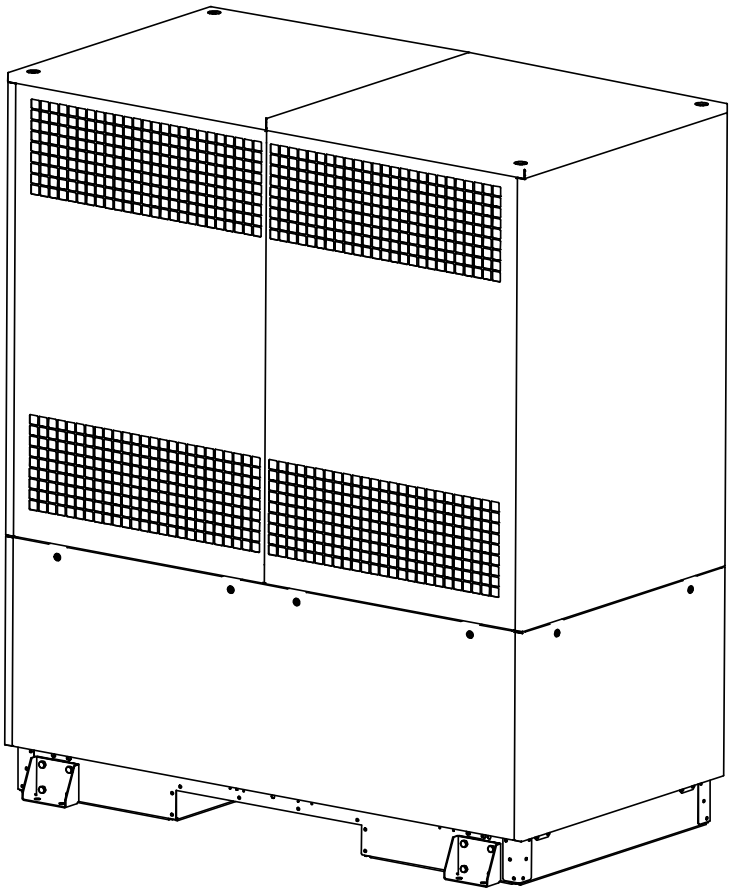
LA 60P-TUR



Installation and Operating Instruction

Air-to-Water
Heat Pump for
Outdoor Installation

Order no.: 452167.66.58-EN

EN · FD 0511

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1 Safety notes

1.1 Symbols and markings

Particularly important information in these instructions is marked with **CAUTION!** and **NOTE**.

⚠ CAUTION!

Immediate danger to life or danger of severe personal injury or significant damage to property.

NOTE

Risk of damage to property or minor personal injury or important information with no further risk of personal injury or damage to property.

1.2 Intended use

This device is only intended for use (see cap. 2) as specified by the manufacturer. Any other use beyond that intended by the manufacturer is prohibited. This requires the user to abide by the relevant project planning documents. Please refrain from tampering with or altering the device.

The device is designed for a service life of 15 years. Maintenance must be carried out as per the maintenance instructions. Before the end of the intended service life and taking into account the current technical rules, the operator must carry out an assessment regarding continued operation. Based on the assessment, the operator must make a decision regarding continued operation, decommissioning or measures to be carried out. If the assessment and any measures to be carried out are not implemented before the end of the intended service life, the device must be decommissioned.

1.3 Legal regulations and directives

The construction and design of the heat pump complies with all relevant EU directives, EN/DIN/VDE regulations (see CE declaration of conformity).

When connecting the heat pump to the power supply, the relevant VDE, EN and IEC standards are to be adhered to. Any further connection requirements stipulated by local utility companies must also be observed.

When connecting the heating system, all applicable regulations must also be adhered to.

The device is filled with flammable refrigerant R290 (propane) and is only intended for outdoor installation. Suitable safety measures must be implemented for setup, assembly, operation and disposal.

Activities on the heat pump must only be carried out by people with the following knowledge. Use by people who have not been instructed is not permissible.

Activity	Instructed people	Qualified specialist	Authorised and qualified after-sales service technician
Transport, storage		✓	✓
Setup		✓	✓
Installation		✓	✓
Commissioning, decommissioning			✓
Operation	✓	✓	✓
Maintenance, repair			✓
Disposal			✓

Fig. 1.1:Phases and authorised people

⚠ CAUTION!

Work on the heat pump must only be performed by authorised and qualified after-sales service technicians!

⚠ CAUTION!

When operating or maintaining a heat pump, the legal requirements of the country where the heat pump is operated apply. Depending on the refrigerant fill quantity, the heat pump must be inspected for leaks at regular intervals by a certified technician, and these inspections must be recorded.

1.4 Energy-efficient use of the heat pump

By operating this heat pump, you are helping to protect the environment. A prerequisite for energy-efficient operation is the correct design of the heat source system and heating system.

To maintain heat pump efficiency, it is particularly important to keep the temperature difference between the heating water and heat source to a minimum. For this reason, it is advisable to design the heat source and heating system very carefully. **A temperature difference that is higher by approx. Kelvin (one °C) increases the power consumption by around 2.5%.** When designing the heating system, it should be borne in mind that special consumers such as domestic hot water preparation should also be taken into consideration and dimensioned for low temperatures. **Underfloor heating systems (panel heating)** are optimally suited for heat pump use on account of the low flow temperatures (30 °C to 40 °C).

It is important to ensure that the heat exchangers are not contaminated during operation, as this increases the temperature difference, which in turn reduces the coefficient of performance (COP).

When set correctly, the heat pump manager is also an essential factor in the energy-efficient use of the heat pump. Further information can be found in the heat pump manager operating instructions.

2 Intended use of the heat pump

2.1 Area of application

The air-to-water heat pump is to be used exclusively for the heating and cooling of heating water. It can be used in new or existing heating systems.

The heat pump is designed exclusively for outdoor installation. The instructions in the chapter "**Setup**" must be observed.

The circulating pump(s) must be controlled using the heat pump manager.

If function-relevant or safety-relevant pump functions, such as integration of the heat pump into the building management system, are not supported, then this can result in loss of warranty and cause a write-off of the heat pump.

The circulating pump(s) and the heat pump controller must always be ready for operation.

The specifications in the technical documents must be followed, particularly limit values for the minimum and – if available – maximum warm/cold water volume flow.

The heat pump is suitable for mono energy and bivalent operation in outside air temperatures to -22 °C.

Proper defrosting of the evaporator is guaranteed by maintaining a heating water return temperature of more than 22 °C during continuous operation. The maximum water outlet temperature must not exceed 64 °C and must be secured on the system side so that, if the temperature is exceeded, all additional heat sources are switched off safely.

The heat pump is not designed for the increased heat consumption required when a building is being dried out. For this reason, the additional heat consumption should be met using special devices provided by the customer. For drying out a building in autumn or winter, it is advisable to install a second heat generator (e.g. an electric heating element available as an accessory).

In cooling operation, the heat pump is suitable for air temperatures ranging from +10 °C to +45 °C.

It can be used for silent and dynamic cooling. The minimum cooling water outlet temperature is +7 °C.

NOTE

The device is not suitable for operation with a frequency converter.

2.2 Operating principle

Heating with the heat source air

Surrounding air is drawn in by the fan and fed through the evaporator (heat exchanger). The evaporator cools the air, i.e. extracts heat from it. This extracted heat is then transferred to the working medium (refrigerant) in the evaporator.

The heat is "pumped" to a higher temperature level by increasing its pressure with the aid of the electrically driven compressors. It is then transferred to the heating water via the liquefier (heat exchanger).

Electrical energy is used to raise the temperature level of the heat from the environment. Since the energy extracted from the air is transferred to the heating water, this type of device is referred to as an air-to-water heat pump.

The air-to-water heat pump consists of the main components evaporator, fan and expansion valve, as well as the low-noise compressors, the liquefier and the electrical control system.

At low ambient temperatures, humidity accumulates on the evaporator in the form of frost, reducing the transfer of heat. Uneven accumulation during this process does not indicate a fault. The evaporator is defrosted automatically by the heat pump as required. Under certain atmospheric conditions, steam may be emitted from the air outlet.

Cooling

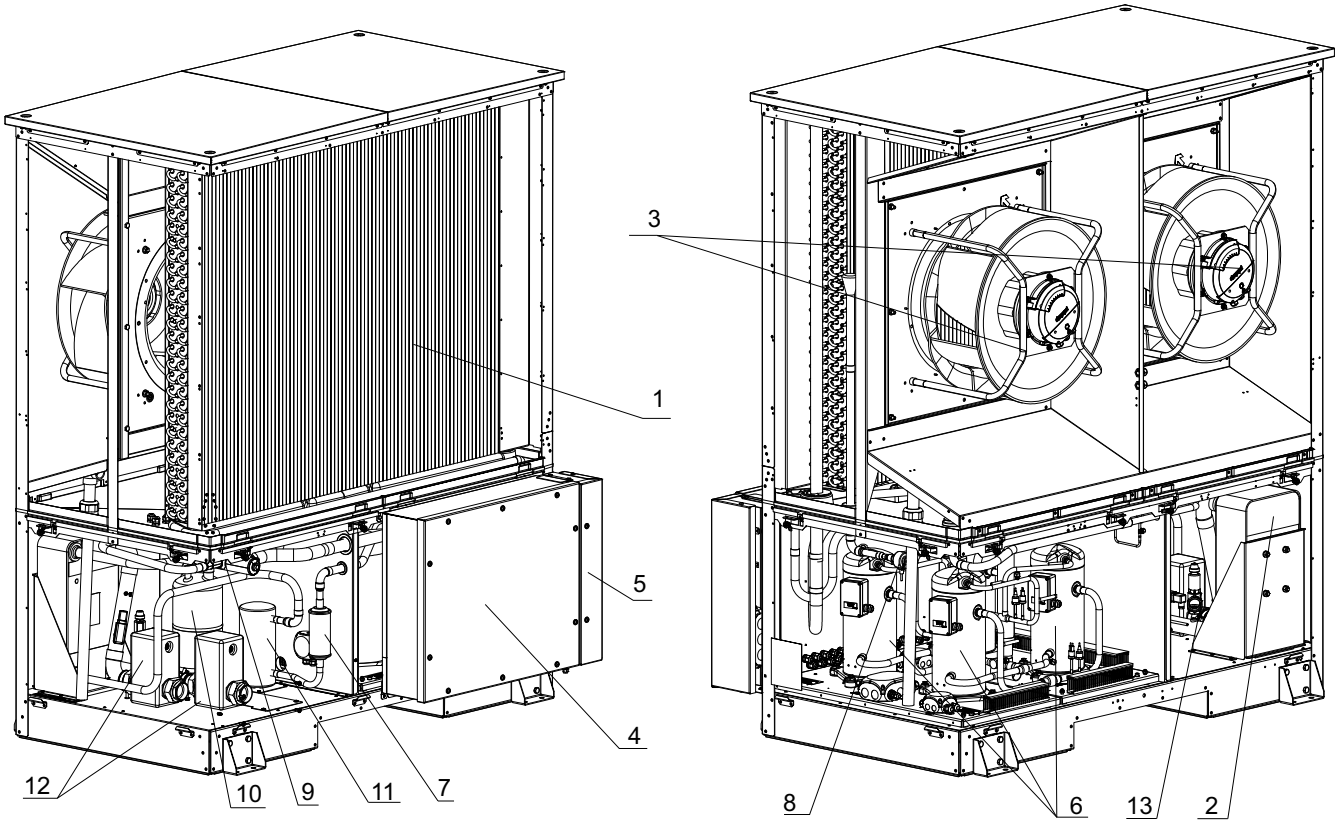
The functions of the evaporator and the liquefier are reversed in the “Cooling” operating mode.

The heating water transfers its heat to the refrigerant via the liquefier, which is now functioning as an evaporator. The refrigerant is brought to a higher temperature level using the compressor. Heat is transferred to the surrounding air via the liquefier (which, in heating operation, functions as an evaporator).

3 Scope of supply

3.1 Basic device

The heat pump contains the components listed below.
R290 (propane) is used as refrigerant.



1) Evaporator, air
2) Liquefier
3) Fan
4) Switch box
5) Connection box
6) Compressor
7) Filter dryer
8) Expansion valve
9) Four-way reversing valve
10) Internal heat exchanger
11) Collector
12) Ventilator
13) Safety valve

3.2 Switch box

The switch box (4) is located on the long side of the heat pump.

The switch box contains the power contactor, the soft starter unit and the refrigeration circuit control.

⚠ CAUTION!

The switch box must be designed to have restricted breathing in accordance with DIN EN 60079-15. It may only be opened by authorised and qualified after-sales service technicians in connection with maintenance or service work. Prior to commissioning or after the work is complete, a check must be carried out to determine restricted breathing in accordance with the repair manual.

3.3 Connection box

The connection box (5) contains the supply connection terminals (load/control voltage) and the connecting terminals for the communication line.

NOTE

Connection work must only be carried out on the connection box.

3.4 Heat pump manager

A heat pump manager (controller -N1) must be used for operating your heat pump.

The heat pump manager is a convenient electronic regulation and control device. It controls and monitors the entire heating system based on the outside temperature, as well as domestic hot water preparation and operating limits.

The external temperature sensor to be mounted on-site is included in the heat pump manager scope of supply together with the necessary fixing accessories.

The functions and usage of the heat pump manager are described in the operating instructions (supplied).

4 Accessories

4.1 Building management system

The heat pump manager can be connected to a building management system network via supplementation of the relevant interface plug-in card. The supplementary installation instructions of the interface card must be consulted regarding the exact connection and parametrisation of the interface. The following network connections can be made on the heat pump manager:

- Modbus
- EIB, KNX
- Ethernet

4.2 External four-way reversing valve

The external four-way reversing valve (Y12) enables operation

of the reversible air-to-water heat pump optimised for heating and cooling. Switching the direction of flow ensures an optimal flow through the heat exchanger in the heat pump in heating operation as well as in the opposite direction in cooling operation. The actuator, driven by an electrical motor and required for automatic switching, is controlled by the heat pump manager. (Max. permissible switching current 2A).

The external four-way reversing valve with an actuating time of max. 30 seconds ensures switching of the water flow over the complete temperature operating range without any mixing losses.

The installation of the four-way reversing valve, available as an accessory, is required to reach the heating and cooling capacity and coefficient of performance (COP) mentioned in the device information. The specified operating limits are only fulfilled in combination with this accessory. A detailed installation description can be found in the instructions included with the valve.

NOTE

For operation of the heat pump with the external four-way reversing valve, it is essential to set up the hydraulic connections according to the instructions included with the valve. These instructions describe the procedure for setting up the correct hydraulics in more detail. The alternating direction of flow in the heating and cooling operation is to be checked as part of commissioning.

The hydraulic diagram in the attachment shows the basic design.

5 Transportation

⚠ CAUTION!
The heat pump must not be tipped during transportation. The machine must be secured to prevent the risk of tipping.

⚠ CAUTION!
Never install the device in rooms in which there are any permanent ignition sources.

⚠ CAUTION!
The device contains R290 (propane). The device is designed exclusively for outdoor installation. Avoid ignition sources in the safety zone!
The casing must remain closed!

⚠ CAUTION!
It is prohibited to remain in the direct vicinity of the device during storms (risk of lightning)!

⚠ CAUTION!
If the device falls or is subject to impact load during transport, the device must be checked immediately for leakages. If an outflow noise can be heard, if oily surfaces form or if a leakage is detected with a detector, the refrigerant must be drained off by an authorised person. Ignition sources in the area around the device must be avoided until the draining is safely completed. If the leakage occurs inside a building, the affected area must be ventilated immediately.
Repair leakages on-site where possible or return the device to the factory for repair.

Transportation, including all related activities such as lifting, loading, lowering, unloading and unpacking, must be carried out by trained personnel.

The transport routes must be cleared and suitable agents must be spread if necessary (for defrosting or increasing grip).

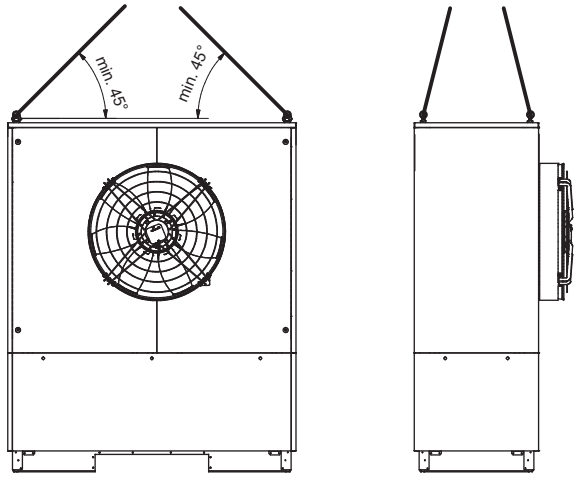
Only use suitable transport equipment.

Personal protective equipment must be used when transporting and removing the transport packaging in accordance with German Social Accident Insurance (DGUV) regulation 100-500 Sec. 2.35

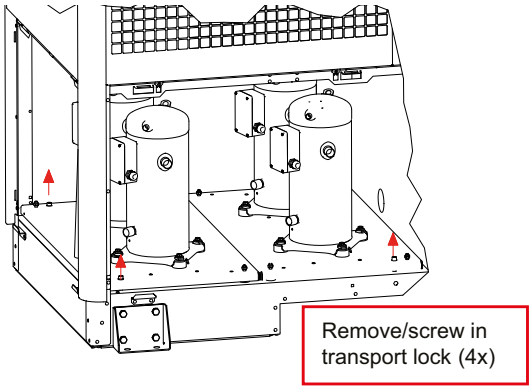
A pallet should be used for transportation to the final installation location. The basic device can be transported with a lift truck, forklift or a crane. The device must only be lifted from the operator side.

When lifting via a crane, observe the load bearing capacity of the lifting gear, see German Social Accident Insurance (DGUV) regulation 100-500 Sec. 2.8.

Slinging cords (rope suspensions) in accordance with EN 13414 or slinging chains (chain suspensions) in accordance with DIN 5687/5688 must be used. It should be ensured that there is a symmetrical load; the conditions necessary for this such as having the same rope/chain length and angle of inclination must be met. Minimum distances in accordance with EN 349 must be observed. After the crane transport, the transport eyebolts must be removed and the openings closed with the vent plugs supplied.



After transportation, the transport fastening in the device is to be removed from both sides of the base.



NOTE
Before commissioning, the transport fastening must be removed.

6 Setup

6.1 General

The heat pump has been designed for areas that are accessible to the general public, as well as for areas that are not accessible to the general public.

These specifications have priority during setup and operation of the system and must be complied with. The responsibility for this lies with the specialist system construction company.

The heat pump, especially its refrigeration circuit, must be protected against damage during installation and other construction methods.

⚠ CAUTION!

Flammable refrigerant R290 (propane): The safety zone must be stringently observed.

⚠ CAUTION!

There must be no ignition sources in the safety zone

⚠ CAUTION!

The heat pump is suited for outdoor installation only. Installation in hollows, shafts or areas with no free outflow or air exchange is not permitted.

The device is a permanently technically sealed system. In rare cases, however, leakages may occur on the plate heat exchanger due to freezing. The risk is increased in particular in the event of tampering on the dirt traps, if the requirements for filling the hydraulic circuit are not complied with, or if the minimum flows are not observed.

⚠ CAUTION!

Propane may transfer into the hydraulic circuit. The exhaust pipe of a safety valve inside buildings must therefore lead outside.

There should be no sinks, shafts, drains into the sewer system or permanent ignition sources in the area around the discharge opening.

Alternatively, other measures may also be taken to minimise the risk. For example with an indirect system with an additional plate heat exchanger for hydraulic separation of the primary and secondary circuit or with a gas separation system with monitoring via propane gas warning sensors. These measures must be implemented on-site in accordance with the valid national or regional regulations, directives and standards.

⚠ CAUTION!

The safety measures at the installation site must be implemented on-site in accordance with the valid national or regional regulations, directives and standards. The safety measures should be implemented in cooperation with the local authorities and/or independent technical test centres.

i NOTE

The responsibility for the heat pump setup lies with the specialist system construction company.

i NOTE

Once the heat pump has been commissioned by an authorised and qualified after-sales service technician, the responsibility for the intended operation of this heat pump lies with the operator.

i NOTE

Before commissioning, a hazard analysis for the system must be carried out by the operator.

i NOTE

The heat pump is not intended for use above 2000 metres (mean sea level).

6.2 General requirements for heat pump installed outdoors

The heat pump unit must be installed on a permanently even, smooth and horizontal surface. The entire frame should be in direct contact with the ground in order to ensure an adequate soundproof seal, to prevent the water-bearing components from becoming too cold and to protect the inside of the device from small animals. If this is not the case, additional insulation measures may be necessary. To prevent small animals from entering the inside of the device, the connection hole in the base plate must be sealed, for example. Furthermore, the heat pump should be installed so that the air outlet direction of the fan is perpendicular to the main wind direction to allow error-free defrosting of the evaporator in high wind exposure.

The heat pump is designed for installation on even ground. For different conditions (e.g.: installation on a platform, flat roof, etc.) or where there is a greater risk of the heat pump tipping over (e.g. due to an exposed position, high wind exposure, etc.), additional protection against tipping over must be provided on-site. For installations on a foundation with direct contact to the building, vibration insulation must be ensured to avoid transmission of solid-borne noise to the building. It must be assessed whether lightning protection is required and, if necessary, implemented. During the installation, the circumstances at the installation location, such as building regulations, static load of the building, wind exposure and lightning protection, must be taken into account.

If the installation is close to walls, it must be noted that there may be more contamination in the intake and air outlet area due to the air flow. If the installation is close to walls, the heat pump must be able to blow out air freely for energy reasons.

To carry out maintenance work, a maintenance area ②, see Fig. 6.1 on page 8 and Fig. 6.2 on page 9, must be kept freely accessible at the illustrated distances. When installing several heat pumps, observe the maintenance distances ② between the individual heat pumps.

6.3 Additional requirements for heat pumps installed outdoors with flammable refrigerant

A **safety zone** ① **of 5 metres** all the way around the device must be observed (Fig. 6.1 on page 8). In this area, there must be no sources of ignition, windows, doors, ventilation openings, light wells, openings to the sewer system and similar. Open drains (e.g. roof gutters when roof-mounting the heat pump) to a lower area are permitted providing that there are no openings to the sewer system 5 m around it. Building openings must be made airtight within the safety zone. The safety zone must not protrude onto neighbouring property or public traffic areas. The device must be positioned in such a way that any leaking refrigerant cannot enter adjacent buildings or pose a danger to people in any other way.

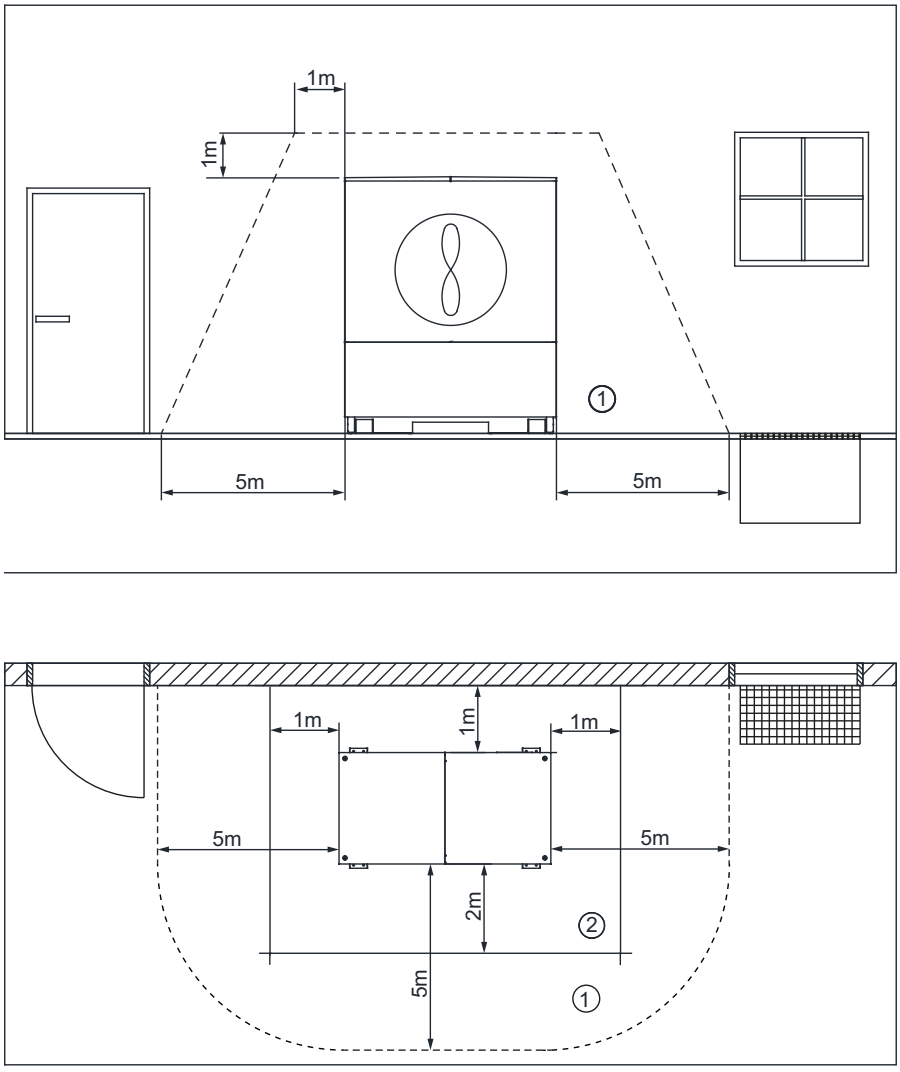


Fig. 6.1:Safety zone and maintenance area of the heat pump

When installing the heat pump on a base (elevation) with a base height of at least 40 cm, the safety zone ③ can be reduced to 3 metres around the heat pump (Fig. 6.2 on page 9). The base must be designed in such a way that air can flow under the base from all directions.

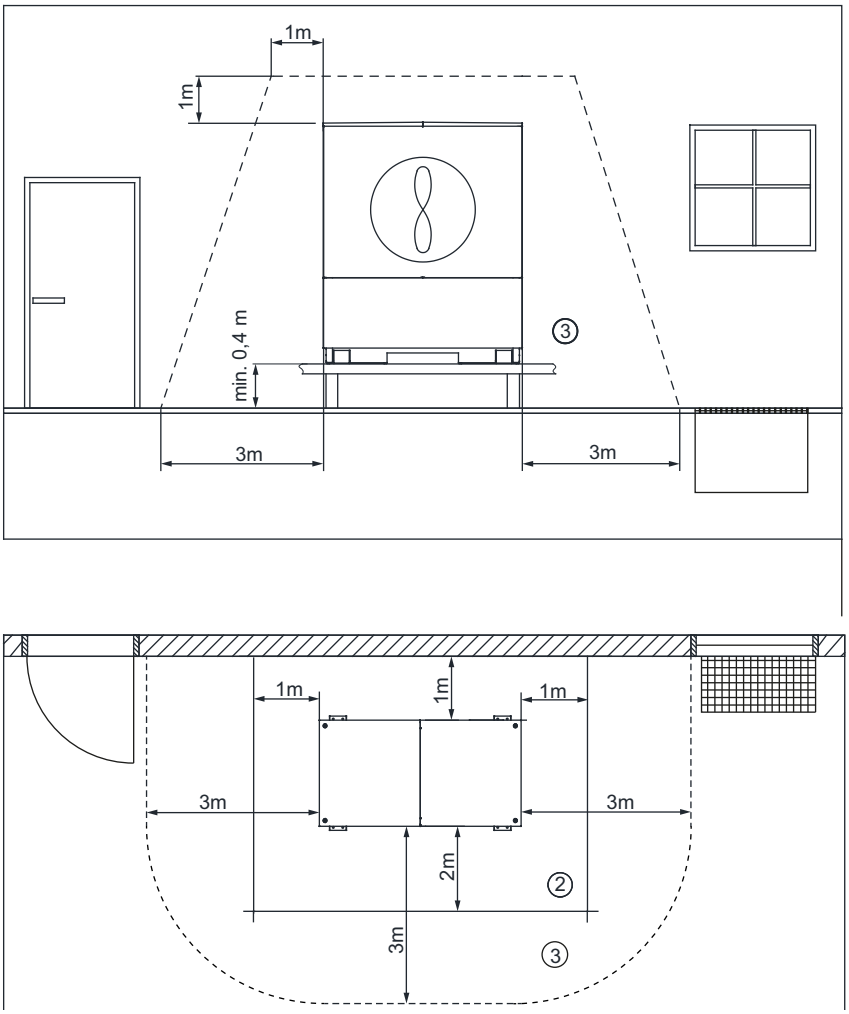


Fig. 6.2:Safety zone and maintenance area of the heat pump in the event of base installation

The heat pump is not an ignition source. When installing several heat pumps, the safety zone ① or ③ must be established around the entire group of heat pumps. The maintenance distances ② between the individual heat pumps must be adhered to.

⚠ CAUTION!

The heat pump must be installed in such a way that any leaking propane cannot enter the building or pose a danger to people in any other way.

If other devices are installed within the safety zone ① or ③, their components within the safety zone must not constitute a source of ignition.

If the implementation of the installation conditions described above is not possible, replacement measures can be applied. The operator must agree these replacement measures with the local authorities and/or independent test centres (e.g. the use of propane detectors which disconnect all sources of ignition in the safety zone from the power supply in the event of a leakage).

i NOTE

The installation area of the heat pump may only be accessed by authorised and instructed personnel.

A sign must be mounted at the entrance to the installation area that points out the hazards, the required code of conduct and states that the area may only be entered by instructed personnel.

⚠ CAUTION!

Do not restrict or block the area around the intake or the air outlet area.

i NOTE

Observe country-specific building regulations!

⚠ CAUTION!

Installation in a hollow or in an inner courtyard is not permitted because cooled air collects at ground level and is drawn in again by the heat pump during extended periods of operation.

⚠ CAUTION!

The heat pump, especially its refrigeration circuit, must be protected against damage during installation and other construction methods.

i NOTE

The physical impacts must be observed for installation close to walls. No windows or doors should be present in the area surrounding the air outlet of the fan.

i NOTE

In cases of installation close to walls, there may be more contamination in the intake and air outlet area due to the air flow. The colder outside air outlet should discharge in such a way as to not increase the heat losses in heated neighbouring rooms.

6.4 Condensate pipe for heat pumps with flammable refrigerant

Frost-free condensate discharge must be guaranteed. To ensure proper drainage, the heat pump must stand horizontally.

i NOTE

The frost line ④ may vary according to the climatic region. The regulations of the countries in question must be observed.

Version 1

The condensate, which accumulates during operation, must be drained vertically into a base filled with gravel. A daily seepage capacity of at least 1.5 litres per kW heat output of the heat pump shall be provided and the diameter of the condensate water pipe should be at least 50 mm.

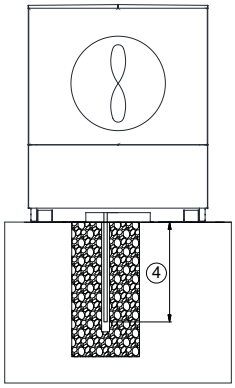


Fig. 6.3:Condensate drain in gravel

i NOTE

The condensate water pipe must be installed vertically to prevent it from freezing in winter.

Version 2

The condensate is channelled into a sewer, rainwater or drainage channel via a condensate pipe in the ground. The condensate pipe contains a siphon below the frost line ④. The water level in the siphon prevents the refrigerant from getting into the channel if there is a leakage. Pumping systems are impermissible!

The siphon must have a minimum sealing liquid level of 300 mm. The condensate drain must be checked during maintenance to ensure that it is working correctly and has no leaks.

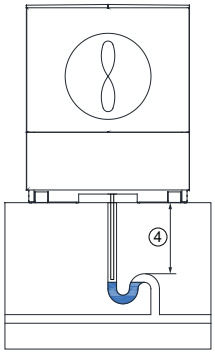


Fig. 6.4:Condensate pipe in channel over siphon

Version 3

Free discharge is only advisable in climate zones with short frost periods. In colder climate zones, the condensate pipe in areas at risk from frost must be fitted with a suitably dimensioned and regulated electrical trace heating on the insulated condensate pipe.

NOTE

Trace heating that is approved for use in an explosion-proof area (device category 3G). The occurring condensate must be directed into a frost-free or heated drain.

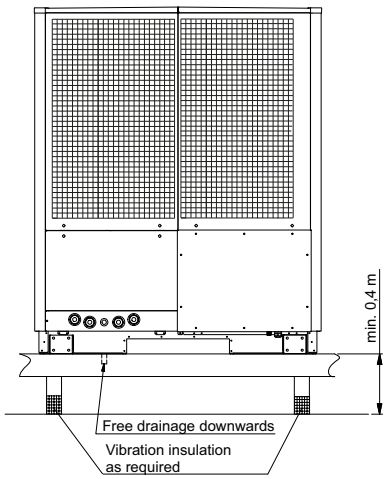
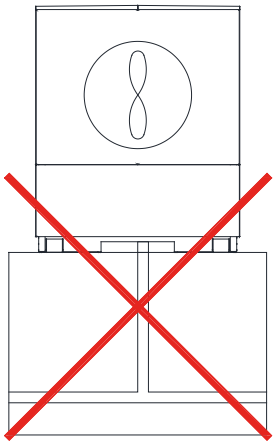


Fig. 6.5:Free condensate drainage

CAUTION!

The direct introduction of condensate into a dirt, rain and drainage channel is impermissible!



7 Assembly

7.1 General

The following connections need to be established on the heat pump:

- Heating system flows and returns
- Condensate drain
- Communication line to the heat pump manager (controller -N1)
- Power supplies (load/control voltage)

NOTE

When setting up and installing the heat pump system, it must be ensured that the heat pump casing is intact and any tampering with the heat pump casing must be refrained from. In particular, misuse of the heat pump casing (e.g. as a mounting or similar) must be prevented.

CAUTION!

It is prohibited to remain in the direct vicinity of the device during storms (risk of lightning)!

CAUTION!

Work outdoors on electrical equipment or live components may only be carried out in dry weather conditions. In wet conditions (rain, snow etc.), the device must be closed correctly.

CAUTION!

Use personal protective equipment in accordance with German Social Accident Insurance (DGUV) regulation 100-500 Sec. 2.35. German Social Accident Insurance (DGUV) regulation 3 must be complied with.

The device is a permanently technically sealed system. In rare cases, however, leakages may occur on the plate heat exchanger due to freezing. The risk is increased in particular in the event of tampering on the dirt traps, if the requirements for filling the hydraulic circuit are not complied with, or if the minimum flows are not observed

CAUTION!

Propane may transfer into the hydraulic circuit. The exhaust pipe of a safety valve inside buildings must therefore lead outside.

There should be no sinks, shafts, drains into the sewer system or permanent ignition sources in the area around the discharge opening.

Alternatively, other measures may also be taken to minimise the risk. For example with an indirect system with an additional plate heat exchanger for hydraulic separation of the primary and secondary circuit or with a gas separation system with monitoring via propane gas warning sensors. These measures must be implemented on-site in accordance with the valid national or regional regulations, directives and standards.

CAUTION!

If automatic air vents are installed in the hydraulic circuit inside buildings, small quantities of propane may escape there in the event of a leakage. This risk must be taken into account when considering the system as a whole.

CAUTION!

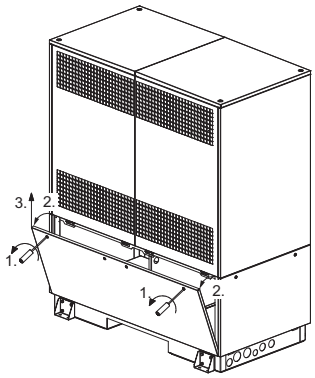
Possible sources of ignition within the hydraulic system must be prevented, in particular in areas in which gas could accumulate.

7.2 Opening and closing of the cover

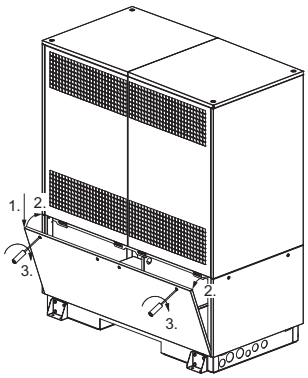
All panelling can be removed to allow access to the inside of the device. Note that the upper covers can only be removed after the lower covers have been taken off.

Opening and closing of the bottom cover

The two sash fasteners must be opened for this purpose. The cover must then be slightly tilted forward and lifted off toward the top.



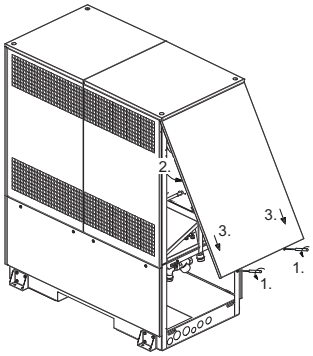
Opening the lower covers



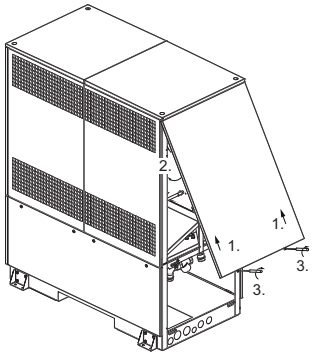
Closing the lower covers

Opening and closing of the top cover

The upper panels are hooked into the cover panel. To dismantle, open the two screws and unhook the panels by pulling them back.



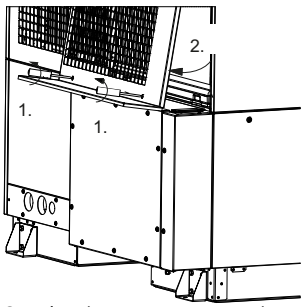
Opening the upper cover panels



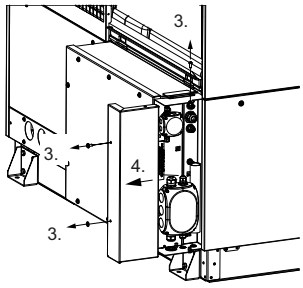
Closing the upper cover panels

Opening the connection box

In order to open the cover plate on the connection box, the top cover panel must first be removed. For this purpose, open both screws and unhook the panel by pulling it back. The three screws of the cover panel for the connection box can then be loosened and the panel can be removed by pulling it forward.



Opening the upper cover panel over the connection box



Opening the cover panel for the connection box

7.3 Connection on heating side

The connection on the heating side must be carried out by trained personnel using personal protective equipment. Refer to the device information for the connection sizes.

A spanner must be used to firmly grip the transitions when connecting the heat pump. After the heat pump has been installed, the ductwork must be sealed so that the connection is gas-tight.

⚠ CAUTION!

Flush the heating system prior to connecting the heat pump.

Before connecting the heating water system to the heat pump, the heating system must be flushed to remove any impurities, residue from sealants, etc. Any accumulation of deposits in the liquefier may cause the heat pump to completely break down.

Once the heat pump has been connected to the heating system, it must be filled, purged and pressure-tested.

⚠ CAUTION!

The leakproofness of the hydraulic circuit must be ensured and checked regularly.

i NOTE

The response pressure of the safety valve in the heat pump is 2.5 bar(g).

i NOTE

Pump units with check valves maintain the specified flow directions. If there is incorrect distribution or breaking off of the volume flow, these units (and the check valves in particular) must be checked! The use of check valves are mandatory in the event of several heating circuits or parallel connections for heat pumps in order to avoid incorrect distribution.

7.4 Water quality in heating systems

NOTE

Damage due to unsuitable filling and additional water
Unsuitable filling and additional water can lead to deposits and corrosion. This can reduce the performance of the heat pump or cause damage to the system.

NOTE

The system installer is responsible for the water quality.

Do not use antifreeze (e.g. water / glycol mixture) in the heating water.

Flush the heating system before filling.

The filling water must meet drinking water standards and must comply with VDI 2035. The following limit values must also be observed:

Evaluation characteristic		Concentration range
Electrical conductivity (saline operation)	µS/cm	100 - 500 [1]
Electrical conductivity (low-salt operation)	µS/cm	< 100 [1]
pH value		8.2 - 9.5 [1 2 3]
Total hardness	°dH	3.5 - 8.4
Chloride ions (Cl^-)	mg/l or ppm	< 20
Iron (Fe)	mg/l or ppm	< 0.2 [1]
Hydrogen carbonate/sulphate (HCO_3^-/SO_4^{2-})		> 1.0
Filterable materials	mg/l	< 30

1. Values stipulated in VDI2035 are applicable
2. When using demineralised water, ensure that the pH value is above the minimum permissible value of 8.2. Failure to comply with this value can result in the heat pump being destroyed.
3. Check operation after 12 weeks at the latest.

Before filling the system, obtain information about the drinking water quality from the local water supply company. In many regions the local water supply company's website provide an insight into water hardness, pH value and a range of other constituent substances.

NOTE

Check the water quality 10 to 12 weeks after filling / commissioning.

Document the filling water conditioning, water quality and any actions taken in the system handbook

Note

For operation of the heat pump with the four-way reversing valve, it is essential to set up the hydraulic connections according to the instructions included in the scope of supply of the valve. These instructions describe the procedure for setting up the correct hydraulics in more detail. Non-observance of this will lead to restrictions in the operation of the heat pump.

Important!

The notes/settings in the instructions of the heat pump manager must always be observed and carried out accordingly; not doing so will lead to malfunctions. The maximum water outlet temperature must not exceed 64°C and must be secured on the system side so that, if the temperature is exceeded, all additional heat sources are switched off safely.

Heating and cooling water flow rates

The values, specifications and notes provided in the device information (Cap. 12 on page 19) must be adhered to. This can be accomplished, for example, by installing a dual differential pressureless manifold as well as corresponding pump sizing.

CAUTION!

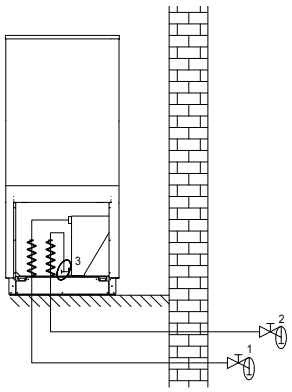
When the minimum heating water flow is undershot, the plate heat exchanger in the refrigeration circuit can freeze, which can lead to total loss of the heat pump.

Further notes and specifications are provided in the device information (Cap. 12 on page 19) and must be taken into consideration during project planning. The required heating water flow for defrost mode must be adhered to. Recommendations for pump sizing – if provided – must be taken into consideration.

An installed flow rate switch is used only for switching off the heat pump in the event of an unusual and abrupt drop in the heating water flow rate and not to monitor and safeguard the flow.

Frost protection

A method of manual drainage (see illustration) should be provided for heat pumps which are exposed to frost. The frost protection function of the heat pump manager is active whenever the heat pump manager and the heat circulating pump are ready for operation. In the event of decommissioning or power failure, the system must be drained and, if necessary, blown out at the points shown (see illustration).



7.5 Temperature sensor

The following temperature sensors are already installed or must be installed additionally:

- Outside temperature (R1) supplied (NTC-2)
- Return temperature, secondary circuit (R2) installed (NTC-10)
- Flow temperature, secondary circuit (R9) installed (NTC-10)

7.5.1 Sensor characteristic curves

Temperature in °C	-20	-15	-10	-5	0	5	10
NTC-2 in kΩ	14.6	11.4	8.9	7.1	5.6	4.5	3.7
NTC-10 in kΩ	67.7	53.4	42.3	33.9	27.3	22.1	18.0

15	20	25	30	35	40	45	50	55	60
2.9	2.4	2.0	1.7	1.4	1.1	1.0	0.8	0.7	0.6
14.9	12.1	10.0	8.4	7.0	5.9	5.0	4.2	3.6	3.1

The temperature sensors to be connected to the heat pump manager (controller -N1) must correspond to the sensor characteristic curve illustrated in Fig. 7.1 on page 14. The only exception is the outside temperature sensor included in the scope of supply of the heat pump (see Fig. 7.2 on page 14)

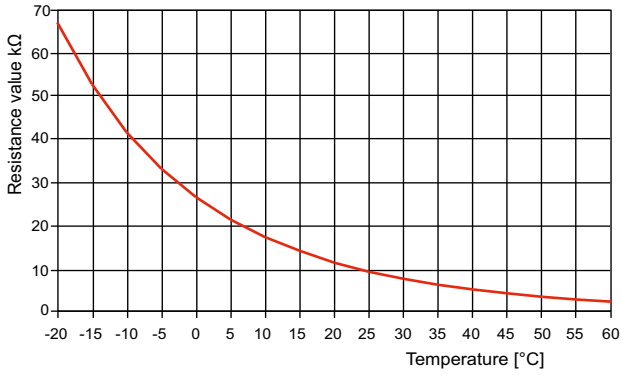


Fig. 7.1:Sensor characteristic curve NTC-10

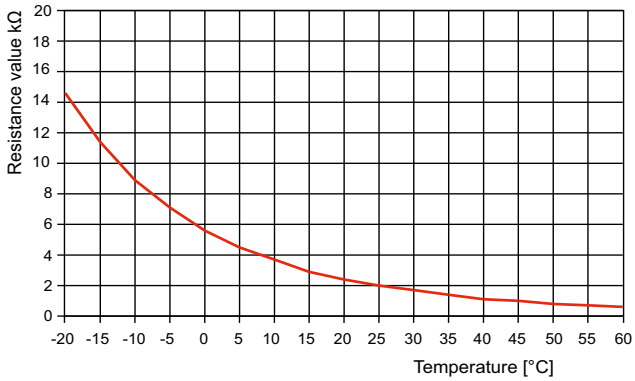


Fig. 7.2:Sensor characteristic curve NTC-2 according to DIN 50350 Outside temperature sensor

7.6 Electrical connection

7.6.1 General

All electrical installation work must be carried out by a trained electrician or a specialist for the specified tasks in accordance with the

- installation and operating instructions,
- country-specific installation regulations (e.g. VDE 0100),
- technical connection conditions of the energy suppliers and supply grid operators (e.g. TAB) and
- local conditions.

To ensure that the frost protection function of the heat pump works properly, the heat pump manager can only be briefly disconnected from the power supply and the flow must be maintained through the heat pump.

⚠ CAUTION!

The switch box must be designed to have restricted breathing in accordance with DIN EN 60335-2. It may only be opened by authorised and qualified after-sales service technicians in connection with maintenance or service work. Prior to commissioning or after the work is complete, a check must be carried out to determine restricted breathing in accordance with the repair manual.

All supply lines on the heat pump must be fed through the designated free cable glands into the connection box provided on the side of the switch box. The lines must be firmly screwed into their feed-throughs. Opening the restricted-breathing switch box for this purpose is not necessary.

⚠ CAUTION!

Changes on the restricted breathing switch box, such as additional cable glands or incomplete screw connections on the cable glands and the switch box cover are not permitted.

7.6.2 Electrical installation work

⚠ CAUTION!

Work outdoors on electrical equipment or live components may only be carried out in dry weather conditions. In wet conditions (rain, snow etc.), the device must be closed correctly.

A standard 5-core cable is used to connect the heat pump to the power supply.

The cable must be provided on-site. The conductor cross section is selected in accordance with the power consumption of the heat pump (see attachment Device Information) and the applicable VDE (EN) and VNB regulations.

An all-pole disconnecting device (e.g. circuit breaker, main switch, utility company blocking contactor, power contactor, mobile switch-off device (see cap. 3.4 on page X) for maintenance etc.), with a contact clearance on each pole according to the conditions of overvoltage category III (min. 3 mm), must be included in the installation for switching off from the mains. These switching equipment components must be installed outside the safety zone (Cap. 6.1 on page 7) (tripping current according to device information). When installing a residual current device, a version that is suitable for DC components that could occur due to electronic equipment, for example, must be used (RCD type B).

The relevant components in the heat pump contain an internal overload protection.

When connecting, ensure that the incoming supply has a clockwise rotating field.

Phase sequence: L1, L2, L3.

⚠ CAUTION!

Ensure that there is a clockwise rotating field: With incorrect wiring, starting of the heat pump is prevented. A corresponding warning is indicated on the display of the heat pump manager (adjust wiring).

- The control voltage is supplied via the heat pump manager (controller -N1).
  A 3-pole line must be laid for this in accordance with the electrical documentation. Further information on the wiring of the heat pump manager is available in the heat pump manager operating instructions.
- A shielded communication line (J-Y(ST)Y ..LG) (not included in the scope of supply) connects the heat pump manager (controller -N1) with the controller -N0 installed in the heat pump. More detailed instructions can be found in the heat pump manager operating instructions and in the electrical documentation (included with the switch box).

i NOTE

The communication cable is necessary for the function of air-to-water heat pumps in outdoor installation. It must be shielded and laid separately from the mains cable.

7.6.3 Demand sensor connection

The demand sensor R2.2 (NTC 10) is included with the heat pump manager (controller -N1). It must be installed depending on the hydraulics used (see cap. 3 on page VII).

If a demand sensor is not connected, the second heat generator cannot be controlled with the heat pump manager in the event of an interruption in communication either.

i NOTE

The return sensor R2 installed in the heat pump is active when the compressor is running and must not be disconnected.

7.6.4 Circulating pump connection with high performance

In many cases, the supply voltage of the pump is stuck on continuous current when using larger electronically controlled circulating pumps (the manufacturer's information on the pump being used should be taken into consideration). The pump is then generally actuated using the Start/Stop input. This input is operated with extra low voltage from the pump (a link cable is usually inserted in the factory default of the pump). In order to be able to actuate the input, a coupling relay with a floating contact is required. This must be controlled with the pump function of a 230 V relay output of the controller. Due to the extra low voltage to be switched, a suitable relay with the appropriate contact material (gilded) must be selected and integrated on-site.

7.6.5 Frost protection

Regardless of the settings for the heat circulating pumps, they always run in heating, defrost and frost protection mode. In systems with multiple heating circuits, the 2nd and 3rd heat circulating pump has the same function.

⚠ CAUTION!

To ensure that the frost protection function on the heat pump works properly, the heat pump manager must remain connected to the power supply and flow must be maintained through the heat pump at all times.

⚠ CAUTION!

The primary pump (M11 – responsible for the heat source flow rate) and the secondary pump (M16 – responsible for the warm/cold water flow rate) must always be clamped to the heat pump manager in all cases. This is the only way to ensure the pump flows and returns necessary for operation and to ensure that the necessary safety measures are in place.

8 Commissioning

8.1 General

Commissioning must be carried out by trained personnel. Specialist tools must be used. To ensure that commissioning is performed correctly, it should only be carried out by an after-sales service technician authorised by the manufacturer (Fig. 1.1 on page 2). Under certain conditions, this may be associated with an additional warranty service.

⚠ CAUTION!

Commissioning, maintenance and repair only by personnel who have verifiably been trained in dealing with the refrigerant propane.

8.2 Preparation

The following items must be checked prior to commissioning:

- The casing covers of the heat pump must be mounted on all sides.
- There must be no ignition sources in the safety zone.
- Personal protective equipment (protective goggles, safety shoes and gloves where necessary) must be used when working on the device.
- All of the heat pump connections must be installed as described in chapter 7.
- The heating circuit must have been filled and checked.
- The leakage tightness of the refrigerant circuit must be tested after all assembly work is complete and the external power supply (load and control voltage) has been connected. The leakage tightness test is described in the maintenance instructions.
- All valves which could impair the proper flow in the heating circuit must be open.
- The air intake and air outlet paths must be clear.
- The fan must turn in the direction indicated by the arrow.
- The settings of the heat pump manager (controller -N1) must be adapted to the heating system in accordance with the operating instructions.
- Ensure that the condensate drain functions properly.
- The hydraulic network must be flushed correctly before installing the heat pump. This includes the supply line to the heat pump. Only when flushing is complete can the heat pump be hydraulically integrated.
- The dirt traps present as standard or included for assembly must be inspected between 4 and 8 weeks after the heat pump is commissioned or changes made to the heating system and cleaned if necessary. Further maintenance intervals must be scheduled depending on the level of soiling, which must be defined and carried out by a suitably qualified person.

Special notes for the integration of heat pumps in existing systems (renovations):

The existing heat distribution network (pipe materials, connection types, etc.) and the existing heating systems (e.g. radiators, underfloor heating, etc.) can impact the quality of the water in existing systems. Particularly when welded steel pipes or pipes that are not oxygen diffusion-proof are used, deposits, scaling, silting or similar may be present that can cause damage in the heat pump system. This can result in a total failure of the heat pump The following measures must be observed to avoid this:

- Compliance with the water properties and water quality
- Flushing of the hydraulic system
- Maintenance interval of the dirt traps

If silting or ferromagnetic particles are to be expected in the hydraulic network, dirt separators or magnetite separators must be installed on-site before the medium enters the heat pump. The maintenance intervals must be defined by a suitably qualified person.

8.3 Procedure

NOTE

Only software that is authorised and approved by the manufacturer can be installed on the machine's control system.

The heat pump is commissioned via the heat pump manager (controller -N1). Settings should be made in compliance with the heat pump manager's instructions.

At heating water temperatures under 7°C, commissioning is not possible. The water in the buffer tank must be heated with the 2nd heat generator to at least 22°C.

To ensure problem-free commissioning, the following procedure is to be implemented:

1) Close all consumer circuits.
2) Ensure that the heat pump has the correct water flow.
3) Select "Winter" mode on the heat pump manager.
4) In the special functions menu, start the "Commissioning" program.
5) Wait until a return temperature of at least 29°C has been reached.
6) Now slowly reopen the heating circuit valves in succession so that the heating water flow rate is constantly raised by slightly opening the respective heating circuit. The heating water temperature in the buffer tank must not be allowed to drop below 24°C during this process. This ensures that the heat pump can be defrosted at any time.
7) When all heating circuits are fully open and a return temperature of at least 22°C is maintained, the commissioning is complete.

⚠ CAUTION!

Operating the heat pump at low system temperatures may cause the heat pump to break down completely.

⚠ CAUTION!

Due to the solubility of propane in water, propane may enter the hydraulic circuit in the event of leakage at the plate heat exchanger despite the safety valve and the bubble separator.

⚠ CAUTION!

Commissioning, maintenance and repair only by personnel who have verifiably been trained in dealing with the refrigerant propane.

9 Maintenance work

9.1 General

NOTE

The maintenance instructions must be observed.

Work on the heat pump must only be performed by authorised and qualified after-sales service technicians!

The device contains combustible refrigerant. Avoid ignition sources in the safety zone!

Before starting the maintenance, the system log book must be observed with respect to repairs and modifications already carried out.

Periodic inspections required by law, e.g. German industrial safety regulations (BetrSichV), etc., must also be observed.

To protect the paintwork, avoid leaning anything against the device or putting objects on the device. External heat pump parts can be wiped with a damp cloth and commercially available domestic cleaner.

NOTE

Never use cleaning agents containing sand, soda, acid or chloride, as these can damage the surfaces.

NOTE

Only software that is authorised and approved by the manufacturer can be installed on the machine's control system.

NOTE

Only original spare parts may be used

⚠ CAUTION!

Maintenance and operating instructions for the machine and the switch box must be taken into account

⚠ CAUTION!

The leakage tightness of the refrigerant circuit must be tested after all assembly work is complete and the external power supply (load and control voltage) has been connected.

⚠ CAUTION!

The long-term leakage tightness of the entire hydraulic circuit must be ensured (for example through repeated inspection).

The device is a permanently technically sealed system. In rare cases, however, leakages may occur on the plate heat exchanger due to freezing. The risk is increased in particular in the event of tampering on the dirt traps, if the requirements for filling the hydraulic circuit are not complied with, or if the minimum flows are not observed.

⚠ CAUTION!

Due to the solubility of propane in water, propane may enter the hydraulic circuit in the event of leakage at the plate heat exchanger despite the safety valve and the bubble separator.

⚠ CAUTION!

Commissioning, maintenance and repair only by personnel who have verifiably been trained in dealing with the refrigerant propane.

9.2 Cleaning the heating system

See the maintenance instructions for the hydraulic station

9.3 Cleaning the air system

See the maintenance instructions

9.4 Maintenance intervals

Maintenance intervals of 12 months must be observed.

10 Faults / troubleshooting / repair

This heat pump is a quality product and is designed for trouble-free operation. In the unlikely event that a fault should occur, please inform the responsible after-sales service.

⚠ CAUTION!
Work on the heat pump must only be performed by authorised and qualified after-sales service technicians!

i NOTE
The repair instructions must be observed.

The following steps must be adhered to before starting the work

1) Before starting the work, ensure that the power supply to the device is disconnected externally.
2) It is prohibited to remain in the direct vicinity of the device during storms (risk of lightning)!
3) Work outdoors on electrical equipment or live components may only be carried out in dry weather conditions. In wet conditions (rain, snow etc.), the device must be closed correctly.
4) The refrigeration circuit must not be damaged.
5) The device contains combustible refrigerant. Avoid ignition sources in the safety zone!
6) Before opening the device, check the work environment with a suitable gas detector. Position the gas detector switched on in the device during all subsequent work.

Carry out a leakage tightness test before switching on the external power supply.

A mobile switch-off device must be mounted before connecting the external power supply (see cap. 3.4 on page X). If there is a risk of refrigerant escaping during repair work, a mobile ventilation (ex-proof fan) can be used as a supporting or even essential measure.

All repair work must only be carried out by a technician who is trained in handling flammable refrigerants, has the necessary experience and fulfils the legal requirements in the relevant country where the refrigerating system is operated.

Before starting the repair work on the relevant component, the paint protector must be checked to ensure it is in the original state. Paint protectors that have to be removed for the repair work must be mounted again once the work is complete.

Before starting the repair, the system log book must be observed with respect to repairs and modifications already carried out.

⚠ CAUTION!
The leakage tightness of the refrigerant circuit must be tested after all assembly work is complete and the external power supply (load and control voltage) has been connected.

⚠ CAUTION!
Maintenance and operating instructions for the machine and the switch box must be taken into account.

⚠ CAUTION!
After disconnecting the power supply, you have to wait 5 minutes before all components are de-energised.

⚠ CAUTION!
The long-term leakage tightness of the entire hydraulic circuit must be ensured (for example through repeated inspection).

The device is a permanently technically sealed system. In rare cases, however, leakages may occur on the plate heat exchanger due to freezing. The risk is increased in particular in the event of tampering on the dirt traps, if the requirements for filling the hydraulic circuit are not complied with, or if the minimum flows are not observed.

⚠ CAUTION!
Due to the solubility of propane in water, propane may enter the hydraulic circuit in the event of leakage at the plate heat exchanger despite the safety valve and the bubble separator.

⚠ CAUTION!
Commissioning, maintenance and repair only by personnel who have verifiably been trained in dealing with the refrigerant propane.

11 Decommissioning / disposal

Before removing the heat pump, disconnect the machine externally from the power source and shut it off hydraulically. The heat pump must be dismantled by trained personnel. Observe all environmental requirements regarding the recovery, recycling and disposal of materials and components in accordance with all applicable standards. Particular attention should be paid to the proper disposal of the flammable refrigerant and refrigerant oil. Anyone carrying out work on the refrigeration circuit must be certified to safely handle flammable refrigerants or be supervised by a person with such certification.

⚠ CAUTION!
Work on the heat pump must only be performed by authorised and qualified after-sales service technicians!

⚠ CAUTION!
It is prohibited to remain in the direct vicinity of the device during storms (risk of lightning)!

⚠ CAUTION!
Work outdoors on electrical equipment or live components may only be carried out in dry weather conditions. In wet conditions (rain, snow etc.), the device must be closed correctly.

⚠ CAUTION!
Before removing the heat pump, disconnect the machine externally from the power source.

⚠ CAUTION!
After disconnecting the power supply, you have to wait 5 minutes before all components are de-energised.

12 Device information

Type and order code				LA 60P-TUR
1	**Design**			
	Heat source			Air
1.1	Version			Universal, reversible
1.2	Controller			HPM
1.3	Thermal energy metering			Integrated
1.4	Installation location			Outside
1.5	Performance level			2
2	**Operating limits**			
2.1	Heating water flow/return [1]		°C	up to 64 ±2 / from 22
	Cooling water flow/return		°C	[2] +7 to +20 / min. 10 °C to max. 28 °C
	Air (heating)		°C	-22 to +40
	Air (cooling)		°C	+10 to +45
3	**Flow / sound**			
3.1	Heating water flow/ internal pressure differential	A7 / W35/30	m³/h / Pa	5.8 / 8400
		A7 / W45/40	m³/h / Pa	5.6 / 7800
		A7 / W45/47	m³/h / Pa	3.4 / 4100
	Recommendation for pump sizing [3]		m³/h / Pa	9.0 / 20500
	Required heating water flow for defrost mode [3]		m³/h / Pa	8.5 / 18500
3.2	Cooling water flow rate/internal pressure differential	A35 / W18/23	m³/h / Pa	11.2 / 31600
	Minimum cooling water flow [3] [4]	A35 / W7/12	m³/h / Pa	8.5 / 18500
3.3	Sound power level according to EN 12102 (A7 / W55) Normal operation / reduced operation [5]		dB(A)	70 / 64
3.4	Sound pressure level at a distance of 10 m (air outlet side) [6] Normal operation / reduced operation [5]		dB(A)	42 / 36
3.5	Maximum sound power level (A-7 / W55) [7] full-load operation / reduced operation [5]		dB(A)	75 / 70
3.6	Sound power level (A2 / W31) [8]	Normal operation	dB(A)	70
	Heat output (A2/W31) [8]	Normal operation	kW	26.7
3.7	Air flow (controlling range, EC fan)		m³/h	0 - 25000
4	**Dimensions, weight and filling quantities**			
4.1	Device dimensions without connections [9]		H x W x L mm	2300 x 1900 x 1190
4.2	Weight of the transportable unit(s) incl. packaging		kg	910
4.3	Device connections for heating		Inches	Rp 2”
4.4	Refrigerant / total filling weight		Type / kg	R290 / 7.6
4.5	Lubricant / total filling quantity		Type / litres	Hatcol 4467 / 9.1
4.6	Volume of heating (cooling) water in device		Litres	9.3
5	**Electrical connection**			
5.1	Supply voltage / fusing / RCD type			3~/PE 400 V (50 Hz) / C50A / B
5.2	Control voltage / fusing via WPM			1~/N/PE 230 V (50 Hz) / 6.3 AT
5.3	Degree of protection according to EN 60 529			IP 24
5.4	Starting current limiter			Soft starter
5.5	Rotary field monitoring			Yes
5.6	Starting current		A	78
5.7	Nominal power consumption A7/W35 / max. consumption [10]		kW	6.8 / 22.4
5.8	Nominal current with A7/W40 / cos φ		A / ---	12.9 / 0.76
5.9	Power consumption of compressor protection (per compressor)		W	54
5.10	Power consumption of fan		kW	up to 3.9
6	**Complies with the European safety regulations**			[11]
7	**Additional model features**			
7.1	Type of defrosting (according to need)			Reverse circulation

Type and order code			LA 60P-TUR	
7.2	Condensate tray frost protection / water in device is protected from freezing [12]		Heated / yes	
7.3	Max. operating overpressure (heat source / heat sink)	bar	1.8	
7.4	Hydraulic four-way reversing valve (external) [13]		Accessories	
8	**Performance / coefficient of performance (COP)**			
8.1	SCOP (seasonal coefficient of performance (COP)) average climate 35°C / 55°C [14]		4.35 / 3.54	
8.2	η_s average climate 35°C / 55°C [14]		171 / 139	
8.3	Heat output / coefficient of performance (COP) [10 13 14] heat source/ heat sink		EN 14511	
	Air / water	performance level	1	2
	with A-15 / W35	kW / ---	18.6 / 2.8	34.6 / 2.7
	with A-7 / W35	kW / ---	22.9 / 3.4	42.1 / 3.1
	with A2 / W35	kW / ---	25.7 / 3.9	44.6 / 3.6
	with A7 / W35-30	kW / ---	33.3 / 4.9	
	with A12 / W35	kW / ---	36.9 / 5.3	
	with A7 / W45-40	kW / ---	32.3 / 4.0	
	with A7 / W55-47	kW / ---	31.8 / 3.4	
8.4	Cooling capacity / coefficient of performance (COP) [10 13 14] heat sink / heat source		EN 14511	
	Air / water	performance level	1	2
	with A35 / W23-18	kW / ---	31.6 / 3.5	64.5 / 3.0
	with A27 / W18	kW / ---	32.7 / 3.9	67.1 / 3.6
	with A35 / W12-7	kW / ---	22.8 / 2.6	49.6 / 2.6
	with A27 / W7	kW / ---	24.0 / 3.0	51.7 / 3.0

1. For air temperatures between -22°C and -1°C, flow temperature increasing from 45°C to 64°C.
2. The minimum achievable flow temperature depends on the current volume flow, the set return set temperature and the current performance level.
3. The specified water flow must be ensured for trouble-free operation in the pump flow and during defrosting.
   Electronic control of the M16 heat generation circuit pump via the WPM enables a reduction of the volume flow in heating operation.
   The M16 heat generation circuit pump must be provided on-site. The control of the M16 heat generation circuit pump must always be clamped onto the heat pump manager.
   The supply of the heat generation circuit pump with supply voltage must be implemented such that the heat pump manager can control pump operation at all times. This is the only way to ensure that the pump flows and returns required for operation are observed and the necessary safety measures are effective.
4. In 2-compressor operation with A35/W7, this results in a cooling water temperature difference of 5K ±1K.
5. The heat output and COP is reduced by approx. 5% in lower operation
6. The specified sound pressure level corresponds to the operating noise of the heat pump in heating operation with a flow temperature of 55°C. The specified sound pressure level represents the free sound area level. The measured value can deviate by up to 16 dB(A) depending on the installation location.
7. Maximum sound power level in full load operation measured at A-7 / W55 with a heat output of 42.5 kW.
8. Operating point according to EN 14825: Low temperature application with moderate climate, partial load ratio B
9. Note that additional space is required for pipe connections, operation and maintenance
10. This data indicates the size and capacity of the system. For an analysis of the economic and energy efficiency of the system, the bivalence point and the regulation should be taken into consideration. These figures are only achieved with clean heat exchangers. Instructions for care, commissioning and operation can be found in the relevant sections of the installation and operation instructions. The specified values have the following meaning, e.g. A 7 / W35: Heat source temperature 7°C and heating water flow temperature 35°C.
11. See CE declaration of conformity
12. The heat circulating pump and the heat pump manager must always be ready for operation.
13. The values specified apply when using the hydraulic four-way reversing valve (observe instructions for accessories).
14. In the first 72 hours of operation following initial commissioning, the performance and efficiency of the heat pump may differ from the stated values.

13 Product information as per Regulation (EU) No 813/ 2013, Annex II, Table 2

Information requirements for heat pump space heaters and heat pump combination heaters

Model	LA60P-TUR
Air-to-water heat pump	yes
Water-to-water heat pump	no
Brine-to-water heat pump	no
Low-temperature heat pump	no
Equipped with a supplementary heater	no
Heat pump combination heater	no

Parameters shall be declared for medium-temperature application, except for low-temperature heat pumps. For low- temperature heat pumps, parameters shall be declared for low-temperature application.

Parameters shall be declared for average climate conditions:

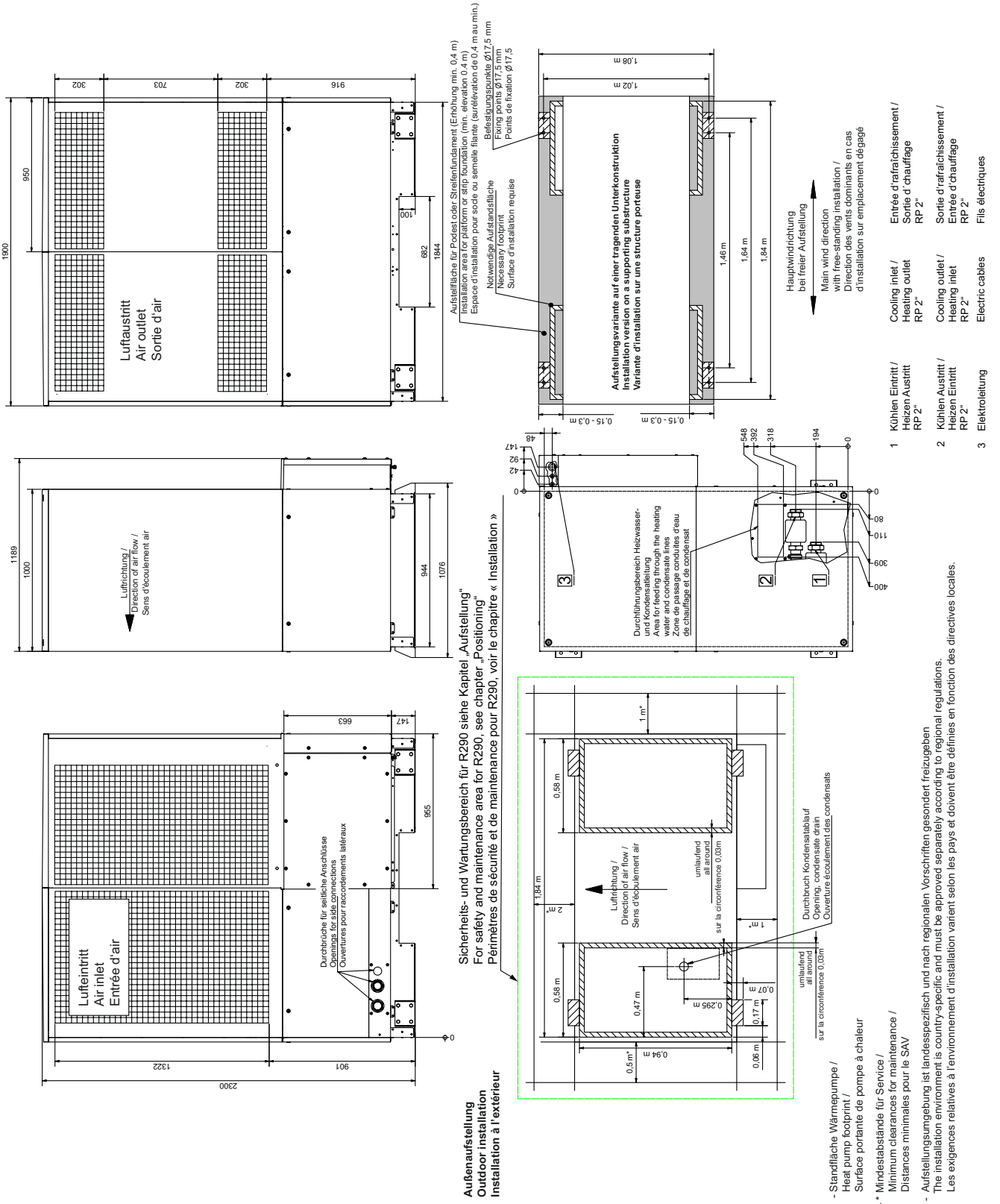
Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
Rated heat output (*)	Prated	40	kW	**Seasonal space heating energy efficiency**	η_s	139	%
Declared capacity for heating foer part load at indoor temperature 20°C and outdoor temperature T*j*				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature T*j*			
Tj = - 7°C	P*dh*	42,0	kW	Tj = - 7°C	COP*d*	2,43	-
Tj = + 2°C	P*dh*	26,4	kW	Tj = + 2°C	COP*d*	3,40	-
Tj = + 7°C	P*dh*	33,3	kW	Tj = + 7°C	COP*d*	4,49	-
Tj = + 12°C	P*dh*	37,1	kW	Tj = + 12°C	COP*d*	5,25	-
Tj = bivalent temperature	P*dh*	39,6	kW	Tj = bivalent temperature	COP*d*	2,27	-
Tj = operation limit temperature	P*dh*	39,6	kW	Tj = operation limit temperature	COP*d*	2,27	-
For air-to-water heat pumps				For air-to-water heat pumps:			
Tj = -15°C (if TOL < -20°C)	P*dh*	0,0	kW	Tj = -15°C (if TOL < -20°C)	COP*d*	0,00	-
Bivalent temperature	T_{biv}	-10	°C	For air-to-water heat pumps: Operation limit temperature	TOL	-10	°C
Cycling interval capacity for heating	P*cych*	-	kW	Cycling interval efficiency	COP*cyc*	-	-
Degradation co-efficient (**)	C*dh*	0,90	-	Heating water operating limit temperature	WTOL	64	°C
Power consumption in modes other than active mode				Supplementary heater			
Off mode	P_{OFF}	0,037	kW	Rated heat output (*)	P*sup*	0	kW
Thermostat-off mode	P_{TO}	0,036	kW	Type of energy input		eletrical	
Standby mode	P_{SB}	0,037	kW				
Crankcase heater mode	P_{CK}	0,051	kW				
Other items							
Capacity control		fixed		For air-to-water heat pumps: Rated air flow rate, outdoors	-	14000	m³ /h
Sound power level, indoors/ outdoors	L_{WA}	- / 70	dB	For water-/brine-to-water heat pumps: Rated brine or water flow rate, outdoor heat exchanger	-	--	m³ /h
Emissions of nitrogen oxides	NO_x	-	mg/kWh				
For heat pump combination heater:							
Declared load profile		-		**Water heating energy efficiency**	η_{wh}	-	%
Daily electricity consumption	Q_{elec}	-	kWh	Daily fuel consumption	Q_{fuel}	-	kWh
Contact details	Glen Dimplex Deutschland GmbH, Am Goldenen Feld 18, 95326 Kulmbach						

(*) For heat pump space heaters and heat pump combination heaters, the rated output P*rated* is equal to the design load for heating P*designh* , and the rated heat output of a supplementary capacity for heating sup(*Tj*).

(**) If C*dh* is not determined by measurement nthen the default degradation is C*dh* = 0,9
(--) not applicable

14 Dimension Drawings

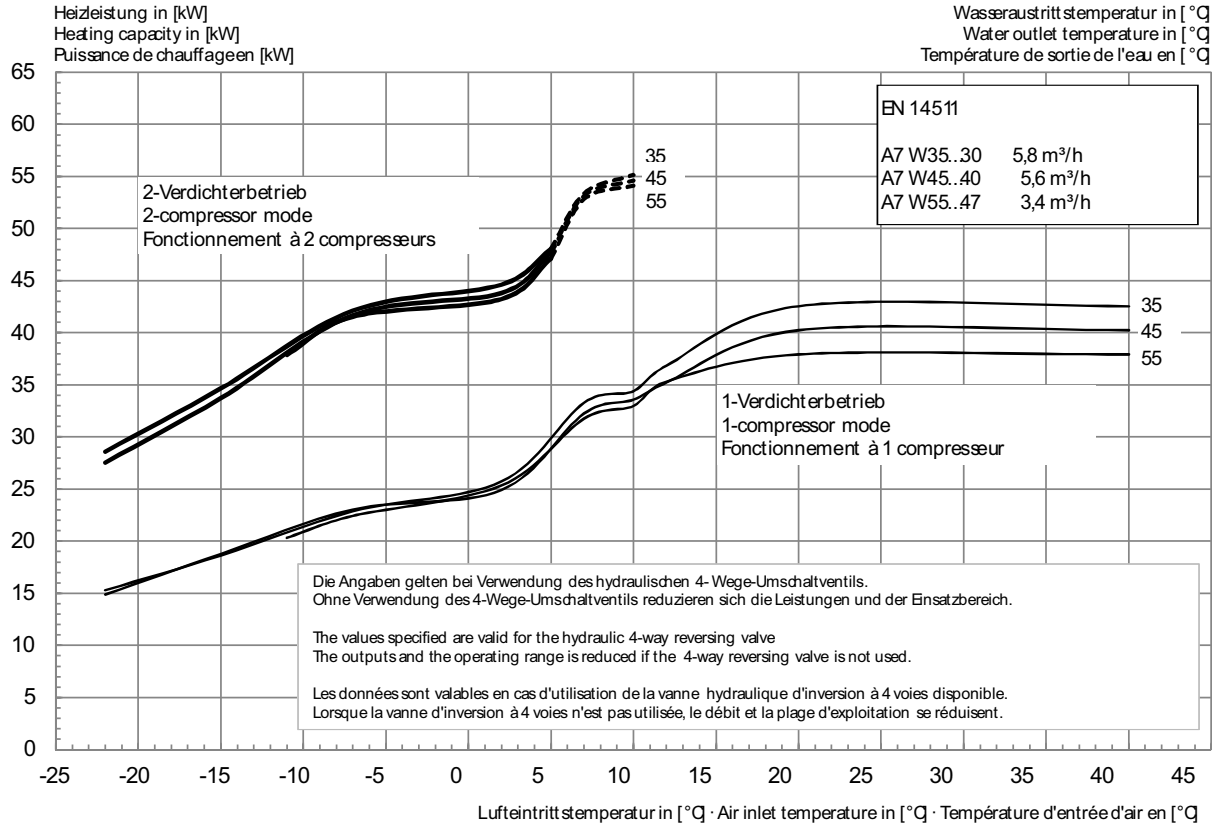
14.1 Dimension Drawing

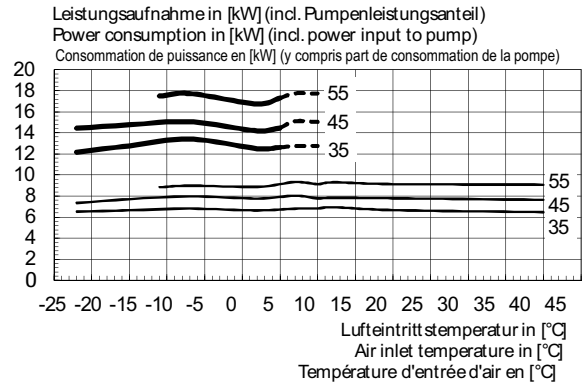


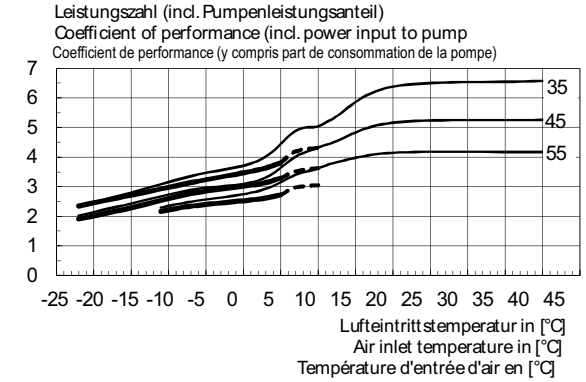
- Standfläche Wärmepumpe / Heat pump footprint / Surface portante de pompe à chaleur
- * Mindestabstände für Service / Minimum clearances for maintenance / Distances minimales pour le SAV
- Aufstellungsumgebung ist landesspezifisch und nach regionalen Vorschriften gesondert freizugeben
The installation enviornment is country-specific and must be approved separately according to regional regulations.
Les exigences relatives à l'environnement d'installation varient selon les pays et doivent être définies en fonction des directives locales.

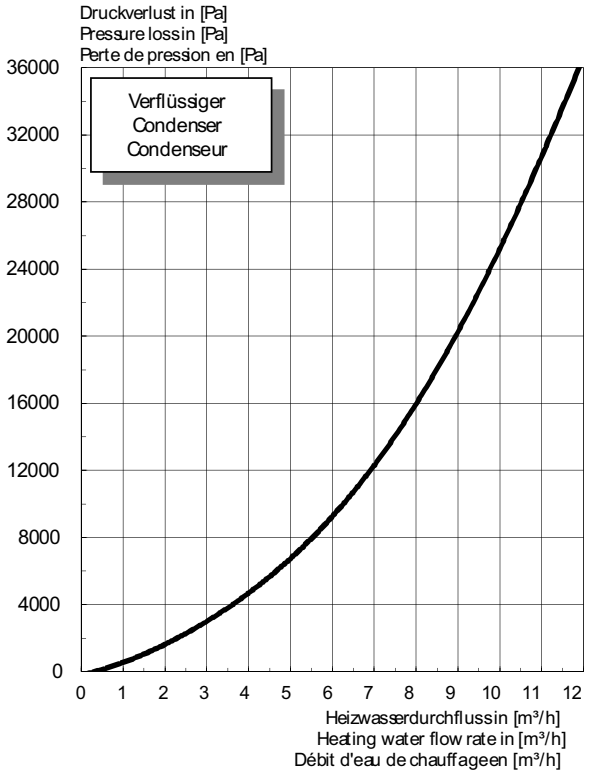
15 Diagrams

15.1 Characteristic curves for heating operation

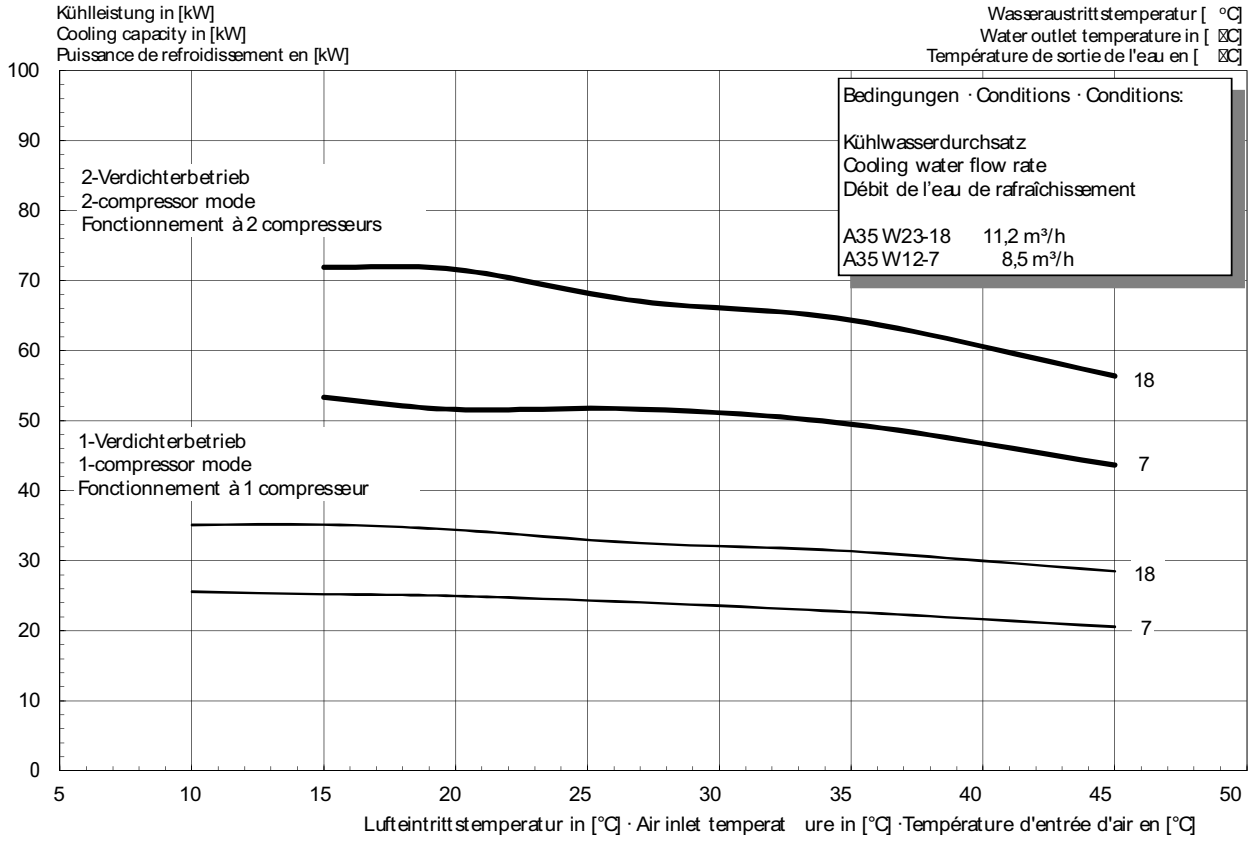


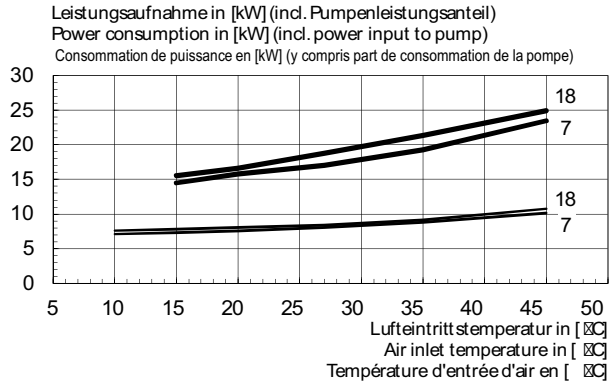


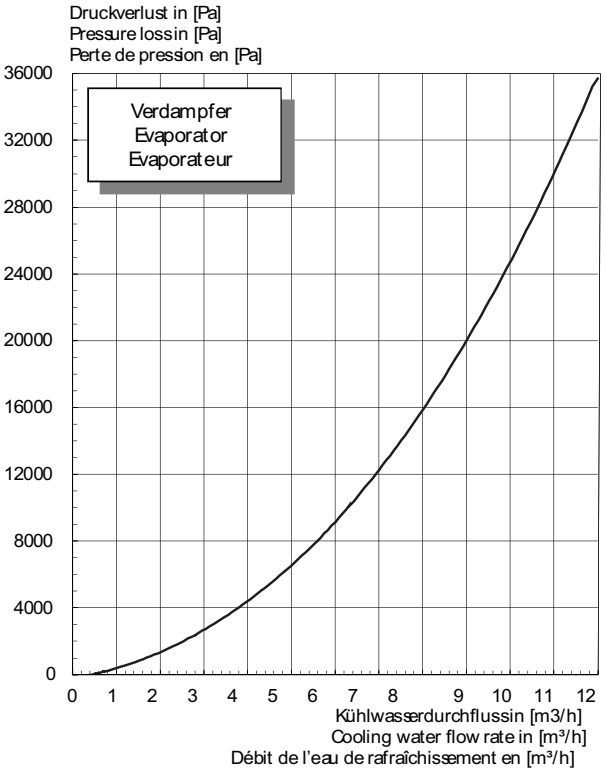


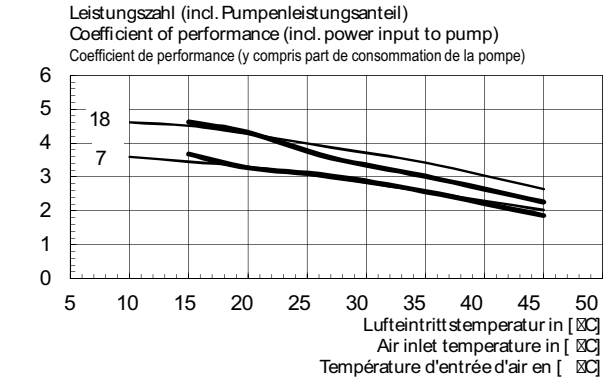


15.2 Characteristic curves for cooling operation

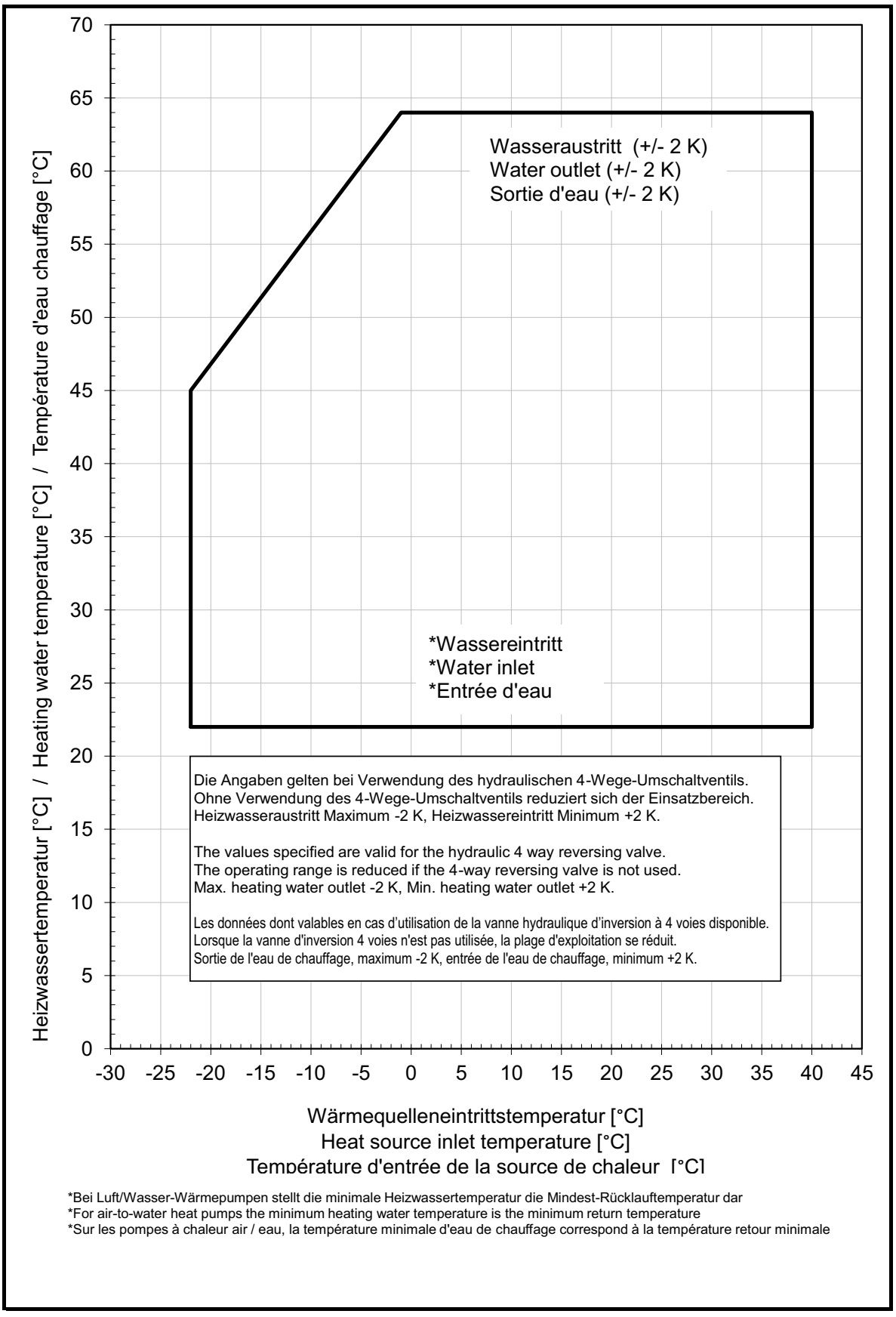






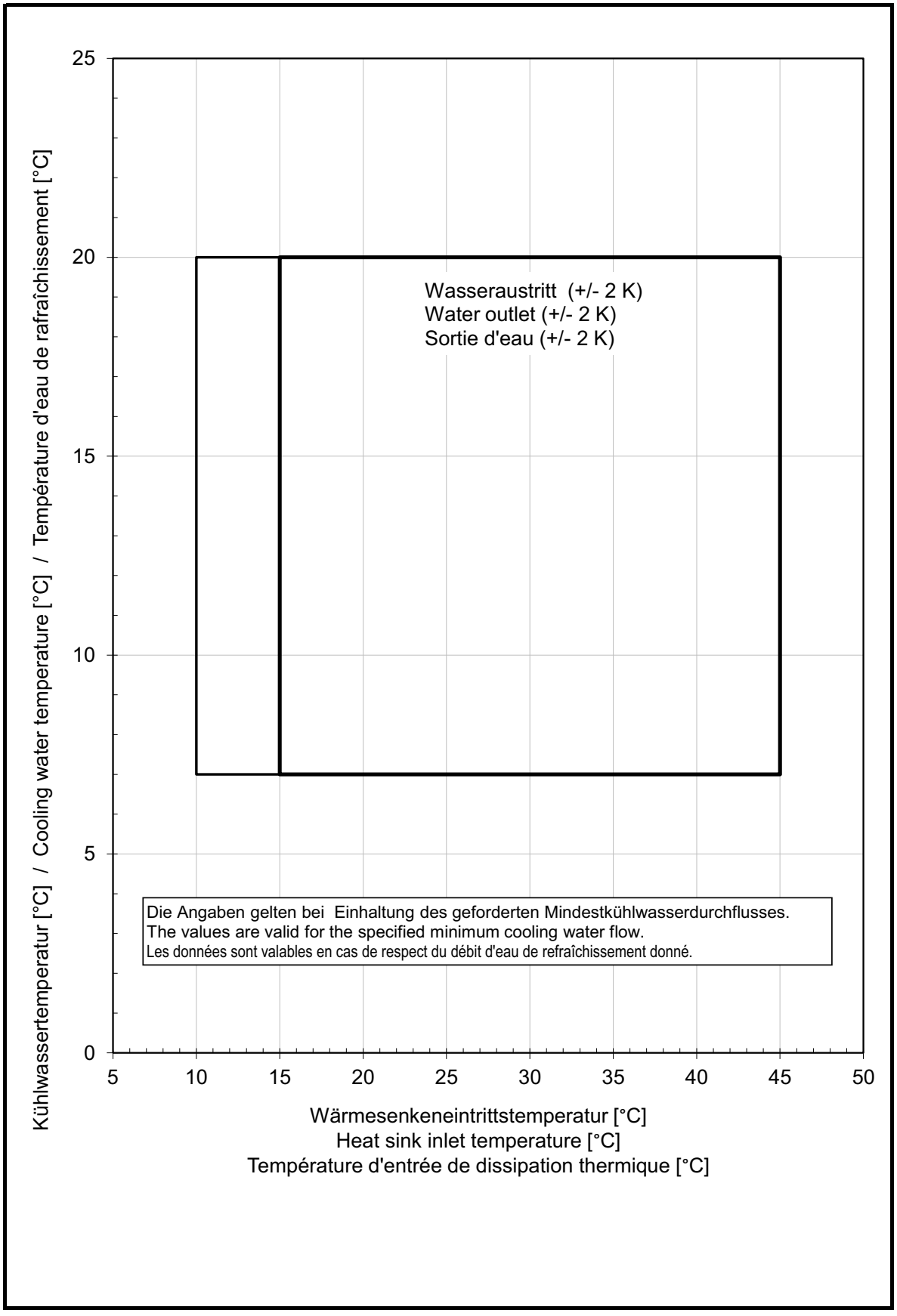


15.3 Operating limits diagram heating



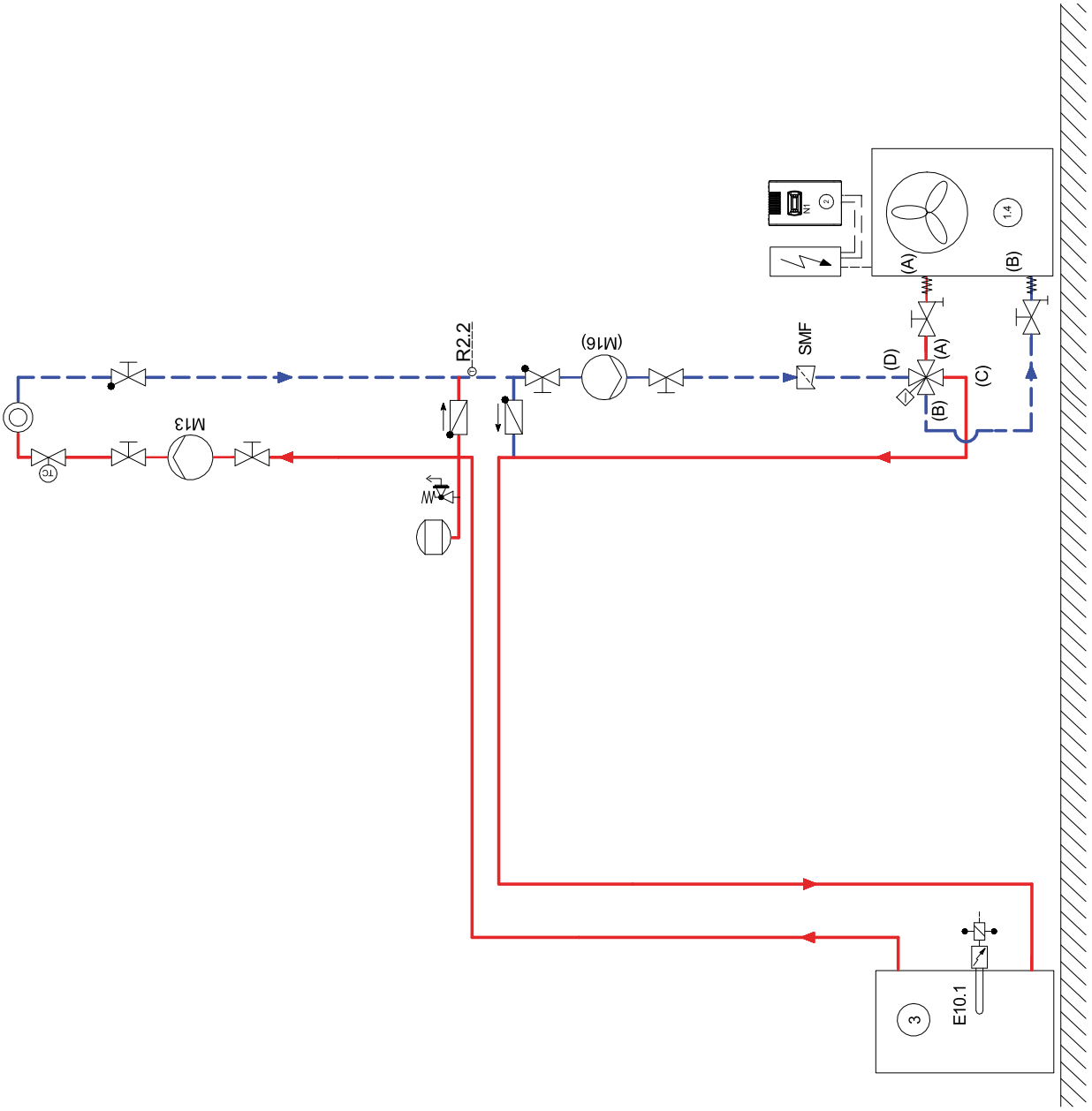
*Bei Luft/Wasser-Wärmepumpen stellt die minimale Heizwassertemperatur die Mindest-Rücklauftemperatur dar
*For air-to-water heat pumps the minimum heating water temperature is the minimum return temperature
*Sur les pompes à chaleur air / eau, la température minimale d'eau de chauffage correspond à la température retour minimale

15.4 Operating limits diagram cooling



16 Integration diagrams

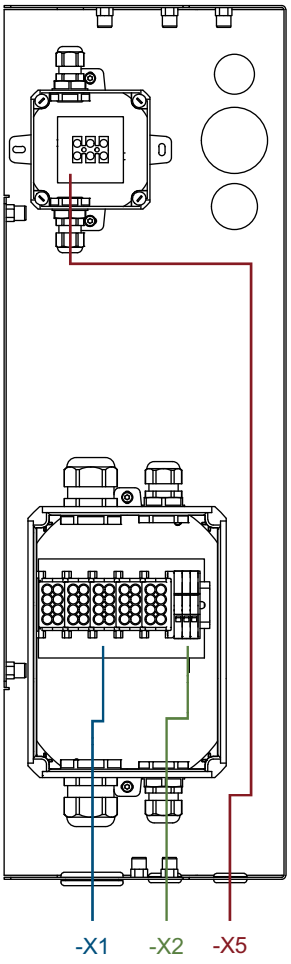
16.1 Hydraulic integration diagrams

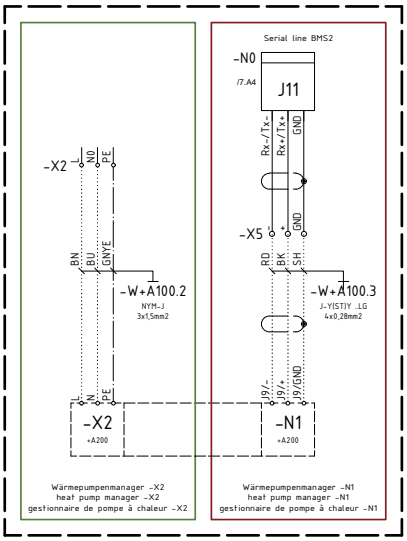


16.2 Legend

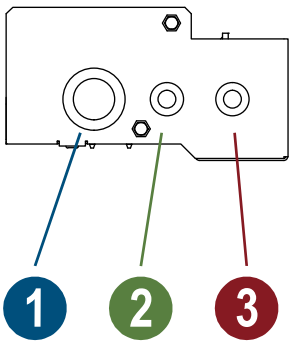
	Absperrventil	Shutoff valve	Vanne d’arrêt
	Sicherheitsventilkombination	Safety valve combination	Jeu de vannes de sécurité
	Umwälzpumpe	Circulating pump	Circulateur
	Ausdehnungsgefäß	Expansion vessel	Vase d’expansion
	Raumtemperaturgesteuertes Ventil	Room temperature-controlled valve	Vanne commandée par température ambiante
	Absperrventil mit Rückschlagventil	Shutoff valve with check valve	Vanne d’arrêt avec clapet anti-retour
	Absperrventil mit Entwässerung	Shutoff valve with drainage	Vanne d’arrêt avec vidange
	Wärmeverbraucher	Heat consumer	Consommateur de chaleur
	Temperaturfühler	Temperature sensor	Sonde de température
	Flexibler Anschlussschlauch	Flexible connection hose	Tuyau de raccordement flexible
	Rückschlagklappe	Check valve	Clapet anti-retour
	Vierwegemischer	Four-way mixer	Mélangeur 4 voies
	Schmutzfänger	Dirt trap	Filtre
⑭	Luft/Wasser-Wärmepumpe reversibel	Reversible air-to-water heat pump	Pompe à chaleur air/eau réversible
②	Wärmepumpenmanager	Heat pump manager	Gestionnaire de pompe à chaleur
③	Reihen-Pufferspeicher	Buffer tank connected in series	Ballon tampon en série
E10.1	Tauchheizkörper	Immersion heater	Résistance immergée
M13	Heizungsumwälzpumpe Hauptkreis	Heat circulating pump for main circuit	Circulateur de chauffage circuit principal
M16	Zusatzumwälzpumpe	Auxiliary circulating pump	Circulateur supplémentaire
N1	Wärmepumpenmanager	Heat pump manager	Gestionnaire de pompe à chaleur
R1	Außenwandfühler	External wall sensor	Sonde sur mur extérieur
R2.2	Anforderungsfühler	Demand sonsor	Sonde de demande

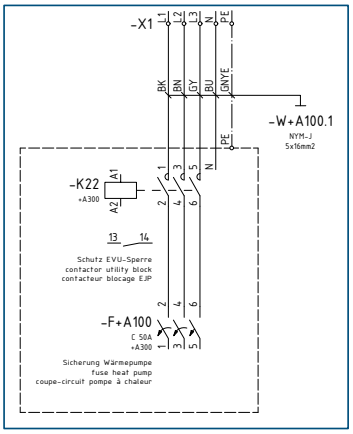
16.3 Circuit diagram heat pump





Wärmepumpenmanager
heat pump manager
gestionnaire de pompe à chaleur

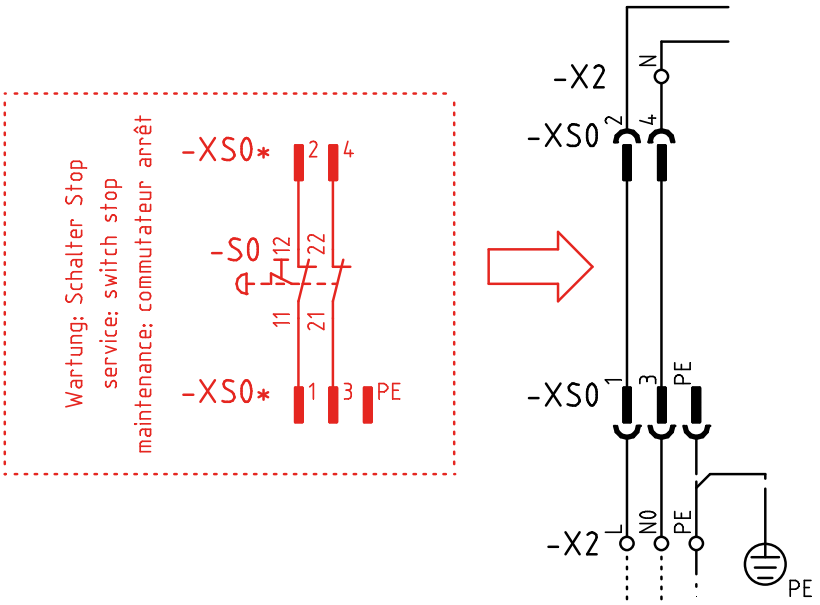




Elektroverteilung
electrical distribution system
distribution électrique

452167.21.43 a

16.4 Extract electrical documentation mobile switch-off device



Die mobile Abschalteinrichtung für den autorisierten Kundendienst ist im Wartungskit 452167.85.48 enthalten.
The mobile switch-off device for the authorised after-sales service is included in the maintenance set 452167.85.48.
Le dispositif de coupure mobile destiné au personnel SAV agréé se trouve dans le kit de maintenance 452167.85.48.



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