TECHNICAL DESCRIPTION

Morix

Higher-capacity heat pump

www.thermia.com

Thermia AB is not liable or bound by warranty if these instructions are not adhered to during installation or service.

The English language is used for the original instructions. Other languages are a translation of the original instructions. (Directive 2006/42/EC)

© Copyright Thermia AB

Table of Contents

1 System overview 5
1.1 Two Morix with WT-C and WT-V plus active cooling 5
1.2 Morix with two WT-C and one WT-V plus active cooling 6
1.3 Two Morix with one WT-C and one WT-V 7
1.4 Morix with one WT-C and one WT-V 8
1.5 Two Morix with two WT-C and one WT-V plus exhaust air 9
1.6 Morix with two WT-C and one WT-V plus exhaust air 10
1.7 Morix S-E with water tank 11
2 Water quality 11
3 Heat pump dimensions and connections 12
3.1 Minimum free space around the heat pump 12
3.2 Setting-up the heat pump 13
4 Components 13
4.1 Components Morix S and M 13
4.2 Components Morix S-E 14
5 Supply and return pipes 14
5.1 Heating system supply pipe and return pipe 15
5.2 Tap water connection, Morix S-E 15
6 Third-octave band sound levels 16
6.1 Third-octave band sound levels Morix S 16
6.2 Third-octave band sound levels Morix M 17
7 Recommended location 18
8 Evacuation ventilation 20
8.1 Guidelines 20
8.2 Ventilation table 22
8.3 Cascade, ventilation 23
8.4 External fan 24
8.5 Safety valves and automatic vents 26
9 Over view connections BM card 27
10 Sensor connections 28
10.1 Positioning and connecting outdoor sensor 28
10.2 Connecting system supply line sensor 30
10.3 Connecting system return line sensor or exhaust-air battery sensor 31
10.4 Connecting system pump 32
10.5 Connecting reversing valve for tap water and hot water sensors 33
10.6 Connecting Power consumption control 33
10.7 Connecting external alarm relay 35
10.8 Connecting control signal (start/stop) for auxiliary heating 35
10.9 Connecting distribution circuit 1 36

Table of Contents

10.10 Buffer tank 36
10.11 TWC-Tap water control 38

11 Technical data 39
11.1 Technical data table S 400V 39
11.2 Technical data table S-E 400V 41
11.3 Technical data table M 400V 43

12 Envelope 45
12.1 Envelope for Morix S 45
12.2 Envelope for Morix M 47

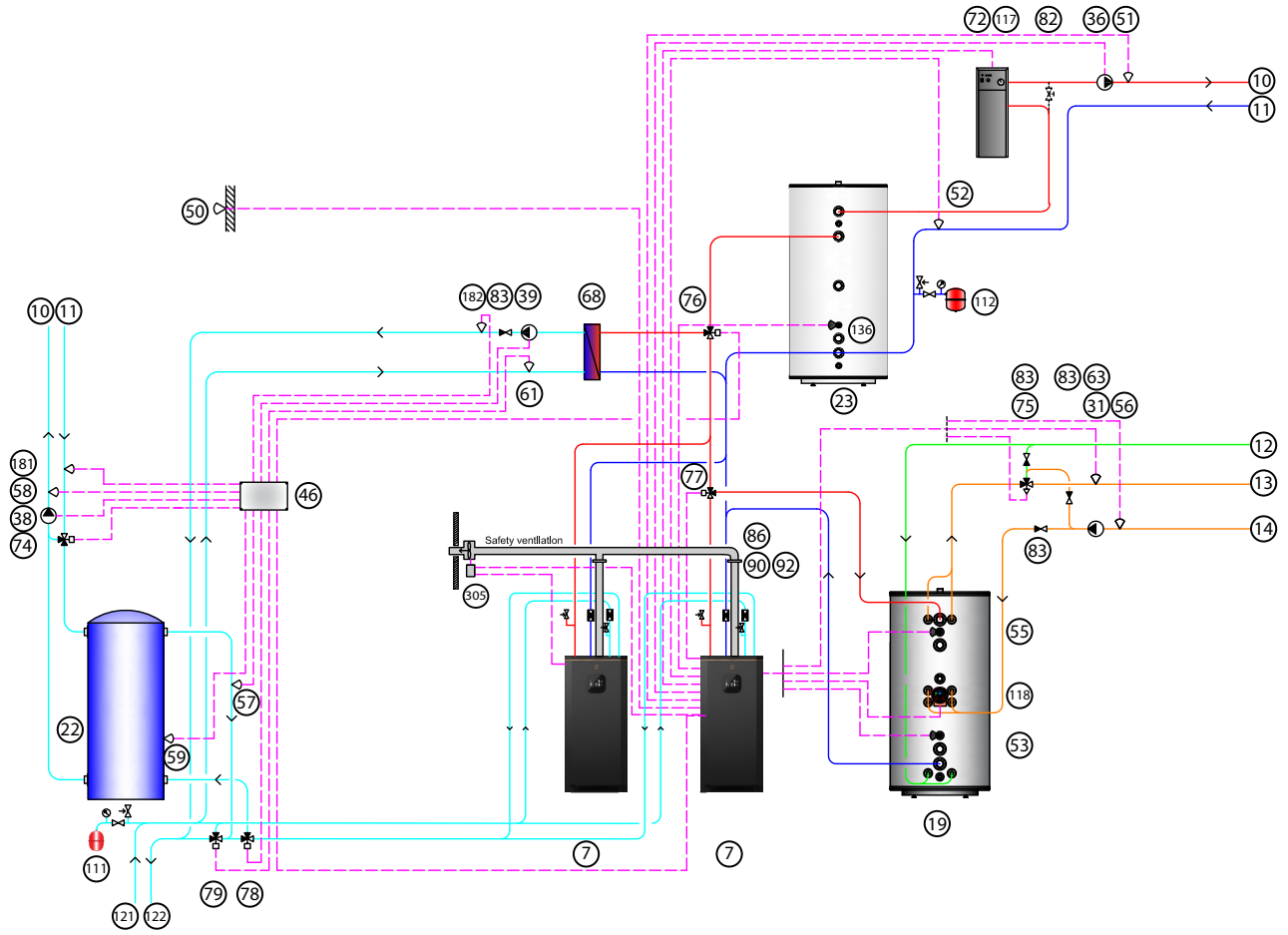
13 Calculated flow/pressure diagrams 49
13.1 Evaporator diagram Morix M 49
13.2 Condenser diagram Morix M 49
13.3 Evaporator diagram Morix S 50
13.4 Condenser diagram Morix S 50

14 Reference output data tables 51
14.1 Reference output data Morix S 51
14.2 Reference output data Morix M 58

15 Estimated current 59
15.1 Estimated current Morix S and S-E 59
15.2 Estimated current for Morix M 59

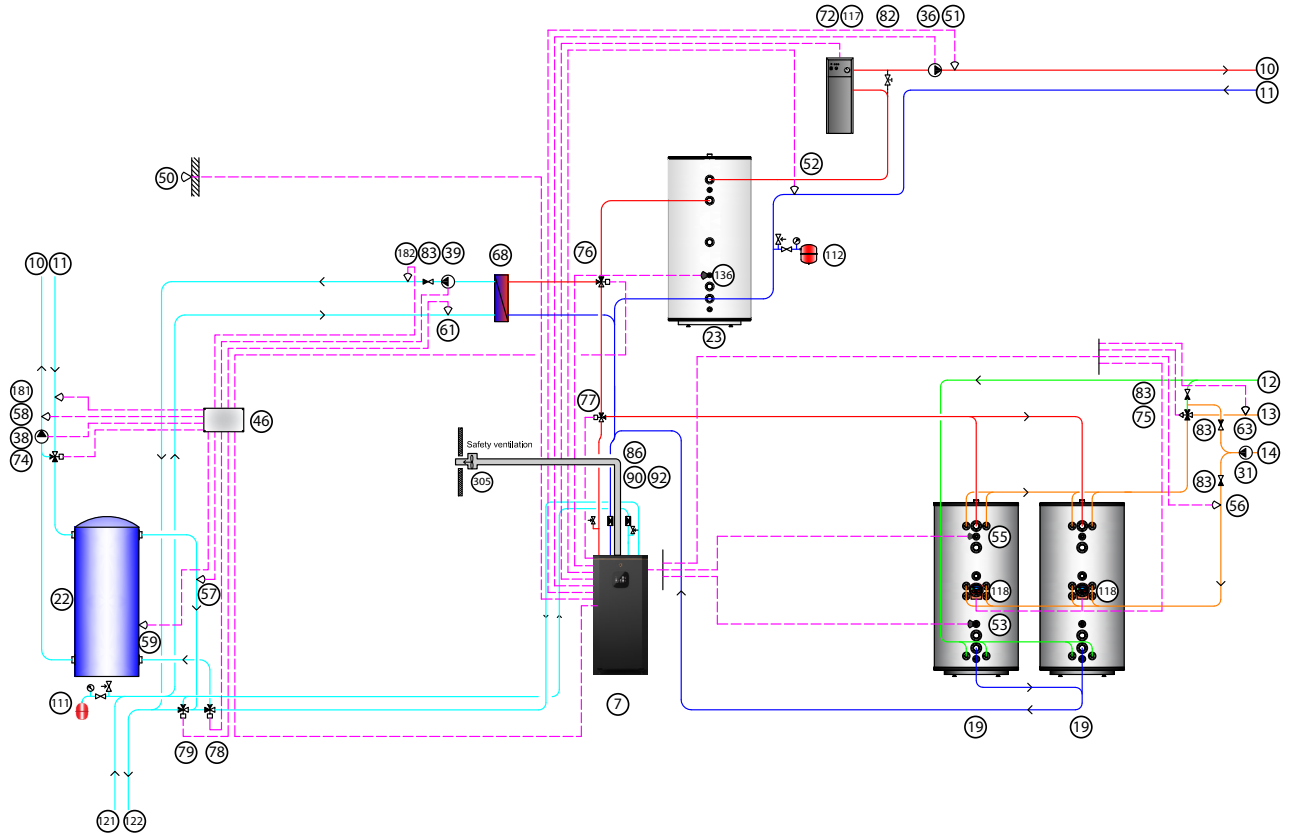
1 System overview

1.1 Two Morix with WT-C and WT-V plus active cooling



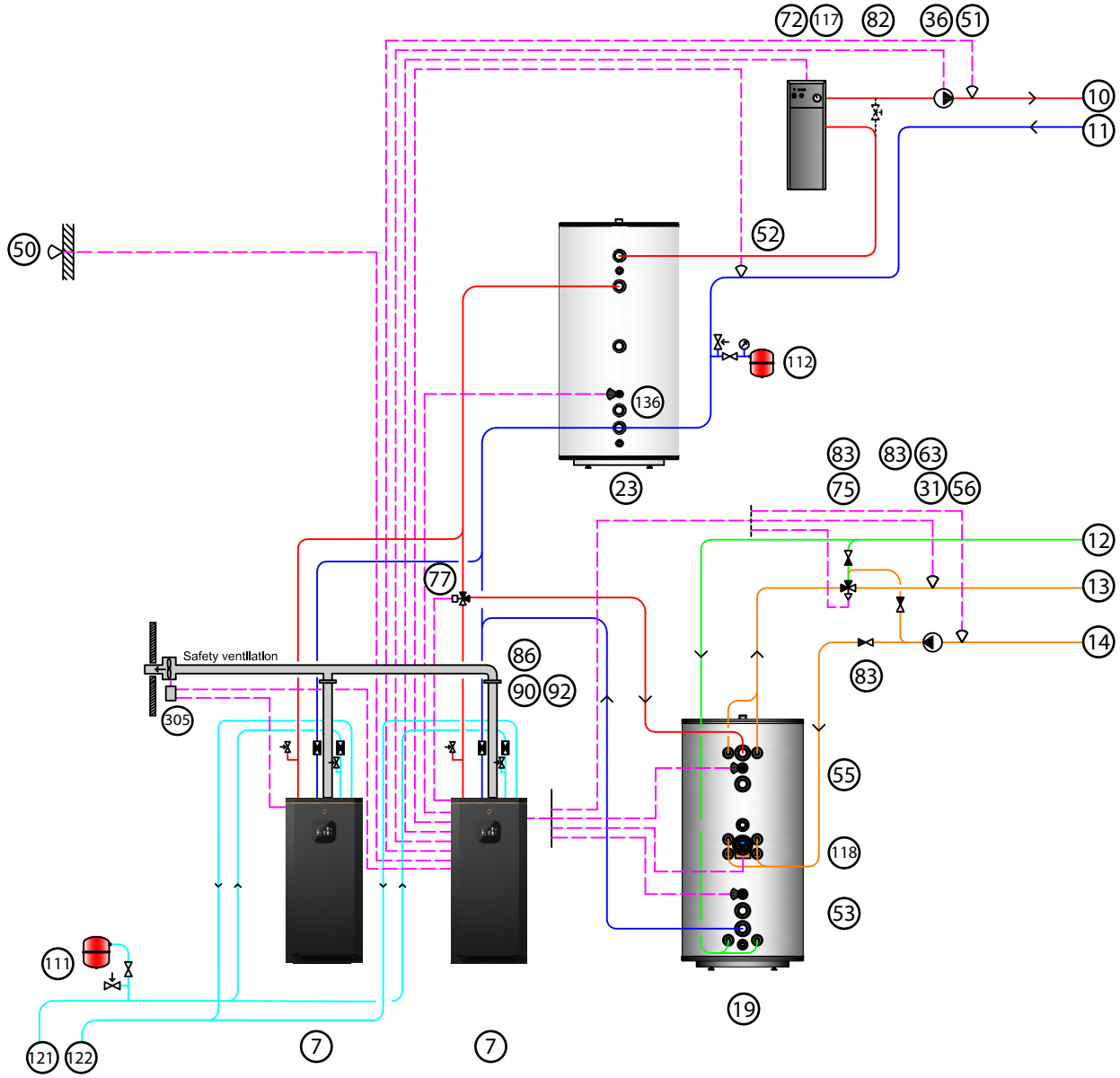
	Description		Description		Description
7	Heat pump	51	System supply line sensor	79	Reversing valve active cooling
10	Heating supply line	53	Hot water lower sensor	82	Adjustment valve
11	Heating return line	55	Hot water top sensor	83	Non-return valve
12	Cold water tap line	56	TWC sensor	86	Safety valve
13	Hot water tap line	57	Return line sensor cooling tank	90	Dirt strainer (condenser)
14	Hot water circulation	58	Supply line sensor cooling circuit	92	Dirt strainer (brine)
19	Hot water storage tank	59	Sensor cooling tank	111	Venting and expansion tank (brine)
21	Buffer tank/Volume tank	61	Return line sensor heat dump	112	Expansion tank
22	Cooling storage tank insulated	63	Mixing valve additional heater	117	Auxiliary heater
23	Storage Tank Heating	68	Surplus Heat exchanger	118	Auxiliary heating anti-legionella
31	Circulation pump (HWC)	72	Ext. aux. heater shunt	121	Brine in
36	Circulation pump (system)	74	Shunt valve cooling circuit	122	Brine out
38	Circulation pump (cooling circuit)	75	Shunt valve, valve HW	136	Buffer tank sensor
39	Circulation pump (heat dump)	76	Reversing valve heat dump	181	Return line sensor (cooling circuit)
46	Cooling Module (HPC-CM)	77	Reversing valve hot water	305	Fan
50	Outdoor sensor	78	Reversing valve cooling		

1.2 Morix with two WT-C and one WT-V plus active cooling



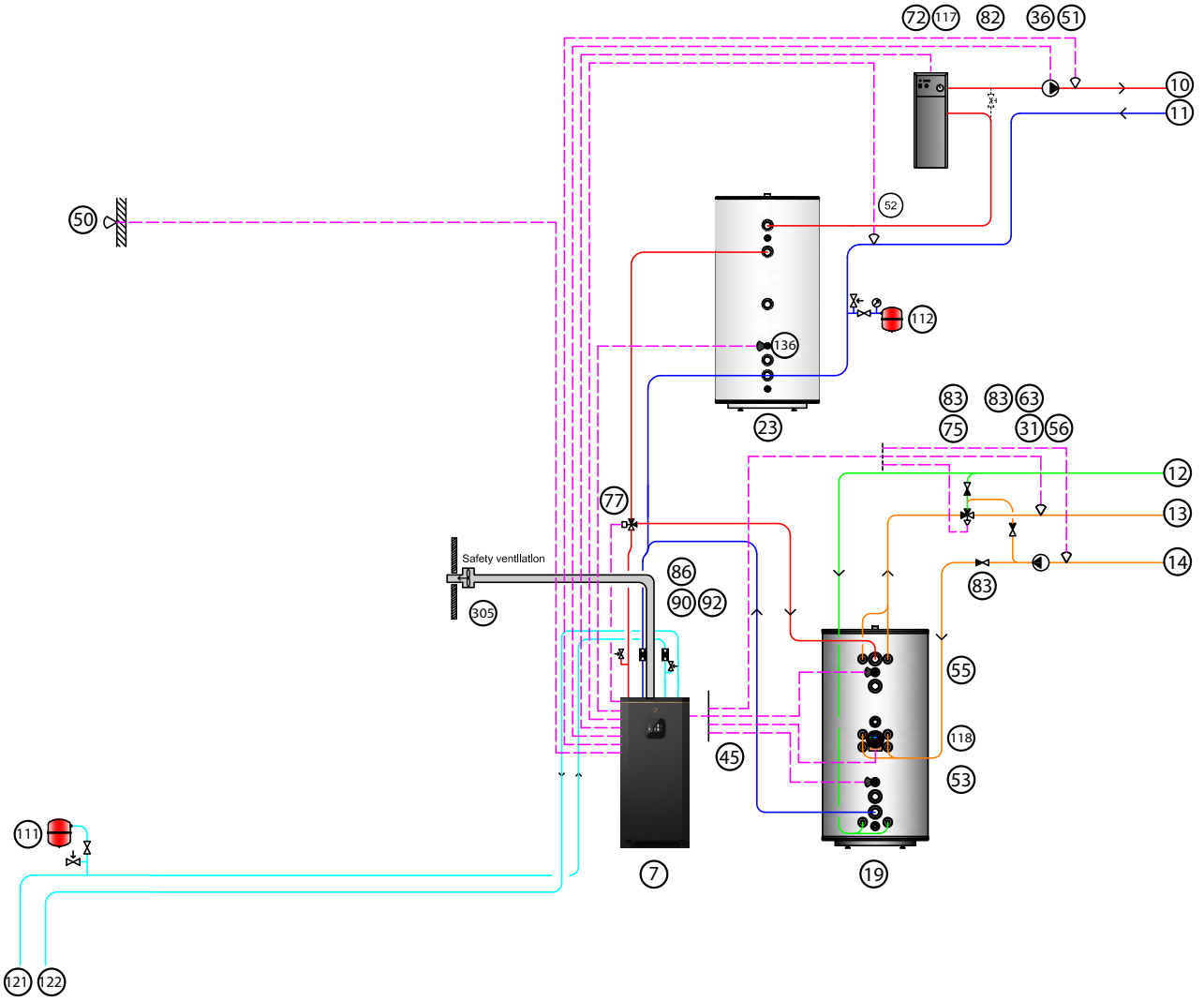
	Description		Description		Description
7	Heat pump	51	System supply line sensor	79	Reversing valve active cooling
10	Heating supply line	53	Hot water lower sensor	82	Adjustment valve
11	Heating return line	55	Hot water top sensor	83	Non-return valve
12	Cold water tap line	56	TWC sensor	86	Safety valve
13	Hot water tap line	57	Return line sensor cooling tank	90	Dirt strainer (condenser)
14	Hot water circulation	58	Supply line sensor cooling circuit	92	Dirt strainer (brine)
19	Hot water storage tank	59	Sensor cooling tank	111	Venting and expansion tank (brine)
21	Buffer tank/Volume tank	61	Return line sensor heat dump	112	Expansion tank
22	Cooling storage tank insulated	63	Mixing valve additional heater	117	Auxiliary heater
23	Storage Tank Heating	68	Surplus Heat exchanger	118	Auxiliary heating anti-legionella
31	Circulation pump (HWC)	72	Ext. aux. heater shunt	121	Brine in
36	Circulation pump (system)	74	Shunt valve cooling circuit	122	Brine out
38	Circulation pump (cooling circuit)	75	Shunt valve, valve HW	136	Buffer tank sensor
39	Circulation pump (heat dump)	76	Reversing valve heat dump	181	Return line sensor (cooling circuit)
46	Cooling Module (HPC-CM)	77	Reversing valve hot water	305	Fan
50	Outdoor sensor	78	Reversing valve cooling		

1.3 Two Morix with one WT-C and one WT-V



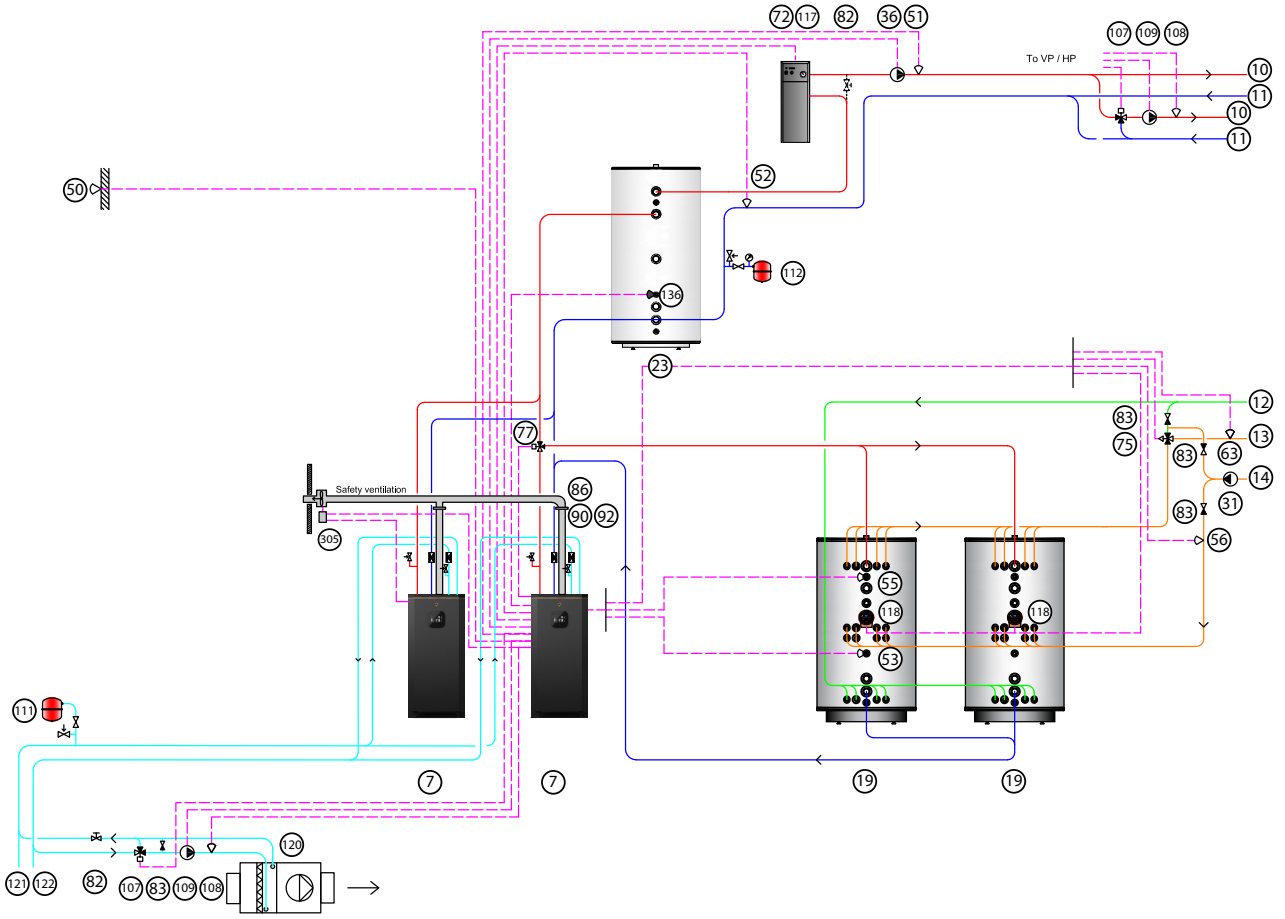
	Description		Description		Description
7	Heat pump	51	System supply line sensor	90	Dirt strainer (condenser)
10	Heating supply line	53	Hot water lower sensor	92	Dirt strainer (brine)
11	Heating return line	55	Hot water top sensor	111	Venting and expansion tank (brine)
12	Cold water tap line	56	TWC sensor	112	Expansion tank
13	Hot water tap line	63	Mixing valve additional heater	117	Auxiliary heater
14	Hot water circulation	72	Ext. aux. heater shunt	118	Auxiliary heating anti-legionella
19	Hot water storage tank	75	Shunt valve, valve HW	121	Brine in
23	Storage Tank Heating	77	Reversing valve hot water	122	Brine out
31	Circulation pump (HWC)	82	Adjustment valve	136	Buffer tank sensor
36	Circulation pump (system)	83	Non-return valve	305	Fan
50	Outdoor sensor	86	Safety valve		

1.4 Morix with one WT-C and one WT-V



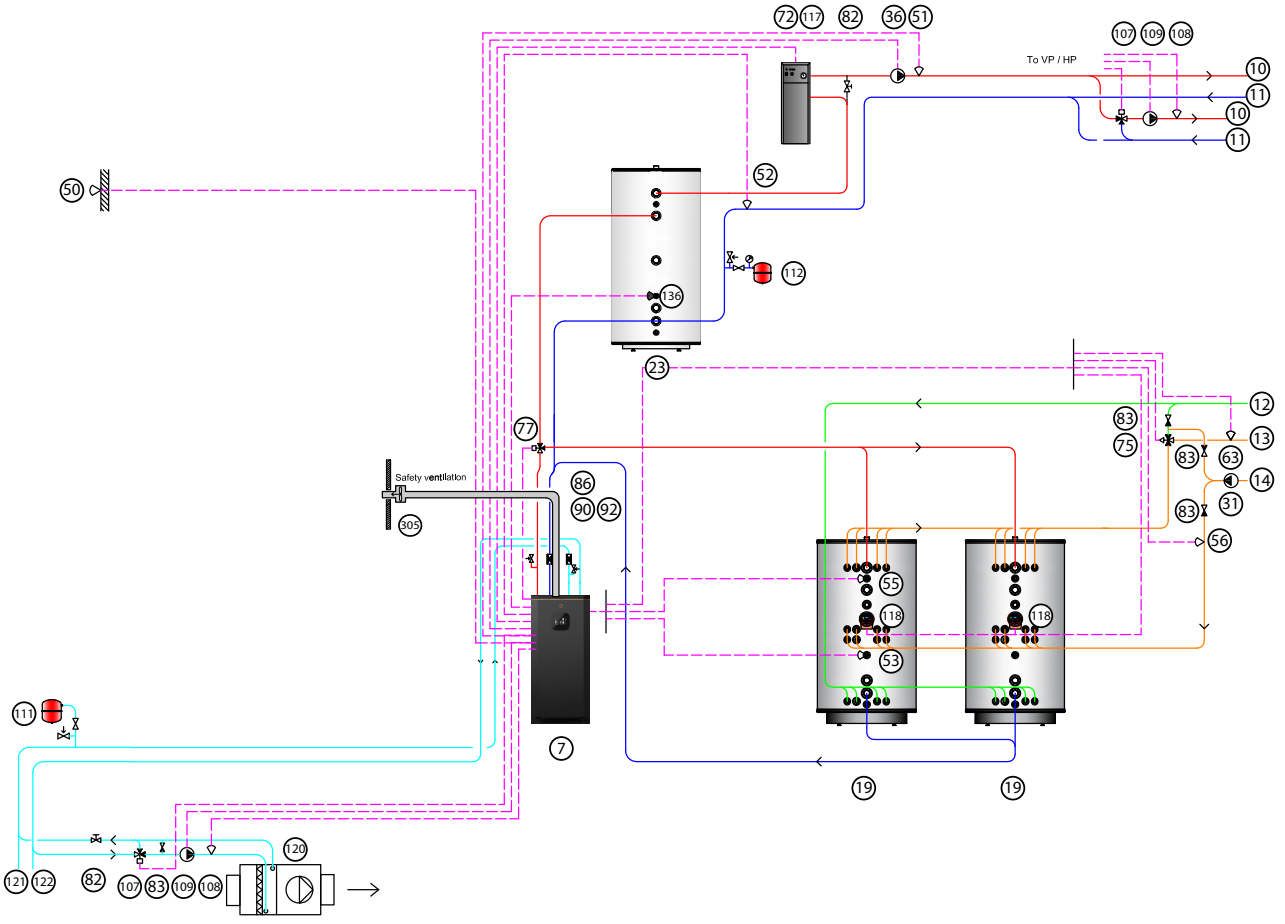
	Description		Description		Description
7	Heat pump	51	System supply line sensor	90	Dirt strainer (condenser)
10	Heating supply line	53	Hot water lower sensor	92	Dirt strainer (brine)
11	Heating return line	55	Hot water top sensor	111	Venting and expansion tank (brine)
12	Cold water tap line	56	TWC sensor	112	Expansion tank
13	Hot water tap line	63	Mixing valve additional heater	117	Auxiliary heater
14	Hot water circulation	72	Ext. aux. heater shunt	118	Auxiliary heating anti-legionella
19	Hot water storage tank	75	Shunt valve, valve HW	121	Brine in
23	Storage Tank Heating	77	Reversing valve hot water	122	Brine out
31	Circulation pump (HWC)	82	Adjustment valve	136	Buffer tank sensor
36	Circulation pump (system)	83	Non-return valve	305	Fan
50	Outdoor sensor	86	Safety valve		

1.5 Two Morix with two WT-C and one WT-V plus exhaust air



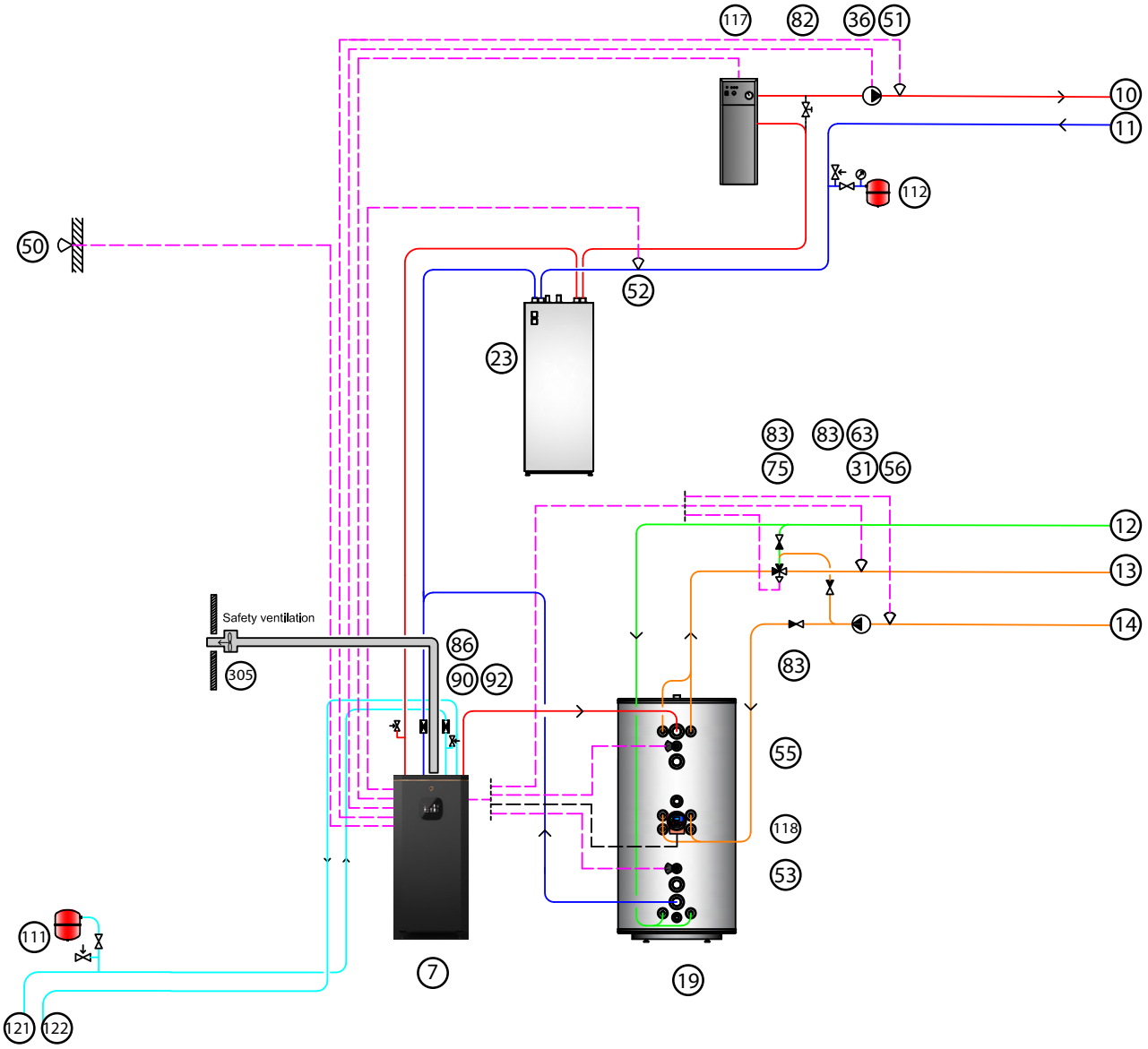
	Description		Description		Description
7	Heat pump	53	Hot water lower sensor	107	Distribution circuit 1, shunt motor + valve
10	Heating supply line	55	Hot water top sensor	108	Distribution circuit 1, supply line sensor
11	Heating return line	56	TWC sensor	109	Distribution circuit 1, circulation pump
12	Cold water tap line	63	Mixing valve additional heater	111	Venting and expansion tank (brine)
13	Hot water tap line	72	Ext. aux. heater shunt	112	Expansion tank
14	Hot water circulation	75	Shunt valve, valve HW	117	Auxiliary heater
19	Hot water storage tank	77	Reversing valve hot water	118	Auxiliary heating anti-legionella
23	Storage Tank Heating	82	Adjustment valve	120	Fan coil
31	Circulation pump (HWC)	83	Non-return valve	121	Brine in
36	Circulation pump (system)	86	Safety valve	122	Brine out
50	Outdoor sensor	90	Dirt strainer (condenser)	136	Buffer tank sensor
51	System supply line sensor	92	Dirt strainer (brine)	305	Fan

1.6 Morix with two WT-C and one WT-V plus exhaust air



	Description		Description		Description
7	Heat pump	53	Hot water lower sensor	107	Distribution circuit 1, shunt motor + valve
10	Heating supply line	55	Hot water top sensor	108	Distribution circuit 1, supply line sensor
11	Heating return line	56	TWC sensor	109	Distribution circuit 1, circulation pump
12	Cold water tap line	63	Mixing valve additional heater	111	Venting and expansion tank (brine)
13	Hot water tap line	72	Ext. aux. heater shunt	112	Expansion tank
14	Hot water circulation	75	Shunt valve, valve HW	117	Auxiliary heater
19	Hot water storage tank	77	Reversing valve hot water	118	Auxiliary heating anti-legionella
23	Storage Tank Heating	82	Adjustment valve	120	Fan coil
31	Circulation pump (HWC)	83	Non-return valve	121	Brine in
36	Circulation pump (system)	86	Safety valve	122	Brine out
50	Outdoor sensor	90	Dirt strainer (condenser)	136	Buffer tank sensor
51	System supply line sensor	92	Dirt strainer (brine)	305	Fan

1.7 Morix S-E with water tank



	Description		Description		Description
7	Heat pump	51	System supply line sensor	111	Venting and expansion tank (brine)
10	Heating supply line	53	Hot water lower sensor	112	Expansion tank
11	Heating return line	55	Hot water top sensor	117	Auxiliary heater
12	Cold water tap line	56	TWC sensor	118	Auxiliary heating anti-legionella
13	Hot water tap line	63	Mixing valve additional heater	121	Brine in
14	Hot water circulation	75	Shunt valve, valve HW	122	Brine out
19	Hot water storage tank	82	Adjustment valve	305	Fan
23	Storage Tank Heating	83	Non-return valve		
31	Circulation pump (HWC)	86	Safety valve		
36	Circulation pump (system)	90	Dirt strainer (condenser)		
50	Outdoor sensor	92	Dirt strainer (brine)		

2 Water quality

Specification for heating water

The water quality must apply to VDI 2035-1 and 2. Regarding dH, use same limits as for condensing wall-hang boilers.

3 Heat pump dimensions and connections

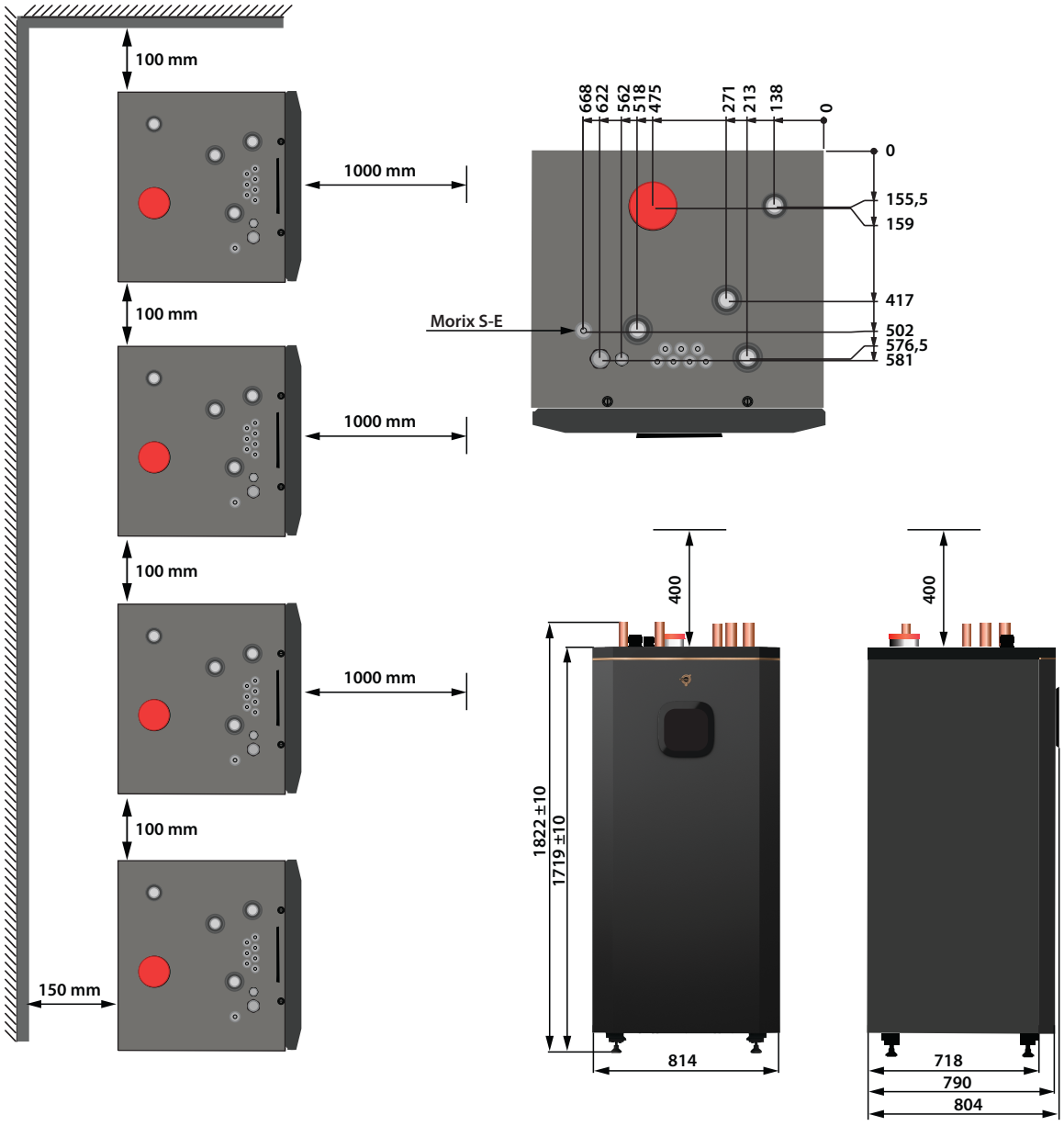
3.1 Minimum free space around the heat pump

To facilitate the installation and subsequent testing and maintenance, there must be sufficient free space around the heat pump.

– Minimum free space on the back 150 mm.

Minimum free space on the side is 100 mm. **Recommended free space** for all models is 500 mm on both the left and the right side, to facilitate any maintenance.

Morix M, S and S-E



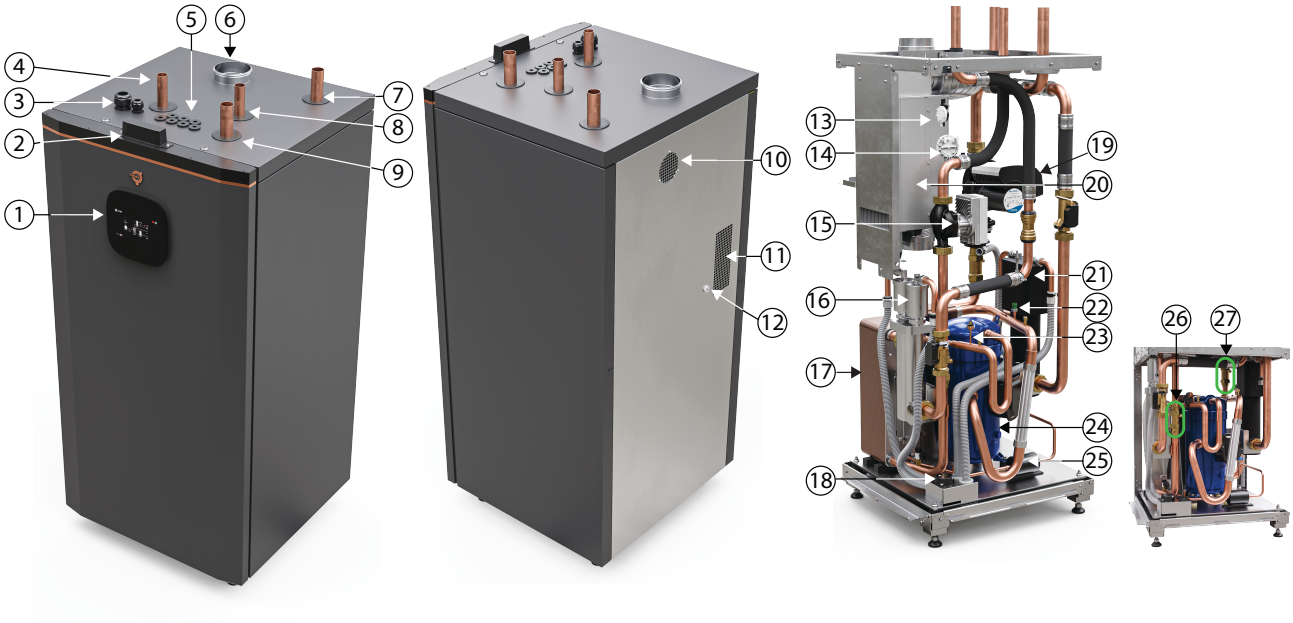
3.2 Setting-up the heat pump

Please note the maximum temperature at the installation site

Model	Maximum temperature at the installation site
Morix S and M	30°C
Morix S-E	Operating with B10W65, or higher, in combined use with the internal immersion 25°C

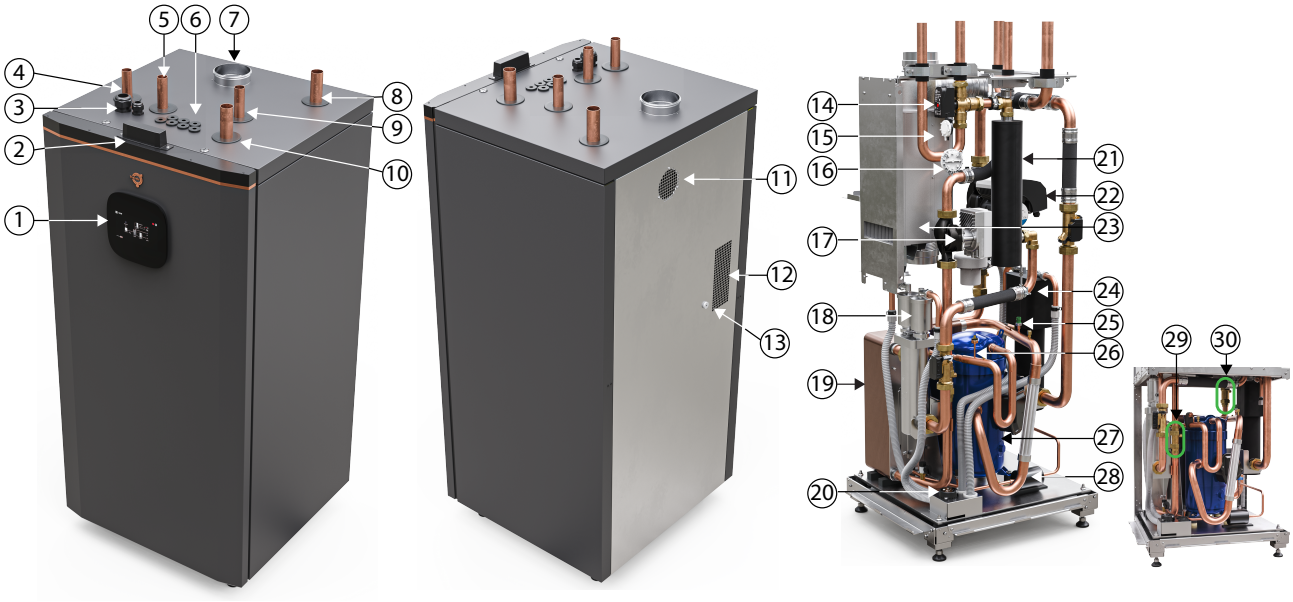
4 Components

4.1 Components Morix S and M



1 Control panel
2 Cover, antenna
3 Lead-in for incoming power supply
4 Supply line heating system
5 Lead-in for incoming power supply
6 Ventilation pipe
7 Brine from heat pump
8 Return pipe, heating system
9 Brine to heat pump
10 Inverter fan air outlet
11 Inverter fan air inlet
12 Differential pressure switch tube
13 Differential pressure transmitter
14 Differential pressure switch
15 Condenser pump
16 Gas separator radiator
17 Condenser
18 Refrigerant sensor
19 Brine pump
20 Inverter
21 Gas separator brine
22 Low pressure transmitter
23 High pressure switch
24 Compressor
25 Drying filter
26 Non-return valve condenser in
27 Non-return valve brine in

4.2 Components Morix S-E



1 Control panel
2 Cover antenna
3 Lead-in for incoming power supply
4 Supply line HWT
5 Supply line heating system
6 Lead-in sensors and communication
7 Ventilation pipe
8 Brine from heat pump
9 Return line heating system
10 Brine to heat pump
11 Inverter fan air outlet
12 Inverter fan air inlet
13 Differential pressure switch tube
14 Mixing valve, heating and tap water
15 Differential pressure transmitter
16 Differential pressure switch
17 Condenser pump
18 Gas separator radiator
19 Condenser
20 Refrigerant sensor
21 Internal immersion heater
22 Brine pump
23 Inverter
24 Gas separator brine
25 Low pressure transmitter
26 High pressure switch
27 Compressor
28 Drying filter
29 Non-return valve condenser in
30 Non-return valve brine in

5 Supply and return pipes

Installation of pipe for heating and brine loop

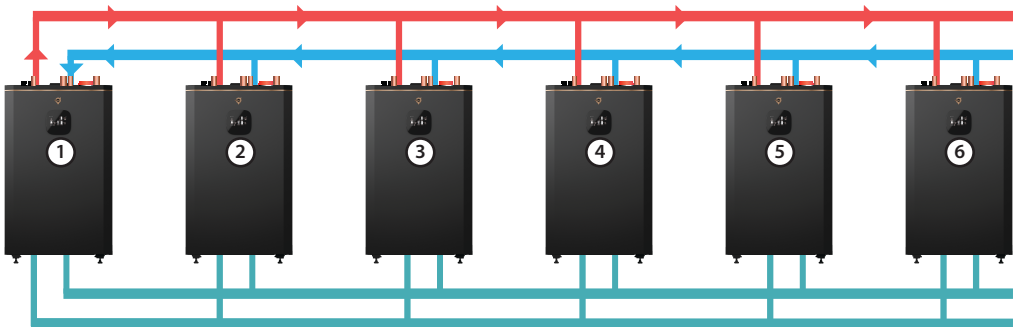
In cascade installations, special consideration should be given to the dimensioning of manifolds. It is not sufficient to base the heat pump connection dimensions for supply and return only.

The manifolds between the heat pumps should be dimensioned with a larger pipe dimension to reduce pressure drop and promote even flow distribution between the units. Such dimensioning contributes to stable operation, good system balance and a reduced risk of imbalance in the system.

It is recommended that the dimensioning is verified by calculation or in consultation with a qualified HVAC consultant or other expert with experience of cascade systems.

For more details see chapter: **Reference output data tables.**

Model	Pipe	Heat pump 1	Heat pump 2	Heat pump 3	Heat pump 4	Heat pump 5	Heat pump 6
Morix S	Copper pipe	35 mm	42 mm				
	Steel pipe						
Morix M	Copper pipe	35 mm	42 mm				
	Steel pipe						



Model	Pipe	Heat pump 1	Heat pump 2	Heat pump 3	Heat pump 4	Heat pump 5	Heat pump 6
Morix S	Copper pipe	42 mm	42 mm				
	Steel pipe						
Morix M	Copper pipe	42 mm	54 mm				
	Steel pipe						

5.1 Heating system supply pipe and return pipe

- Install a filter (max mesh size 0.7 mm) in the heating system's return pipe to protect the unit against foreign particles.
- Install the supply line with all the accompanying components.
- Ensure that the correctly dimensioned system pump is connected to the heating system's supply line, and connect the system pump's control cables to the correct terminal block (see connection of system pump).
- Install the return line with all the accompanying components.
- Insulate the supply and return lines.

5.2 Tap water connection, Morix S-E

If the tap water connection on Morix S-E is not used, it must be plugged with a bleed valve installed.

6 Third-octave band sound levels

6.1 Third-octave band sound levels Morix S

Measurements according to ISO 3741 and EN 12102

Morix S	Min BOW35	Energy Label 35%@BOW55	Max BOW35
f [Hz]	LW, dB	LW, dB	LW, dB
50,0	15,0	17,7	18,0
63,0	25,6	10,1	12,2
80,0	11,3	32,0	14,2
100,0	15,8	21,1	30,3
125,0	27,0	25,1	46,6
160,0	27,5	29,8	30,3
200,0	28,1	31,9	31,6
250,0	30,5	38,9	46,1
315,0	28,1	37,2	40,4
400,0	30,2	40,6	46,8
500,0	24,2	34,8	35,6
630,0	25,7	32,4	34,7
800,0	22,8	29,7	37,2
1000,0	20,2	29,2	37,7
1250,0	20,5	22,5	35,1
1600,0	23,0	25,5	38,2
2000,0	23,2	26,4	36,1
2500,0	24,4	26,1	42,9
3150,0	25,3	26,1	38,3
4000,0	26,6	28,1	38,0
5000,0	32,5	33,1	46,8
6300,0	28,9	29,7	37,5
8000,0	29,9	30,2	34,3
10000,0	32,2	34,7	32,6
A 100 - 10k Hz	**40,9**	**46,4**	**54,3**
C 100 - 10k Hz	**48,0**	**52,9**	**64,0**

6.2 Third-octave band sound levels Morix M

Measurements according to ISO 3741 and EN 12102

Morix M	Min BOW35	Energy Label 35%@BOW55	Max BOW35
f [Hz]	LW, dB	LW, dB	LW, dB
50,0	16,5	24,9	17,3
63,0	19,7	15,5	16,8
80,0	14,5	21,1	21,3
100,0	20,3	38,4	43,5
125,0	21,0	19,4	31,7
160,0	22,7	27,0	27,8
200,0	29,8	23,6	44,5
250,0	28,7	34,3	39,4
315,0	33,0	36,5	41,9
400,0	33,2	38,2	47,9
500,0	26,9	35,7	41,5
630,0	24,8	39,9	37,5
800,0	22,1	33,4	38,5
1000,0	19,7	31,2	36,4
1250,0	20,4	35,4	42,7
1600,0	22,3	42,6	45,0
2000,0	23,0	35,7	38,5
2500,0	24,6	31,3	48,1
3150,0	25,0	39,0	38,2
4000,0	26,7	32,3	40,6
5000,0	34,0	28,1	42,6
6300,0	27,5	27,7	32,4
8000,0	28,0	28,1	30,3
10000,0	30,4	28,6	30,9
A 100 - 10k Hz	**41,3**	**48,9**	**55,2**
C 100 - 10k Hz	**47,5**	**58,2**	**64,1**

7 Recommended location

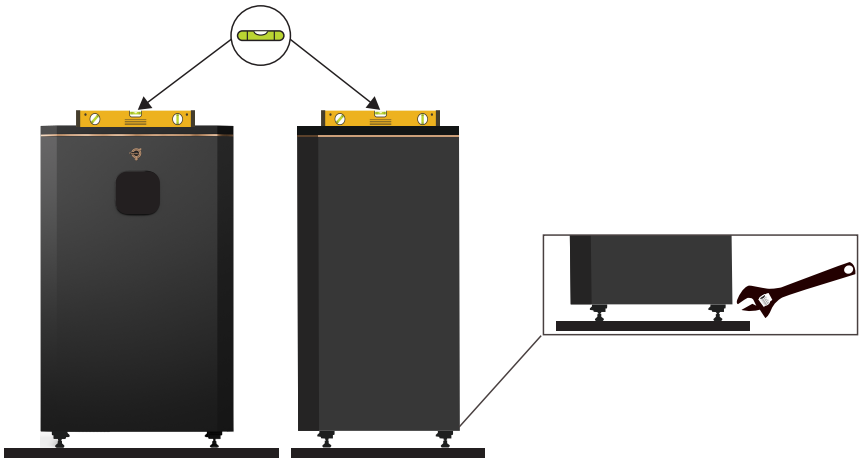
Positioning the heat pump

Prior to the installation of the heat pump, the installation space shall be assessed with regard to noise and vibration impact. Heat pumps can generate both airborne noise and structure-borne noise through transmitted vibrations, which may affect adjacent areas.

This is partly due to the fact that the unit operates across a range of frequencies, depending on load and operating conditions. Variations in operating frequency can result in changes in both noise characteristics and vibration levels, potentially leading to resonance effects in surrounding structures.

Consideration should be given when the unit is in or beneath noise-sensitive spaces such as bedrooms and living rooms. Where there is any uncertainty regarding the conditions, acoustic expertise shall be engaged to assess and define any necessary mitigation measures. Recommendations and examples of noise and vibration mitigation measures are provided in this documentation and shall be considered during the design phase.

- The heat pump should preferably be placed against an outside wall.
- Do not place the heat pump against walls facing noise-sensitive areas.
- Avoid placing the heat pump in the corner of a room.
- If possible, choose a location where the surfaces nearest the heat pump are soft. Avoid placing the heat pump close to large plastered or tiled areas.
- The heat pump is fitted with internal vibration isolation. However, the degree of vibration isolation achieved depends on the bearing strength of the floor. In order to achieve adequate vibration isolation, the heat pump should be placed on a concrete floor with a thickness of at least 100 mm, or another surface with equivalent characteristics.
- In order to minimize noise generation from the heat pump, the sound blocker base (included) should be fitted when the heat pump has been put into position.
- The heat pump must be placed in an area with a floor drain (so any condensation may drain from the condensation hole in the bottom of the unit).
- The heat pump must be level. Make sure to adjust feet in a way that the pump stands steady. If the feet is not adjusted correctly it could cause some unwanted noise. Do the adjustment with the heat pump running on its most critical gear.



Noise and vibration

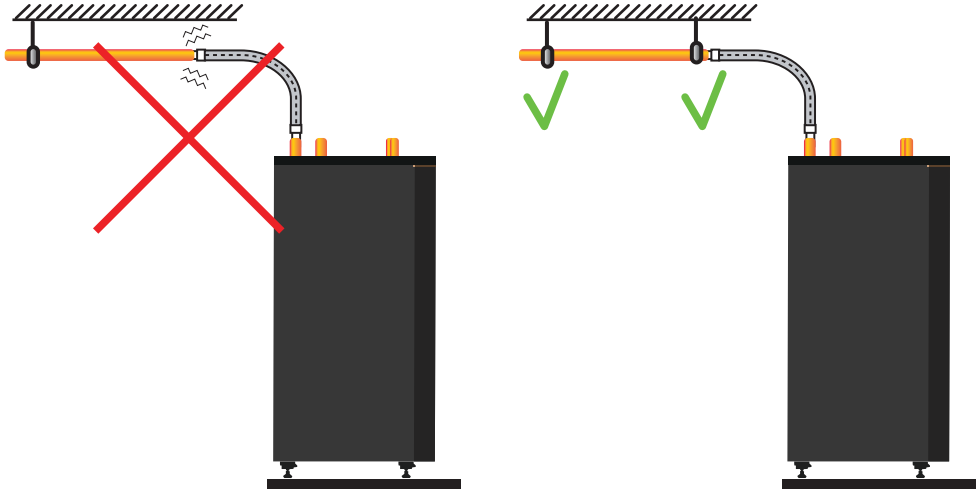
To prevent disturbing noise and vibrations from the heat pump, the following recommendations should be observed:

- In order to reduce the noise level inside the heat pump room, sound absorptive panels can be attached to the walls and ceiling.
- In order to reduce the noise level in adjacent rooms, reinforce the sound reduction of the heat pump room walls.
- Seal all openings from the heat pump room with air-tight material.
- Sound-dampen any joint ventilation chambers leaving the room.
- If necessary, change doors and windows to models with higher sound reduction.
- The brine and heat transfer fluid should normally be connected to the heat pump by means of a flexible hose.
- Pipes must not be attached to roofs or walls facing noise-sensitive areas.
- In cases where attachment of pipes to sensitive construction elements cannot be avoided, special elastic pipe attachments should be used.
- Not correctly adjusted feet, can cause unwanted noise.

Vibration and structure-borne sound

Structure-borne sounds can be dealt with by isolating the heat pump as much as possible from contact with sound-sensitive parts of the framework of the building.

- If there are problems with specific frequencies, this can be adjusted in the display by tuning the actual gear. 50-100 rpm in either direction can make a significant improvement.
- Use flexible hoses between the heat pump and the radiator and brine system.
- The heat pump's pipe connections cause vibration. In order to prevent this vibration spreading to the heating system and frame, the pipes should be connected and laid with particular care.
- Extra weight attached tight to a pipe, or other vibrating parts, can change and dampen the vibration output due to the energy loss during the transfer to the added mass. The vibrating frequency will likely move to a lower range. Make sure to examine other gears of the compressor after making changes.



Floor preparations

The heat pump is equipped with an internal insulation for vibrations and can therefor, in normal cases, be placed directly on the floor without taking further measures. If the heat pump is to be placed on a more sensitive floor, i.e. a wooden floor or a thinner concrete floor, some preparations might have to be made, to prevent a distribution of unwanted vibrations. See text and illustrations below.

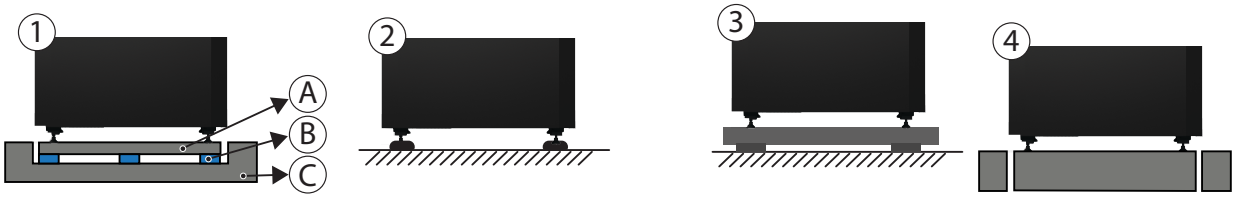
1. For installations with a very thick concrete slab, an alternative solution is to install an elastic element between the lower concrete slab and the floating concrete slab, as shown in the illustration. Consult the manufacturer of the acoustic isolation elements for correct selection and dimensioning based on the floor thickness and the weight of the heat pump.

   A, Floating concrete slab

   B, Elastic element

   C, Concrete slab
2. Elastic shims can be placed under the feet of the heat pump, with a thickness of at least 4-6mm, depending on the weight of the heat pump.
3. In extra sound sensitive spaces, a concrete base can be placed on top of elastic shims on the floor.
4. As an alternative, the section of the concrete slab supporting the heat pump can be structurally separated from the surrounding concrete floor.

   NOTE! Before performing this modification, take a core sample to verify the construction of the concrete floor and the underlying substrate.



8 Evacuation ventilation

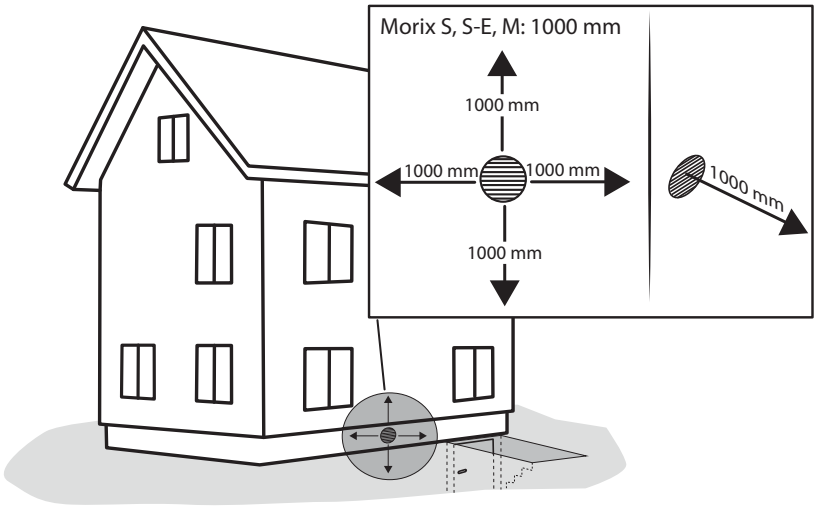
This heat pump requires the heat pump to be ventilated to an outdoor environment. Lead the ventilation duct on the top of the heat pump to the outside of the house.

The ventilation duct must not be connected to any other function, and be independent from any other ventilation systems in the building.

The area next to the end of the ventilation outlet on the outside is an Ex Zone 2 classified space. No ignition- or open flame sources can be any closer than 1m to the ventilation outlet. Make sure that there is no risk of the outlet being blocked by snow, ice, leaves or any other debris. Install the outlet according to local height recommendations, especially when it comes to snow depth.

The refrigerant has a higher density than air. In the event of leaks, escaping refrigerant can accumulate near the ground. Accumulations of refrigerant (e.g. in cavities) can lead to a dangerous, explosive, asphyxiating or toxic atmosphere.

- The refrigerant must not enter the interior of the building through openings.
- The refrigerant must not enter the drain network
- Avoid cavities > 0.5 m³ in which the refrigerant can accumulate.



Model	Unit	Ex Zone 2 radius
Morix S, S-E, M	mm	1000

8.1 Guidelines

It is required that the cabinets ventilation system debauch outdoors, otherwise the installation is not approved as a closed ventilated cabinet. This is done by connecting the plug (125mm) to the top of a ventilation duct. The duct must not be connected to any other function, and be independent from the facility's ventilation system. The venting must debouch in a place without any sources of ignition and where the risk of leaking refrigerant is minimized.

Requirements

The heat pump is designed as a ventilated enclosed system that includes:

- **Detecting system**
- **Refrigerant sensor**
- **Differential pressure switch**

This means:

- **Cabinets ventilation system must debauch outdoors!**
- **External fan must installed, controlled by the heat pump.**

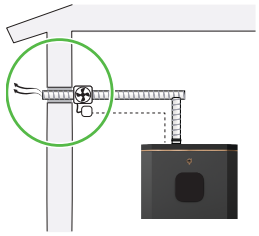
ATEX classified external fan

The exhaust fan must be Ex-rated and suitable for installation in ATEX Zone 2. This appliance is charged with R290, a highly flammable refrigerant and in the event of a leakage it may cause an explosive atmosphere if it is mixed with the right amount of air. To minimize this risk the external fan is used to ensure sufficient ventilation and abduction of refrigerant leakage.

Since the fan may be used in or affect an area where an explosive atmosphere may occur, it must be suitably designed for the relevant explosive environment, therefore the requirement for an ATEX-classified fan applies.

Placement, external fan

The external evacuation fan should be placed as close as possible to the ventilation outlet point at the external wall. This minimize the part of the evacuation system that is placed at the fans pressure side and thereby shortens the pipe length where refrigerant/air mixture is transported during over pressure.



Any leakage in a pressurized pipe section may lead to the release of a refrigerant/air mixture into the surrounding environment.

For a suction fan, the major portion of the piping system is situated on the suction side. Consequently, any minor leakage in this section of the system will primarily cause air ingress into the system rather than the release of a refrigerant/air mixture into the surrounding area.

Locating the fan close to an external wall is therefore a risk-reduction measure, as it minimizes the length of the pressurized pipe section and thereby reduces the risk that any leakage could result in the release of an explosive refrigerant/air mixture into surrounding areas. This helps to limit the risk of the formation of an explosive atmosphere outside the intended evacuation system.

The ventilation system must be connected and installed in a professional manner that ensures that leakage of air and leaked refrigerant does not leak from the duct into the room. Joints must be sealed. The ventilation ducts must be well suspended. Ducts in ventilation systems must be of at least Class B according to PN EN 12237:2005

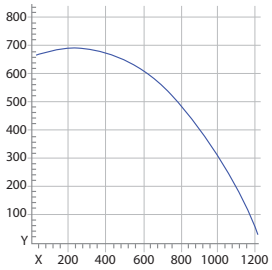
8.2 Ventilation table

Ventilation tables for Morix S, S-E and M

The tables below should be viewed as a general guide. The recommendation is to always make a flow and pressure drop calculation for each individual installation to get the correct length and dimension of the ventilation pipes. It is of most importance to check the manufacturer's data (pipes, bends, check valves and grilles, etc.) to get the correct information regarding flows and pressure drops, as this can differ between different manufacturers.

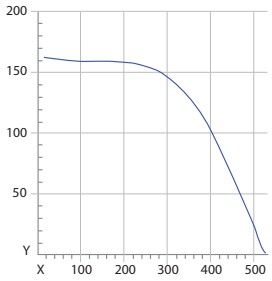
RFTX 400V and **RFEX 230V** fans are available as Thermia accessories. For other fans, refer to **Table 3** for the required dimensions.

1. Dimension table for fan RFTX 400V

Fan: RFTX 400V	Unit	1 unit	2 units	3 units	4 units
	Available pressure (Pa)	650	650	650	650
		Maximum pipe length, end system (m)			
	4 bends	70+	70+	70+	70+
	6 bends	70+	70+	70+	70+
	8 bends	70+	70+	70+	70+
	10 bends	70+	70+	70+	70+
	12 bends	70+	70+	70+	70+

Y: External static pressure (Pa) **X**: Air flow (m^3/h)

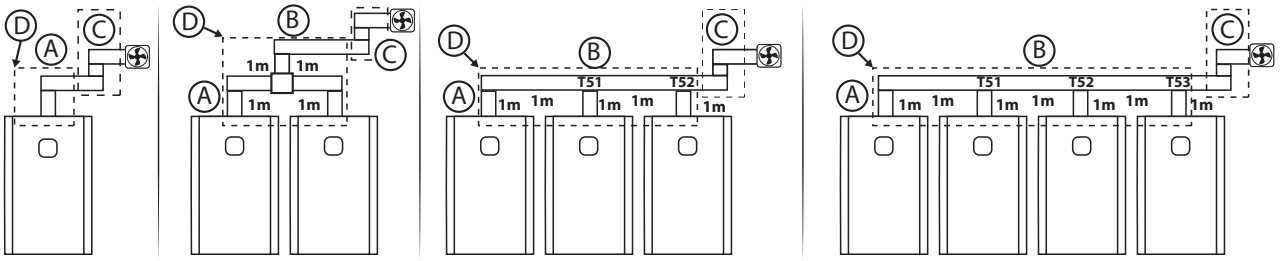
2. Dimension table for fan RFEX 230V

Fan: RFEX 230V	Unit	1 unit	2 units	3 units	4 units
	Available pressure (Pa)	160	158	158	155
		Maximum pipe length, end system (m)			
	4 bends	70+	70+	48	17
	6 bends	70+	70+	42	12
	8 bends	70+	70+	37	7
	10 bends	70+	70+	31	-
	12 bends	70+	70+	25	-

Y: External static pressure (Pa) **X**: Air flow (m^3/h)

3. Dimension table for fan

Description	Unit	1 unit	2 units	3 units	4 units
Flow	m^3/h	65	130	195	260
Internal pressure heat pump	Pa	60	60	60	60
External pressure loss, manifold	Pa	27	38	47	58
Pipe (Pa/m) End system, pressure loss	Pa/m	0,4	0,4	0,9	1,3
Bend (Pa/st) End system, pressure loss	Pa/st	0,88	1,2	2,5	3,5
Total pressure heat pump + manifold	Pa	87	98	107	118

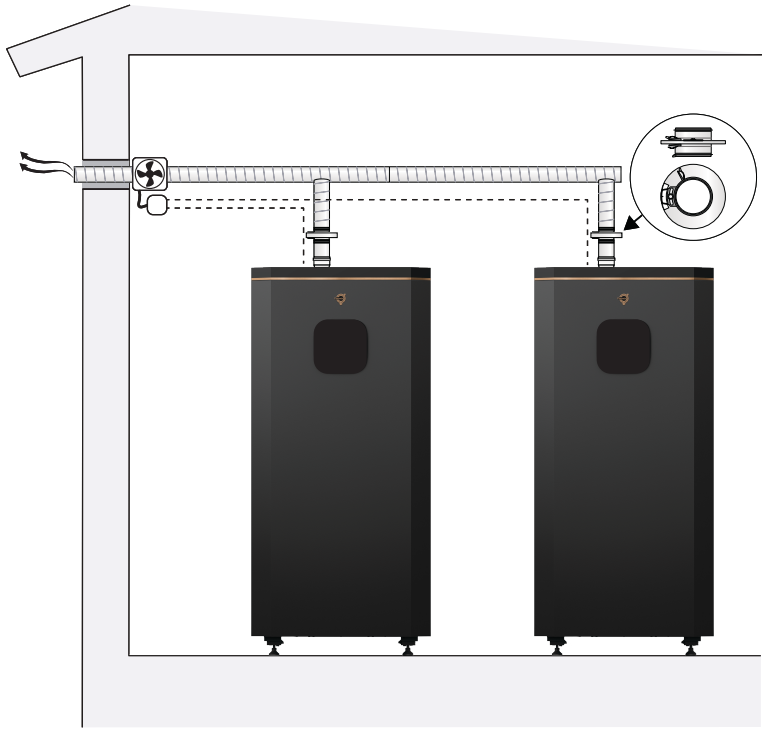


A: **Ø** 125 mm **B**: **Ø** 160 mm **C**: End system **D**: Manifold

8.3 Cascade, ventilation

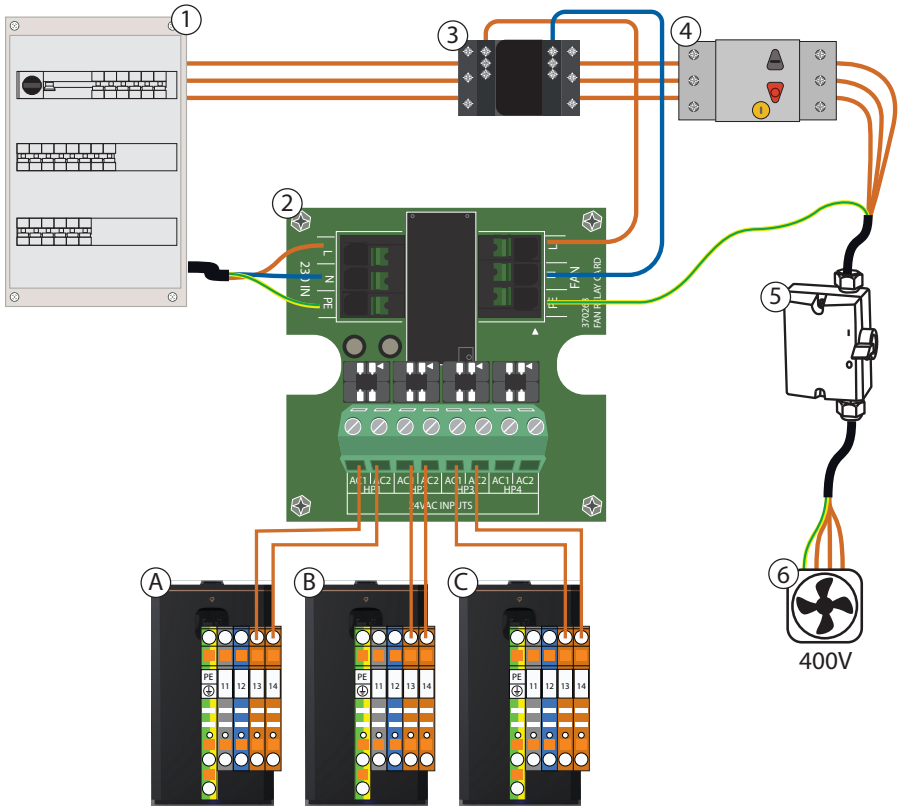
When installing several heat pump units, same ventilation duct can be used as shown in the picture or alternatively individual ventilation drums. If the ventilation system is cascaded, adjustment valves must be installed in the system according to the picture, to align the flow between the heat pumps.

Cascade installation

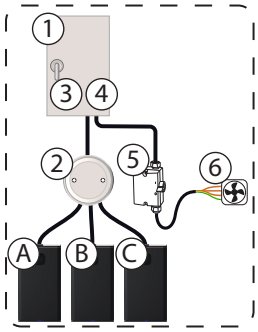


8.4 External fan

Connecting an external 400V fan to the fan relay card, cascade installation – schematic illustration



Overview image



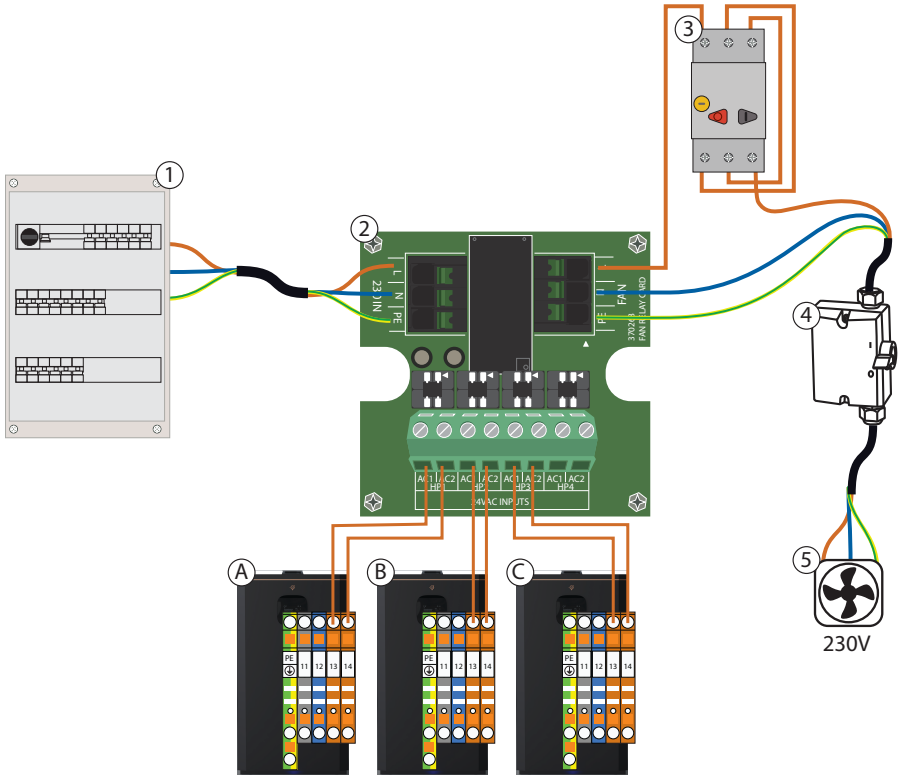
1. Electrical distribution board
2. Fan relay card
3. Contactor
4. Motor protection circuit break
5. Safety switch
6. Fan 400V, 276W

Caution

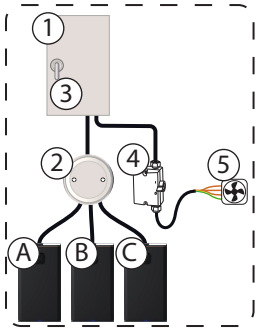
It is required that the cabinets ventilation system debauch outdoors, otherwise the installation is not approved as a closed ventilated cabinet.

Terminal heat pump	Terminal External fan module	Description
13	AC1	Unit A
14	AC2	
13	AC1	Unit B
14	AC2	
13	AC1	Unit C
14	AC2	

Connecting external 230V fan to Fan relay card, cascade installation – schematic illustration



Overview image



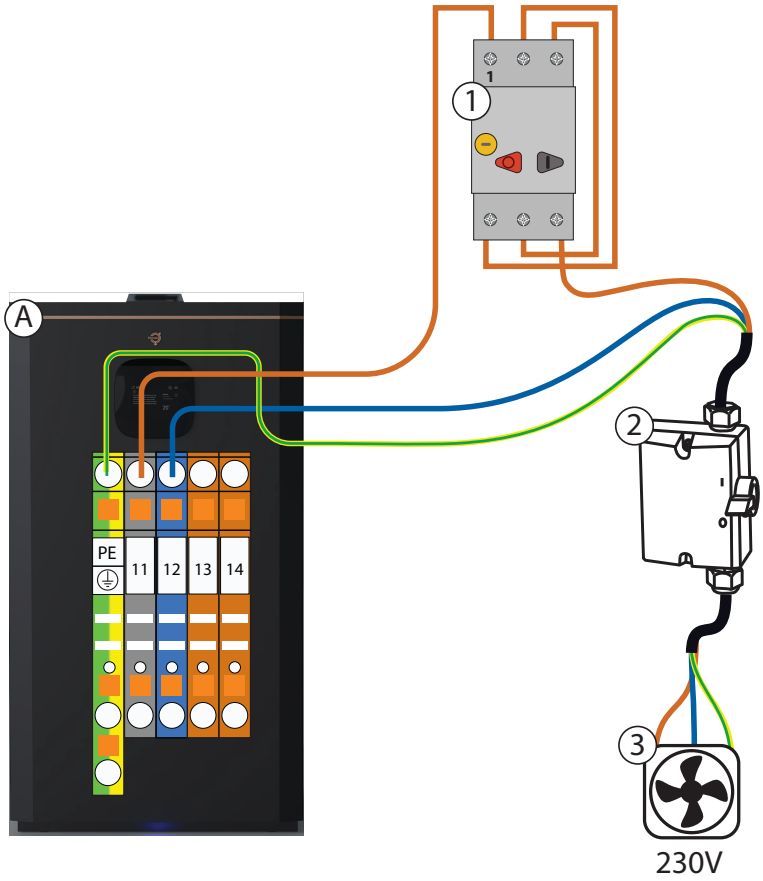
1. Electrical distribution board
2. Fan relay card
3. Motor protection circuit break
4. Safety switch
5. Fan 230V, 175W

Caution

It is required that the cabinets ventilation system debauch outdoors, otherwise the installation is not approved as a closed ventilated cabinet.

Terminal heat pump	Terminal External fan module	Description
13	AC1	Unit A
14	AC2	
13	AC1	Unit B
14	AC2	
13	AC1	Unit C
14	AC2	

Connecting external 230V fan, single installation – schematic illustration



1. Heat pump terminal
2. Motor protection circuit break
3. External fan 230V, 175W

Caution

It is required that the cabinets ventilation system debauch outdoors, otherwise the installation is not approved as a closed ventilated cabinet.

Terminal connections heat pump	Heat pump
PE	Unit A
11	
12	

8.5 Safety valves and automatic vents

Thanks to built-in gas separators, the refrigerant will be separated before the liquid leave the heat pump, no refrigerant will reach the heating or brine system and therefore there is no requirements for safety valves and automatic vents to be lead out from the building.

All secondary circuits must be equipped with safety valves and automatic detectors with outlets that ensures that no leaked refrigerant ends up indoors. Consider local and national regulations.

Ventilation led outside

9 Over view connections BM card

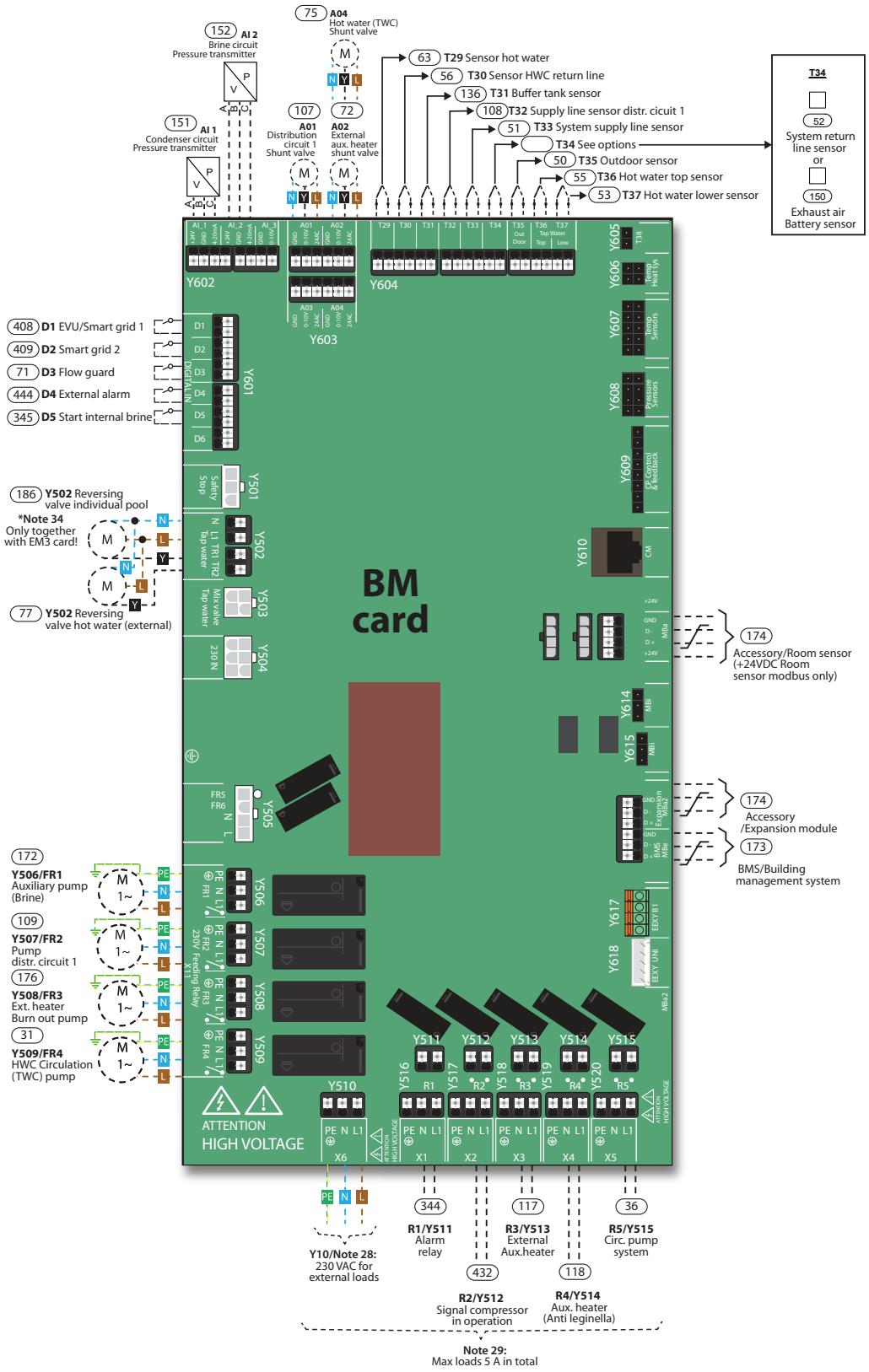


Table item number	Terminal	Description
31	Y509/FR4	HWC Circulation (TWC) pump
176	Y508/FR3	Ext. heater Burn out pump
109	Y507/FR2	Pump distribution circuit 1

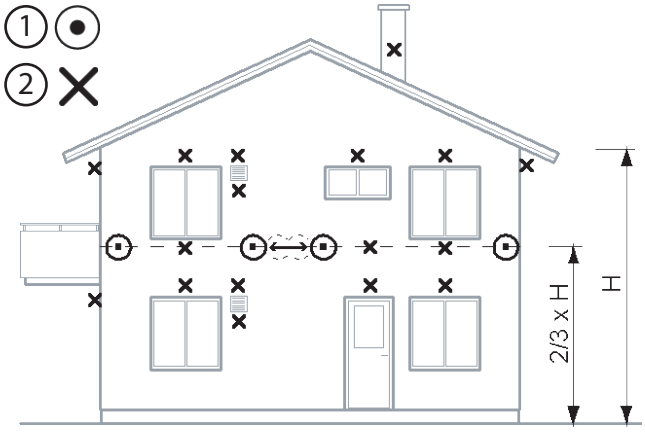
Table item number	Terminal	Description
172	Y506/FR1	Auxiliary pump (Brine)
77	Y502	Reversing card valve hot water (external)
186	Y502	Reversing valve individual pool. Note 34 Only together with EM3 card!
345	D5	Start internal brine
444	D4	External alarm
71	D3	Flow guard
409	D2	Smart grid 2
151	AI 1	Condenser circuit Pressure transmitter
152	AI 2	Brine circuit Pressure transmitter
107	A01	Distribution circuit 1 Shunt valve
72	A02	External auxiliary heater shunt valve
75	A04	Hot water (TWC) Shunt valve
63	T29	Sensor hot water
56	T30	Sensor HWC return line
136	T31	Buffer tank sensor
108	T32	Supply line sensor distribution circuit 1
51	T33	System supply line sensor
52/150	T34	System return line sensor/Exhaust air Battery sensor
50	T35	Outdoor sensor
55	T36	Hot water top sensor
53	T37	Hot water lower sensor
174	MBa	Accessory/Room sensor (+24VDC Room sensor modbus only)
174	MBa2	Accessory/Expansion module
173	MBe	BMS/Building management system
36	R5/Y515	Circulation pump system. Max loads 5 A in total
118	R4/Y514	Auxiliary heater (Anti leginella). Max loads 5 A in total
117	R3/Y513	External auxiliary heater. Max loads 5 A in total
432	R2/Y512	Signal compressor in operation. Max loads 5 A in total
344	R1/Y511	Alarm relay. Max loads 5 A in total
	Y10	230 VAC for external loads. Max loads 5 A in total

10 Sensor connections

This chapter describes the most common connections of sensors and relays that can be used with this heat pump. See the Wiring Diagram for a complete map of connections.

10.1 Positioning and connecting outdoor sensor

1. Proper placement
2. Improper placement



The outdoor sensor is connected by a two core cable. A maximum cable length of 50 m applies for a cross section of 0.75 mm2. For greater lengths a cross section of 1.5 mm2 is used, up to a maximum of 120 m.

Position the outdoor sensor on the north or north west side of the house.

Note

For high buildings, the sensor should be positioned between the second and third storey. Its location must not be completely protected from the wind but not in a direct draft. The outdoor sensor should not be placed on reflective panel walls.

Note

The sensor must be positioned at least 1 m from openings in the walls that emit hot air.

Note

If the sensor cable is connected through a pipe, the pipe must be sealed so that the sensor is not affected by outgoing air.

Note

The outdoor sensor must be of PT1000 type.

Connecting outdoor sensor

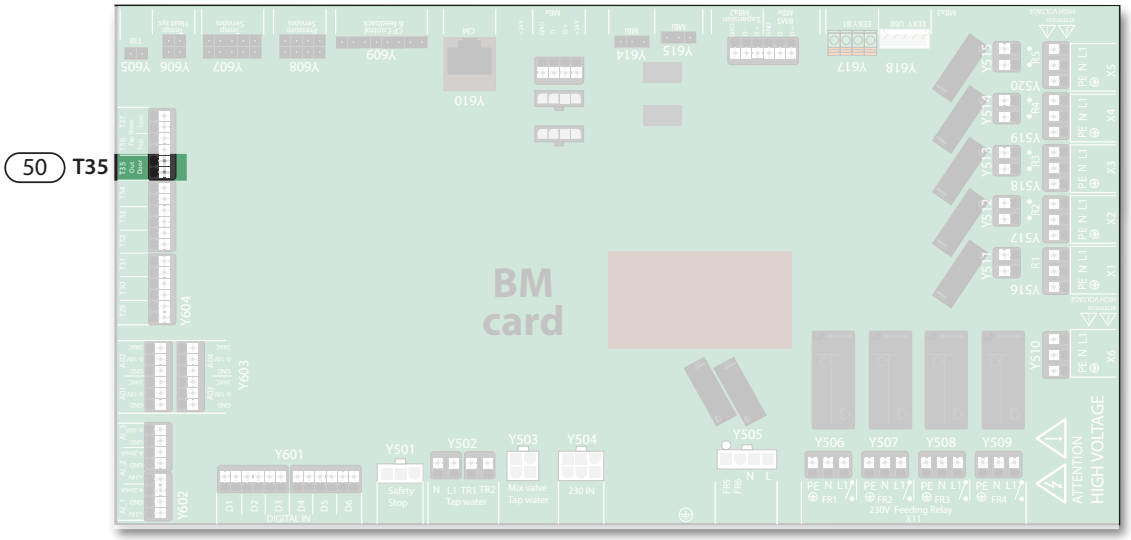


Table item number	Terminal	Description
50	T35	Outdoor sensor

10.2 Connecting system supply line sensor

The system supply sensor must always be installed on the system's supply line after the auxiliary heating. The sensor must be positioned so that the hot water is mixed properly before passing the sensor.

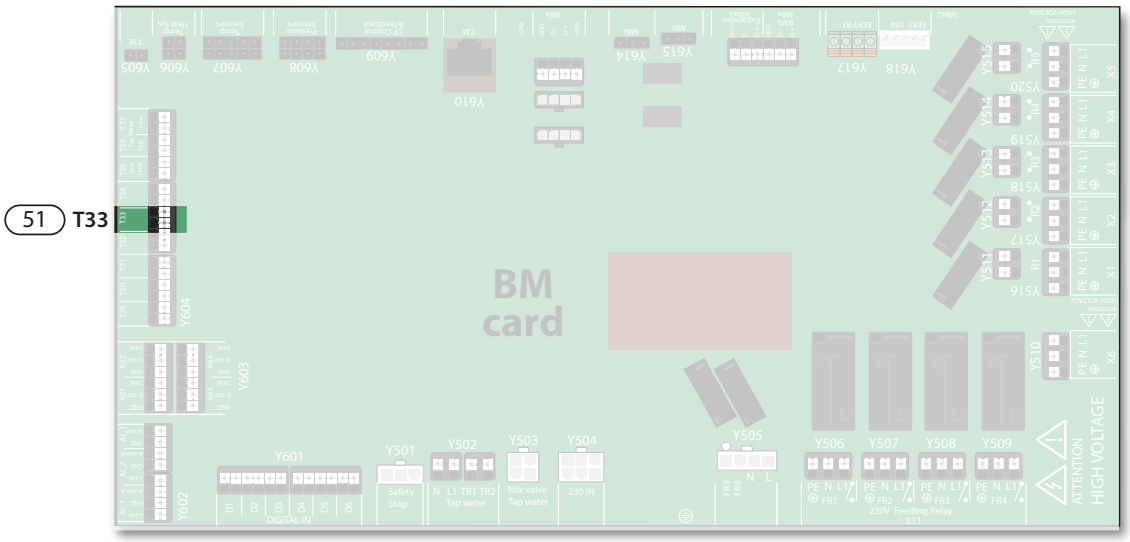


Table item number	Terminal	Description
51	T33	System supply line sensor

10.3 Connecting system return line sensor or exhaust-air battery sensor

Depending on the design of the heating system it is possible to connect a system return line sensor as an accessory. This sensor is placed on the return line of the system before it goes back to the heat pump.

The system return line sensor is optional but recommended, as it further improves heat demand calculation (derivative control) and condenser pump speed control. The sensor is enabled separately. For example, it helps manage situations where system circuits close or where pressure-controlled system pumps reduce their speed.

Check the box on the electrical label sheet (placed inside on the electrical cabinet door) on what of the options is used.

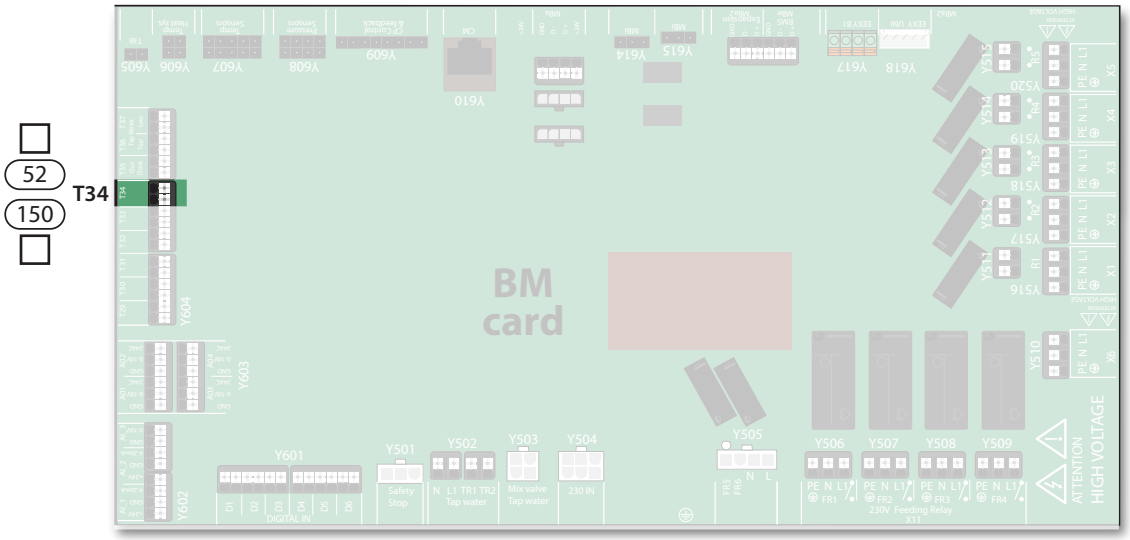


Table item number	Terminal	Description
52	T34	Option: System return line sensor
150	T34	Option: Exhaust air battery sensor

10.4 Connecting system pump

Start/stop of building's system pump 230 VAC.

When the system pump is activated, it operates continuously during the heating season. The system pump is normally not in operation when heating season is not active. The speed of the system pump is not regulated by the CM-card. Activation of the system pump deactivates standby operation on the condenser pump.

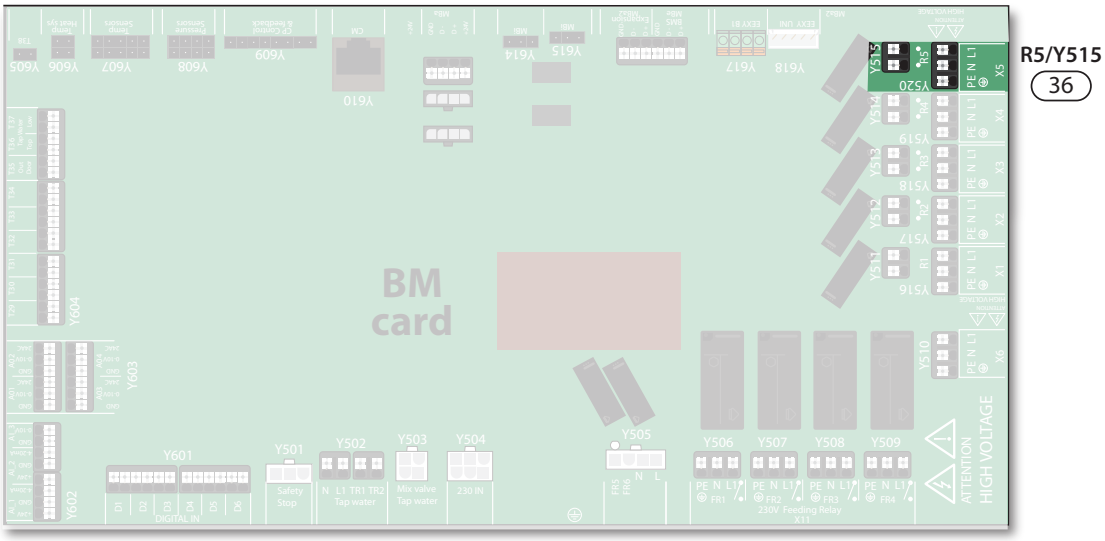


Table item number	Terminal	Description
36	R5/Y515	System pump

10.5 Connecting reversing valve for tap water and hot water sensors

To control tap water production, connect a 3-way valve .A tap water demand is initiated when either the weighted tap water temperature falls below the start threshold or the tank temperature decreases. The weighted temperature is calculated from the top and bottom tap water sensors according to the configured sensor influence setting.

When a tap water demand is initiated, the 3-way valve switches to the tap water tank position and the compressor starts producing tap water .If the heating season is inactive, the 3-way valve remains in the tap water position until the demand has been fulfilled and the compressor has stopped completely. The valve then returns to the heating position, which is its default position.

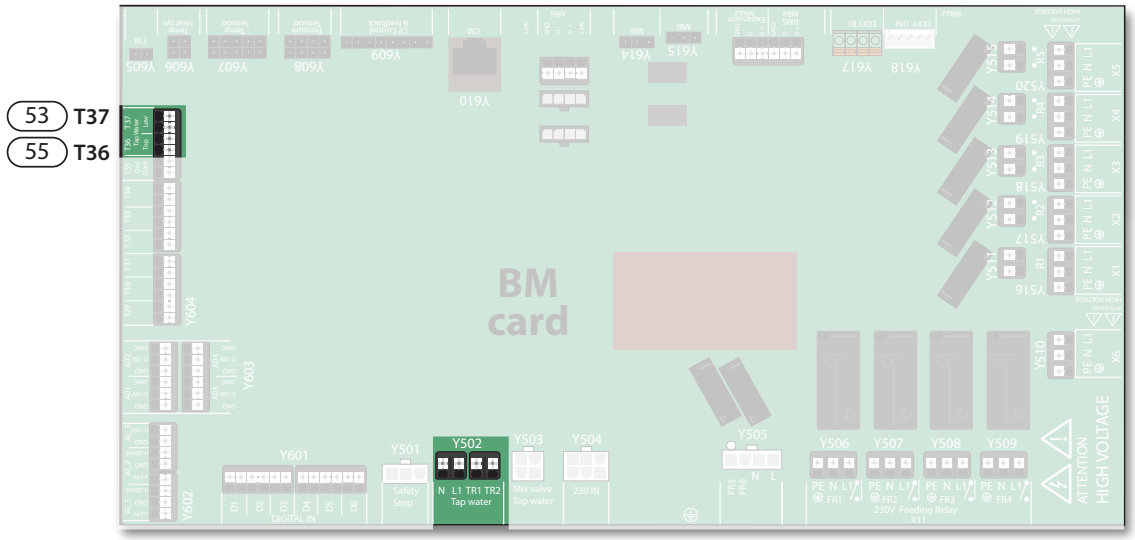


Table item number	Terminal	Description
77	Y502: TR2, L, N	Reversing card valve hot water (external)
53	T37	Hot water lower sensor
55	T36	Hot water top sensor

10.6 Connecting Power consumption control

Power consumption control is a feature designed for electrical grid load control and local home automation/optimization.

The function is activated in the display, with login, under **Installer settings/Installation/Power consumption control**.

Mode selection under **Installer settings/Power consumption control/Input mode:**

None | SG-ready | PL/LU

The two digital inputs (Smart grid 1 and Smart grid 2) have a total of four open/closed combinations (1=Closed, 0=Open),where each combination represents a different mode based on the main input mode setting. These are also available via BMS. Mode set from digital inputs will be prioritized over BMS.

There are two different configurations available: SG-ready and PL/LU (Power Limitation/Load Up). Each configuration utilizes the four different inputs, to affect how the heat pump operates with certain limitation settings.

In Primary/secondary mode, Power consumption control is only connected to the primary unit, which controls the rest of the secondary heat pumps.

SG-ready mode (Intended for electrical grid control)

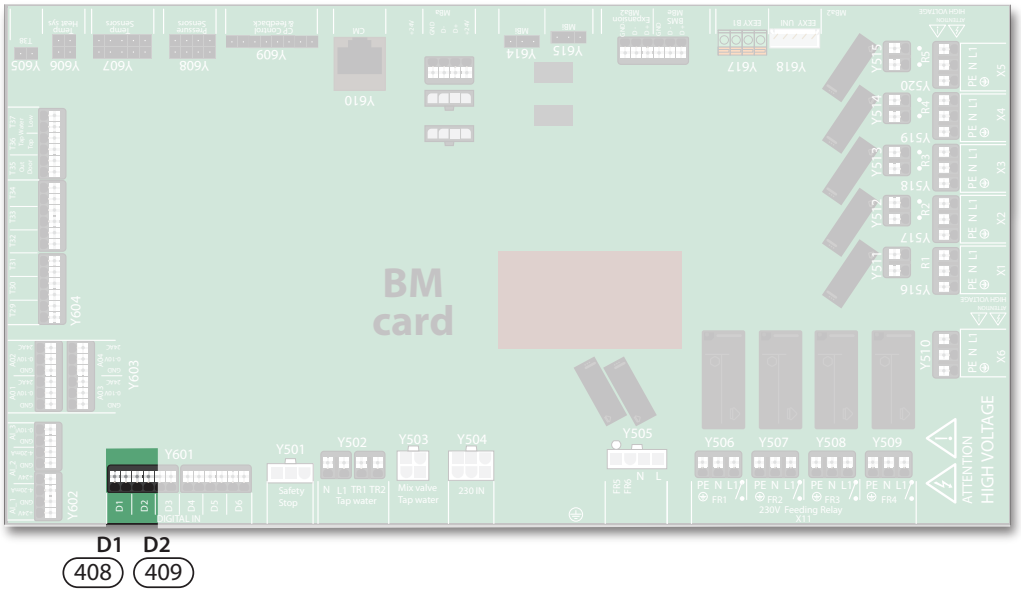
SG-1	SG-2	Description
0	0	**Normal:** Normal operation
1	0	**EVU:** The function blocks compressor operation and internal immersion heater. Other components such as circulation pumps, exchange valves and external auxiliary heater are still controlled.
0	1	**Comfort:** Increased start and stop temperature of hot water.
1	1	**Boost:**Increased start and stop temperature of hot water, increased room setting (default 22°C)and triggers anti-legionella if the tank is two degrees below stop temperature for anti-legionella.

SG-1	SG-2	Description
		Buffer tank:sets desired tank temperature to 55°C, and if "Allow immersion heater during boost" is set in the display, internal immersion heater is also used.

Note: The EVU functionality will prevent the compressor from starting. If the compressor is running, trigger of the EVUsignal will cause a compressor stop to be initiated. Note that the compressor will need up to 5 minutes to stop depending, on running circumstances. Physical power cut off, before the compressor has stopped, is not permitted, as repeated cutoff power supply when the compressor is running, could cause operational disturbances/damage.

PL/LU mode (Supports combination of PV panel overcharge and power limitation)

SG-1	SG-2	Description (closing=1)
0	0	**Normal:** Normal operation
1	0	**Power limitation:**The system runs within the configured power limitation or turns off. Withpower limitation set to 0 the system always turns off.
0	1	**Load up (Comfort):** Increased start and stop temperature of hot water.
1	1	**Power limitation:**Increased start and stop temperature of hot water, increased room setting (default 22°C)and triggers anti-legionella if the tank is two degrees below stop temperature for anti-legionella. **Buffer tank:**Applies to the external heater if it is configured to be an electric heater, or if the electric external heater that has an external capacity control. Applies to TWC, where the capacity needs to be configured. TWC heater is forced off if Compressor speed up is restricted. Anti-legionella is blocked.



408 409

Table item number	Terminal	Description
408	D1	EVU/Smart grid 1
409	D2	Smart grid 2

10.7 Connecting external alarm relay

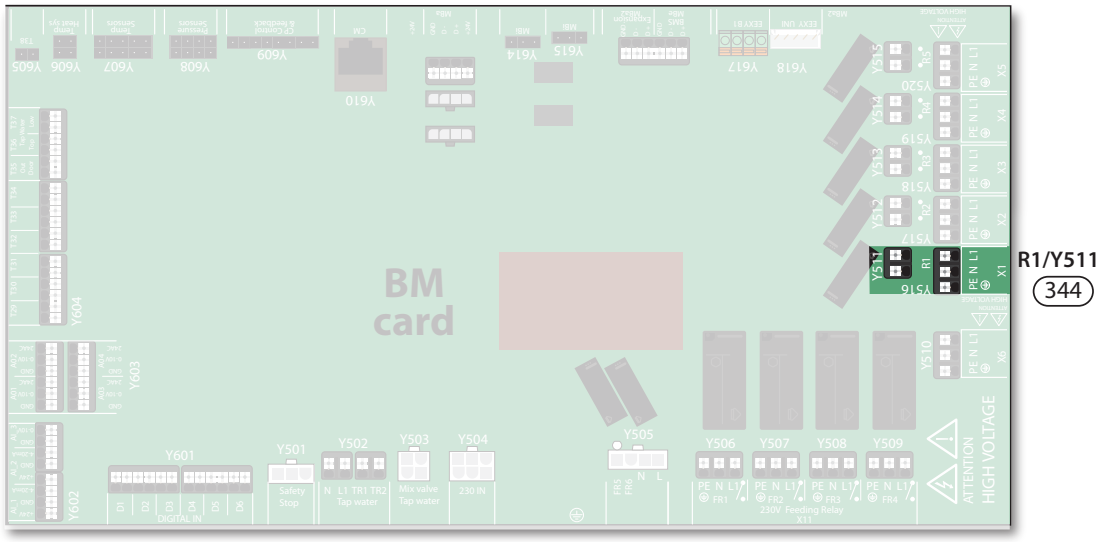


Table item number	Terminal	Description
344	R/1Y511	Alarm relay, Max loads 5 A in total

10.8 Connecting control signal (start/stop) for auxiliary heating

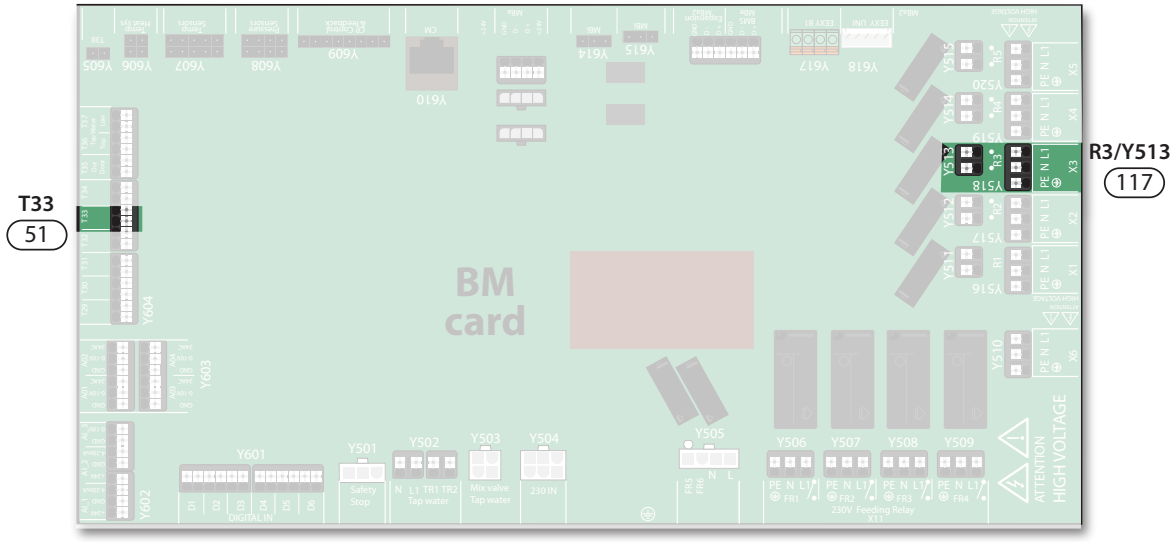


Table item number	Terminal	Description
51	T33	System supply line sensor
117	R3/Y513	External auxiliary heater

The external auxiliary heater requires a system supply line sensor. The external auxiliary heater also controls a 0-10 V signal which regulates system supply line temperature in accordance with calculated set point and desired delay.

The output signal is operated with a PI control and a control range which affects how often the output signal is permitted to change.

- **24V:** Connect control signal to input 0-10 and GND (AO25). Power supply is drawn from terminals AC1-AC2 (X16).
- **230V:** Power supply is drawn from terminals L3 (X13) and N (X14).

10.9 Connecting distribution circuit 1

In heating systems that require a separately controlled heating circuit in addition to the main circuit, it is possible to control a distribution circuit with a lower heating curve. The circuit consists of a mixing valve (207), temperature sensor (208), and circulation pump (209).

Distribution Circuit 1 is used for distributing heating or cooling. Select the desired function in the display.

When cooling is enabled, Distribution Circuit 1 can also control a temperature sensor (52), circulation pump (109), and mixing valve (107). During cooling operation, the mixing valve regulates to a fixed supply temperature, which can be adjusted in the display.

An automatic mode is also available. In this mode, the mixing valve automatically switches between heating and cooling operation depending on the season. Relay output (185) is activated during the cooling season and deactivated during the heating season.

The circulation pump (109) is running when the appliance is in heating season.

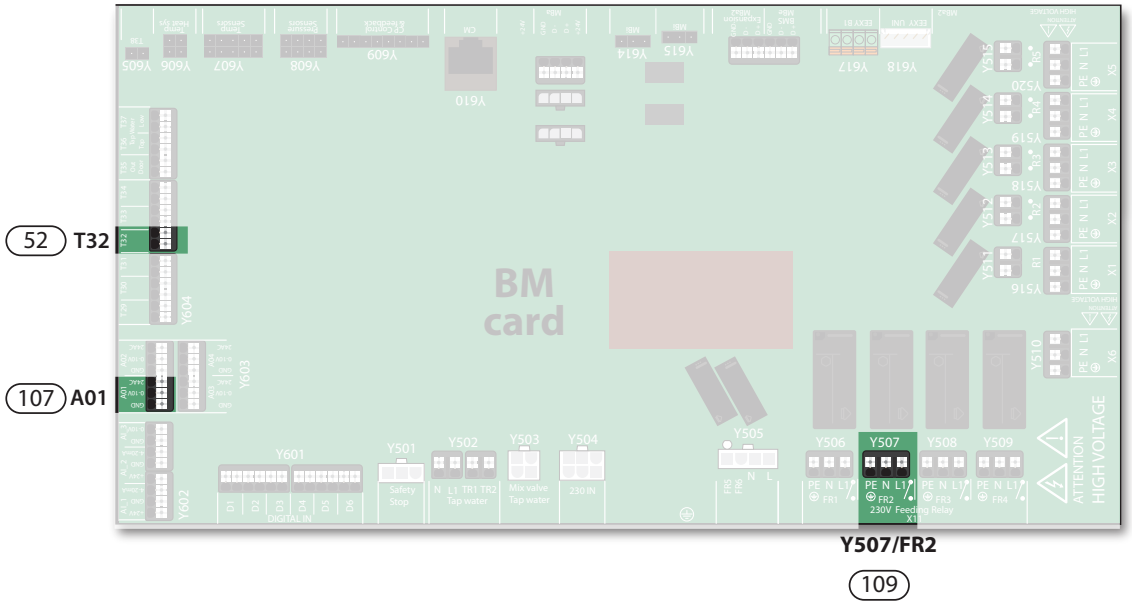


Table item number	Terminal	Description
107	A01	Shunt valve 230VAC
52	T32	Supply line sensor
109	FR2	Circulation pump

10.10 Buffer tank

Buffer tank type: 1

The function requires a system pump and is not supporting external auxiliary heater controlled by heat pump or Pool functionality.

NOTE: This buffer tank type is not available if T34 is allocated for Exhaust air temperature sensor on the BM card.

The heat pump is connected to feed the buffer tank and the buffer tank then feeds the heating system via the system mixing valve, adjusting the system temperature. Overcharge in the tank is allowed. No external auxiliary heater is permitted in this solution, only an internal electric heater, when applicable.

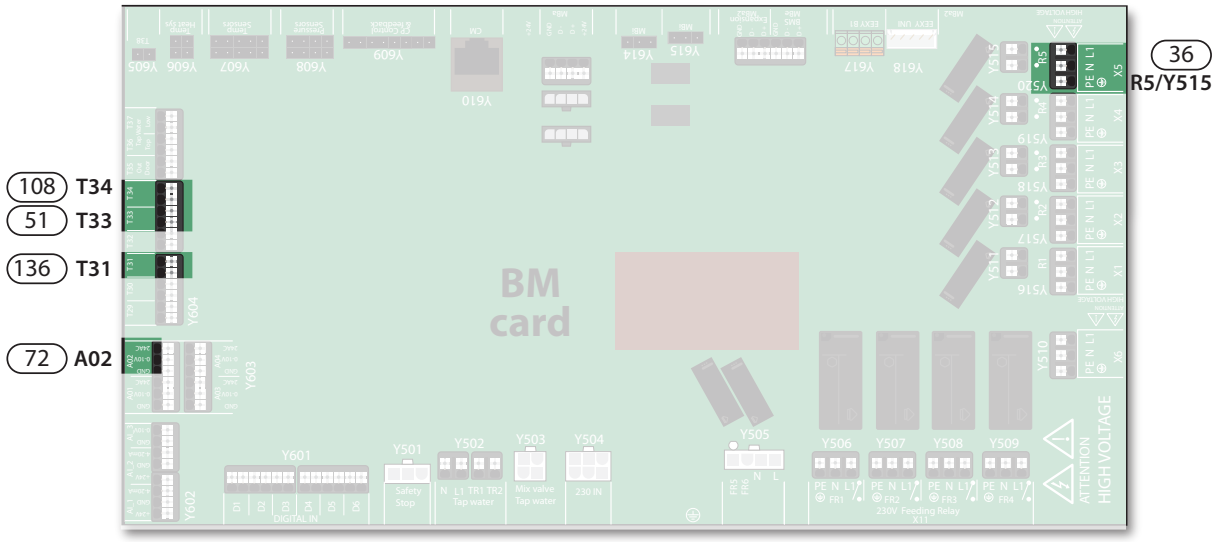


Table item number	Terminal	Description
36	R5/Y515	Circulation pump (system)
51	T33	System supply line sensor
108	T34	System return line sensor
72	AO2	External auxiliary heater shunt
136	T31	Buffer tank sensor

Buffer tank type: 4 (requires auxiliary heater)

The heat pump feeds the buffer tank. The buffer tank, in turn, feeds the heating system in series with the external auxiliary heater (on/ off, 0-10V controlled, or in combination with both, depending on the type of external additional heater). The buffer tank is not directly charged by the external auxiliary heater. Overcharge of the buffer tank is not allowed.

Table item number	Terminal	Description
36	R5/Y515	Circulation pump (system)
51	T33	System supply line sensor
108	T34	System return line sensor
72	AO2	External auxiliary heater shunt
117	R3/Y513 (If auxiliary heater is 0-10V controlled, it must be connected to AO2 instead)	External auxiliary heater
136	T31	Buffer tank sensor

Buffer tank type: 5 (requires auxiliary heater and distribution circuit 1)

The heat pump feeds the buffer tank. The buffer tank, in turn, feeds the heating system in series with the external auxiliary heater (on/ off, 0-10V controlled, or in combination with both, depending on the type of external additional heater). The buffer tank is not directly charged by the external auxiliary heater. The distribution circuit 1 mix valve located after buffer tank allows for overcharge.

Table item number	Terminal	Description
36	R5/Y515	Circulation pump (system)
51	T33	System supply line sensor
108	T34	System return line sensor
72	AO2	External auxiliary heater shunt
117	R3/Y513 (If auxiliary heater is 0-10V controlled, it must be connected to AO2 instead)	External auxiliary heater
136	T31	Buffer tank sensor

10.11 TWC-Tap water control

The TWC function regulates the temperature for the outgoing hot water temperature via sensor (63) (mixing valve (75) is required) The mixing valve keeps the desired set value on the outgoing hot water. Auxiliary heater(s) (118) can be activated/deactivated for Anti legionella protection.

The HWC circulation pump (31) is constantly running, and the Sensor HWC return line (56) is used only for monitoring. Hot water lower sensor (53) and hot water top sensor (55) must be connected to get TWC function to operate.

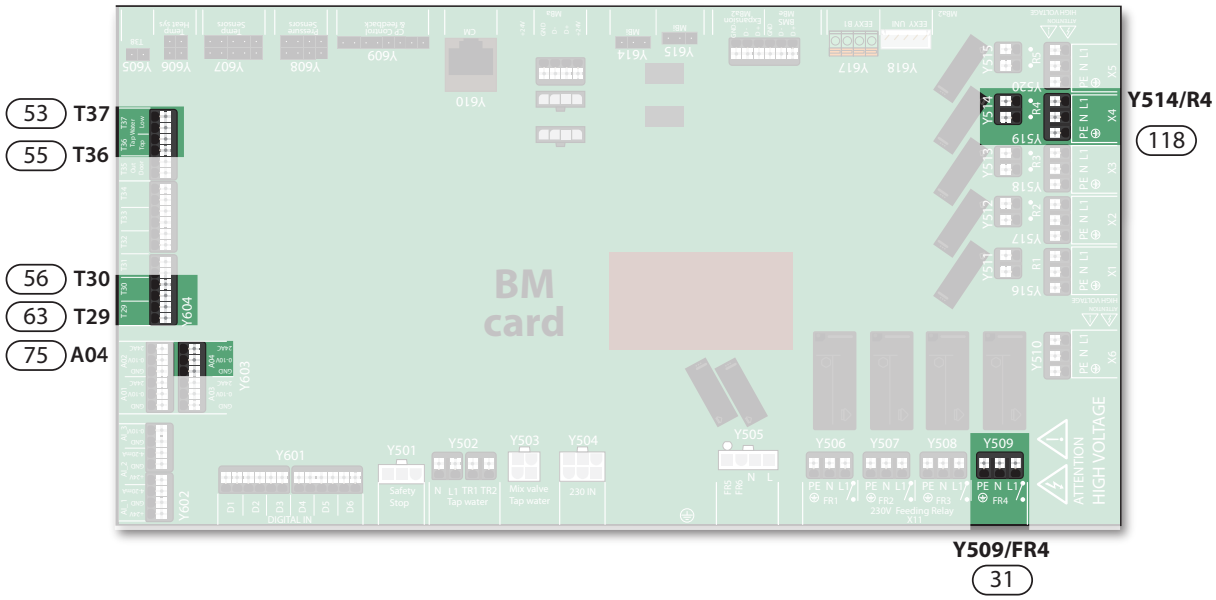


Table item number	Terminal	Description
31	Y509/FR4	HWC Circulation (TWC) pump
53	T37	Hot water lower sensor
55	T36	Hot water top sensor
56	T30	Sensor HWC return line
63	T29	Sensor hot water
75	A04	Hot water (TWC) Shunt valve
118	R4/Y514	Anti leginella

11 Technical data

11.1 Technical data table S 400V

Description		Unit	Morix S 400V
Heating capacity		kW	7-33
Refrigerant	Type		R290
	Amount[1]	kg	1,60
	CO² equivalent	tons	0,000032
Compressor	Type		Scroll
	Oil		POE
	Amount	l	3,50
Electrical data 400V~3N	Mains power supply	V	400
	Max working power, compressor	kW	14
	Rated power, circulation pumps	kW	0,8
	Immersion heater, 3 steps	kW	N/A
	Fuses, combined[2]	A	N/A
	Fuse separate supply, compressor only	A	25
	Fuse separate supply, immersion heater only	A	N/A
	Starting current	A	N/A
	Short-circuit power (Ssc)[2]	MVA	2,0
Performance	SCOP, floor heating (35 °C)[3]		5,16
	P-design (35°C)[3]		29,80
	SCOP, radiator heating (55°C)[3]		4,06
	P-design (55°C)[3]		28,22
	SCOP, floor heating (35°C)[4]		4,95
	P-design (35°C)[4]		29,80
	SCOP, radiator heating (55°C)[4]		3,95
	P-design (55°C)[4]		28,22
	Heating capacity[5]	kW	13,10
	Electrical power input[5]	kW	2,89
	COP[5]		4,53
Energy class - System[6]	Floor heating (35°C)		A+++
	Radiator heating (55°C)		A+++
Energy class - Product[7]	Floor heating (35°C)		A+++
	Radiator heating (55°C)		A+++
	Hot water[8]		N/A
Max/min temperature	Brine	°C	+25/-10
	Heating	°C	+75/+20
Max/min refrigerant circuit	Low pressure	MPa	0,1
	High pressure	MPa	3,1
Max pressure	Brine	bar(g)	6
	Heating	bar(g)	6
Required air flow	External fan	m3/h	58,3
		l/s	16,2
Anti freeze type[9]	Antifreeze protection + water, freezing point -17°C ± 2°C		
	Anti freeze mixture of ethanol + water, <29% ethanol		
Pressure limits refrigerant circuit	Low pressure	bar(g)	1
	High pressure	bar(g)	31
Sound power level	Min/max	dB(A)	41-54[10]
	Energy label	dB(A)	46[11]
Weight	Empty	kg	345

Description		Unit	Morix S 400V
Dimensions (W/D/H)	Without pipes	mm	811x805x1719 ± 10
	With pipes	mm	811x805x1829 ± 10

1) The refrigerant circuit is hermetically sealed and contains refrigerants covered by the F-gas regulation. GWP for R454B according to IPCC AR4 is 466.

2) The minimum recommended fuse size depends on the limitation of the electrical immersion heater in combination with the compressor. The maximum permissible power for immersion heater can also be set differently with and without compressor for further adjustment at low fuses. 400V versions: The power supply for the auxiliary heater and the compressor are powered by L1, L2 and L3. Control and circulation pumps are operated with L3. Meets IEC61000-3-12 at Ssc. 230V versions: The feeding for auxiliary heater and compressor can be physically separated.

3) SCOP according to EN14825, cold climate (Helsinki).

4) SCOP according to EN14825, average climate (Strassbourg).

5) At B0/W35, according to EN14511.

6) When the heat pump is installed in a heating system that is controlled via the heat pump's control computer. According to EU regulation 811/2013.

7) When the heat pump is not connected to a heating system, and the function of the built-in control computer is not taken into account. According to EU regulation 811/2013.

8) Hot water performance according to EN16147, COP according to XL cycle.

9) Local regulations and regulations must always be checked before antifreeze agents are used.

10) Sound power level measured according to EN12102 and EN 3741.

11) Sound power level according to energy labeling, measured according to EN12102 and EN3741 (B0W55).

11.2 Technical data table S-E 400V

Description		Unit	Morix S-E 400V
Heating capacity		kW	7-33
Refrigerant	Type		R290
	Amount[1]	kg	1,60
	CO^2 equivalent	tons	0,000032
Compressor	Type		Scroll
	Oil		POE
	Amount	l	3,50
Electrical data 400V~3N	Mains power supply	V	400
	Max working power, compressor	kW	14
	Rated power, circulation pumps	kW	0,8
	Immersion heater, 3 steps	kW	5/10/15
	Fuses, combined[2]	A	32/40/50
	Fuse separate supply, compressor only	A	25
	Fuse separate supply, immersion heater only	A	10/16/25
	Starting current	A	N/A
	Short-circuit power (Ssc)[2]	MVA	2,0
Performance	SCOP, floor heating (35 °C)[3]		5,16
	P-design (35°C)[3]		29,80
	SCOP, radiator heating (55°C)[3]		4,06
	P-design (55°C)[3]		28,22
	SCOP, floor heating (35°C)[4]		4,95
	P-design (35°C)[4]		29,80
	SCOP, radiator heating (55°C)[4]		3,95
	P-design (55°C)[4]		28,22
	Heating capacity[5]	kW	13,10
	Electrical power input[5]	kW	2,89
	COP[5]		4,53
Energy class - System[6]	Floor heating (35°C)		A+++
	Radiator heating (55°C)		A+++
Energy class - Product[7]	Floor heating (35°C)		A+++
	Radiator heating (55°C)		A+++
	Hot water[8]		N/A
Max/min temperature	Brine	°C	+25/-10
	Heating	°C	+75/+20
Max/min refrigerant circuit	Low pressure	MPa	0,1
	High pressure	MPa	3,1
Max pressure	Brine	bar(g)	6
	Heating	bar(g)	6
Required air flow	External fan	m3/h	58,3
		l/s	16,2
Anti freeze type[9]	Antifreeze protection + water, freezing point -17°C ± 2°C		
	Anti freeze mixture of ethanol + water, <29% ethanol		
Pressure limits refrigerant circuit	Low pressure	bar(g)	1
	High pressure	bar(g)	31
Sound power level	Min/max	dB(A)	41-54[10]
	Energy label	dB(A)	47[11]
Weight	Empty	kg	365
Dimensions (W/D/H)	Without pipes	mm	811x805x1719 ± 10
	With pipes	mm	811x805x1829 ± 10

1) The refrigerant circuit is hermetically sealed and contains refrigerants covered by the F-gas regulation. GWP for R454B according to IPCC AR4 is 466.

2) The minimum recommended fuse size depends on the limitation of the electrical immersion heater in combination with the compressor. The maximum permissible power for immersion heater can also be set differently with and without compressor for further adjustment at low fuses. 400V versions: The power supply for the auxiliary heater and the compressor are powered by L1, L2 and L3. Control and circulation pumps are operated with L3. Meets IEC61000-3-12 at Ssc. 230V versions: The feeding for auxiliary heater and compressor can be physically separated.

3) SCOP according to EN14825, cold climate (Helsinki).

4) SCOP according to EN14825, average climate (Strassbourg).

5) At B0/W35, according to EN14511.

6) When the heat pump is installed in a heating system that is controlled via the heat pump's control computer. According to EU regulation 811/2013.

7) When the heat pump is not connected to a heating system, and the function of the built-in control computer is not taken into account. According to EU regulation 811/2013.

8) Hot water performance according to EN16147, COP according to XL cycle.

9) Local regulations and regulations must always be checked before antifreeze agents are used.

10) Sound power level measured according to EN12102 and EN 3741.

11) Sound power level according to energy labeling, measured according to EN12102 and EN3741 (B0W55).

11.3 Technical data table M 400V

Description		Unit	Morix M 400V
Heating capacity		kW	12-45
Refrigerant	Type		R290
	Amount[1]	kg	1,95
	CO^2 equivalent	tons	0,000039
Compressor	Type		Scroll
	Oil		POE
	Amount	l	3,50
Electrical data 400V~3N	Mains power supply	V	400
	Max working power, compressor	kW	20
	Rated power, circulation pumps	kW	0,8
	Immersion heater, 3 steps	kW	N/A
	Fuses, combined[2]	A	N/A
	Fuse separate supply, compressor only	A	32
	Fuse separate supply, immersion heater only	A	N/A
	Starting current	A	N/A
	Short-circuit power (Ssc)[2]	MVA	2,6
Performance	SCOP, floor heating (35 °C)[3]		5,32
	P-design (35°C)[3]		44,82
	SCOP, radiator heating (55°C)[3]		4,13
	P-design (55°C)[3]		40,85
	SCOP, floor heating (35°C)[4]		5,13
	P-design (35°C)[4]		44,82
	SCOP, radiator heating (55°C)[4]		4,02
	P-design (55°C)[4]		40,85
	Heating capacity[5]	kW	21,67
	Electrical power input[5]	kW	4,68
	COP[5]		4,62
Energy class - System[6]	Floor heating (35°C)		A+++
	Radiator heating (55°C)		A+++
Energy class - Product[7]	Floor heating (35°C)		A+++
	Radiator heating (55°C)		A+++
	Hot water[8]		N/A
Max/min temperature	Brine	°C	+25/-10
	Heating	°C	+75/+20
Max/min refrigerant circuit	Low pressure	MPa	0,1
	High pressure	MPa	3,1
Max pressure	Brine	bar(g)	6
	Heating	bar(g)	6
Required air flow	External fan	m^3/h	65
		l/s	18,1
Anti freeze type[9]	Antifreeze protection + water, freezing point -17°C ± 2°C Anti freeze mixture of ethanol + water, <29% ethanol		
Pressure limits refrigerant circuit	Low pressure	bar(g)	1
	High pressure	bar(g)	31
Sound power level	Min/max	dB(A)	41-55[10]
	Energy label	dB(A)	49[11]
Weight	Empty	kg	375
Dimensions (W/D/H)	Without pipes	mm	811x805x1719 ±10
	With pipes	mm	811x805x1829 ± 10

1) The refrigerant circuit is hermetically sealed and contains refrigerants covered by the F-gas regulation. GWP for R454B according to IPCC AR4 is 466.

2) The minimum recommended fuse size depends on the limitation of the electrical immersion heater in combination with the compressor. The maximum permissible power for immersion heater can also be set differently with and without compressor for further adjustment at low fuses. 400V versions: The power supply for the auxiliary heater and the compressor are powered by L1, L2 and L3. Control and circulation pumps are operated with L3. Meets IEC61000-3-12 at Ssc. 230V versions: The feeding for auxiliary heater and compressor can be physically separated.

3) SCOP according to EN14825, cold climate (Helsinki).

4) SCOP according to EN14825, average climate (Strassbourg).

5) At B0/W35, according to EN14511.

6) When the heat pump is installed in a heating system that is controlled via the heat pump's control computer. According to EU regulation 811/2013.

7) When the heat pump is not connected to a heating system, and the function of the built-in control computer is not taken into account. According to EU regulation 811/2013.

8) Hot water performance according to EN16147, COP according to XL cycle.

9) Local regulations and regulations must always be checked before antifreeze agents are used.

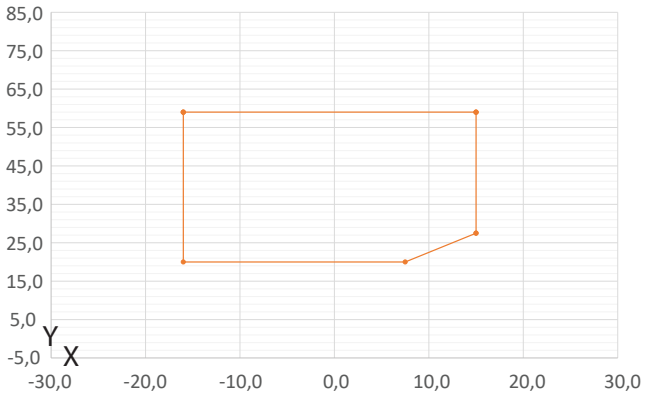
10) Sound power level measured according to EN12102 and EN 3741.

11) Sound power level according to energy labeling, measured according to EN12102 and EN3741 (B0W55).

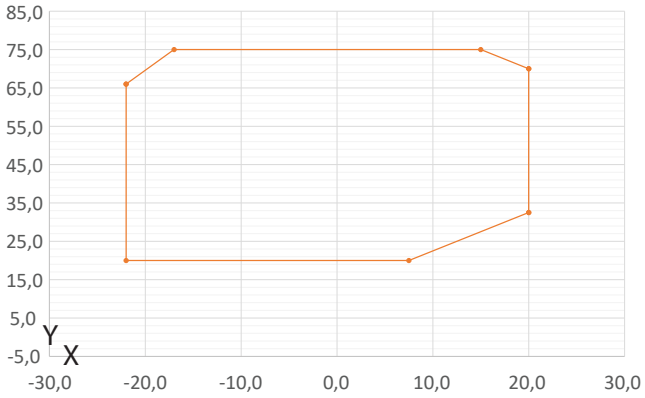
12 Envelope

12.1 Envelope for Morix S

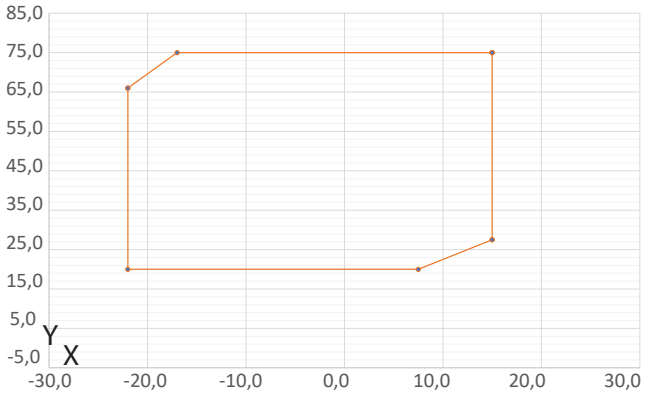
Note: The diagrams show the evaporation temperature, which is normally 5–10°C below the brine inlet temperature, depending on the operating conditions. The minimum permissible brine inlet temperature is -10°C.



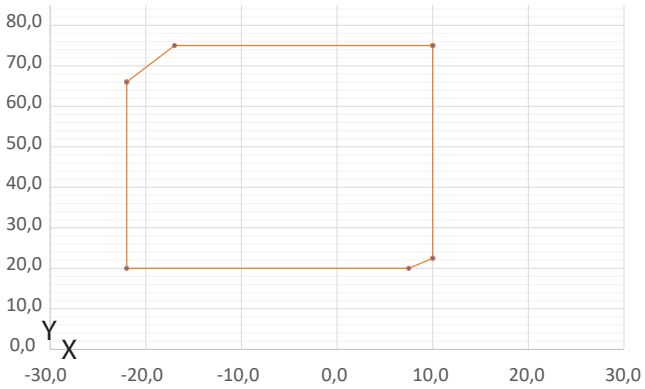
Envelope 1 1800-2999 RPM
Y: Condensation temperature °C
X: Evaporation temperature °C



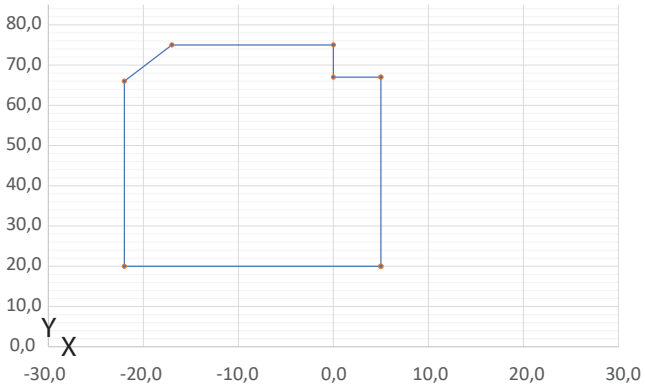
Envelope 2 3010 - 4599 RPM
Y: Condensation temperature °C
X: Evaporation temperature °C



Envelope 3 4600 - 5499 RPM
Y: Condensation temperature °C
X: Evaporation temperature °C



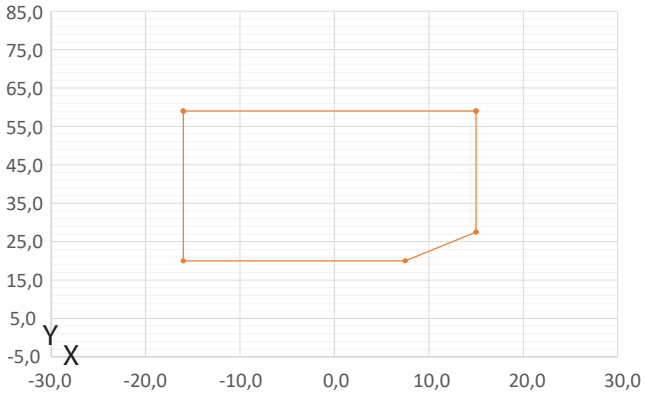
Envelope 4 5500 - 5990 RPM
Y: Condensation temperature °C
X: Evaporation temperature °C



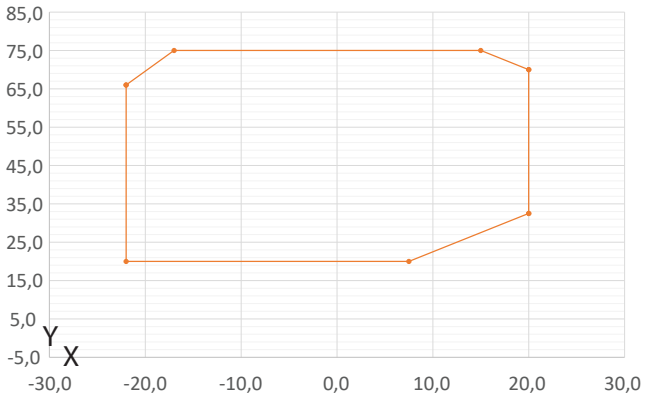
Envelope 6000 - 7200 RPM
Y: Condensation temperature °C
X: Evaporation temperature °C

12.2 Envelope for Morix M

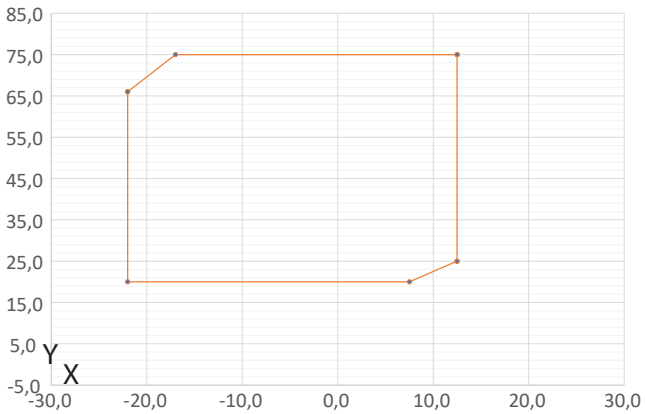
Note: The diagrams show the evaporation temperature, which is normally 5–10°C below the brine inlet temperature, depending on the operating conditions. The minimum permissible brine inlet temperature is -10°C.



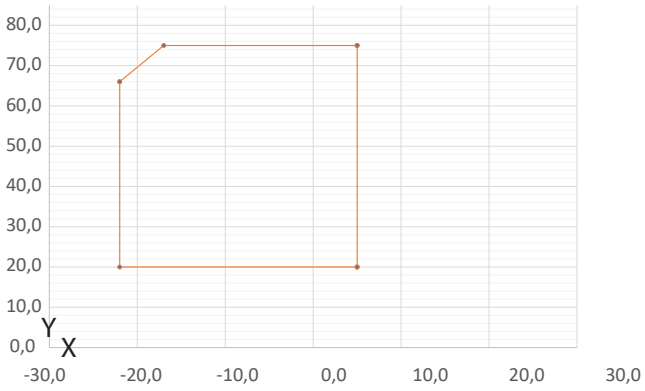
Envelope 1 1800-2999 RPM
Y: Condensation temperature °C
X: Evaporation temperature °C



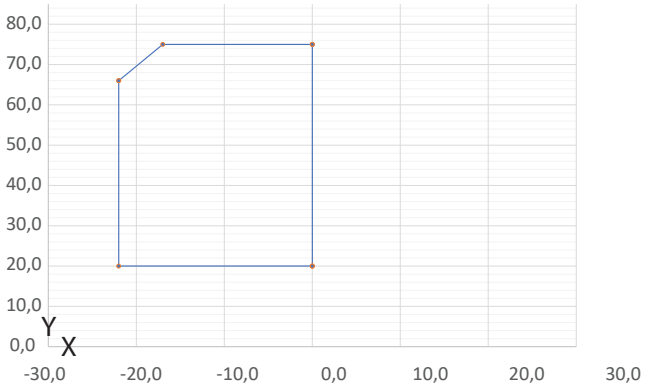
Envelope 2 3010 - 4250 RPM
Y: Condensation temperature °C
X: Evaporation temperature °C



Envelope 3 4260 - 5100 RPM
Y: Condensation temperature °C
X: Evaporation temperature °C



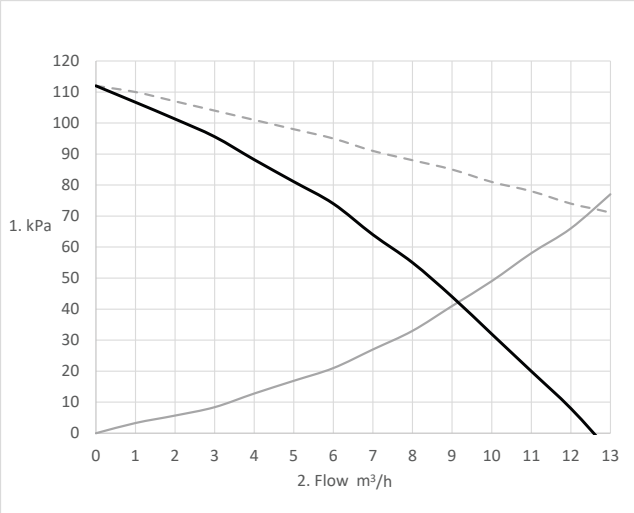
Envelope 4 5110 - 5990 RPM
Y: Condensation temperature °C
X: Evaporation temperature °C



Envelope 6000-6300 RPM
Y: Condensation temperature °C
X: Evaporation temperature °C

13 Calculated flow/pressure diagrams

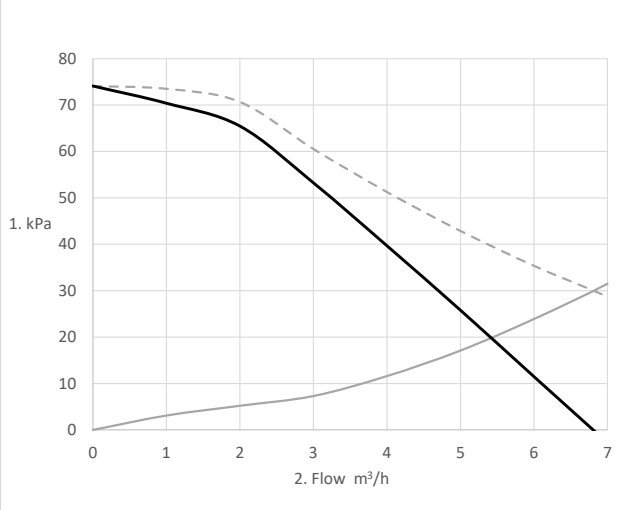
13.1 Evaporator diagram Morix M



Pump curve
Internal pressure drop
External available pressure

1. Pressure (kPa)
2. Brine flow (l/s)

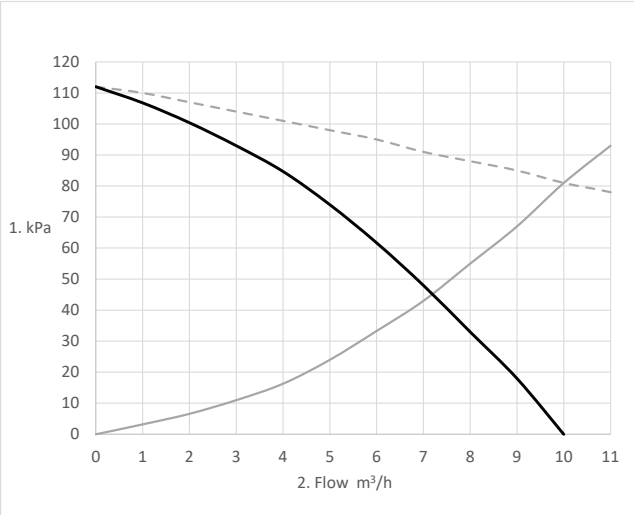
13.2 Condenser diagram Morix M



Pump curve
Internal pressure drop
External available pressure

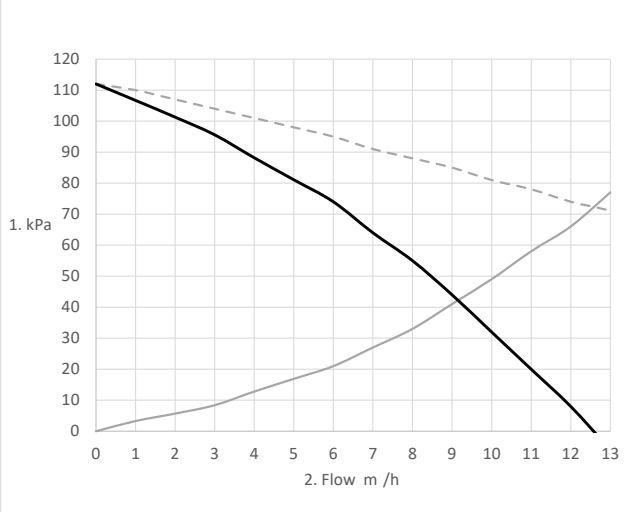
1. Pressure (kPa)
2. Brine flow (l/s)

13.3 Evaporator diagram Morix S



Pump curve
Internal pressure drop
External available pressure
1. Pressure (kPa)
2. Brine flow (l/s)

13.4 Condenser diagram Morix S



Pump curve
Internal pressure drop
External available pressure
1. Pressure (kPa)
2. Brine flow (l/s)

14 Reference output data tables

14.1 Reference output data Morix S

Radiator temp. in/out °C			35/25						35/30					
Brine temp. in/out °C			-6/-10	-3/-7	0/-4	0/-3	5/1	6/10	-6/-10	-3/-7	0/-4	0/-3	5/1	10/6
RPM 1818														
	Heating Capacity	kW	6	7	8	8	9	10	6	7	7	8	9	10
	Cooling Capacity	kW	5	5	6	6	7	9	4	5	6	6	7	8
	Input power	kW	1,7	1,7	1,7	1,7	1,6	1,6	1,7	1,7	1,7	1,7	1,7	1,6
	COP	-	3,7	4,1	4,6	4,7	5,4	6,5	3,6	3,9	4,3	4,5	5,1	6,1
	Radiator flow	m³/h	0,5	0,6	0,7	0,7	0,8	0,9	1,1	1,2	1,3	1,3	1,5	1,7
	Ext. available pressure	kPa	78	78	78	78	78	78	77	77	76	76	75	74
	Brine flow	m³/h	1,0	1,1	1,3	1,8	1,6	1,9	0,9	1,1	1,2	1,7	1,5	1,8
	Ext. available pressure	kPa	109	108	107	103	105	102	109	108	107	104	105	103
RPM 2250														
	Heating Capacity	kW	8	9	10	10	11	13	8	8	9	10	11	12
	Cooling Capacity	kW	6	7	7	8	9	11	6	6	7	7	9	10
	Input power	kW	2,1	2,1	2,1	2,1	2,0	2,0	2,2	2,1	2,1	2,1	2,1	2,0
	COP	-	3,7	4,1	5,6	4,7	5,5	6,5	3,6	4,0	4,4	4,5	5,2	5,1
	Radiator flow	m³/h	0,7	0,8	0,8	0,9	1,0	1,1	1,3	1,5	1,6	1,6	1,9	2,2
	Ext. available pressure	kPa	78	78	78	78	77	77	76	75	75	74	73	69
	Brine flow	m³/h	1,2	1,4	1,6	2,2	2,0	2,4	1,2	1,4	1,5	2,1	1,9	2,3
	Ext. available pressure	kPa	107	106	105	100	102	98	108	106	105	101	102	99
RPM 2600														
	Heating Capacity	kW	9	10	11	11	13	15	9	10	11	11	13	15
	Cooling Capacity	kW	7	8	9	9	11	13	6	7	8	9	10	12
	Input power	kW	2,5	2,5	2,4	2,4	2,4	2,3	2,5	2,5	2,5	2,5	2,4	2,4
	COP	-	3,5	4,1	4,6	4,7	5,4	6,5	3,6	3,9	4,4	4,5	5,2	6,1
	Radiator flow	m³/h	0,8	0,9	1,0	1,0	1,1	1,3	1,5	1,7	1,9	1,9	2,2	2,5
	Ext. available pressure	kPa	78	78	77	77	77	76	75	74	73	72	69	64
	Brine flow	m³/h	1,5	1,7	1,9	2,6	2,3	2,8	1,4	1,6	1,8	2,5	2,2	2,7
	Ext. available pressure	kPa	106	104	103	97	99	95	106	105	103	98	100	96
RPM 3010														
	Heating Capacity	kW	11	12	13	13	15	18	10	11	13	13	15	17
	Cooling Capacity	kW	8	9	10	10	12	15	7	9	10	10	12	14
	Input power	kW	2,9	2,9	2,9	2,9	2,8	2,8	3,0	2,9	2,9	2,9	2,9	2,8
	COP	-	3,7	4,1	4,5	4,6	5,4	6,4	3,5	3,9	4,3	4,5	5,1	6,0
	Radiator flow	m³/h	0,9	1,0	1,1	1,2	1,3	1,5	1,8	2,0	2,2	2,2	2,5	2,9
	Ext. available pressure	kPa	78	77	77	77	76	75	73	72	69	68	64	58
	Brine flow	m³/h	1,7	1,9	2,2	3,0	2,7	3,3	1,5	1,9	2,1	2,9	2,6	3,1
	Ext. available pressure	kPa	104	102	100	94	96	91	105	103	101	95	97	93
RPM 3350														
	Heating Capacity	kW	12	13	14	15	17	20	12	13	14	14	16	19
	Cooling Capacity	kW	9	10	11	12	14	16	8	9	11	11	13	16
	Input power	kW	3,3	3,3	3,2	3,2	3,2	3,1	3,3	3,3	3,3	3,3	3,2	3,2
	COP	-	3,7	4,0	4,5	5,6	5,3	6,2	3,5	3,9	4,3	4,4	5,0	5,9
	Radiator flow	m³/h	1,0	1,1	1,2	1,3	1,5	1,7	2,0	2,2	2,4	2,5	2,8	3,3
	Ext. available pressure	kPa	77	77	77	76	76	74	71	68	65	64	59	53
	Brine flow	m³/h	1,9	2,2	2,5	3,4	3,0	3,6	1,8	2,1	2,4	3,3	2,9	3,5
	Ext. available pressure	kPa	103	101	98	91	94	88	103	101	99	92	95	89
RPM 3600														
	Heating Capacity	kW	13	14	16	16	18	21	13	14	15	16	18	20
	Cooling Capacity	kW	9	11	12	12	15	18	9	10	12	12	14	17
	Input power	kW	3,6	3,5	3,5	3,5	3,5	3,4	3,6	3,6	3,6	3,6	3,5	3,5
	COP	-	3,6	4,0	4,4	4,5	5,2	6,2	3,5	3,8	4,2	4,3	5,0	5,8
	Radiator flow	m³/h	1,1	1,2	1,3	1,4	1,6	1,8	2,2	2,4	2,6	2,7	3,0	3,5

Radiator temp. in/out °C			35/25						35/30					
Brine temp. in/out °C			-6/-10	-3/-7	0/-4	0/-3	5/1	6/10	-6/-10	-3/-7	0/-4	0/-3	5/1	10/6
	Ext. available pressure	kPa	77	77	76	76	75	73	69	66	63	61	56	49
	Brine flow	m³/h	2,0	2,3	2,6	3,7	3,2	3,9	2,0	2,2	2,5	3,5	3,1	3,7
	Ext. available pressure	kPa	102	100	97	88	92	85	102	100	98	90	93	87
RPM	**4300**													
	Heating Capacity	kW	16	17	19	19	22	25	15	17	18	19	21	24
	Cooling Capacity	kW	11	12	14	15	17	21	11	12	14	14	17	20
	Input power	kW	4,4	4,4	4,4	4,4	4,3	4,3	4,5	4,5	4,4	4,5	4,4	4,4
	COP	-	3,5	3,9	4,3	4,4	5,0	5,9	3,4	3,7	4,1	4,2	4,8	5,6
	Radiator flow	m³/h	1,3	1,5	1,6	1,7	1,9	2,2	2,6	2,9	3,1	3,2	3,7	4,2
	Ext. available pressure	kPa	76	75	75	74	73	69	62	59	55	53	47	38
	Brine flow	m³/h	2,5	2,8	3,2	4,4	3,9	4,7	2,4	2,7	3,0	4,2	3,7	4,5
	Ext. available pressure	kPa	99	96	93	81	86	78	99	97	94	83	87	80
RPM	**4900**													
	Heating Capacity	kW	18	20	21	22	25	29	17	19	21	21	24	28
	Cooling Capacity	kW	13	14	16	17	20	24	12	14	16	16	19	23
	Input power	kW	5,2	5,2	5,1	5,2	5,1	5,1	5,3	5,3	5,3	5,3	5,2	5,2
	COP	-	3,5	3,8	4,2	4,2	4,9	5,7	3,3	3,6	4,0	4,0	4,6	5,3
	Radiator flow	m³/h	1,5	1,7	1,9	1,9	2,2	2,5	3,0	3,3	3,6	3,7	4,2	4,8
	Ext. available pressure	kPa	75	74	73	72	69	64	56	52	47	46	38	28
	Brine flow	m³/h	2,8	3,2	3,6	5,0	4,4	5,3	2,7	3,1	3,5	4,8	4,2	5,1
	Ext. available pressure	kPa	96	93	89	75	81	70	97	94	90	77	82	73
RPM	**5400**													
	Heating Capacity	kW	20	22	24	24	27	32	19	21	23	24	27	31
	Cooling Capacity	kW	14	16	18	18	22	26	13	15	17	18	21	25
	Input power	kW	5,8	5,8	5,8	5,9	5,8	5,8	6,0	6,0	6,0	6,0	6,0	6,0
	COP	-	3,4	3,7	4,1	4,1	4,7	5,5	3,2	3,5	3,9	3,9	4,5	5,2
	Radiator flow	m³/h	1,7	1,9	2,0	2,1	2,4	2,8	3,3	3,7	4,0	4,1	4,6	5,4
	Ext. available pressure	kPa	74	73	71	70	66	60	51	47	41	40	31	19
	Brine flow	m³/h	3,1	3,5	4,0	5,5	4,9	5,9	3,0	3,4	3,8	5,3	4,7	5,6
	Ext. available pressure	kPa	93	90	85	69	76	64	94	91	87	71	78	67
RPM	**5900**													
	Heating Capacity	kW	22	24	26	27	30	35	21	23	25	26	29	34
	Cooling Capacity	kW	15	17	19	20	24	28	15	16	19	19	22	27
	Input power	kW	6,6	6,6	6,6	6,7	6,6	6,6	6,7	6,7	6,7	6,8	6,8	6,8
	COP	-	3,3	3,6	4,0	4,0	4,6	5,3	3,2	3,4	3,8	3,8	4,3	5,0
	Radiator flow	m³/h	1,9	2,1	2,2	2,3	2,5	3,0	3,7	4,0	4,4	4,5	5,1	5,9
	Ext. available pressure	kPa	73	71	68	67	63	56	46	41	35	33	24	11
	Brine flow	m³/h	3,4	3,9	4,4	6,1	5,3	6,4	3,3	3,7	4,2	5,8	5,1	6,1
	Ext. available pressure	kPa	91	87	81	63	71	57	92	88	83	66	74	61
RPM	**6500**													
	Heating Capacity	kW	24	26	29	30	33	39	24	26	28	29	32	37
	Cooling Capacity	kW	17	19	21	22	26	31	16	18	20	21	25	29
	Input power	kW	7,5	7,5	7,5	7,6	7,5	7,6	7,7	7,7	7,7	7,8	7,8	7,9
	COP	-	3,2	3,5	3,8	3,9	4,4	5,1	3,1	3,3	3,6	3,7	4,2	4,7
	Radiator flow	m³/h	2,1	2,3	2,5	2,6	2,9	3,4	4,1	4,5	4,8	5,0	5,6	6,5
	Ext. available pressure	kPa	70	68	64	63	59	52	40	34	28	25	15	1
	Brine flow	m³/h	3,8	4,3	4,8	6,7	5,9	7,1	3,6	4,1	4,6	6,4	5,6	6,7
	Ext. available pressure	kPa	88	83	77	55	65	49	89	84	79	59	68	54
RPM	**7200**													
	Heating Capacity	kW	27	30	32	33	37	43	26	29	31	32	36	*41
	Cooling Capacity	kW	18	21	24	24	28	34	18	20	22	23	27	*32
	Input power	kW	8,6	8,7	8,7	8,8	8,7	8,8	8,9	8,9	8,9	9,1	9,0	*9,2
	COP	-	3,1	3,4	3,7	3,8	4,3	4,9	3,0	3,2	3,5	3,5	4,0	*4,5
	Radiator flow	m³/h	2,3	2,6	2,8	2,9	3,2	3,7	4,6	5,0	5,4	5,6	6,2	*7,1
	Ext. available pressure	kPa	67	64	60	59	54	45	32	26	19	16	5	*-11

Radiator temp. in/out °C			35/25						35/30					
Brine temp. in/out °C			-6/-10	-3/-7	0/-4	0/-3	5/1	6/10	-6/-10	-3/-7	0/-4	0/-3	5/1	10/6
	Brine flow	m³/h	4,2	4,7	5,3	7,4	6,5	7,9	4,0	4,5	5,1	7,0	6,1	*7,4
	Ext. available pressure	kPa	84	78	71	45	57	38	85	80	74	50	61	*45

*Negative external pressure drop, meaning that the heat pump's circulation pump alone cannot provide the required flow.

Radiator temp. in/out °C			55/40						55/45					
Brine temp. in/out °C			-6/-10	-3/-7	0/-4	0/-3	5/1	6/10	-6/-10	-3/-7	0/-4	0/-3	5/1	10/6
RPM 1818														
	Heating Capacity	kW	7	7	8	8	9	10	6	7	7	7	8	9
	Cooling Capacity	kW	4	4	5	5	6	7	3	4	4	5	5	7
	Input power	kW	2,8	2,7	2,7	2,7	2,6	2,6	2,8	2,8	2,7	2,7	2,7	2,6
	COP	-	2,3	2,5	2,8	2,9	3,2	3,7	2,2	2,4	2,6	2,7	3,0	3,5
	Radiator flow	m³/h	0,4	0,4	0,4	0,4	0,5	0,6	0,6	0,6	0,6	0,6	0,7	0,8
	Ext. available pressure	kPa	77	77	77	77	77	77	77	77	77	77	77	77
	Brine flow	m³/h	0,8	0,9	1,0	1,4	1,3	1,5	0,8	0,9	1,0	1,3	1,2	1,4
	Ext. available pressure	kPa	110	109	108	106	106	104	110	109	109	106	107	105
RPM 2250														
	Heating Capacity	kW	8	9	10	10	11	13	8	8	9	10	11	12
	Cooling Capacity	kW	5	5	6	6	7	9	4	5	6	6	7	8
	Input power	kW	3,3	3,3	3,3	3,3	3,2	3,1	3,4	3,3	3,3	3,3	3,2	3,2
	COP	-	2,4	2,6	2,9	3,0	3,3	3,9	2,3	2,5	2,7	2,8	3,2	3,6
	Radiator flow	m³/h	0,5	0,5	0,5	0,6	0,6	0,7	0,7	0,7	0,8	0,8	0,9	1,0
	Ext. available pressure	kPa	77	77	77	77	77	77	76	77	77	77	77	77
	Brine flow	m³/h	1,0	1,2	1,3	1,9	1,6	2,0	1,0	1,1	1,3	1,7	1,5	1,8
	Ext. available pressure	kPa	108	107	106	103	104	101	109	108	107	104	105	102
RPM 2600														
	Heating Capacity	kW	9	10	11	11	12	14	9	10	11	11	12	14
	Cooling Capacity	kW	6	6	7	7	9	11	5	6	7	7	8	10
	Input power	kW	3,8	3,8	3,7	3,7	3,7	3,6	3,8	3,8	3,8	3,8	3,7	3,7
	COP	-	2,5	2,7	2,9	3,0	3,4	3,9	2,4	2,6	2,8	2,9	3,2	3,7
	Radiator flow	m³/h	0,5	0,6	0,6	0,7	0,7	0,8	0,8	0,9	0,9	0,9	1,0	1,2
	Ext. available pressure	kPa	77	78	77	77	77	76	75	74	73	72	69	76
	Brine flow	m³/h	1,2	1,7	1,9	2,6	2,3	2,8	1,4	1,6	1,8	2,5	2,2	2,2
	Ext. available pressure	kPa	107	106	105	100	102	99	108	107	105	101	103	100
RPM 3010														
	Heating Capacity	kW	11	12	13	13	15	17	11	11	12	13	14	16
	Cooling Capacity	kW	4	7	8	9	10	12	6	7	8	8	10	12
	Input power	kW	4,3	4,3	4,3	4,3	4,2	4,2	4,4	4,4	4,4	4,4	4,3	4,2
	COP	-	2,5	2,7	3,0	3,0	3,4	4,0	2,4	2,6	2,8	2,9	3,3	3,8
	Radiator flow	m³/h	0,6	0,7	0,7	0,8	0,8	1,0	0,9	1,0	1,1	1,1	1,2	1,4
	Ext. available pressure	kPa	77	77	77	77	77	77	77	77	77	77	76	75
	Brine flow	m³/h	1,5	1,7	1,9	2,6	2,3	2,8	1,4	1,6	1,8	2,5	2,2	2,6
	Ext. available pressure	kPa	106	104	103	97	99	95	106	105	103	98	100	97
RPM 3350														
	Heating Capacity	kW	12	13	14	15	16	19	12	13	14	14	16	18
	Cooling Capacity	kW	9	10	11	12	12	14	7	8	9	9	11	13
	Input power	kW	3,3	3,3	3,2	3,2	4,7	4,6	4,9	4,9	4,9	4,9	4,8	4,7
	COP	-	3,7	4,0	4,5	5,6	3,5	4,0	2,4	2,6	2,8	2,9	3,3	3,8
	Radiator flow	m³/h	1,0	1,1	1,2	1,3	0,9	1,1	1,0	1,1	1,2	1,2	1,4	1,6
	Ext. available pressure	kPa	77	77	77	76	77	77	77	77	76	76	75	74
	Brine flow	m³/h	1,9	2,2	2,5	3,4	2,6	3,1	1,6	1,8	2,0	2,8	2,4	2,9
	Ext. available pressure	kPa	103	101	98	91	97	93	105	104	102	96	98	94
RPM 3600														
	Heating Capacity	kW	13	14	15	16	18	20	13	14	15	15	17	19
	Cooling Capacity	kW	8	9	10	11	12	15	8	9	10	10	12	14
	Input power	kW	5,2	5,2	5,1	5,2	5,1	5,0	5,3	5,3	5,2	5,2	5,2	5,1

Radiator temp. in/out °C			55/40						55/45					
Brine temp. in/out °C			-6/-10	-3/-7	0/-4	0/-3	5/1	6/10	-6/-10	-3/-7	0/-4	0/-3	5/1	10/6
	COP	-	2,5	2,7	3,0	3,1	3,5	4,0	2,4	2,6	2,9	2,9	3,3	3,8
	Radiator flow	m³/h	0,8	0,8	0,9	0,9	1,0	1,2	1,1	1,2	1,3	1,3	1,5	1,7
	Ext. available pressure	kPa	77	77	77	77	77	76	77	76	76	76	75	74
	Brine flow	m³/h	1,8	2,0	2,3	3,2	2,8	3,4	1,7	1,9	2,2	3,0	2,6	3,2
	Ext. available pressure	kPa	104	102	100	93	96	90	104	103	101	94	97	93
RPM	**4300**													
	Heating Capacity	kW	16	17	18	19	21	24	15	17	18	18	20	23
	Cooling Capacity	kW	10	11	12	13	15	18	9	10	12	12	14	17
	Input power	kW	6,2	6,2	6,2	6,2	6,2	6,1	6,3	6,3	6,3	6,3	6,3	6,2
	COP	-	2,5	2,7	3,0	3,0	3,4	4,0	2,4	2,6	2,8	2,9	3,3	3,8
	Radiator flow	m³/h	0,9	1,0	1,1	1,1	1,2	1,4	1,3	1,5	1,6	1,6	1,8	2,0
	Ext. available pressure	kPa	77	77	77	77	76	75	76	75	74	74	73	71
	Brine flow	m³/h	2,1	2,4	2,8	3,8	3,4	4,1	2,0	2,3	2,6	3,6	3,2	3,8
	Ext. available pressure	kPa	101	99	96	87	91	84	102	100	97	89	92	86
RPM	**4900**													
	Heating Capacity	kW	18	20	21	22	24	28	18	19	21	21	23	27
	Cooling Capacity	kW	11	12	14	14	17	20	10	12	13	14	16	19
	Input power	kW	7,2	7,2	7,2	7,2	7,2	7,1	7,3	7,3	7,3	7,4	7,3	7,2
	COP	-	2,5	2,7	2,9	3,0	3,4	3,9	2,4	2,6	2,8	2,9	3,2	3,7
	Radiator flow	m³/h	1,0	1,1	1,2	1,3	1,4	1,6	1,5	1,7	1,8	1,8	2,0	2,3
	Ext. available pressure	kPa	77	77	76	76	75	74	75	74	73	72	71	66
	Brine flow	m³/h	2,5	2,8	3,1	4,4	3,8	4,6	2,7	2,7	3,0	4,1	3,6	4,4
	Ext. available pressure	kPa	99	96	93	81	86	78	100	97	94	84	88	81
RPM	**5400**													
	Heating Capacity	kW	20	22	23	24	27	30	19	21	23	23	26	29
	Cooling Capacity	kW	12	14	15	16	19	22	11	13	14	15	18	21
	Input power	kW	8,0	8,0	8,1	8,1	8,0	8,0	8,2	8,2	8,2	8,3	8,2	8,1
	COP	-	2,5	2,7	2,9	3,0	3,3	3,8	2,4	2,6	2,8	2,8	3,1	3,6
	Radiator flow	m³/h	1,2	1,3	1,4	1,4	1,5	1,8	1,7	1,8	2,0	2,0	2,3	2,6
	Ext. available pressure	kPa	77	76	76	76	75	73	74	73	71	71	68	63
	Brine flow	m³/h	2,7	3,1	3,5	4,8	4,2	5,1	2,6	2,9	3,3	4,6	4,0	4,8
	Ext. available pressure	kPa	97	94	90	77	83	73	98	95	92	79	85	76
RPM	**5900**													
	Heating Capacity	kW	22	24	26	26	29	33	21	23	25	25	28	32
	Cooling Capacity	kW	13	15	17	17	20	24	12	14	16	16	19	23
	Input power	kW	8,9	8,9	9,0	9,0	9,0	8,9	9,1	9,1	9,1	9,2	9,1	9,1
	COP	-	2,5	2,6	2,9	2,9	3,2	3,7	2,4	2,5	2,7	2,8	3,1	3,5
	Radiator flow	m³/h	1,3	1,4	1,5	1,5	1,7	1,9	1,9	2,0	2,2	2,2	2,5	2,8
	Ext. available pressure	kPa	76	76	75	75	74	72	72	71	69	68	65	60
	Brine flow	m³/h	3,0	3,3	3,8	5,2	4,6	5,5	2,8	3,2	3,6	5,0	4,3	5,2
	Ext. available pressure	kPa	95	91	87	72	79	68	96	93	89	75	81	72
RPM	**6500**													
	Heating Capacity	kW	24	26	28	29	32	36	24	25	27	28	31	35
	Cooling Capacity	kW	14	16	18	19	22	26	13	15	17	18	21	25
	Input power	kW	10,0	10,1	10,1	10,2	10,1	10,1	10,2	10,3	10,3	10,4	10,3	10,3
	COP	-	2,4	2,6	2,8	2,8	3,2	3,6	2,3	2,5	2,6	2,7	3,0	3,4
	Radiator flow	m³/h	1,4	1,5	1,6	1,7	1,9	2,1	2,1	2,2	2,4	2,4	2,7	3,0
	Ext. available pressure	kPa	75	75	74	74	72	70	70	68	66	65	61	56
	Brine flow	m³/h	3,2	3,7	4,1	5,7	5,0	6,0	3,1	3,5	3,9	5,4	4,7	5,6
	Ext. available pressure	kPa	92	88	84	67	75	63	94	90	86	70	78	67
RPM	**7200**													
	Heating Capacity	kW	27	29	31	32	35	39	26	28	30	31	34	38
	Cooling Capacity	kW	15	17	20	20	24	28	15	16	18	19	22	26
	Input power	kW	11,4	11,5	11,5	11,6	11,6	11,6	11,6	11,7	11,8	11,9	11,8	11,9
	COP	-	2,4	2,5	2,7	2,7	3,0	3,4	2,2	2,4	2,6	2,6	2,9	3,2

Radiator temp. in/out °C		55/40						55/45					
Brine temp. in/out °C		-6/-10	-3/-7	0/-4	0/-3	5/1	6/10	-6/-10	-3/-7	0/-4	0/-3	5/1	10/6
Radiator flow	m³/h	1,6	1,7	1,8	1,9	2,0	2,3	2,3	2,4	2,6	2,7	3,0	3,3
Ext. available pressure	kPa	75	74	73	73	71	67	67	65	62	61	57	52
Brine flow	m³/h	3,6	4,0	4,5	6,2	5,4	6,4	3,4	3,8	4,2	5,8	5,1	6,0
Ext. available pressure	kPa	89	85	80	60	70	57	61	87	83	65	73	63

Radiator temp. in/out °C		65 / 40					
Brine temp. in/out °C		-6/-10	-3/-7	0/-4	0/-3	5/1	10/6
RPM 1818							
Heating Capacity	kW	7	7	7	8	8	9
Cooling Capacity	kW	3	4	4	5	5	6
Input power	kW	3,2	3,1	3,1	3,1	3,0	3,0
COP	-	2,1	2,2	2,4	2,5	2,8	3,2
Radiator flow	m³/h	0,4	0,4	0,4	0,4	0,5	0,5
Ext. available pressure	kPa	77	77	77	77	77	77
Brine flow	m³/h	0,7	0,8	1,0	1,8	1,6	1,9
Ext. available pressure	kPa	110	109	108	106	105	102
RPM 2250							
Heating Capacity	kW	8	9	9	10	11	12
Cooling Capacity	kW	4	5	6	6	7	8
Input power	kW	3,8	3,7	3,7	3,7	3,6	3,5
COP	-	2,2	2,4	2,6	2,6	2,9	3,4
Radiator flow	m³/h	0,5	0,5	0,5	0,6	0,6	0,7
Ext. available pressure	kPa	77	77	77	77	77	77
Brine flow	m³/h	1,0	1,1	1,3	1,7	1,5	1,8
Ext. available pressure	kPa	109	108	107	104	105	102
RPM 2600							
Heating Capacity	kW	9	10	11	11	12	14
Cooling Capacity	kW	5	6	7	7	8	10
Input power	kW	4,2	4,2	4,2	4,2	4,1	4,0
COP	-	2,2	2,4	2,6	2,7	3,0	3,5
Radiator flow	m³/h	0,6	0,6	0,6	0,6	0,7	0,8
Ext. available pressure	kPa	77	77	77	77	77	77
Brine flow	m³/h	1,2	1,3	1,5	2,1	1,8	2,2
Ext. available pressure	kPa	108	107	105	101	103	100
RPM 3010							
Heating Capacity	kW	11	12	13	13	14	16
Cooling Capacity	kW	6	7	8	8	10	12
Input power	kW	4,8	4,8	4,8	4,8	4,7	4,6
COP	-	2,3	2,5	2,7	2,7	3,1	3,5
Radiator flow	m³/h	0,6	0,7	0,7	0,8	0,8	0,9
Ext. available pressure	kPa	77	77	77	77	77	77
Brine flow	m³/h	1,4	1,6	1,8	2,4	2,1	2,6
Ext. available pressure	kPa	106	105	103	99	100	97
RPM 3350							
Heating Capacity	kW	12	13	14	15	16	18
Cooling Capacity	kW	7	8	9	9	11	13
Input power	kW	5,3	5,3	5,3	5,3	5,2	5,1
COP	-	2,3	2,5	2,7	2,8	3,1	3,6
Radiator flow	m³/h	0,7	0,8	0,8	0,8	0,9	1,1
Ext. available pressure	kPa	77	77	77	76	77	77
Brine flow	m³/h	1,5	1,8	2,0	2,8	2,4	2,9
Ext. available pressure	kPa	105	104	102	96	98	94
RPM 3600							
Heating Capacity	kW	13	14	15	16	17	20
Cooling Capacity	kW	7	9	10	10	12	14
Input power	kW	5,7	5,7	5,7	5,7	5,6	5,5

Radiator temp. in/out °C			65 / 40					
Brine temp. in/out °C			-6/-10	-3/-7	0/-4	0/-3	5/1	10/6
	COP	-	2,3	2,5	2,7	2,8	3,1	3,6
	Radiator flow	m³/h	0,8	0,8	0,9	0,9	1,0	1,1
	Ext. available pressure	kPa	77	77	77	77	77	76
	Brine flow	m³/h	1,7	1,9	2,2	3,0	2,6	3,2
	Ext. available pressure	kPa	104	103	101	94	97	92
RPM	**4300**							
	Heating Capacity	kW	16	17	18	19	21	24
	Cooling Capacity	kW	9	10	12	12	14	17
	Input power	kW	6,8	6,8	6,8	6,8	6,7	6,7
	COP	-	2,3	2,5	2,7	2,8	3,1	3,6
	Radiator flow	m³/h	0,9	1,0	1,1	1,1	1,2	1,4
	Ext. available pressure	kPa	77	77	77	77	76	75
	Brine flow	m³/h	2,0	2,3	2,6	3,6	3,2	3,8
	Ext. available pressure	kPa	102	100	97	89	92	8864
RPM	**4900**							
	Heating Capacity	kW	18	19	21	22	24	27
	Cooling Capacity	kW	10	12	13	14	16	19
	Input power	kW	7,8	7,8	7,8	7,9	7,8	7,7
	COP	-	2,3	2,5	2,7	2,7	3,1	3,5
	Radiator flow	m³/h	1,1	1,1	1,2	1,3	1,4	1,6
	Ext. available pressure	kPa	77	77	76	76	75	74
	Brine flow	m³/h	2,3	2,6	3,0	4,1	3,6	4,4
	Ext. available pressure	kPa	100	97	94	84	88	81
RPM	**5400**							
	Heating Capacity	kW	20	22	23	24	26	30
	Cooling Capacity	kW	11	13	14	15	18	21
	Input power	kW	8,7	8,7	8,8	8,8	8,7	8,7
	COP	-	2,3	2,5	2,6	2,7	3,0	3,4
	Radiator flow	m³/h	1,2	1,3	1,4	1,4	1,5	1,1,78
	Ext. available pressure	kPa	76	76	76	75	75	73
	Brine flow	m³/h	2,6	2,9	3,3	4,6	4,0	4,8
	Ext. available pressure	kPa	98	95	92	79	85	76
RPM	**5900**							
	Heating Capacity	kW	22	24	25	26	29	32
	Cooling Capacity	kW	12	14	16	16	19	23
	Input power	kW	9,6	9,7	9,7	9,8	9,7	9,7
	COP	-	2,3	2,4	2,6	2,7	3,0	3,4
	Radiator flow	m³/h	1,3	1,4	1,5	1,5	1,7	1,9
	Ext. available pressure	kPa	76	75	75	75	74	72
	Brine flow	m³/h	2,8	3,2	3,6	4,9	4,3	5,2
	Ext. available pressure	kPa	96	93	89	75	81	72
RPM	**6500**							
	Heating Capacity	kW	24	28	28	28	31	35
	Cooling Capacity	kW	13	15	17	17	20	24
	Input power	kW	10,8	10,9	10,9	11,0	11,0	11,0
	COP	-	2,2	2,4	2,6	2,6	2,9	3,2
	Radiator flow	m³/h	1,4	1,5	1,6	1,7	1,8	2,1
	Ext. available pressure	kPa	75	75	74	74	73	70
	Brine flow	m³/h	3,1	3,5	3,9	5,4	4,7	5,6
	Ext. available pressure	kPa	94	90	86	70	78	67
RPM	**7200**							
	Heating Capacity	kW	27	29	31	31	35	*N/A
	Cooling Capacity	kW	14	16	18	19	22	*N/A
	Input power	kW	12,2	12,3	12,4	12,5	12,5	*N/A

Radiator temp. in/out °C		65 / 40					
Brine temp. in/out °C		-6/-10	-3/-7	0/-4	0/-3	5/1	10/6
COP	-	2,2	2,3	2,5	2,5	2,8	*N/A
Radiator flow	m³/h	1,6	1,7	1,8	1,8	2,0	*N/A
Ext. available pressure	kPa	74	74	73	73	71	*N/A
Brine flow	m³/h	3,3	3,8	4,2	5,8	5,1	*N/A
Ext. available pressure	kPa	91	87	83	65	74	*N/A

*The required flow rate is outside the heat pump's operating envelope. The heat pump can continue to operate, but at a larger ΔT.

14.2 Reference output data Morix M

Radiator temp. in/out °C			35/30				55/47			
Brine temp. in/out °C			--5/-8	0/-3	5/2	10/7	--5/-8	0/-3	5/2	10/7
RPM	**1818**									
	Heating Capacity	kW	10,6	12,3	14,3	16,4	10,3	11,6	13,4	15,1
	Cooling Capacity	kW	7,9	9,6	11,7	13,8	6,3	4,6	9,4	11,1
	Input power	kW	2,7	2,7	2,6	2,6	4,0	4,0	4,0	4,0
	COP	-	3,9	4,6	5,4	6,2	2,6	2,9	3,4	3,8
	Radiator flow	m³/h	1,8	2,1	2,5	2,8	1,2	1,3	1,5	1,6
	Brine flow	m³/h	2,1	2,8	3,4	4,1	1,6	2,2	2,8	3,4
RPM	**3600**									
	Heating Capacity	kW	21,3	25,1	29,0	33,7	20,5	23,5	26,8	30,8
	Cooling Capacity	kW	15,6	19,4	23,3	27,8	12,4	15,4	18,7	22,6
	Input power	kW	5,7	5,7	5,7	5,9	8,1	8,1	8,1	8,2
	COP	-	3,7	4,4	5,1	5,8	2,5	2,9	3,3	3,8
	Radiator flow	m³/h	3,7	4,4	5,1	5,8	2,2	2,6	2,9	3,4
	Brine flow	m³/h	4,2	5,5	6,7	8,2	3,4	4,4	5,5	6,5
RPM	**4400**									
	Heating Capacity	kW	26,4	30,6	35,1	41,0	24,9	28,6	32,7	37,5
	Cooling Capacity	kW	19,1	23,3	27,7	33,3	14,9	18,4	22,5	27,3
	Input power	kW	7,3	7,3	7,4	7,7	10,0	10,2	10,2	10,2
	COP	-	3,6	4,2	4,7	5,3	2,5	2,8	3,2	3,7
	Radiator flow	m³/h	4,6	5,3	6,1	7,1	2,7	3,1	3,6	4,1
	Brine flow	m³/h	5,1	6,4	7,5	9,8	4,1	5,3	6,6	8,1
RPM	**5400**									
	Heating Capacity	kW	32,3	38,8	43,4	50,5	31,0	35,2	39,8	45,6
	Cooling Capacity	kW	22,9	29,2	33,5	40,3	18,0	22,2	26,8	32,5
	Input power	kW	9,4	9,6	9,9	10,2	13,0	13,0	13,0	13,1
	COP	-	3,4	4,0	4,4	5,0	2,4	2,7	3,1	3,5
	Radiator flow	m³/h	5,6	6,7	7,5	8,7	3,4	3,8	4,3	5,0
	Brine flow	m³/h	6,3	7,9	9,8	12,1	4,9	6,3	7,9	9,7
RPM	**6300**									
	Heating Capacity	kW	38,6	44,9	50,7	55,3	36,0	41,0	46,6	49,7
	Cooling Capacity	kW	27,0	32,8	38,3	42,3	20,4	25,2	30,7	33,2
	Input power	kW	11,6	12,1	12,4	13,0	15,6	15,8	15,9	16,5
	COP	-	3,3	3,7	4,1	4,2	2,3	2,6	2,9	3,0
	Radiator flow	m³/h	6,7	7,7	8,7	9,5	3,9	4,5	5,1	5,4
	Brine flow	m³/h	6,9	9,2	11,3	12,5	5,6	7,2	9,1	9,9

15 Estimated current

15.1 Estimated current Morix S and S-E

Rad out °C	Estimated current (A) for Morix S and S-E[2]							
75 °C	-	24,5	24,5	24,5	24,5	21,3	21,1	19,4
70 °C	23,0	23,4	23,7	23,7	23,7	23,6	19,7	18,1
65 °C	21,6	22,0	22,1	22,2	22,1	22,0	18,4	16,9
60 °C	20,3	20,6	20,7	20,7	20,6	20,5	17,2	15,8
55 °C	19,1	19,3	19,4	19,4	19,3	19,2	16,1	14,8
50 °C	17,9	18,1	18,2	18,2	18,1	18,0	15,1	13,9
45 °C	16,9	17,1	17,1	17,1	17,0	16,9	14,2	13,1
40 °C	16,0	16,1	16,2	16,1	16,0	16,0	13,5	12,4
35 °C	15,2	15,3	15,3	15,3	15,2	15,1	12,8	11,8
30 °C	14,4	14,5	14,6	14,5	14,5	14,4	12,2	11,3
25 °C	13,8	13,9	13,9	13,9	13,9	13,9	11,7	-
20 °C	13,3	13,4	13,4	13,4	13,4	13,5	-	-
Brine in °C	**-10**	**-5**	**0**	**5**	**10**	**15**	**20**	**25**

2) The table only includes estimated current in compressor-only operation. Since Morix S-E also have a built-in immersion heater, its estimated current must be added separately to the table values, with consideration on how many steps that are planned to be used. To include immersion heater estimated current,

- for Step 1 (5kW) : add 7,2 A to table value.
- for Step 2 (10kW): add 14,5 A to table value.
- or Step 3 (15kW): add 21,7 A to table value.

15.2 Estimated current for Morix M

Rad out °C	Estimated current (A) for Morix M							
75 °C		32	32,0	32,0	32,0	32,0	28,1	23,9
70 °C	31,0	31,4	31,7	31,8	31,8	30,4	26,1	22,3
65 °C	28,9	29,3	29,5	29,6	29,6	28,3	24,3	20,8
60 °C	26,9	27,3	27,5	27,6	27,5	26,3	22,7	19,4
55 °C	25,2	25,5	25,7	25,7	25,7	24,6	21,2	18,1
50 °C	23,5	23,8	24,0	24,1	24,1	23,0	19,8	16,9
45 °C	22,1	22,3	22,5	22,5	22,6	21,6	18,6	15,9
40 °C	20,8	21,0	21,1	21,2	21,2	20,3	17,5	14,9
35 °C	19,6	19,8	20,0	20,0	20,1	19,3	16,5	14,0
30 °C	18,6	18,8	18,9	19,0	19,1	18,3	15,7	13,2
25 °C	17,8	18,0	18,1	18,2	18,3	17,5	15,0	-
20 °C	17,1	17,2	17,4	17,5	17,6	16,9	-	-
Brine in °C	**-10**	**-5**	**0**	**5**	**10**	**15**	**20**	**25**

Thermia AB
Box 950
SE 671 29 ARVIKA
Phone +46 570 81300
E-mail: info@thermia.com
Website: www.thermia.com

Thermia can accept no responsibility for possible errors in catalogues, brochures and other printed material. Thermia reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequential changes being necessary in specifications already agreed. All trademarks in this material are property of the respective companies. Thermia AB and the Thermia AB logotype are trademarks of Thermia AB. All rights reserved.

BWMOI01TD0102

Produced by Thermia AB © 2026