

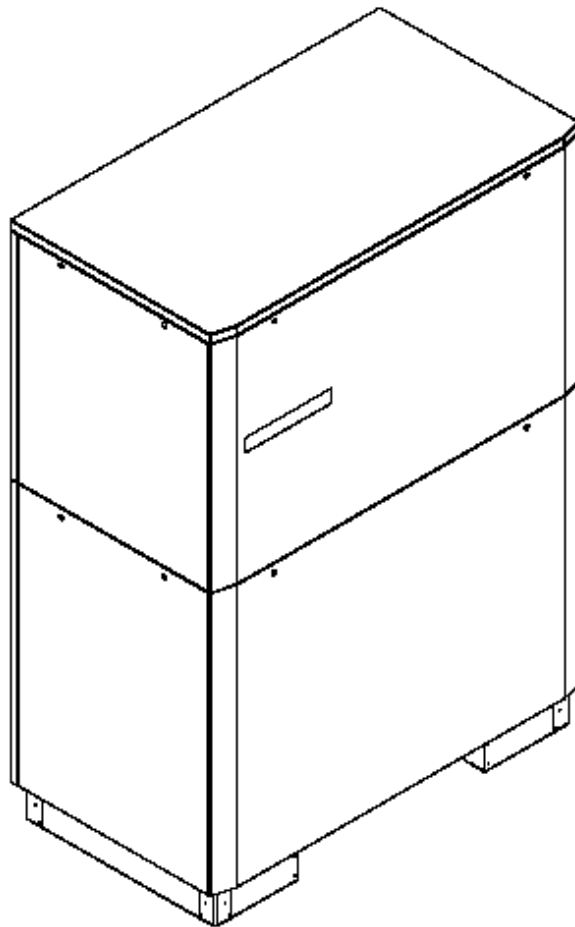


CE

# INSTALLATION and OPERATING INSTRUCTIONS

## Brine-to-Water Heat Pump for Indoor Installation

**SI 50ZS / SI 75ZS / SI 100ZS**



Order No.: 452234.67.01

FD 8511

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# 1 READ IMMEDIATELY

## 1.1 Important Information

**CAUTION!** Any work on the heat pump may only be performed by an authorised and qualified customer service.

**CAUTION!** The transport securing devices must be removed after the transport.

**CAUTION!** The heat pump must not be tilted more than max. 45° (in either direction).

**CAUTION!** Flush the heating system prior to connecting the heat pump.

**CAUTION!** The supplied strainer is to be fitted in the heat source inlet of the heat pump to protect the evaporator against contamination.

**CAUTION!** The brine solution must consist of at least 25 % of a frost and corrosion protection agent on a monoethylene glycol or propylene glycol basis.

**CAUTION!** The clockwise phase sequence must be ensured when connecting the load lines.

**CAUTION!** Commissioning of the heat pump must be performed in accordance with the installation and operating manual of the heat pump controller.

**CAUTION!** All electrical circuits must be disconnected from the power supply prior to opening the unit.

## 1.2 Legal Provisions and Guidelines

This heat pump conforms to all relevant DIN/VDE regulations and EU directives. For details refer to the EC Declaration of Conformity in the appendix.

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

The heat pump is to be connected to the heat source and heat distribution systems in accordance with all applicable provisions.

**CAUTION!** Any work on the heat pump may only be performed by an authorised and qualified customer service.

## 1.3 Energy-Efficient Use of the Heat Pump

By operating this heat pump you contribute to the protection of our environment. A prerequisite for an efficient operation is the proper design and sizing of the heating system and the heat source system. In particular, it is important to keep water flow temperatures as low as possible. All energy consumers connected should therefore be suitable for low flow temperatures. A 1 K higher heating water temperature corresponds to an increase in power consumption of approx. 2.5 %. Underfloor heating systems with flow temperatures between 30 °C and 40 °C are optimally suited for energy-efficient operation.

## 2 PURPOSE OF THE HEAT PUMP

### 2.1 Application

The brine-to-water heat pump is designed for use in existing or newly built heating systems. Brine is used as the heat carrier in the heat source system. Ground coils, ground collectors or similar systems can be used as the heat source.

### 2.2 Principle of Operation

The heat generated by the sun, wind and rain is stored in the ground. This heat stored in the ground is collected at low temperature by the brine circulating in the ground collector, ground coil or similar device.

A circulating pump then conveys the warmed brine to the evaporator of the heat pump. There, the heat is given off to the refrigerant in the refrigeration cycle. When so doing, the brine cools so that it can again take up heat energy in the brine circuit.

The refrigerant, however, is drawn in by the electrically driven compressor, is compressed and "pumped" to a higher temperature level. The electrical power needed to run the compressor is not lost in this process, but most of the generated heat is transferred to the refrigerant as well.

Subsequently, the refrigerant is passed through the condenser where it transfers its heat energy to the heating water. Based on the thermostat setting, the heating water is thus heated to up to 55 °C.

## 3 SCOPE OF DELIVERY

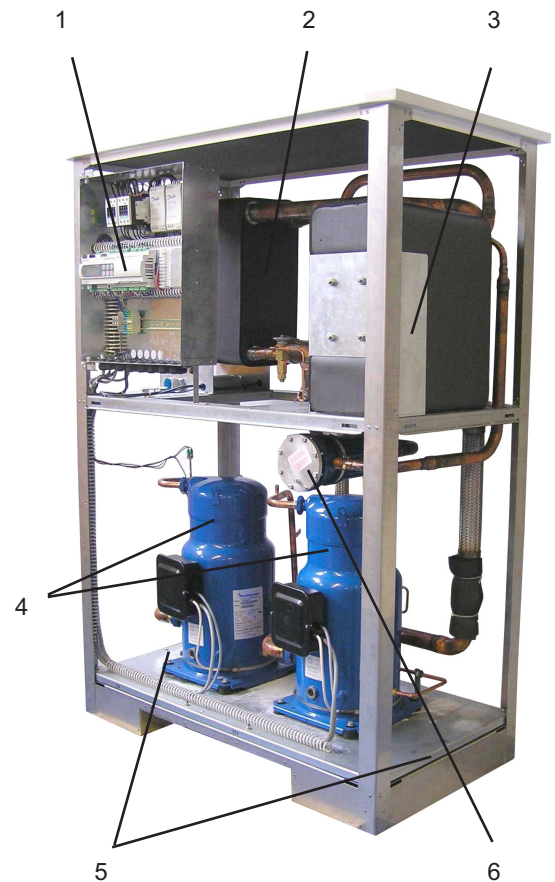
### 3.1 Baseline Unit

The baseline unit consists of a heat pump, ready for connection, for indoor installation, complete with sheet metal cabinet, control box and integrated controller. The refrigeration cycle contains the refrigerant R404A. Refrigerant R404A is CFC-free, non-ozone depleting and non-combustible.

All components required for the operation of the heat pump are located in the control box. A sensor for the external wall temperature including mounting hardware as well as a strainer are supplied with the heat pump. The voltage supply for the load and control current must be provided by the customer.

The control wire of the brine pump (to be provided by the customer) is to be connected to the control box. When so doing, a motor protecting device is to be installed, if required.

The collector loops including the brine manifold must be provided by the customer.



- |               |                               |
|---------------|-------------------------------|
| 1) Control    | 4) Compressor                 |
| 2) Evaporator | 5) Transport securing devices |
| 3) Condenser  | 6) Filter drier               |

## 4 ACCESSORIES

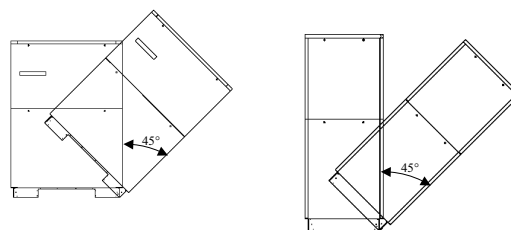
### 4.1 Connecting Flanges

The use of flat-sealing connecting flanges allows the unit, as an option, to be connected by means of flanges.

## 5 TRANSPORT

For the transport by means of a hand truck or boiler trolley, position the latter under the front end of the unit below the transport security device.

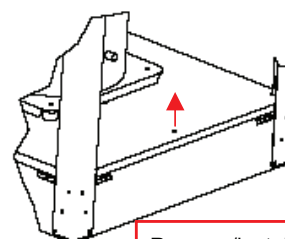
For transport on a level surface, the unit can be lifted from the rear or from the front by means of a lift truck or forklift. In this case, the transport securing device is not imperative.



**CAUTION!**

The heat pump must not be tilted more than max. 45° (in either direction).

After the transport, the transport securing device is to be removed on either side at the bottom of the unit.



Remove/install transport securing device

**CAUTION!**

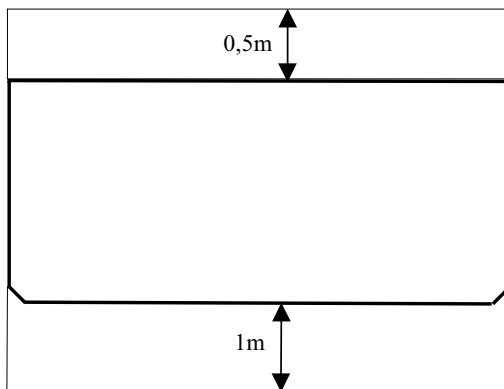
The transport securing device is to be removed after the transport.

## 6 INSTALLATION

### 6.1 General Information

As a rule, the unit must be installed indoors on a level, smooth and horizontal surface. The entire base frame should make full contact with the surface in order to ensure adequate sound insulation. Failing this, additional sound insulation measures may become necessary.

The heat pump should be installed to allow easy maintenance/service access. This is ensured if a clearance of approx. 1 m in front of the heat pump is maintained.



### 6.2 Sound Emissions

The heat pump offers silent operation due to efficient sound insulation. Any sound transmission to the foundation or the heating system can be largely prevented by internal sound decoupling measures.

## 7 MOUNTING

### 7.1 General Information

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

- supply/return flow of the brine system
- supply/return flow of the heating system
- power supply

### 7.2 Connection on Heating Side

**CAUTION!**

**The heating system must be flushed prior to connecting the heat pump.**

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, as well as residues of sealing material, and the like. Any accumulation of deposits in the condenser may result in a total failure of the heat pump.

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

The sensor supplied loose in the control box must be fitted as shown in the block diagram.

#### Heating water minimum flow rate

The heating water minimum flow rate through the heat pump must be assured in all operating states of the heating system. This can be accomplished, for example, by installing a differential pressure-free manifold or an overflow valve. The procedure for setting an overflow valve is described in the Chapter Commissioning.

#### Frost protection for installations prone to frost

Provided the controller and heating circulating pumps are ready for operation, the frost protection feature of the controller is active. If the heat pump is taken out of service or in the event of a power failure, the system has to be drained. In heat pump installations where a power failure cannot be readily detected (holiday house), the heating circuit must contain a suitable antifreeze product.

### 7.3 Connection on Heat Source Side

The following procedure must be observed when making the connection:

Connect the brine line to the flow and return pipe of the heat pump.

**CAUTION!**

**The supplied strainer must be fitted in the heat source inlet of the heat pump in order to protect the evaporator against the ingress of impurities.**

In addition, a powerful vent must be installed at the highest point of the heat source system. The hydraulic plumbing diagram must be observed here.

The brine liquid must be produced prior to charging the system. The brine concentration must be at least 25 %. Freeze protection down to -14°C can thus be ensured.

Only antifreeze products on the basis of monoethylene glycol or propylene glycol may be used.

The heat source system must be vented (de-aerated) and checked for leaks.

**CAUTION!**

**The brine solution must contain at least 25 % of an antifreeze and corrosion protection agent on a monoethylene glycol or propylene glycol basis.**

### 7.4 Electrical Connection

The following electrical connections must be established on the heat pump:

- Connection of the control wire to terminals X1: L/N/PE in the control box of the heat pump.
- Connection of the load wire to terminals X5: L1/L2/L3/PE in the control box of the heat pump.
- The control of the brine pump is effected via the controller N1/J12/N03/N + PE (max. 200 W), or a pump contactor connected to these terminals (without PE). If a motor protective switch is used, the auxiliary contact (NC contact) needs to be connected to N1/J5/ID5 and X2, instead of the wire jumper which must be removed.

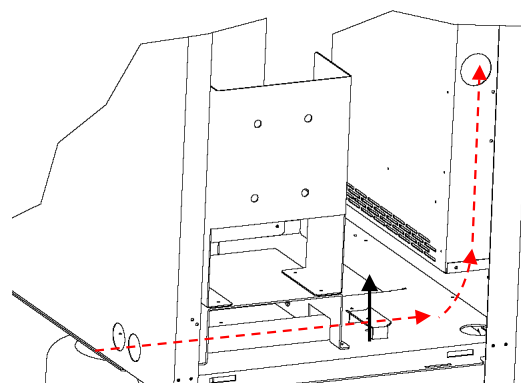
All electrical components required for the operation of the heat pump are located in the control box.

For more detailed instructions concerning the connection and functioning of the heat pump controller (e.g. the supplied external wall sensor) please refer to the enclosed operating manual of the controller.

An all-pole disconnecting device with a contact gap of at least 3 mm (e.g. utility company disable contactor or power contactor) as well as a 3-pole circuit breaker with simultaneous tripping of all external conductors must be provided. The required cross-sectional area of the conductors is to be selected according to the power consumption of the heat pump, the technical connection requirements of the relevant utility company and all applicable regulations. Power consumption data of the heat pump is provided in the product literature and on the nameplate. The terminals are designed for a max. conductor cross-section of 35 mm<sup>2</sup>.

**CAUTION!**

**The clockwise phase sequence must be observed when connecting the load lines (the heat pump will deliver no output and will be very noisy when the phase sequence is incorrect).**



The power cable must be run through the guide tubes, inserted into the side of the control box and secured by means of the strain relief.

# 8 COMMISSIONING

## 8.1 General Information

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

## 8.2 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 7.
- The heat source system and the heating circuit must have been filled and checked.
- The strainer must have been fitted in the sole inlet of the heat pump.
- In the brine and heating circuits all valves that might impair the proper flow must be open.
- The settings of the heat pump controller must be adapted to the heating installation in accordance with the instructions contained in the controller's operating manual.

## 8.3 Commissioning Procedure

The start-up of the heat pump is effected via the heat pump controller.

**CAUTION!**

**Commissioning is to be effected in accordance with the installation and operating manual of the heat pump controller.**

Where an overflow valve is fitted to assure the minimum heating water flow rate, the valve must be set in accordance with the requirements of the heating installation. An incorrect setting may result in various error symptoms and an increased electric power consumption. To correctly set the overflow valve, the following procedure is recommended:

Close all of the heating circuits which may also be closed during operation (depending on the type of heat pump usage) so that the least favourable operating state - with respect to the water flow rate - is achieved. Normally, these heating circuits are those of the rooms located on the south and west sides of buildings. At least one heating circuit must remain open (e.g. bathroom).

The overflow valve is to be opened to such an extent that based on the current heat source temperature the maximum temperature difference between heating supply and return flow temperature is obtained, as indicated in the table below. The temperature difference should be measured as closely to the heat pump as possible. In mono-energetic systems, the electric heating element is to be deactivated.

Heat source temperature from	Heat source temperature to	max. difference between heating supply and return temperature
-5 °C	0 °C	10 K
1 °C	5 °C	11 K
6 °C	9 °C	12 K
10 °C	14 °C	13 K
15 °C	20 °C	14 K
21 °C	25 °C	15 K

Any malfunctions occurring during operation are displayed on the heat pump controller and can be corrected as described in the operating manual of the heat pump controller.



# 9 CARE/CLEANING

## 9.1 Care

The heat pump is maintenance-free. To prevent malfunctions due to sediments in the heat exchangers, care must be taken that no impurities can enter the heat source system and the heating installation. In the event that operating malfunctions due to contamination occur nevertheless, the system should be cleaned as described below.

## 9.2 Cleaning of Heating Side

The ingress of oxygen into the heating water circuit may result in the formation of oxidation products (rust). It is therefore important - in particular with respect to the piping of underfloor heating systems - that the installation is executed in a diffusion-proof manner. Also residues of lubricating and sealing agents may contaminate the heating water.

In the case of severe contamination leading to a reduction in the performance of the condenser in the heat pump, the system must be cleaned by a heating technician.

Based on current knowledge, 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 either case, the cleaning fluid should be at room temperature. It is recommended that the heat exchanger be cleaned in the direction opposite to the normal flow direction.

To prevent acidic cleaning agents from entering the circuit of the heating installation we recommend that the flushing device be fitted directly to the supply and return lines of the condenser of the heat pump.

Thereafter the system must be thoroughly flushed using appropriate neutralising agents in order to prevent any damage caused by cleaning agent residues that may still be present in the system.

All acids must be used with great care, all relevant regulations of the employers' liability insurance associations must be adhered to.

If in doubt, contact the manufacturer of the chemicals!

## CAUTION!

**Caution - Heating Technicians !**  
Depending on the filling 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 reason for this is the water hardness and 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.

## 9.3 Cleaning of Heat Source Side

## CAUTION!

**The supplied strainer is to be installed in the heat source inlet of the heat pump in order to protect the evaporator against contamination.**

The filter screen of the strainer should be cleaned one day after commissioning, thereafter every week. If no more contamination can be noticed any more, the strainer filter can be removed in order to reduce pressure losses.

## 10 MALFUNCTIONS/ TROUBLESHOOTING

### 10.1 Correction of Minor Malfunctions by Owner

This heat pump is a quality product and designed for trouble- and maintenance-free operation. In the event that a malfunction occurs nevertheless, you will be able to correct the problem yourself in most of the cases. Simply consult the Malfunctions and Troubleshooting table contained in the installation and operating manual of the heat pump controller.

If you cannot correct the malfunction yourself, please contact the after-sales service agent in charge (see Warranty Certificate).

**CAUTION!**

**All work on the heat pump may only be performed by an authorised an qualified after-sales service.**

**CAUTION!**

**Disconnect all electrical circuits from the power supply before opening the enclosure.**

## 11 DECOMMISSIONING

### 11.1 Summer Shutdown

A heating-only system can be shut down in summer (no domestic water heating). This can be effected by means of the mode selector switch of the heat pump controller. Please follow the instructions contained in the controller's in-stallation and operating manual.

To avoid possible frost damage, shutting down the system without draining the heating circuit is only permissible if outside temperatures are greater than 0 °C.

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

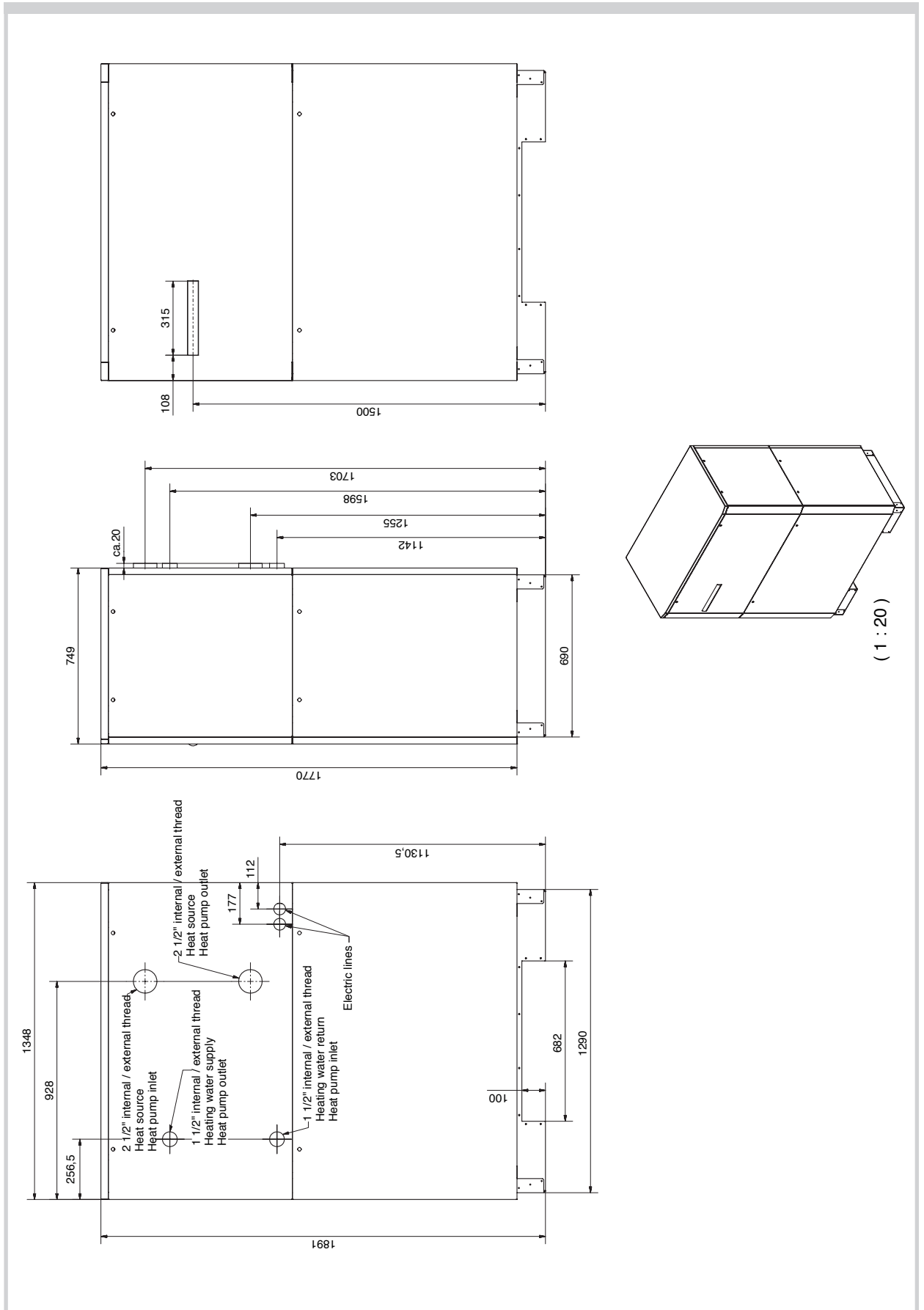
Before removing the heat pump, disconnect the unit from the power source and close all valves.

Environment-relevant requirements regarding the recovery, recycling and disposal of service fuels and components in accordance with all relevant standards must be adhered to. Particular attention must hereby be paid to the proper disposal of refrigerants and refrigeration oils.

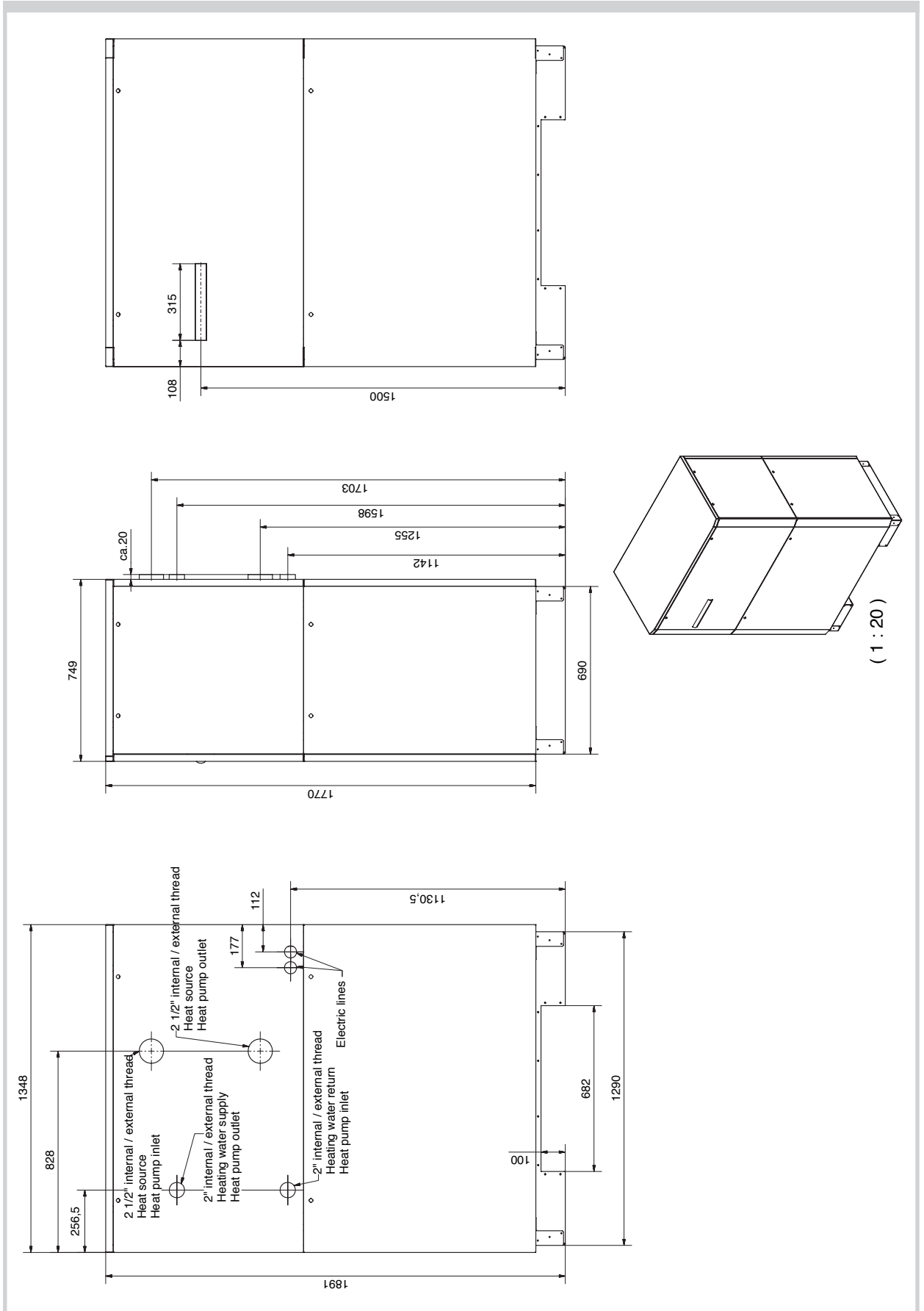
# 12 APPENDIX

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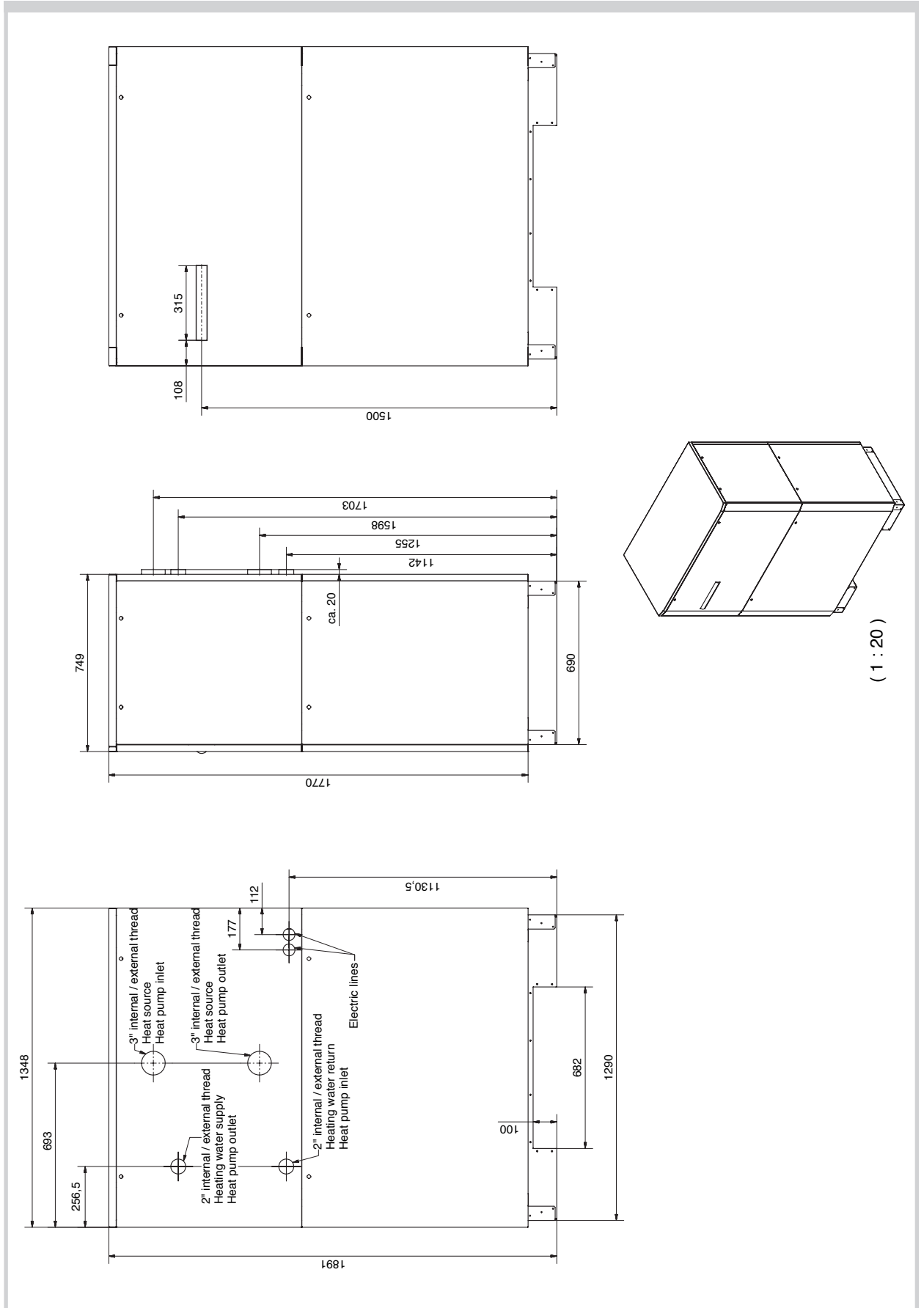
12.1.1 Dimensioned Drawing SI 50ZS



12.1.2 Dimensioned Drawing SI 75ZS



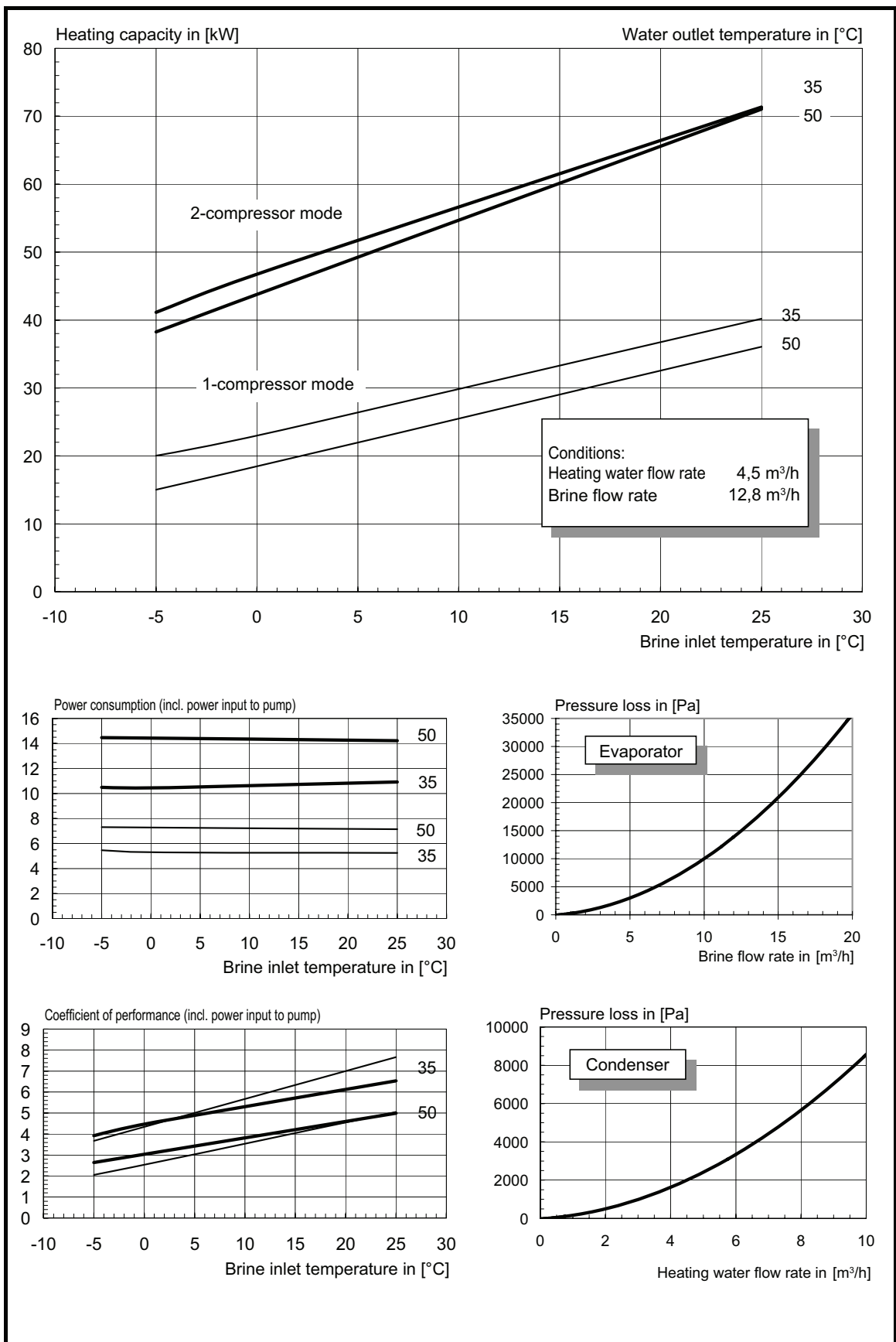
12.2.3 Dimensioned Drawing SI 100ZS



## Equipment Data

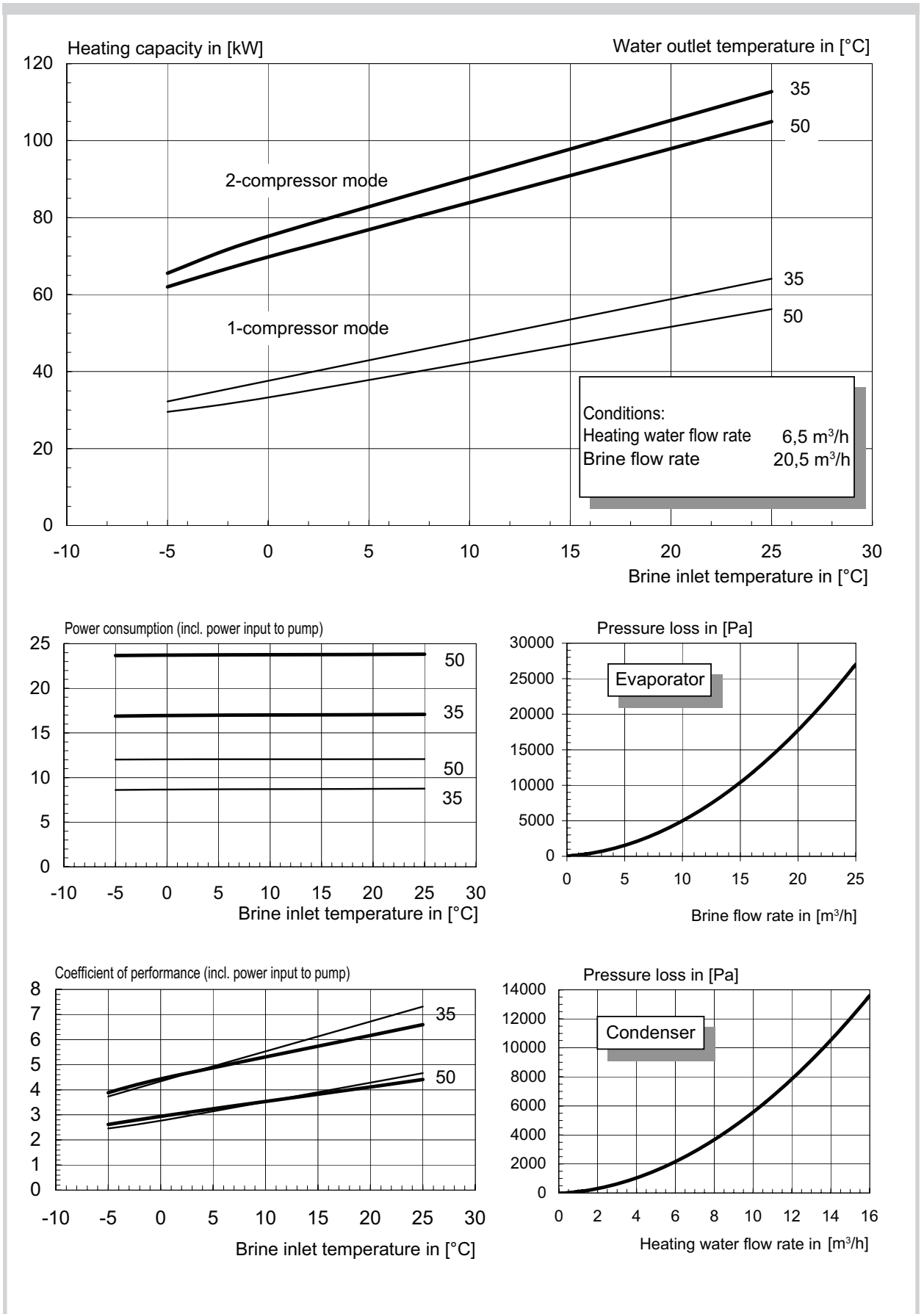
EQUIPMENT DATA for brine-to-water heat pumps for heating purposes					
1	TYPE AND COMMERCIAL DESCRIPTION		..50ZSN	..75ZSN	..100ZSN
2	<b>MODEL</b>				
2.1	Enclosure type acc. to EN 60 529		IP 21	IP 21	IP 21
2.2	Installation site		indoors	indoors	indoors
3	<b>PERFORMANCE DATA</b>				
3.1	Operating temperature limits:				
	Heating water supply	°C	max. 60	max. 60	max. 60
	Brine (heat source)	°C	-5 to +25	-5 to +25	-5 to +25
	Antifreeze agent		monoethylene glycol	monoethylene glycol	monoethylene glycol
	Minimum brine concentration (-13°C freezing temperature)		25%	25%	25%
3.2	Heating water temperature difference at B0 / W35	K	8,9	9,9	9,7
3.3	Heating capacity / coeff.of perform. at B-5 / W55 1)	kW / --- 5)	37,5 / 2,4	59,8 / 2,3	76,2 / 2,5
		kW / --- 6)	15,0 / 2,1	30,1 / 2,2	33,6 / 2,4
	at B0 / W50 1)	kW / --- 5)	43,8 / 3,0	69,8 / 2,9	87,9 / 3,1
		kW / --- 6)	18,5 / 2,5	33,3 / 2,8	39,1 / 2,8
	at B0 / W35 1)	kW / --- 5)	46,7 / 4,5	75,2 / 4,4	96,3 / 4,6
		kW / --- 6)	23,0 / 4,4	37,6 / 4,3	48,4 / 4,6
3.4	Sound power level	dB(A)	65	69	71
3.5	Sound pressure level at a distance of 1 m	dB(A)	50	54	55
3.6	Heating water flow rate at internal pressure difference	m <sup>3</sup> /h / Pa	4,5 / 2000	6,5 / 2500	8,5 / 3600
3.7	Brine flow rate at internal pressure difference (heat source)	m <sup>3</sup> /h / Pa	12,8 / 15700	20,5 / 17800	24,0 / 18600
3.8	Refrigerant; total charge weight	Type / kg	R404A / 8,6	R404A / 12,6	R404A / 20,5
4	<b>DIMENSIONS; CONNECTIONS AND WEIGHT</b>				
4.1	Equipment dimensions without connections 4)	H x W x L mm	1890 x 1350 x 750	1890 x 1350 x 750	1890 x 1350 x 750
4.2	Equipment connections for heating system	inches	G 1 1/2" i/ext.	G 2" i/ext.	G 2" i/ext.
4.3	Equipment connections for heat source	inches	G 2 1/2" i/ext.	G 2 1/2" i/ext.	G 3" i/ext.
4.4	Weight of transport unit(s) incl. packaging	kg	486	571	652
5	<b>ELECTRICAL CONNECTION</b>				
5.1	Nominal voltage; fusing	V / A	400 / 50	400 / 63	400 / 80
5.2	Nominal power consumption 1) B0 W35	kW	10,45	16,95	20,93
5.3	Starting current with soft starter	A	56	105	120
5.4	Nominal current B0 W35 / cosφ 5)	A / ---	18,9 / 0,8	30,58 / 0,8	37,8 / 0,8
6	<b>COMPLIES WITH EUROPEAN SAFETY REGULATIONS</b>		3)	3)	3)
7	<b>OTHER DESIGN CHARACTERISTICS</b>				
7.1	Water inside equipment protected against freezing 2)		yes	yes	yes
7.2	Performance settings		2	2	2
7.3	Controller internal / external		internal	internal	internal
1)	These data characterize the size and performance capability of the system. For economic and energetic reasons, additional factors such as balance point and control need to be taken into consideration. Abbreviations have the following meaning, e.g. B10 / W55: heat source temperature 10 °C and heating water supply temperature 55 °C.				
2)	The heating circulating pump and the controller of the heat pump must be on standby at all times.				
3)	See EC Declaration of Conformity				
4)	Please keep in mind that additional space is required for pipe connections, operation and maintenance.				
5)	2-compressor operation				
6)	1-compressor operation				
	Subject to technical modifications		Issued: 02.11.2005		

12.3.1 Characteristic Curves SI 50ZS

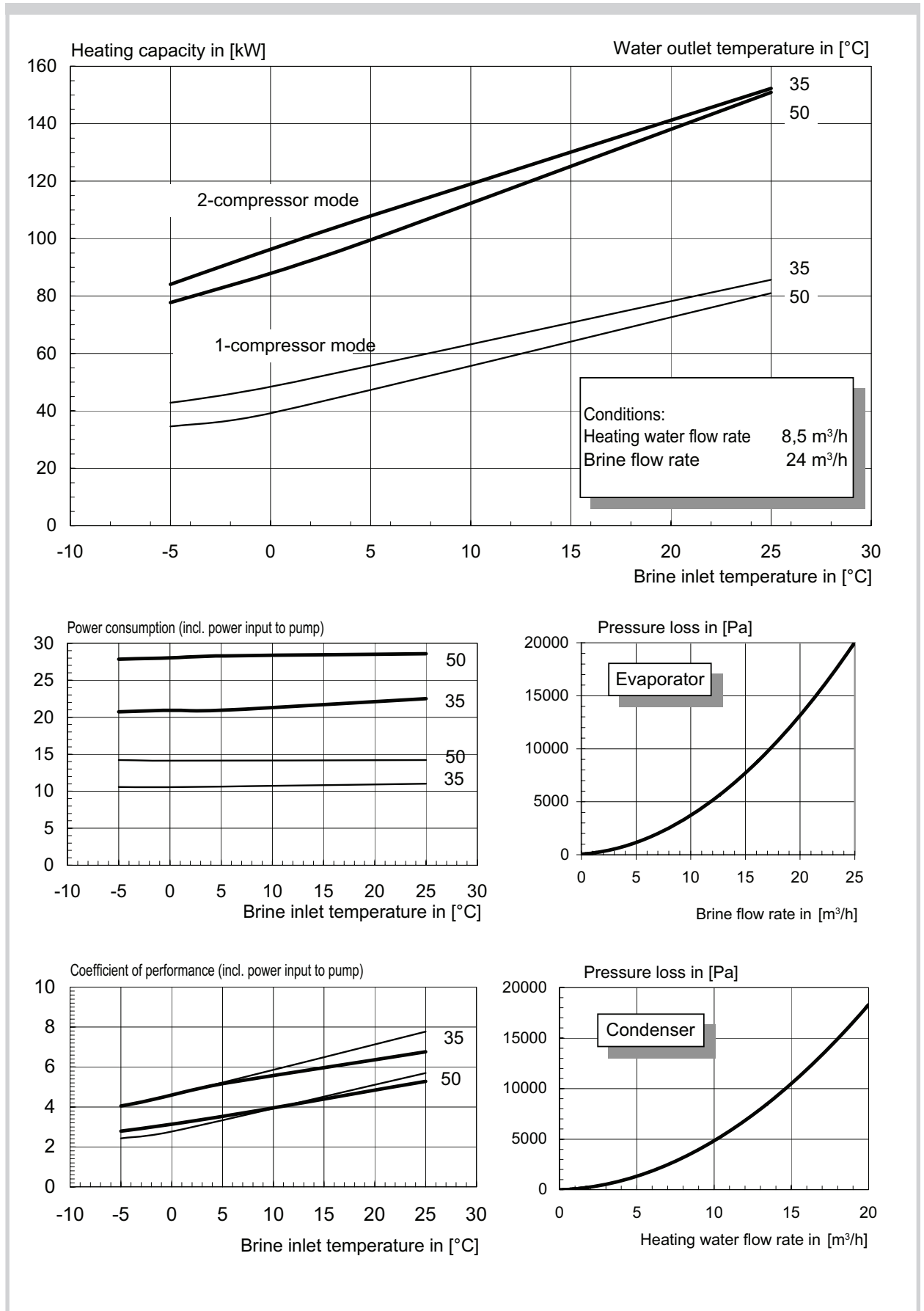




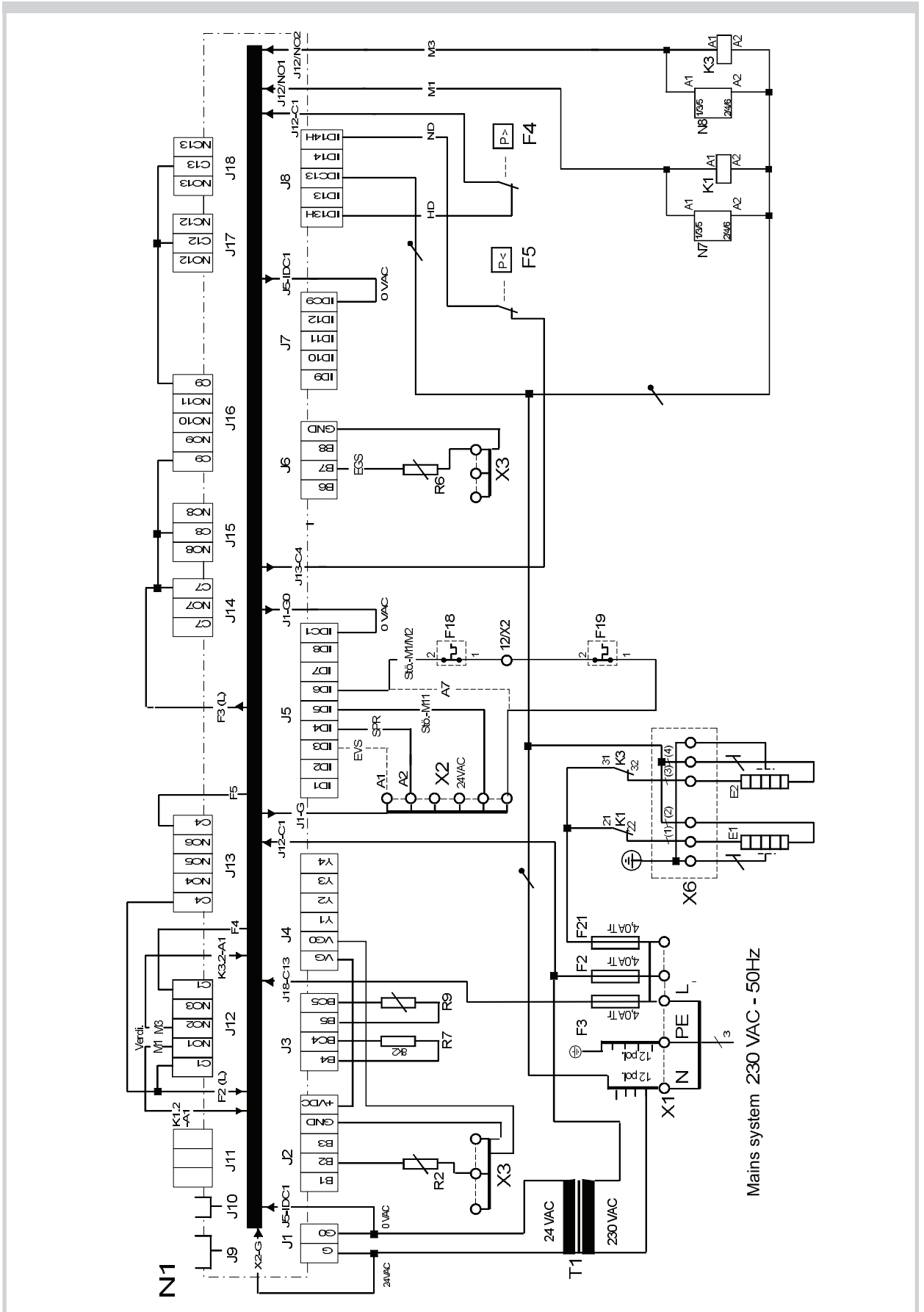
12.3.2 Characteristic Curves SI 75ZS



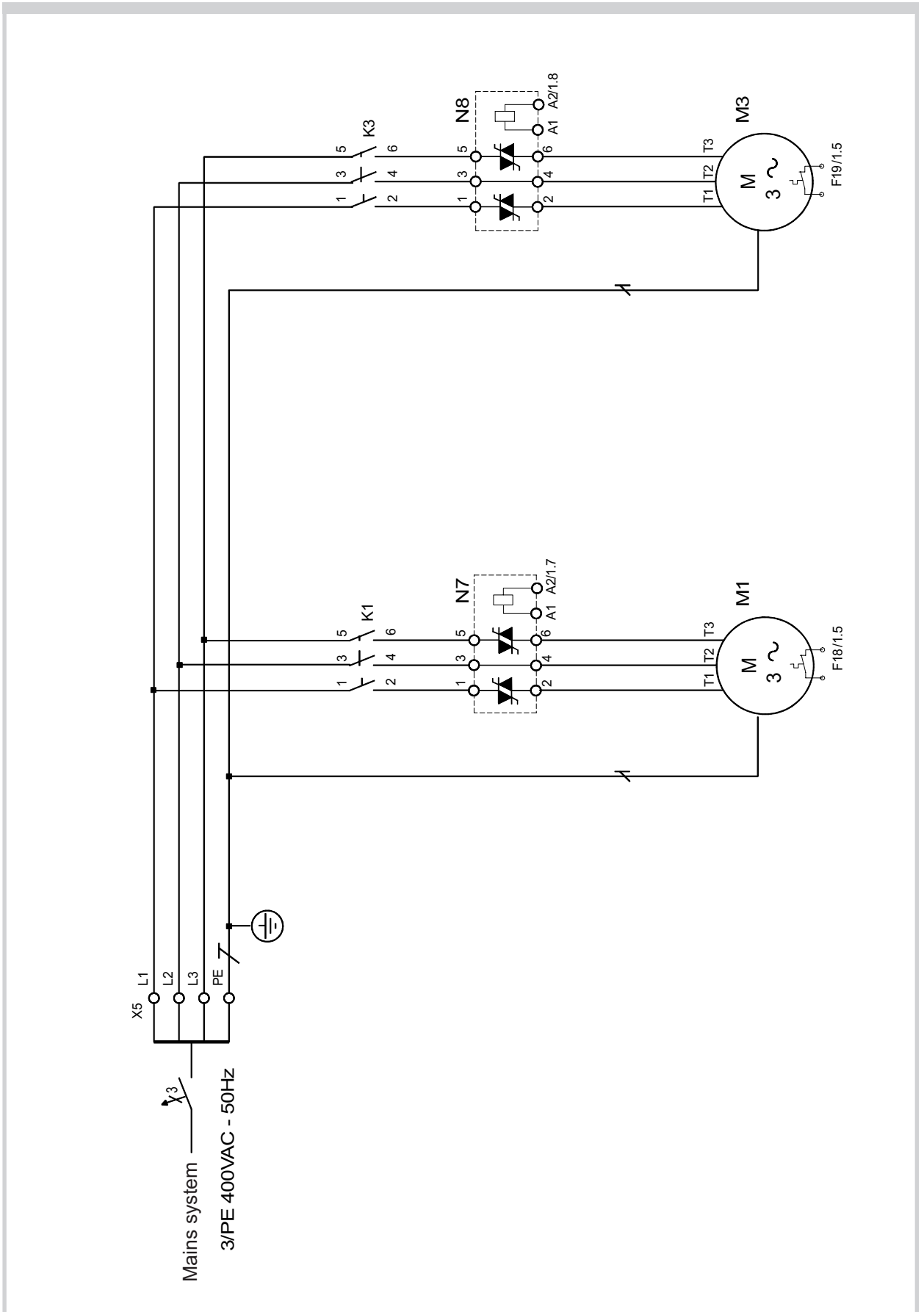
12.3.3 Characteristic Curves SI 100ZS



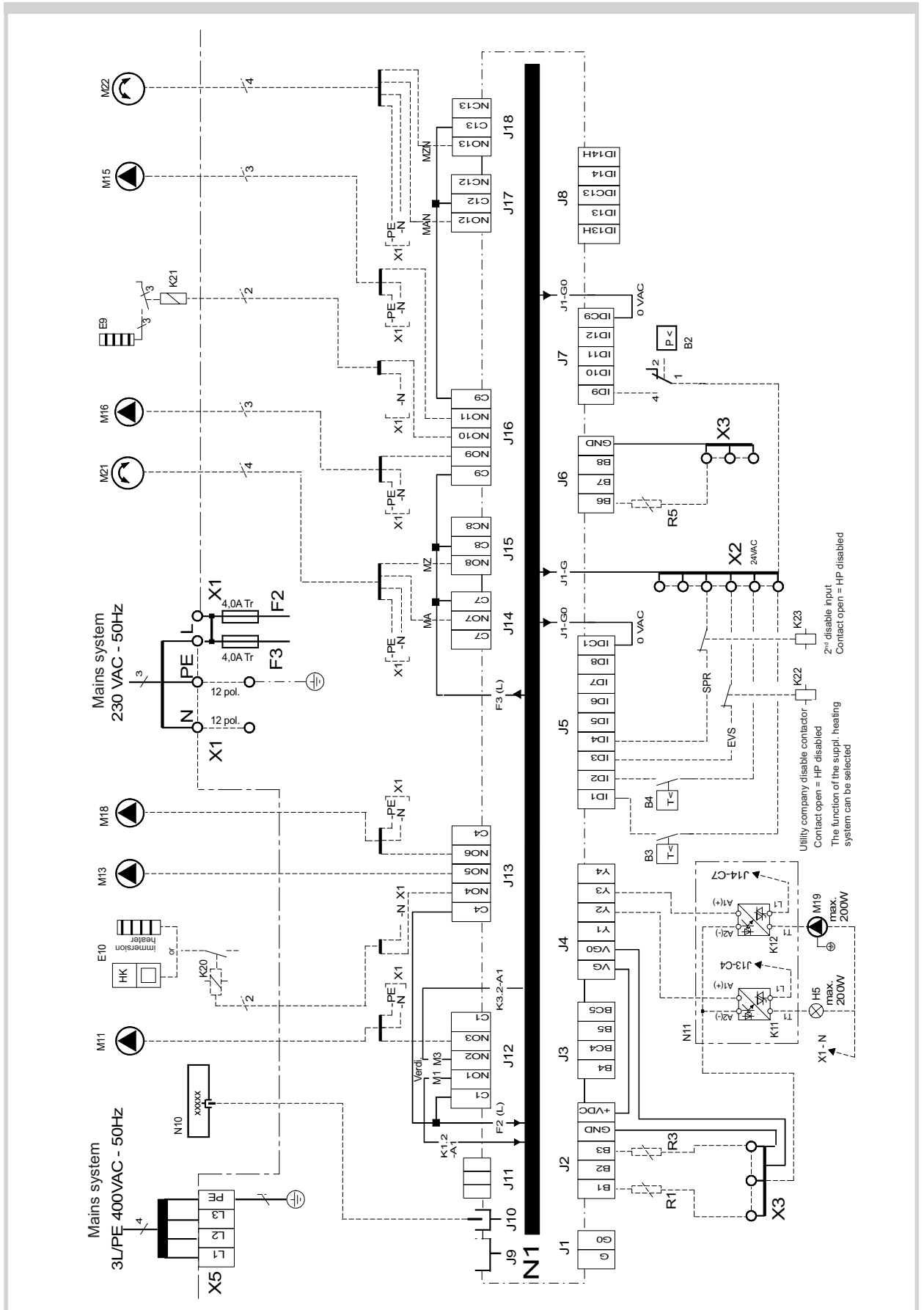
12.4.1 Control



12.4.2 Load



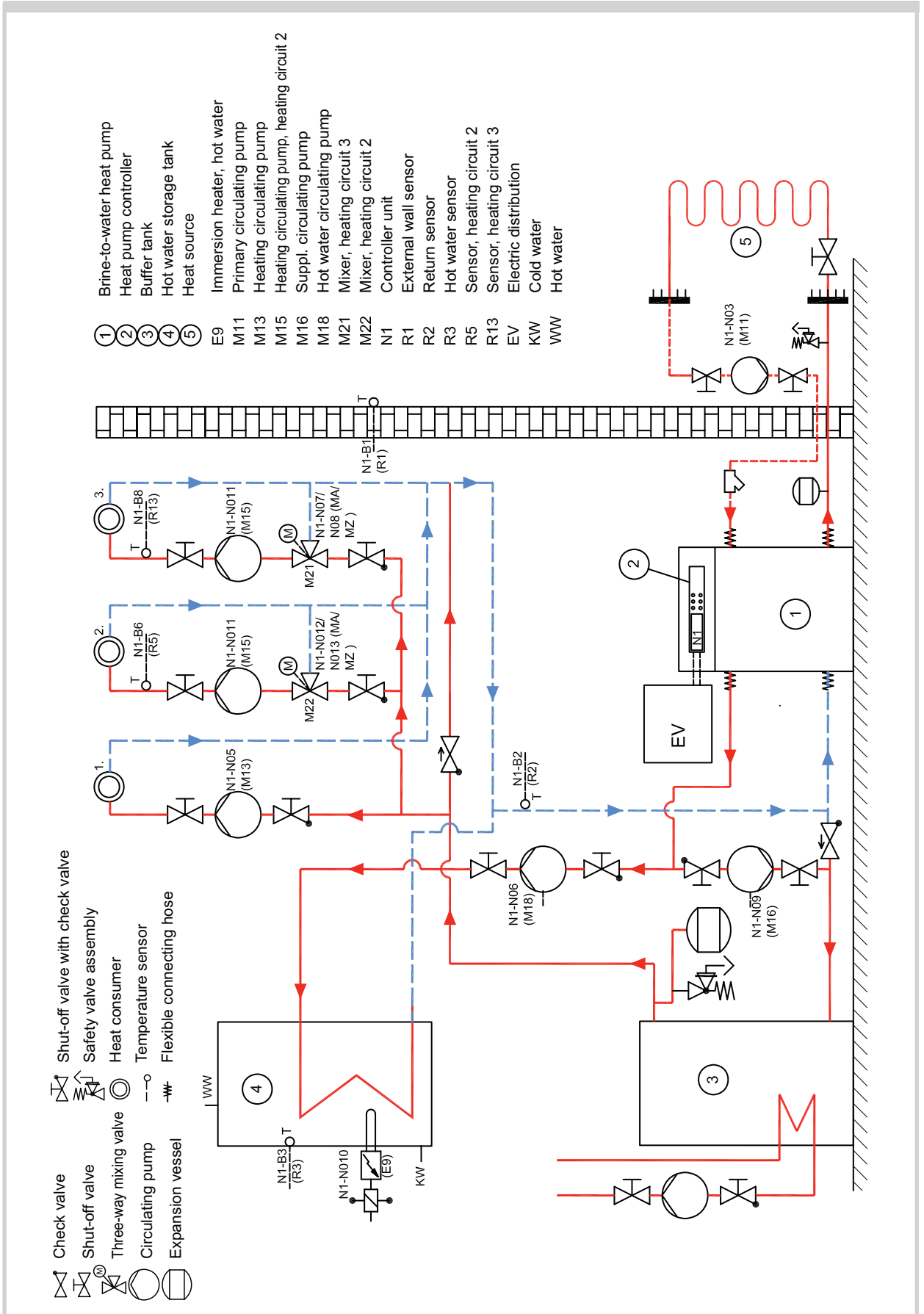
12.4.3 Terminal Diagram



12.4.4 Legend

A1	Wire jumper across J5-ID3>X2 must be inserted if no utility company disable contactor is used	
A2	Wire jumper, must be removed if 2nd disable input is used	
A7	Wire jumper in SI 50/-70, in place of F18/F19	
B2*	Pressostat low pressure, brine	
B3*	Thermostat, hot water (as an alternative to hot water sensor)	
B4*	Thermostat, swimming pool water	
E9*	Electr. immersion heater, hot water	
E10*	Suppl. heating system (boiler or electr. heating element)	
F2	Load fuse for N1 relay outputs across J12 and J13	4.0 A slow-acting
F3	Load fuse for N1 relay outputs across J15 to J18	4.0 A slow-acting
F4	Pressostat, high pressure	
F5	Pressostat, low pressure	
H5*	Lamp, remote fault indicator	
J1...J18	Terminal connector at N1	
K1	Contactor, compressor 1	
K3	Contactor, compressor 2	
K11*	Electron. relay for remote fault indicator (relay module)	
K12*	Electron. relay for swimming pool water circulating pump (relay module)	
K20*	Contactor, suppl. heating system (boiler or electr. heating element)	
K21*	Contactor, electr. immersion heater for hot water	
K22*	Utility company disable contactor	
K23*	SPR auxiliary contactor	
M1	Compressor 1	
M3	Compressor 2	
M11*	Primary pump	
M13*	Heating circulating pump	
M15*	Heating circulating pump for heating circuit 2	
M16*	Suppl. circulating pump	
M18*	Hot water circulating pump	
M19*	Swimming pool circulating pump	
M21*	Mixer, principal circuit	
M22*	Mixer, heating circuit 2	
N1	Heat pump controller	
N7	Starting current limiter, compr. 1	
N8	Starting current limiter, compr. 2	
N10*	Remote control station	
N11*	Relay module	
R1	External sensor	
R2	Return sensor	
R3*	Hot water sensor (as an alternative to hot water thermostat)	
R5*	Sensor for heating circuit 2	
R6	Freeze protection sensor	
R7	Coding resistor 8k	
R9	Flow sensor	
T1	Safety isolating transformer 230/24 VAC-28VA	
X1	Terminal strip mains control L/N/PE-230VAC-50Hz/fuses/N and PE-terminal block	
X2	Terminal strip 24 VAC-terminal block	
X3	Terminal strip GND terminal block for sensors R1/-2 and -3 at J2 and R5 and -6 at J6	
X5	Terminal strip power supply 3L/PE-400VAC-50 Hz	
Abbreviations:		
EVS	Utility company disable input	
SPR	Supplementary disable input	
MA	Mixer OPEN	
MZ	Mixer CLOSED	
* Components to be supplied by the customer, available as accessories		

Hydraulic Block Diagram (Example)



EC Declaration of Conformity

**CE** **EC Declaration of Conformity** ©

The undersigned

**Glen Dimplex Deutschland GmbH**  
**Division Dimplex**  
**Am Goldenen Feld 18**  
**D-95326 Kulmbach / Allemagne**

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 authorisation.

Designation of the product(s):

**Brine-to-water heat pumps**  
 for indoor installation, containing R407C

EC Directives:

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

Type(s):

SI 50 ZS  
 SI 75 ZS  
 SI 100 ZS

Harmonized EN Standards:

EN 255:1997  
 EN 378:1994  
 DIN 8901  
 DIN EN 60335-1 (VDE 0700 Part 1):2001-08  
 DIN EN 60335-2-40 (VDE 0700 Part 40):2001-05  
 DIN EN 55014-2 (VDE 0875 Part 14-2):2002-08  
 Requirements of category II  
 DIN EN 55014-1 (VDE 0875 Part 14-1):2003-09  
 DIN EN 61000-3-2 (VDE 0838 Part 2):2001-12  
 DIN EN 61000-3-3 (VDE 0838 Part 3):2002-05

EN 60335-1:94+A1+A2+A11  
 to A16:2001  
 EN 60335-2-40 1997+A1:2000  
 EN 55014-2:1997+A1:2001  
 EN 55014-1:2000+A1:2001+A2:2002  
 EN 61000-3-2:2000  
 EN 61000-3-3:1995+  
 Corr.: 1997+A1:2001

Order No.:

Kulmbach, 24.11.2005

National Standards/Directives:

D A CH  
 VBG20 SVTI

  
**Wolfgang Weinhold**  
 General Manager

  
**Andreas Tüch**  
 Spartenleiter Haustechnik  
 Division Manager,  
 Haustechnik





**Notes**

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