

Manual for Installation, Use and Maintenance

Commercial Air-Water Heat Pumps

WPL-45-K1 HT
WPL-70-K1 HTT
WPL-90-K1 HTT

The manual has to be handed over to the end user after installation.

ENG

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WPL-45-K1 HT / WPL-70-K1 HTT / WPL-90-K1 NTT

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1. Important information

The manual describes the process of installation and maintenance of the device. The installation and maintenance can only be performed by qualified personnel. Read the manual carefully before the installation, this way you will be informed about the intended use, functionality and process of handling the device.

- ▶ The manual has to be handed over to the end user after installation.
- ▶ In case the product shall be given to a third person for use, the manual has to be handed over to them as well.

Definitions

- ▶ An informed person is a person who reads this manual.
- ▶ A qualified person has a certificate of expert qualifications.
- ▶ An authorised commission contractor is trained by the manufacturer and authorised to perform commission.
- ▶ The authorised technician is trained and authorised by the manufacturer to perform maintenance and servicing of the device.
- ▶ The user uses the device according to its use.
- ▶ The installer is a person professionally trained for performing hardware and/or electro-installation work and mounting of the device.

Incorrect use of the device can lead to damage of the device, property or injury to the user. To reduce risk the manual points out important information with the use of symbols.

1.1 Symbols



These symbols mark various risks for the user or the device.

DANGER: Risk of situations which can lead to serious physical injuries.

WARNING: Risk of situations which can lead to minor physical injuries.

CAUTION: Risk of situations which can lead to damage or malfunction of the device.



This symbol marks information for the user.

NOTE: A notice which holds important information regarding requirements of the manufacturer.

1.2 General



NOTE

Read the instructions for use and installation before installation.



NOTE

Any remaking or replacement of original components of the device eliminates the manufacturer's guarantee for safe and functional operation. In the case of undesignated and incorrect use of the device the manufacturer is not responsible for the consequences and will not acknowledge claims for damages in these cases. The user is solely responsible for injuries and damages on the device itself or on other objects resulting from undesignated and incorrect use of the device.



NOTE

The installation of the device has to be performed in accordance with the manual; otherwise the manufacturer does not acknowledge the warranty.



NOTE

The device is designed for yearly use of 2000 hours. Choosing an inadequate power of the device can lead to yearly operation of above 2000 hours which will reduce the lifespan of the device.



NOTE

Devices with the rated current higher than 16 A are in accordance with IEC 61000-3-12.



NOTE

After connecting the device it is necessary to acquire the guarantee or consult the operator of the distribution network that the impedance of the network is lower than prescribed for the individual type of device in the technical data. This way the device will operate within acceptable limits of disruptions. Otherwise it is necessary to connect the device to the network using a soft start device.



DANGER

Failure to comply with the manual and good practise while connecting the device to the power supply can lead to serious injury or death.



WARNING

Connecting the device to the power source can only be performed by a qualified installer.

1.3 Safety warnings and instructions



DANGER

It is prohibited to move, shift, clean or service the device while in operation.

**WARNING**

It is prohibited to play with the device. Children are not allowed to clean the device without supervision.

**WARNING**

The device can be operated independently only by informed persons who are familiar with the safe operation of the device and understand possible hazards of its operation. Children older than 8 and people with reduced physical and mental capacities and with lack of experience and knowledge can only operate the device under the supervision of an informed person.

**WARNING**

Before installation and any further adjustments to the device it is necessary to consider the manual for safe use and maintenance.

**WARNING**

Installation has to be performed in accordance with national regulations on electrical installations and with the instructions of the manufacturer. It has to be performed by a professionally trained person.

**CAUTION**

The servicing and maintenance of the device can only be performed by a person authorised by the manufacturer. In case of a malfunction, first contact the installer who installed the device.

**WARNING**

It has to be made sure that the device does not endanger anybody. Access to the device has to be denied to children and persons who are not informed about the operation of the device.

**WARNING**

The device must never be cleaned with cleaning agents containing sand, soda, acid or chlorides because these might damage the surface of the device.

**WARNING**

The device contains fluorinated greenhouse gas. This is why tampering with the device is only allowed to persons authorised for working with the refrigerant as defined by the national legislation in force. While performing works on the device, it is necessary to prevent the refrigerant to leak into the atmosphere.

**WARNING**

It is necessary to consider all technical data and instructions in this manual as well as all warnings and notes during planning, design, installation and use of the device.

**WARNING**

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Electrical installations have to be inspected in accordance with regulations on the requirements for low voltage electrical installations in buildings by the installer of electrical installations.



DANGER

Connecting the device power cable can be performed by a qualified electrician. During the procedure the device must not be live.



WARNING

In case the power cable of the device is damaged it has to be immediately replaced. The replacement can only be performed by the installer or authorised maintenance worker.



WARNING

Before opening the device disconnect all electrical circuits and make sure the device is not live.



CAUTION

Putting any kinds of items on or next to the device is prohibited.



CAUTION

In case the device is placed on the ground which is more subject to the transfer of vibrations than a classical concrete panel with a screed, it is necessary to underlay the device with a suitably thick and quality anti-vibration underlay.



CAUTION

The device must not be placed in a room where it cannot be removed. Later walling or setting up of other obstacles next to the device is forbidden.



CAUTION

In three-phase versions of the device it is necessary to ensure the correct arrangement of phases when connecting it to the power supply.



CAUTION

For the correct operation of the device, the electrical distributor has to provide electricity of adequate quality (SIST EN 50160). In normal conditions this is within $\pm 10\%$ of the rated voltage. The data about the state of the electrical grid have to be acquired from the electrical distributor.



CAUTION

Operation of the device with a frequency converter is forbidden.



CAUTION

Connecting the device to the electrical network has to be performed in accordance with the standards for connecting devices to the electrical network. Connect the device to the electrical network via the power supply cut-off which is installed into the electrical installation under the regulations in force.

1.4 Obligations of the manufacturer

The manufacturer guarantees that the device is in accordance with current European directives and standards. The device is marked with the mark CE and it has all the necessary documentation.

We reserve the right to make changes to the manual without prior notice.

As manufacturer we do not take responsibility for the consequences arising from:

- ▶ Non-compliance with the manual for the device.
- ▶ Incorrect and/or inadequate maintenance of the device.
- ▶ Non-compliance with the manual for the installation of the device.

1.5 Obligations of the installer during installation

The installer is responsible for installing the device in accordance with the following requirements:

- ▶ To thoroughly study the instructions for use and installation accompanying the device before installation.
- ▶ To install the device in accordance with the instructions and national legislation, policies and standards in force.

1.6 Obligations of the authorised contractor for commissioning at first commission.



CAUTION

The first commission can only be performed by the contractor of commissions appointed by the manufacturer in accordance with the instructions for commission.

The contractor for commissions is responsible for commissioning the device in accordance with the following requirements:

- ▶ Performs the first commission and with the installer of others section of heating system eliminates all eventual irregularities found at the commission.
- ▶ To train the user for operating the device and settings.
- ▶ Alerts the user to regularly maintain the device for keeping the device functioning properly throughout its entire lifespan.
- ▶ Gives the user all the documentation accompanying the device.

1.7 Obligations of the user

For ensuring unobstructed and effective operation of the device the user has to follow the following instructions:

- ▶ To thoroughly study the instructions for use and installation accompanying the device before use.
- ▶ To have a qualified and authorised installer perform the installation of the device.
- ▶ To have a contractor for commissions perform the commission.
- ▶ Allow the authorised contractor for commissioning or ask him to thoroughly explain the functioning and how to operate the device.
- ▶ Ensure regular yearly inspections and maintenance of the device by the authorised maintenance worker.
- ▶ Store this manual in an appropriate dry place close to the device.

1.8 Factory testing

For ensuring the high quality standard every device is tested in production for the following:

- ▶ Tightness of the cooling cycle,
- ▶ Water-tightness
- ▶ Electrical safety and
- ▶ Functionality.

2. Transport and installation of the device

2.1 Transport



CAUTION

- ▶ The device must be transported with transport devices.
- ▶ Secure the device during transport to prevent damage.
- ▶ Transport the device in vertical position.
- ▶ It is prohibited to tilt the device above 45°. Otherwise, damage to the cooling system may occur.

2.2 Installation of the device



NOTE

When installing the device, it is necessary to take into account that the centre of gravity is not in the middle of the device. To help manipulating the device, there are stickers on the device indicating the centre of gravity.



CAUTION

Installation can only be performed with a forklift or mobile crane. Other installation methods are not permitted.



CAUTION

Appropriate transport equipment must be used for installing the device. Safety regulations and good practise have to be followed.

2.2.1 Installing the device with a forklift



When inserting the forks of the forklift under the device, care must be taken not to damage the heating cable (green colour) intended for preventing freezing in the condensate drainage pipe.

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2.2.2 Installing the device with a mobile crane

To manipulate the device with a mobile crane, the so-called manipulation equipment provided by the manufacturer of the device and shipped on customer demand must be used on the site. The customer must return the equipment after completing the installation of the device.

Manipulation equipment



Preparing the device for transport

Two U-profiles are inserted through the out-most supporting legs. The U-profiles serve as leads for the connecting straps, they also protect against damage because there are screws on the bottom of the device which could tear the straps.



The transport frame is fixed to the mobile crane on the ground and is then lifted above the device; it is then secured to the device with the straps. The transport frame must be positioned approx. 20 cm above the device. The transport frame must not be placed or laid against the roof of the device because this could lead to damage of the roof.



Devices with higher power are manipulated in the same manner as those with lesser power (described above), but the transport frame used is bigger, and an additional strap and U-profile are used (picture below).



2.3 Storing and warehousing of the device

The device has to be stored in a dry and clean place. The allowed storing temperature is between 10 °C and 45 °C, for a short period (up to 24h) also up to 50 °C.

3. Delivery package

3.1 The delivery package includes

- ▶ Compact heat pump (device) for external installation (external unit).



- ▶ Controller unit TERMOTRONIC 3000 (internal unit)
- ▶ Manipulation equipment (see chapter 2.2.2).
- ▶ Manual for Installation, Use and Maintenance.
- ▶ Instructions for use.
- ▶ Filter (optional).
- ▶ Rubber compensator or flexible pipe (optional).
- ▶ Circulation pump (optional).

3.2 Internal unit

The internal device is installed depending on the design of the heating system:

- ▶ Basic wall control unit TT3000 - see **Manual for Installation, Use and Maintenance of the Wall Control Unit TT3000**,
- ▶ Expansion wall control unit TT3000 - see **Manual for Installation, Use and Maintenance of the Expansion Wall Control Unit TT3000**,

3.3 Package and worn-out device management

- ▶ Sort the package according to cardboard, wood and foil and dispose of it in appropriate containers.
- ▶ After the lifespan of the device ends it has to be disposed of in accordance with the legislation on waste electrical and electronic devices in force.

Coolant

The device holds the fluorinated greenhouse gas. You have to prevent leakage of the gas into the atmosphere. During a maintenance procedure or removal of the device it has to be made sure that the gas is removed in accordance with the current regulations on the use of substances harmful to the ozone and fluorinated greenhouse gasses.

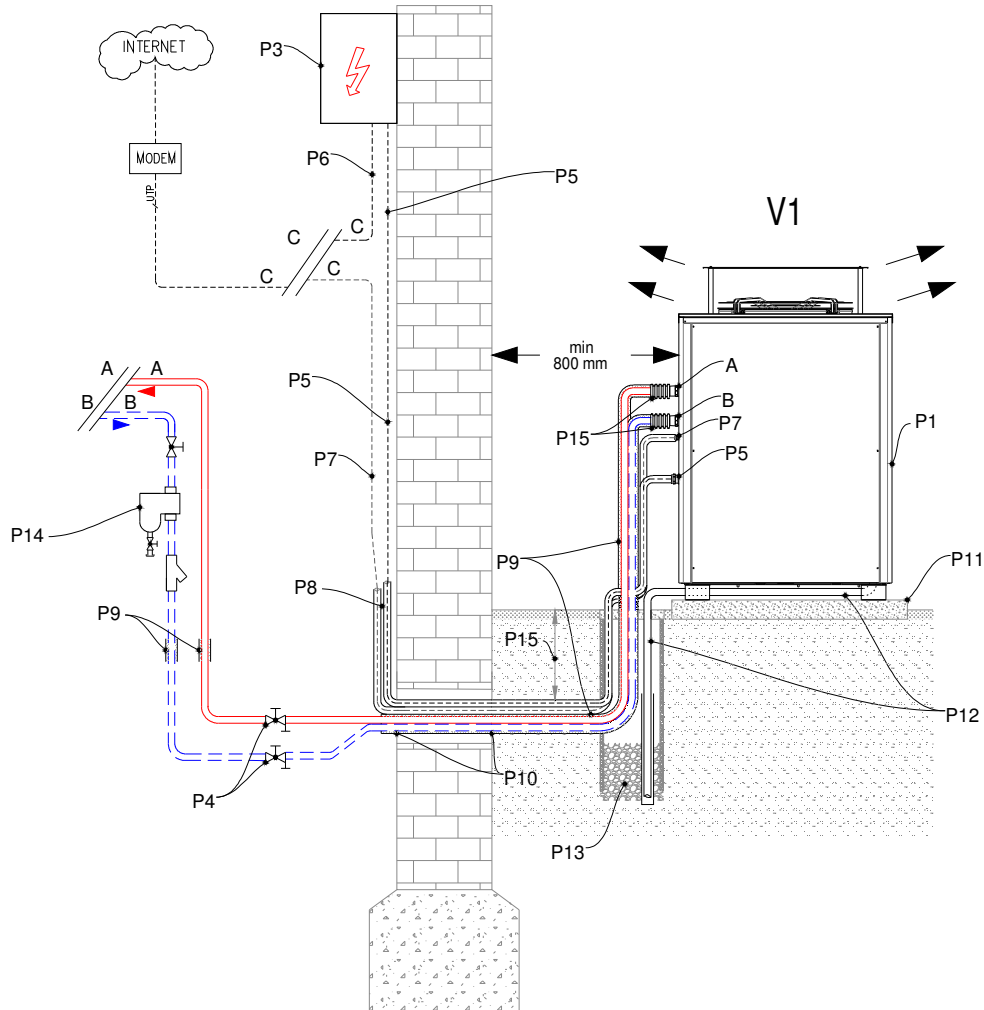
4. Installation of the device

The device is installed on the open, as close to the DHW room of the main building as possible (this lowers energy losses) and is connected to the heating system.

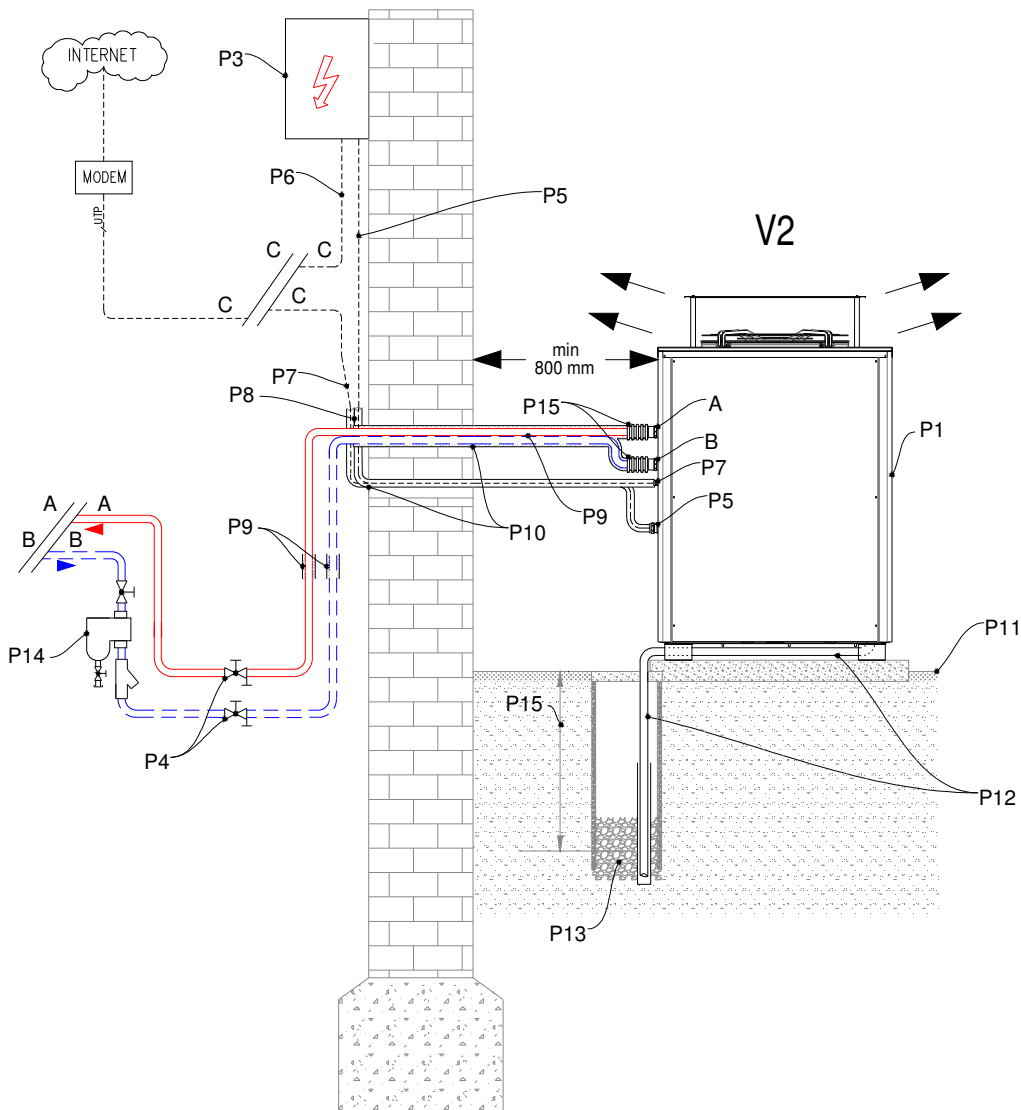
4.1 General

The device enables a machine connection with the DHW room from the bottom (INSTALLATION-V1) and back (INSTALLATION-V2) side.

INSTALLATION-V1



INSTALLATION-V2



| | | | |
|----|--|-----|--|
| A | Supply pipe (heating) | P8 | An adequate protection hose separate for power / communication |
| B | Return (heating) | P9 | Heat insulation with suitable protection (i.e. ALU harness) |
| C | Control unit TT3000, TT3003 | P10 | Wall penetrations must be water-proofed and adequately insulated |
| P1 | Heat pump - external device | P11 | Concrete pedestal for the device |
| P3 | Electrical cabinet | P12 | Condensate drainage (must be routed into the sink or rain water drain) |
| P4 | The closing valve with exhaust has to be installed lower than the pipe connections on the device | P13 | Sink |
| P5 | Power cable - external control unit | P14 | Magnetic separator of impurities |
| P6 | Power cable - internal control unit | P15 | Rubber - compensators |
| P7 | Communication cable - connection between external and internal unit | P16 | Frost limit (depending on the geographical location) |

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Devices for external installation must be placed on a level concrete foundation (chapter 4.2.4). For exact position and dimensions of pipe connections, see dimensional drawings of the device (chapter 7.1). Along with pipes for the hydraulic connection, install also pipes with wire rope (it is advisable to separate the power / sensors). This wire rope is used to pull the device's power supply cable from the DHW room and the communication FTP cable for controlling the device. For the appropriate diameter of the power cable, see technical data (chapter 7.2).

Make a sink for the condensate forming in the evaporator of the device underneath the concrete foundation. The sink must be under the frost limit to ensure unobstructed drainage. The pipe for condensate drainage must be installed lower than the hardware connections of the DHW room and device. It can also be routed to the rain water sink; in this case freezing of the pipe must be prevented.



WARNING

If the condensate drainage is fed to faecal sewage, a suitable syphon must be installed on the drainage pipe. Otherwise, the presence of ammonia can lead to corrosion of vital parts of the device and malfunction of the device.

4.2 Location of the device



CAUTION

- ▶ The concrete pedestal must carry the weight of the device. See technical information.
- ▶ The device must be screwed to the concrete pedestal because of the possibility of strong gusts of wind.
- ▶ The device must be levelled



NOTE

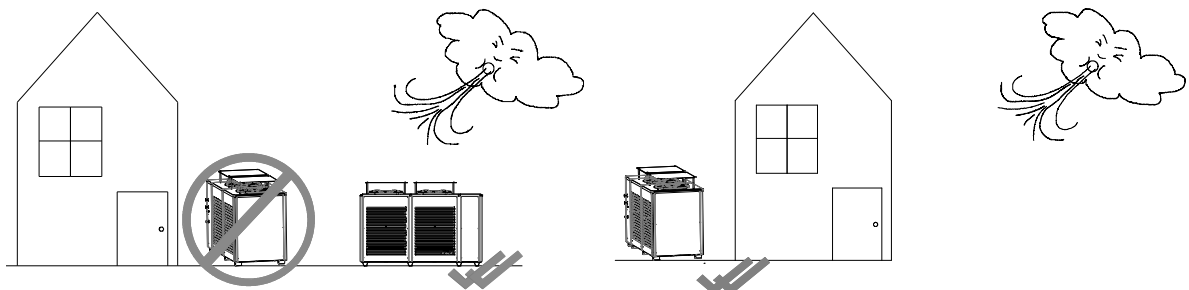
It is obligatory to consider the minimal clearance from obstacles for ensuring unobstructed access for maintenance and service of the device.



NOTE

The location of the device has to be accessible with manual transport devices to ensure undisturbed delivery of replacement parts and equipment for maintenance and servicing. Costs connected with hiring special equipment for installing the device, servicing and maintenance are charged the operator separately and are not subject of the warranty.

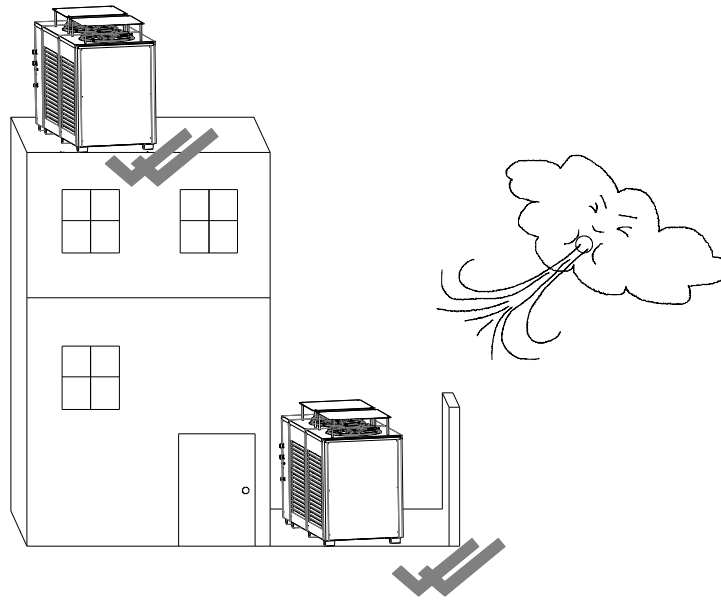
The device must not be set up at a location which is subject to stronger and lengthy gusts of wind (i.e. bora wind); they could obstruct the normal air circulation through the evaporator which could result in disruptions in operation.



In case the device is installed in the wind direction, it is necessary to install adequate wind protection.

- ▶ Wind protection must be robust enough to prevent the influence of the wind. The best option is a concrete or brick version.
- ▶ The height and width of the wind protection must be at least 150% of the basic dimensions of the device. Only these dimensions enable adequate wind protection of the device.

- ▶ The wind protection must be located at least 3000 mm away from the external unit to ensure sufficient air flow.

**NOTE**

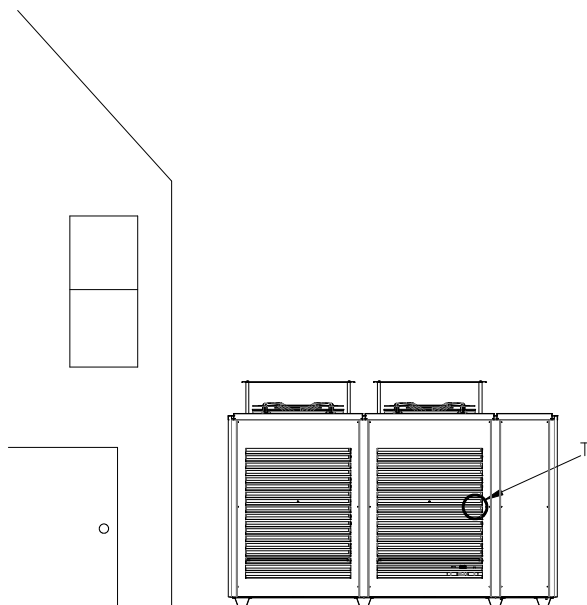
The device must be set up in a leeward location.

**CAUTION**

The device must be placed in such a manner that the external air temperature sensor is **on the shady side**.

**NOTE**

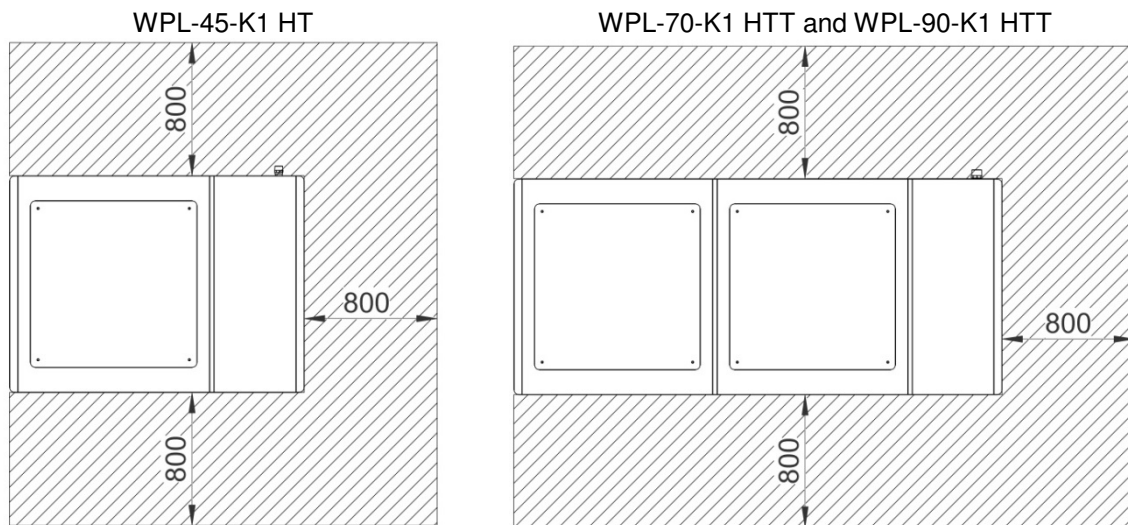
Salt or dust gathering on the outer heat conductor must be regularly cleaned (dust once yearly and salt in coastal regions at least three times yearly) or rinsed with water.

**T**

Temperature sensor

4.2.1 Minimal clearance from the device

Minimal clearances of the external device from walls for seamless operation, maintenance and servicing.



NOTE

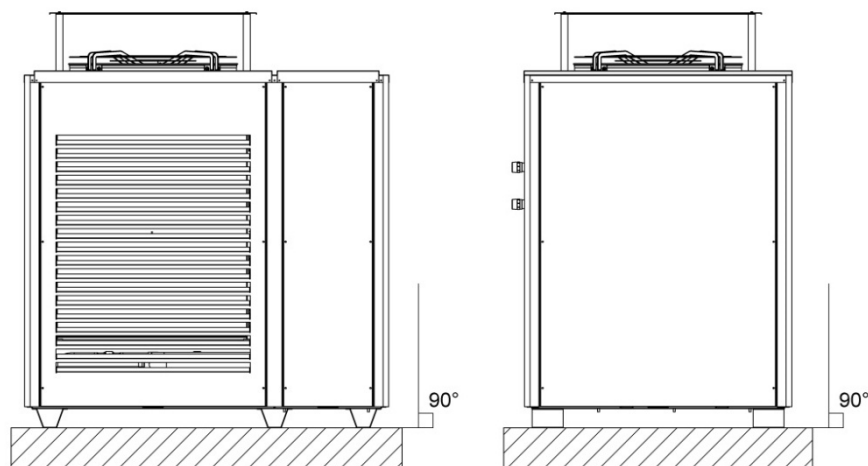
In case of an insufficient clearance of the device from the building, moisture and rain drops travelling with the air exhaust on the top of the device can damage the façade.

The clearances for the wall controller unit are listed in the documents:

- ▶ **Instructions for Installing the Basic Wall Control Unit TT3000 and**
- ▶ **Instructions for Installing the Expansion Wall Control Unit TT3003.**

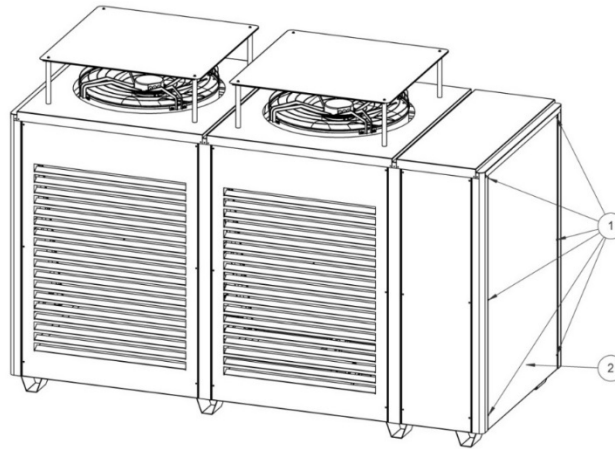
4.2.2 Levelling of the device

It has to be made sure all the elements installed are placed perpendicularly to the ground as shown in the scheme below:



4.2.3 Removal of side

- ▶ The installation power breakers must be in the “OFF” position.



- ▶ Unscrew the screws marked with 1 on the right side of the device.
- ▶ Pull the lower part of the side (2) towards you and disconnect it from the device's cover.

4.2.4 Concrete pedestal

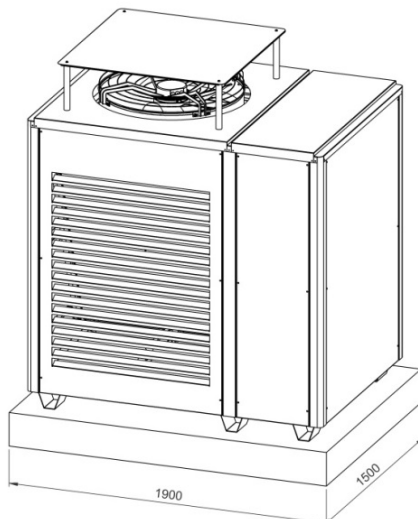
The installation (connections above or below ground) routed from the DHW room to the device does not influence the make of the concrete pedestal.

To ensure greater protection against freezing, installation using an underground cable duct is recommended.

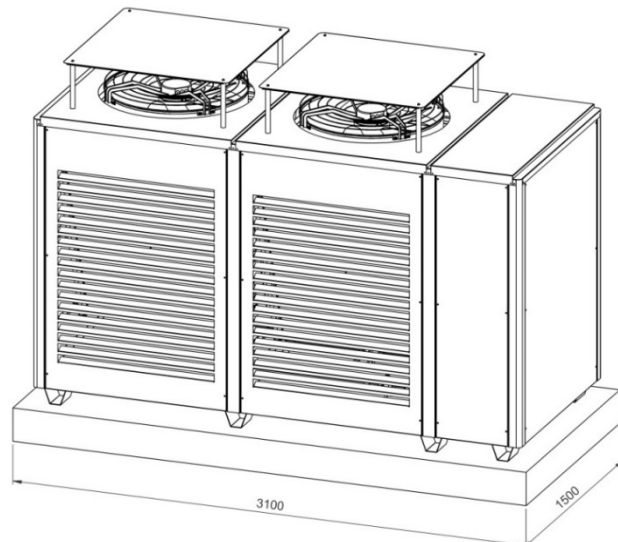
Installation of the concrete pedestal

The reinforced concrete pedestal must be installed on a suitable buffered base. The recommended minimal edge thickness of the concrete pedestal is given by the design engineer according to the mass of the device (chapter 7.2).

WPL-45-K1 HT



WPL-70-K1 HTT and WPL-90-K1 HTT



CAUTION

The device must be screwed on the left and right side through the supporting legs to the concrete pedestal because of the possibility of stronger gusts of wind.

4.3 Hydraulic connection of the device

Connect the external unit to the heating system with water pipes of appropriate dimensions (see technical data - chapter 7). The pipes have to be insulated with insulation which is at least 13 mm thick and resistant to weather-proof. The hydraulic connection of the system is made via a transitional pipe connection on the device.

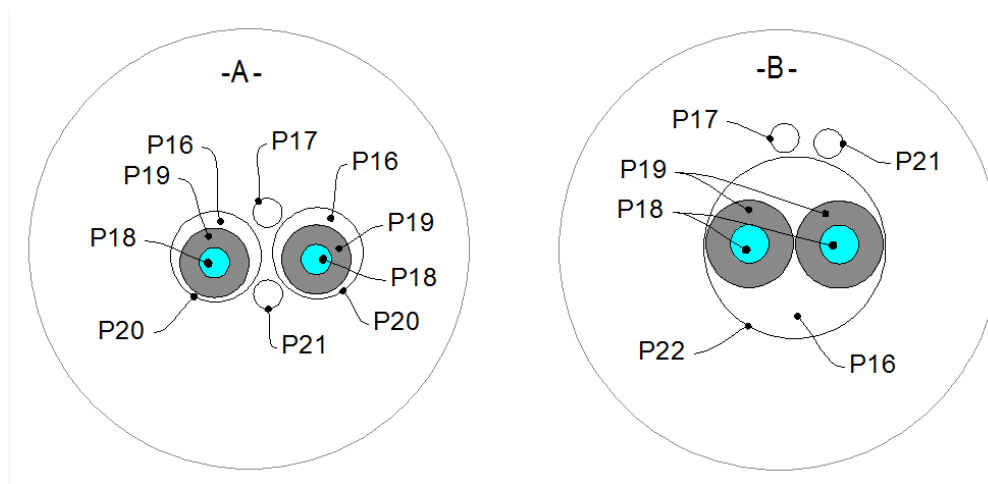


CAUTION

The water pipes must not be installed alongside the heating in the screed or alongside any kind of source of heat or cold.

External pipe connection

The pipe connection between the DHW room and the device can be made using two ribbed pipes (A) or one separate ribbed pipe (B).



| A | External pipe connection | B | External pipe connection |
|-----|--|-----|--|
| P16 | Fill with waterproof polyurethane foam, i.e.: purpen | P20 | Ribbed protective pipe min. ϕ 100 |
| P17 | Communication cable protective pipe | P21 | Power cable protective pipe |
| P18 | Pipe - min. DN25 i.e.:(Cu-28, Alumplast-32) | P22 | Ribbed protective pipe min. ϕ 150 |
| P19 | Insulation at least 13 mm | | |

For unobstructed and safe operation it is important to have a heat accumulator. The accumulator is needed for the hydraulic balancing, ensuring unobstructed flow and defrosting and a longer lifespan of the device. A larger accumulator ensures a more even temperature of heating and more comfort. The accumulator is dimensioned to provide at least 10 litres per kW of heating power under the condition of A2W35.



WARNING

Before connecting the device, it is necessary to rinse the pipe system thoroughly and remove impurities (hard particles, oils, greases ...).



CAUTION

The closing valve with exhaust has to be installed lower than the pipe connections on the device.

4.4 Heating system of machine installations



WARNING

The dimensioning of circulation pumps, valves, safety elements and pipes has to be performed by the designing engineer according to the heating/cooling capacity of the device.

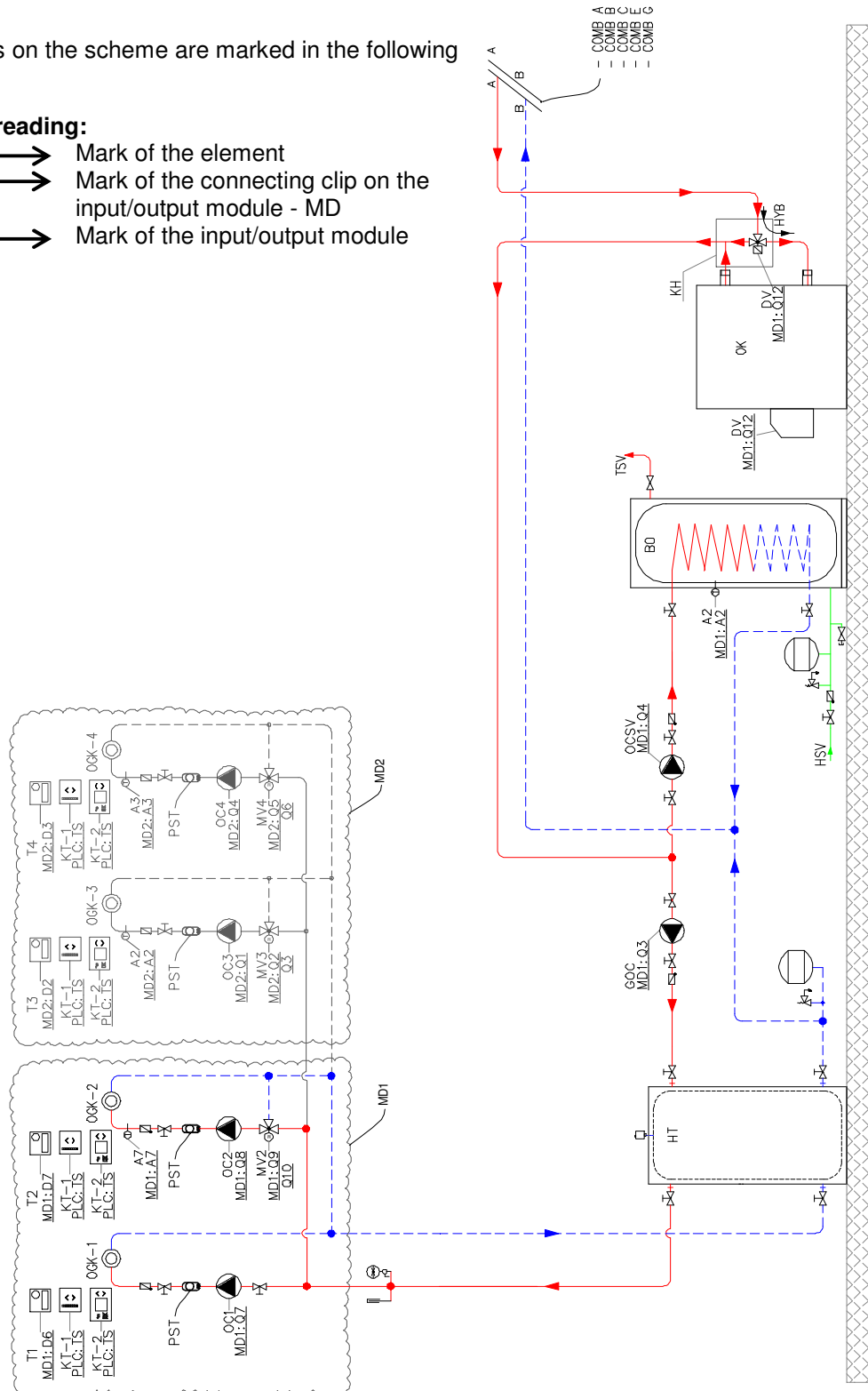
4.4.1 The scheme of the heating system

Below you can see an example of the basic hydraulic and control scheme of the heating system. For other circuits see **The Catalogue of Hydraulic Circuit Diagram**.



















The elements on the scheme are marked in the following manner:

Legend of reading:

- GOC** → Mark of the element
- MD1:Q3** → Mark of the connecting clip on the input/output module - MD
- Mark of the input/output module



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| ELEMENTS | CONNECTING CLIPS | MARK | CHARACTERISTICS |
|---|----------------------------|---|---|
| | | COMB A - G | Connection to various types of heat pumps |
| | | A | The device's supply pipe |
| | | B | The device's return pipe |
| OK | | | Current oil DHW |
| SP | | | Backup source |
| HT | | | Buffer tank for DHW |
| TSV | | | Warm sanitary water |
| BO | | | Boiler for sanitary water |
| HSV | | | Cold sanitary water |
| OCSV | | | Circulating pump for DHW |
| GOC | | | Main circulation pump |
| PLC | | | Processing unit |
| KT-1 | | | Room temperature corrector KT-1 (can be used in all heating cycles) |
| KT-2 | | | Room temperature corrector KT-2 (can be used in all heating cycles) |
| TS | | | Connector on PLC |
| | Q1-Q12 | | Digital outputs of regulation ~ 230 V (input/output module MD1 and MD2) |
| | A1-A8 | | Analogue input (input/output module MD1 and MD2) |
| | D1-D9 | | Digital input (input/output module MD1 and MD2) |
| HYB | | | Switch to hybrid operation |
| KH | | | Krono-hybrid |
| MD1 | | | Basic input/output module 1 |
| T1 | | | Thermostat of heating cycle 1 |
| T2 | | | Thermostat of heating cycle 2 |
| OC1 | | | Circulation pump of heating cycle 1 |
| OC2 | | | Circulation pump of heating cycle 2 |
| MV2 | | | Mixing valve of heating cycle 2 |
| OGK-1 | | | Heating cycle 1 |
| OGK-2 | | | Heating cycle 2 |
| MD2 | | | Expansion input/output module 2 |
| T3 | | | Thermostat of heating cycle 3 |
| T4 | | | Thermostat of heating cycle 4 |
| OC3 | | | Circulation pump of heating cycle 3 |
| OC4 | | | Circulation pump of heating cycle 4 |
| MV3 | | | Mixing valve of heating cycle 3 |
| MV4 | | | Mixing valve of heating cycle 4 |
| OGK-3 | | | Heating cycle 3 |
| OGK-4 | | | Heating cycle 4 |
| PST | | | Pipe safety thermostat |
| MARK | CHARACTERISTICS | MARK | CHARACTERISTICS |
|  | Closing valve |  | Manometer |
|  | Circulation pump |  | Temperature sensor |
|  | Closing valve with exhaust |  | Thermometer |
|  | Drain valve with plug |  | Consumer of heat / coolness |
|  | Cleaning piece |  | Automatic vent |
|  | Expansion tank |  | 3-way switching valve with em drive |
|  | Safety valve |  | 3-way mixing valve with em drive |
|  | Non-return valve |  | Supply pipe |
|  | Pipe safety thermostat |  | Return |



CAUTION

The supply pipe of each heating cycle must be fitted with an abutment safety thermostat connected sequentially with the circulation pump to safeguard against the inflow of a medium of excessive temperature.

4.4.2 Charging of the heating system



WARNING

Thorough venting of the system has to be ensured. Otherwise, malfunctions in operation may occur.



CAUTION

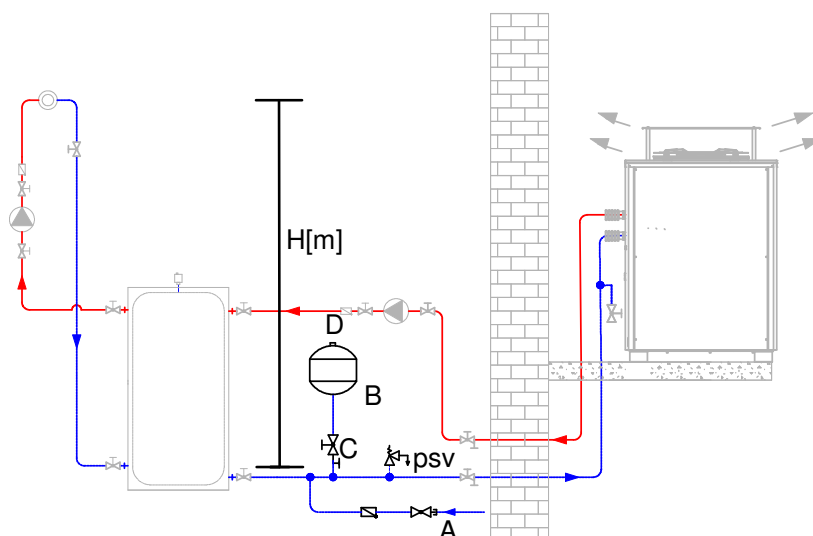
An expansion vessel of suitable dimensions must be fitted to the heating system. The expansion vessel must be dimensioned in accordance with standard EN 12828.



CAUTION

For normal operation of the expansion vessel, it is necessary to perform proper adjustments of the tank's working pressure. The settings have to be checked every 12 months.

The pressure settings of the expansion vessel and filling the heating system



A - Filling the system.
 B - Expansion vessel.
 C - Ball valve with exhaust.
 D - Air filling valve.
 H - Height of the heating system.
 p_{sv} - Pressure of the safety valve.



CAUTION

Consider the maximal operational pressure of the vessel.



NOTE

Unsuitable pre-load of the expansion vessel with the pressure p_0 is the reason for incorrect operation of the heating system.



NOTE

The dimensions of the expansion vessel must be in accordance with standard EN 12828.

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Setting the pressure for the expansion vessel p_0

- ▶ Before filling the system with water, check and set the pressure p_0 . The expansion vessel is factory set to the pressure specified on the standard label. For correct operation of the system, set the pressure p_0 according to the equation below. The filling must not exceed the maximal operational pressure specified on the serial label of the expansion vessel.
- ▶ Calculate the p_0 pressure value with the help of the equation:

$$p_0[\text{MPa}] = \frac{H[\text{m}]}{100} + 0,02 [\text{MPa}],$$
$$\left(p_0[\text{bar}] = \frac{H[\text{m}]}{10} + 0,2 [\text{bar}] \right).$$



CAUTION

If the calculation shows a pressure lower than 0,1 MPa (1 bar), set the pressure of the expansion vessel to 0,1 MPa (1 bar).

p_0 [MPa (bar)] – pressure in the expansion vessel,

$p_{0\text{min}}$ [MPa (bar)] – minimal allowed pressure of the heating system,

$p_{0\text{max}}$ [MPa (bar)] – maximal allowed pressure of the heating system,

H [m] – Height of the heating system.

- ▶ Set the amount of pressure in the expansion vessel by releasing or supplementing dry nitrogen.
- ▶ Record the new value of the pressure p_0 on the serial label.
- ▶ Open the ball valve of the expansion vessel carefully, open the vents and close the drain.

Filling the heating system

- ▶ Use the filling valve to fill the system with water of suitable quality (with anti-corrosion additives, etc.) to the pressure p_F .
 - ▶ $p_F[\text{MPa}] = p_0[\text{MPa}] + 0,03 [\text{MPa}]$,
 - ▶ $(p_F[\text{bar}] = p_0[\text{bar}] + 0,3 [\text{bar}])$.

p_F [MPa (bar)] – filling pressure,

p_0 [MPa (bar)] – pressure in the expansion vessel.

Filling the system to the final pressure

- ▶ The final pressure of the system is determined by heating the system to the maximal heating temperature (thermal degassing).
- ▶ Turn off the circulation pumps, open the vents and vent the system.
- ▶ Fill the system up to the final pressure which is 0,05 MPa (0.5 bar) lower than the venting pressure of the safety valve.
 - ▶ $p_E[\text{MPa}] \leq p_{\text{sv}}[\text{MPa}] - 0,05 [\text{MPa}]$,
 - ▶ $(p_E[\text{bar}] \leq p_{\text{sv}}[\text{bar}] - 0,5 [\text{bar}])$.

p_E – the final pressure of the system,

p_{sv} – the pressure of the safety valve.

4.4.3 Preparing the heating system – secondary

Prepare the system according to one of the recommended hydraulic schemes (**Catalogue of Hydraulic Wiring Diagrams**) which is specified by the manufacturer of the device. This is the only way to ensure reliable and effective operation of the device. After connecting the device to the heating system, it is necessary to examine all circulating pumps and electric motor valves if they function correctly.

The device must be connected to the heating system via rubber compensator or flexible pipes. The latter must not be under tension in final position, this would worsen the devices noise and vibration protection. In extreme cases this can also lead to damage to the device.

Quality of heating water

Maximal allowed content of individual substances in the heating water and the influence of these on the heat exchanger are presented in the table below. It is not allowed to use heating water which contains any substance in concentrations which cause corrosion in the heating system (influence “-”). It is also not allowed to use heating water which contains two or more substances in concentrations which could cause corrosion in the heating system (influence “0”).

| TYPE OF PRESENT SUBSTANCE | UNIT | CONCENTRATION | INFLUENCE TO THE HEAT CONDUCTOR |
|---|---------|---------------|---------------------------------|
| Organic sediment | mg / L | | 0 |
| Ammonia NH ₃ | mg / L | < 2 | + |
| | | 1 to 20 | 0 |
| | | > 20 | - |
| Chloride | mg / L | < 300 | + |
| | | > 300 | 0 |
| Allowed water hardness | °dH | 5 – 10 | |
| Electrical conductivity | µS / cm | < 10 | 0 |
| | | 10 to 500 | + |
| | | > 500 | - |
| Iron (Fe) removed | mg / L | < 0.2 | + |
| | | > 0.2 | 0 |
| Free carbonic acid | mg / L | < 5 | + |
| | | 5 to 20 | 0 |
| | | > 20 | - |
| Manganese (Mn) removed | mg / L | < 0.1 | + |
| | | > 0.1 | 0 |
| Nitrates (NO ₃) removed | mg / L | < 100 | + |
| | | > 100 | 0 |
| pH value | mg / L | < 7.5 | 0 |
| | | 7.5 to 9 | + |
| | | > 9 | 0 |
| Oxygen | mg / L | < 2 | + |
| | | > 2 | 0 |
| Hydrogen sulphide (H ₂ S) | mg / L | < 0.05 | + |
| | | > 0.05 | - |
| HCO ₃ ⁻ / SO ₄ ²⁻ | mg / L | > 1 | + |
| | | < 1 | 0 |
| Hydrogen carbonate | mg / L | < 70 | 0 |
| | | 70 to 300 | + |
| | | > 300 | 0 |
| Aluminium (Al) removed | mg / L | < 0.2 | + |
| | | > 0.2 | 0 |
| Sulphates | mg / L | < 70 | + |
| | | 70 to 300 | 0 |
| | | > 300 | - |
| Sulphite (SO ₃) | mg / L | < 1 | + |
| Chlorine (gas) (Cl ₂) | mg / L | < 1 | + |
| | | 1 to 5 | 0 |
| | | > 5 | - |

Table: Influence of various aggressive substances in the heating water on the stability of stainless copper welded plate transmitters. (+ = no influence, 0 = danger of corrosion, - = corrosion - use not permitted).

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CAUTION

The heating system has to be filled with water with the hardness between 5 °dH and 10 °dH. Malfunctions of the device because of water hardness are not covered by the warranty.

The quality of the water used in the heating system is very important. The water from the water supply is mostly not suitable for use in the heating system. To ensure adequate water hardness you must built the water softener into the system.

The heating systems must not be filled with dirty or corrosive water. The heating water must be prepared by adding anti-corrosion and anti-biological agents as well as agents against algae.



CAUTION

The water used for heating DHW via the built-in heat exchanger in the buffer tank for DHW has to be in accordance with the requirements of standard VDI 2035 and must not contain microorganisms. The heating system has to be filled with soft water which has been added anti-corrosion and antibacterial agents for preventing corrosion. Before filling the heating system has to be cleaned of all impurities.

The heating system has to be thoroughly vented. You must prevent air, including diffusion air entering the device.



NOTE

To prevent damage to the components of the hydraulic system, we recommend the additional installation of SpiroVent RV2 air (micro-bubble) venting system.

The presence of micro bubbles in the system eventually forms larger bubbles which in time can cause corrosion of the system, system component malfunction and operation disturbance.

In new systems, the impurities are a consequence of welding, soldering, dirty pipes (oil, grease), etc. In case the impurities start accumulating in the device this can worsen the flow and heat transfer, in worst cases also freezing of water in the heat exchanger and consequently the destruction of the device.



WARNING

To protect the device from intake and accumulation of dirt in the heat exchanger you must install the strainer on the return line, before entry into the device.



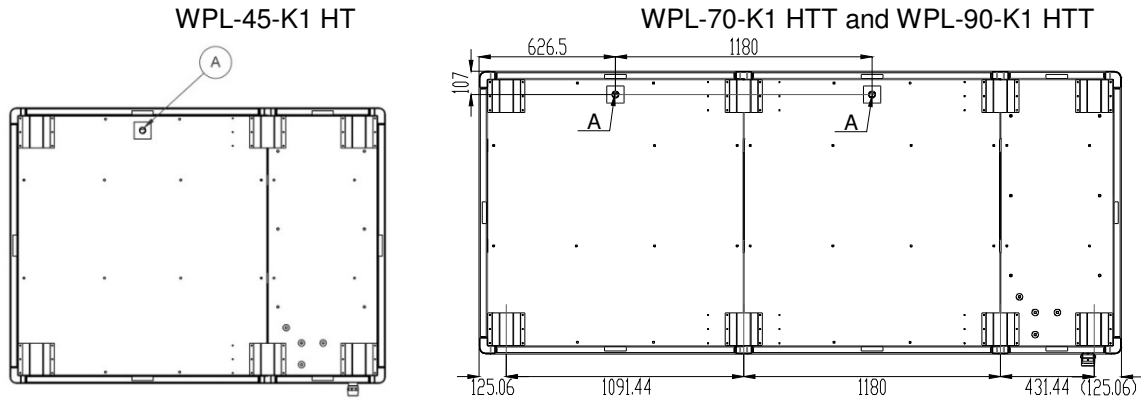
WARNING

A galvanic disconnection between individual elements of the heating system (i.e. boiler, container ...) is obligatory.

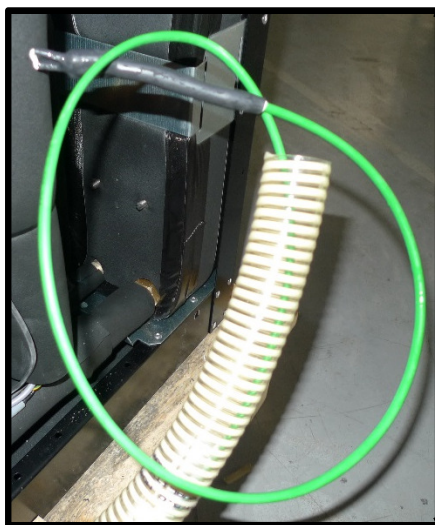
In the case of using grey steel pipes in the heating system, it is necessary to degrease them (the interior of the pipe) before connecting them to the heat pump.

4.4.4 Condensate drainage

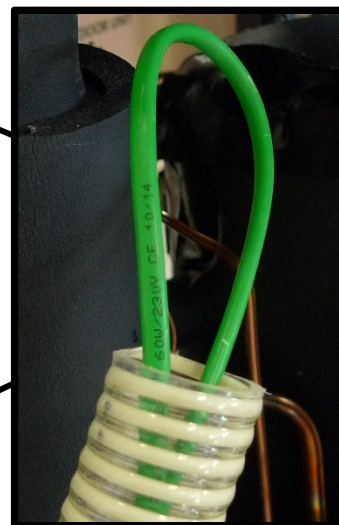
The device has one opening on the bottom side (WPL-45-K1 HT) or two openings (WPL-70-K1 HTT and WPL-90-K1 HTT) for condensate drainage which is collected in the condensation vessel of the device. The condensate accumulates on the evaporator from the air or is a consequence of evaporator defrosting. The position of the drain(s) is shown on the pictures below (A).



The heating cable with thermostat is factory connected to the device. After connecting the condensate pipe to the drains (A), the heating cable with thermostat must be inserted into it. The position of this thermostat must be on the coolest part of the condensate pipe which leads into the drain. Turn the thermostat which comes out the heating cable for 180° and insert it back into the pipe so that only 10 cm of the loop is sticking out.



Thermostat at the end of the heating cable.



10 cm leftover heating cable which you have to insert back into the condensate pipe.

4.5 Electrical connection

Connect the external device to the mains according to the instructions described in this chapter.



CAUTION

Connecting the device to the electrical network has to be performed in accordance with the standards for connecting devices to the electrical network. The device has to be connected to the electrical network via the power supply cut-off which is installed into the electrical installation under the regulations in force. The power supply cut-off has to separate all contacts under the regulations of the overvoltage category III - minimal spacing between contacts is 3 mm.



DANGER

The final electrical connection, before commissioning can only be performed by the person authorised by the manufacturer to ensure the correct and efficient operation of the device.
IT IS STRICTLY PROHIBITED FOR UNAUTHORISED PERSONS TO TAMPER WITH THE ELECTRICAL CONNECTION OF THE DEVICE.



DANGER

The device must be connected to the mains, which has a built-in RCD residual-current device, switch type A.



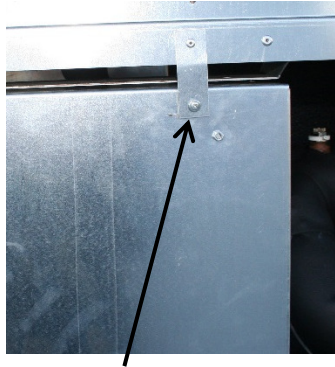
CAUTION

The device must be connected to the mains with a cable with an appropriate **diameter**. The electrician defines the diameter of the cable according to the **installation method, distance** of the device from the main electrical cabinet and the **power** of the device.

4.6 Removal of the lid of the control unit



Remove the side of the device (see chapter 4.2.3).



Unscrew the screw on the lid of the control unit cabinet.



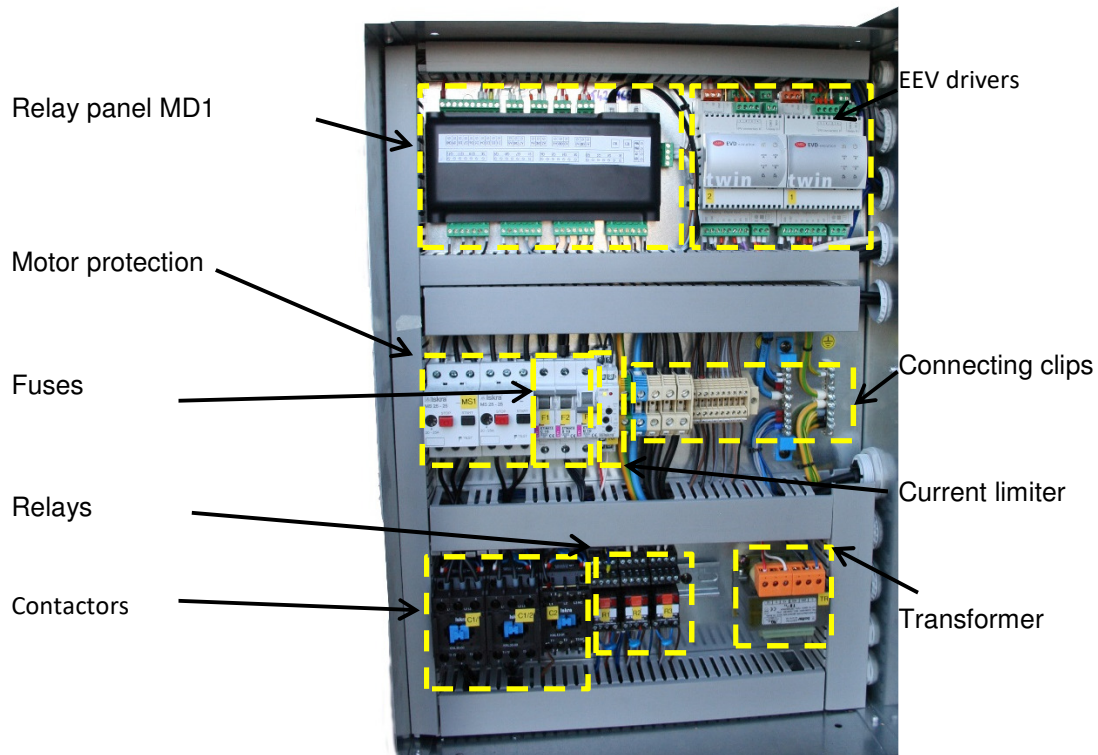
Open the controller cabinet towards you.

4.7 Connecting the external unit

In the scope of the external unit, you have to connect the electrical cabinet with:

- ▶ External unit power cable.
- ▶ Communication FTP cable between external and internal control unit.

Constituent elements of the external electrical cabinet



- ▶ The procedure of connecting the external electrical cabinet is described below.

4.7.1 Power cable connection of the external unit



DANGER

Connecting the device to the power source can only be performed by a qualified installer in a voltage-free state.



CAUTION

The cable must be routed through the cord anchorage installed before the connecting terminals in the indoor unit. Make sure the cable connected in the indoor unit is relieved from strain.



CAUTION

Wrong dimensioning of the power cable or too weak terminal fuses of the device could lead to an overload of the safety elements on the power grid of the building which could lead to overheating of the electrical installation. Follow the requirements listed in this manual.



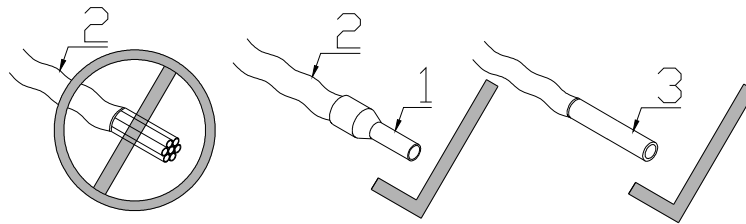
CAUTION

The communication cable must not be laid together with energy cables (in accordance with good engineering practise and regulations).



CAUTION

In case of connecting the multi-wire flexible cable to the connecting clamp, it always has to have a necking die at the end.



1 Necking die

3 Massive single-wire cable

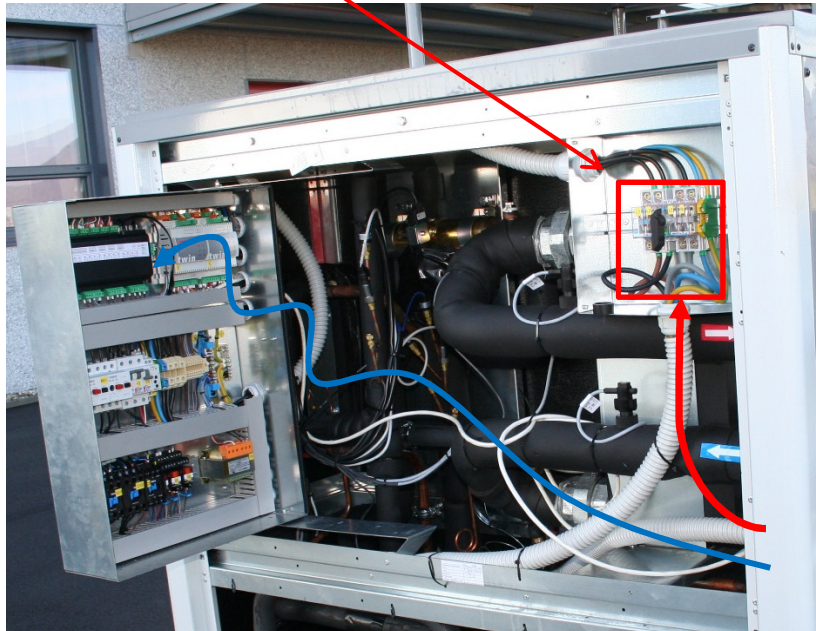
2 Multi-wire flexible cable

- ▶ To connect to connecting clamps of the device, use cables with necking dies or a massive single-wire cable.

Connecting clips of the supply cable

- ▶ Connect the electrical supply (3N ~ 400V / 50Hz) to the connecting clips L1, L2, L3, N and PE (⊕). For choosing the appropriate diameters of the cables, see technical data (chapter 7.2).

Clip PE (⊕) (yellow-green cable) / clip N (blue cable) / clips L1 L2, L3 (3 x black or black, grey, brown cable).

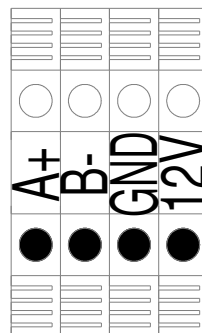


supply cable
util. cable

4.7.2 The connection of the communication FTP cable to the external unit

The communication cable is intended for communication between the external MD3 and the internal MD1 input/output module.

- ▶ After installing the plated cable between the external and internal device, use four cables and connect them to the connecting terminals **A+** / **B-** / **12 V** / **GND** in external device.



X7

- ▶ In the case of prefabricated FTP cable, connect the cable pair wires **1, 2** to **A+**, **2, 3** to **B-**, **4, 5** to **12 V** and **GND** to **7, 8**.

For a detailed description of connecting the FTP cable of the internal unit, see:

- ▶ **Manual for Installation, Use and Maintenance for Installing the Basic or Expansion Wall Control Unit TT3000, TT3003.**

4.8 Connecting the internal device

See:

- ▶ **Manual for Installation, Use and Maintenance for Installing the Basic or Expansion Control Unit TT3000, TT3003.**

4.9 Spatial corrector

See:

- ▶ **Instructions for installing and using KT-1 or**
- ▶ **Instructions for installing and using KT-2**

5. Commissioning of the device



CAUTION

Before the commission it is necessary all the required tasks and inspections from the tasks for commission.

After professional installation, the authorised contractor has to perform the commissioning of the device.



CAUTION

The commission can only be performed by a person authorised by the manufacturer! If the commission is performed by an unauthorised person, the warranty is not recognised.

Management of the device must be performed in accordance with current instructions for use.

6. MAINTENANCE

The device must be visually inspected once a year. The electrical and hardware installation of the device as well as the state of the evaporator have to be inspected. In case irregularities and impurities are detected on the evaporator or clotting of the channels between the lamellas, contact the authorised maintenance worker to perform cleaning.



CAUTION

The servicing and maintenance of the device can only be performed by a person authorised by the manufacturer. In case of a malfunction, first contact the installer who installed the device.

6.1 Cleaning the water filter



NOTE

Cleaning of water filters on the return into the device is advised to be performed at least once yearly.



CAUTION

A blocked water purifying component and magnetic filter can lead to a malfunction of the device or incorrect functioning of the device. In case the display displays a warning of flow malfunction ("Caution, flow!").

6.2 Monitoring the pressure in the heating system



NOTE

Periodically, once yearly, check the water temperature in the heating system.



NOTE

In case the pressure falls (i.e. Leakage of the system) the display displays a warning of flow malfunction ("Caution, flow!").

6.3 Cleaning of the heat conductors

6.3.1 Cleaning of the heating system (water side)

Residue of grease and sealants in pipes can pollute the condenser of the device up to a point where cleaning is necessary. In this case the authorised person should perform the cleaning with a mild solution (up to 5 %) of phosphorous acid which should be heated to room temperature. The condenser has to be completely disconnected from the heating system and rinsed with diluted phosphorous acid in the opposite direction of normal flow.

After cleaning the condenser has to be rinsed thoroughly with an agent neutralising the acid detergent so as to prevent contamination of the heating system.



CAUTION

Acid detergents should be used carefully, instructions of the manufacturer and environmental regulations must be followed. The cleaning can only be performed by a qualified person.

If any doubts about using the detergents arise, consult with the manufacturer of the detergent.

6.3.2 Cleaning the heat source (air side)

The air lamella heat exchanger must be checked at least 1 x yearly. In case of impurities in the air dust can accumulate on the surface of the heat exchanger which worsens heat exchange in the air. In this case the evaporator has to be cleaned. The cleaning has to be performed by a qualified person.



DANGER

Before cleaning, make sure the device is turned off and in a voltage free state.



WARNING

Do not touch the vaporizer with your hands so as not to cut yourself on the lamellas.

Cleaning the lamella conductor should be done with an air jet which blows away dust particles on the lamella heat conductor. The evaporator can also be cleaned using a soft water spray or purpose cleaning agents intended for cleaning the lamellas of the conductor. Be careful not to deform the lamellas and cause uneven air flow and degraded performance of the device.



WARNING

Heating the air heat conductor (evaporator) can only be performed by a qualified person. The manufacturer is not liable for damage to the user or device. All damage to the device caused by inappropriate cleaning are not covered by the warranty.

6.4 Disturbances in the operation

In case of a malfunction during the operation of the device, the display of the TERMOTRNIC controller displays the warning "Caution, malfunction".

Find the malfunction description in the manual. For error correction call the installer who installed the device.



CAUTION

In case of heavy snowfall, it has to be made sure the snow does not obstruct the airflow through the evaporator.

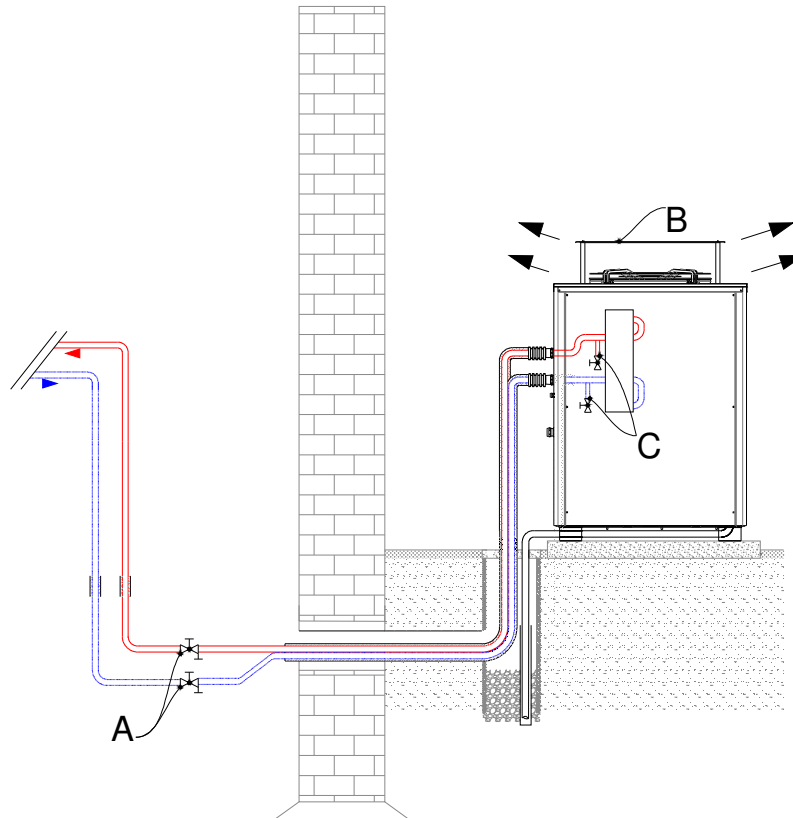
In case the device is installed in an environment where temperatures can drop under the freezing point, there is a chance the water in the device can freeze. In this case draining the water from the device must be enabled or the system must be filled with anti-freeze.



CAUTION

In case of low external temperatures under 0 °C and a power outage longer than 2 hours, the water must be drained from the device.

Example of installing drainage valves.



| | |
|---|---------------------------------------|
| A | Valve with exhaust |
| B | External device |
| C | Exhaust valve installed in the device |



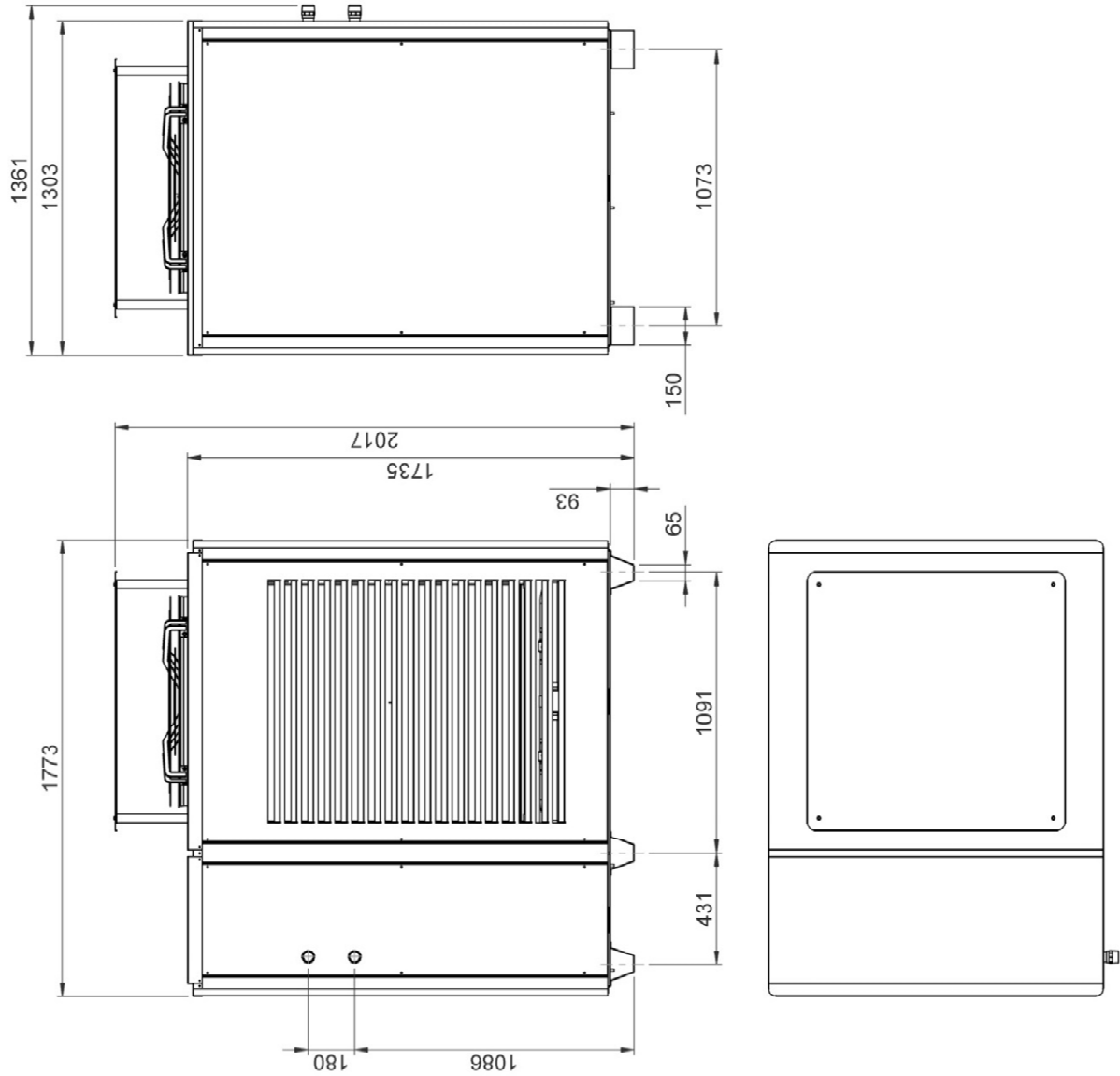
CAUTION

In case of low external temperatures, do not cut the device off from the power supply, this would disable the operation of the anti-freeze programme. There is a risk of machine breakage.

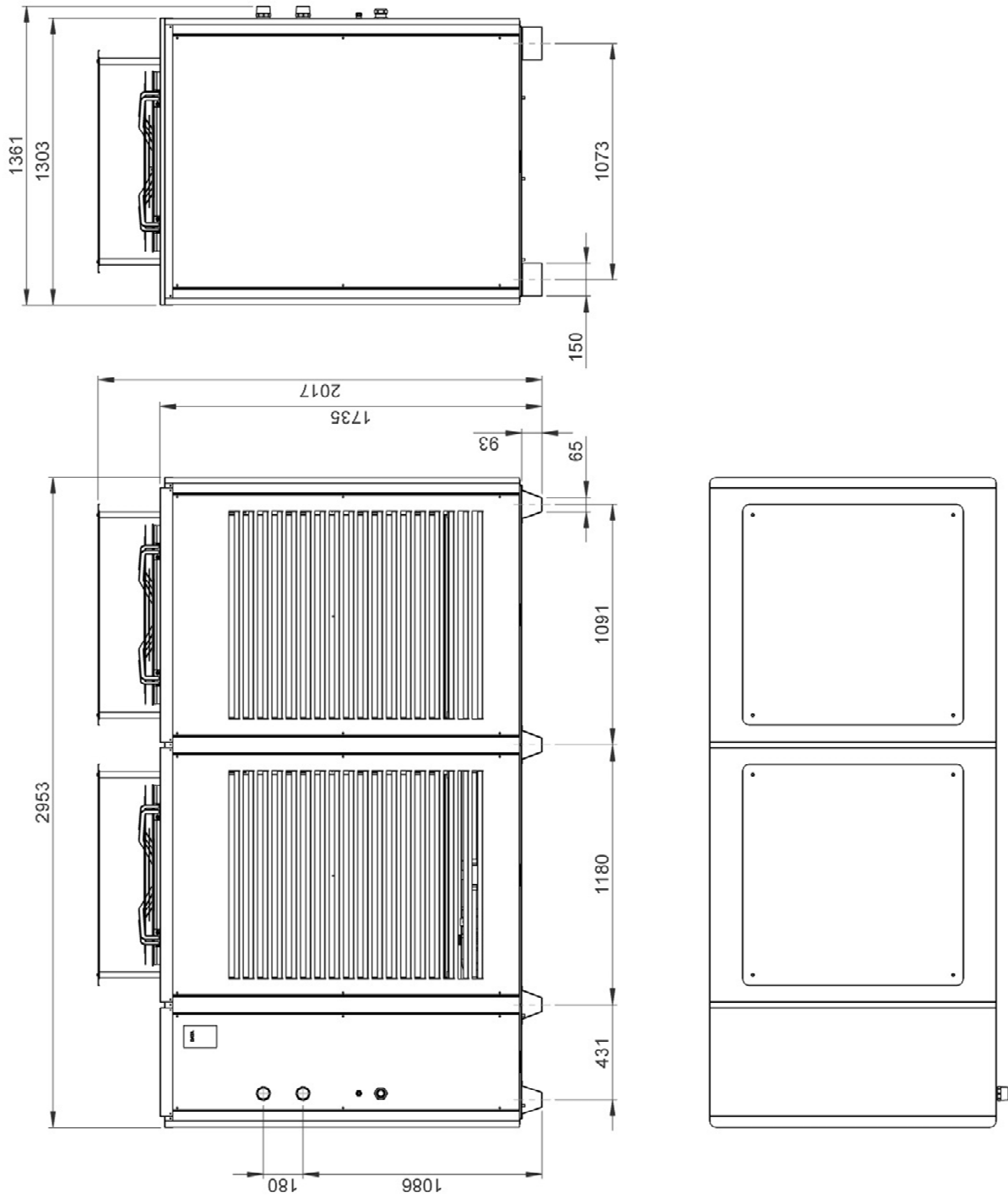
7. Technical data

7.1 Device dimension drawings

7.1.1 WPL-45-K1 HT



7.1.2 WPL-70-K1 HTT and WPL-90-K1 HTT



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7.2 Technical data

| Device | | WPL-45-K1 HT | WPL-70-K1 HTT | WPL-90-K1 HTT |
|--|-------------------|---|---------------------|--------------------|
| Version | | | | |
| Heat source | | | External air | |
| Heat sink | | | Water ¹⁾ | |
| Controller | | TERMOTRONIC 3000 WEB | | |
| Device placement | | External | | |
| Placement of the controller un. | | Internal | | |
| Compressor | | 1 x scroll | 2 x scroll | 2 x scroll |
| Defrosting | | Passive (with ambient air) + Active (change of cooling cycle direction) | | |
| Electric heater | | / | | |
| Soft start-up | | Yes (optional) | | |
| Circulation pump, secondary | | / | | |
| Capacity | | | | |
| Heating | | | | |
| | | Heating power / electrical power / COP ²⁾ | | |
| A7/W35 | kW / kW / - | 44,8 / 9,7 / 4,62 | 70,3 / 15,6 / 4,51 | 86,8 / 19,7 / 4,40 |
| A2/W35 | kW / kW / | 38,3 / 9,3 / 4,13 | 60,5 / 15,0 / 4,02 | 74,1 / 18,8 / 3,94 |
| A7/W55 | kW / kW / - | 40,9 / 13,2 / 3,10 | 64,5 / 21,4 / 3,01 | 79,3 / 26,7 / 2,97 |
| A2/W55 | kW / kW / - | 33,8 / 12,3 / 2,74 | 53,6 / 20,1 / 2,67 | 65,6 / 25,0 / 2,62 |
| A-10/W35 | kW / kW / - | 28,7 / 8,4 / 3,41 | 46,1 / 13,9 / 3,31 | 55,7 / 17,3 / 3,22 |
| A-10/W55 | kW / kW / - | 26,8 / 11,2 / 2,39 | 44,1 / 18,1 / 2,43 | 54,0 / 22,7 / 2,38 |
| Cooling | | | | |
| | | Cooling power / electrical power / EER ³⁾ | | |
| A35/W12-7 | kW / kW / - | 33,6 / 11,5 / 2,92 | 52,8 / 18,9 / 2,79 | 66,0 / 23,8 / 2,77 |
| Electrical data | | | | |
| External and internal unit | | | | |
| Max. electrical power | kW | 17.6 | 27.9 | 34.5 |
| Z _{max} ¹¹⁾ | Ω | | 0.015 | |
| External unit | | | | |
| Rated voltage | | 3N~ 400 V; 50 Hz | | |
| Max. operational current | A | 28.6 | 47.6 | 56.6 |
| Max. electrical power | kW | 17.1 | 27.4 | 34.0 |
| Current of blocked rotor (LRA) | A | 127 | 149 ¹⁰⁾ | 127 |
| Fuses ¹²⁾ | A | 3 x 32 | 3 x 50 | 3 x 63 |
| Electrical power cable ⁴⁾ | mm ² | 5 x 6 | 5 x 10 | 5 x 10 |
| Internal unit⁵⁾ | | | | |
| Rated voltage | | ~ 230 V; 50 Hz | | |
| Max. operational current | A | 2.3 | 2.3 | 2.3 |
| Max. electrical power | kW | 0.5 | 0.5 | 0.5 |
| Z _{max} ¹¹⁾ | Ω | | 0.015 | |
| Fuses | A | 1 x C16 | 1 x C16 | 1 x C16 |
| Electrical power cable ⁴⁾ | mm ² | 3 x 2.5 | 3 x 2.5 | 3 x 2.5 |
| Cooling system | | | | |
| Coolant - type | | R407C | | |
| Coolant - quantity | kg | 32.7 | 58.0 | 61.0 |
| Max. operational pressure | MPa | 2.9 | | |
| Oil - type | | POE (Emkarte RL 32 3MAF) | | |
| Oil - quantity | l | 4.14 | 8.00 | 8.28 |
| Primary side (heat source) - air | | | | |
| Nominal flow | m ³ /h | 10,400 | 20,200 | 20,800 |
| Heating | | | | |
| Range of operation - min. / max. air temperature | °C | -23 / 40 | | |
| Cooling | | | | |
| Range of operation - min. / max. air temperature | °C | 10 / 40 | | |

| Device | | WPL-45-K1 HT | WPL-70-K1 HTT | WPL-90-K1 HTT |
|---|--------------------|--|----------------------|--------------------|
| Secondary side (heat sink) - water¹⁾ | | | | |
| Min. / Max. pressure in the system | MPa | 0,05 / 0,3 (0,5 / 3 bar) | | |
| Pipe connections | | G 1.1/2" (ext. dev.) | G 2" (ext. dev.) | G 2" (ext. dev.) |
| Recommended main circulation pump ⁶⁾ | WILO | Stratos PARA 30/1-12 | Stratos PARA 50/1-12 | |
| Recommended dimensions of pipes leading to the device ⁷⁾ | DN | 40 | 50 | 65 |
| Heating | | | | |
| Rated flow ⁶⁾ | m ³ / h | 7.4 | 12.1 | 14.9 |
| Pressure drop at rated flow | kPa | 27 | 29 | 37 |
| Range of operation - min. / max. water temperature | °C | 25 / 63 | | |
| Cooling | | | | |
| Range of operation - min. / max. water temperature | °C | 7 / 25 | | |
| Dimensions and mass | | | | |
| Dimensions (W x H x D) | mm | 1773 x 2017 x 1361 | 2953 x 2017 x 1361 | 2953 x 2017 x 1361 |
| Transport mass | kg | 805 | 1325 | 1366 |
| Net mass | kg | 802 | 1315 | 1361 |
| Noise | | | | |
| Level of sound power | dB (A) | 75 | 76 | 77 |
| The level of sound pressure at a distance of 1 m | dB (A) | 67 | 68 | 69 |
| The level of sound pressure at a distance of 5 m | dB (A) | 53 | 54 | 55 |
| The level of sound pressure at a distance of 10 m | dB (A) | 47 | 48 | 49 |
| Communication | | | | |
| Connection between ext. and inter. unit | | FTP cable / LiYCY 4 x 0.75 mm ² | | |
| Connection to BMS | | MODBUS protocol (UTP cable – connection RJ45) – RS 485 | | |
| Connection to the internet ⁸⁾ | | UTP 5e cable - connection RJ45 - Ethernet | | |
| Miscellaneous | | | | |
| Protection class | | | | |
| External unit | | IPX4 | | |

- 1) A water solution of up to 35 % of propylene-glycol or ethylene-glycol can be used as secondary medium. Use of other substances is not permitted or the manufacturer of the device must be consulted prior to use. Requirements regarding water quality are listed in the installation manual in the chapter "Preparation of the Hydraulic System". The requirements must be taken into account!
- 2) COP (Coefficient of Performance) is a card for performance efficiency of the device, the heating number which is a quantity without unit. Computer-wise COP is the ratio between the energy gained - heat (in cooling it is heat taken away) and electrical energy needed for the functioning of the device.
- 3) EER (Energy Efficiency Ratio) is an abbreviation for the coefficient of the cooling energy efficiency. Mathematically EER is the ratio between the effective cooling power and effective electrical power in [kW].
- 4) With the cable we have taken into account laying B2 from the table A.52.4 – IEC 60364-5-52. The cable in the installation pipe is fixed to the wall. The dimensions of the electrical cables must always be checked or determined by the designing engineer of electrical installations.
- 4⁾ With the cable we have taken into account laying C from the table A.52.4 – IEC 60364-5-52. The cable in the installation pipe is fixed onto the wall. The dimensions of the electrical cables must always be checked or determined by the designing engineer of electrical installations.
- 5) Joint maximal load (circulation pumps, electronic valves ...) which can be connected to or powered by the internal unit, must not exceed 500 W. Higher consumers (i.e. pumps) should have their own supply.

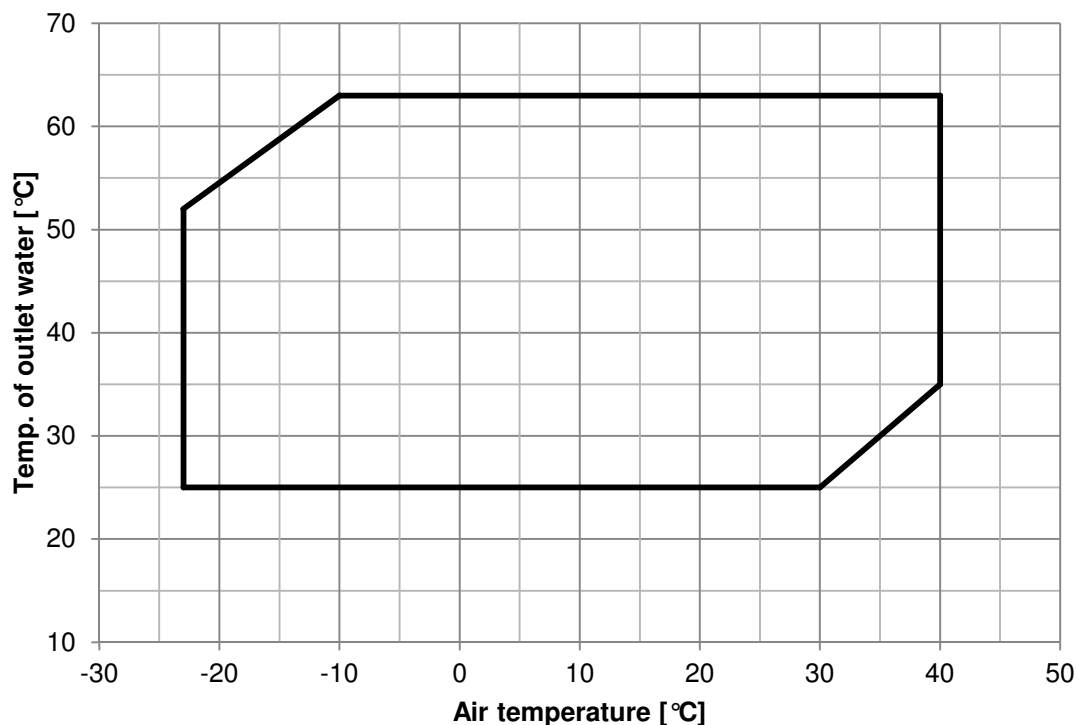
KRONOTERM

- 6) The circulation pump must be dimensioned in such a way that it ensures rated voltage through the heat pump.
- 7) Applies to pipe connections of adequate dimensions and joint distance of up to 20 m. Pipe dimensions and types of pumps must always be verified or determined by the designing engineer of electrical installations. Circulation pumps must be dimensioned in such a way so as to ensure rated voltage (see table) through the device.
- 8) Connection to the internet is not necessary for the operation of the device but it is necessary for remote control through the Home Cloud service. It is also advisable for faster troubleshooting of the device's operation.
- 9) For internal HM devices, see technical data for HM.
- 10) Compressor 1 + compressor 2 ($I_{n1} + LRA_2$)
- 11) After connecting the device it is necessary to acquire the guarantee or consult the operator of the distribution network that the impedance of the network is lower than Z_{max} . This way the device will operate within acceptable limits of disruptions. Otherwise it is necessary to connect the device to the network using a soft start device.
- 12) Circuit breaker with "slow" characteristics for devices with very high inrush current.

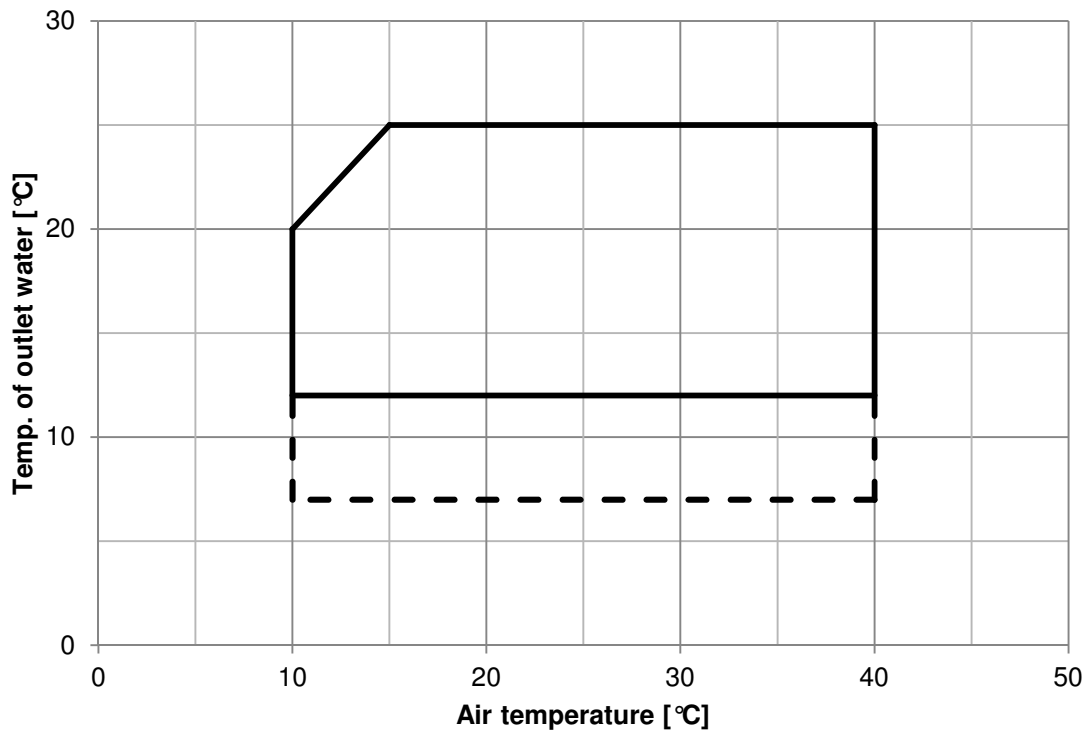
7.3 Range of operation

Devices can operate inside the operation ranges shown below.

7.3.1 Heating mode

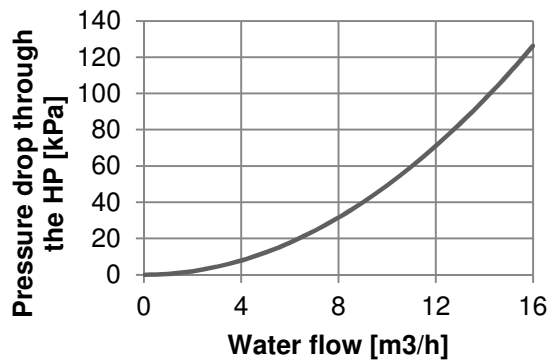


7.3.2 Cooling mode

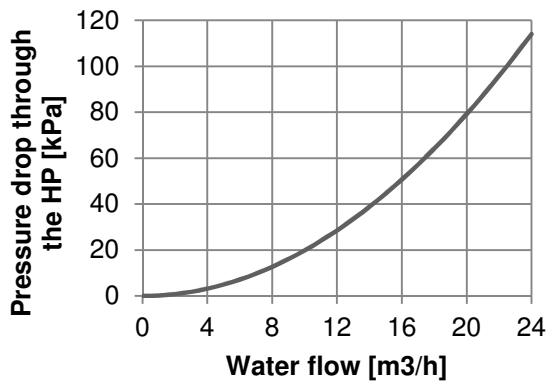


7.3.3 Pressure drop through the device

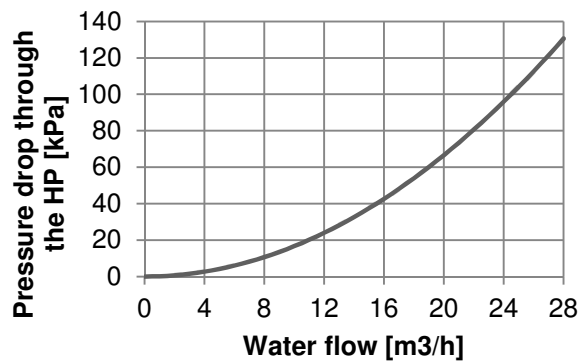
WPL-45-K1 HT



WPL-70-K1 HTT



WPL-90-K1 HTT



7.4 Noise

Noise is any kind of sound which causes a disturbance, interferes with a person's work and causes harm to health and well-being. Individuals can have different reactions to the same noise at different occasions. Perception of sound also depends on the current mood of an individual.

Every device which operates with fluctuation is a source of sound. The spread of sound or noise is also affected by walls and other obstacles in the vicinity of the device. This is why the correct choice of location of the device is very important.

Sound emissions of the device into the surroundings are described by physical quantities such as sound power and sound pressure. Both physical quantities are given in the dimensionless unit decibel (dB).

Level of sound power (*L*)

The power level of sound is the energy of sound which the device emits into the environment per second. It is a quantity which is used for the basic comparison of various sound sources and for determining whether the machine or device complies with the regulations and standards for noise radiation. The power of sound is independent on the environment in which the source is located.

The reference sound power is 10^{-12} W.

Example: The sound power of the human breathing is 10^{-11} W or 10 dB.

The sound power of whispering is 10^{-10} W or 20 dB.

The level of sound pressure (*p*)

The level of sound pressure is the changing pressure of sound waves which a sound produces. Sound pressure is detected or heard as volume. It depends on the environment where the source is located and the distance of the listener to the source of the sound.

The standard reference sound pressure in the air is 20 μ Pa (10^{-6} Pa). This is the sound auditory threshold at the sound frequency of 1 kHz.

Example: The sound pressure of normal human speech at a distance of 1 m ranges from 2 to 20 mPa (10^{-3} Pa) or from 40 to 60 dB.

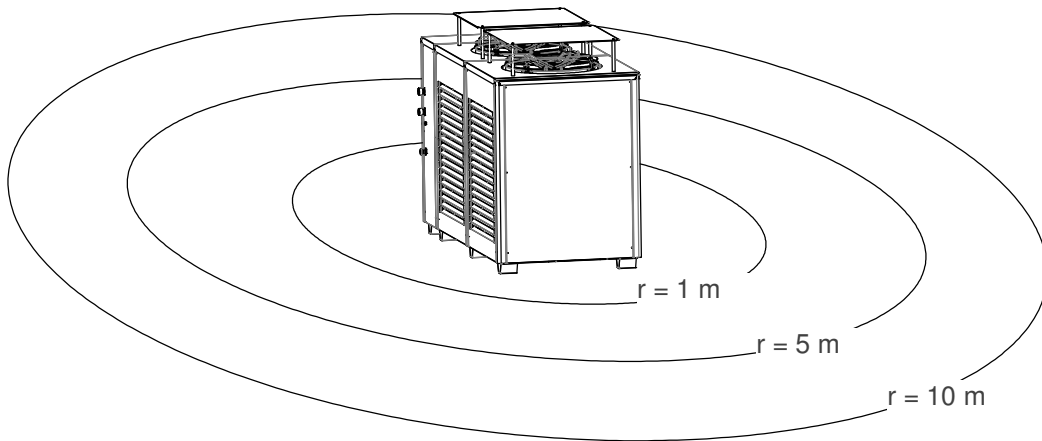
Decibel (dB, dB (A))

A decibel is the unit without dimension with which we express the ratio between the changing quantity and the fixed reference. Among others it is also used for measuring the intensity of sound or sound energy. It is calculated on a logarithmic scale which means that if the ratio increases by 3 dB, the sound energy doubles, if it increases by 10 dB, the sound energy increases by a factor of 10 and if it increases by 20 dB, the sound energy increases by a factor of 100, etc.

Example:


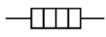

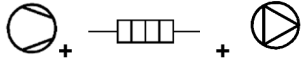









The level of sound pressure of the device is measured in a free sound field at three different distances. For precise data on the sound pressure of your device see technical data 7.2.

| Noise | | |
|---|--------|----|
| Level of sound power of the device | dB (A) | 57 |
| Level of sound pressure at a distance of 1 m | dB (A) | 49 |
| Level of sound pressure at a distance of 5 m | dB (A) | 43 |
| Level of sound pressure at a distance of 10 m | dB (A) | 29 |



| The source of sound of the device | Level of sound power [dB] | Noise |
|-----------------------------------|---------------------------|------------|
| A pocket watch in the bedroom | 20 | Very quiet |
| Air conditioning in an office | 40 | quiet |
| Heating heat pump | 57 | Loud |
| Normal speech | 60 | Loud |
| Gas burner | 75 | Very loud |
| Traffic, loud radio | 80 | Very loud |
| Plane motor | 140 | Painful |

7.5 Legend of data label

| Mark | Characteristics |
|---|--|
|  | Maximal compressor electrical power. |
|  | Maximal electrical heater power. |
|  | Maximal additional load electrical power (circulation pump, etc.). |
|  | Maximal electrical power of the device (compressor + electric heater + additional load). |
|  | Cooling circuit. |
|  | DHW. |
|  | Heat exchanger in the DHW. |
|  | Heating system. |
|  | Internal device (Hydraulic module or Termotronic). |
|  | External device (WPL or WPLV). |
|  | Device mass. |
|  | Note about handling waste electronic equipment. |
|  | CE sign for the compliance of the device with CE directives. |

The headquarters of the company and place of production

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