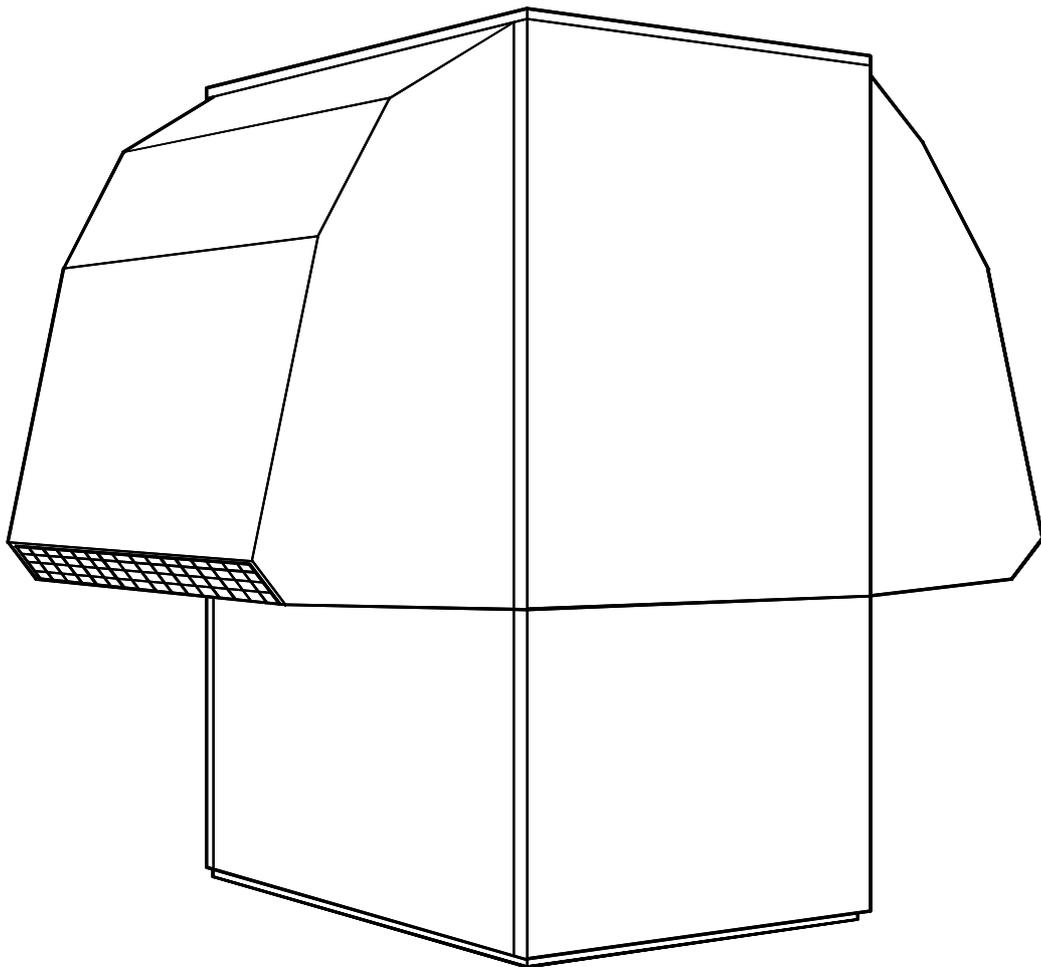


CE

**MOUNTING and OPERATING MANUAL**

**Reversible Air-to-Water Heat Pump  
for Outdoor Installation  
LA 16ASR**



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# 1 READ IMMEDIATELY

## 1.1 Important Information

**CAUTION!** Prior to opening the unit it must be ensured that all electrical circuits are disconnected from the power source.

**CAUTION!** During transport, the heat pump must not be tilted more than 45° (in either direction).

**CAUTION!** Heat pump and transport pallet are only connected by the packaging film.

**CAUTION!** The intake and outlet duct openings must not be restricted nor obstructed.

**CAUTION!** Clockwise phase sequence to be observed: Damage to the compressor may be incurred if it is operated in the wrong sense of rotation.

**CAUTION!** Do not use any cleaning agents containing sand, soda, acid or chloride as these may attack the surface.

**CAUTION!** To prevent consequential damage it is imperative that the water circuit be neutralized after cleaning using appropriate agents.

**CAUTION!** The unit is not suitable for operation with a frequency converter.

**CAUTION!** Work on the refrigeration circuit may be performed by qualified persons only.

## 1.2 Legal Provisions and Guidelines

This heat pump was designed and built in compliance with all relevant EU directives, DIN and VDE regulations (see CE Declaration of Conformity).

The electrical connection of the heat pump must be performed according to and conforming with all relevant VDE, EN and IEC standards. Beyond that, all technical connection requirements of the local electrical utility company have to be observed.

On connecting the heating and cooling system, all relevant regulations have to be complied with.

## 1.3 Energy-Efficient Use of the Heat Pump

By purchasing this heat pump you contribute to the protection of the environment. A prerequisite for energy-efficient operation is the proper design of the heat source system and the heat utilization/cooling system.

One of the most important factors of heat pump efficiency is keeping the temperature difference between the heating water and the heat source as small as possible. It is therefore strongly recommended that the design of both the heat source system and the heat distribution system be carried out with great care. **A 1 Kelvin (1°C) higher temperature difference corresponds to an increase in power consumption of approx. 2.5%.** When designing the heating system care must be taken that special applications such as domestic water heating are taken into consideration and dimensioned for low temperature operation. Heat pumps are optimally suited for **underfloor heating (surface/radiant heating) applications** due to the low supply temperatures (30 °C to 40 °C).

During operation it is essential that the heat exchanger is not contaminated as this would increase the temperature difference resulting in an inferior coefficient of performance.

A considerable contribution to the economical operation is made by the heat pump controller provided it is set correctly. For more detailed information refer to the operating manual of the heat pump controller.

## PURPOSE OF HEAT PUMP SCOPE OF DELIVERY

# 2 PURPOSE OF HEAT PUMP

### 2.1 Application

The air-to-water heat pump is designed for use in existing or newly built heating systems.

The heat pump is designed exclusively for the heating and cooling of heating water!

In the heating mode, the heat pump is suitable both for mono-energetic and bivalent operation at outdoor air temperatures down to -20 °C.

In the continuous mode of operation, a heating water return temperature of more than 18 °C must be maintained in order to ensure proper defrosting of the evaporator.

The heat pump is not designed for any increased heat demand during the drying phase of new buildings; the additional heat demand must be met by special appliances to be supplied on site. For the structural drying of new buildings in the autumn or winter it is recommended that an additional electric heating element (available as accessory) be installed.

In the cooling mode, the heat pump is suited for air temperatures ranging from +15 °C ... +40 °C.

It can be used for passive and dynamic cooling applications alike. The minimum water temperature is +7 °C.

**CAUTION!**

The unit is not suited for operation with a frequency converter.

### 2.2 Principle of Operation

#### Heating

Ambient air is drawn in by the fan and passed over the evaporator (heat exchanger). The evaporator cools the air, i.e. it extracts the heat it contains. In the evaporator, the heat removed is transferred to the working fluid (refrigerant).

With the aid of an electrically driven compressor, the absorbed heat is "pumped" to a higher temperature level through pressure increase and given off to the heating water via the condenser (heat exchanger).

The desuperheater, mounted upstream, enables domestic hot water to be produced simultaneously or separately.

In so doing, electrical energy is used to raise the heat of the environment to a higher temperature level. Due to the fact that the energy extracted from the air is transferred to the heating water, this type of appliance is referred to a air-to-water heat pump.

The air-to-water heat pump consists of the following main components: evaporator, fan and expansion

valve as well as the low-noise compressor, a desuperheater, a condenser and the electric control unit.

In the case of low ambient temperatures, air humidity may accumulate on the evaporator in the form of frost impairing the heat transfer. The evaporator is automatically defrosted by the heat pump, if required.

#### Cooling

In the "cooling" mode, the operating process of evaporator and condenser is reversed..

The heating water transfers the heat to the refrigerant via the condenser that is now working as the evaporator. In the compressor the temperature of the refrigerant is raised, and the heat is rejected to the ambient air via the condenser (in the heating mode the evaporator).

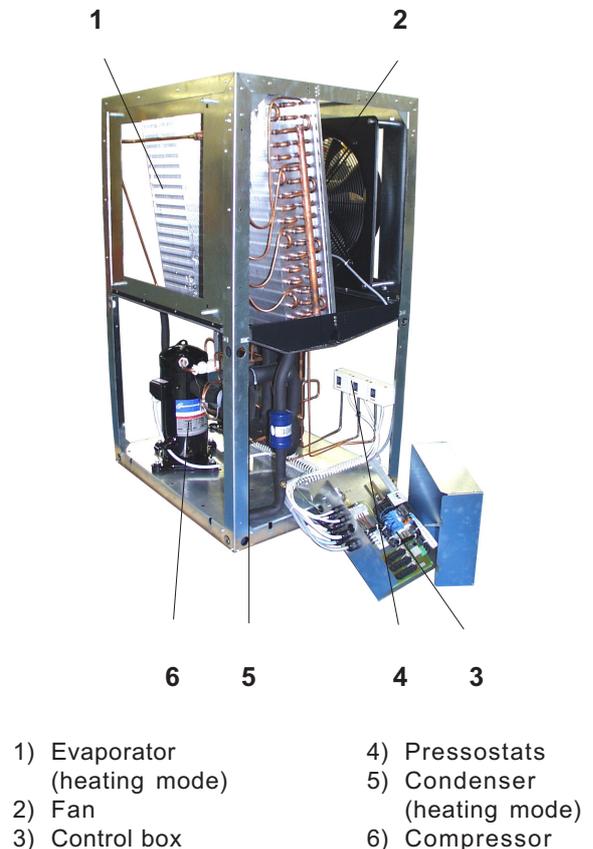
Via the additional heat exchanger, the waste heat can also be used for hot water consumers such as domestic hot water, swimming pool or bathroom heating applications.

# 3 SCOPE OF DELIVERY

### 3.1 Baseline Unit

The heat pump is delivered as a compact unit containing the components listed below.

The refrigerant used is R404A.



### 3.2 Control Box

The control box is integrated in the heat pump. It can be folded downward after removing the lower front panel and loosening the fastening screws located at the top on the right.

The control box houses the mains terminals as well as the power contactors and the soft start unit.

The plug connector for the control lead is located at the bottom of the unit in the immediate vicinity of the line feed-through through the bottom of the unit.

### 3.3 Heat Pump Controller

**For the operation of your reversible air-to-water heat pump, the reversible heat pump controller included in the scope of delivery is to be used.**

The heat pump controller is a comfortable electronic regulating and control unit. It controls and monitors the entire heating/cooling system as a function of the outdoor air temperature, the hot water preparation and the safety devices.

The external temperature sensor, to be mounted by the customer, incl. fastening hardware is shipped with the controller.

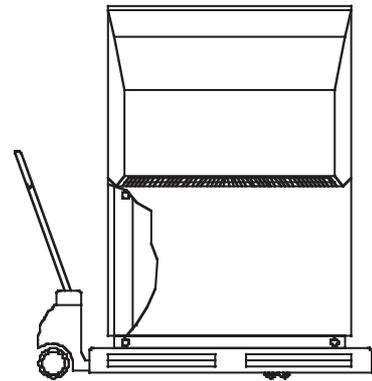
Method of functioning and operation of the heat pump controller are described in the enclosed operating manual.

## 4 TRANSPORT

### CAUTION!

**During transport, the heat pump must not be tilted more than 45° (in either direction).**

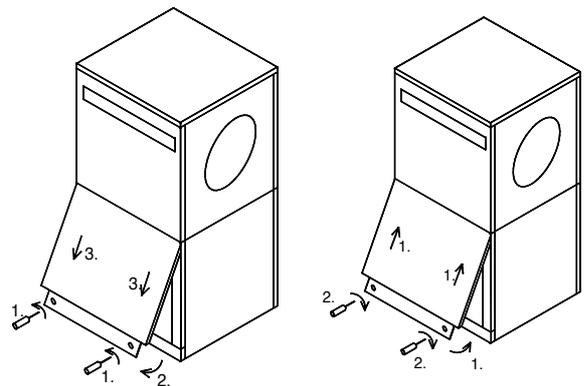
The unit should be transported to the final installation site on a wooden pallet. The baseline unit can be transported either by means of a lift truck, a sack trolley, or the like, or using 3/4" pipes to be put through the openings provided in the base plate or the frame.



### CAUTION!

**The heat pump and transport pallet are only connected by the packaging film.**

It is necessary to remove the lower cover panel to be able to access the transport openings in the frame. For this purpose, loosen two screws each in the base, retract the panels and disengage them at the



Opening the cover

Closing the cover

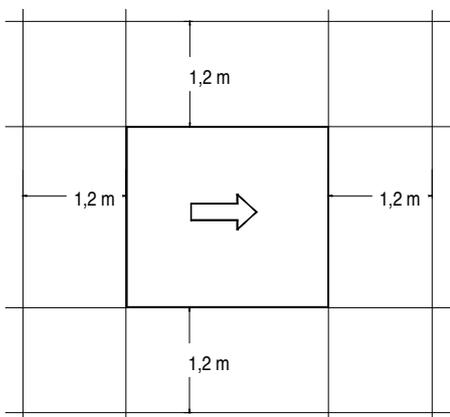
top. When reinstalling the panels, they should be pushed upward by exerting slight pressure.

When slipping the carrying pipes through the frame, care must be taken that no components are damaged.

# 5 INSTALLATION

## 5.1 General

The unit should always be installed on a permanently level, smooth and horizontal floor. The entire base frame surface should thereby make close contact with the floor in order to ensure adequate sound insulation and to prevent water-carrying parts from cooling out. If this is not the case, additional insulation measures may become necessary. It must be possible to carry out servicing work without any problems. This is ensured if a clearance of 1.2 m to solid walls is maintained.



**CAUTION!**

**The intake and discharge openings must not be restricted nor obstructed.**

## 5.2 Condensate Line

The condensation water that may collect during operation must be drained in a place protected from frost. The heat pump must be positioned horizontally so that proper discharge can be ensured. The condensation water pipe must have a minimum diameter of 50 mm and should be discharged to the sewer drain in a frost-proof location.

# 6 MOUNTING

## 6.1 General

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

- supply/return flow of heating system
- supply/return flow of hot water circuit
- condensate drain
- control lead to the heat pump controller
- power supply

## 6.2 Heating and Hot Water Connection

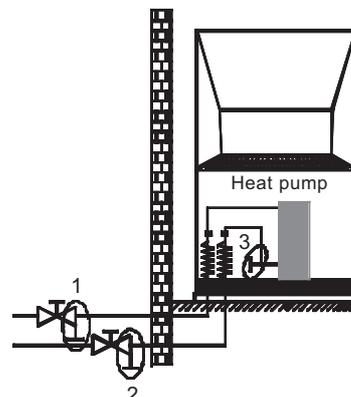
The connections on the heating side of the heat pump are provided with 1" external thread. The hoses to be connected exit the unit through its bottom. When carrying out the connections, use a wrench to counterhold at the transitions.

Before completing the heat pump connections on the heating water side, the heating installation must be flushed in order to remove any impurities that may be present and to ensure trouble-free operation of the heat pump. On systems equipped with heating water flow shut-off devices such as radiator or thermostat valves, an overflow valve to be provided by the customer needs to be installed behind the heating pump in a heating system bypass. This guarantees a minimum heating water flow through the heat pump and prevents any malfunctions from occurring.

Once the installation on the heating side has been completed, the heating system must be filled, de-aerated and pressure-tested.

### Frost Protection

As a precaution against frost, manual drain valves should be provided. If the heat pump is placed out of service or in the event of a power failure, the system has to be drained at three points (see figure) and blown out. In heat pump installations where a power failure cannot be readily detected (holiday house), the heating circuit must contain a suitable antifreeze product.



### 6.3 Electrical Connection

The power connection of the heat pump is effected via a commercially available 4-core cable.

The cable has to be supplied by the client and the wire cross-section to be selected according to the power consumption of the heat pump (see Equipment Data in the appendix) as well as the relevant VDE (EN) and VNB regulations.

The power supply of the heat pump must be equipped with an all-pole disconnecting device with a contact gap of at least 3 mm (e.g. utility company shut-off contactor, power contactor) as well as a 3-pole circuit breaker with simultaneous tripping of all external conductors (tripping current as stated on the device data plate).

When making the electrical connection, the clockwise phase sequence of the power supply must be ensured.

Phase sequence: L1, L2, L3.

**CAUTION!** Clockwise phase sequence to be observed: Damage to the compressor may be incurred if it is operated in the wrong sense of rotation.

The control voltage is supplied via the heat pump controller.

The 230V AC-50 Hz power supply of the heat pump controller is effected as described in its instruction manual (fusing 16 A).

The control lead (not included in the scope of delivery) is connected to the heat pump controller via a multi-pole plug connector. In the heat pump, the plug connector located at the bottom of the unit in the immediate vicinity of the line feed-through through the base of the unit. More detailed instructions are contained in the instruction manual of the heat pump controller.

For more detailed information refer to the wiring diagrams in the appendix.

## 7 COMMISSIONING

### 7.1 General

To ensure proper commissioning it should be carried out by an after-sales service authorized by the manufacturer. Only then can an extended warranty period of 3 years in total be granted (cf. Warranty service).

### 7.2 Preparatory Steps

Prior to commissioning, the following items need to be checked:

- All connections of the heat pump must have been made as described in Chapter 6.
- In the heating circuit all valves that could impair the proper heating water flow must be open.
- The air intake/discharge path must be unobstructed.
- The sense of rotation of the fan must correspond to the direction of the arrow.
- The settings of the heat pump controller must be adapted to the heating installation in accordance with the instructions contained in its instruction manual.
- Proper condensate drainage must be ensured.

### 7.3 Procedure During Heating Season

The start-up of the heat pump is effected via the heat pump controller. The settings must be made in accordance with its instruction manual.

Malfunctions during operation are displayed on the heat pump controller and may be corrected as described in the heat pump controller's instruction manual.

In the case of outdoor temperatures below 10 °C and heating water temperatures below 16 °C, the buffer tank has to be heated to at least 30 °C using the second heat generator.

The following procedure has to be observed so that the commissioning activities can be carried out without any problems:

- a) Close all heating circuits.
- b) Open the overflow valve all the way.
- c) Select the automatic mode on the controller.
- d) Wait until the buffer tank has reached a temperature of 25-30 °C.
- e) Subsequently, slowly reopen the valves of the heating circuits, one after the other, in such a way that the heating water flow rate is continually increased by slightly opening the related heating circuit valve. When so doing, the heating water temperature in the buffer tank must not fall below 25 °C so that the heat pump can be defrosted at any time.

- f) Once all heating circuit are fully open and a heating water temperature of approx. 25 °C is maintained in the buffer tank, the minimum flow rate must be set on the overflow valve and the heating circulating pump.
- g) New buildings have an increased heat demand due to the energy required for structural drying. This increased heat demand may result in insufficiently dimensioned heating installations not attaining the desired room temperature at all times. In this case it is therefore recommended that the second heat generator be kept ready for operation in the first heating season. The limit temperature on the heat pump controller should therefore be raised to 15°C.

#### 7.4 Procedure During Cooling Season

In this case, all heating circuits can be fully opened.

The setting described in 7.3 f) must be carried out during the heating season.

## 8 CLEANING / MAINTENANCE

### 8.1 Maintenance

To protect the paint finish, avoid placing objects against or on the unit. The external parts of the heat pump can be wiped with a damp cloth and commercially available cleaning agents.

**CAUTION!**

**Do not use any cleaning agents containing sand, soda, acid or chloride as these may damage the surface.**

To prevent malfunctions in the heat exchanger of the heat pump caused by dirt deposits, care must be taken that the heat exchanger cannot become contaminated in the heating installation. In the event that operating malfunctions due to contamination occur nevertheless, the system should be cleaned as described below.

### 8.2 Cleaning of Heating Side

The ingress of oxygen into the heating water may result in the formation of oxidation products. An additional contamination of the heating water caused by residues of lubricating and sealing agents occurs in many cases.

Both of the above causes may lead to a reduction in the performance of the heat pump condenser. In these cases the installer needs to clean the condenser. Based on information known to date we recommend cleaning with a 5% phosphoric acid solution or, in the case that cleaning needs to be performed more frequently, with a 5% formic acid solution. In both cases the

cleaning fluid should be at room temperature. Thorough flushing is necessary to ensure that all cleaning agent residues are removed from the system. It is recommended that the heat exchanger is cleaned in the direction opposite to the normal flow direction. Owing to their acid content flushing agents must be used with caution. To prevent acidic flushing agents from entering the heating installation when cleaning the condenser, we recommend that the flushing device should be mounted directly to

the supply and return line of the heat pump. The regulations of the trade associations must be adhered to. If in doubt, contact the manufacturers of the chemicals!

## CAUTION!

**To prevent consequential damage it is imperative that the water circuit be neutralized after cleaning using appropriate agents.**

### Caution - Heating Engineers

Depending on the water quality and quantity, in particular in the case of mixed installations and plastic pipes, mineral deposits (rust sludge, lime) may form impairing the proper functioning of the heating installation. A cause of this is the water hardness as well as oxygen dissolved in the filling water as well as additional oxygen from the air which may penetrate via valves, fittings and plastic pipes (oxygen diffusion). As a preventive measure it is recommended that a physical water conditioner such as ELYSATOR be used.

### 8.3 Cleaning of Air Side

Evaporator, fan and condensate drain should be cleaned of debris (leaves, branches, etc.) from time to time. To this end, the front panel of the heat pump should be opened first at the bottom and then at the top.

## CAUTION!

**Prior to opening the unit it must be ensured that all electrical circuits are disconnected from the power source.**

The removal and reinstallation of the panel assemblies to be performed as described in Chapter 4.

When cleaning do not use any sharp or hard objects so as to prevent any damage to the evaporator and the condensate pan.

## 9 MALFUNCTIONS / TROUBLESHOOTING

This heat pump is a quality product and is designed for troublefree and maintenance-free operation. In the event that a malfunction occurs nevertheless, you will be able to correct the problem easily yourself. Simply consult the Malfunctions and Troubleshooting table in the operating manual of the controller. Malfunctions can be interrogated at the heat pump controller. If the problem cannot be corrected by the user, please contact the after-sales service in charge (see Warranty Card).

## CAUTION!

**Any work on the heat pump may only be performed by an authorized and qualified after-sales service.**

## 10 DECOMMISSIONING

### 10.1 Placing Out of Service in Summer

Placing the heat pump out of service in summer can be effected by switching the heat pump controller to the "Summer" operating mode.

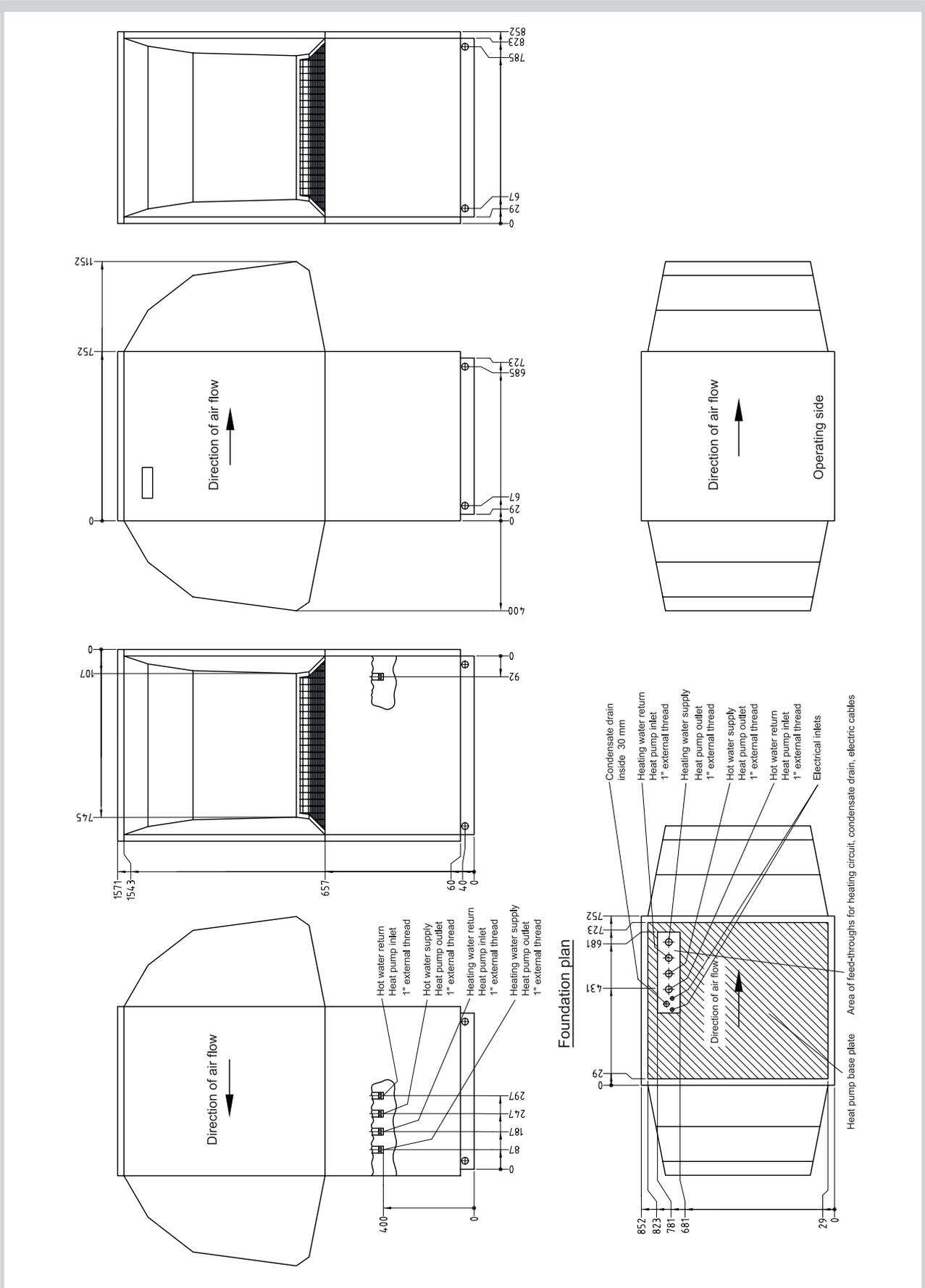
### 10.2 End-of-Life Decommissioning / Disposal

Before removing the heat pump, disconnect the machine from the power supply and close all valves. Environment-relevant requirements regarding the recovery, recycling and disposal of service fuels and components in accordance with all relevant standards must be adhered to. In this context, particular attention must be paid to the proper disposal of refrigerants and refrigeration oils.

# 11 APPENDIX

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Dimension Drawing

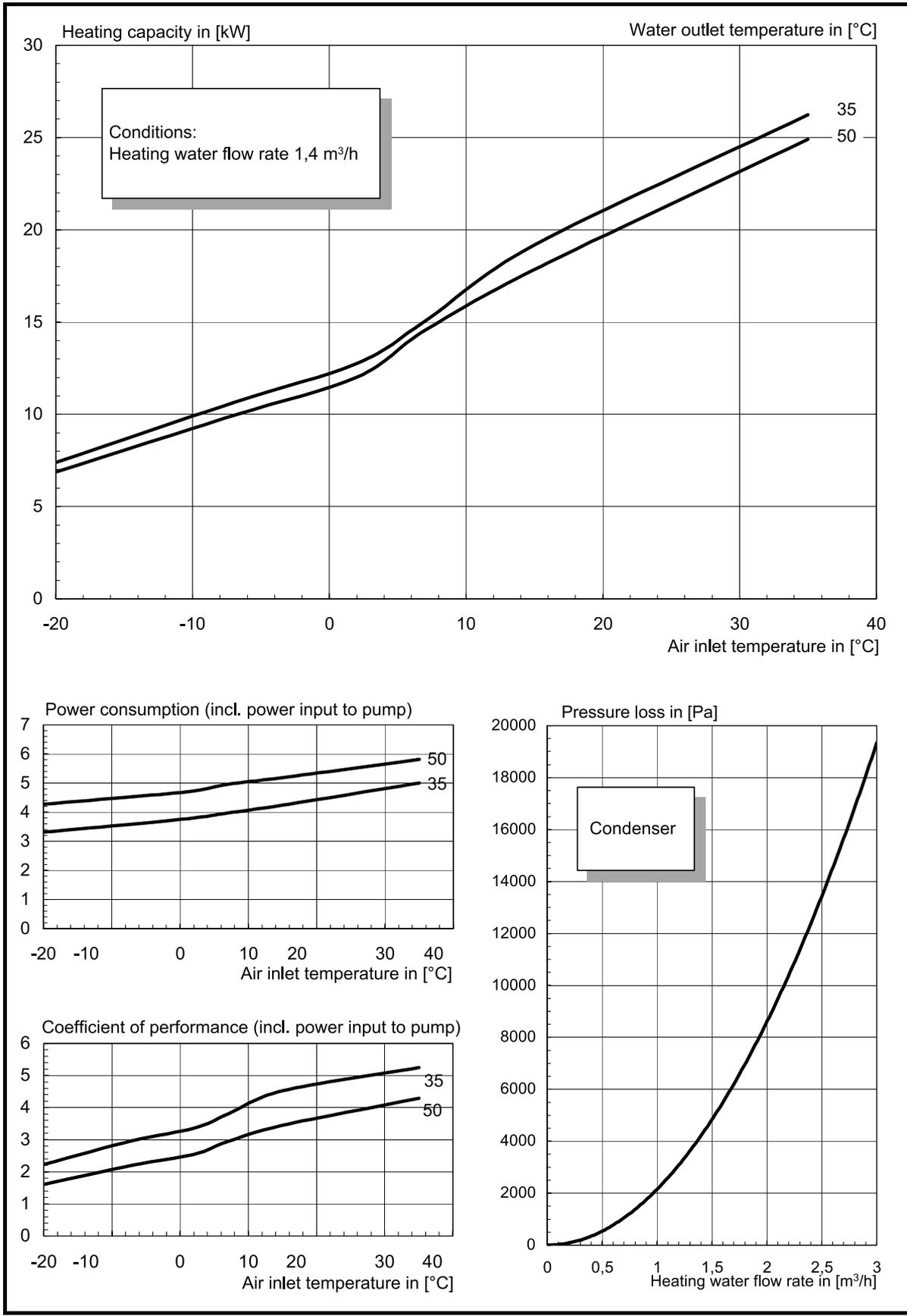


# APPENDIX: 11.2 EQUIPMENT DATA

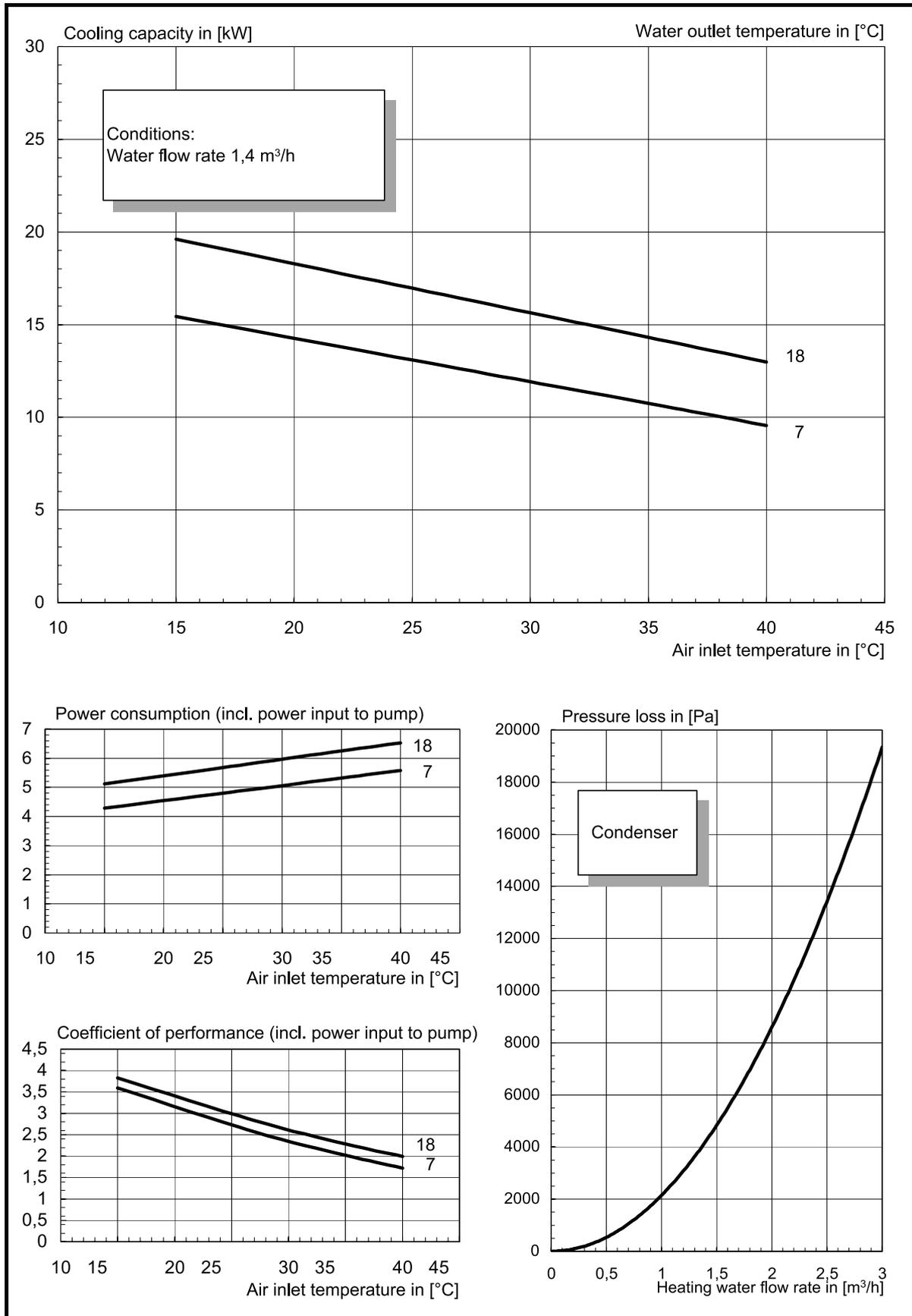
## Equipment Data

EQUIPMENT DATA for air-to-water heat pumps for heating			
1	<b>TYPE AND COMMERCIAL DESCRIPTION</b>		<b>..16ASR</b>
2	<b>MODEL</b>		
2.1	Type		compact, reversible
2.2	Enclosure type acc. to EN 60 529 for compact unit or heating element		IP 24
2.3	Installation site		External
3	<b>PERFORMANCE DATA</b>		
3.1	Operating temperature limits:		
	Heating water supply / return 3)	°C / °C	max. 55 / min. 18
	Cooling, supply	°C	+7 to +20
	Air (heating)	°C	-20 to +35
	Air (cooling)	°C	+15 to +40
3.2	Heating water temperature spread at A2 / W35		7,9
3.3	Heating capacity / coeff. of perform.		
	at A-7 / W35 1)	kW / ---	10,6 / 3,0
	at A2 / W35 1)	kW / ---	12,8 / 3,4
	at A2 / W50 1)	kW / ---	12,0 / 2,5
	at A7 / W35 1)	kW / ---	15,1 / 3,8
	at A10 / W35 1)	kW / ---	16,7 / 4,1
3.4	Cooling capacity / coeff. of perform.		
	at A27 / W7	kW / ---	12,6 / 2,6
	at A27 / W18	kW / ---	16,4 / 2,8
	at A35 / W7	kW / ---	10,7 / 2,0
	at A35 / W18	kW / ---	14,3 / 2,3
3.5	Sound power level	dB(A)	-
3.6	Heating water flow rate at internal pressure difference	m³/h / Pa	1,4 / 4500
3.7	Air flow rate at external static pressure difference	m³/h / Pa	4000
3.8	Refrigerant; total charge weight	type / kg	R404A / 5,7
4	<b>DIMENSIONS, CONNECTIONS AND WEIGHT</b>		
4.1	Equipment dimensions	H x W x L cm	157 x 155 x 85
4.2	Equipment connections for heating	inch	1" external thread
4.3	Weight of transport unit(s) incl. packaging	kg	289
5	<b>ELECTRICAL CONNECTION</b>		
5.1	Nominal voltage; fusing	V / A	400 / 20
5.2	Nominal power consumption 1) A2 W35	kW	3,8
5.3	Starting current with soft starter	A	25
5.4	Nominal current A2 W35 / cos φ	A / ---	6,9 / 0,8
6	<b>COMPLIES WITH EUROPEAN SAFETY REGULATIONS</b>		
			5)
7	<b>OTHER DESIGN CHARACTERISTICS</b>		
7.1	Defrosting		automatic
	Type of defrosting		cycle reversal
	Defrost pan available		yes (heated)
7.2	Heating water inside unit protected against freezing		yes 2)
7.3	Performance settings		1
7.4	Controller internal / external		external
1)	These data characterize the size and performance of the system. For economic and energetic reasons, additional factors such as defrosting behaviour, bivalence point and control need to be taken into consideration. Abbreviations have the following meaning, e.g. A2 / W55: outside temperature 2 °C and heating water supply temperature 55 °C.		
2)	The heating circulating pump and the controller of the heat pump must be ready for operation at all times.		
3)	See operating limits diagram		
5)	See EC Declaration of Conformity		
	Subject to change without notice		Issued: 10.10.2003
Prep'd.	10.10.03	Kohlmann	
Check'd			
Standard			
a 6400	13.10.2003	Hnl.	
Distribution:	TWK1 X		
	<b>KKW</b>	Kulmbacher Klimageräte Werk GmbH	Benennung : <b>GI-Blatt LA16ASR</b>
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			Sheets 1

11.3.1 Heating Mode



11.3.2 Cooling Mode

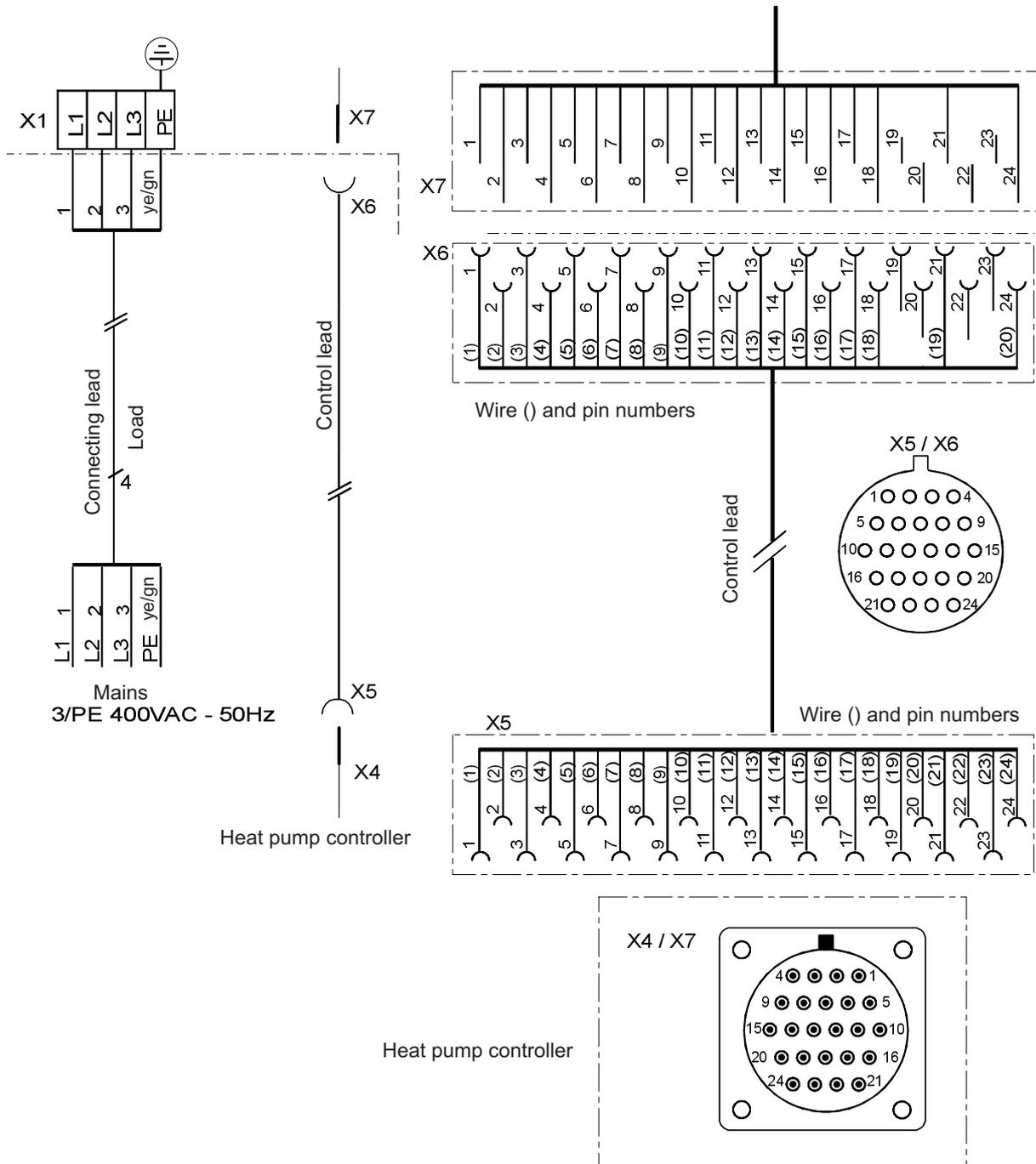






11.4.3 Terminal Diagram

Terminal connection diagram and connector assignment in the reversible air-to-water outdoor unit



## APPENDIX: 11.4 WIRING DIAGRAMS

### 11.4.4 Legend

E1	Crankcase heater, compressor
E2	Fan for nozzle ring heater
E3	Defrost end pressostat
E4	Condensing pressure pressostat
F2	High-pressure pressostat
F3	Low-pressure pressostat
F5	Thermostat HG
F23	Winding shield, fan
K1	Compressor contactor
K2	Fan contactor
M1	Compressor
M2	Fan
N1	Heat pump controller
N3	Soft start control
R9	Frost protection sensor for heating water
R10	Heating water return flow sensor
R11	Coding resistor (5k6)
X1	Terminal strip: load terminal
X2	Terminal strip: internal wiring
X3	Terminal strip: heaters
X4	Plug connector, heat pump controller
X5	Plug connector, control lead
X6	Plug connector, control lead
X7	Plug connector, heat pump
Y1	4-way reversing valve



EC Declaration of Conformity



Declaration of Conformity



The undersigned

**KKW Kulmbacher Klimageräte-Werk GmbH,  
Geschäftsbereich Dimplex  
Am Goldenen Feld 18  
D-95326 Kulmbach**

hereby confirm that the design and construction of the product(s) listed below, in the version(s) placed on the market by us, conform to the relevant requirements of the applicable EC directives.

This declaration becomes invalidated if any modifications are made to the product(s) without our prior authorization.

Designation of the product(s):

**Air-to-water heat pumps**  
for outdoor installation,  
containing R404A

EC Directives:

EC Directive for Low Voltage  
(73/23/EEC)  
EC Directive for Electromagnetic Compatibility (EMC)  
(89/336/EEC)  
Pressure Equipment Directive  
(97/23/EEC)

Type(s):

LA 16ASR

Harmonized EN Standards:

EN 255:1997  
EN 378:1994  
DIN EN 60335-1 (VDE 0700 Teil1):1995-10  
DIN EN 60335-1/A1 (VDE 0700 Teil1/A1):1997-08  
DIN EN 60335-1/A12 (VDE 0700 Teil 1/A12):1997-08  
DIN EN 60335-1/A13 (VDE 0700 Teil 1/A13):1998-12  
DIN EN 60335-1/A14 (VDE 0700 Teil 1/A14):1999-05  
DIN EN 60335-2-40 (VDE 0700 Teil 40):1998-07  
DIN EN 55014-2 (VDE 0875 Teil 14-2):1997-10  
Requirements of category II  
DIN EN 55014-1 (VDE 0875 Teil 14-1):1999-10  
DIN EN 61000-3-2 (VDE 0838 Teil 2):1998-10  
EN 60335-1:1994+A11:1995  
EN 60335-1/A1:1996  
EN 60335-1/A12:1996  
EN 60335-1/A13:1998  
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Order No.:

342 070

National Standard/Directives:

<u>D</u>	<u>A</u>	<u>CH</u>
VBG20		SVTI

Kulmbach, 25.07.2003



Wolfgang Weinhold  
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Technical Director







