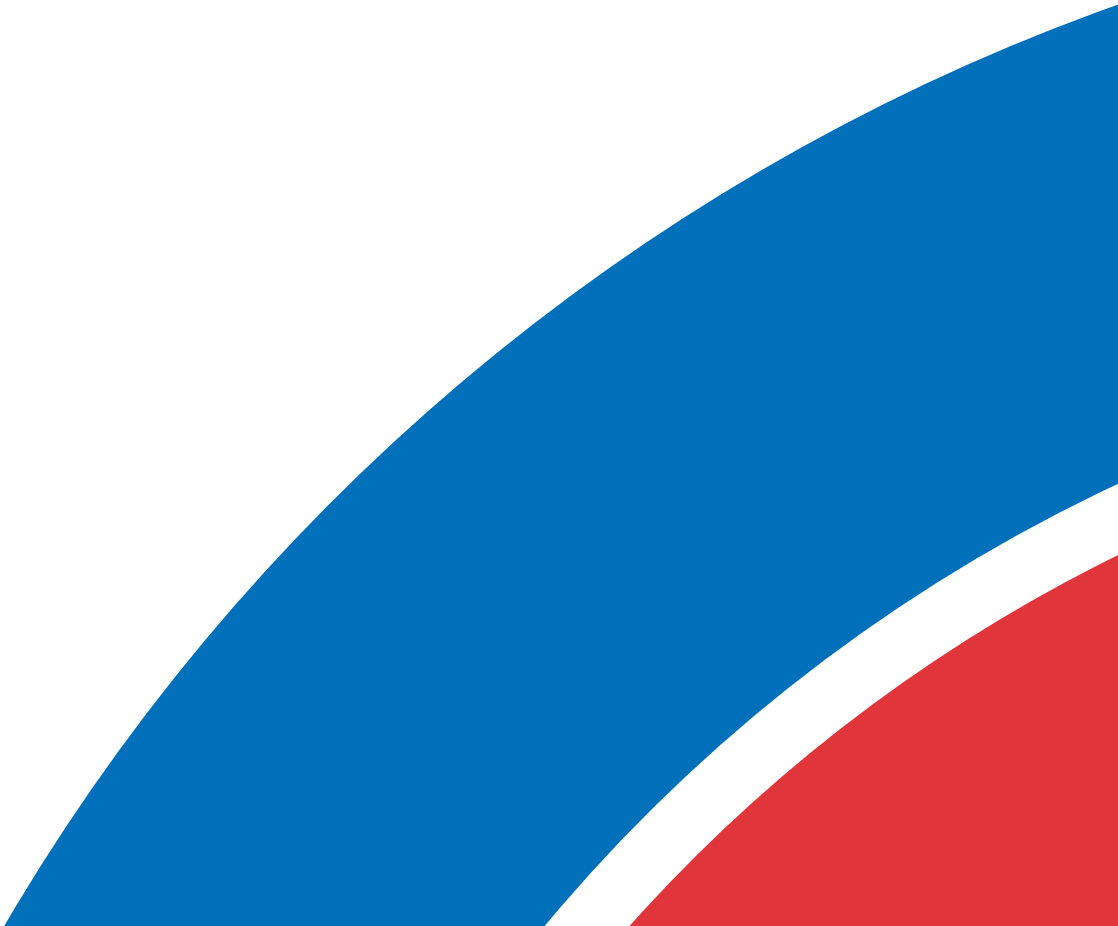
INSTALLATION GUIDE

Sigrin

Brine/water 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)

Table of Contents

Table of Contents

1 About documents and decals

This manual is intended for installers with a prior experience in installing heat pumps. Industrial standards, common practise and local regulations must always be followed even if the explicit requirements may not be stated in this manual.

Manuals with more extensive information and technical information can be found and downloaded here:

www.thermia.com under the tab **Partner Login**.

1.1 Symbols in documentation

The instructions contain different warning symbols, which, together with text, indicate to the user that there are risks involved with actions to be taken.

The symbols are displayed to the left of the text with two different symbols used to indicate the degree of danger and one symbol to give extra attention:

Danger

Indicates an immediate danger that leads to fatal or serious injury if necessary measures are not taken.

Warning

Risk of personal injury! Indicates a possible danger that can lead to fatal or serious injury if necessary measures are not taken.

Caution

Risk of installation damage. Indicates a possible hazard that can lead to item damage if necessary measures are not taken.

Note

Information regarding making the handling of the installation easier or anything that may need further attention.

1.2 Symbols on decals

1.2.1 General

Warning, danger!

Read the documentation provided.

Read the documentation provided.

Warning, hazardous electrical voltage!

Warning, hot surfaces!

Warning, moving parts!

Warning, risk of crushing injury!

1.2.2 Electrical Components

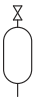
Component, ordinary delivery according to proposed system solutions.

Components, accessories according to proposed system solutions.

1.2.3 Pipe Connections

Tap water

Heating system



Expansion tank with safety valve

Air bleeding

Water heater

2 General product information

2.1 Refrigerant: General

Note

Service maintenance and repair such as: breaking into the refrigerant; opening of sealed components; opening of ventilated enclosures, shall be performed by competent personnel only.

Note

Compliance with national gas regulations shall be observed.

2.2 Refrigerant: Additional precautions for R454C (A2L refrigerant)

This appliance is charged with R454C, a mildly flammable refrigerant.

Warning

In accordance to IEC60335-2-40:2024, prior to installation, the appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance, an operating electric heater or a hot surface with a temperature above 700 °C).

Warning

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. Be aware that refrigerants may not contain an odour. Do not pierce or burn. If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system.

2.3 General precautions

Caution **Installation site, indoors.**

This product is made for indoor use only.

Caution **Installation site, height above sea level.**

This product may not be installed at a height above sea level that exceeds 2000m.

2.4 Scrapping

Caution **Appliance disposal**

When the heat pump has reached end-of-life and is subject to scrapping, it should be sent to a recycling/ treatment facility to ensure correct handling of disassembly, recycling, and disposal. Local rules and regulations related to correct extraction and disposal of refrigerant and compressor oil must be followed.

To empty the water in the water tank, follow the instructions below:

1. Turn off the power.
2. Turn off the water supply from the main water line.
3. Empty the tank from the top using a siphon hose.

Make sure to read chapter **12 Recovering and filling the refrigerant** for safe recovery of the refrigerant.

2.5 Water quality

This heat pump and its components is developed to reliably and efficiently work with water qualities in line with VDI 2035. In practice this means that some general precautions should be taken:

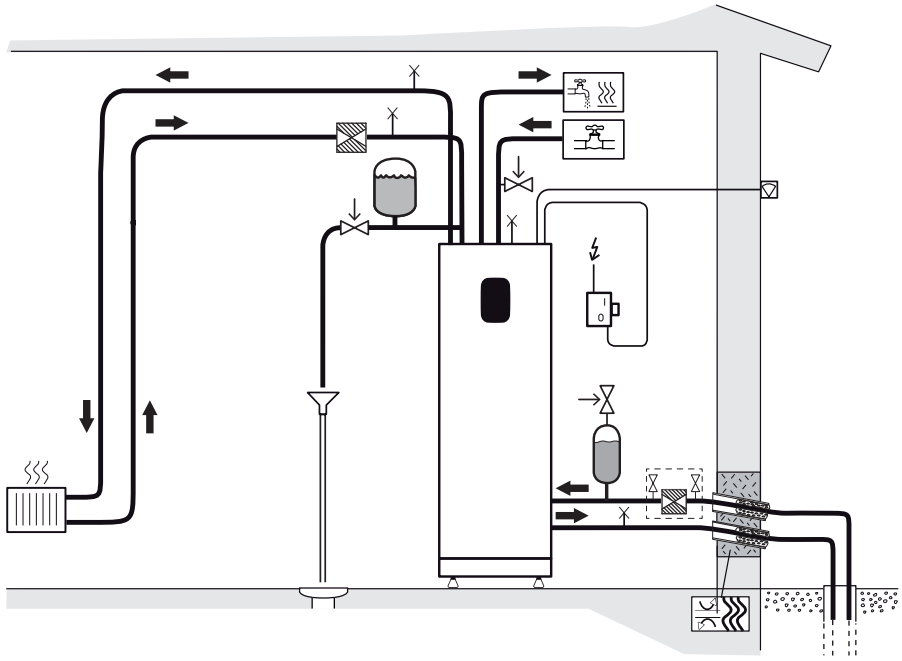
As a heating system often contains small amounts of suspended solids (rust) and sludge products from calcium oxide, precaution should be taken to ensure that the water in the heating system is as clean as possible to ensure long lasting performance and minimize the risk of reliability issues. If magnetite can be expected in the heating system, cleaning of system and /or installation of magnetite filters should always be considered. Any filters supplied with the heat pumps should always be installed. The dirt strainer should be fitted on the return line from the heating system, as close to the heat pump as possible.

Heating system, hot water and brine circuit:

Chemical and/or oil contamination shall always be avoided. In areas where there are exceptional water conditions with regards to hard water, a softening filter may be necessary to use/install. The softening filter softens the water, cleans any impurities and prevents the buildup of calcification. The hot water tank is designed to work well in all normal drinking water qualities in line with the European drinking water directive (2020/2184). With regards to chloride level this means that it is approved to up to 250 mg/l.

2.6 Overview image

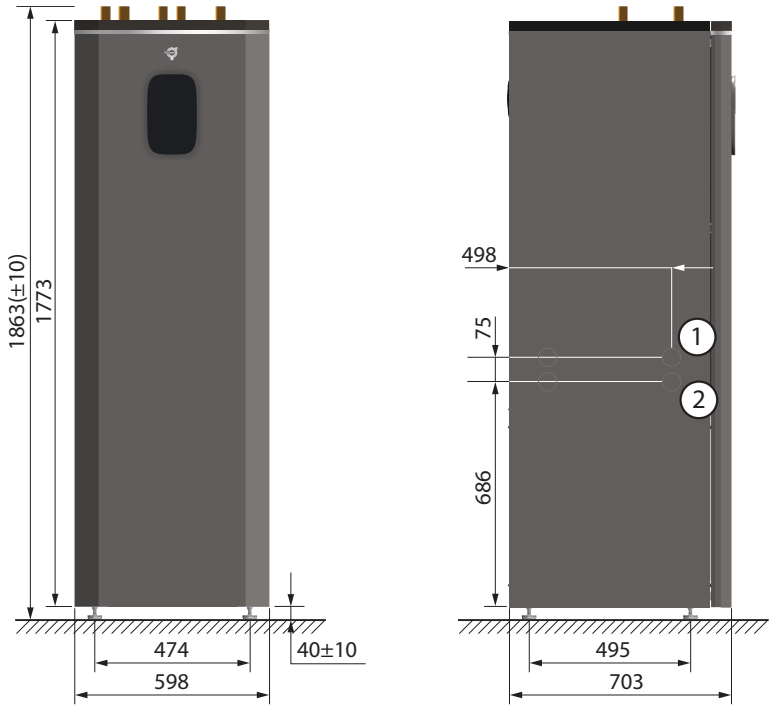
2.6.1 Overview image

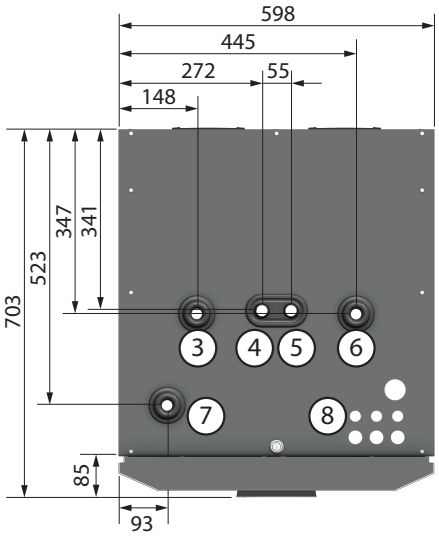


– Hot water
– Heating system
– Power
– Brine

3 Heat pump data, dimensions and connections

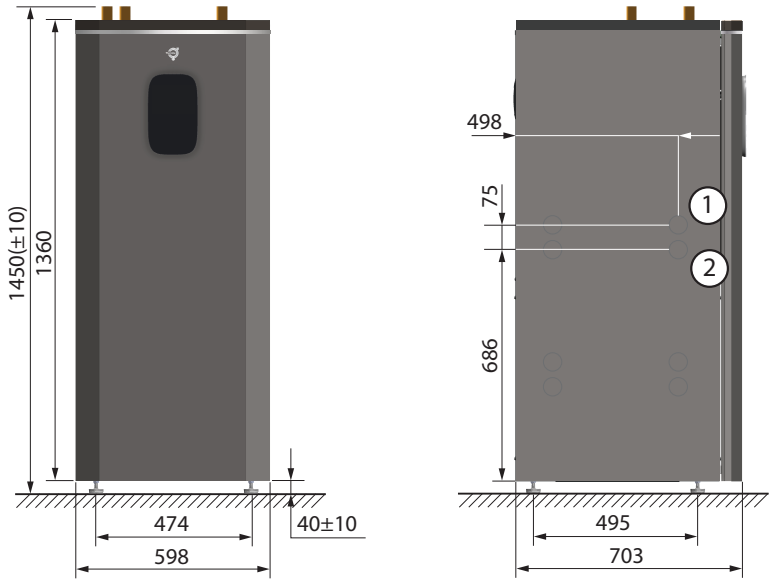
3.1 Sigrin 9, 13 & 19

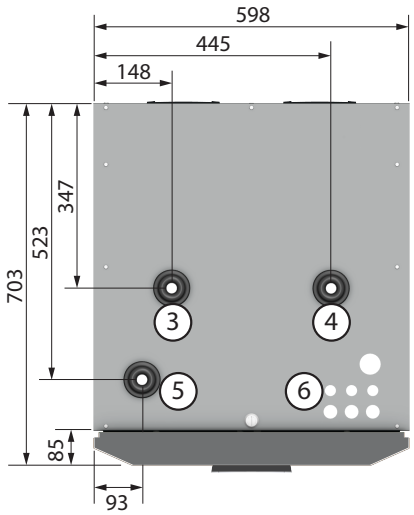




1. Brine in, 28mm
2. Brine out, 28mm
3. Heating system return, 28mm
4. Hot water line, 22mm
5. Cold water line, 22mm
6. Connection for bleed valve, 22mm
7. Heating system supply, 28mm
8. Lead-in for power supply, sensor and communication cables

3.2 Sigrin 9, 13 & 19 Duo





1. Brine in, 28mm
2. Brine out, 28mm
3. Heating system and hot water tank return, 28mm
4. Heating supply to hot water tank, 28mm
5. Heating system supply, 28mm
6. Lead-in for power supply, sensor and communication cables

3.3 Delivery content

Installation kit

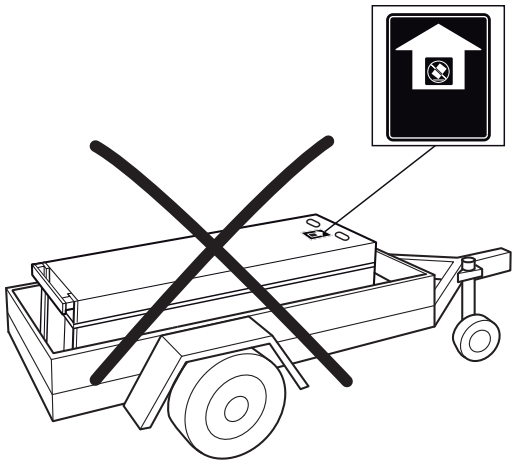
Description
Insulation tape
Plastic manual holder
Push-fit elbow
Cable inlet M40 black
Cable inlet M20 black
Cable inlet M25 black
Grommet
Outdoor sensor
Safety valve 9 bar
Filter ball DN25 PN16
Cardboard box

Brine assy install kit

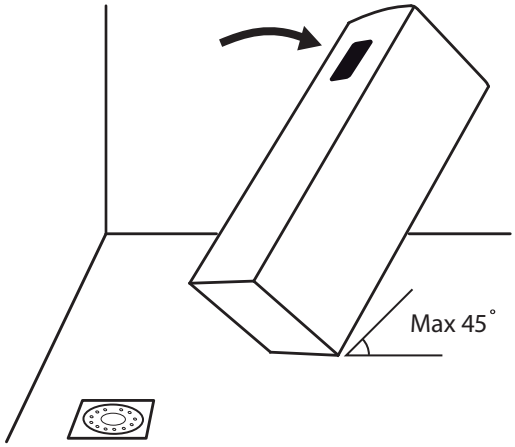
Description
Pipe insulation X3
Brine pipe out
Brine pipe in

4 Transportation, space requirements and recommended location

4.1 Transportation

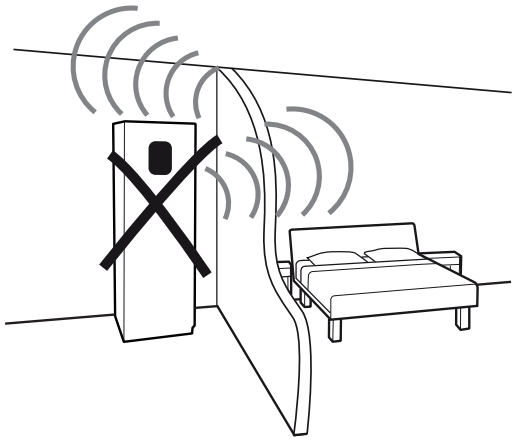


The heat pump must not be transported lying down.

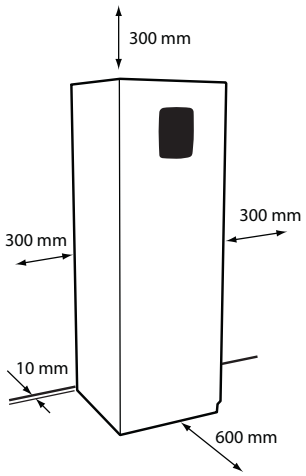


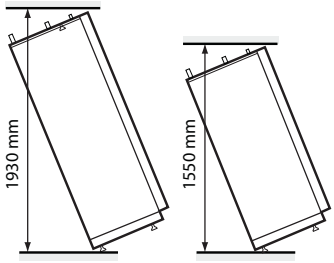
Maximum tilt 45°.

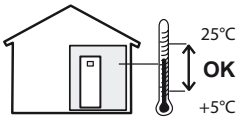
4.2 Space requirements and recommended location

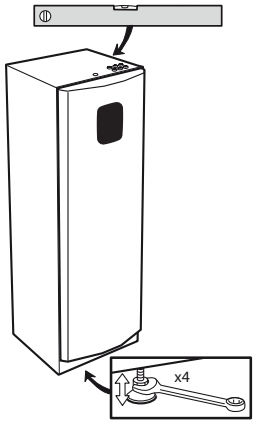


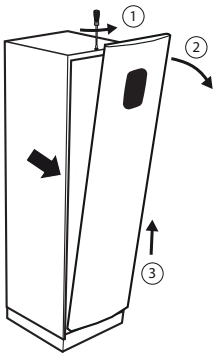
Avoid placing the heat pump in a corner or near a bedroom. The surrounding walls can amplify the sound from the heat pump.





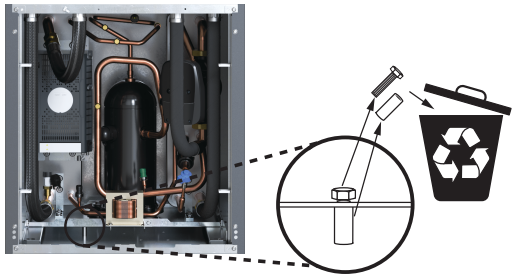






Adjust the heat pump using the adjustable feet so that it is horizontal on the ground.

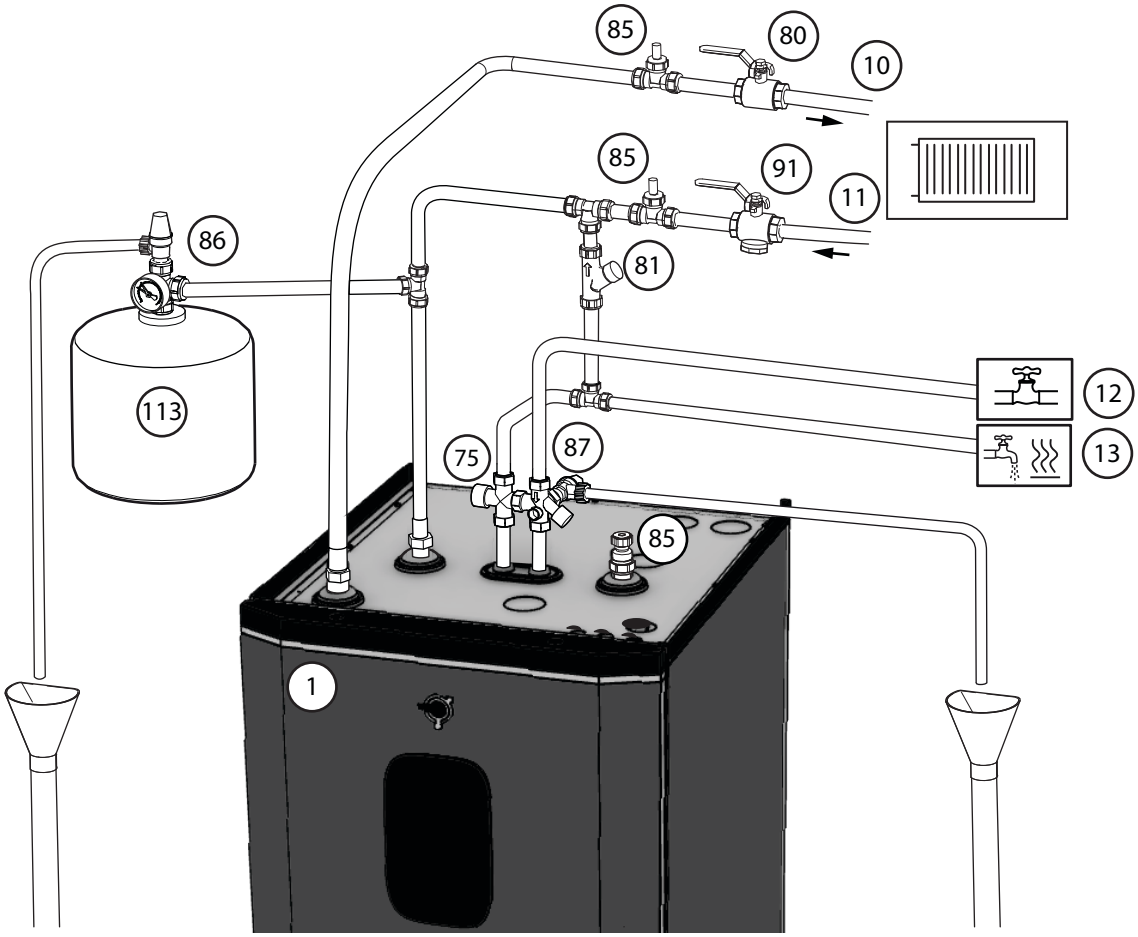
The appliance shall be stored and installed so as to prevent mechanical damage from occurring.



When the heat pump is in position, remove the transport safety. (If the heat pump should be moved further, put back the transport safety screw.) Make sure all parts of the transport safety is removed!

5 Heating and hot water connections

5.1 Heating and hot water connections high model

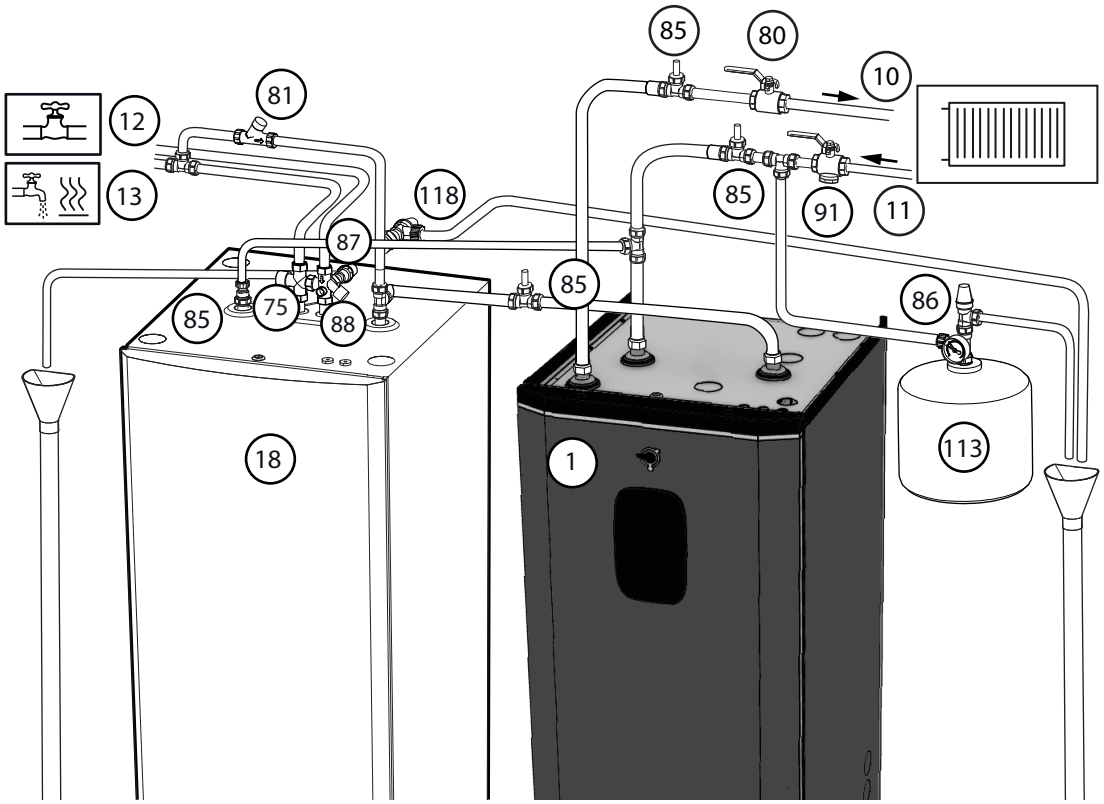


Position number	Description
1	Heat pump
10	Heating system supply pipe
11	Heating system return pipe
12	Cold water line
13	Hot water line
80	Shut-off valve
81	Filling valve
85	Venting valve
86	Safety valve (Max 3 bar, heat pump), recommended: 1,5 bar
87	Safety valve (9 bar, hot water)
91	Dirt strainer with shut-off valve, DN 25
113	Expansion vessel

Important! Everything in the picture is NOT included in delivery, but a representation of an installation.

Make sure that a free flow is always possible on the heating circuit. Insufficient water volumes or stop in the heating circuit may cause operational disturbances.

5.2 Heating and hot water connections duo model



Position number	Description
1	Heat pump
10	Heating system supply line
11	Heating system return line
12	Cold water line
13	Hot water line
18	Coil tank
80	Shut-off valve
81	Draining/filling valve
85	Manual air bleeding valve
86	Safety valve
87	Safety valve (9 bar, hot water)
88	Valve pipe (cold water)
91	Dirt strainer with shut-off valve, DN 25
113	Expansion vessel

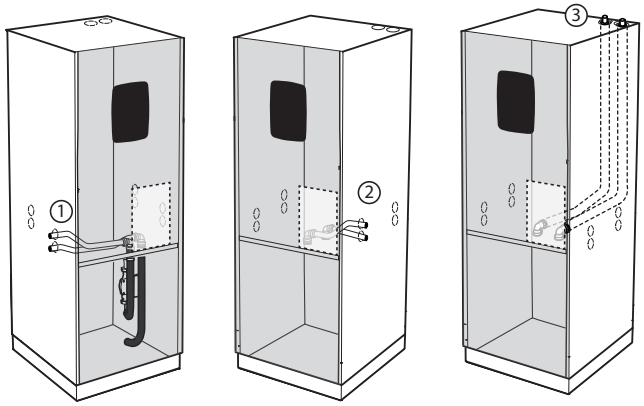
Important! Everything in the picture is NOT included in delivery, but a representation of an installation.

Make sure that a free flow is always possible on the heating circuit. Insufficient water volumes or stop in the heating circuit may cause operational disturbances.

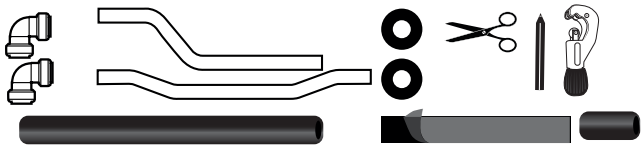
6 Brine connections

6.1 Brine connections, alternatives

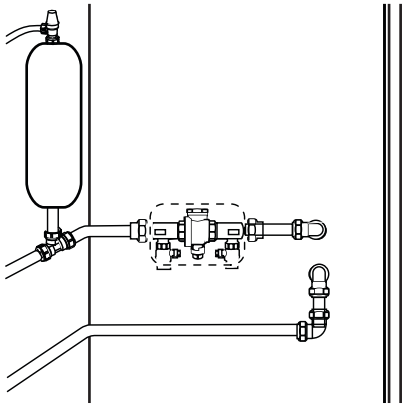
1. Left knock-out
2. Right knock-out
3. Top knock-out



Equipment setup for installing:

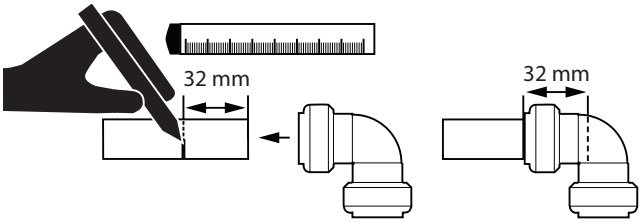


Expansion vessel and filling device, brine:



6.2 General information for brine connections

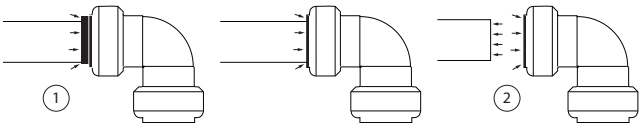
The quick couplings included are tool-free and pushed in place. The coupling locks automatically. Before mounting, check that there are no sharp edges or irregularities on the pipe that could damage the rubber sealing in the couplings and cause leakage. The coupling can be rotated after mounting on pipes.



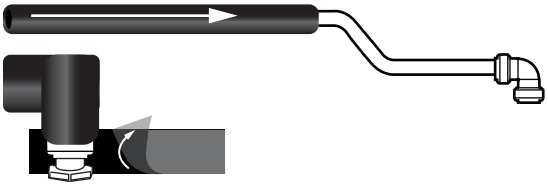
Press the coupling on to the pipe and make sure it reaches the 32mm mark.

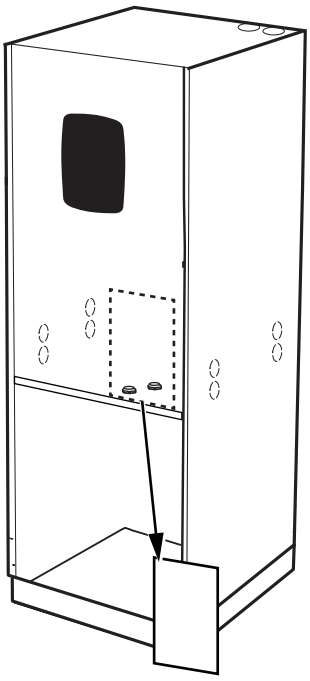
Do the following to disassemble:

1. Push the plastic ring inwards
2. Pull the pieces apart

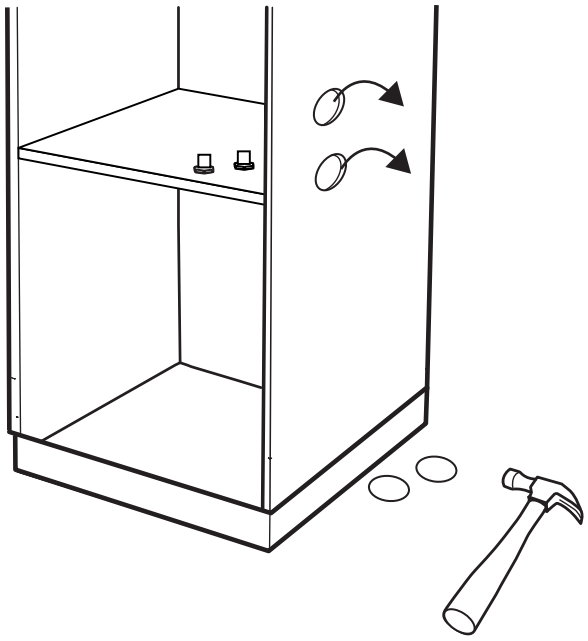


Insulate the brine pipe and prepare with the insulation tape before installing the pipe in the heat pump. Loosen the tape from the protective film partly, and place it behind the clutch when mounted on the pipe. This makes it easier to complete the insulation when the pipe is in place in the heat pump.





In order to access the brine connections, the heat pump front and the metal plate to the electrical cabinet must be removed.

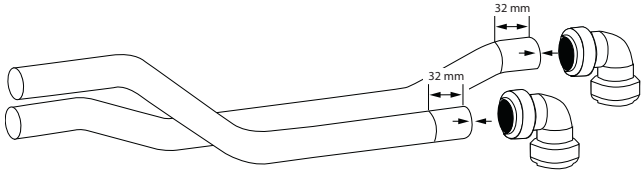


Remove knock-out holes to the left, right or on top.

6.3 Alternative 1 (left)

For connections on the left hand side, when facing the heat pump.

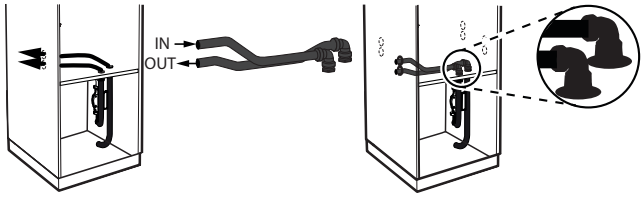
1. Press the quick couplings (delivered with the heat pump) on to the pipes according to the picture . Make sure the coupling reach the 32 mm mark.



2. Insulate before mounting the pipes.

3. Install the insulated pipes from the inside of the heat pump and out. Pay attention to which one of the pipes are brine in and brine out (see picture below).

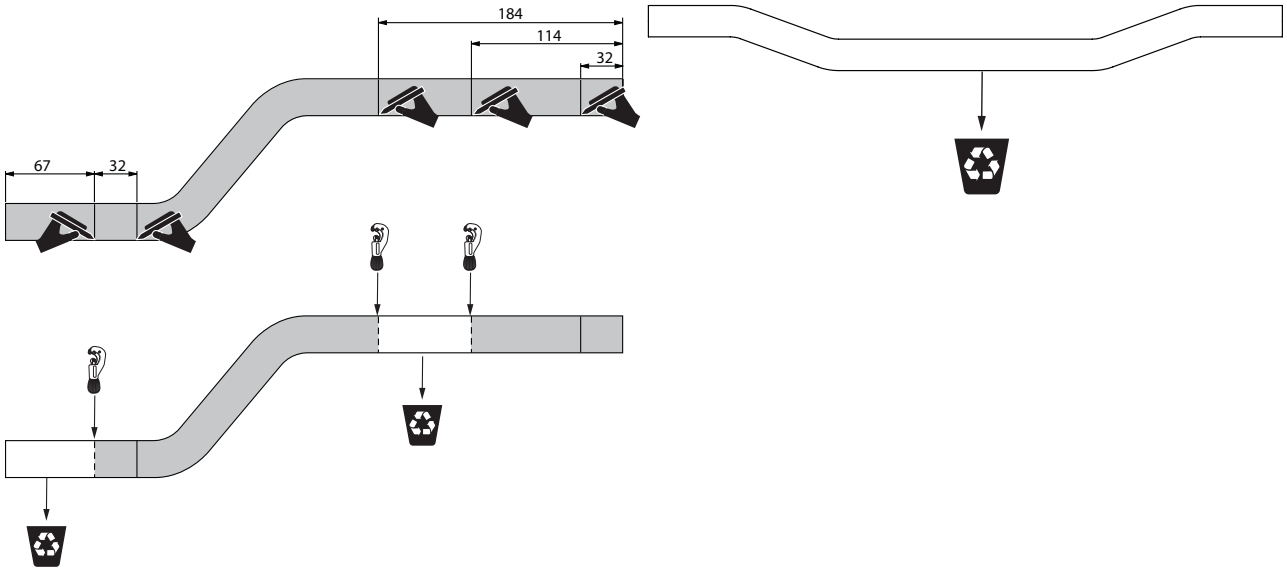
4. Press the pipes on to the connections in the heat pump (the pipe connections are located behind the electrical cabinet in the heat pump, remove the metal plate). Isolate with insulation tape so that it is partially seated against the plate.

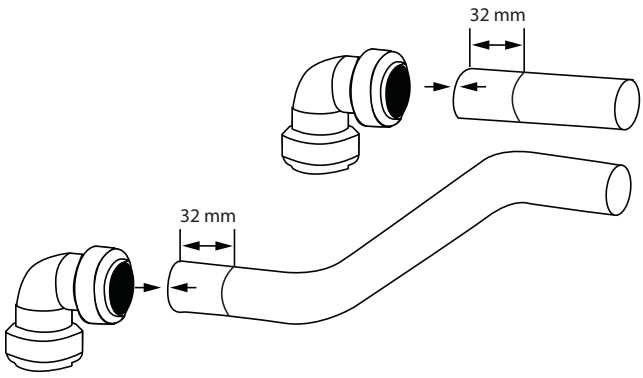


5. Fit the rubber sleeves into the knock-out holes.

6.4 Alternative 2 (right)

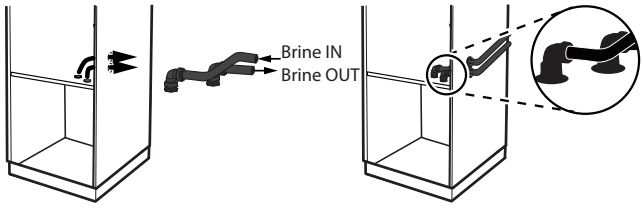
For connections to the right hand side, when facing the heat pump.





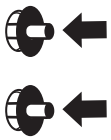
1. Press the quick couplings (delivered with the heat pump) on to the pipes . Make sure the coupling reach the 32 mm mark.

2. Insulate before mounting the pipes.



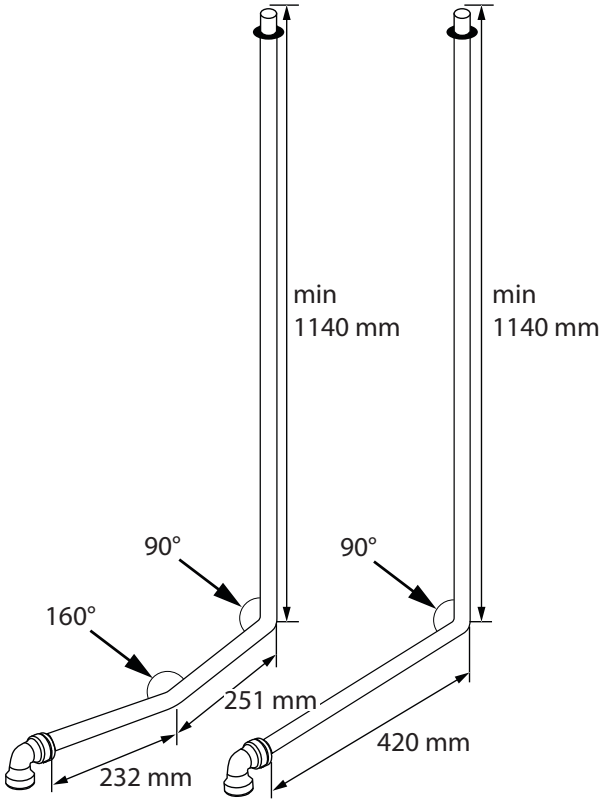
3. Press the pipes on to the connections in the heat pump (see picture above). Install the insulated pipes from the inside of the heat pump and out. Pay attention to which one of the pipes are brine in and brine out (the pipe connections are located behind the electrical cabinet in the heat pump, remove the metal plate). Isolate with insulation tape so that it is partially seated against the plate.

4. Fit the rubber sleeves into the knock-out holes.

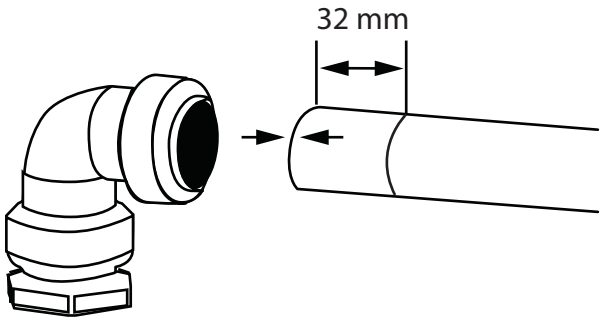


6.5 Alternative 3 (top)

Connections through the top knock-out holes. For this option, pipes are not included in the delivery.

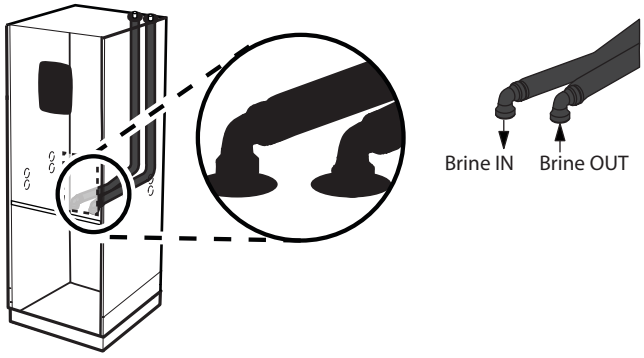


1. Prepare the pipes according to the dimensions in the picture. Cu 28 mm is the recommended material and dimension intended for brine pipes.

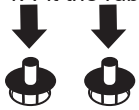


2. Insulate before mounting the pipes.

3. Press the pipes on to the connections in the heat pump (see picture below). Install the insulated pipes from the inside of the heat pump and out. Pay attention to which one of the pipes are brine in and brine out (the pipe connections are located behind the electrical cabinet in the heat pump, remove the metal plate). Isolate with insulation tape so that it is partially seated against the plate.



4. Fit the rubber sleeves into the knock-out holes.



7 Sensors and power supply

Warning **Electrical voltage!**

The connection terminals are powered and can cause life hazards due to electrical shock. All power supplies must be disconnected before electrical installation can commence.

Caution **Cables, power supply**

The electrical installation must be carried out using permanently routed cables and must follow applicable local and national regulations. It must be possible to isolate the power supply using an all-pole circuit breaker with a minimum contact gap of 3 mm.

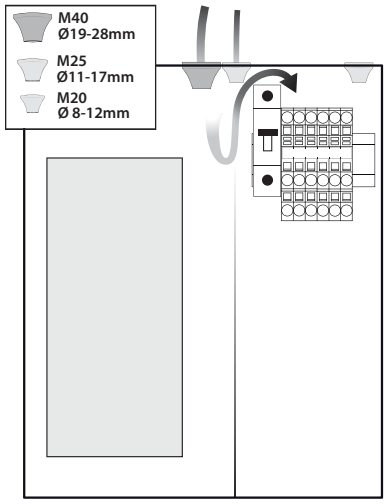
Caution **Cables, characteristics**

The power supply cable must be rigid. No flexible cable may be used, due to the lack of strain relief in the electrical cabinet.

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. Also take into account the effects of aging or continual vibration from sources such as compressors or fans. The wiring shall be installed in accordance with national wiring regulations.

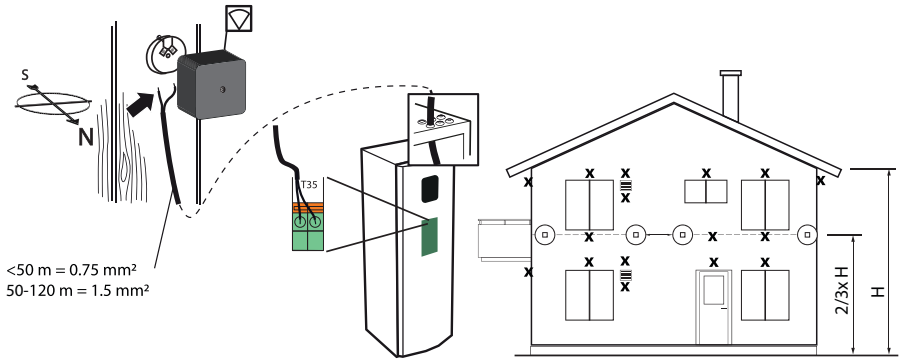
230V/ 400V	Model (including Duo)	IEC	MVA	Description
230V	Sigrin 9 & 13	61000-3-12	N/A	Complies without conditional connection
400V	Sigrin 9	61000-3-12	N/A	Complies without conditional connection
400V	Sigrin13	61000-3-12	0,6*	
400V	Sigrin19	61000-3-12	1,0*	

* Complies, provided that the short-circuit power Ssc is greater than the **MVA** value at the interference point between the user´s supply and the public system. It is the installer´s or user´s responsibility to ensure with the network operator, if necessary, that the equipment is connected to a supply with a sufficient short-circuit power.



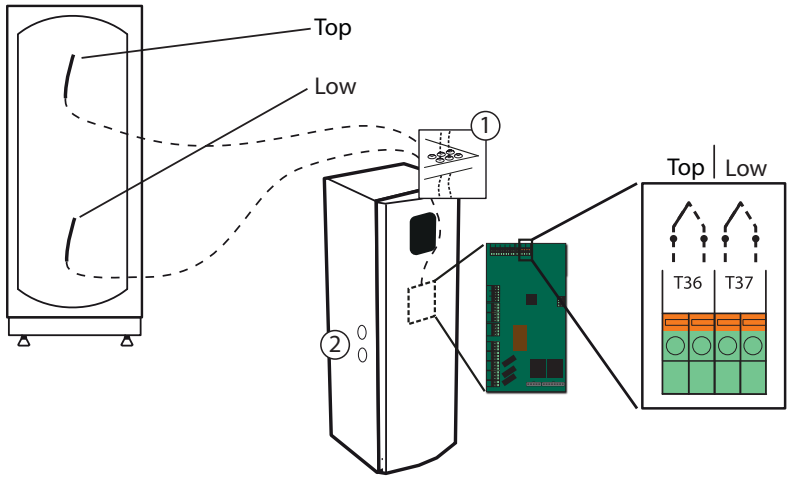
Make sure that all grommets are put in place in the top of the heat pump and the electrical cabinet, regardless of which ones are used for power supply or sensors. This to ensure a tight seal of the enclosures and to meet the IP rating requirements.

7.1 Outdoor sensor



X Improper placement
⊡ Proper placement
Sensor type PT1000

7.2 Tap water sensor for Duo models

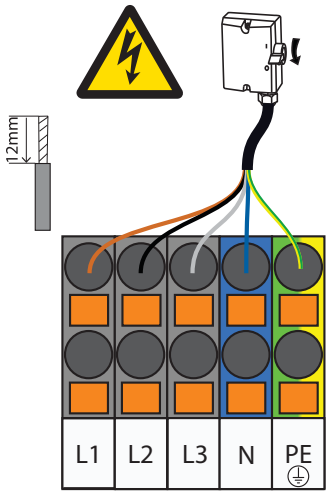


(Factory fitted with built in water tank)

1. Lead the cables through the rubber grommets on the top of the heat pump.
2. The knock-out holes, on each side of the heat pump cabinet, can also be used as lead-in for the sensor cable.

Attach the cables according to the picture above.

7.3 Power supply connections for 400V



7.4 Fuse sizes for 400V~3N

The internal immersion heater can be limited in the heat pump control.

Settings for the immersion heater in the controller can be set differently, with/without compressor.

Immersion heater steps					
Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
1,5 kW	3 kW	4,5 kW	6 kW	7,5 kW	9 kW

Max steps: 4 (factory setting)

Max steps with compressor: 4 (factory setting)

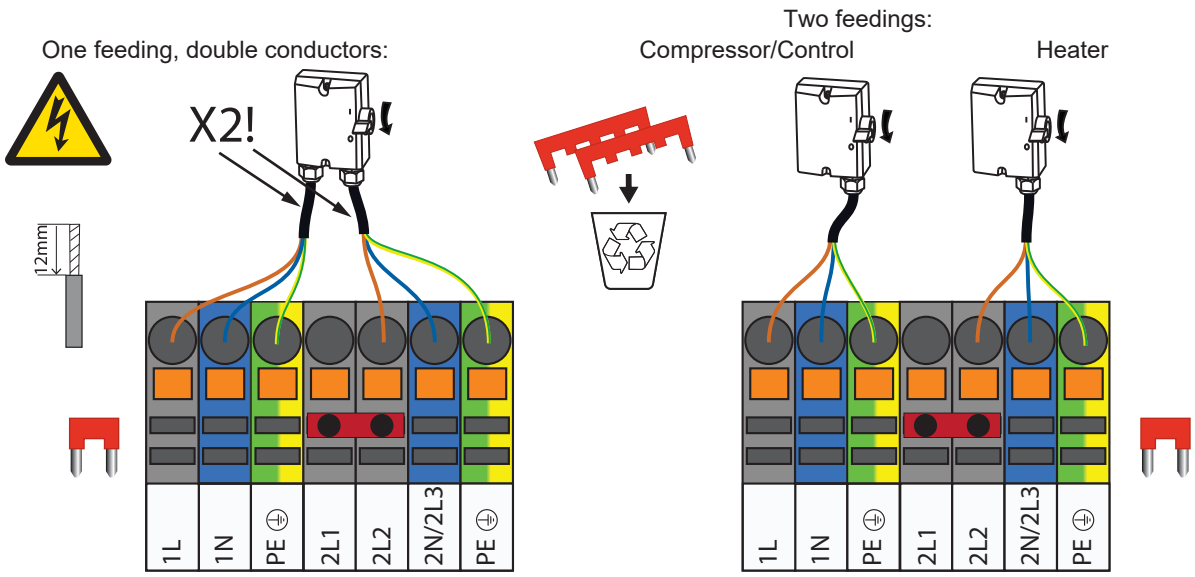
Initial delay: 30 minutes (factory setting)

(Setting in controller for **Max steps** can be set equal or higher than **Max steps with compressor**. Lowest possible setting is "Step 1".) Recommended minimum fuse sizes (recommended fuse characteristic is C)

	Unit	Sigrin 9	Sigrin 13	Sigrin 19
Immersion heater	kW	1,5/3/4,5/6/7,5/9	1,5/3/4,5/6/7,5/9	1,5/3/4,5/6/7,5/9
Fuses, combined[2B]	A	10/13/20/20/20/20	13/13/20/20/25/25[2B]	16/16/25/25/25/25[2B]
Fuse separate supply, compressor only	A	10	10	13
Starting current	A	<3	<4	<5

[2B]) 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. Control and circulation pumps are operated with L3. The power supply and the frequency converter for the compressor are powered by L1, L2 and L3. Meets IEC61000-3-12 Ssc at connection point >0,6 MVA for Sigrin 13 400V och >1,0 MVA for 19 400V, without action. Sigrin 9 400V complies with IEC 61000-3-12 without conditional connection

7.5 Power supply connections for 230V~1N



7.6 Fuse sizes for 230V~1N

The internal immersion heater can be limited in the heat pump control.

Settings for the immersion heater in the controller can be set differently, with/without compressor.

Immersion heater steps					
Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
1 kW	2 kW	3 kW	4 kW	5 kW	6 kW

Max steps: 4 (factory setting)

Max steps with compressor: 4 (factory setting)

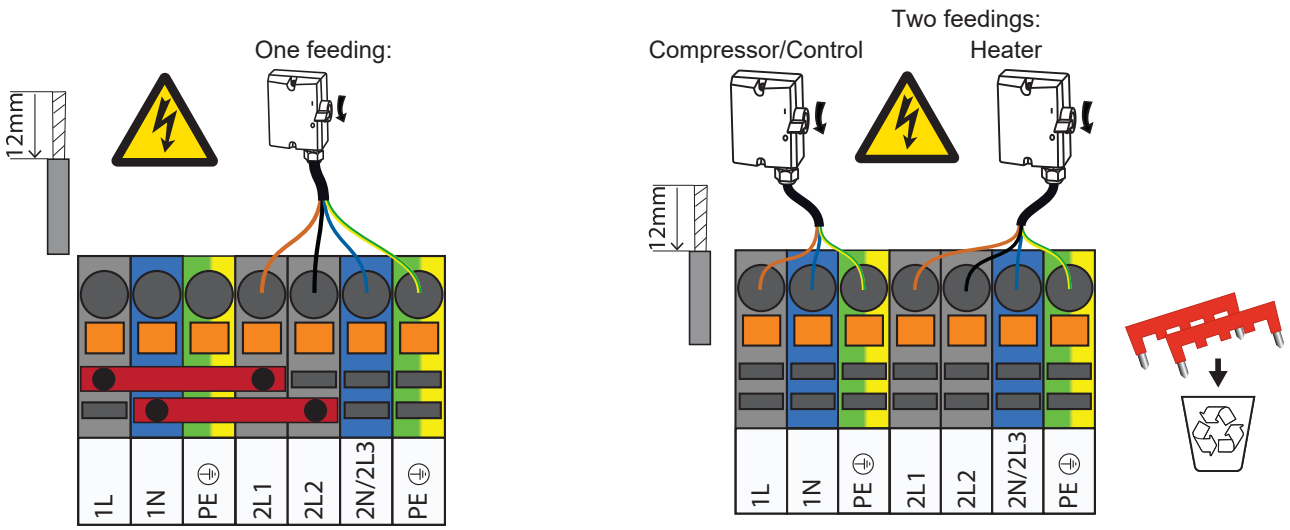
Initial delay: 30 minutes (factory setting)

(Setting in controller for **Max steps** can be set equal or higher than **Max steps with compressor**. Lowest possible setting is "Step 1"). Recommended minimum fuse sizes (recommended fuse characteristic is C):

	Unit	Sigrin 9	Sigrin 13
Immersion heater	kW	1/2/3/4/5/6	1/2/3/4/5/6
Fuses, combined[2C]	A	20/25/32/40/40/50[2C]	25/32/32/40/50/50[2C]
Fuse separate supply, compressor only	A	16	20
Fuse separate supply, internal immersion heater only	A	10/10/13/20/25/32	10/10/13/20/25/32
Starting current	A	<8	<10

[2C]) 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. Connection can be done either with one common supply, or with physically separated supplies to heat pump (compressor) and to auxilliary heater to lower the fuse needed Complies with IEC 61000-3-12 without conditional connection.

7.7 Power supply connections for 230V~3



7.8 Fuse sizes for 230V~3

The internal immersion heater can be limited in the heat pump control.

Settings for the immersion heater in the controller can be set differently, with/without compressor.

Immersion heater steps					
Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
1 kW	2 kW	3 kW	4 kW	5 kW	6 kW

Max steps: 4 (factory setting)

Max steps with compressor: 4 (factory setting)

Initial delay: 30 minutes (factory setting)

(Setting in controller for **"Max steps"** can be set equal or higher than **"Max steps with compressor"**. Lowest possible setting is "Step 1"). Recommended minimum fuse sizes (recommended fuse characteristic is C):

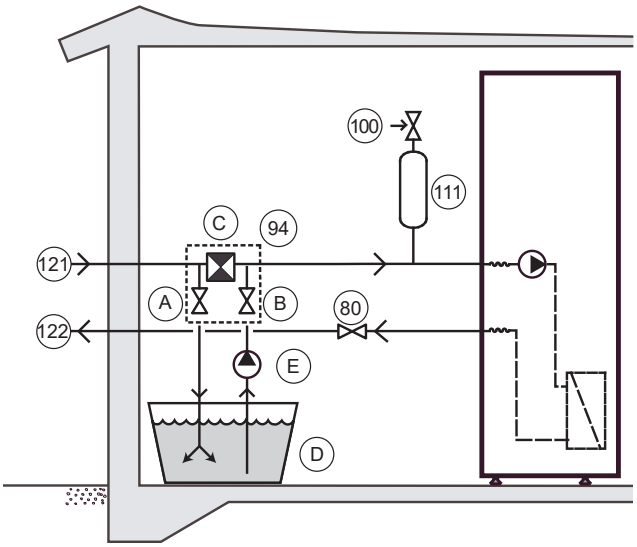
	Unit	Sigrin 9	Sigrin 13
Immersion heater	kW	1/2/3/4/5/6	1/2/3/4/5/6
Fuses, combined[2C]	A	20/20/25/25/32/32[2C]	25/25/32/32/32/32[2C]
Fuse separate supply, compressor only	A	16	20
Fuse separate supply, internal immersion heater only	A	10/10/13/16/20/25	10/10/13/16/20/25
Starting current	A	<8	<10

[2C]) 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. Connection can be done either with one common supply, or with physically separated supplies to heat pump (compressor) and to auxilliary heater to lower the fuse needed Complies with IEC 61000-3-12 without conditional connection.

8 Filling and bleeding

8.1 Filling and bleeding the brine circuit

1. Mix clean water and antifreeze ethanol, for heat pump use, to the correct freezing point in a clean external container.
2. Use a refractometer to check the freezing point, for the brine collector circuit, -17 ±2°C.
3. Use an external pump to fill the brine system. Connect the pressure side of the pump to the filling device.
4. Follow the instructions that comes with the filler unit.
5. Start the external pump and fill the brine circuit, proceed until all air is gone and the pressure reaches approximately 1 bar.
6. Shut the valve and turn off the pump.



- 80 Shut-off valve
- 94 Filling device brine
- 100 Safety valve, 1,5 bar
- 111 Expansion vessel brine
- 121 Brine in
- 122 Brine out
- A Shut-off valve
- B Shut-off valve
- C Dirt strainer with shut-off valve
- D External container
- E External pump

8.2 Filling and bleeding the water heater and heating system

Filling and bleeding the water heater and heating system

1. Fill the water heater with cold water by opening the shut-off valve on the incoming cold water pipe. Open one of the hot water taps in the house, with water flowing. (= water tank is filled.)
2. Then fill the water heater coil and the heating system with water to a pressure of approximately 1 bar.
3. Open all heating system valves fully, bleed all heating systems and the water heater coil thoroughly from the bleed valve fitted on the top of the water tank (venting valve for TWS coil).
4. Refill the heating system to a pressure of approximately 1 bar.
5. Repeat the procedure until all air has been removed.
6. Check the system for leakage.
7. Leave the radiator valves fully open.

Note: As the air bleed is placed on the suction side of the circulation pump, the circulation pump must be off while bleeding, to avoid air ingress.

9 Commissioning

9.1 Installer settings

Certain functions will be locked and only accessible with the correct access code. To gain access, the following steps must be made:

1. Press on the start screen to open the **Menu screen**.
2. Scroll all the way down and press to unlock advanced settings.
3. Press the input area to open up the number pad.
4. Enter the code for installer access, **607080**, and confirm by pressing in the lower right corner.
5. A new menu button is now available: **Installer settings**.

Note: To activate other functions than heat and tap water, the heat pump needs to be set to Off mode, then go Advanced settings/Installation and activate desired function. Some functions may need additional accessories to work.

The access code is active for 8 hours, after which, it will log out automatically. Logging out manually is done by leaving the input area empty, or typing a "false" code, and pressing the confirm symbol. Restarting the heat pump will also force a log out.

9.2 Select display language

1. Press in the upper left corner of the start screen.
2. Press **System settings**
3. Press **Language** and choose your language.
4. Press in the upper left corner to return to the **Menu**.

9.3 Setting date and time

1. Press in the upper left corner of the start screen.
2. Press **System settings**
3. Press **Date/time** and choose the correct time zone.
4. Press in the upper left corner to return to the **Menu**.

9.4 Internal immersion heater

1. Press on the Start screen to open the Menu screen.
2. Press to open the **Installer settings** menu.
3. Scroll down to **Internal immersion heater**.
4. Make the desired changes.

(For steps, kW and fuse sizes, see electrical installation chapter.

9.5 Radiator or floor heating settings

Important: If the house has floor heating, the supply line temperature must not exceed the values recommended by the floor manufacturer. Otherwise the floor might get damaged.

To change default heat settings from radiator- to floor heating (or reverse):

1. Press on the start screen to open the menu screen.
2. Press to open the **Heating** menu.
3. Expand to **Advanced settings** and choose the desired heating type.

9.6 Adjusting the Heat Curve

1. Press to open the menu screen.
2. Press
3. Expand **Advanced settings** and press **Heat curve** to open the menu.
4. There are two ways of adjusting the heat curve:
   – Press **Adjust curve**, press + or - to adjust the entire curve.
   Or:
   – Press **Adjust points**, individual points can be moved separately by pressing the desired point and pressing + or - to the desired temperature.

The heat curve indicator value shows the temperature of the water supplied to the heating system ("supply line temperature") at an outdoor temperature of 0 °C.

9.7 Heating settings

Press to open the **Menu** and press **Heating**.

Heating

Target home temperature

Temperature tuning

Advanced settings

Heat curve

Supply line temperature limits

Seasonal stop

Room sensor

Important! If the house has floor heating, the supply line temperature must not exceed the values recommended by the floor manufacturer. Otherwise the floor might get damaged.

9.8 Mix valves

Distribution circuit 1 is available as an additional heating- or cooling circuit without having to use an expansion module.

Press to open the menu screen and open **Installer settings**.

Go to **Installation** and enable the **Distribution circuit** you want to activate

Then press to open the menu screen and press to open the **Mix valves** menu and activate the **Distribution circuit**.

Mix valves

(These are examples of how different types of distribution circuits are displayed)

Distribution circuit 1

Distribution circuit 2

Mixing dynamics setting

Mixing dynamics is a value that controls how fast or slow the shunt motor on the circuit should regulate. Depending on the type of shunt, the table below can be used as a recommendation on what approximate value to set. A lower value will cause the shunt motor to open and close faster, a higher value will cause it to open and close slower.

The range is between 30-240. Default value is 140.

Default value and effects:

Setting	Effect
< 140 (30-140)	Faster regulation
140	Default value
>140 (140-240)	Slower regulation

Approximate values depending on shunt motor and system characteristics:

Mixing dynamic value	Shunt motor characteristic
50	300 seconds
100	200 seconds
150	100 seconds

9.9 Adjusting the indoor temperature

On the start screen, adjustment to the indoor temperature is done very easily, provided that the heat curve is set properly.

Press + or - to raise or lower the temperature. Each step represents an increase/decrease of approximately 0,5 °C of the indoor temperature.

9.10 Additional information about heating settings

The heat curve is the base for all space heating adjustments. The curve number (example "40") corresponds to what target temperature the supply line will have to the heating system when the outdoor temperature is 0 °C (if not adjusted with any offset). A higher set heat curve will increase the desired supply line temperature when the outdoor temperature gets lower and vice versa.

Enable heating is default on, and should normally never be deactivated as this will stop heating (risk of freezing).

Start with setting **Heating type** (Radiator/floor heating) . Floor heating will limit max adjustable supply line temperature for end customer to 45 °C for installations with floor heating . Floor heating will also set the default heat curve to «30» instead of 40. Note that the value for the heat curve should be adjusted and fine tuned for the installation to get desired indoor climate.

Supply line temperature limits sets the minimum- and maximum supply line temperature used as base line for the heat curve. (Note: For certain floor heating applications, a max temperature set too high may cause damages to the floor.)

Seasonal stop is the set outdoor temperature condition where the heat pump will begin to prepare to stop (or start) heating. Often set to around 17°C.

Comfort factor: When the heat curve is set properly, changes made with the comfort settings, on the start page, will parallel offset the heat curve up or down, and will not change the inclination of the heat curve. Each step up or down will increase the desired supply line temperature with the setting of the "Comfort factor". The factory setting of the comfort

factor setting is 3 and is often suitable for radiator systems, meaning that a 1°C increase on the comfort setting corresponds to an increase of the desired supply line temperature with 3°C. In floor heating systems a comfort factor of 2 is often more suitable.

This means that when the heat curve and comfort factor is set properly, an adjustment of 1°C on the comfort setting is representative of 1°C to the room temperature.

(Note: Fixed supply line set point that may be available in the menu is not used in normal installations and should normally not be activated.)

General guidance: To increase the indoor temperature by around 1 °C (at a given outdoor temperature), the supply line temperature normally needs to be increased by 2-3 °C in the heat curve setting, depending on the heating system.

The temperature reference (e.g. 20 °C) shown on the comfort settings (start page) may deviate from the actual indoor temperature, and is intended as a reference value to facilitate understanding and adjustment for the end customer.

9.11 Activate manual test

1. Press on the start screen to open the **Menu** screen.
2. Press **Installer settings**.
3. Scroll to **Manual test** and turn the function On.
4. Activate the functions that needs to be tested.

During manual test, this symbol is shown in the display (as a reminder to turn off Manual test mode when the testing is done):

Note:

- Start the circulation pump, listen for air. Run the reversing valve to Hot water, listen for air. If necessary, bleed for air.
- Start the brine pump, listen for air. If necessary, bleed for air.
- If necessary, the compressor and the internal immersion heater can also be run in manual testing. Additional testing may apply if external devices are installed and activated.
- After completion, turn off **Manual test**.

Parameter	Meaning
Brine pump	0 = stop brine pump, 1 = start brine pump
Circulation pump	0 = stop circulation pump, 1 = start circulation pump
Compressor	0 = stop compressor, set compressor gear
Internal immersion heater	Six active steps: 1-6
Reversing valve	0 = Heating, 1 = Hot water
Compressor manual enable	On/off
Actual rpm	Compressor rpm, %
Set compressor gear	10 active steps: 1-10
Ignore transducer working pressure	On/off
Sum alarm, test signal	On/off
Expansion valve manual enable	On/off
Expansion valve opening degree	0-100%

9.12 Selecting operating mode

Set the heat pump to the desired operating mode in the menu:

1. Press ⊞ on the start screen to open the Menu screen.
2. Scroll down to **System configurations** and press **Mode** to open the **Operating mode** screen.
3. 

4. Choose the desired operating mode.
5. Normal mode is **Auto** (On).

If the compressor has recently stopped, a restriction time may occur that temporarily prevents the compressor from starting again. If that is the case, the following symbol appears in the top of the display:

Operating mode	Description
Auto (default)	The heat pump will automatically run the compressor and the auxiliary heater to meet the heating and hot water needs.
Use auxiliary heater only	The heat pump will only use the electrical auxiliary heater to meet the heating and hot water needs. This means that the heat pump can produce heat and hot water even if the compressor function is compromised or non operational. Using the auxiliary heater only will increase energy consumption.
Off	All heat pump functions, such as the compressor and auxiliary heater are turned off. No heat or hot water will be produced which risks freeze damage. A red light will also be visible on the floor to further indicate that the heat pump is in Off mode.

If the heating system is very cold, auxiliary heater may be used initially to simplify start up. Tap water production is enabled (factory setting). The heat pump will start producing hot water before space heating.

Note: Do not shut off the electrical power to the heat pump when the compressor is running. (When planned, set the operating mode to off position and allow compressor to stop completely before shutting off the electrical power to the heat pump.)

9.13 Primary/secondary mode

A primary/secondary system solution, enables the end user to control up to 15 heat pumps simultaneously with a single heat pump unit via a network router/switch. It requires all heat pumps to be connected to the same heating system and brine circuit.

Press ⊞ to open the menu screen and open ⚙ **Installer settings**.

Go to **Installation** and enable **Primary/secondary**.

Configuration:

1. Enable primary/secondary mode on all heat pumps.
2. Select one heat pump to be the primary unit, and the rest of the heat pumps to be secondary units.
3. Enable heat pumps on the primary unit.
4. Assign a unique ID (1-15) to all secondary units.
5. Follow the network setup guide on all units.
6. When the configuration is done, the heat pumps should connect to the primary unit automatically. A list of connected units can be viewed on the primary unit's starting page and all secondary units should display their respective heat pump ID.

Network setup

1. Connect all heat pumps to a router/switch via the RJ45 connection located on the CM card (front door needs to be removed). If you are using only two units, the connection can be made directly between the two units.
2. Go to Settings/Network settings and check the unit's IP-address.

3. a. If you are using a router and DHCP mode, an IP-address should appear automatically and no further network configuration is needed.

   b. If you are using a switch or direct connection, you need to manually configure the network setting in Static mode.

Example:

- Primary - IP address: 192.168.0.100, Network mask: 255.255.255.0
- Secondary 1 - IP address: 192.168.0.101, Network mask: 255.255.255.0
- Secondary 2 - IP address: 192.168.0.102, Network mask: 255.255.255.0

Primary

The primary unit controls all secondary units and accessories in the system. Only one primary unit is allowed on the same network by default.

Secondary

The secondary unit is controlled by the primary unit.

Heat pump ID

Heat pump ID (1-15) needs to be unique for every secondary.

9.14 Connectivity

To be able to use the full scope of the functionality of the heat pump, it needs to be connected to the internet. This can be done in three different ways, with Wi-Fi or ethernet (both will require a router connection) or a cellular network.

Below are steps for the different internet connections that might be good to know:

(All three functions can be found in the **System settings** view)

Wi-Fi

Open the Wi-Fi view and enable the function. A list of available networks should be visible. Choose the one you want to connect to and type in the correct password for that network.

Ethernet

Connect an ethernet cable, on the back of the display, to a router. Open the Ethernet view and enable the function. Either let the heat pump acquire an automatic IP address or type in the required information to establish a connection.

Cellular network

Open the Cellular network view and enable the function.

9.15 Monitoring and control

In order to use the **Thermia Online Pro** service, download the **Thermia Onsite** app on your mobile device or visit **www.onlinepro.thermia.com** to access connected heat pump installations via internet.

Sign in and follow on screen instructions to start using the service.

Note: If you want to create a new user account, contact your company administrator or local **Thermia** sales office.

Connecting the installation

- Make sure the heat pump is connected to the internet.
  For further instructions on how to connect your heat pump to the internet:
  Press **Menu**
  Press **System settings**
  Choose **Wi-Fi**, **Ethernet** or **Cellular network**
- Sign in to **Thermia Onsite** app or via web **onlinepro.thermia.com**

– Make note of the serial number of the heat pump.
– Follow instructions in app or web on how to add your device.
– Choose if you wish to:

  - request device to be connected to your company, which enables remote monitoring and control to the specific device.

  - send invite to end customer for remote access via **MyThermia** app.

Thermia hereby declare that the radio system type in this heat pump complies with Directive 2014/53/EU. For a full review of the Declaration of conformity for this product, please visit www.thermia.se/declarations

9.16 Brine monitoring

In cases where there is a risk that the energy outtake becomes too large for the collector (and the borehole becomes too cold), "Brine monitoring" can be enabled in the display. This function will limit the compressor 1-2°C before the stop limit (Brine in min). If the heat pump power is insufficient, the internal immersion heater will be used, resulting in increased energy consumption.

1. Press on the Start screen to open the Menu screen.
2. Open **Installer settings** and press **Installation**.
3. Scroll down to **Brine monitoring** and activate the function.

9.17 Alarms

During commissioning and start up, alarms sometimes may occur. A pop up window will appear, with information on the alarm(s) and a shortcut button that leads to the **Alarms** view. Press **Alarms** to get more information about the alarm. Expand the view of the alarm you want more information on by pressing the arrow to the right. There is also the option to reset alarms, in the bottom of the first view, and to watch historical alarms.

Examples on alarms that may occur are:

Internal immersion heater: This is most often caused by poor flow or air in the coil inside the hot water tank or heating circuit, or before the circulation pump. Bleed for air thoroughly and reset overheat protection T1 on the electrical cabinet when the temperature has decreased.

High pressure: This is most often caused by poor flow or air in the coil inside the hot water tank or heating circuit, or before the circulation pump. Bleed for air and reset alarm.

Low pressure: This is most often caused by poor flow or air in the brine circuit. Bleed for air and reset alarm.

9.18 Selecting hot water settings

Hot water settings:

1. Press and then **Hot water** to enter the menu.
2. Select one tap water mode according to the customer demands:

– **Economy** will give the most energy efficient hot water production and is often sufficient for households with low to moderate hot water consumption.
– **Normal** can be selected as the best compromise between energy efficiency and hot water availability.
– **Comfort** is the choice for customers with large demands of hot water availability.

Boost hot water will temporarily increase the hot water production.

In **Advanced settings**:
– **Anti legionella** settings
– **Start on decreasing temperature**, activated as default but can be deactivated. This feature is used to detect large tap water withdrawal and start tap water production earlier than normal.

Remember to inform the end customer that the settings can be changed in the settings menu.

9.19 Display symbol description

Symbol	Description
	Opens the menu screen from the start screen. Return to the menu screen from any sub-menu.
	Home. Press to go back to the start screen.
	This symbol indicates whenever a text area can be pressed to open up a more detailed view.
	Alarm. Press the symbol to go to the alarm view, which shows current and historic alarms.
	Select operating mode. Press the symbol to select operating mode in the next view.
	System information. Opens a number of sub-menus such as Operating data, Operating time etc.
	Reset button. Gives the option to reset values in the current view to factory default values or to the previous values that was set before the view was opened and edited.
	Push/pull control. Used for raising or lowering values. Drag the handle left or right, release at the desired value.
	Certain menu selections are locked, to prevent unauthorized use. An authorization code is required. Press to enter code.
1	Internal immersion heater mode. Visible in the top of the display when the heat pump is producing heat or hot water with the internal immersion heater. The number indicates which step is used.
	Restart icon. Visible in the top of the display when the heat pump has a pending restart demand. Execute a restart in the Operating view.
	Wi-Fi icon. Visible in the top view when there is an established Wi-Fi connection. A fully filled symbol means there is a good, solid communication/connection.
	Internet connection. Visible in the top of the display when the heat pump has an internet connection.
	Ethernet connection. Visible in the top of the display when the heat pump has an ethernet connection.
	Pool heating mode. Visible in the top of the display when the heat pump is in pool heating mode.
	Space heating mode. Visible in the top of the display when the heat pump is in space heating mode.
	Restriction timer. Visible in the top of the display when the compressor has a restriction that prevents it from starting.
	Hot water production. Visible in the top of the display when the heat pump is producing hot water. Depending on the Hot water settings, the symbol shows 1 (Economy), 2 (Normal) or 3 (Comfort) red waves inside the container. During Hot water boost, the container outline will also be in the same red color.
	Anti Legionella. Visible in the top of the display when the heat pump is in Anti Legionella mode.

10 Additional functionality

10.1 Functions table

In addition to the standard functionality (heating and hot water production etc), a wide range of extra functionality is available as accessory, or from factory, depending on the heat pump and selected application.

Accessories that interact with the heat pump are shown in table below.

Explanation:

- "**BM**" stands for Building Module (I/O) and means that the functionality is standard and available on the BM-card fitted in the heat pump.
- "**EM4**" stands for Expansion Module 4 and means that the functionality is available with the expansion module only. EM4 is available as accessory. For functions that require EM4, read the installation manual for EM4 on how to set it up.
- "**CM**" stands for Control Module, also the display unit.
- Space is available to fit the EM4-card inside the electrical cabinet in the heat pump.
- The functions of the different input/output connections are set in the display, in the Installation menu.
- Sensors used are PT1000 type. Mixing valves are 230V.

Functionality	Connection	Terminal connections BM/CM/EM4	Position numbers	Description
Room sensor, PT1000	BM	T34	132	
Room sensor, Modbus	BM	MBa	62	Room sensor, Modbus type connected to MBa connection (Modbus Accessory).
Room sensor, Wi-Fi	CM	Wi-Fi	N/A	Wireless connection between the Control Module and the room sensor.
BMS (Connection to Building Management System)	CM	ETHERNET	173	Modbus TCP/IP connection only.
Buffer tank control	BM	TR10-11	29	Shunt valve 230VAC
	BM	FR1	36	Circulation pump 230VAC
	BM	T33	51	Supply line sensor
	BM	T31	136	Buffer tank sensor
External auxiliary heater (relay)	BM	TR10-11	29	Shunt valve 230VAC
	BM	FR1	36	Circulation pump 230VAC
	BM	T33	51	Supply line sensor
	BM	R3	117	External auxiliary heater
				Not in combination with External brine pump or alarm relay without EM4.
External auxiliary heater (control)	BM	FR1	36	Circulation pump 230VAC
	BM	T33	51	Supply line sensor
	BM	AO25	72	External auxiliary control 0-10V
Power consumption control	BM	D21	408	EVU/Smart grid 1
	BM	D22	409	Smart grid 2
Flow guard/Level guard	BM	D23	71	Not in combination with Start internal brine pump on external signal without EM4.
Start internal brine pump on external signal	BM	D23	345	Not in combination with Flow guard/Level guard without EM4.
Distribution circuit 1 (extra under shunt group for heating or cooling)	BM	TR12-13	107	Shunt valve 230VAC
	BM	T32	108	Supply line sensor
	BM	FR2	109	Circulation pump 230VAC
				Possible to use as a second lower set heat curve or for certain cooling applications. For passive cooling, also see Cooling function below.
Current limiter	BM	MBa	456	Modbus type connected to MBa connection (Modbus accessory).
Passive cooling (with Distribution 1 on BM, or Cooling on EM4)	BM	TR12-13	107	Shunt valve 230VAC
	BM	T32	108	Supply line sensor
	BM	FR2	109	Circulation pump 230VAC

Functionality	Connection	Terminal connections BM/CM/EM4	Position numbers	Description
	EM4	T84	59	Cooling tank sensor
	EM4	TR70	38	Shunt valve 230VAC
	EM4	T83	58	Supply line sensor
	EM4	FR63	74	Circulation pump 230VAC
				Passive cooling on BM uses the same Inputs/Outputs as Distribution circuit 1 and can therefor not be combined. If both are required, use EM4 (Cooling). Enable Cooling on BM in Installation menu and navigate to Cooling and select BM.
Alarm relay (Sum alarm output)	BM	R3	344	Not in combination with External brine pump or External aux heater without EM4.
	EM4	R52	344	
External brine pump	BM	R3	172	On/off control of External brine pump. Not in combination with External aux heater or alarm relay without EM4.
	EM4	R51	172	
Distribution circuit 2 (extra under shunt group for heating or cooling)	EM4	TR68	207	Shunt valve 230VAC
	EM4	T81	208	Supply line sensor
	EM4	FR61	209	Circulation pump 230VAC
	EM4	(U91-92)	(422)	(Dew point/temperature sensor)
				Possible to use as a second lower set heat curve or for certain cooling applications. It is possible to use dew point sensor (422) for cooling mode.
Distribution circuit 3 (extra under shunt group for heating or cooling)	EM4	TR69	207	Shunt valve 230VAC
	EM4	T82	208	Supply line sensor
	EM4	FR62	209	Circulation pump 230VAC
	EM4	(U93-94)	(422)	(Dew point/temperature sensor)
				Possible to use as a second lower set heat curve or for certain cooling applications. It is possible to use dew point sensor (422) for cooling mode.
Active cooling	EM4	TR70	74	Shunt valve 230VAC
	EM4	T83	58	Supply line sensor
	EM4	T84	59	Cooling tank sensor
	EM4	T85	57	Return line sensor
	EM4	FR63	38	Circulation pump cooling 230VAC
	EM4	FR64	39	Circulation pump cooling 230VAC
	EM4	TR65	79	Reversing valve 230VAC
	BM	TR9	310	Reversing valve 230VAC on BM
Pool	EM4	TR67	101	Reversing valve 230VAC
	EM4	T86	183	Supply line sensor
	EM4	T87	60	Return line sensor
	EM4	D96	342	External pool off
External alarm (Sum alarm input)	EM4	D95	444	

10.2 How to set up additional accessories, functions etc.

For more detailed information and system solutions see separate instructions or system solution generator on Thermia's website. Functions not activated/enabled from factory must be enabled and activated in the control system before they can be used.

1. Login and go to Advanced settings.
2. Select desired function. Activate by selecting "BM", or "EM4", depending on function.
3. Make the desired settings.
4. Restart the heat pump and check functionality.

10.3 Distribution circuit 1

In heating systems where there is a need of a separately controlled heating circuit (in addition to the open main circuit) with a lower heat curve, it is possible to control a separate circuit (mixing valve, temperature sensor and circulation pump) with a lower set heat curve.

The supply line temperature for distribution circuit 1 is determined from the Temperature sensor (108), and is used to regulate the mixing valve actuator (107). The circulation pump (109) is running when the heat pump is in heating season.

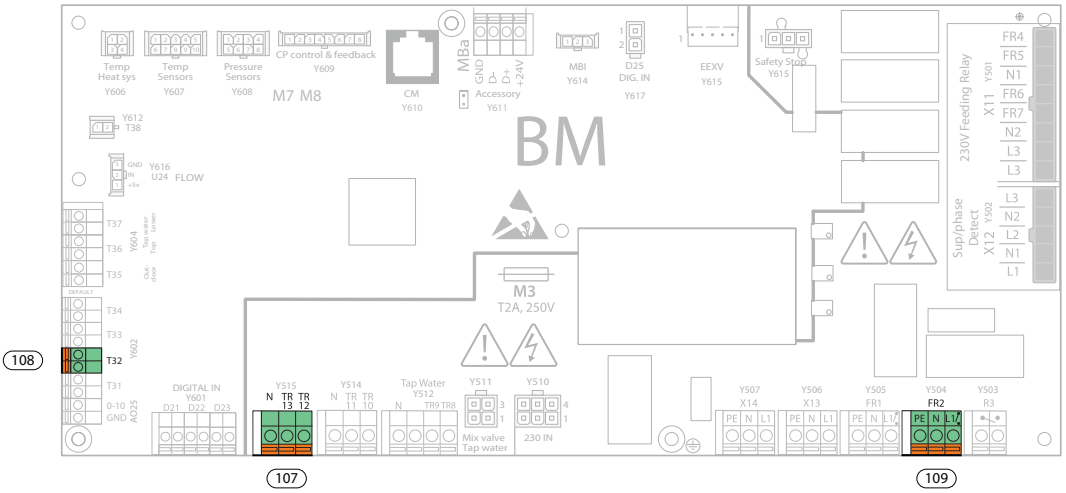


Table item number	Terminal	Description
107	TR12-13	Shunt valve 230VAC
108	T32	Supply line sensor
109	FR2	Circulation pump

10.4 Buffer tank

There are two different setups of buffer tank supported. Both enable connections to different heat sources (such as wood, solar heating or waste heating) to be connected to the same accumulator tank as the heat pump, and will make it possible for the heat pump and other sources of non-controllable heat to work together.

(Please note that if a mixing valve controlled by the heat pump is not fitted (= tank is to be used only as a volume tank), buffer tank control should not be activated.)

Alt 1: Heat pump physically connected to charge buffer tank (without external auxiliary heater controlled by heat pump).

With this setup the heat pump will charge the tank, meaning that heating will be supplied from the tank to the heating system.

As the heat pump in this application is charging the tank and always has the water volume of the hot water tank to work with, it is often possible to achieve long running time for the compressor with few stops also when the heat demand is low. The heat pump will use the buffer tank sensor (136) and the system supply line sensor (51) to regulate the buffer tank (shunt valve, 29) and heat pump. The shunt will then control on the calculated set point from the main curve, using the system supply line sensor to calculate the heat demand. The system circulation pump (36) is required and running when the heat pump is in heating season.

Alt 2: Heat pump NOT connected to charge tank (not in combination with external aux heater)

With this setup, the heat pump is never charging the tank ("heat pump connected to tank" should be "off" in the controller menu), but when the tank temperature, measured by buffer tank sensor (136), exceeds set overcharge temperature above desired supply line temp, the compressor will stop and the buffer tank shunt / Shunt valve (29) will regulate the shunt according to set heat curve and use the energy in the tank before the heat pump is started again. When the temperature in the buffer tank is colder than the system set point, the system shunt is completely switched off and the compressor starts based on the demand calculation as usual.

This alternative does not use the volume available in the tank to achieve longer running time but may be preferred in certain applications where it is not desired to charge the accumulator tank. This solution requires a system circulation pump.

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

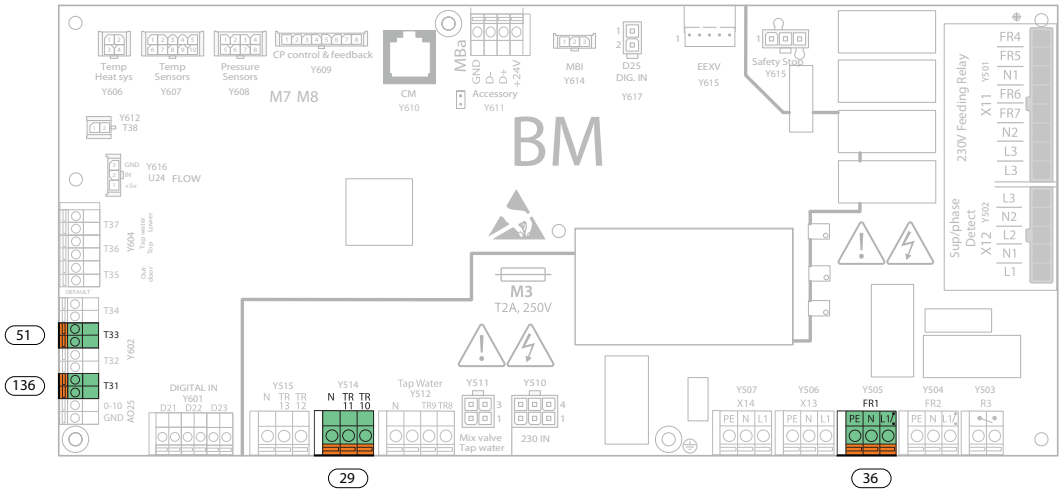


Table item number	Terminal	Description
29	TR10-11	Shunt valve 230VAC
36	FR1	Circulation pump 230VAC
51	T33	Supply line sensor
136	T31	Buffer tank sensor

10.5 System circulation pump & system supply line sensor

In certain systems (such as systems with a volume tank where there is no shunt valve) it may be desired to let the heat pump control a system pump (circulation pump for heating) and make the heat pump calculate the demand based on the system supply line sensor that can be positioned after the volume tank. To do this (provided that no other function uses these connections), install according to wiring diagram (position number 51 & 36) and enable "system pump" in the circulation pump menu, then go to ⚙⚙ Advanced settings and activate Auxiliary heater or Buffer tank, in order to establish a connection. There is no need to activate the functions in their respective settings view for the system to communicate.

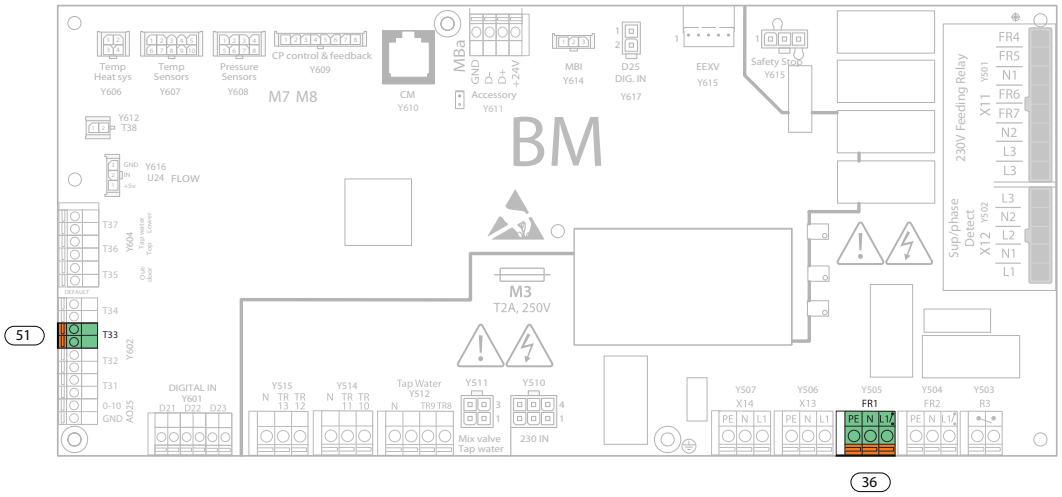


Table item number	Terminal	Description
36	FR1	System circulation pump (Needs to be activated in display to be activated.)
51	T33	System supply line sensor

10.6 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	BMS address	Description
0	0	0	**Normal:** Normal operation
1	0	1	**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	2	**Comfort:** Increased start and stop temperature of hot water.
1	1	3	**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. **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 EVU signal 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 cut off 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	BMS address	Description
0	0	0	**Normal:** Normal operation
1	0	1	**Power limitation:** The system runs within the configured power limitation or turns off. With power limitation set to 0 the system always turns off.
0	1	2	**Load up (Comfort):** Increased start and stop temperature of hot water.
1	1	3	**Power limitation:** 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.

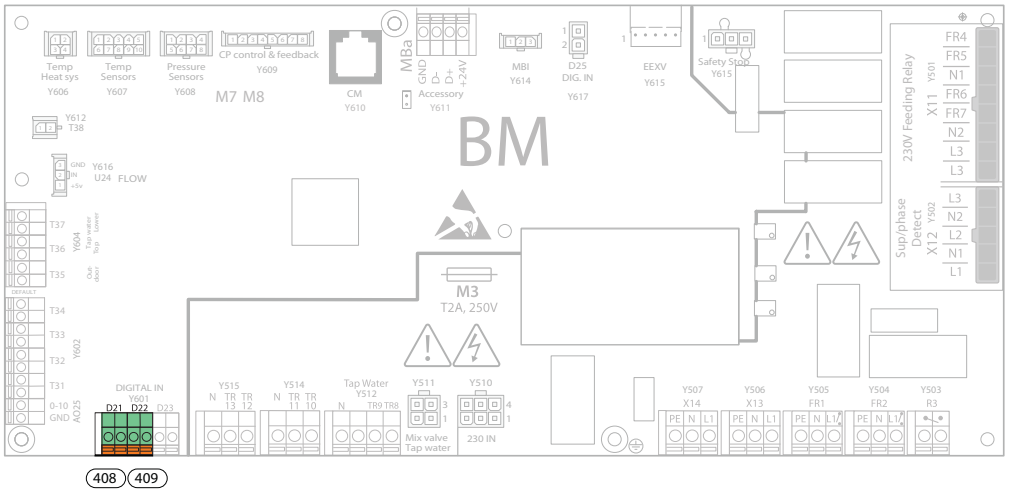


Table item number	Terminal	Description
408	D21	EVU/Smart grid 1
409	D22	Smart grid 2

10.7 Passive cooling (with Distribution 1)

With the Passive cooling function, it is possible to produce a very energy efficient passive cooling by circulating the brine to a separate circuit (with or without intermediate heat exchanger). A requirement to make passive cooling useful is that the brine temperatures are not too high. When Passive cooling is desired due to e.g. high outdoor temperatures, leading to high indoor temperatures, it is possible to control and regulate a separate circuit to a fixed cooling temperature set point.

The temperature reading from the supply line sensor cooling circuit (108) is used for regulating the shunt valve cooling circuit (107) (shunt valve). The shunt valve and cooling circuit circulation pump (109) is active when the heat pump is in cooling season (which is determined by the cooling integral and settings made for seasonal cooling temp) in the controller and a cooling demand is detected.

When cooling is produced, the internal brine pump and the cooling circulation pump is running. The mixing valve will strive to keep desired cooling supply line temperature to the set value (desired cooling temp) in the controller.

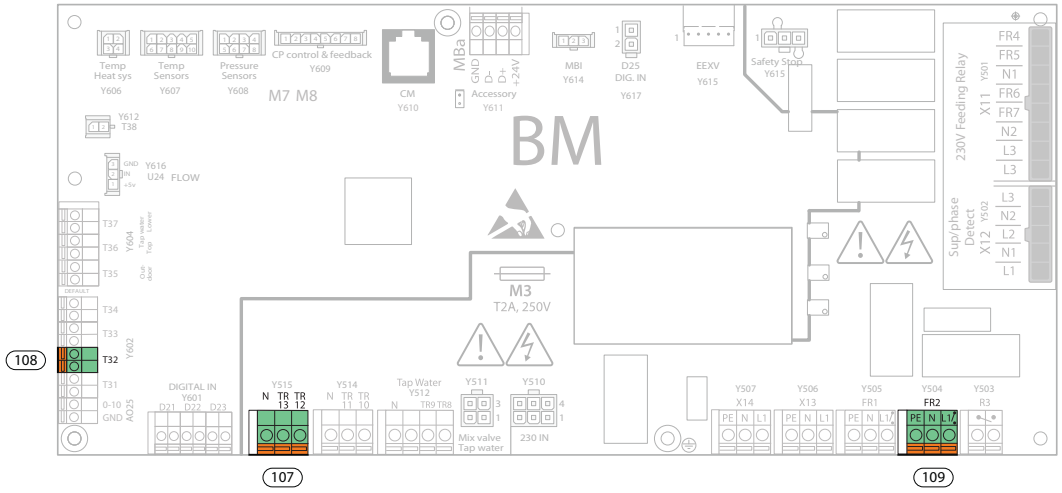


Table item number	Terminal	Description
107	TR12-13	Shunt valve 230VAC
108	T32	Supply line sensor
109	FR2	Circulation pump 230VAC

10.8 External auxiliary heater

The heat pump can, in addition to heat pump and internal immersion heater also control external aux heater (0-10V and on/off). 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 relay (117) is potential free.

External auxiliary heater can only produce heating and pool (if pool after external auxiliary heater is activated).

External auxiliary heater (relay)

(Not in combination with External brine pump or Alarm relay without EM4.)

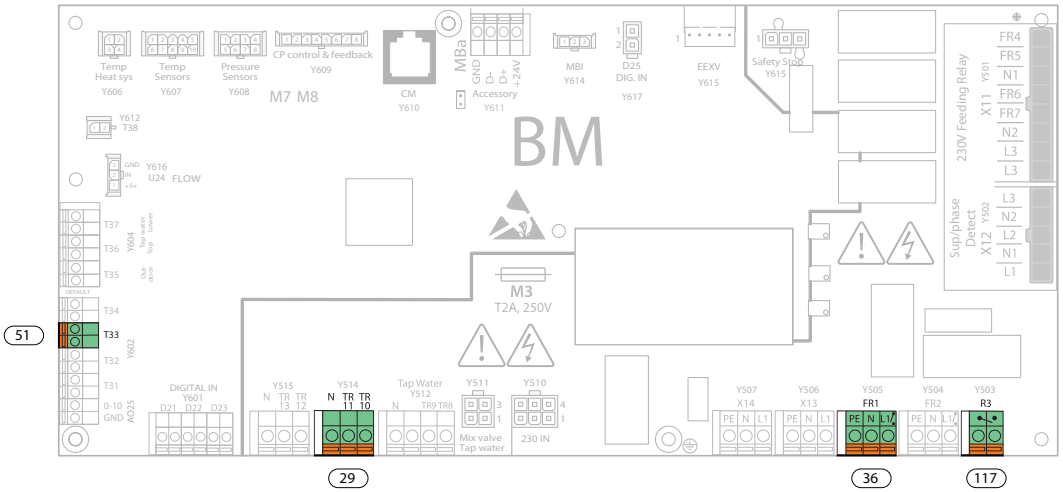


Table item number	Terminal	Description
29	TR10-11	Shunt valve 230VAC
36	FR1	Circulation pump 230VAC
51	T33	Supply line sensor
117	R3	External auxiliary heater

External auxiliary heater (control)

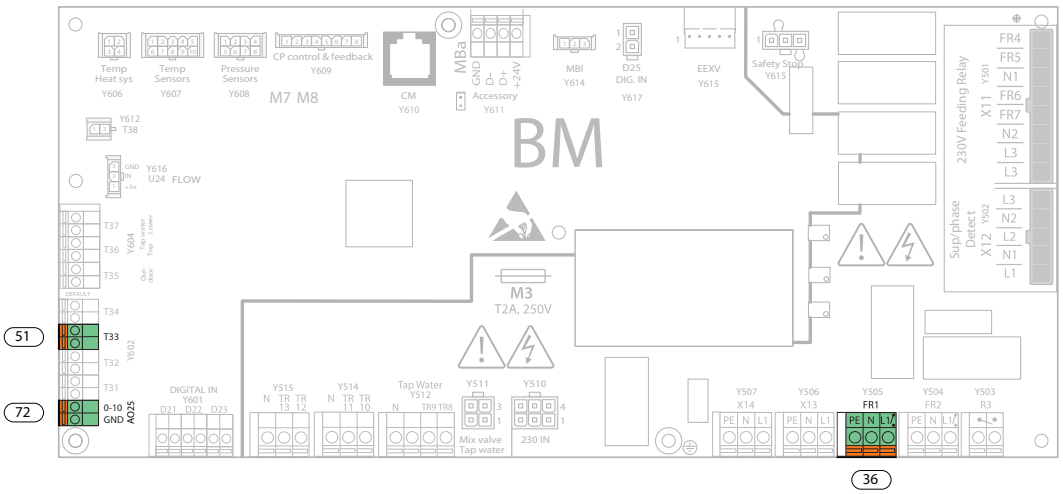


Table item number	Terminal	Description
36	FR1	Circulation pump 230VAC
51	T33	Supply line sensor
72	AO25	External auxiliary control 0-10V

10.9 Flow guard/pressure switch

In applications where a flow guard or pressure switch is required to stop or prevent starting the compressor in the case of a lack of flow or pressure, this can be installed and monitored with a digital input (open / closed loop. Flow = Closing)

Flow sensor monitoring is active when the internal/external brine pump is running, or the compressor is running. During the start sequence, the flow sensor has default 25 seconds (start delay compressor - 5 seconds) to report flow. If the flow disappears while the compressor is in operation, the compressor will stop directly. If there is a loss of flow an alarm is triggered immediately, but a restart attempt may be permitted. When a restart attempt is activated, an alarm is triggered if the flow disappears more than three times in two hours. Time between stop and start is 20 minutes (not restriction time).

The flow sensor alarm prevents the brine pump from running until the alarm has been acknowledged. This blocks passive cooling.

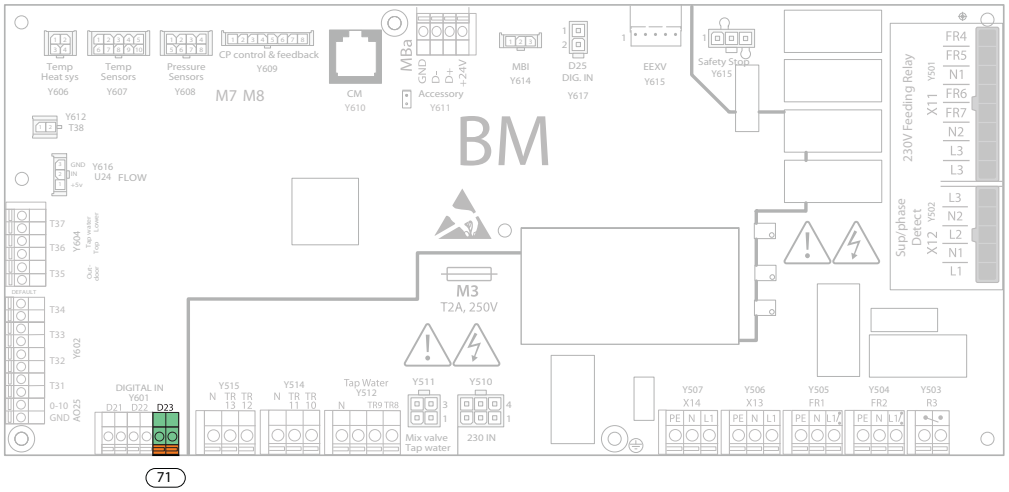


Table item number	Terminal	Description
71	D23	Not in combination with Start internal brine pump on external signal without EM4.

10.10 External brine pump

In applications where an external brine pump or ground water pump needs to be controlled, this can be done with the BM card. The signal is active when the internal brine pump is active. If continuous operation of the brine pump is activated, the external brine pump also operates continuously.

The relay is potential free.

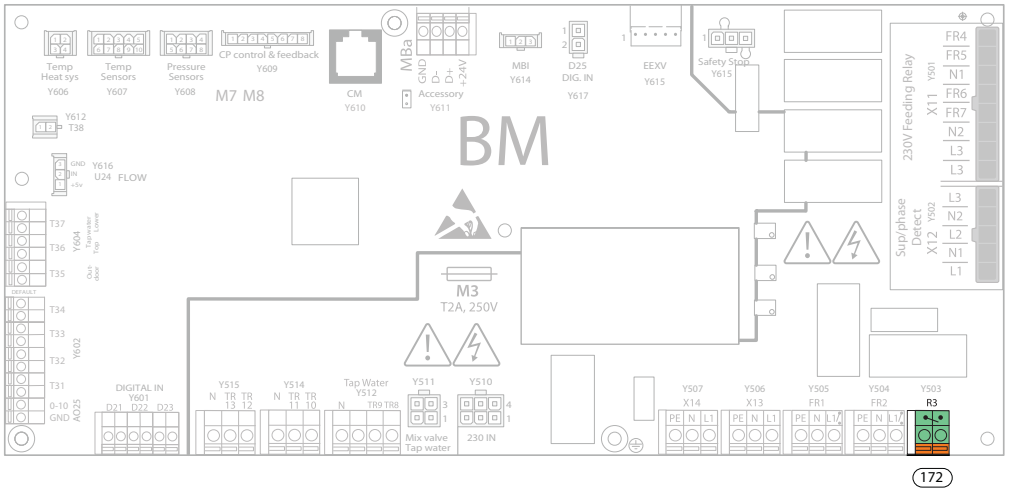


Table item number	Terminal	Description
172	R3	On/off control of external brine pump. Not in combination with External auxiliary heater or Alarm relay without EM4.

10.11 Internal brine pump on external signal

In applications where e.g. cooling is achieved by a separate system, (not controlled by the heat pump) the internal brine pump can be activated on external command using the BM card. The digital in (Open/closed loop) is then activating the internal brine pump when required. The internal brine pump will run when the control signal loop is closed.

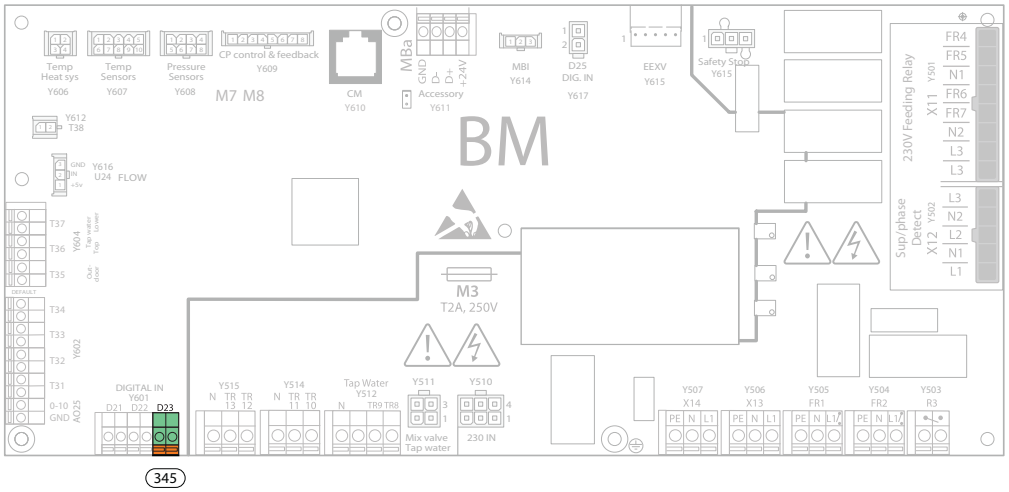


Table item number	Terminal	Description
345	D23	Not in combination with Flow guard/level guard without EM4.

10.12 Alarm relay (sum alarm output)

With the sum alarm function, it is possible to make alarms trigger a relay output signal that can be connected to for example a strobe light.

It is possible to set the alarm level that shall activate the signal in 3 levels:

- Alarms class A+B+C (= all alarms)
- Alarms Class A+B (=only alarms that may affect function etc.)
- Alarms Class A (=only alarms that stops compressor etc.)

For connection, see wiring diagram "Alarm relay" (position number 344). Relay is potential free.

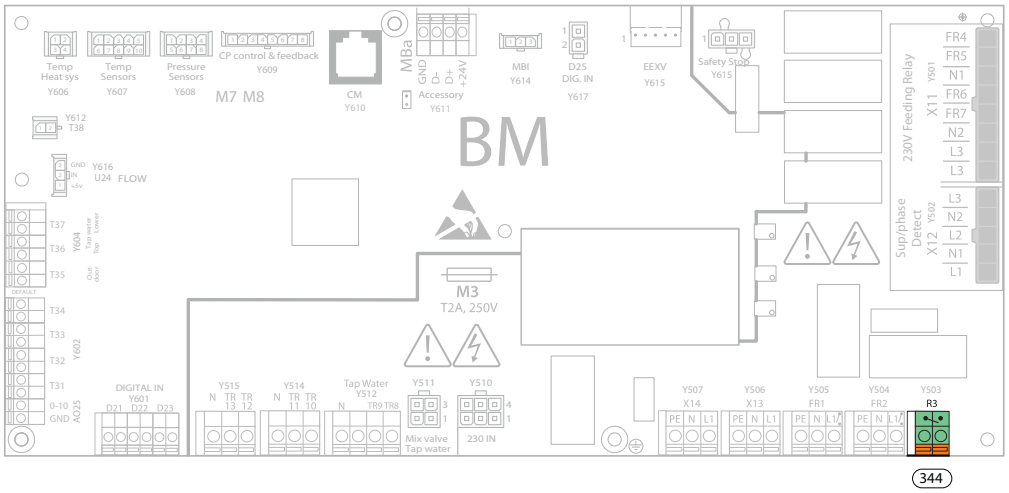
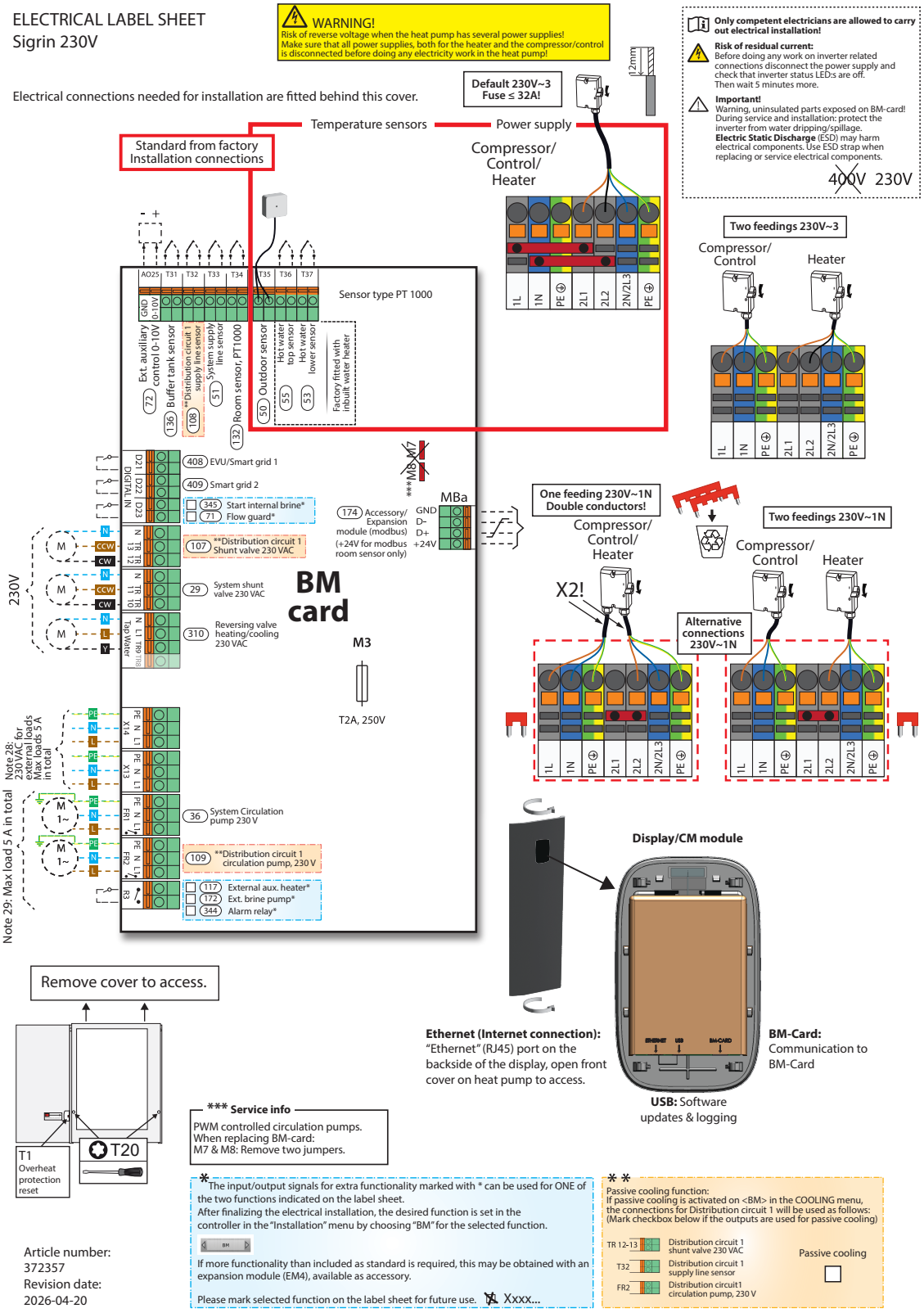


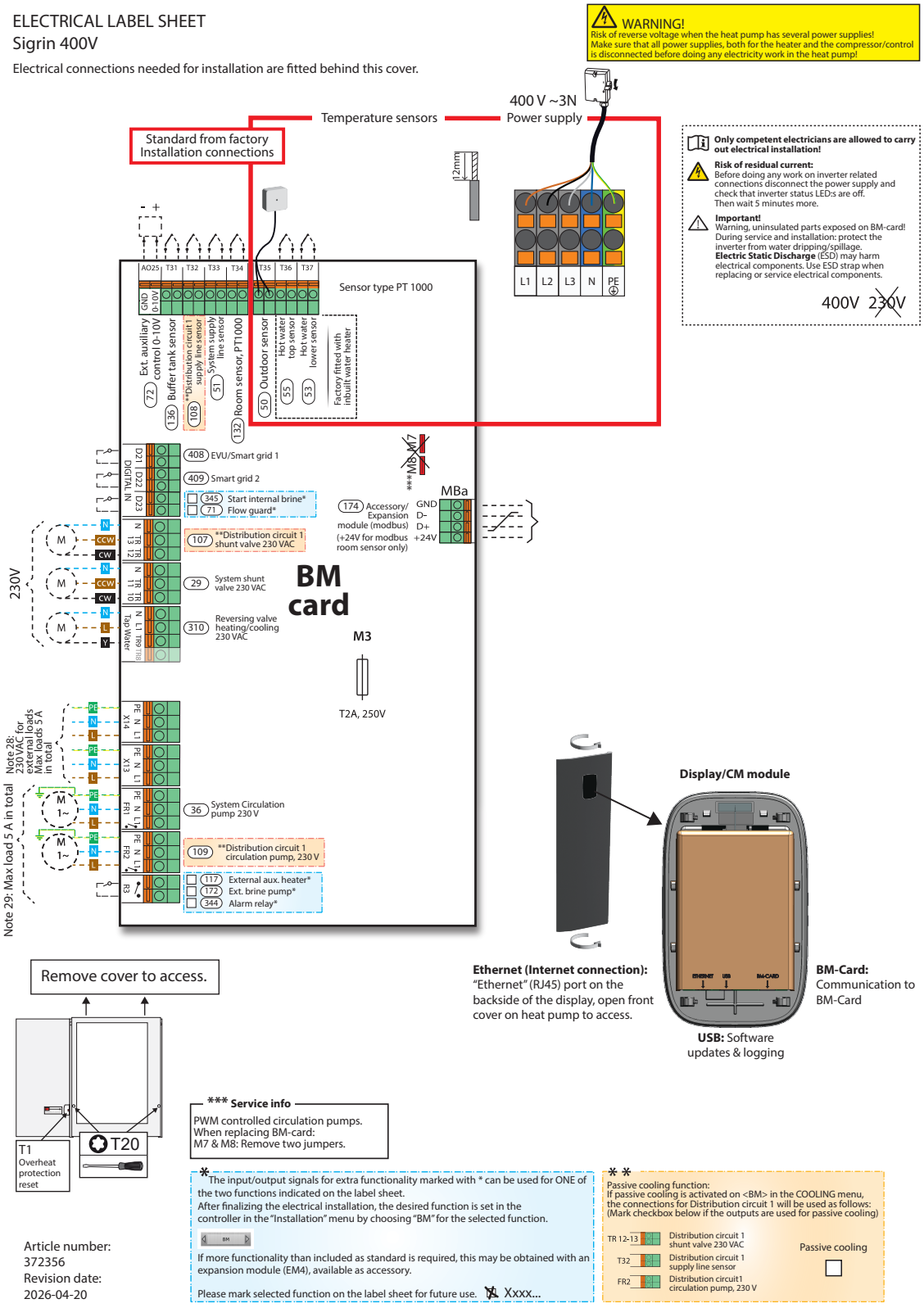
Table item number	Terminal	Description
344	R3	Not in combination with External brine pump or External auxiliary heater without EM4.

11 Electrical connections

11.1 Electrical connections 230V (this label is also fitted on the electrical cabinet of the heat pump)



11.2 Electrical connections 400V (this label is also fitted on the electrical cabinet of the heat pump)



12 Recovering and filling refrigerant

12.1 General service instructions

12.1.1 Checks and preparations

Note

Compliance with national gas regulations shall be observed.

Note

Service, maintenance and repair, such as: breaking into the refrigerant circuit; opening of sealed components; opening of ventilated enclosures, shall be performed as recommended by Thermia and only by competent personnel.

Note

All maintenance staff, and others, working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.

Warning

In accordance to IEC60335-2-40:2024, prior to installation, the appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance, an operating electric heater or a hot surface with a temperature above 700°C for A2L and 370°C for A3).

Warning

Under no circumstances shall potential sources of ignition be used in the searching for, or detection of, refrigerant leaks. A halide torch (or any detector using a naked flame) shall not be used. Be aware that refrigerants may not contain an odour. Do not pierce or burn. If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system.

Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. "No smoking" signs shall be displayed.

A2L symbol

Service personnel shall have competence about:

- The explosion potential of flammable refrigerants to show that flammable refrigerants may be dangerous when handled without care.
- Potential ignition sources, especially those that are not obvious, such as lighters, light switches, vacuum cleaners, electric heaters, etc.
- The different safety concepts (Unventilated, Ventilated enclosure, Ventilated room).
- Refrigerant detectors.
- The concept of sealed components and sealed enclosures according to IEC60079-15:2010.
- The correct working procedures for commissioning, maintenance, repair, decommissioning and disposal.

Ensure that the area is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that work is carried out. The ventilation should safely disperse any refrigerant and preferably expel it externally into the atmosphere.

The following leak detection methods are deemed acceptable for flammable refrigerants:

- Electronic leak detectors may be used to detect refrigerant leaks. Detection equipment shall be calibrated in a refrigerant-free area. Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant. Leak detection equipment shall be set to 20% of the LFL (Lower Flammability Limit) of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (A3: 1,7% maximum, A2L: 25% maximum) is confirmed.

– Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available at hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

For maximum refrigerant charge (mmax), see type plate on the heat pump.

12.2 Recovering and filling the refrigerant

12.2.1 Preparations before opening the refrigerant circuit

The following instructions make no difference between A2, A2L & A3 refrigerants. Safely remove refrigerant following local and national regulations related to correct extraction and disposal of refrigerant. Observe the general safety information.

Make sure that you use tools and equipment that are suitable for the actual refrigerant and its characteristics. Always have a Class C powder extinguisher nearby when performing the work.

After recovering the refrigerant from the cooling circuit, with the intention of decommissioning and/or scrapping, a label has to be attached, visibly, stating the date of the recovery and with a signature of the person who carried out the work.

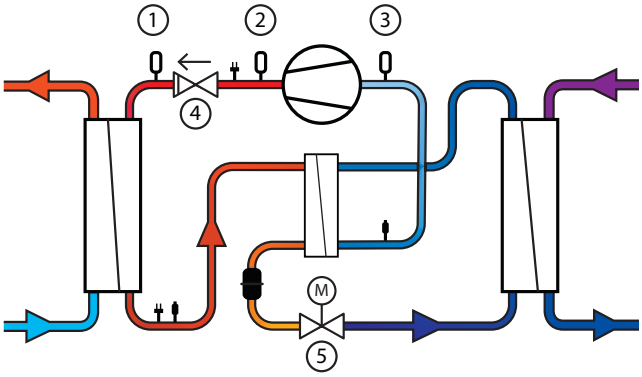
Reference picture for instructions referring to the refrigerant circuit

1. Refill/drain valve, high pressure side
2. Vacuum*/flush valve, high pressure side
3. Flush/refill**/vacuum* valve, low pressure side
4. Non return valve
5. Expansion valve with stepper motor

* When performing a vacuum operation, both valve 2 and 3 should be used simultaneously.

** Refill valve for top-up when the compressor is running.

Schematic view of the refrigerant circuit. Numbers correlate to the list above:



12.2.2 Before recovering the refrigerant

Before starting:

- Make sure that the expansion valve is fully open. This is done in the display, in **Manual test**. Log in and set the opening degree to 100%. This is done to allow for an easy evacuation of the refrigerant, for the flushing (nitrogen gas) and for the vacuum suction of the circuit.
- Press **Advanced settings** and navigate to **Manual test**.
- On the first page, activate Manual test. A hand symbol appears in the Status bar in the top of the display, to indicate that the heat pump is in **Manual test** mode.
- Navigate to the expansion valve page. Activate and pull the slider for the opening degree to 100 %.
- When the expansion valve is fully open (after about 10 seconds from confirming in the display), remove the stepper motor from the valve (chapter 12.2.1, reference picture, 6)
- Cut the power to the heat pump (to be able to connect the gauge manifold with an equipotential bonding). The expansion valve is now open.

The refrigerant circuit should not be open any longer than necessary, to avoid air from entering the circuit. Therefore don't open the refrigerant circuit before all the necessary preparations are done and all the required tools are in place. If the work is aborted, the circuit has to be closed and filled with Nitrogen gas to a small overpressure, to prevent any ingress of air. The filter dryer shall always be exchanged when the circuit has been opened.

Additional safety measures:

- Always start the personal leakage detector or electronic leakage detector before entering the work area. Don't turn off the detector before the work is done. The gas detector shall be calibrated to the refrigerant.
- Ventilate the work area.
  Eliminate ignition sources and keep a Class C powder extinguisher close by.
- If an indirect refrigerating circuit is being used, the secondary unit shall be checked for the presence of refrigerant.
- Make sure that the markings of the equipment are visible and correct for the specific job (type of refrigerant). If indicated as unsuitable, change to proper equipment.
- Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue the operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.
- Make sure that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking.
- Make sure that no live electrical components and wiring are exposed while charging, recovering or purging the system.
- Make sure that there is continuity of earth bonding.

12.2.3 Recovering the refrigerant, step by step

1. Check and make sure that the atmosphere is safe before starting the work with a gas detector, fulfilling the requirements above mentioned.
2. Place a fan so that a good circulation of the air is achieved at the working area. Connect it to a socket at least 3 m away from the point of the circuit being opened.
3. Connect the power supply to the recovering unit at least 3 m away from the circuit being opened.
4. Make sure that the refrigerant cylinder, the refrigerant circuit and the recovering unit are equipotentially bonded.
5. Make sure that the necessary valves are open.
6. Start recovering the refrigerant (chapter 12.2.1, reference picture, 1).
7. Check the connections on the recovering unit and the refrigerant cylinder with a leakage detector during the work procedure, to make sure that there is no leakage that can create a dangerous atmosphere.
8. Recover the system down to 0,6 bar(a) or lower. Empty completely for scrapping.
9. **It is important to make sure that no oxygen enters the circuit!** Prevent this by closing all valves before connecting the Nitrogen. Flush the system with Nitrogen gas for at least 5 min on the low pressure service valve (chapter 12.2.1, reference picture, 3) and expansion valve fully OPEN, with the pressure set to around 1,0 bar (e). Release Nitrogen from the drain valve on the high pressure side (chapter 12.2.1, reference picture, 1). When performing the flushing, use a Schrader needle opener, to adjust the flow of Nitrogen and thus reducing the amount of Nitrogen being used.
10. Place the end of the hose connected to the vacuum pump in a well ventilated space or outdoors. Check that any leaking gas from the vacuum pump cannot create a dangerous atmosphere.

11. Connect the vacuum pump to a power source at least 3m from the point of the circuit being open. Set the ON/OFF button on the vacuum pump to ON and Start suction to around 0,3 bar (a) (chapter 12.2.1, reference picture, 2 & 3).
12. In this step, the stepper motor (chapter 12.2.1, reference picture, 6) needs to be put back into place with the expansion valve set to 0% opening degree in the display. Flush the system again with Nitrogen gas for at least 5 min on the low pressure service valve (chapter 12.2.1, reference picture, 3). Release Nitrogen from the refill/drain valve on the high pressure side (chapter 12.2.1, reference picture, 1). Set the expansion valve to CLOSED, to ensure that the compressor gets thoroughly flushed.
13. Before work on the refrigerant circuit, the pressure in the circuit has to get lower still, with more vacuum suction down to a pressure of 2 mBar, before cut off with dry Nitrogen gas. When the recovering unit is emptied, flushed with Nitrogen gas, vacuum sucked and protectively filled with dry Nitrogen gas, the work on the refrigerant circuit can start in a safe manner.

12.2.4 Refilling the refrigerant, step by step

When refilling the refrigerant, be sure not to over fill the circuit. The amount must be weighed according to the amount printed on the manufacturers sign on top of the heat pump or be filled after subcooling.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow-up leak test shall be carried out prior to leaving the site.

1. Place the fan so that sufficient ventilation is achieved at the work area. Then connect the fan to a power supply at least 3m from the point of the circuit being open.
2. Place the refrigerant cylinder on a scale prepared for the refrigerant amount.
3. Connect the refrigerant cylinder and make sure that the refill hose is vacuum suctioned.
4. Make sure the refrigerant cylinder and the refrigerant circuit are equipotentially bonded.
5. Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
6. Cylinders shall be kept in an appropriate position according to the instructions.
7. Ensure that the refrigerating system is grounded prior to charging the system with refrigerant.
8. Label the system when charging is complete (if not done already).
9. Extreme care shall be taken not to overfill the refrigerating system.
10. Check with a leakage detector to make sure that no leakage is present that can create a dangerous atmosphere.
11. Start filling the refrigerant.
12. Do leakage tracing with spray or soap water or with an electronic leakage detector.
13. Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. Also take into account the effects of aging or continual vibration from sources such as compressors or fans.

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