | Concentration | Copper-brazed | Stainless steel | Screwed |
|---------------------------------------------------------|-------|---------------|---------------|-----------------|---------|
| 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 ( $(\text{NH}_3, \text{NH}_4^+)$ ) <sub>4</sub> | mg/L  | < 2           | +             | +               | +       |
|                                                         |       | 2–20          | °             | +               | +       |
|                                                         |       | > 20          | -             | +               | +       |
| Alkalinity ( $\text{HCO}_3^-$ )                         | mg/L  | < 60          | +             | +               | +       |
|                                                         |       | 60–300        | +             | +               | +       |
|                                                         |       | > 300         | °             | +               | +       |
| Sulphate ( $\text{SO}_4^{2-}$ ) <sub>4</sub>            | mg/L  | < 100         | +             | +               | +       |
|                                                         |       | 100–300       | °/-           | +               | +       |
|                                                         |       | > 300         | -             | +               | +       |
| $\text{HCO}_3^- / \text{SO}_4^{2-}$                     | mg/L  | > 1.5         | +             | +               | +       |
|                                                         |       | < 1.5         | °/-           | +               | +       |
| Nitrates ( $\text{NO}_3^-$ ) <sub>3</sub>               | mg/L  | < 100         | +             | +               | +       |
|                                                         |       | > 100         | °             | +               | +       |
| Hydrogen sulphide ( $\text{H}_2\text{S}$ )              | mg/L  | < 0.05        | +             | +               | +       |
|                                                         |       | > 0.05        | °/-           | +               | +       |
| free carbon dioxide ( $\text{CO}_2$ ) <sub>2</sub>      | mg/L  | < 5           | +             | +               | +       |
|                                                         |       | 5–20          | °             | +               | +       |
|                                                         |       | > 20          | -             | +               | +       |
| Manganese                                               | mg/L  | < 0.1         | +             | +               | +       |
|                                                         |       | > 0.1         | °             | +               | +       |
| Iron (Fe)                                               | mg/L  | < 0.2         | +             | +               | +       |
|                                                         |       | > 0.2         | °             | +               | +       |
| Aluminium                                               | mg/L  | < 0.2         | +             | +               | +       |
|                                                         |       | > 0.2         | °             | +               | +       |

Depending on the water quality of the well, the use of a safety heat exchanger is recommended. Based on the water quality found, the table can be used to determine whether a safety heat exchanger should be used and, if so, which type. If the properties are not optimal (°) for more than two criteria, or if a criterion does not meet the minimum requirement (-), the use of that particular type should be avoided.

## 5.4 ELECTRICAL INSTALLATION



### DANGER

- The power supply to the heater comes from the building's distribution board and must be protected by separate residual current circuit breakers:
  - each of the two refrigeration circuits must be protected by a Type B residual current device (RCD) with a trip current of 300 mA, a 10 ms short-time delay and a suitably rated capacity. Recommendation: ABB F204B-40/0.3;
  - the control voltage must be protected by a Type A residual current circuit breaker (RCD) with a tripping current of 30 mA and an appropriately rated capacity. Recommendation: ABB F204A-40/0.03.
- The residual current circuit breakers must be labelled separately for the heater, e.g. as 'WP: Compressor 1'; 'WP: Control voltage'. Please ensure the correct assignment of phase and neutral conductors during cabling.
- Ensure that the rotating field is clockwise.
- The unit must be earthed.
- Use cable cross-sections appropriate to the power rating of the heater.
- The electrical installation must comply with the applicable standards and generally accepted engineering practice.
- Never carry out work on the hydraulics or mechanics of the unit whilst it is live.
- The same applies when filling the system or pressurising it subsequently.
- To completely isolate the unit from the mains supply, the RCDs in the control cabinet must be switched off.
- Maintenance work must only be carried out by an authorised person.
- Never short-circuit the heat pump's safety pressure relief valve.

### 5.4.1 ELECTRICAL CONNECTION SPECIFICATIONS

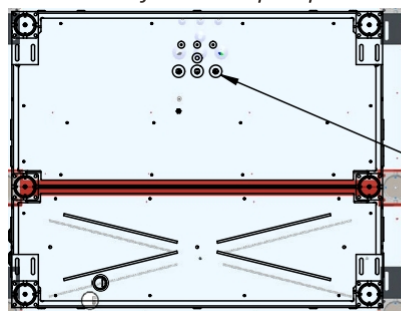
#### WARNING

- Have the installation and wiring carried out only by authorised specialist personnel.
- We reserve the right to make errors and changes to all specifications, images and drawings.
- The generally applicable and recognised rules of good engineering practice, as well as any local regulations, must be strictly observed!
- The values given apply to installation in conduits with a cable length of up to 100 m and should be regarded as recommendations!

#### WP Max-HiQ/LoQ pF67

|                 |                     |                        |
|-----------------|---------------------|------------------------|
| 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 | RCD                 | Type A                 |
|                 | Fuse                | B16 3-pole             |
|                 | Cable cross-section | 5G 2.5 mm <sup>2</sup> |

Underside of the heat pump



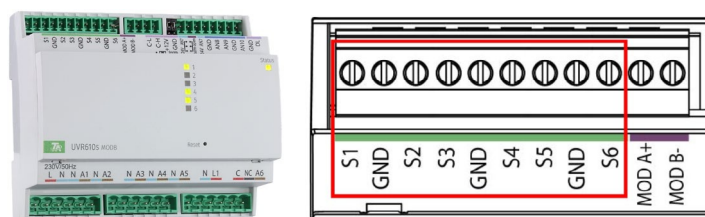
Cable entries: Electrical connection and data cables

## 5.4.2 TERMINAL DIAGRAM AND DESCRIPTION

| X1.1                                           |    |    |   |    | X1.2                                           |    |    |   |    |
|------------------------------------------------|----|----|---|----|------------------------------------------------|----|----|---|----|
| L1                                             | L2 | L3 | N | PE | L1                                             | L2 | L3 | N | PE |
| 400 V mains supply,<br>compressor 1 (B32, 5G6) |    |    |   |    | 400 V mains supply,<br>compressor 2 (B32, 5G6) |    |    |   |    |

| X1.3                                        |    |    |    |   |   |    |    |
|---------------------------------------------|----|----|----|---|---|----|----|
| L1                                          | L1 | L2 | L3 | N | N | PE | PE |
| 400 V mains control voltage<br>(B16, 5G2.5) |    |    |    |   |   |    |    |

Connect X3 and X4 directly to the UVR610S controller using terminal K29:



| X3                                        |     |              |    |             |    |        |     |         | X4                               |        |
|-------------------------------------------|-----|--------------|----|-------------|----|--------|-----|---------|----------------------------------|--------|
| S1                                        | GND | S2           | S3 | GND         | S4 | S5     | GND | S6      | MOD A+                           | MOD B- |
| Smart Grid 1 /<br>Electricity<br>Supplier |     | Smart Grid 2 |    | Requirement |    | 0–10 V |     | Cooling | Connection for<br>Modbus devices |        |

| X5               |       |      |                   |       |       |
|------------------|-------|------|-------------------|-------|-------|
| CAN-L            | CAN-H | 12 V | GND               | CAN-L | CAN-H |
| CAN bus (CAN-IN) |       |      | CAN bus (CAN-OUT) |       |       |

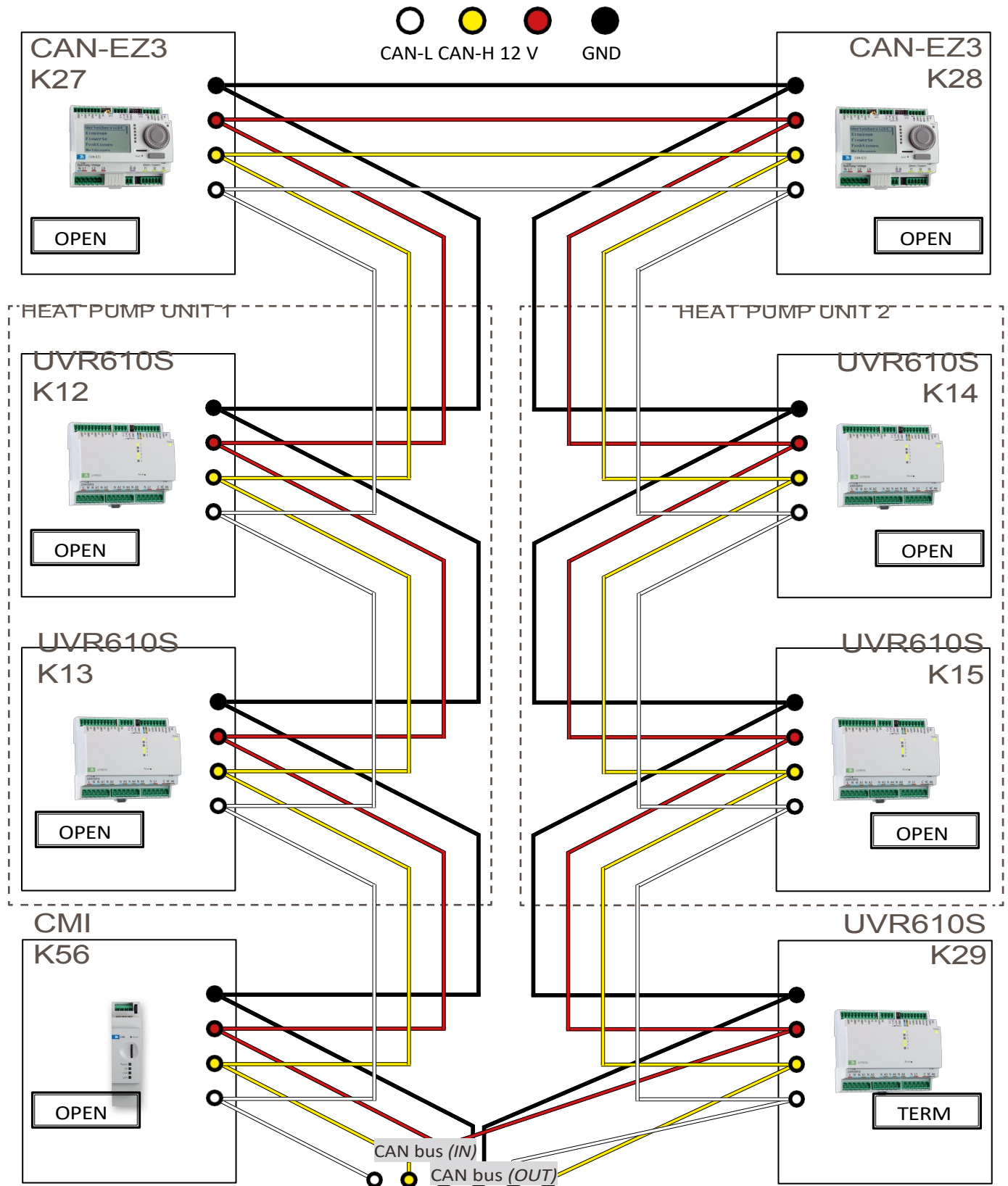
- Recommended fuses for the outdoor unit: 2 x 3-pole B32 and 1 x 3-pole B16,
- X3.1 and X3.4 are not required when using the rZR 16x2 from ratiotherm as the main controller! However, parallel use for Power-to-Heat is possible.
- X3.2 and X3.3 are used to process a signal from the network operator/energy supplier. X3.2 is backwards compatible with the EVU contact.
- Please wire the EVU contact as a normally open contact (closed when the EVU lock is active).

## 5.4.3 CAN BUS DIAGRAM

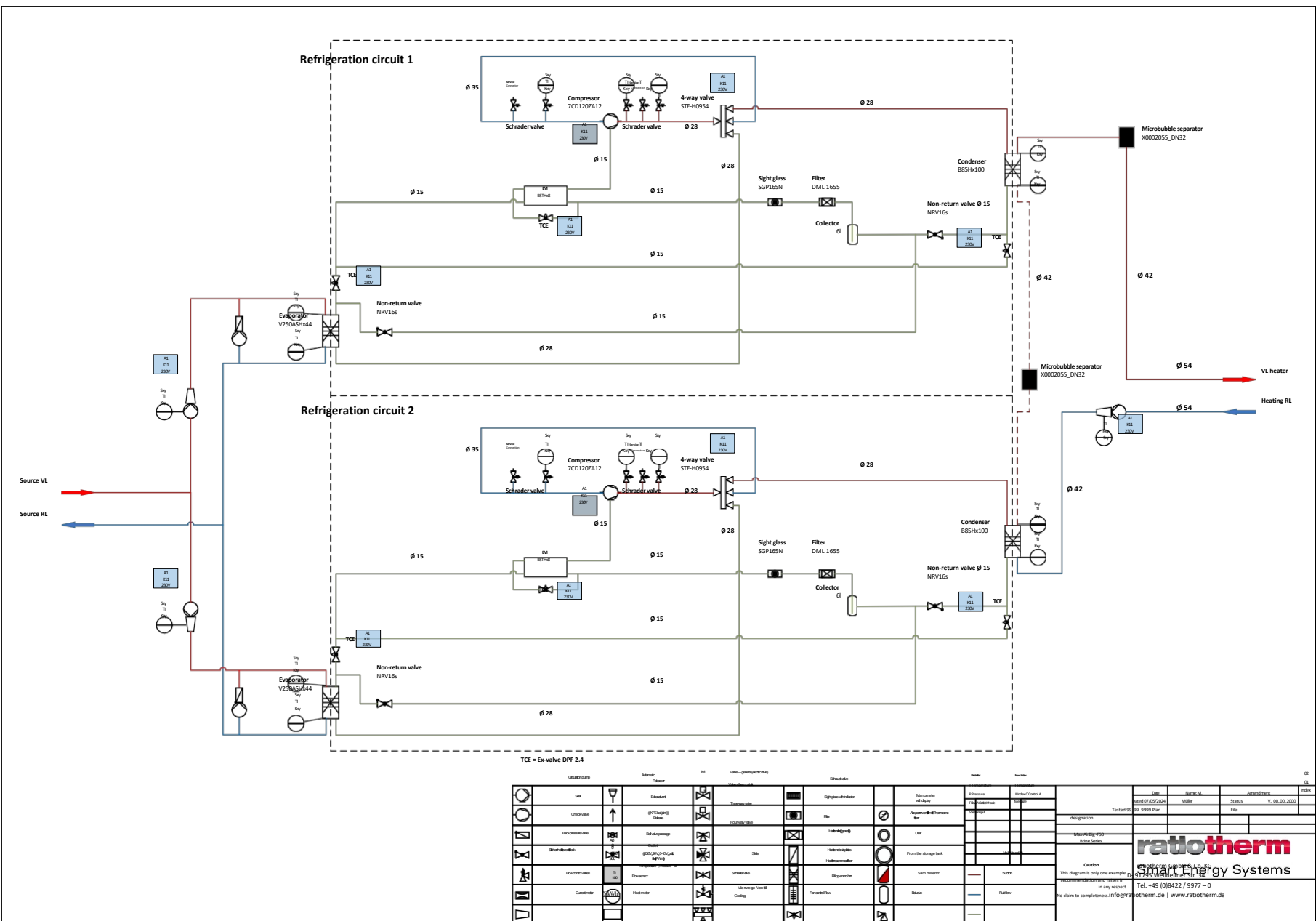
### NOTE

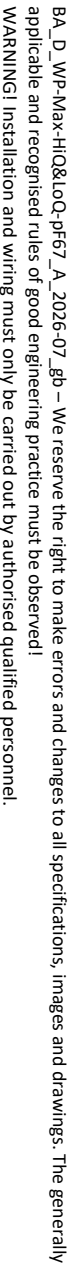
- Ensure the CAN bus is wired correctly! Do not use a star-shaped network! Configure the network as a daisy chain.
- The total load of all devices must not exceed 6 watts.
- For the first and last CAN bus participants, the termination jumper must be set to TERM. Participants in between must be set to OPEN. One end connects to the outdoor unit (K15), the other end to the rZR 16x2.

- If a ratiotherm central controller is not being used, the jumper on the C.M.I. must be set to TERM.
- Use a shielded, 4-core cable! Recommended cable: Unitronic Bus CAN FD P 2x2x0.5

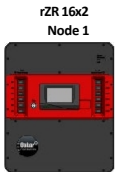


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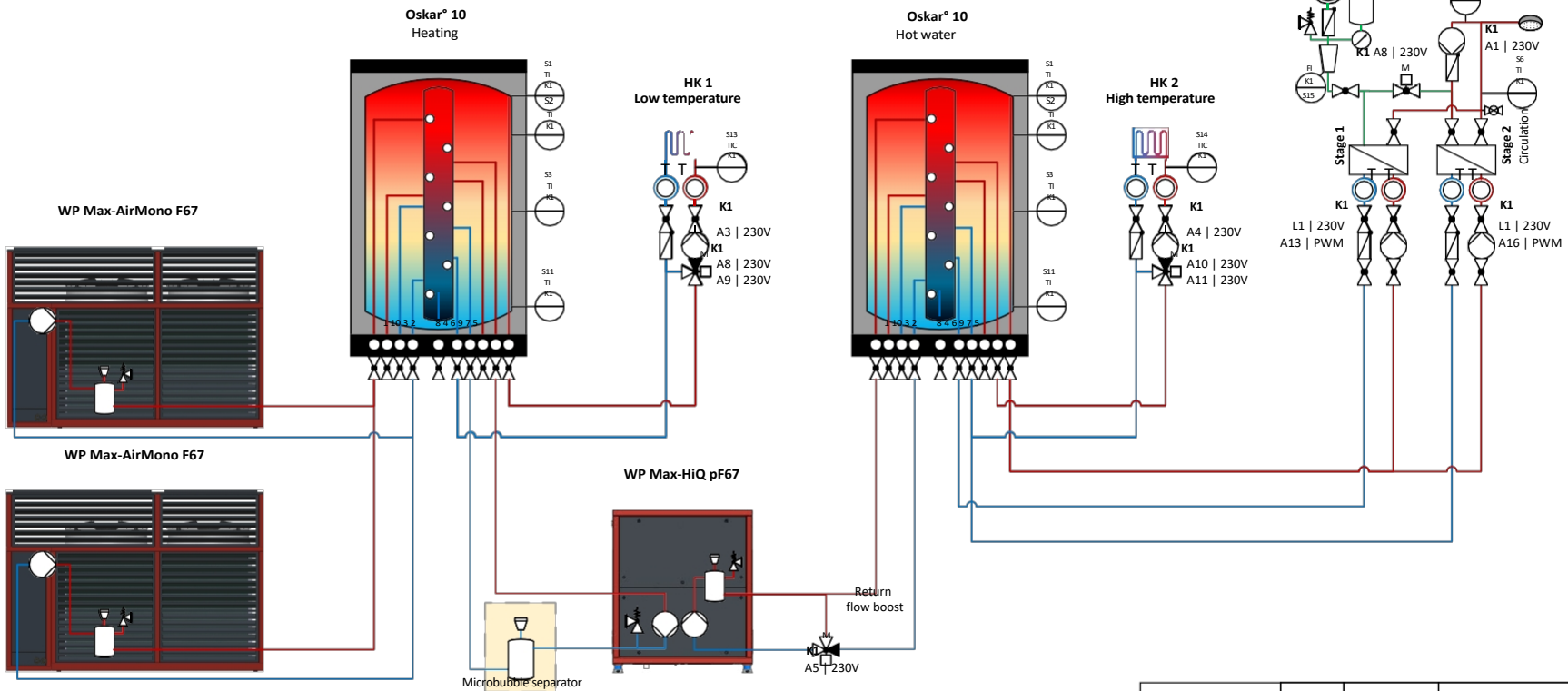




5.7 USE AS A BOOSTER HEAT PUMP



When used as a booster heat pump, a microbubble separator must be installed on the source side by the client. The outlet of the separator must be integrated into the heat pump's safety venting system.

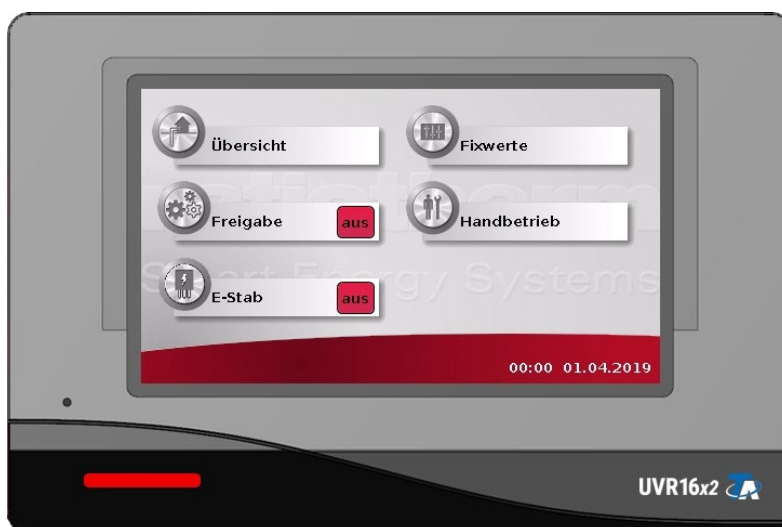


| Automatic air vent |                                                     | Ball valve |                                        | Non-return valve |                                             | Non-return flap |                                 | Balancing valve |             | First letter  | Subsequent letter |
|--------------------|-----------------------------------------------------|------------|----------------------------------------|------------------|---------------------------------------------|-----------------|---------------------------------|-----------------|-------------|---------------|-------------------|
|                    | Ventilation (KFE)                                   |            | Valve - general (electric motor drive) |                  | Safety valve (corner)                       |                 | Pressure gauge with display     |                 | Flow switch | T Temperature | T Temperature     |
|                    | ball valve)                                         |            | Three-way valve (electric motor drive) |                  | Heat exchanger (general)                    |                 | Shut-off valve with thermometer |                 | Flow meter  | P Pressure    | I Indicator C     |
|                    | Draining                                            |            | Four-way valve                         |                  | Temperature, pressure or volume flow sensor |                 | Expansion vessel                |                 | Pump        | F Flow        | Control A         |
|                    | Valve control, through-type                         |            | Heat meter                             |                  | Pump                                        |                 | Pump                            |                 | Pump        | A Output      | Message           |
|                    | output (230V, 24V, 0-10V, potentiometer, freq. PWM) |            |                                        |                  |                                             |                 |                                 |                 |             | K Valve       |                   |
|                    |                                                     |            |                                        |                  |                                             |                 |                                 |                 |             | E Error       |                   |

|                                                                                                                                                |      |                |              |
|------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------|--------------|
| signed 17 June 2026                                                                                                                            | Date | Name: G. Sibor | Amendment    |
| Checked                                                                                                                                        | File | Status         | V-00.00.2000 |
| designation                                                                                                                                    |      |                |              |
| Example diagram: pF67 as a booster                                                                                                             |      |                |              |
| Please note: This diagram is for guidance only and does not claim to be exhaustive in any respect.                                             |      |                |              |
| <b>ratiotherm</b><br>Smart Energy Systems<br>91795 Wellheimer Str. 34<br>Tel. +49 (0)8422 / 9977 - 0<br>info@ratiotherm.de   www.ratiotherm.de |      |                |              |

## 6. OPERATION

### 6.1 CONTROLLER OPERATION



- The heat pump can be operated via the ratiotherm central controller, via a web portal or via an optional 4.3" touch screen.
- Selecting one of the windows takes you to the corresponding sub-menu.

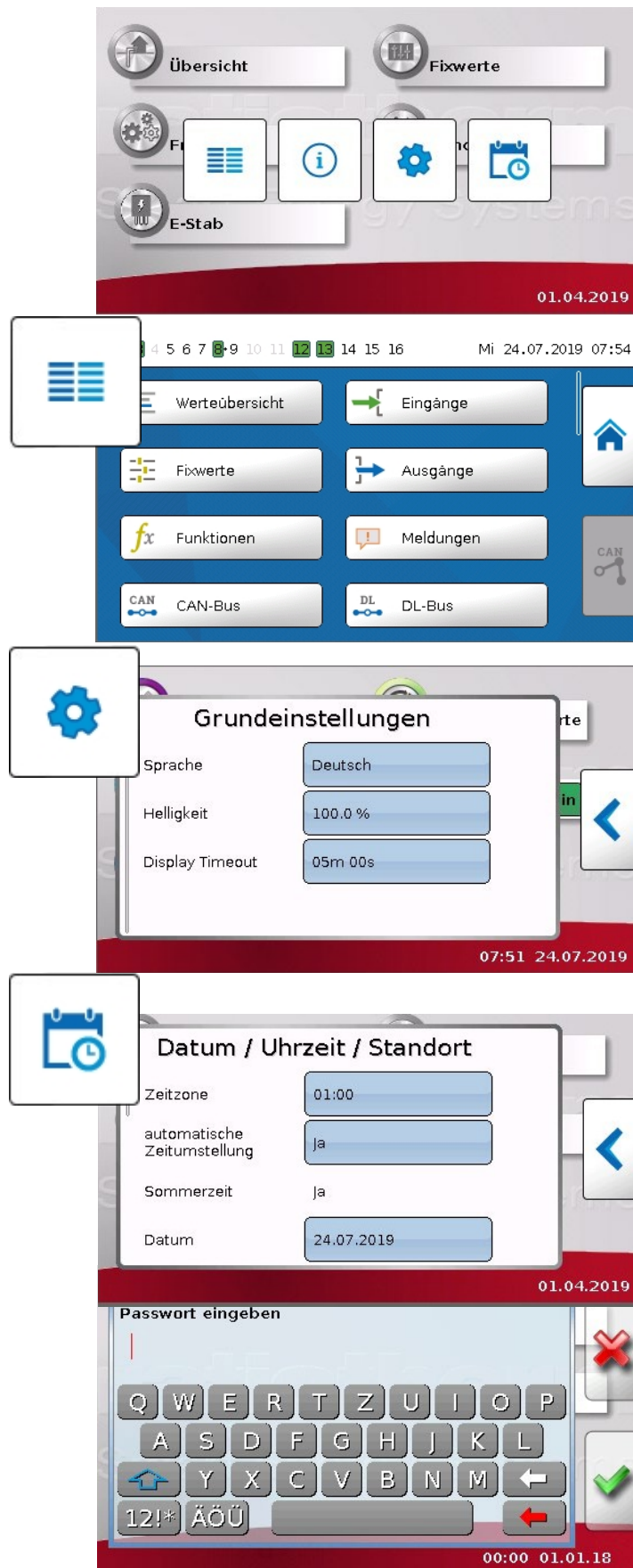
The indicator light can display various statuses:

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

Controls:



## 6.2 BASIC SETTINGS



### Sub-menu

By pressing and holding the display for 5 seconds, you will access the sub-menu, which allows you to configure the basic settings or switch to the controller menu.

### Controller menu

Shortcut to the controller menu

### Basic settings

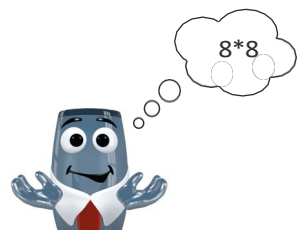
You can set the language, brightness and display timeout

### Date/Time/Location

Allows you to set the time zone and date

### Enter password

Enter the technician password to access the technician menu.



## 7. MAINTENANCE

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

**NOTE** We recommend taking out a maintenance contract.



### WARNING

#### Improper handling

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

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

## 7.1 TROUBLESHOOTING

Fault and error messages may occur whilst the heat pump is in operation. In many cases, the unit may trigger a fault message automatically. Should fault messages occur, the system will lock and must be unlocked manually. This is done by pressing the reset button on the heat pump's display or in the unit's menu.

Fault messages may be reset once. Should the fault reoccur, please contact your specialist contractor or ratiotherm customer service.

### 7.1.1 HIGH PRESSURE

| Error message       | HD fault                                                                                                                                                                                                                                                                                                                                                            | HD fault                                                                                                          |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Fault description   | The high-pressure protection for the refrigeration system has triggered                                                                                                                                                                                                                                                                                             |                                                                                                                   |
| Heat pump behaviour | <ul style="list-style-type: none"> <li>• System locked for 5 minutes</li> <li>• If 3 faults occur within 60 minutes, switch to high-pressure fault</li> </ul>                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>• System lockout</li> <li>• Unlock by pressing the reset switch</li> </ul> |
| Cause of fault      | <ul style="list-style-type: none"> <li>• Lack of heat dissipation</li> <li>• Blockage in the refrigeration circuit</li> <li>• Heat sink too hot</li> </ul>                                                                                                                                                                                                          |                                                                                                                   |
| Troubleshooting     | <ul style="list-style-type: none"> <li>• Check the heat sink temperature or setpoint temperatures</li> <li>• Temperatures below the maximum water temperature stated on the type plate</li> <li>• Check the heat transfer to the medium (pump, heat exchanger)</li> <li>• Bleed the system and check the heating pressure</li> <li>• Refrigeration check</li> </ul> |                                                                                                                   |

## 7.1.2 LOW PRESSURE

| Error message              | LP fault                                                                                                                                                                                                                                                                                                                                                                    | Low-pressure fault                                                                                                   |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Error description          | The low-pressure protection on the refrigeration circuit has tripped.                                                                                                                                                                                                                                                                                                       |                                                                                                                      |
| Behaviour of the heat pump | <ul style="list-style-type: none"> <li>• System locked out for 5 minutes</li> <li>• If 3 faults occur within 60 minutes, switch to high-pressure fault</li> </ul>                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>• System lockout</li> <li>• Unlocking by pressing the reset switch</li> </ul> |
| Cause of fault             | <ul style="list-style-type: none"> <li>• Insufficient heat absorption</li> <li>• Insufficient refrigerant charge</li> <li>• Blockage in the refrigeration circuit</li> </ul>                                                                                                                                                                                                |                                                                                                                      |
| Troubleshooting            | <ul style="list-style-type: none"> <li>• Check the sink temperature or setpoint temperatures</li> <li>• Temperatures below the maximum water temperature stated on the type plate</li> <li>• Check the heat absorption at the evaporator (flow rate, temperature)</li> <li>• Bleed the system and check the heating pressure</li> <li>• Refrigeration inspection</li> </ul> |                                                                                                                      |

## 7.1.3 INVERTER

| Fault code Fault description | Inverter fault                                                                                                                                                       |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              | The inverter's fault contact is not closing.                                                                                                                         |
| Behaviour of the heat pump   | <ul style="list-style-type: none"> <li>• System lockout</li> <li>• Unlock by pressing the reset switch</li> </ul>                                                    |
| Cause of fault               | <ul style="list-style-type: none"> <li>• No power supply</li> <li>• Other inverter fault</li> </ul>                                                                  |
| Troubleshooting              | <ul style="list-style-type: none"> <li>• Check the power supply (right-hand rotating field, phase failure)</li> <li>• Check the fault code (see appendix)</li> </ul> |

## 7.1.4 FAN (FOR AIR-COOLED OUTDOOR UNIT)

| Fault message Fault description | Fan fault                                                                                                                                                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 | The fan fault contact is not closing.                                                                                                                            |
| Behaviour of the heat pump      | <ul style="list-style-type: none"> <li>• System lockout</li> <li>• Unlock by pressing the reset switch</li> </ul>                                                |
| Cause of fault                  | <ul style="list-style-type: none"> <li>• No power supply</li> <li>• Fan impeller jammed</li> <li>• Other fan fault</li> </ul>                                    |
| Troubleshooting                 | <ul style="list-style-type: none"> <li>• Check the power supply</li> <li>• Check that the fan impeller is free to rotate</li> <li>• Replacing the fan</li> </ul> |

### 7.1.5 HOT GAS

| Fault message              | Fault description                                                                                                                                        |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hot gas                    | Compressor outlet temperature has been too high for 20 minutes                                                                                           |
| Behaviour of the heat pump | <ul style="list-style-type: none"> <li>• System lockout</li> </ul>                                                                                       |
| Cause of fault             | <ul style="list-style-type: none"> <li>• Unlock by pressing the reset switch</li> <li>• Compressor outlet temperature too high for 20 minutes</li> </ul> |
| Troubleshooting            | <ul style="list-style-type: none"> <li>• Check sensor validity</li> <li>• Refrigeration system check</li> </ul>                                          |

### 7.1.6 FROST PROTECTION

| Error message       | Frost protection fault                                                                                                                                            | Frost protection fault                                                                                            |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Fault description   | The hydraulic circuit's frost protection limit has been triggered                                                                                                 |                                                                                                                   |
| Heat pump behaviour | <ul style="list-style-type: none"> <li>• System locked for 10 minutes</li> <li>• If 3 faults occur within 60 minutes, switch to frost protection fault</li> </ul> | <ul style="list-style-type: none"> <li>• System lockout</li> <li>• Unlock by pressing the reset switch</li> </ul> |
| Cause of fault      | <ul style="list-style-type: none"> <li>• Lack of heat absorption at the indoor unit</li> <li>• Heat source too cold</li> </ul>                                    |                                                                                                                   |
| Troubleshooting     | <ul style="list-style-type: none"> <li>• Checking the heat source (temperatures, pumps, heat exchangers)</li> <li>• Bleeding</li> </ul>                           |                                                                                                                   |

### 7.1.7 INCREASED GAS CONTENT

| Fault message                      | Fault description                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fault: increased gas concentration | The gas sensor detects a refrigerant leak.                                                                                                                                                                                                                                                                                                                                       |
| Heat pump behaviour                | <ul style="list-style-type: none"> <li>• System lockout</li> <li>• Switches to safety mode: fan starts</li> <li>• Unlock by pressing the reset switch: may be pressed once; if the propane concentration remains too high, the system remains locked</li> <li>• In this case, the system may only be unlocked by a specialist company once the leak has been repaired</li> </ul> |
| Cause of fault                     | <ul style="list-style-type: none"> <li>• Propane sensor detects escaping refrigerant</li> </ul>                                                                                                                                                                                                                                                                                  |
| Troubleshooting                    | <ul style="list-style-type: none"> <li>• Leak detection using a suitable propane detector</li> </ul>                                                                                                                                                                                                                                                                             |

## 7.1.8 PRESSURE CHECK

| Fault message Fault description | Pressure check Fault                                                                                                                                                                                                                                    |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 | The pressure on the hydraulic side is too high or too low.                                                                                                                                                                                              |
| Behaviour of the heat pump      | <ul style="list-style-type: none"> <li>• System lockout</li> <li>• Unlock by pressing the reset switch</li> </ul>                                                                                                                                       |
| Cause of fault                  | <ul style="list-style-type: none"> <li>• Damage to the condenser</li> <li>• Refrigerant is flowing into the load circuit</li> <li>• Safety valve on the sink side opens</li> <li>• Leak in the cooling circuit; heating water leaks out</li> </ul>      |
| Troubleshooting                 | <ul style="list-style-type: none"> <li>• Check the heating pressure</li> <li>• Check for leaks using a suitable propan detector</li> <li>• Replace the condenser</li> <li>• Replace the safety valve</li> <li>• Flushing the heating circuit</li> </ul> |

## 7.1.9 FLOW CHECK

| Fault message Fault description | Flow control fault                                                                                                                                                                                                                                              |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 | Flow on the hydraulic side is too low.                                                                                                                                                                                                                          |
| Behaviour of the heat pump      | <ul style="list-style-type: none"> <li>• System lockout</li> <li>• Unlock by pressing the reset switch</li> </ul>                                                                                                                                               |
| Cause of fault                  | <ul style="list-style-type: none"> <li>• Leak on the lowering side</li> <li>• Incorrectly switched or closed valves/components in the lowering circuit</li> <li>• Safety valve on the lowering side was open</li> <li>• Air in the hydraulic circuit</li> </ul> |
| Troubleshooting                 | <ul style="list-style-type: none"> <li>• Check the hydraulic circuit</li> <li>• Repair the leak</li> <li>• Replace the safety valve</li> <li>• Bleeding the hydraulic circuit</li> </ul>                                                                        |

## 7.1.10 NEGATIVE PRESSURE

| Fault code Fault description | Fault: Negative pressure                                                                                                                                                                                                                      |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              | Negative pressure in the housing is no longer present                                                                                                                                                                                         |
| Behaviour of the heat pump   | <ul style="list-style-type: none"> <li>• System lockout</li> </ul>                                                                                                                                                                            |
| Cause of fault               | <ul style="list-style-type: none"> <li>• Unlock by pressing the reset switch</li> <li>• Enclosure doors were opened</li> <li>• Leak in the refrigeration circuit</li> <li>• Fan failure</li> <li>• Enclosure is no longer airtight</li> </ul> |
| Troubleshooting              | <ul style="list-style-type: none"> <li>• Leak detection using a suitable propane detector</li> <li>• Test the fan for proper operation</li> <li>• Check the housing for leaks</li> </ul>                                                      |

## 7.2 CLEANING

### 7.2.1 CLEANING THE HEATING SIDE

- Cleaning: to be carried out by a plumber
- Flushing unit: Connect to the condenser's supply and return pipes
- Condenser: Flush in the opposite direction to the normal flow (take the gravity brake into account)

### 7.2.2 CLEANING THE HEAT PUMP

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



#### NOTE

##### Improper cleaning

Using the wrong cleaning products can damage the unit's surfaces. Please note the following:

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



#### NOTE

##### Limescale deposits

Limescale deposits can cause the safety valve to become stuck.

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

## 7.3 HEAT PUMP LEAK TEST

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

- DIN EN 378:2000 'Refrigerating systems and heat pumps – Safety and environmental requirements'
- VDMA Standard Sheet 24243 (August 2005) "Refrigeration Machinery and Systems – Leak-tightness of Refrigeration Systems and Heat Pumps – Leak Detection/Leak Testing"



#### NOTE

##### Leak test

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

## 7.4 SYMBOLS ON THE UNIT

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

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

As the design of the equipment and the complexity of the production processes do not permit the use of people with disabilities (e.g. those with visual impairments) for safety reasons, the manufacturer has chosen not to include tactile symbols. The requirements for staff and the professional qualifications required to operate the equipment are set out in Chapter 2.3 'Target Groups'.

## 7.5 MAINTENANCE SCHEDULE

**DANGER!** Do not put the equipment into operation if any faults are found.

| Maintenance work:                      | Measures                                                                                                                                                                                                                                                              | Interval    |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| operators and owners                   |                                                                                                                                                                                                                                                                       |             |
| Visual and functional inspection       | <ul style="list-style-type: none"> <li>Check the unit for any visible external defects and mechanical damage.</li> <li>Carry out a visual inspection of the control elements.</li> <li>Carry out a visual and functional inspection of all safety devices.</li> </ul> | Monthly     |
| Cleaning the unit                      | <ul style="list-style-type: none"> <li>Follow the instructions in section 7.2 'Cleaning'.</li> </ul>                                                                                                                                                                  | As required |
| Qualified personnel                    |                                                                                                                                                                                                                                                                       |             |
| Inspection of electrical components    | <ul style="list-style-type: none"> <li>Check the electrical components for damage.</li> <li>Carry out any necessary repairs.</li> </ul>                                                                                                                               | annually    |
| Inspection of hydraulic components     | <ul style="list-style-type: none"> <li>Check the hydraulic components for damage.</li> <li>Carry out any necessary repairs.</li> </ul>                                                                                                                                | y           |
| Inspection of refrigeration components | <ul style="list-style-type: none"> <li>Check the refrigeration components for damage.</li> <li>Carry out any necessary repairs.</li> </ul>                                                                                                                            | annually    |
| Inspection of safety devices           | <ul style="list-style-type: none"> <li>Carry out a visual and functional inspection of all safety devices.</li> <li>Document these checks.</li> </ul>                                                                                                                 | y           |
| Inspection of symbols on the unit      | <ul style="list-style-type: none"> <li>Check the symbols on the unit.</li> <li>Replace the symbols if necessary.</li> </ul>                                                                                                                                           | annually    |
| Inspection of purchased components     | <ul style="list-style-type: none"> <li>Follow the manufacturer's documentation for third-party components.</li> </ul>                                                                                                                                                 | y           |
|                                        |                                                                                                                                                                                                                                                                       | annually    |
|                                        |                                                                                                                                                                                                                                                                       | annually    |
|                                        |                                                                                                                                                                                                                                                                       | annually    |

## 8. DECOMMISSIONING

When the heat pump is taken out of service, dismantling of the unit must only be carried out by qualified personnel. Hazardous substances and waste must be disposed of properly. When dismantling the heat pump, follow the instructions at the start of the original operating manual and the safety instructions listed below.



### DANGER

Fatal electric shock

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

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

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

### 8.1 TEMPORARY TAKING OUT OF SERVICE

This unit contains the flammable refrigerant R290 and must therefore not be taken out of service temporarily. The safety devices (such as the gas sensor, ventilation of the refrigeration compartment, pressure monitoring, etc.) must remain switched on at all times, even if the heat pump is not required, e.g. in summer. The heat pump must only be authorised to start up.



### NOTE

Improper decommissioning

Improper deactivation of the unit may result in damage to components, impaired functionality and safety risks.

Do not disconnect the unit from the mains.

Please observe the following instructions:

- Frost may cause damage to the device.
- Water freezes at outdoor temperatures below 0 °C.
- Taking the unit out of service without draining the heating circuit is only permitted at temperatures above 0 °C.
- Refrigerant leaks cannot be detected when the unit is disconnected from the mains.

### 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 fluids and components in accordance with current standards must be observed. The refrigerant must first be extracted and the refrigeration circuit properly evacuated before the system is disconnected from the mains.



### NOTE

Improper disposal

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

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

## 9. EC DECLARATION OF CONFORMITY

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

### Manufacturer

ratiotherm GmbH & Co. KG  
Wellheimer Straße 34  
91795 Dollnstein

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

that the device:

Device designation: **WP Max-HiQ pF67 and WP Max-LoQ pF67**  
Year of manufacture: see type plate  
Intended use: The heat pump uses ambient heat to provide supplementary heating and domestic hot water supply.

In the version supplied, it complies with the directives

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

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

### Harmonised standards applied:

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

- DIN EN 80079-36
- DIN EN 1127
- DIN EN 60079

### Relevant EC Directives & Regulations

- Directive 2014/30/EU
- Directive 2014/35/EU
- Directive 2014/68/EU
- Directive 2009/125/EC
- Directive 2011/65/EU
- Directive 1999/92/EU
- Directive 2014/34/EU
- Directive 2006/42/EC
- Regulation 2024/573
- Regulation 2023/988

Technical documentation is available. Name and address of the person authorised to compile the technical documentation and to issue this declaration on behalf of the manufacturer or their authorised representative:

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

We hereby certify that the certification procedure has been carried out in accordance with the Low Voltage Directive 2014/35/EU, Annex IV, and the Pressure Equipment Directive (2014/68/EU), and that the provisions of standard DIN EN ISO/IEC 17050-1 'Conformity assessment – Supplier's declaration of conformity – Part 1: General requirements' have been observed in issuing this declaration of conformity. Should any modification be made to the equipment without our prior agreement, this declaration shall cease to be valid. Any unauthorised modification of this nature shall exclude any liability on our part.

Dollnstein, on \_\_\_\_\_ Signature of authorised representative: \_\_\_\_\_

## 10. NOTES

[illegible]





# You can find us here



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