

CE

**MOUNTING and
OPERATING MANUAL**

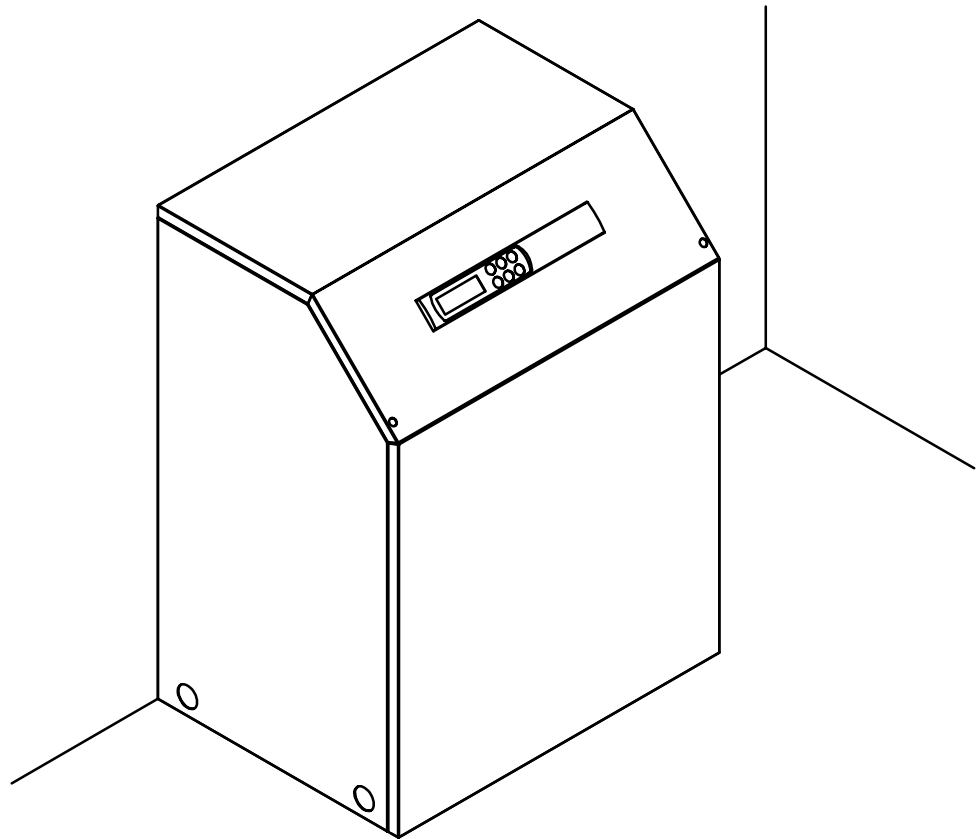
**Brine-to-Water Heat Pump
for Indoor Installation**

SI 5MSR

SI 7MSR

SI 9MSR

SI 11MSR



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1 READ IMMEDIATELY

1.1 Important Information

CAUTION! The heat pump is not attached to the wooden pallet.

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

CAUTION! Do not lift unit by the holes in the panel assemblies!

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 in order to protect the evaporator against contamination.

CAUTION! The brine must contain at least 25 % of a frost and corrosion protection agent on a monoethyleneglycol or propyleneglycol basis.

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

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

CAUTION! All power circuits must be disconnected from the power source prior to opening the cabinet.

1.2 Legal Provisions and Directives

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 heating systems in accordance with all applicable provisions.

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

Heating

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

Cooling

In the Cooling mode, the operating process of the 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. The heat is rejected to the brine, and ultimately to the ground, via the condenser (which acts as the evaporator in the heating mode).

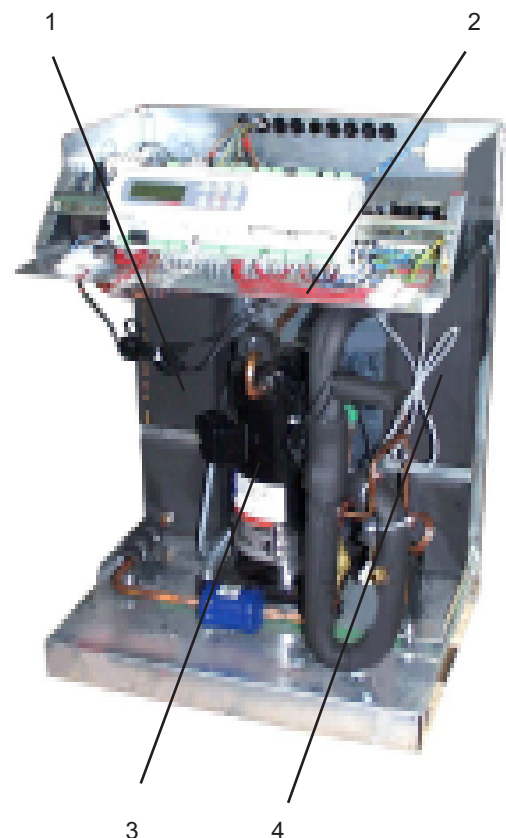
3 BASELINE UNIT

The baseline unit consists of a heat pump, ready for connection, for indoor installation complete with sheet metal cabinet, control panel and integrated controller. The refrigeration cycle contains the refrigerant R407C. Refrigerant R407C is CFC-free, non-ozone depleting and non-combustible.

All components required for the operation of the heat pump are located on the control panel. The power feed for the load and control current must be field-installed by the customer.

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

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

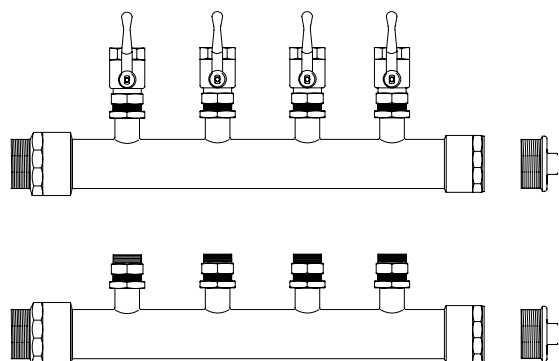


- | | |
|------------------|---------------|
| 1) Condenser | 3) Compressor |
| 2) Control panel | 4) Evaporator |

4 ACCESSORIES

4.1 Brine Manifold

The brine manifold ties the individual collector loops of the heat source system into a single main line which is connected to the heat pump. Integrated ball valves allow individual brine circuits to be shut off for venting purposes.

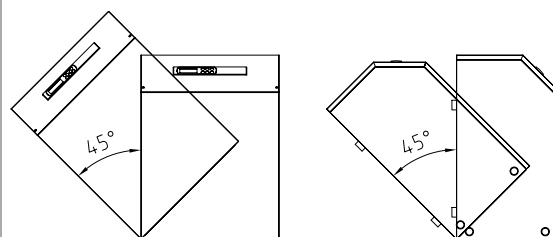


5 TRANSPORT

A lift truck is suited for transporting the unit on a level surface. If the heat pump needs to be transported on an uneven surface or carried up or down stairs, carrying straps may be used for this type of transport. These straps may be passed directly underneath the wooden pallet.

CAUTION!

The heat pump is not secured to the wooden pallet.



CAUTION!

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

For lifting the unit without pallet, the holes provided in the sides of the frame should be used. The side panel assemblies must be removed for this purpose. A commercially available pipe can be used as a carrying aid.

CAUTION!

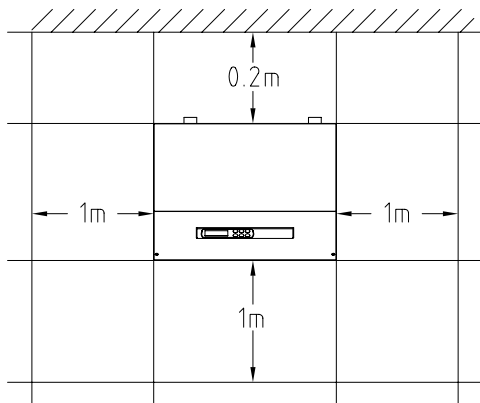
Do not use the holes in the panel assemblies for lifting the unit!

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 thereby make close 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 located to allow safe and easy maintenance/service access. This is ensured if a clearance of approx. 1 m in front of and to each side of the heat pump is maintained.



6.2 Sound Emissions

The heat pump offers silent operation due to efficient sound insulation. To prevent noise transmission to the foundation, a suitable, sound dampening rubber mat should be placed underneath the base frame of the heat pump.

To prevent any sound transmission to the heating system it is recommended that the heat pump is connected to the heating system by means of hose sections.

7 MOUNTING

7.1 General

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.

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 controllers and 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 and be 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 the control panel of the heat pump via terminals X1: L/N/PE.
- Connection of the load wire to the control panel of the heat pump via terminals X6: L/N/PE.
- Connection of the brine pump (to be provided by the customer) to the control panel of the heat pump via terminal X1: PE and pump contactor K5: 2/4.

All electrical components required for the operation of the heat pump are located on the control panel.

For detailed instructions concerning the connection and functioning of the heat pump controller refer to the operating manual supplied with the controller.

A disconnecting device with a contact gap of at least 3 mm (e.g. utility company shut-off contactor or power contactor) as well as a 1-pole circuit breaker have to be provided. The required cross-sectional area of the conductor is to be selected according to the

power consumption of the heat pump, the technical connection requirements of the relevant electrical utility company as well as all applicable regulations. Details on the power consumption of the heat pump are contained on the product information sheet and the typeplate. The terminals are designed for a max. conductor cross-section of 10 mm².

8 COMMISSIONING

8.1 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). Commissioning must be carried out in the heating mode.

8.2 Preparation

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 could impair the proper heating water 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 of the heat pump must be performed in accordance with the mounting and operating manual of the heat pump controller.

Where the minimum heating water flow rate is assured by means of an overflow valve, the valve must be set to meet the requirements of the heating installation. An incorrect setting may result in various error symptoms and an increased electrical power

consumption. To correctly set the overflow valve, the following procedure is recommended:

- a) Open all heating circuits and close the overflow valve. Determine the resulting temperature difference between supply and return flow.
- b) Close all of the heating circuits that may also be closed during operation (depending on the type of heat pump usage) so that the most unfavourable operating state - with respect to the water flow rate - is achieved.
- c) In this operating state open the overflow valve until approximately the same temperature difference exists that was measured under a) when the overflow valve was closed and the heating circuits open.

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.

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.

In either case, the cleaning fluid should be at room temperature. It is recommended that the heat exchanger is 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. To prevent any damage caused by cleaning agent residues that may be present in the system it is important that the system be thoroughly flushed using appropriate neutralising agents.

The 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!

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 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 of the performance of the condenser in the heat pump, the system must be cleaned by a heating technician.

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 waters 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

This heat pump is a quality product and is designed for trouble-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 operating manual of the heat pump controller.

Additional malfunctions can be interrogated at 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 and qualified after-sales service.

CAUTION!

All electrical circuits must be disconnected from the power source prior to opening the equipment.

11 DECOMMISSIONING

11.1 Shutdown in Summer

Shutting down the heating system in summer is effected by switching the heat pump controller to the "Summer" operating mode.

11.2 End-of-Life Decommissioning/ Disposal

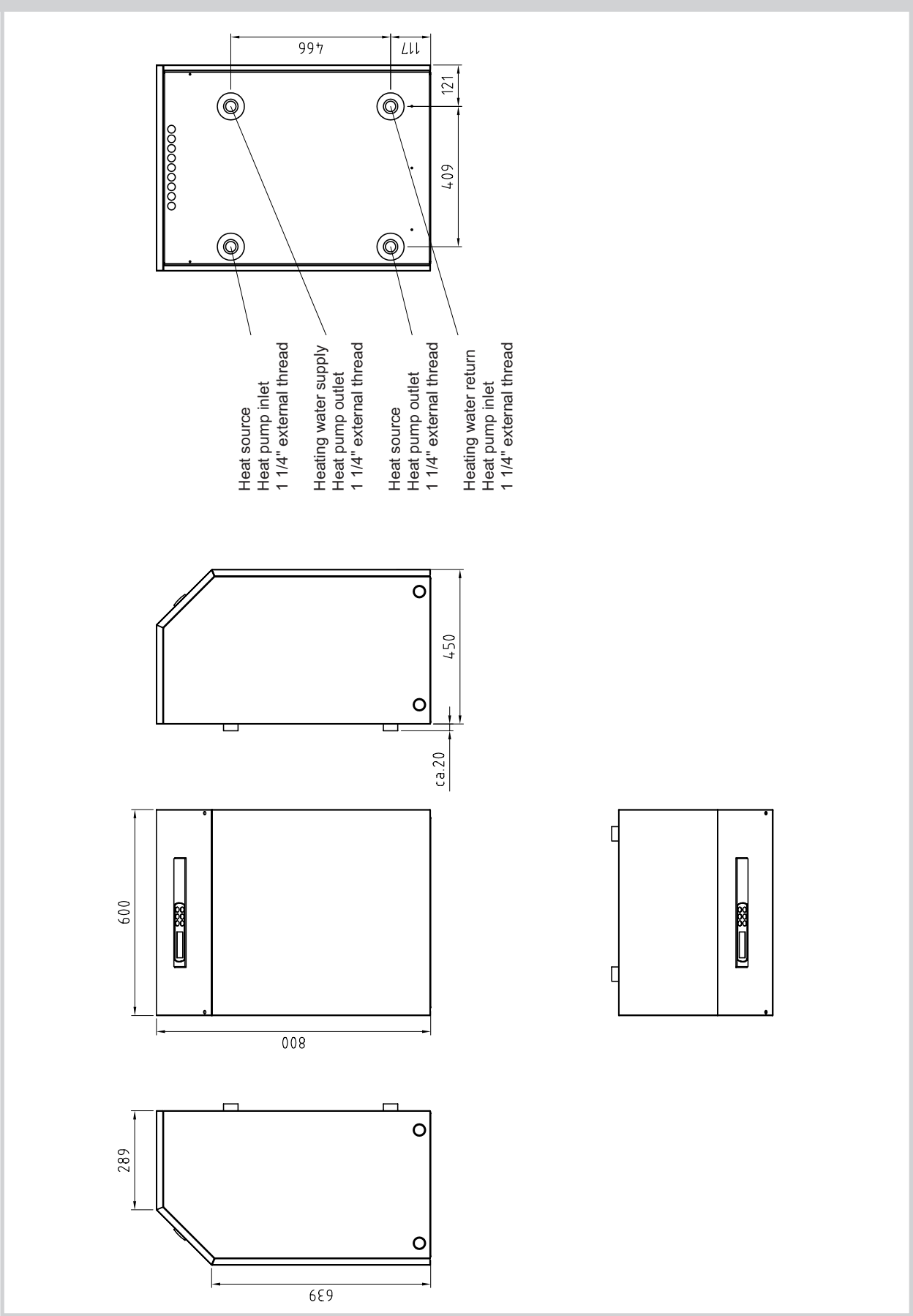
Before removing the heat pump, disconnect the machine from the power source and close all valves. Environment-relevant requirements regarding the recovery, recycling and disposal of service fuels and components in accordance with all relevant standards must be adhered to. Particular attention must hereby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

12

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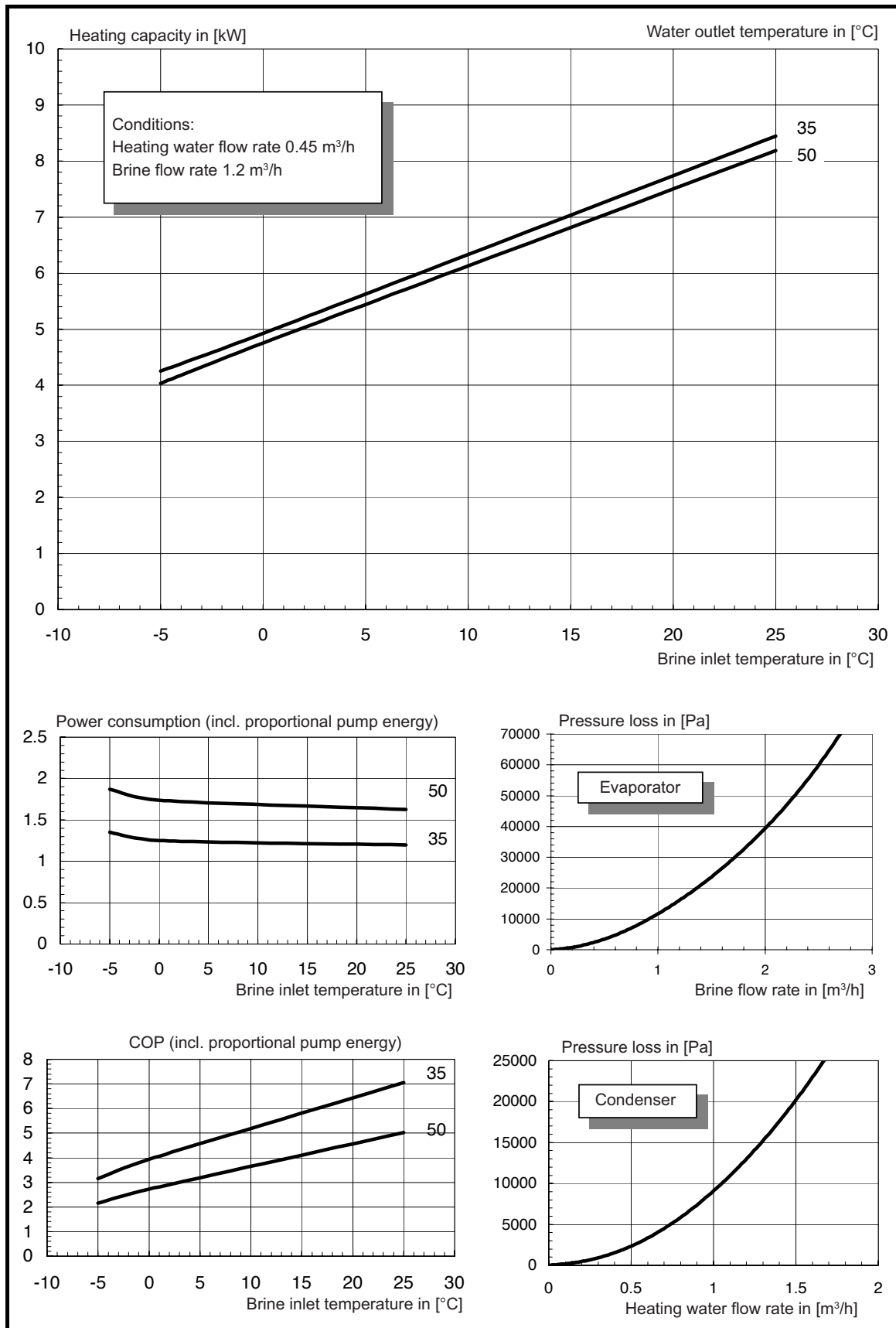
Dimensioned Drawing



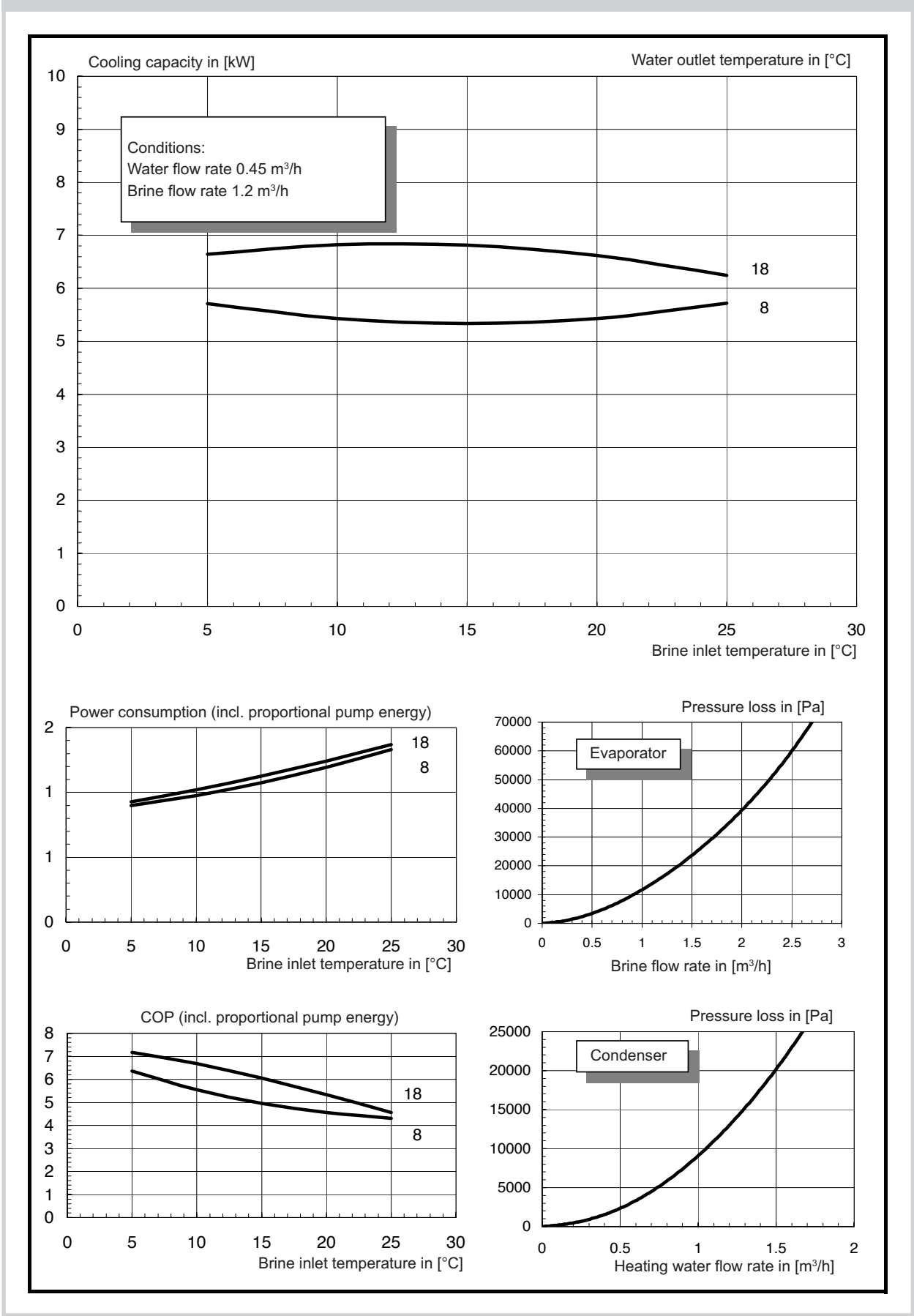
Equipment Information

EQUIPMENT DATA for brine-to-water heat pumps for heating purposes					
1	TYPE AND COMMERCIAL DESCRIPTIONS	..5MSR	..7MSR	..9MSR	..11MSR
2	MODEL				
2.1	Type	reversible	reversible	reversible	reversible
2.2	Enclosure type acc. to EN 60 529	IP 20	IP 20	IP 20	IP 20
2.3	Installation site	indoors	indoors	indoors	indoors
3	PERFORMANCE DATA				
3.1	Operating temperature limits:				
	Heating water supply °C	max. 55	max. 55	max. 55	max. 55
	Cooling, supply °C	+8 to +20	+8 to +20	+8 to +20	+8 to +20
	Brine (heat source, heating) °C	-5 to +25	-5 to +25	-5 to +25	-5 to +25
	Brine (heat sink, cooling) °C	+5 to +25	+5 to +25	+5 to +25	+5 to +25
	Antifreeze agent	monoethylene glycol	monoethylene glycol	monoethylene glycol	monoethylene glycol
	Minimum brine concentration (-13°C freezing temperature)	0,25	0,25	0,25	0,25
3.2	Heating water temperature spread at B0 / W35 K	9,4	9,1	10,6	9,9
3.3	Heating capacity/coeff. of perform. at B-5 / W55 1) kW / ---	4,0 / 2,0	5,4 / 2,1	7,5 / 2,0	9,8 / 2,1
	at B0 / W50 1) kW / ---	4,8 / 2,7	6,2 / 2,7	8,8 / 2,8	11,3 / 2,9
	at B0 / W35 1) kW / ---	4,9 / 3,9	6,4 / 3,8	9,3 / 4,0	11,6 / 4,1
3.4	Cooling capacity, coeff. of perform. at B20 / W8 kW / ---	5,4 / 4,6	7,0 / 4,5	9,9 / 4,6	11,4 / 4,6
	at B20 / W18 kW / ---	6,6 / 5,3	8,6 / 5,3	12,0 / 5,4	14,1 / 5,3
	at B10 / W8 kW / ---	5,4 / 5,6	7,0 / 5,5	9,9 / 5,6	11,6 / 5,7
	at B10 / W18 kW / ---	6,8 / 6,7	8,8 / 6,6	12,4 / 6,7	14,1 / 6,5
3.5	Sound power level dB(A)	54	55	56	56
3.6	Heating water flow rate at internal pressure difference m³/h / Pa	0,45 / 1900	0,6 / 3300	0,75 / 2300	1,0 / 4100
3.7	Brine flow rate at internal pressure difference (heat source) m³/h / Pa	1,2 / 16000	1,7 / 29500	2,3 / 25000	3,0 / 24000
3.8	Refrigerant; total charge weight Type / kg	R407C / 0,9	R407C / 0,9	R407C / 1,25	R407C / 1,6
4	DIMENSIONS, CONNECTIONS AND WEIGHT				
4.1	Equipment dimensions without connections 4) H x W x L mm	800 x 600 x 450	800 x 600 x 450	800 x 600 x 450	800 x 600 x 450
4.2	Equipment connections for heating system inches	1¼" ext. thread	1¼" ext. thread	1¼" ext. thread	1¼" ext. thread
4.3	Equipment connections for heat source inches	1¼" ext. thread	1¼" ext. thread	1¼" ext. thread	1¼" ext. thread
4.4	Weight of transport unit(s) incl. packaging kg	101	104	110	114
5	ELECTRICAL CONNECTION				
5.1	Nominal voltage; fusing V / A	230 / 16	230 / 16	230 / 20	230 / 25
5.2	Nominal power consumption 1) B0 W35 kW	1,25	1,68	2,3	2,8
5.3	Starting current with soft starter A	24	26	38	38
5.4	Nominal current B0 W35 / cosφ A / ---	6,8 / 0,8	9,1 / 0,8	12,5 / 0,8	15,2 / 0,8
6	COMPLIES WITH EUROPEAN SAFETY REGULATIONS	3)	3)	3)	3)
7	OTHER DESIGN CHARACTERISTICS				
7.1	Water inside equipment protected against freezing 2)	yes	yes	yes	yes
7.2	Performance settings	1	1	1	1
7.3	Controller internal / external	internal	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 ready for operation at all times.				
3)	See EC Declaration of Conformity				
4)	Please keep in mind that more space is required for pipe connection, operation and maintenance.				
	Subject to technical modifications Issued: 14.04.2004				

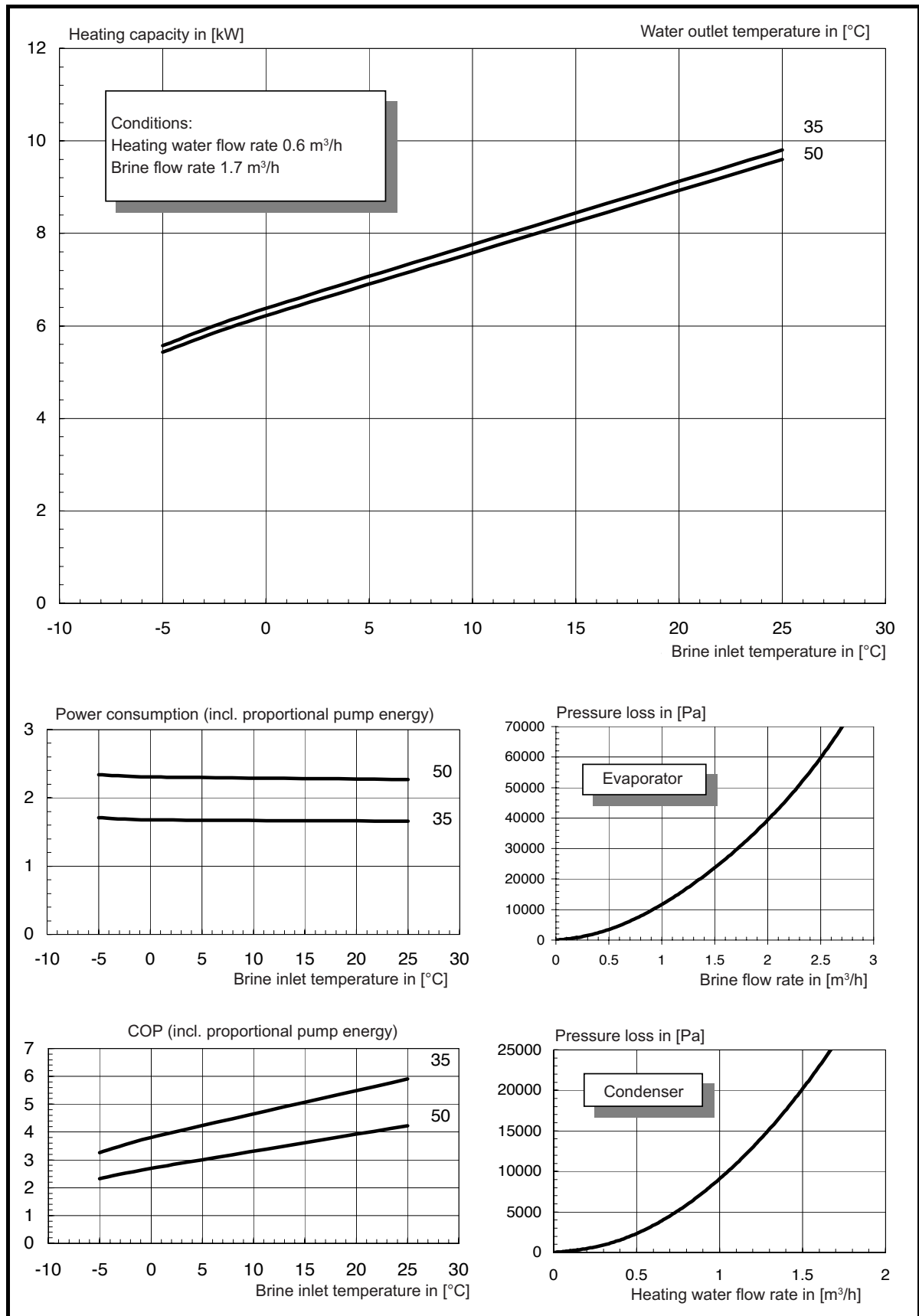
12.3.1 Heating Mode .. 5MSR



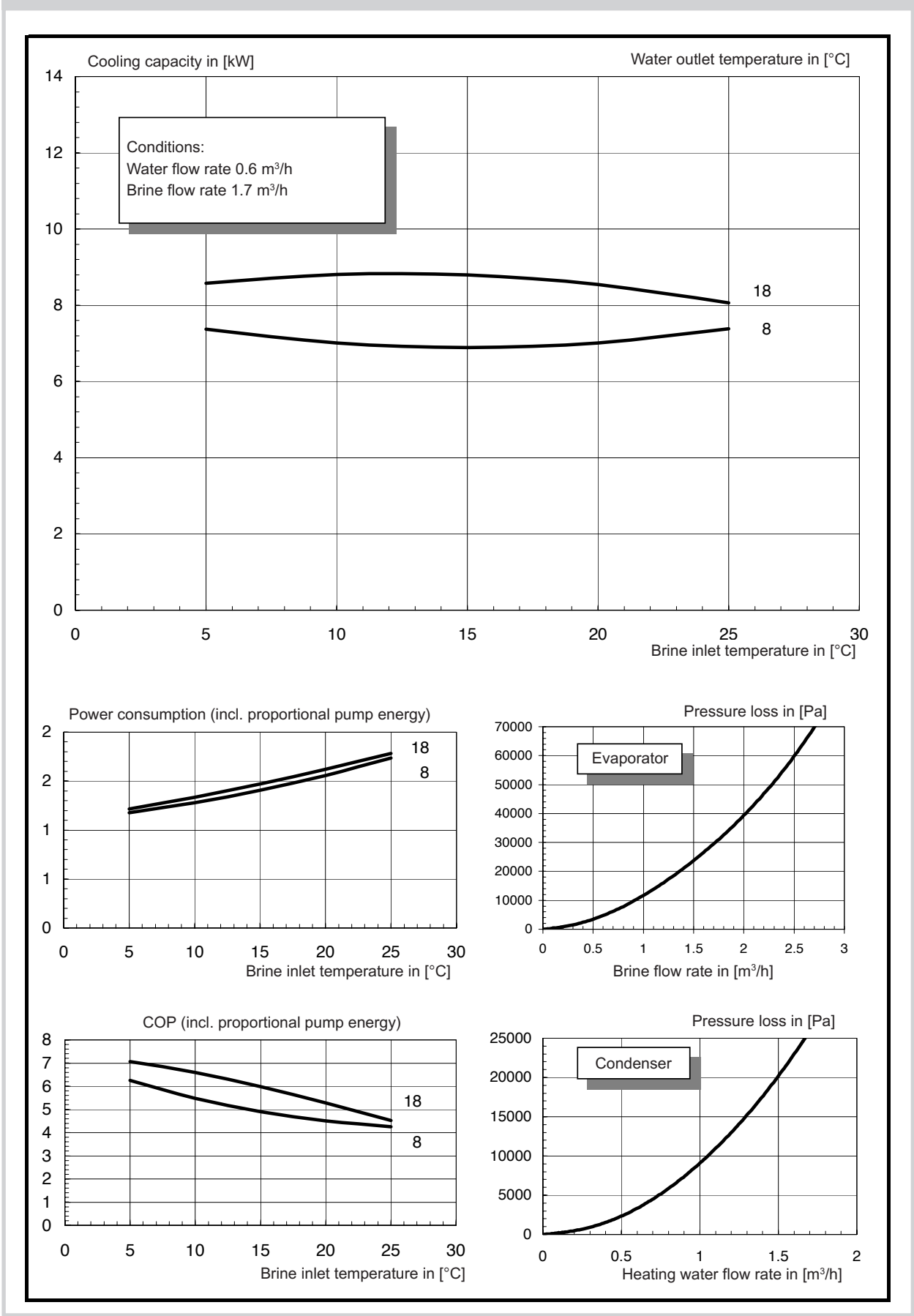
12.3.2 Cooling Mode .. 5MSR



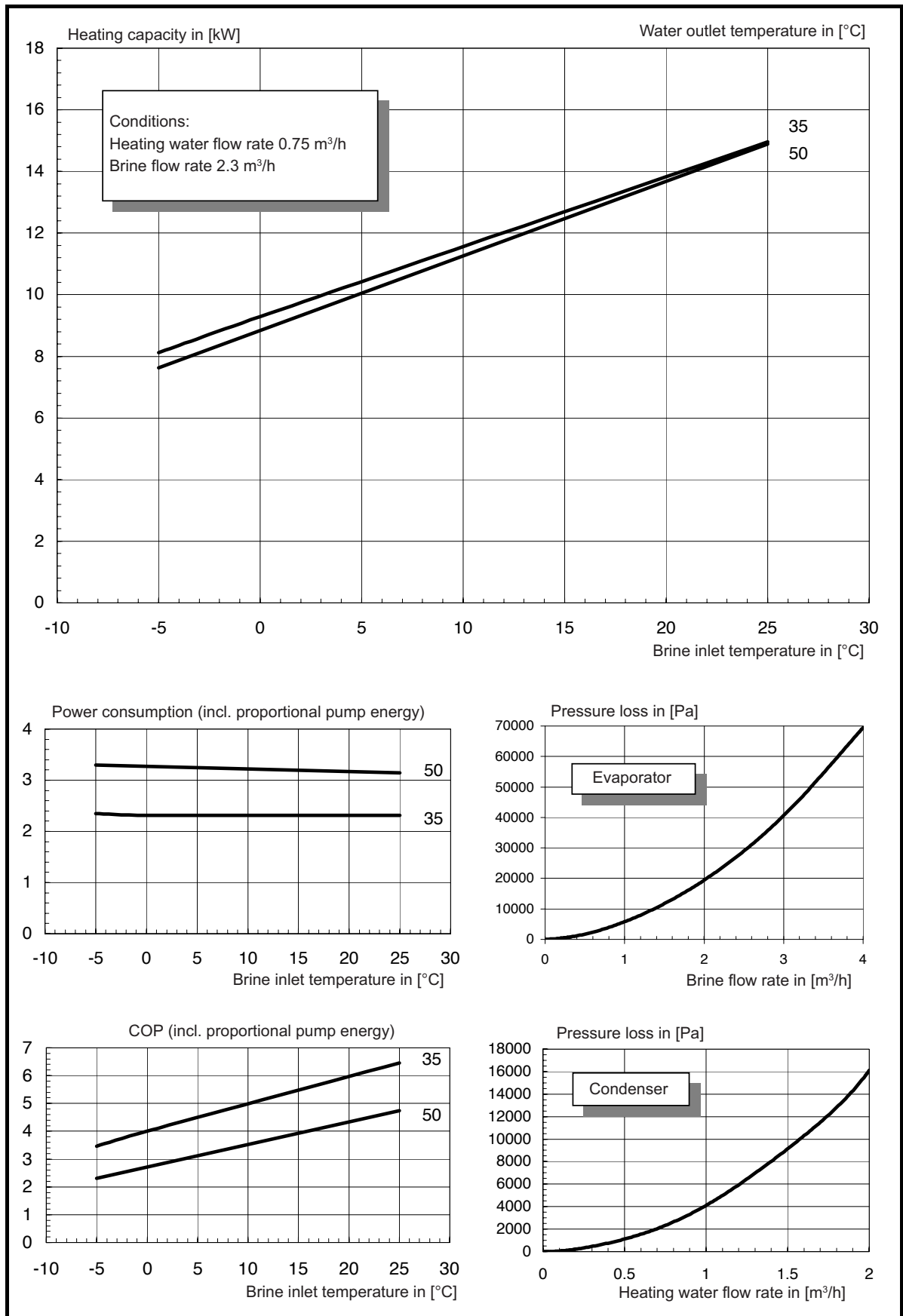
12.3.3 Heating Mode .. 7MSR



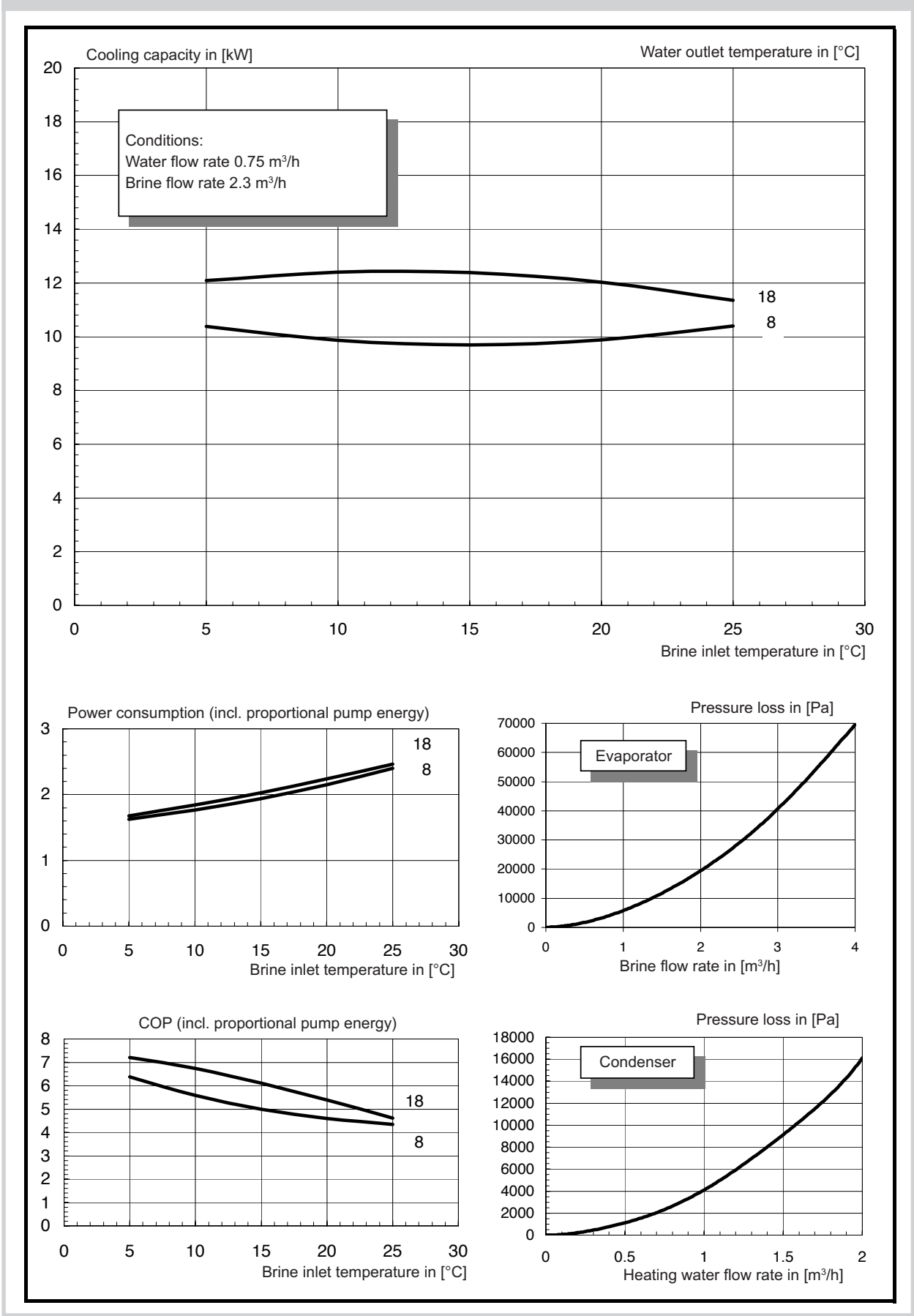
12.3.4 Cooling Mode .. 7MSR



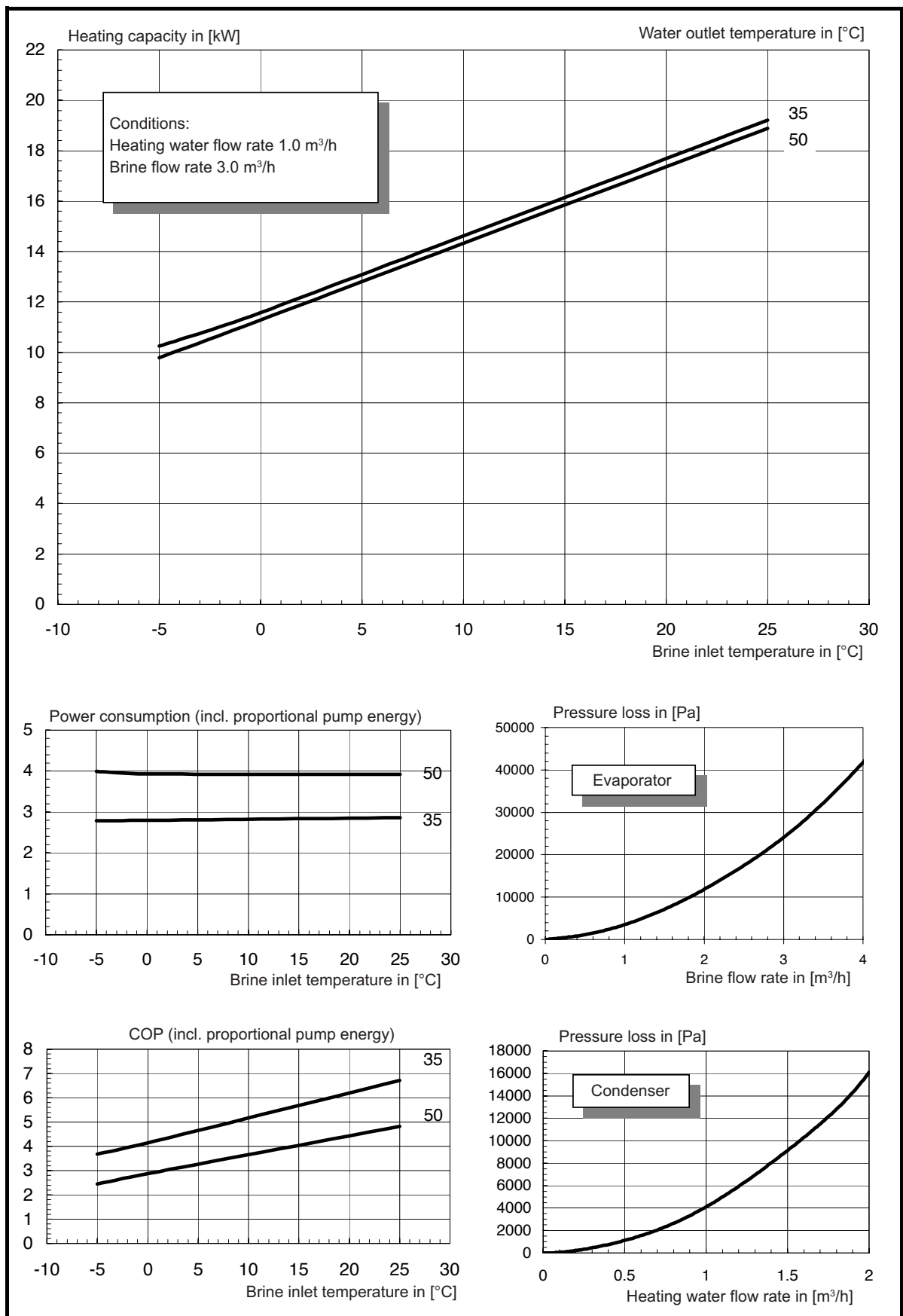
12.3.5 Heating Mode .. 9MSR



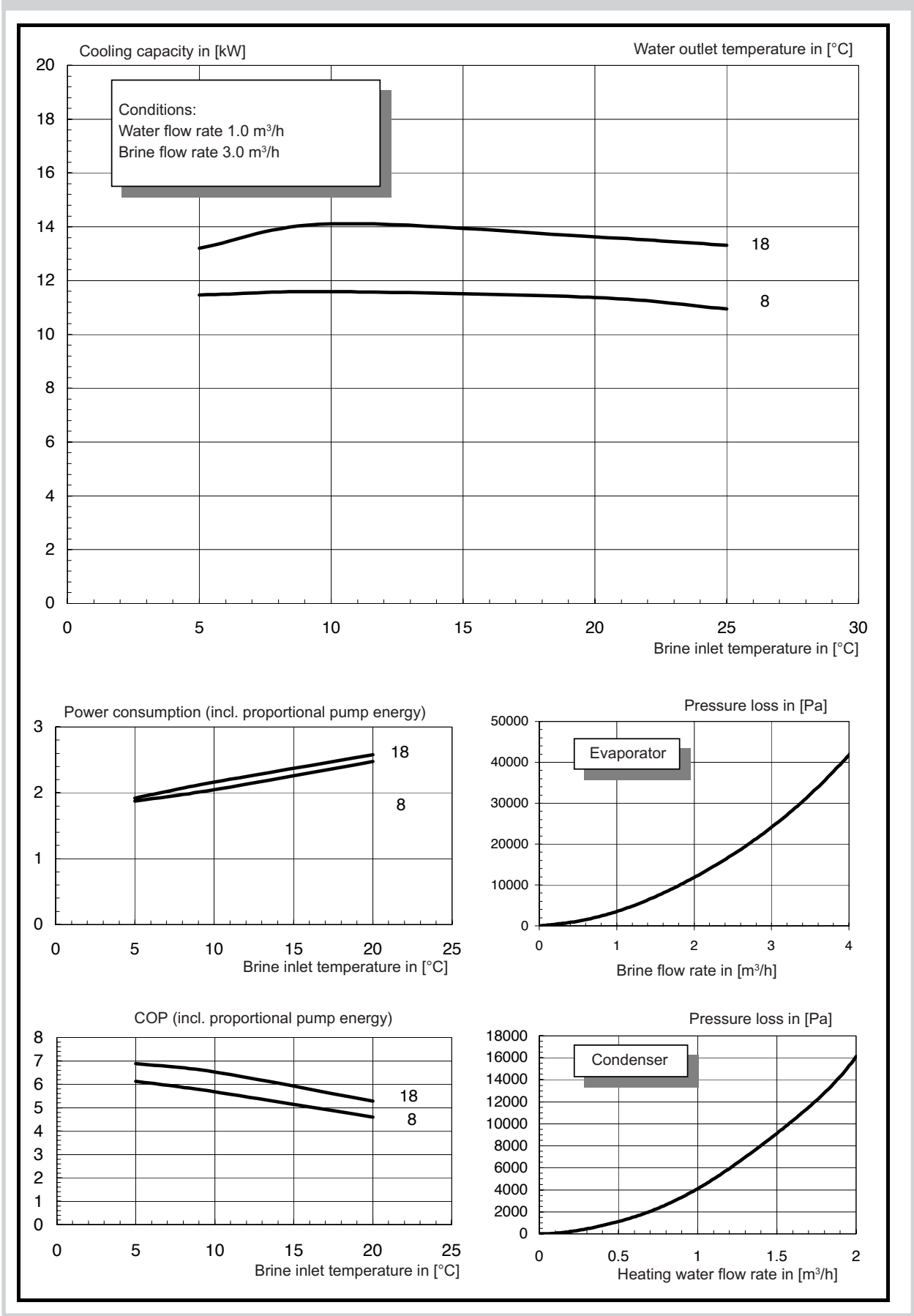
12.3.6 Cooling Mode .. 9MSR



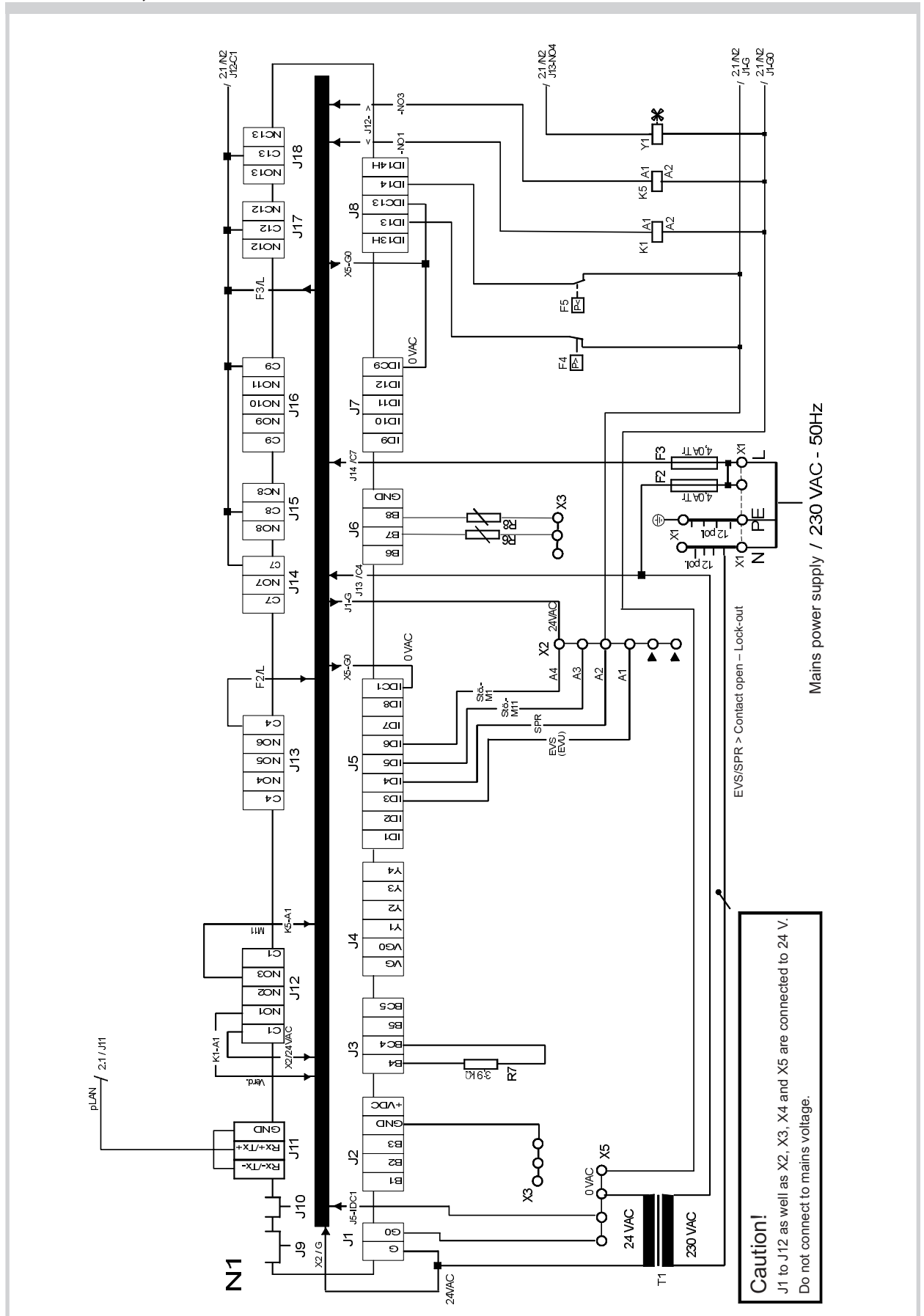
12.3.7 Heating Mode .. 11MSR



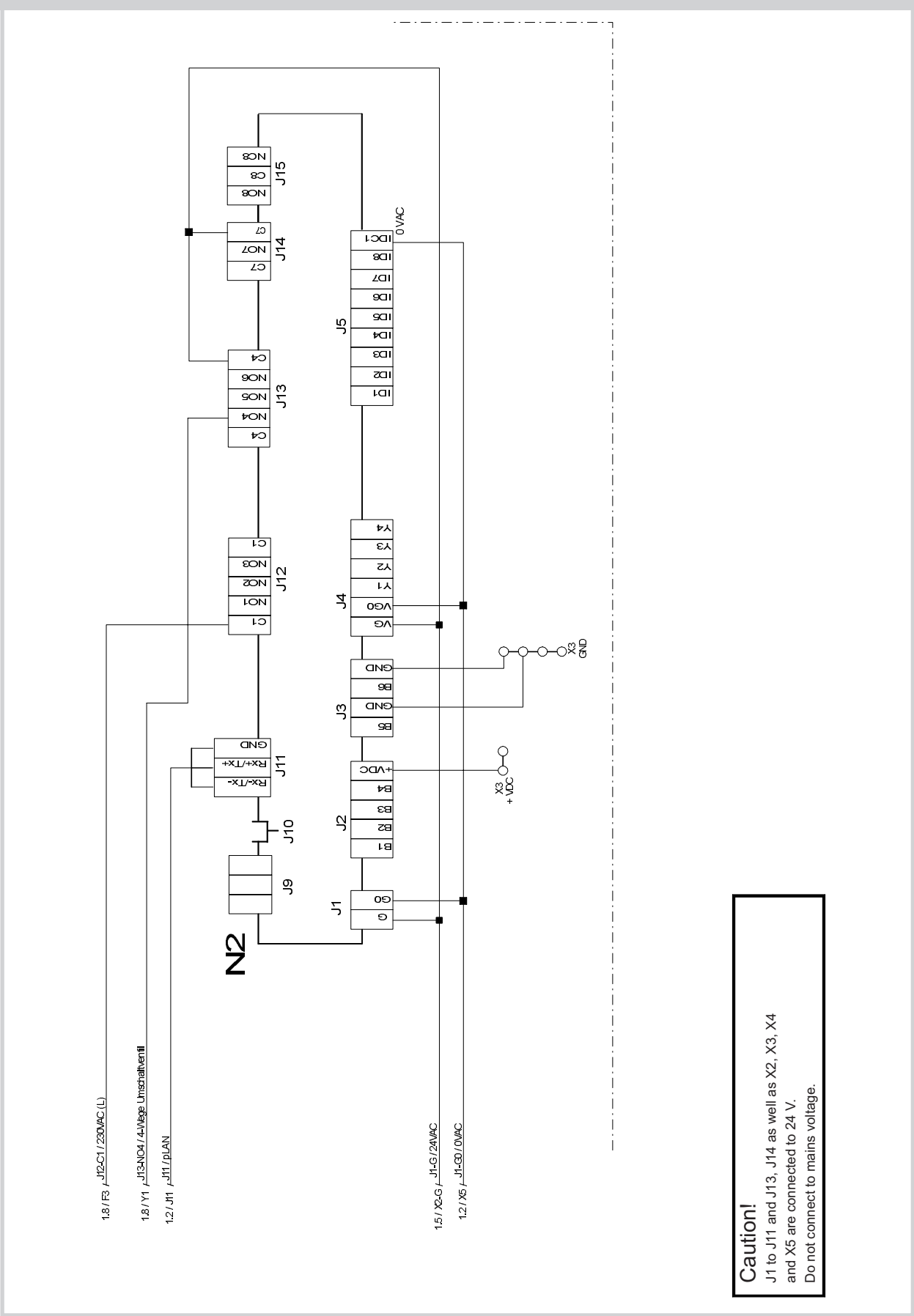
12.3.8 Cooling Mode .. 11MSR



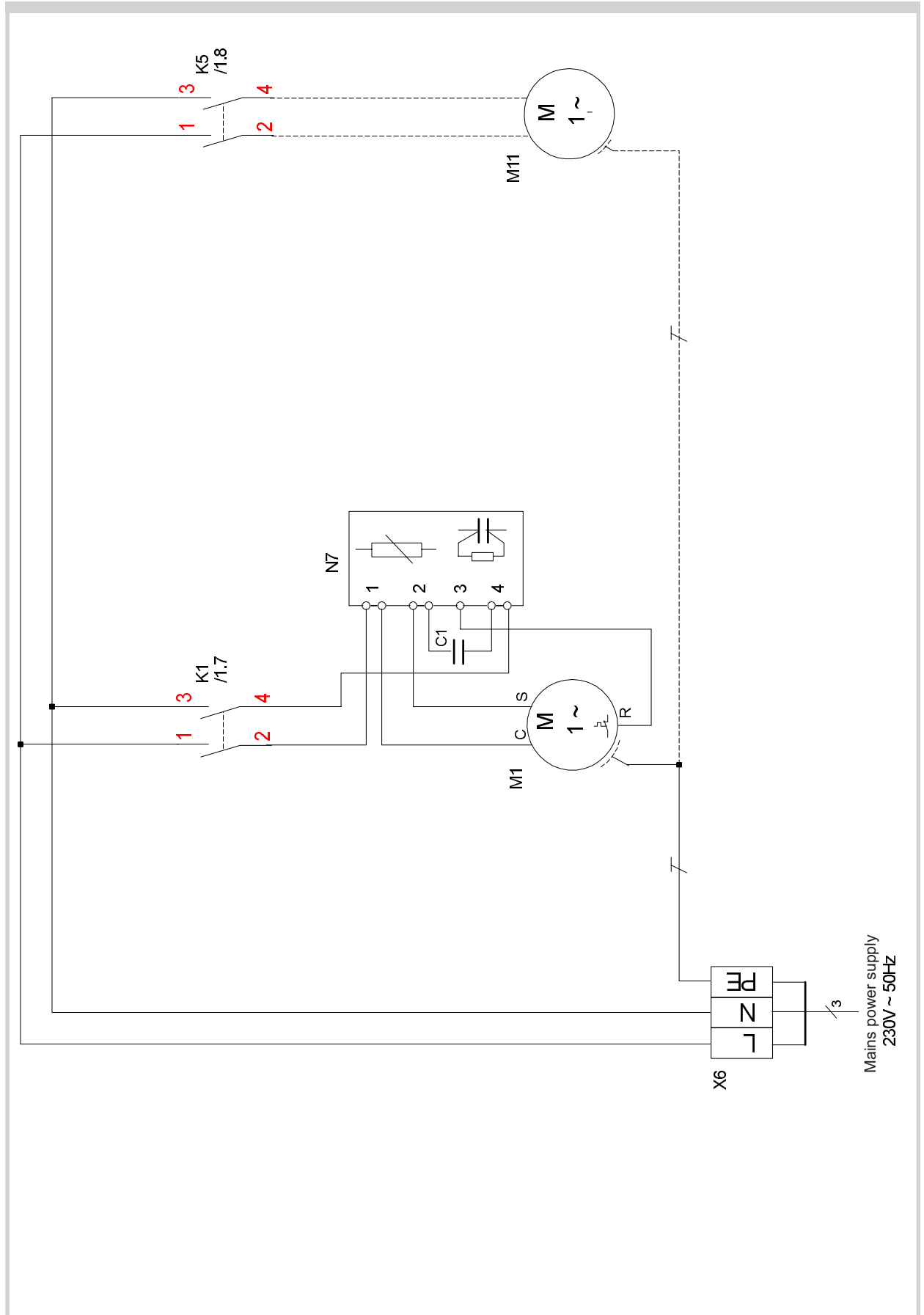
12.4.1 Control, Standard Controller



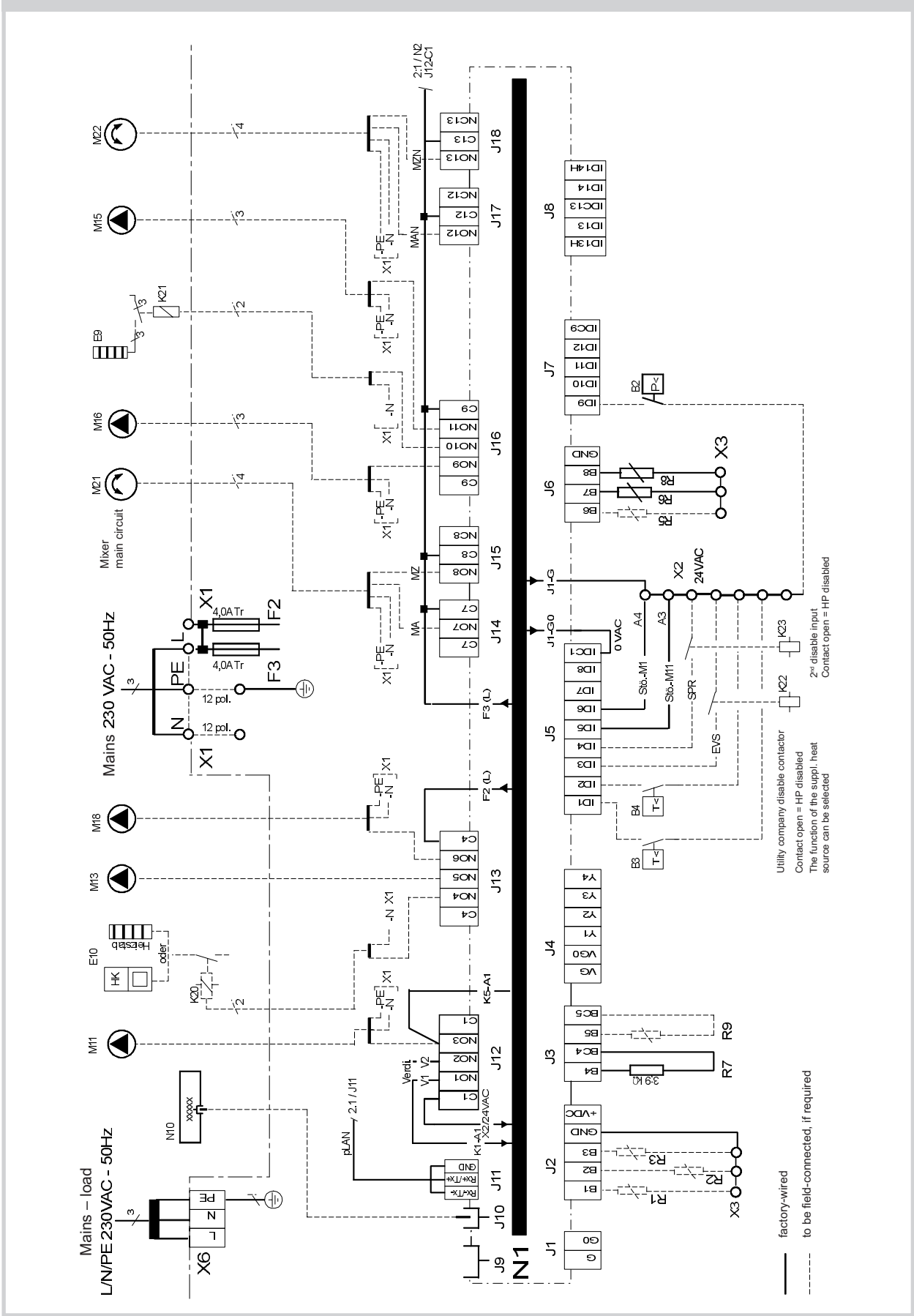
12.4.2 Control, Cooling Controller



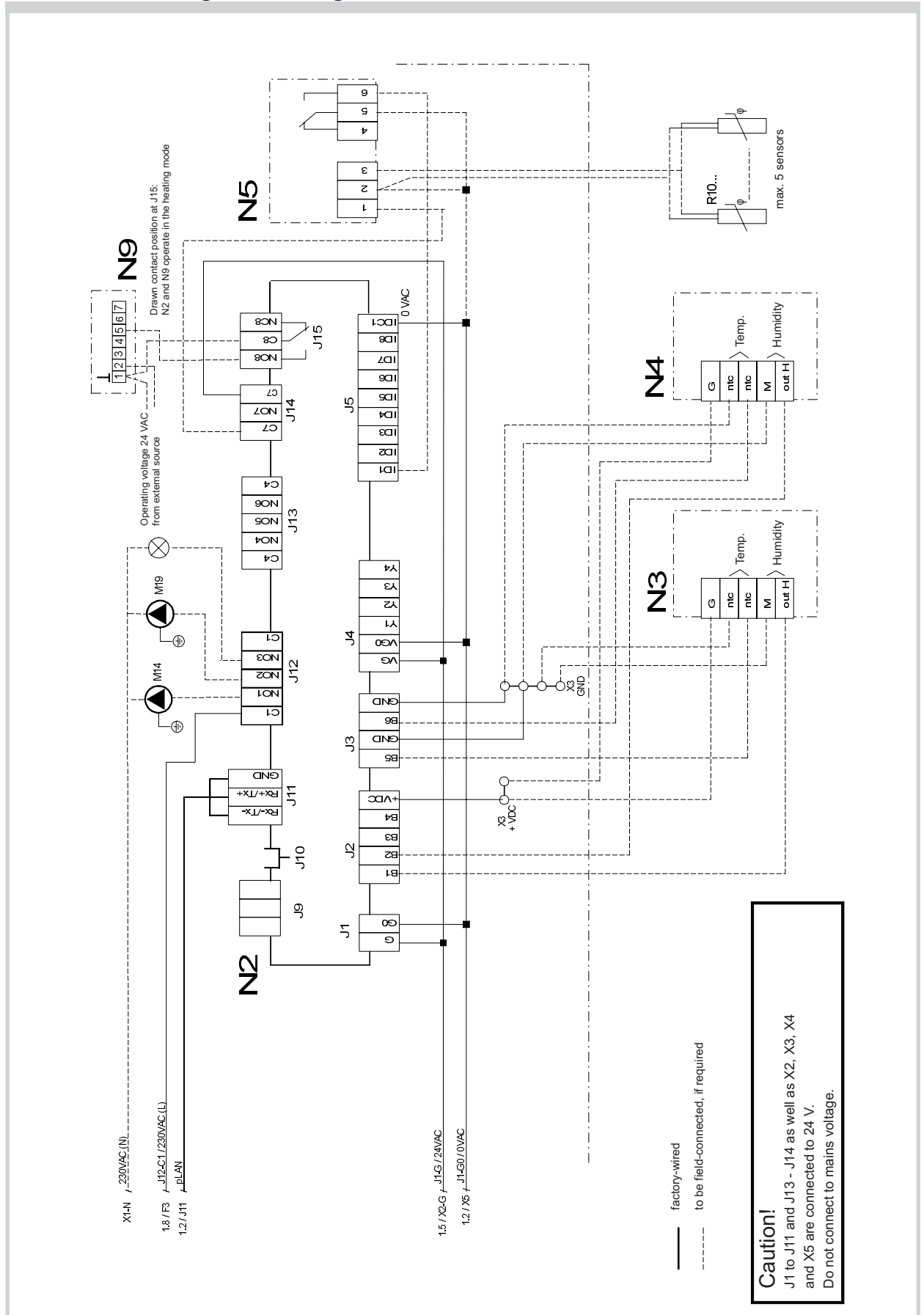
12.4.3 Load



12.4.4 Terminal Diagram, Standard Controller



12.4.5 Terminal Diagram, Cooling Controller



12.4.6 Legend

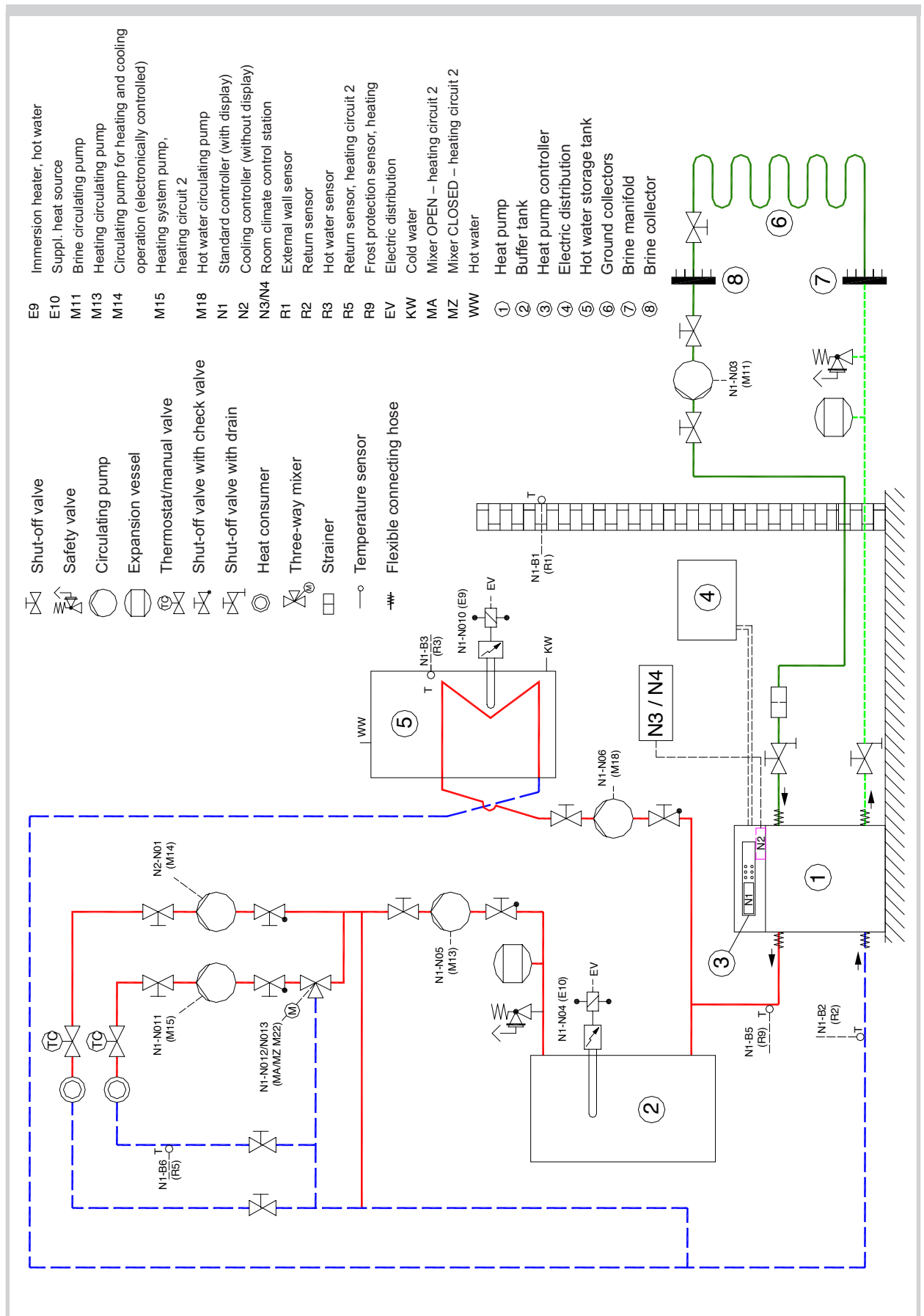
A1	Wire jumper, must be removed upon installation of a utility company disable contactor	
A2	Wire jumper, must be removed if 2nd disable input is used	
A3	Wire jumper, must be removed if a motor protection contact for primary pump is used	
A4	Wire jumper, must be removed if a motor protection contact for the compressor is used	
	Open wire jumpers or contacts mean: lock-out or malfunction	
B2*	Pressostat low pressure, brine	
B3*	Thermostat, hot water	
B4*	Thermostat, swimming pool water	
C1	Operating capacitor, compressor	
E9*	Electr. immersion heater, hot water	
E10*	Suppl. heat source (boiler or electr. heating element)	
F2	Load fuse for N1 relay outputs across J13	4.0 A slow
F3	Load fuse for N1 relay outputs across J15 to J18 at N1 and -J12 at N2	4.0 A slow
F4	Pressostat high pressure	
F5	Pressostat low pressure	
J1...J18	Terminal connector at N1 (standard controller)	
J1...J15	Terminal connector at N2 (cooling controller)	
K1	Contactor, compressor	
K5	Contactor, primary pump (M11)	
K20*	Contactor for E10	
K21*	Contactor for E9	
K22*	Utility company disable contactor	
K23*	SPR auxiliary relay	
M1	Compressor 1	
M11*	Primary pump	
M13*	Heating circulating pump, primary circuit	
M14*	Heating circulating pump - heating circuit 1	
M15*	Heating circulating pump - heating circuit 2	
M16*	Auxiliary circulating pump	
M18*	Hot water circulating pump	
M19*	Swimming pool water circulating pump	
M21*	Mixer, main circuit	
M22*	Mixer, heating circuit 2	
N1	Standard controller (pCO2)	
N2	Cooling controller (pCO1)	
N3/N4*	Room units for dew point control	
N5	Dew point monitor	
N7	Soft start control	
N9*	Room thermostat	
N10*	Remote control station	
R1	External sensor	
R2	Return sensor	
R3	Hot water sensor (as an alternative to the hot water thermostat)	
R5	Sensor for heating circuit 2	
R6	Freeze protection sensor (brine)	
R7	Coding resistor 3k9	
R8	Frost protection sensor, cooling	
R9	Frost protection sensor, heating	
R10*	Humidity sensors of N5	
T1	Safety isolating transformer 230/24V AC-50V A	
X1	Terminal strip mains control L/N/PE-230V AC-50 Hz/fuses/N and PE-terminal block	
X2	Terminal strip 24V AC-terminal block	
X3	Terminal strip GND terminal block for sensors	
X5	Terminal strip 0V AC terminal block	
X6	Terminal strip power supply L/N/PE-230V AC-50 Hz	
Y1	4-way reversing valve	

Abbreviations:

EVS	Utility company disable input
SPR	Supplementary disable input
MA*	Mixer OPEN
MZ	Mixer CLOSED

* Components to be supplied by the customer

Hydraulic Block Diagram



EC Declaration of Conformity



Declaration of Conformity



The undersigned

KKW Kulmbacher Klimageräte-Werk GmbH,
Division 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 basic 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):

Brine-to-water heat pumps
 for indoor installation with R407C

EC Directives:

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

Type(s):Harmonized EN Standards:

SI 5MSR	EN 255:1997	
SI 7MSR	EN 378:1994	
SI 9MSR	DIN EN 60335-1 (VDE 0700 Teil1):1995-10	EN 60335-1:1994+A11:1995
SI 11MSR	DIN EN 60335-1/A1 (VDE 0700 Teil1/A1):1997-08	EN 60335-1/A1:1996
	DIN EN 60335-1/A12 (VDE 0700 Teil 1/A12):1997-08	EN 60335-1/A12:1996
	DIN EN 60335-1/A13 (VDE 0700 Teil 1/A13):1998-12	EN 60335-1/A13:1998
	DIN EN 60335-1/A14 (VDE 0700 Teil 1/A14):1999-05	EN 60335-1/A14:1998
	DIN EN 60335-2-40 (VDE 0700 Teil 40):1998-07	EN 60335-2-40:1997
	DIN EN 55014-2 (VDE 0875 Teil 14-2):1997-10	EN 55014-2:1997
	Requirements of category II	
	DIN EN 55014-1 (VDE 0875 Teil 14-1):1999-10	EN 55014-1:1993+A1:1997+A2:1999
	DIN EN 61000-3-2 (VDE 0838 Teil 2):1998-10	EN 61000-3-2:1995+
		Corrigendum:1997+A1:1998+A2:1998
	DIN EN 61000-3-2/A14 (VDE 0838 Teil 2/A14):2001-01	EN 61000-3-2:1995/A14:2000
	DIN EN 61000-3-3 (VDE 0838 Teil 3):1996-03	EN 61000-3-3:1995

Order No.:

342 360
 342 370
 342 380
 342 390

National Standard/Directives:

D	A	CH
VBG20		SVTI

Wolfgang Weinhold
 General Manager

Mathias Huprich
 Technical Director

Kulmbach, 27.01.2004

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