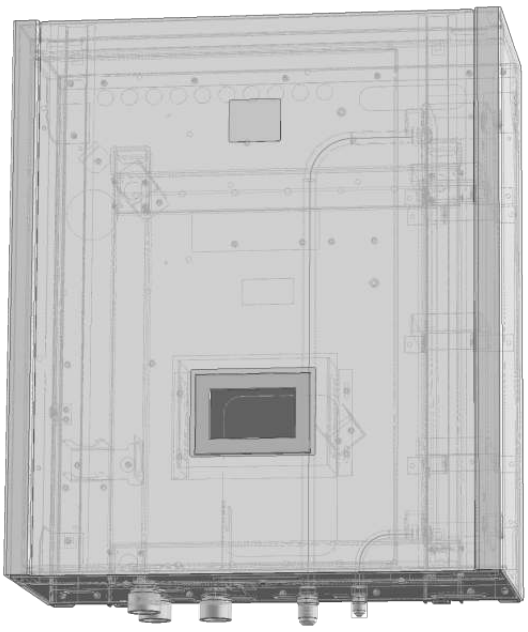
Installation manual

NeoRé TG

Heat pump air-water



NeoRé 5TG
NeoRé 8TG
NeoRé 11TG
NeoRé 14TG
NeoRé 8TG HP
NeoRé 11TG HP
NeoRé 14TG HP
NeoRé 16TG HP

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Contents

1. Introduction

Installation manual extends User manual by more informations. This manual is designed primarily for construction companies and heating engineers, which realise installation of outdoor and indoor unit of NeoRé heat pump and connect it to the heating system.

Second part of this manual is designed for service organisations and engineers. In this part is an explanation of error codes and instructions for device maintenance.

2. Safety instructions

2.1 Safety warning

Read the manual carefully before installing, putting into operation or maintaining the device. Adherence to the described procedures for the installation and operation of the device is important for long-term and trouble-free operation. Faults and defects caused by non-compliance with the safety instructions, installation procedures and operating rules will not be taken into account, not even damage or destruction of other related equipment. The device may only be installed by persons with appropriate qualifications in the field of heating, cooling and electrical engineering.

In addition, observe all applicable safety regulations related to the actual installation and operation of the NeoRé heat pump.

The device may only be operated by a person familiar with this manual and older than 15 years. Persons with limited physical, sensory and mental capabilities or with lack of experience and/or knowledge may operate the device only if they are supervised or trained in the safe use of the device by the person responsible for their safety and if they understand the dangers involved. Children must not play with the device or clean or maintain it.

The R32 refrigerant is a class A2L flammable gas.

To install the indoor unit, observe the minimum floor area requirement. More in *Installation Manual, Table Minimum floor area when using A2L gas in Chapter Refrigerant piping*.

The heat pump must be installed in a room without continuous open flame operation (e.g. running gas appliance) and ignition sources (e.g. operating electric heater).

2.2 Safety precautions

The heat pump is an electric device working with a voltage of 400 V! The device may only be installed and serviced by an authorized electrician. In case of fire, do not extinguish with water or foam. Use only a powder or snow extinguisher!

In the event of a refrigerant leak, turn off all circuit breakers located on the indoor unit and contact the service organization indicated on the plate on the indoor unit. The R32 refrigerant is slightly flammable, non-toxic. Under no circumstances should you try to stop the refrigerant leak yourself. It reaches very low temperatures (up to −50°C). In the event of a leak in the interior of a building, ventilate the room. In case of inhalation of refrigerant vapours or fire fumes, take the affected person to a ventilated place and call for medical help: phone number 112. In case of contact with liquid refrigerant, dry the area immediately and warm it, for example with a blanket. In case of contact with eyes, rinse immediately with plenty of lukewarm water and call for medical help: phone number 112.

In case of fire, disconnect the device from the mains and extinguish with a snow or powder fire extinguisher.

In the event of a heating water leak, turn off all circuit breakers located on the indoor unit and contact your service organization.

When handling the refrigerant piping (cleaning, maintenance), use personal protective equipment (gloves, goggles, protective clothing, ...).

Do not put your hands or other objects in the fan area of the outdoor unit, there is a risk of serious injury!.

Do not expose yourself to the airflow from the outdoor unit for a long time. There is a risk of severe hypothermia!

- Perform the installation only in accordance with the installation manual, which is available at https://www.neota.cz/en/downloads/.
- Connect the outdoor and indoor unit (refrigerant, electric) only with the material specified in the installation manual.
- Installation work on the refrigerant and electric circuit must be performed by an appropriately authorized person.
- Do not use flexible inlets and piping to connect the units.
- Do not operate a device that is not completely installed.
- Do not use refrigerants whose quality and purity you are not sure about. Observe the safety precautions on the refrigerant packaging.
- Do not add refrigerant to increase performance.
- Always use a vacuum pump before filling the refrigerant.
- Pay attention to work safety and personal protective equipment during installation.
- The device must be installed by a specialist company authorized by the manufacturer. Do not attempt to install the device yourself. You can destroy the device or cause injury.
- Do not mix two types of refrigerant. Use only the refrigerant specified on the label.

2.3 Legal conditions

Legal conditions that must be observed when handling the device.

ČSN EN 378-4+A1:2020 Art. 6.5.x
All parts of refrigeration equipment, e.g. refrigerant, heat-transfer medium, filter, dehydrator, insulation material, compressor and the whole refrigerant circuit system must be recovered, reused and/or properly disposed of in connection with maintenance, repair and decommissioning. Maintenance and disposal must be performed by a person professionally qualified for the disposal of refrigerants and oils.

ČSN EN 378-4+A1:2020 Art. 6.2.x
Used refrigerant that is not intended for reuse must be treated as waste for safe disposal. Prevent emissions to the environment. Any handling of the refrigerant must be performed by a person professionally qualified for the disposal of refrigerants and oils.

ČSN EN 378-4+A1:2020 Art. 6.2.x
Used oil recovered from refrigeration equipment that cannot be regenerated must be stored in a suitable separate container and must be treated as waste for safe disposal. Oil must be drained by a qualified person.

ČSN EN 378-4+A1:2020 čl. 6.6
All activities related to recovery, reuse of refrigerant and refrigerant source must be recorded in the refrigeration equipment's operating log (see En 378-4 Art. 4.2). If required, it must be provided by the refrigerant supplier or service company.

2.4 Storage and transport conditions

Indoor unit NeoRé IU16-20

Environment	dust-free, non-aggressive
Temperature range	-10 to 45°C
Relative humidity	max 70%

Outdoor unit OU GMx or OU GPx

Environment	dust-free, non-aggressive
Temperature range	-10 to 45°C
Relative humidity	max 90%

The outdoor unit must be stored and transported in a vertical position in the original packaging and properly secured. If necessary, protect fragile parts, especially the evaporator, from damage. Overturning or leaking refrigerant may lead to injury.

During transport, all components of the device must be secured with straps or other technical means to prevent overturning and injury.

If damage or refrigerant leakage occur during transport, do not attempt to stop the leak improperly. Evaporation of the refrigerant significantly cools the affected areas and may cause injury in contact with the skin.

2.5 Table of technical parameters

SERIES NAME				COMFORT SERIES				HIGH POWER SERIES			
Type				NeoRé 5 TG	NeoRé 8 TG	NeoRé 11 TG	NeoRé 14 TG	NeoRé 8 TG HP	NeoRé 11 TG HP	NeoRé 14 TG HP	NeoRé 16 TG HP
Building heat loss	Low-temperature (35 °C)		kW	5	6	7	9	6	9	11	13
	Medium-temperature (55°C)		kW	4	5	6	6	5	8	10	11
Bivalent temperature	Low-temperature		°C	-7							
	Medium-temperature		°C	-7							
Seasonal energy efficiency (Eu 811,813/2013)	Low-temperature		%	174	176	175	173	194	192	186	184
	Medium-temperature			121	124	123	120	133	134	127	124
	Low-temperature class			A++	A+++	A++	A++	A+++	A+++	A+++	A+++
	Medium-temperature class			A+	A+	A+	A+	A++	A++	A++	A+
Seasonal coefficient of performance SCOP	Low-temperature class			4,42	4,48	4,45	4,39	4,92	4,88	4,71	4,67
	Medium-temperature class			3,09	3,16	3,14	3,07	3,4	3,42	3,26	3,18
+2°C / +35°C (EN 14511) - compressor power 100%	Heat output		kW	4,5	7,5	10	13	8	10	13	16
+2°C / +35°C (EN 14511)	Heat output / compressor power		kW/%	3,5 / 45	4,3 / 45	4,9 / 45	5,41 / 45	3,8 / 45	5,2 / 45	6,6 / 55	7,6 / 60
	COP* / compressor power			3,65 / 45	3,7 / 45	3,65 / 45	3,5 / 45	4,07 / 45	4,15 / 45	3,95 / 55	3,8 / 60
+7°C / +35°C (EN 14511)	Heat output / compressor power		kW/%	3,8 / 45	5,2 / 45	6,0 / 45	7,25 / 45	5,2 / 45	7,05 / 45	8,9 / 55	10,25 / 63
	COP* / compressor power			4,7 / 45	4,75 / 45	4,7 / 45	4,65 / 45	5,5 / 45	5,61 / 45	5,47 / 55	5,29 / 63
+7°C / +55°C (EN 14511)	Heat output / compressor power		kW/%	3,8 / 55	5,6 / 55	6,2 / 55	7,4 / 55	6,81 / 60	9,34 / 60	11,89 / 70	13,56 / 78
	COP* / compressor power			2,7 / 55	2,8 / 55	2,74 / 55	2,7 / 55	3,16 / 60	3,3 / 60	3,1 / 70	2,95 / 78
Annual energy consumption	Low-temperature		kWh	2102	2813	3361	4241	2466	3809	4821	5747
	Medium-temperature		kWh	2339	3321	3714	4214	2921	4831	6337	7157
Cooling power	+40 °C / +15 °C		kW	3,9	6,33	9,47	11,46	7,1	10	11,5	13
EER				3,9	3,9	3,56	3,31	5,18	5,26	5	4,3
INDOOR UNIT											
Backup heat source	Power		kW	6,0 (3×2 kW)							
Noise level (acoustic power)			dB(A)	32,5 dB							
Indoor unit dimensions	H x W x D		cm	65 x 57 x 30							
Indoor unit weight			kg	48 net							
Condensing exchanger				stainless steel plate – soldered							
Max. water column height			m	18							
Safety overpressure			MPa	0,25							
Heating circuit connection				G1" female thread							
Pumping power	(indoor unit)		m	6,8							
Nominal flow of heating water			l/h	850	950	1360	2400	950	1360	2400	2700
Circulating pump				ErP low-energy							
Supply cable protection			A	3x20	3x20	3x25	3x25	3x20	3x25	3x25	3x25
OUTDOOR UNIT											
Outdoor unit voltage				1ph 230V							3ph 400V
Current	Max.		A	13,1	17,5	18,5	20	17,5	18,5	20	10,5
Fan motor				DC – variable speed							
Noise level (acoustic power)			dB(A)	60	60	62	62	58	59,5	59,5	60,5
Sound pressure level at 5m**			dB(A)	38	38	40	40	36	38	38	39
Outdoor unit dimensions	H x W x D		cm	63x87x30	89x90x32	89x90x32	89x90x32	105x101x37	155x101x37	155x101x37	134x90x32
Outdoor unit weight	(net)		kg	45	68	68	68	74	104	104	95
Refrigerant				R32(GWP=675)							
Refrigerant quantity			kg	1,35	2,1	2,1	2,1	1,9	3,1	3,1	3,1
Connecting pipes – Diameter		Liquid	mm	ø 6,4	ø 9,52						
		Gas	mm	ø 12,7	ø 15,88						
Connecting pipes – Length		Min. / Max.	m	5/25	5/25	5/25	5/25	3/30	3/40	3/40	3/40
Connecting pipes – Length (without addition)		Max.	m	30	30	30	30	30	30	30	30
Connecting pipes – Height difference		Max.	m	10	10	10	10	10	10	10	10
Operating range			°C	-15 ~ 24				-27 ~ 24			
Max. output water temperature			°C	55				60			
Min. output water temperature			°C	20							
Compressor				DC - inverter (with variable speed)							
Refrigerant circuit control				electronic expansion valve							
Evaporator				Al-Cu vertical							
Air flow	m^3/h			2250	4080	4080	4200	3180	6180		
Defrosting				hot gas through reverse valve							
Limits for relative humidity				15-95%							

* The value is measured according to ČSN14511 (measured including defrosting, consumption of the complete pump system included)

** Value measured according to EN12102-1 at 5m, direction coefficient 2 | The seasonal thermal efficiency values are determined for the average temperature range.

Figure 2.1: Table of technical parameters

3. Installation manual

The heat pump may only be installed in accordance with the safety instructions, see chapter 2 Safety instructions (p. 5).

3.1 Working conditions

The heat pump can be used as a heat source for

- heating
- water heating
- cooling

Freezing of the coolant exchanger - The basic protection against freezing of the coolant/water exchanger is to ensure minimum flow through the exchanger, see project documentation. Such accident of the coolant exchanger can only occur during defrosting the evaporator, or cooling. It is necessary to ensure that no control element is inserted in the heating circuit, that could close or significantly reduce the heating water circulation. When starting the heat pump for the first time and after a shutdown, ensure that the water in the heating circuit has at least 20° C.

According to ČSN 33 2000-3, the heat pump must not be located and installed in an environment with a risk of explosion of flammable gases.

3.1.1 Working environment

environment according to ČSN 33 2000-3 for an outdoor unit	AA2; AA3; AA4; AA5; AB7; AD3
environment according to ČSN 33 2000-3 for an indoor unit	AA5; AB5

Technical parameters of el. connections	
nominal voltage	3x400/230V; +/-10%; 50Hz
maximum power	according to table of technical parameters
grid type	TN-CS according to ČSN EN 33 2000-3
ingress protection	I according to ČSN EN 60335-1
outdoor unit ingress protection	IPX4
indoor unit ingress protection	IP40/20 (with / without cover)

Table 3.1: Technical parameters of el. connections

3.1.2 Cooling circuit

refrigerant R32, CH_2F_2 , GWP 675, refill by type (table of technical parameters on p. 8)
maximum overpressure 4.2 MPa

The working range of output water temperature can be found in the figure 8.3 on page 49.

3.1.3 Technical parameters of heating / cooling water

Before the installation we recommend to make water analysis. Each material reacts when come to touch with water. Type of reaction depends on substances containde in water. Water with higher content of salt, calcium and magnesium sedimenst in form of limescale after warming up to 60°C. It is an irreversible procedure which causes significant deterionation of whole device and significant decrease of efficiency.

Generally recommended operating water parameters:

- pH 6,5-8,5
- conductivity under 350 μs/cm
- hardness 2-6°dH
- bacteria NE
- mechanical impurities NO

3.1.4 Technical parameters of water

Inlet water quality for stainless steel tank must not exceed following parameters:

- Calcium (Ca) + Magnesium (Mg) = 1,25 mmol/l
- Ferrum (Fe) = 0,2 mg/l
- Mangan (Mn) = 0,05 mg/l
- Chloride (Cl) = 0,03 mg/l
- Chlorides = 100 mg/l
- Water hadrness less than or equal to 7°dH

If the inside of water tank will be damaged in cause of exceeding the parameters of water, there is no claiming warranty from the manufacturer.

If the water does not meet parameters, it is needed to connect a mechanical filter to cold water inlet and install convient water threatment.

More in chapter 7.3 Hot water tank maintenance (p. 42)

Overpressure and temperature	
highest overpressure	2,5 bar
highest working overpressure	0,8 bar
highest working temperature	60°C

Table 3.2: Overpressure and temperature

The minimum heating water flow rate for each power type is shown in the figure 8.2 on page 48.

3.2 Preparation of space for the outdoor unit

When choosing an area for the outdoor unit, it is necessary to consider current legislation and choose the location so that the day-time or night-time noise limits on the site boundaries are not exceeded. Ambient materials (wall, bushes, solid area, green area, etc.) significantly affect propagation of noise. Therefore, it is advisable to draw up a noise study prior to physical location of the outdoor unit.

When choosing an area for the outdoor unit, it is necessary to keep the minimum distances from the surrounding objects for the sake of air flow through the device. Failure to observe these distances may have a major impact on the correct functioning and performance of the device.
It is also necessary to secure the unit against tipping and ensure condensate drainage from the unit so that no ice freezes are formed under it in the winter months. The condensate drainage method depends mainly on the climatic conditions in which the unit is installed. Heating cable under unit is recomended in cold climate, to melt an ice and help the water soak up. The space around the unit must be maintained clear of snow and other things.

Minimum spacing distances

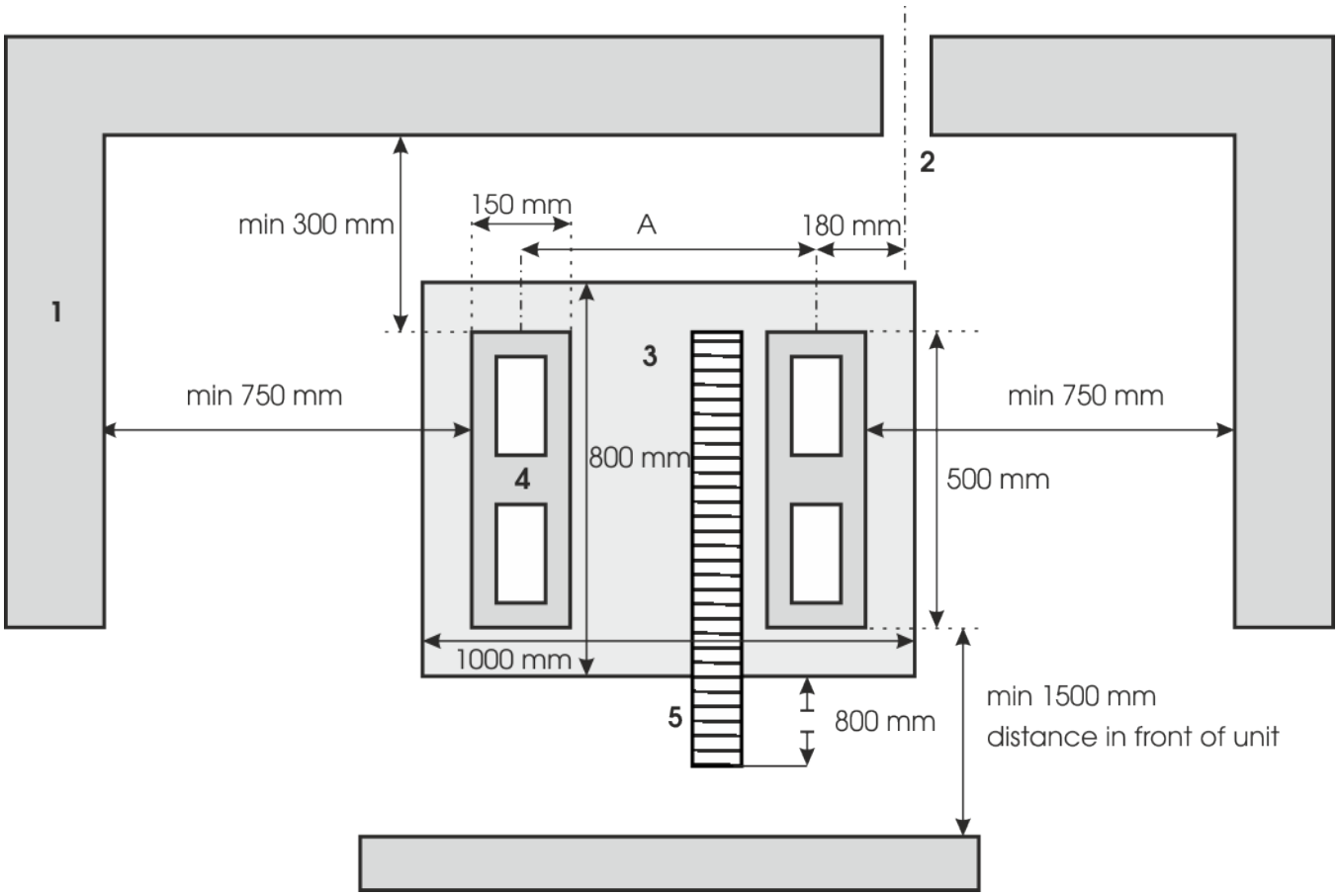


Figure 3.1: Drawing of foundation for the outdoor unit - floor plan
1 - wall; 2 - passage through the wall into the interior; 3 - drainage pit;
4 - concrete masonry; 5 - drainage hose

Dimensions dependent by outdoor unit type	
Outdoor unit	**dimension A**
NeoRé 5, 8, 11, 14 TGx, NeoRé 16 TGx HP	600 mm
NeoRé 8, 11, 14 TGx HP	620 mm

Table 3.3: Console pitch depending on outdoor unit type (x = TX or MINI)

Images 3.1 and 3.2 (p. 14) show the way space can be prepared for installation of the outdoor unit. The image 3.1 indicates minimum distances from the walls. This is the worst acceptable scenario that still enables proper functioning of the device. There must be no fixed obstacle in front of the unit, at least one meter away. Always ask supplier for the correct install method for your system.

The dimensions of the drainage pit are, again, marked with regard to good functionality and convenient implementation. Inside the drainage pit, there are masonry blocks filled with concrete. During casting, it is advisable to insert threaded rods that will anchor the console under the outdoor unit, into the concrete pillars. Another option is to anchor the threaded rods with chemical mortar.

At the bottom of the drainage pit, especially if the soil is clayey and impermeable, it is recommended to insert a drainage hose, which must be at least 800 mm outside the drainage pit, covered in geotextile and stored in pebbles. Likewise, the entire area of the drainage pit will be filled with pebbles to ensure proper water drainage and allow it to soak into the subsoil.

To fit the outdoor unit, use a console to ensure that the unit is higher than the surrounding terrain. This results in a lower rate of clogging of the exchanger with surrounding dirt from the ground and, above all, the passage of air through the snow in winter is not limited. Before fitting the outdoor unit, the console must be mounted.

The passage through the wall needs to be higher than the outlets from the outdoor unit, so that during rain, water will run off the object.

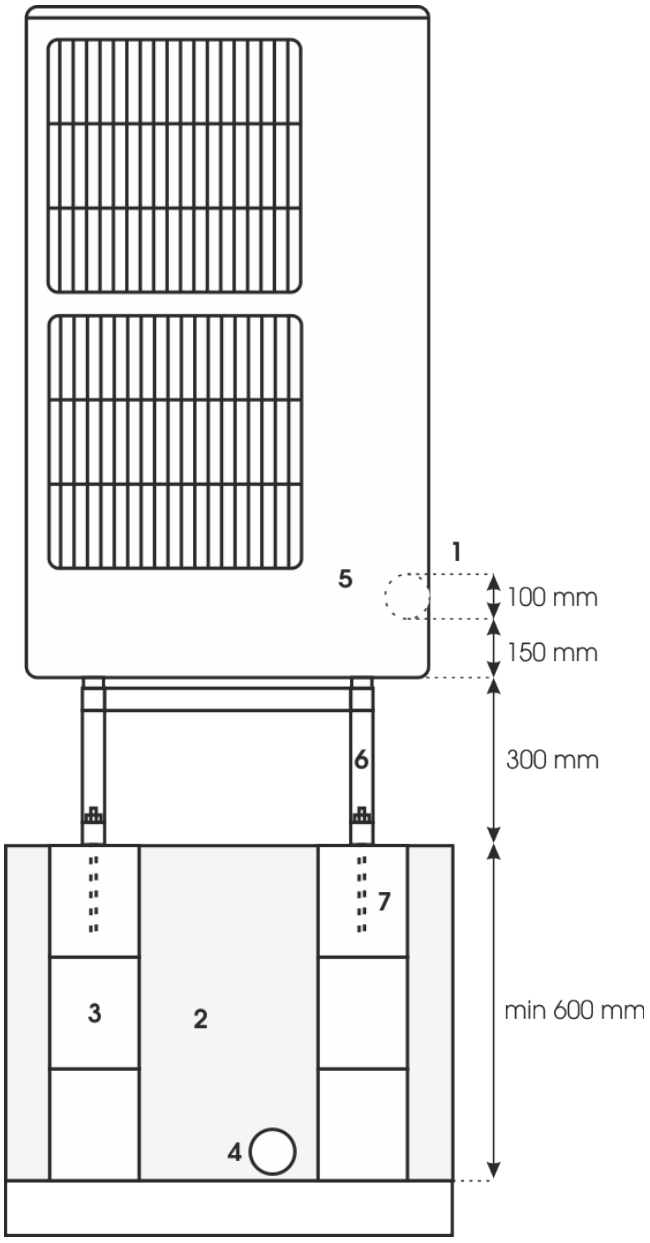


Figure 3.2: Outline drawing for the outdoor unit - front view
1 - passage through the wall into the interior; 2 - drainage pit;
3 - concrete masonry; 4 - drainage hose; 5 - outdoor unit;
6 - console with anti-corrosive finish 7 - bracket for console mounting

3.3 Fitting the outdoor unit

Before fitting the outdoor unit, it is necessary to check whether the console, on which the unit is to be mounted, is well anchored. Under no circumstances should the outdoor unit be fitted unless the console is securely anchored.

The outdoor unit must be fitted with a minimum of two workers. Once seated on the console, one of the workers holds the unit in a stable position while the other one secures the unit with screws at the bottom. The entire concrete foundation assembly, including the console and the outdoor unit, is shown in the picture 3.2 (p. 14).

The unit must be attached to the bottom console with M6x70 mm screws and these must be tightened properly.

3.4 Preparation of space for the indoor unit

The indoor unit is designed for wall mounting. Upon installation, you need to keep the minimum wall and ceiling distances that are shown in the picture 3.1 p. 12. There is an allocated space under the unit itself that should be kept free for the connection of the heating circuit, refrigerant piping and cable connections.

It is also necessary to take into account the weight of the device and choose the appropriate wall and anchoring technology with respect to it.

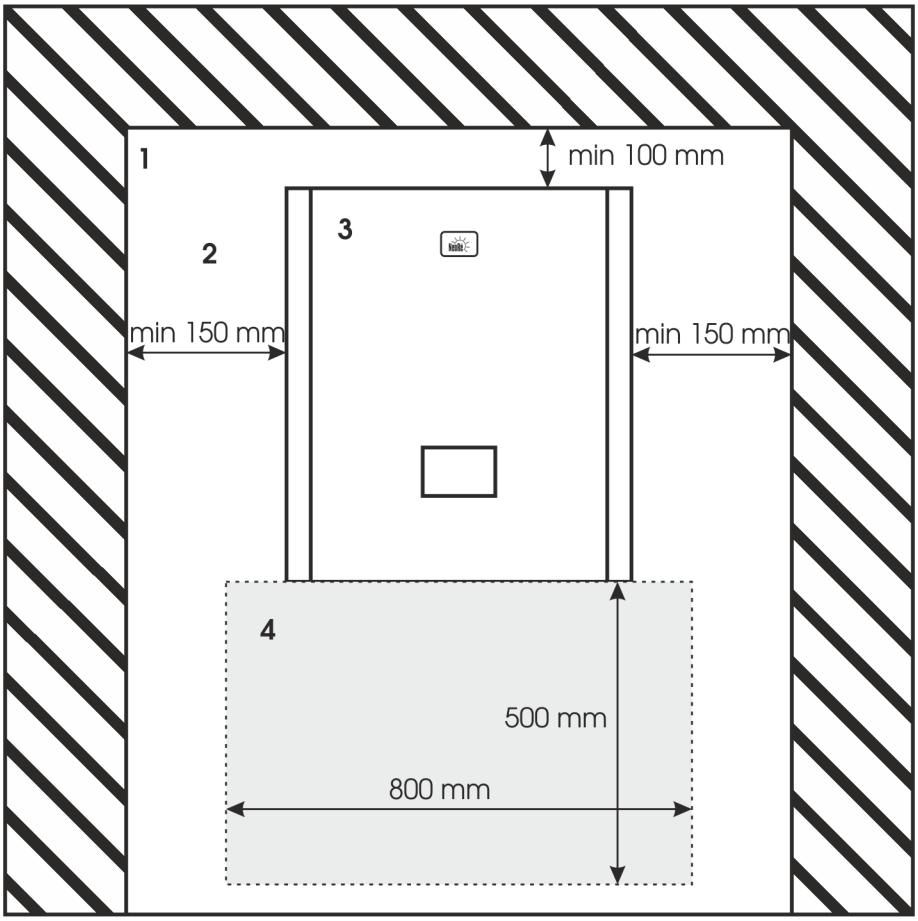


Figure 3.3: Indoor unit placement
1 - walls and ceiling; 2 - interior space; 3 - indoor unit;
4 - space for cable and pipe connections

3.5 Indoor unit mounting

After selecting the appropriate space to place the indoor unit, first step is to fix a mount pad on the wall. There are holes in the pad that anchor it to the wall by fixing with screws. Recommended screws are min. 5x70.

When anchoring, keep in mind that the mounting pad will have to bear the weight of the entire indoor unit. Therefore, it is necessary to use an anchoring system with sufficient load-bearing capacity and suitable for material of the relevant wall.

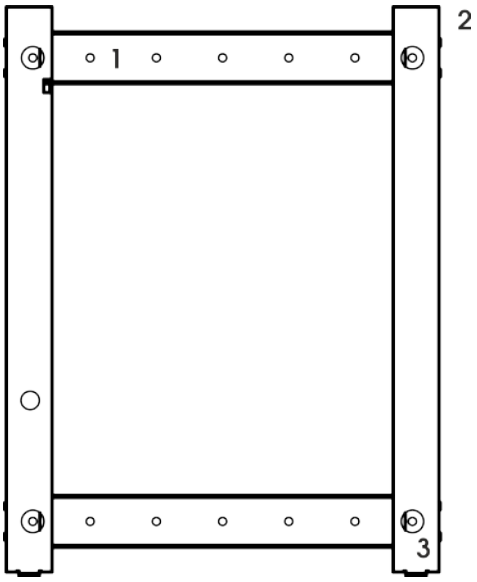


Figure 3.4: Mounting pad of the indoor unit for wall mounting
1 - hole for wall anchoring ⌀6 mm; 2 - fixtures for hanging the indoor unit;
3 - hole for fixing the indoor unit to the mounting pad with a M4x15 mm screw;

The mounting pad is shown in the picture 3.4 (p. 16) After fixing the mounting pad, it is possible to hang the indoor unit. Due to the size and weight of the unit, at least two workers are required to hang it on the pad. The indoor unit hangs on hooks that are located directly in the back of the unit. After hanging the unit, it is necessary to secure the it against unwanted falling with two screws at marked places at the bottom.

Handling, hanging and mounting the indoor unit requires at least two workers and the use of personal protective equipment.

3.6 Units connection

Several connections must be made between the indoor and the outdoor units without which the heat pump as a whole will not be able to operate.

It is necessary to prepare the piping for the refrigerant circuit where the heating medium is transferred. Then it is necessary to prepare the power supply cable for the indoor unit, the power supply cable for the outdoor unit, the indoor / outdoor communication cable, the outdoor temperature sensor cable and optionally the indoor temperature sensor. The location of the temperature sensors must be consulted with a specialist as their improper location can have a major impact on the quality of the heat pump operation.

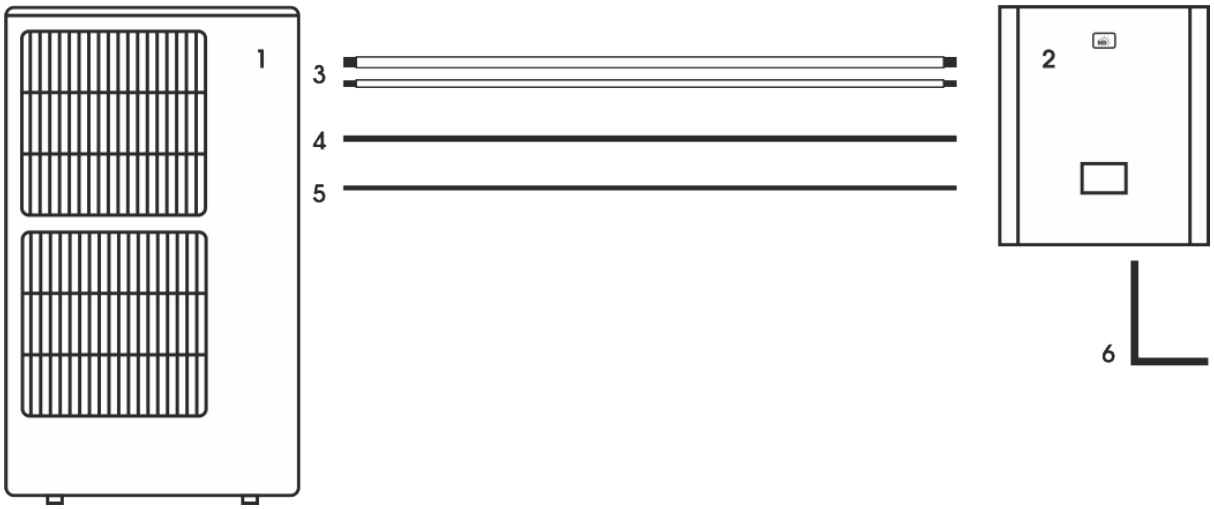


Figure 3.5: Interconnection of indoor and outdoor units
1 - outdoor unit; 2 - indoor unit; 3 - refrigerant piping;
4 - power supply cable for the outdoor unit; 5 - communication cable; 6 - power supply cable 5x4 mm^2

3.6.1 Refrigerant piping

It is very important to prevent any dirt and moisture from getting into the pipes of the refrigerant piping. Dirt or moisture could cause damage or even complete destruction of the entire device.

It is also advisable that the pipeline outside the building is as short as possible and well insulated to minimize the losses. If the pipeline is buried underground, moisture insulation, in addition to thermal insulation, is required.

The indoor and outdoor units must be interconnected by a pair of pipes, one of which serves for leading liquid refrigerant and the other for refrigerant in gaseous state. It is necessary to use a thick-wall copper tubes for refrigeration with a polished inner wall. **For gaseous refrigerant, a 5/8 inch diameter and 1mm wall thickness is intended. A 3/8 inch diameter and 1 mm wall thickness tube is intended for liquid refrigerant.** Greater wall thickness is used for increased durability and longer service life. Nevertheless, care must be taken when handling and shaping the pipes to avoid sharp bends and breaks. Use a cutting wheel to divide the pipes.

Type	Liquid refrigerant	Refrigerant gas
NeoRé 5TG	1/4" (6,4 mm)	1/2" (12,7 mm)
NeoRé 8,11,14,16TG (HP)	3/8" (9,52 mm)	5/8" (15,88 mm)

Table 3.4: Refrigerant pipe diameter, wall thickness 1 mm

R32 refrigerant is an A2L class flammable gas.

R32 refrigerant is very low flammable and difficult to ignite. The burning rate is 6.32 cm/s. A spark generated by the electrical switching elements or the lighting switch, for example, do not have sufficient energy to ignite the R32-air mixture.
The minimum floor area condition must be met to install the indoor unit.

According to EN 378, the minimum floor area for residential installations is determined while using A2L gas, see table. If the minimum floor area condition is not met, it is necessary to ventilate the room.

In the case of room ventilation, the ventilation openings must be unobstructed

Type	Minimum floor area
NeoRé 5 TG	1,72 m^2
NeoRé 8,11,14 TG	4,17 m^2
NeoRé 8 TG HP	3,41 m^2
NeoRé 11,14,16 TG HP	9,1 m^2

Table 3.5: Minimum floor area when using A2L gas

To work with R32 refrigerant, the installer must have a valid Ministry of Environment certificate according to EU regulation 2015/2067. It is also necessary to use special tools (vacuum pump, aspirator) approved for use with R32. Avoid mixing oxygen with R32. Always use nitrogen to test for leaks of pipeline.

The refrigerant should be handled with care, and protective equipment to protect skin, face and eyes from possible frost damage should be worn.

In case of capping, do not use any mineral oils. Mineral oils can reduce the service life of the equipment.
If the pipes are connected by soldering, a hard solder must be used (min. 30% Ag) and the piping must be filled with nitrogen to prevent scale formation. The gas must not be pressurized.
Use insulation suitable for refrigerant circuits. Pipe surface temperature can reach up to 120°C! For outdoor use, use insulation at least 20 mm thick. For interior spaces, 10-15 mm is sufficient. These parameters apply to insulation that meets a thermal resistance of 0.045W / (mK) or better (at 20°C)

The refrigerant piping that is laid in a convenient manner should be connected to the indoor and outdoor units. It is important to check the pipe ends for cleanliness before starting the connection. If the ends of the refrigerant piping are not clean or there is even a suspicion there might be dirt inside the pipeline, the pipeline must be replaced with a new one. Otherwise, the entire device may be damaged or destroyed.

Use only quality refrigeration tools. Cutting of the pipes by a cutting wheel prevents sawdust formation. First, it is necessary to get rid of the inside edges of the pipe left by the cutting wheel. Subsequently, the UNF-SAE nut is attached to the pipeline and a capping cup is formed at the end of the piping with size fitting the nut. Its parameters are listed in the table3.8. Now, connect the pipes to the coolant outlets of the indoor and outdoor units with nuts.

After connection, the piping must be vacuumed. Do this in several steps:

1. First unscrew the plug from the three-way service valve (gas). Connect a pressure gauge suitable for vacuum and vacuum pumps.
2. Start the vacuum pump and vacuum for about 15 - 20 minutes. Do not open the three-way valves.
3. Perform a leak test by shutting off the pump and checking the manometer after 60 minutes.
4. If the refrigerant has been refilled, disconnect the service hose (mind refrigerant leakage - use protective equipment). In case there was no refrigerant filling, slowly open the three-way valve (liquid) and fill the pipeline up to the atmospheric pressure (check the pressure gauge). You can then disconnect the service hose and screw in the service access plug.
5. Open both three-way valves (liquid first). Put the plugs back and tighten them.
6. Check the refrigerant circuit for leakage through the refrigerant leak detector.

After completing this process, the connection of the refrigerant circuit is complete.

Do not exceed the maximum pipe length. If the maximum pipe length is exceeded, the parameters of the equipment may deteriorate and the compressor may be destroyed.

If pipes are laid in the ground, they must be sufficiently insulated and protected from contact with water. The manufacturer recommends using Flexalen Protect Tube 150 with end cuffs.

Unit type	Pipe dimension	Length	Height difference
NeoRé 5 TG	1/4", 1/2"	5 - 25 m	max. 10 m
NeoRé 8,11,14 TG	3/8", 5/8"	5 - 25 m	max. 10 m
NeoRé 8 TG HP	3/8", 5/8"	3 - 30 m	max. 10 m
NeoRé 11,14,16 TG HP	3/8", 5/8"	3 - 40 m	max. 10 m

Table 3.6: Pipe capping 1

Distance in meters	Coefficient
5-10 m	k=1
10-15 m	k=0,98
15-17 m	k=0,95
17-25 m	k=0,92
25-30 m	k=0,89

Table 3.7: Nominal power loss coefficient depending on the length of the refrigerant piping

Example: The NeoRé 11 TG with a coolant pipe distance of 25 m with and basic output of 10 kW. The result nominal output will be 9.2 kW according to a coefficient of 0.92.

Pipe diameter	Diameter of hem A	Overlap B
6,4 mm (1/4")	9,1 mm	0 - 0,5 mm
12,7 mm (1/2")	16,6 mm	0 - 0,5 mm
9,5 mm (3/8")	13,2 mm	0 - 0,5 mm
15,9 mm (5/8")	19,7 mm	0 - 0,5 mm

Table 3.8: Pipe capping 2 - sizes

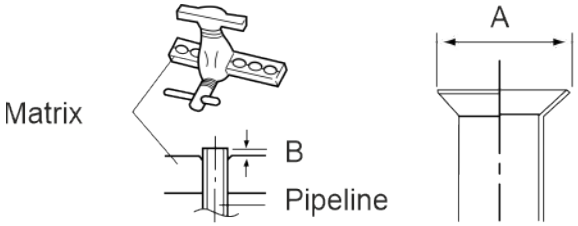


Figure 3.6: Pipe capping

When tightening, hold the torque wrench at right angle to the pipe.

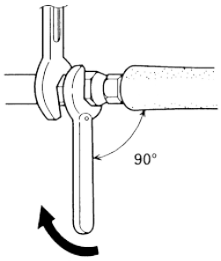


Figure 3.7: Tightening plated connections

Pipe diameter	Tightening torque
1/4"	14 - 18 N*m
1/2"	49 - 61 N*m
3/8"	33 - 42 N*m
5/8"	68 - 82 N*m

Table 3.9: Tightening torque

3.6.2 Cable connections

The main supply for the entire device is routed to the indoor unit. The outdoor unit is powered from the indoor unit, where it has a separate protection.

All supplying and interconnecting cables used must be solid and made of copper. A 5x4 mm^2 cable must be used to power the indoor unit, which must be routed separately from the switchboard where it must be separately fused. To power the outdoor unit, use a cable according to the table, that is routed from the indoor unit. A 5x1.5 mm^2 cable that connects the indoor and outdoor units must be used as a linking communication cable.

Unit type	Outdoor unit power supply cable
NeoRé 5 TG	3x2,5 mm^2
NeoRé 8 TG(HP), 11 TG(HP), 14 TG (HP), 16 TG	3x4 mm^2
NeoRé 16 TG HP	5x2,5 mm^2

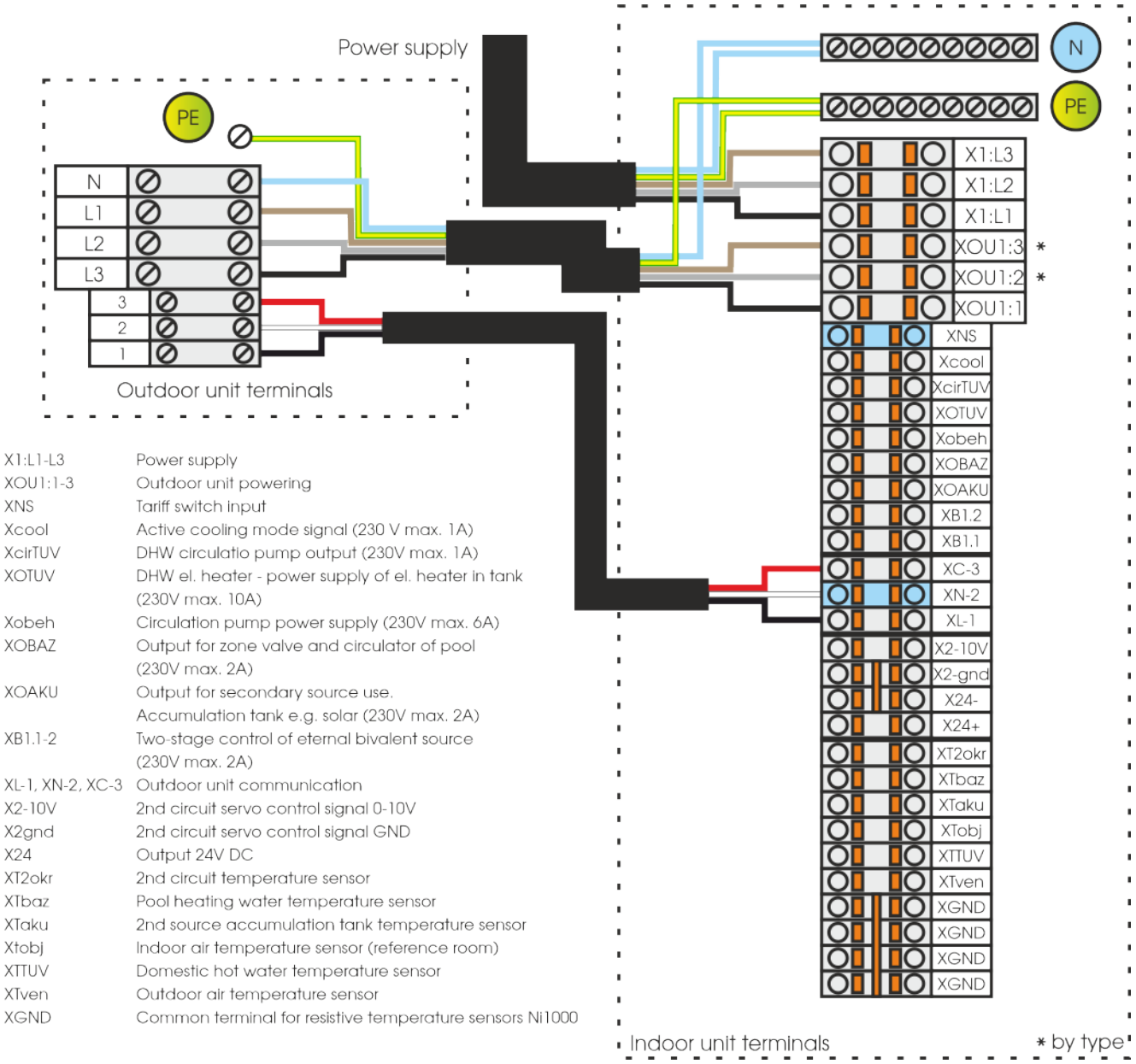
Table 3.10: Linking cables

Electrical parts may only be connected by a qualified electrician (min. §5)

3.6.3 Cable connecting

Terminals X1: L1-L3 are designated for connecting the main power cable 5x4 mm^2. The outdoor unit is powered from the indoor unit from the XOU1 terminals and is connected by a 5x2.5 mm^2 cable for three-phase outdoor unit, or by a 3x4 mm^2 cable (for NeoRé 5TGx 3x2.5 mm^2), if the outdoor unit is powered by one phase. The 3x1.5mm^2 unit cable for communication between the units is connected to terminals XL-1, XN-2 and XC-3.

Other terminals are intended for connection of controls of other technologies (secondary heating circuit, pool circuit and others) and also connection of their temperature sensors.



X1:L1-L3	Power supply
XOU1:1-3	Outdoor unit powering
XNS	Tariff switch input
Xcool	Active cooling mode signal (230 V max. 1A)
XcirTUV	DHW circulatio pump output (230V max. 1A)
XOTUV	DHW el. heater - power supply of el. heater in tank (230V max. 10A)
Xobeh	Circulation pump power supply (230V max. 6A)
XOBAZ	Output for zone valve and circulator of pool (230V max. 2A)
XOAKU	Output for secondary source use. Accumulation tank e.g. solar (230V max. 2A)
XB1.1-2	Two-stage control of eternal bivalent source (230V max. 2A)
XL-1, XN-2, XC-3	Outdoor unit communication
X2-10V	2nd circuit servo control signal 0-10V
X2gnd	2nd circuit servo control signal GND
X24	Output 24V DC
XT2okr	2nd circuit temperature sensor
XTbaz	Pool heating water temperature sensor
XTaku	2nd source accumulation tank temperature sensor
Xtobj	Indoor air temperature sensor (reference room)
XTTUV	Domestic hot water temperature sensor
XTven	Outdoor air temperature sensor
XGND	Common terminal for resistive temperature sensors Ni1000

Figure 3.8: The terminal block of indoor and outdoor units and their connection

The diagram in the figure 3.9 (p. 23) shows how the heater cartridge, control relay and mixing valve are connected.

The relay connection method is applicable for the XOBAZ, XOAKU, XB1.1 and XB1.2 outputs. The mixing valve is controlled by 0-10 V and serves to mix the heating water of the second circuit.

All connections must be secured against current overload.

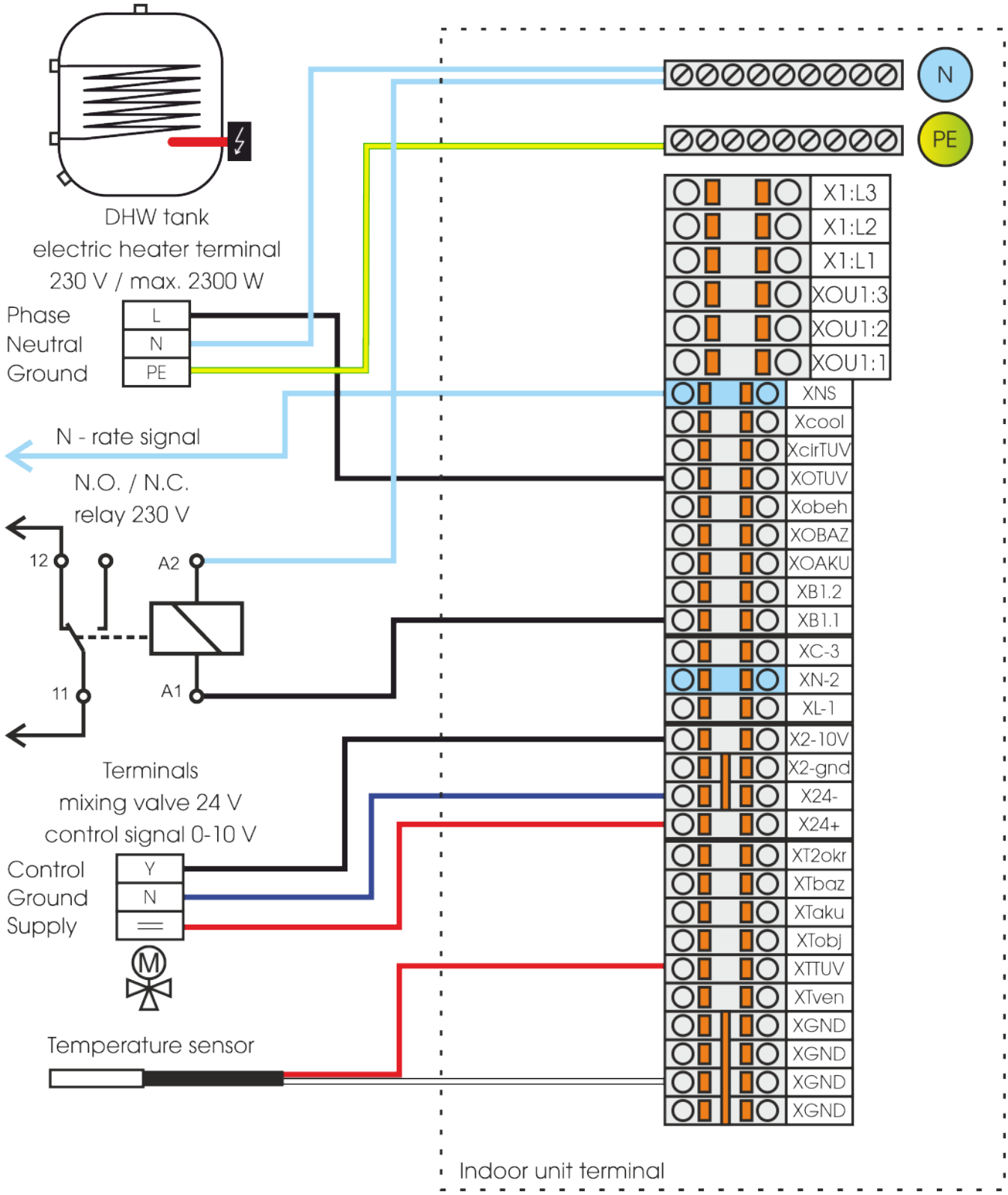


Figure 3.9: Terminal blocks of the indoor unit and controlled devices

3.7 Connection of the heat pump to the heating system

Three outlets are located on the bottom panel of the heat pump's indoor unit. Two outlets for heating water circuit and hot water circuit and one common inlet for return water from both circuits.

Pictures 3.11, 3.12, 3.13 (p. 25) schematically show recommended connections. The minimum pipe dimensions are listed in the table. Each pipe connected to the equipment must be provided with a fitting and a ball valve, as it provides the option to shut down or dismantle the equipment. Also, on the return pipe, a magnetic descaler with a filter must be installed in close proximity to the device to protect the circulation pump and the plate heat exchanger from damage due to occurrence of dirt in the heating circuit. Recommended strainer thickness is 100 microns.

Sufficient heating pipe dimensions and sufficient hot water tank exchanger surface are essential for proper operation of the entire heating system.
Both of these values are shown in the following tables.

Unit type	Main pipe diameter	Pressure loss
NeoRé 5,8,11 (HP)	28 mm	49 kPa
NeoRé 14 (HP)	28 mm	40 kPa
NeoRé 16 HP	35 mmm	33 kPa

Table 3.11: Main pipe diameter and pressure loss

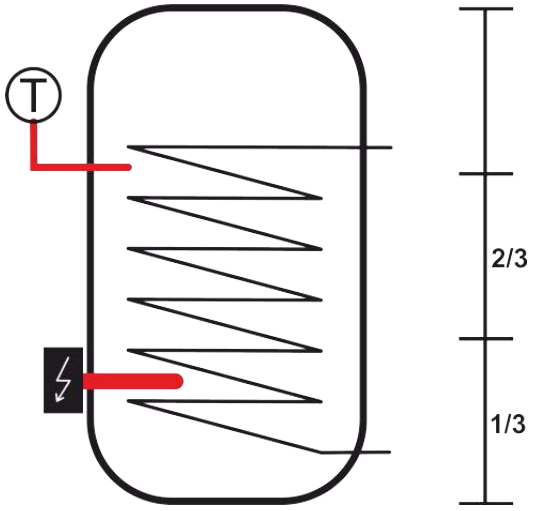


Figure 3.10: Hot water tank dimensions

Unit type	Exchanger surface m^2
NeoRé 5	1,8
NeoRé 8, 8 HP	2,5
NeoRé 11	3,2
NeoRé 11 HP, 14, 14 HP	4
NeoRé 16 HP	4,5

Table 3.12: Exchanger surface

Pipeline legend	
	Heating water
	Return water
	DHW tank heating
	Water supply system cold water
	DHW tank hot water output

Elements legend	
①	NeoRé indoor unit
②	Expansion tank
③	Accummulation tank
⑥	Anuloid
⑦	Electric boiler

Symbol legend	
	Screw connection
	Drain ball valve
	Ball valve
	Ball valve with drainage
	Safety valve straight
	Decanting magnetic filter
	Automatic bleeding valve

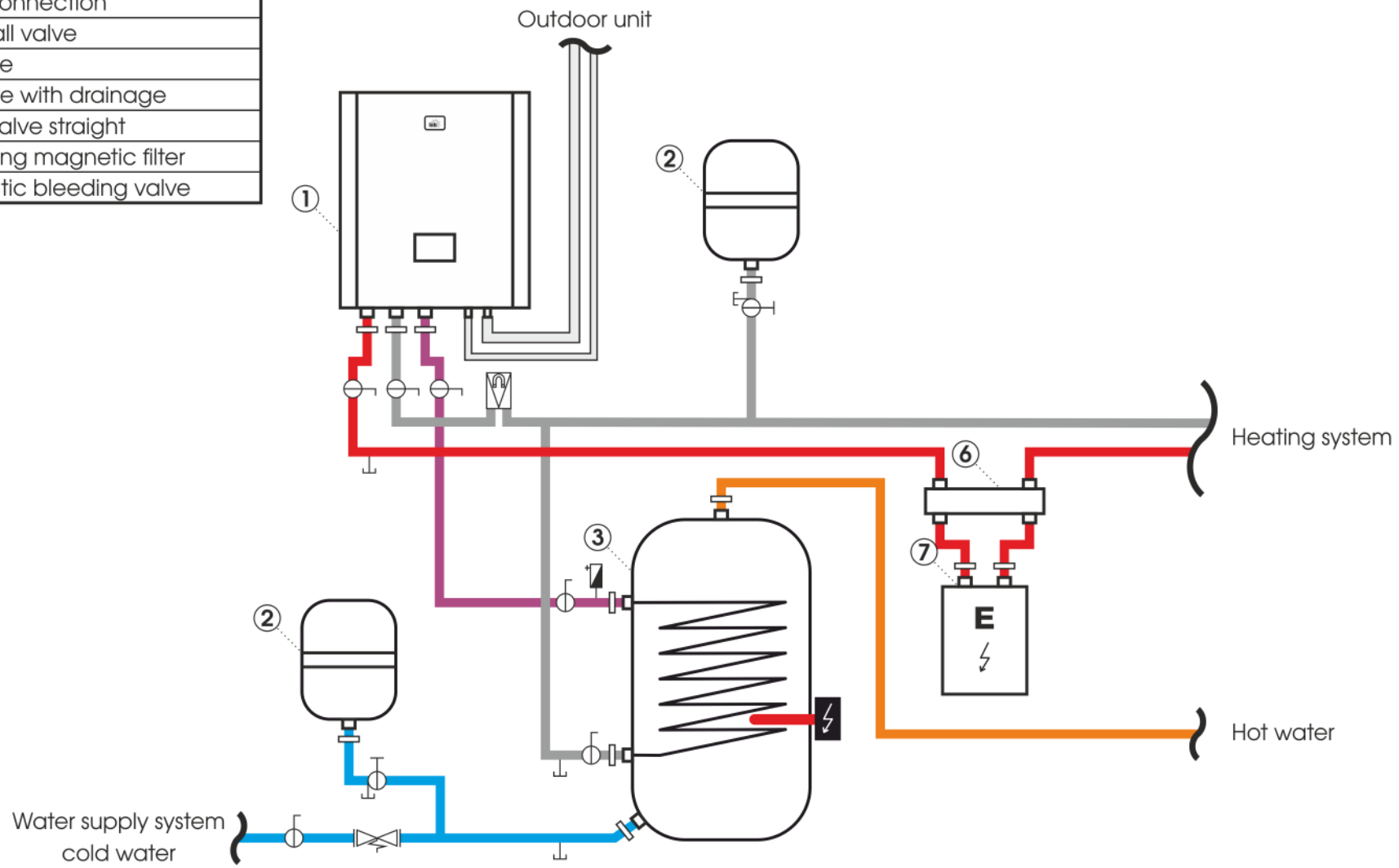


Figure 3.11: Connection to the heating system and hot water tank

Pipeline legend	
	Heating water
	Return water
	DHW tank heating
	Water supply system cold water
	DHW tank hot water output
	Pool circuit water

Symbol legend	
	Screw connection
	Drain ball valve
	Ball valve
	Ball valve with drainage
	Safety valve straight
	Decanting magnetic filter
	Automatic bleeding valve

Elements legend	
①	NeoRé indoor unit
②	Expansion tank
③	Accummulation tank
④	Circulator
⑤	Mixing / zone valve
⑥	Anuloid
⑦	Electric boiler
⑧	Desk exchanger

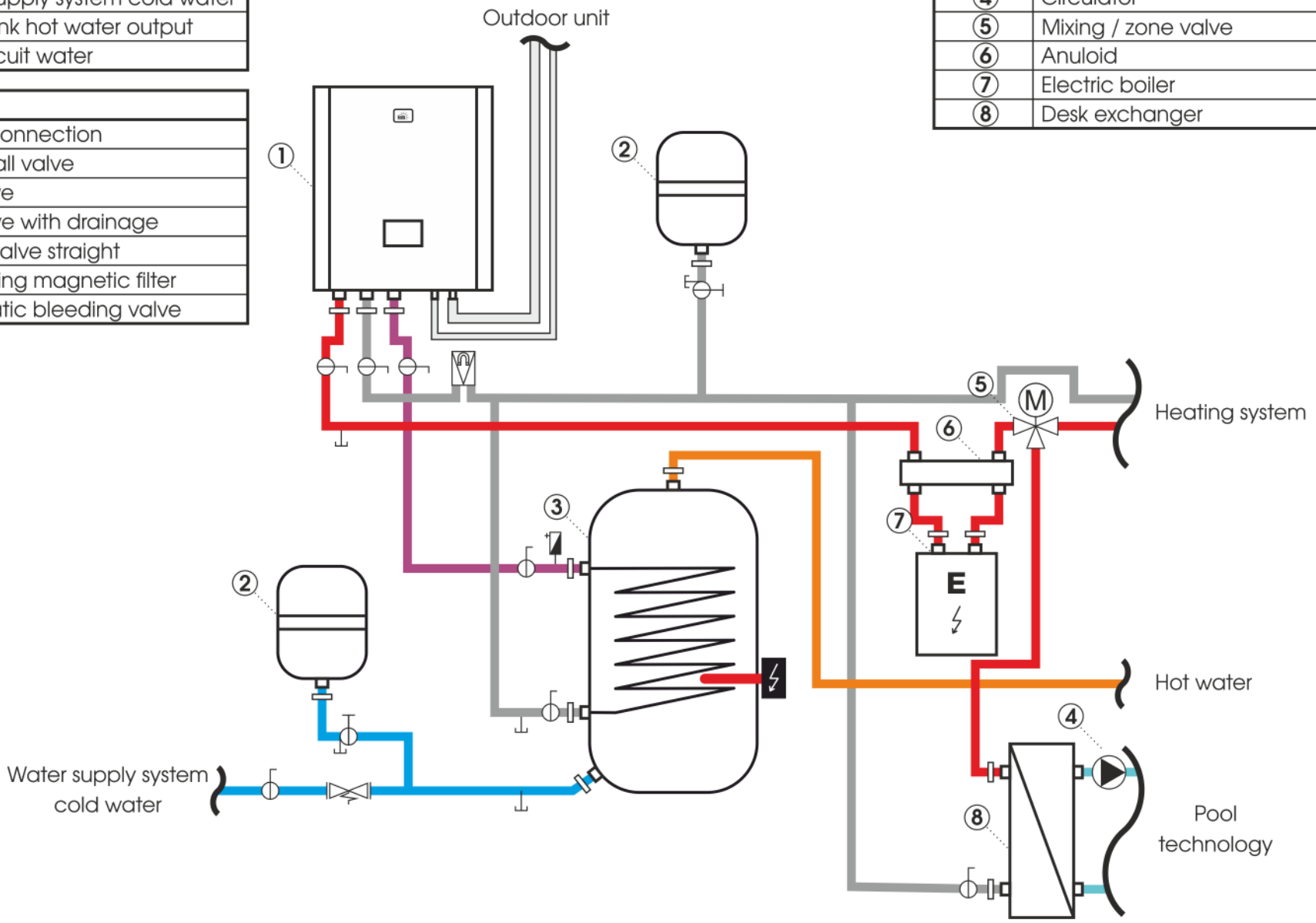


Figure 3.12: Connection to the heating system and heat exchanger for the pool circuit

Pipeline legend	
	Heating water
	Return water
	DHW tank heating
	Water supply system cold water
	DHW tank hot water output
	Pool circuit water
	2nd source heating water

Symbol legend	
	Screw connection
	Drain ball valve
	Ball valve
	Ball valve with drainage
	Safety valve straight
	Decanting magnetic filter
	Automatic bleeding valve
	One-way valve

Elements legend	
1	NeoRé indoor unit
2	Expansion tank
3	DHW tank
4	Circulator
5	Mixing / zone valve
6	Anuloid
7	Electric boiler
8	Desk exchanger
9	Accumulation tank

If the one-way valve is used, it is needed to set circulator minimum power to 70-100%

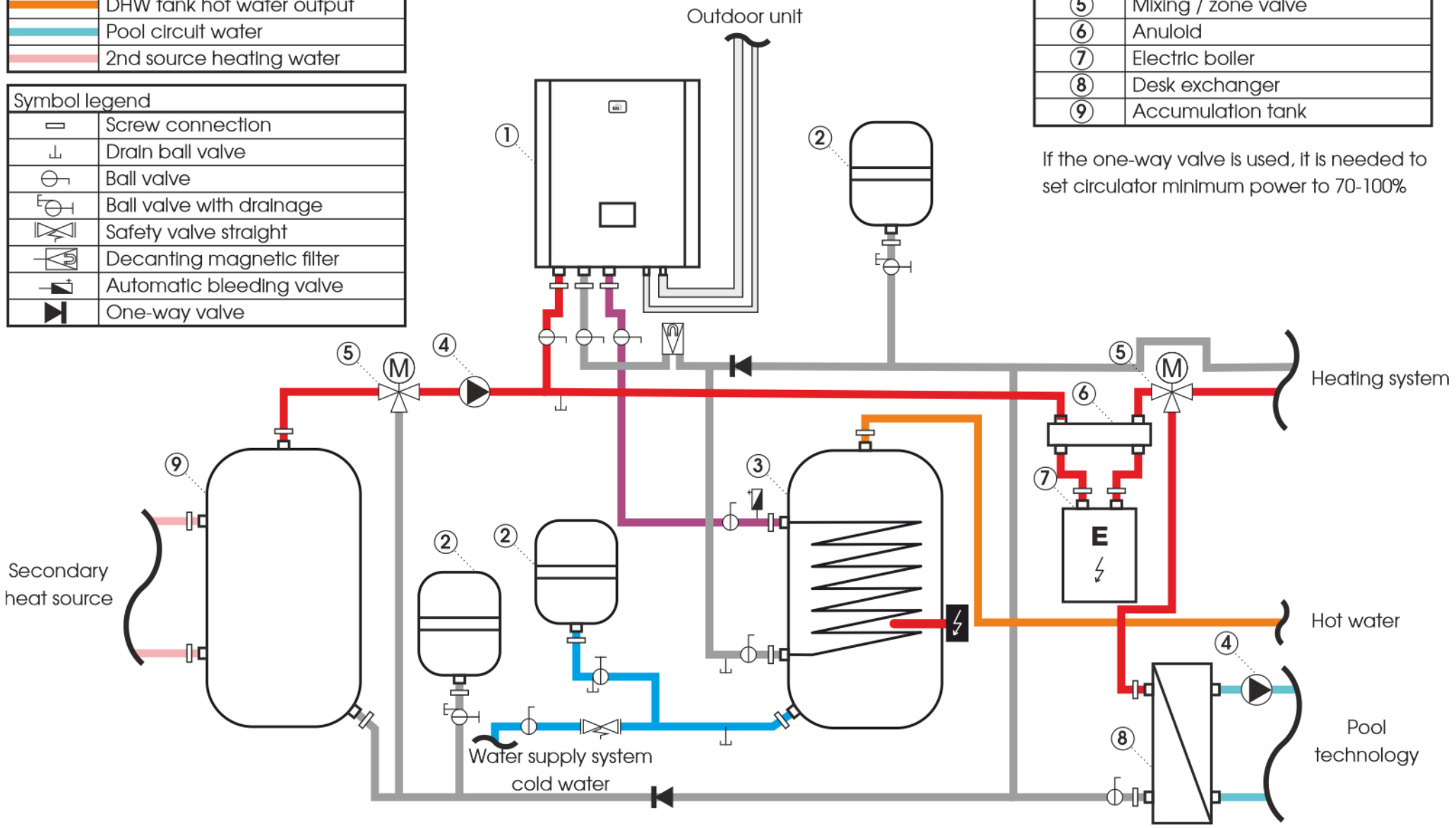


Figure 3.13: Connection to the heating system and storage tank for secondary water supply

Technology wiring diagram of NeoRé heat pump

Elements legend	
①	NeoRé indoor unit
②	Expansion tank
③	DHW tank
④	Circulator
⑤	Mixing / zone valve
⑥	Anuloid
⑦	Electric boiler
⑧	Desk exchanger
⑨	Temperature sensor
⑩	Accumulation tank

Elements connection		Clamp	Cable *
4.1	2nd circuit circulator	Xobeh	Cable CYSY 3x1,5 mm²; supply 230 V, max 2 A
4.2	Pool circuit circulator	XOBAZ	Cable CYSY 3x1,5 mm²; supply 230 V, max 2 A
4.3	Secondary source circulator	XOAKU	Cable CYSY 3x1,5 mm²; supply 230 V, max 2 A
5.1	2nd circuit mixing valve	X2-10V	Cable CYSY 3x0,5 mm²; supply 24 V, max 10W
5.2	Pool circuit zone valve	XOBAZ	Cable CYSY 3x0,5 mm²; supply 230 V, max 2 A
5.3	Secondary source mixing valve	X2-10V	Cable CYSY 3x0,5 mm²; supply 24 V, max 10W
7.1	Signal for bivalent source	XB1.x	Cable CYSY 3x1,5 mm²; supply 230 V, max 2 A
7.5	DHW tank electric heater powering	XOTUV	Cable CYSY 3x2,5 mm²; supply 230 V, max 10A
9.1	2nd circuit temperature sensor	XT2okr	Cable SYKFY 2x2x0,5 mm²
9.2	Pool circuit temperature sensor	XTbaz	Cable SYKFY 2x2x0,5 mm²
9.3	Secondary source circuit temperature sensor	XT2okr	Cable SYKFY 2x2x0,5 mm²
9.4	Secondary source tank temperature sensor	XTAKU	Cable SYKFY 2x2x0,5 mm²
9.5	DHW tank temperature sensor	XTTUV	Cable SYKFY 2x2x0,5 mm²
9.6	Outdoor air temperature sensor	XTven	Cable SYKFY 2x2x0,5 mm²

* It could be used a different type of cable when you use another connection method

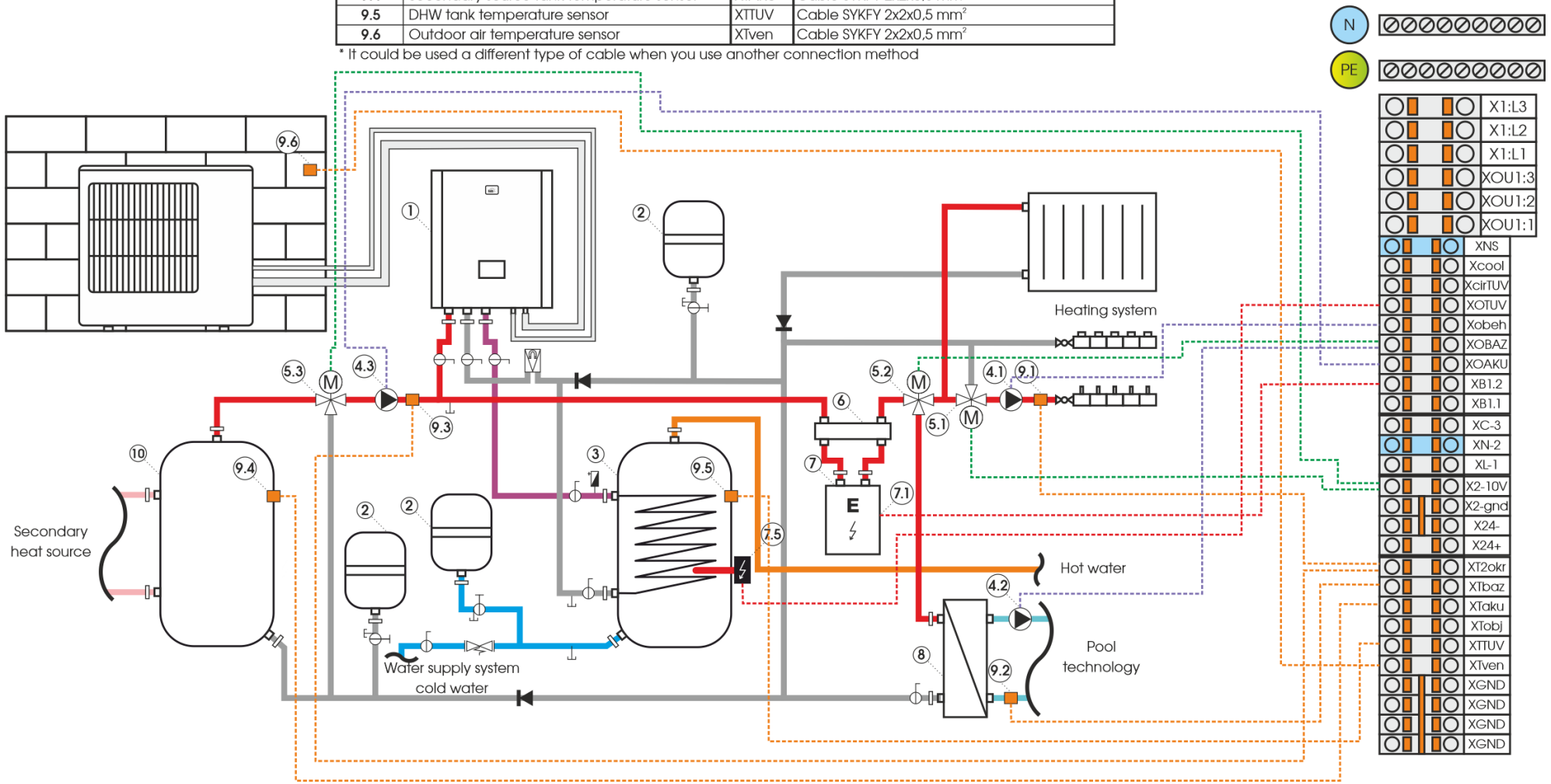


Figure 3.14: Wiring diagram of NeoRé heat pump technology

3.7.1 Connection methods for:

Circulation pumps

Pumps without power control are used as circulation pumps in the system and therefore, they are controlled only by power supply. Zero and protective conductors are connected to PE and N bridges. The phase conductor is connected to the terminal according to the location of the pump in the system.

Temperature sensors

Resistance temperature sensors of type NI1000 - 6180ppm/K must be used in the system. These temperature sensors are connected between the XGND and XT terminals... according to the true placement in the system.

Heating cartridge

Electric heater with a maximum capacity of 2300 W for supplemental heating and disinfecting the hot water tank. Zero and protective conductors are connected to PE and N bridges. The phase conductor is connected to the XOTUV terminal.

External bivalent source

In addition to integrated electric heaters with a total output of 6 kW, the heat pump can also, in a passive way, control an external heat source. This source may be an electric, gas, or other heat source equipped with input for the control signal. Alternatively, the source can be controlled by a pre-relay. The control is done passively and it means that the bivalent source has its own regulation and safety elements for operation and at the time when performance is required, it reacts to the 230 V signal from terminal XB1.1. If higher power is required, the signal is also on terminal XB1.2. The maximum output load allowed is 2 A.

Mixing fitting

The mixer fitting may be used to connect the low temperature heating system where an accumulation vessel is used to connect another high temperature heat source or when low temperature and high temperature heating elements are used within one installation. The mixing fitting must have a 24 V operating voltage and a 0-10 V control signal. Terminals X24 and X24-, which are a 24 V supply, are designated to supply this valve. The output of the control signal is at terminal X2-10V.

3-way zone valve

A 3-way zone valve with a working voltage of 230 V is used to connect the pool circuit. Zone valve power is supplied externally, for example, from the switch cabinet for the pool technology. The control signal is taken from the XOBAZ terminal.

2-way zone valve

A 2-way valve could be used when you would like to use cooling function during summer time. You want to cool through ceiling system and wean floor system. Valve in the distributor is activated by a signal 230 V and close the distributor. The control signal is taken from the Xcool terminal.

3.8 Unauthorized connections to the heating system

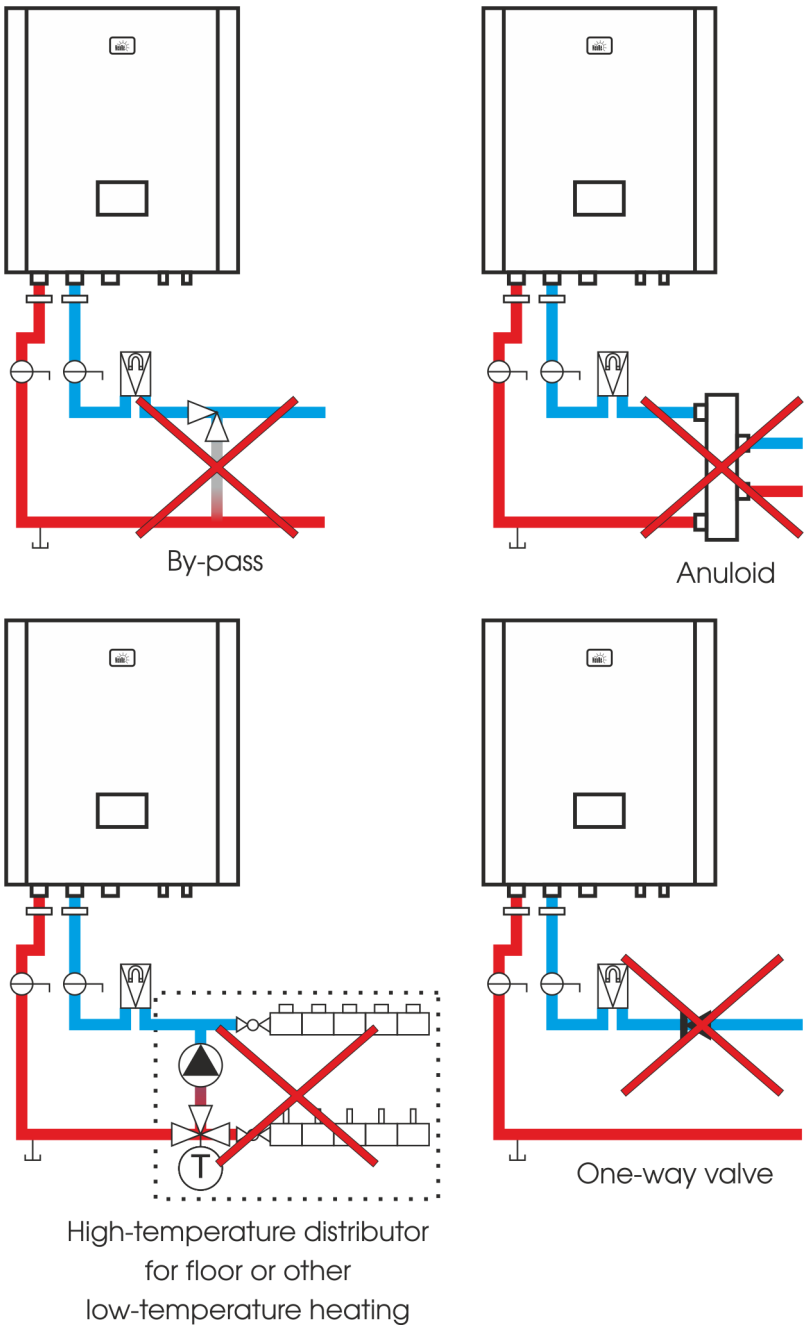


Figure 3.15: Unauthorized connections to the heating system

4. Commissioning

4.1 Commissioning of the heating system

Before starting the circulating pump, the circuit must be filled with water. Water should be filled to a basic pressure of 1–1.5 bar. From a water column height of 14 m, the basic pressure increases by 0.1 bar per metre of height. The maximum water column height is 18 m. The maximum operating pressure is 2.1 bar. After increasing the pressure, the circuit must be completely vented. Venting of the indoor unit can be performed on the upper right side of the plate exchanger. After starting the circulating pump, the plate exchanger must be completely vented, which is indicated by smooth running of the circulating pump. Before starting the compressor, it is recommended to let the circulating pump run for at least 10 min.

For more information, see the **Installation Manual**, Chapter **Connection of the heat pump to the heating system**.

4.2 Activation

After filling and venting, you can test the electrical equipment of the heat pump.

Switch on the TECHNOLOGY circuit breaker and, after the controller system initializes, press the H/C button in the "Overview" section. This activates the circulating pump. Check the state of the hydraulic system. If the flow and pressure are OK, you can switch on the remaining circuit breakers. Check the settings and check the operation of all heat pump devices, especially the outdoor unit (for DHW heating settings, see the DHW chapter in the User Manual).

- BIVALENT – bivalent source circuit breakers
- OUTDOOR UNIT – outdoor unit circuit breakers
- TECHNOLOGY – circuit breaker of the indoor unit (control, 3-way valve, circ. pump...)
- DHW EL. HEATER – circuit breaker of DHW heating

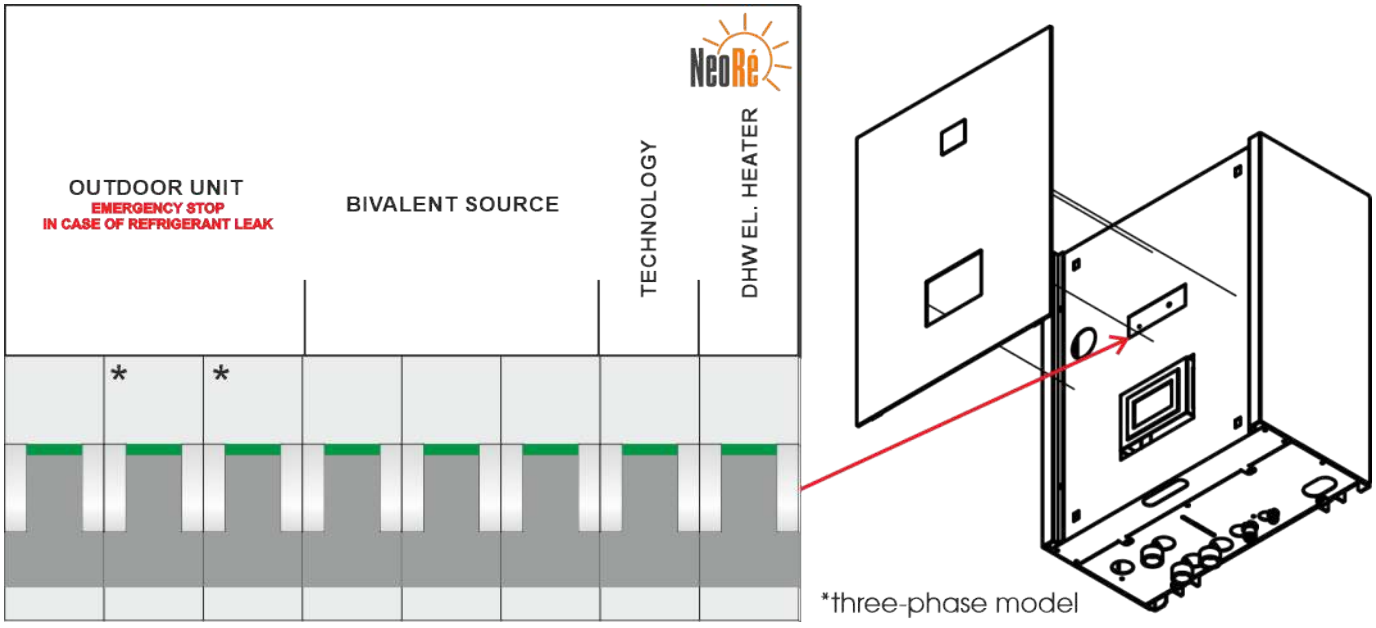


Figure 4.1: Circuit breakers of the heat pump

5. Shutdown

Attention! When shutting down the system completely, the heating system and the heat pump can be damaged or completely destroyed in winter due to freezing.

5.1 Short-term shutdown

If you need to turn off the heat pump briefly, press `H/C` and/or `DHW` so that the orange indicator in the upper right corner of the button turns grey. Do not turn off the heat pump using the circuit breaker! The circulating pump turns off 15 minutes after the operation is switched off. To reactivate, use again `H/C` (`DHW`)

5.2 Long-term shutdown

If you need to turn off the heat pump for a long time, press `H/C` and/or `DHW` so that the orange indicator in the upper right corner of the buttons turns grey. Do not turn off the heat pump immediately using the circuit breaker! The circulating pump turns off 15 minutes after deactivation. You can then switch off all circuit breakers. When shutting down the system for more than 6 months, you must switch on the TECHNOLOGY circuit breaker after this time and leave it on for at least 24 hours. Otherwise, the backup battery may be depleted and all user settings may be lost. When shutting down the system e.g. from spring to autumn, we recommend using the method described in Chapter 5.1 – Short-term shutdown (page 32). The heat pump consumes only 13 W of energy and the circulating pump regularly flushes the heating system. This reduces clogging and the possibility of the circulating pump being jammed.

6. Faults and status messages

6.1 Error code structure

A fault code consists of four digits. **The first two digits** indicate critical errors. These are faults that cause the heat pump to stop running. **The other two digits** indicate the status of the connected temperature sensors. Faults of temperature sensors do not affect the operation of the heat pump. However, the lack of information may decrease the quality of control and impair thermal comfort inside the building.

Figure 6.1: Division of heat pump faults and states

6.2 Overview of faults and status messages

The following section describes what values the fault codes can have and what these values mean. When reading the code, we proceed from left to right. The order of the digits determines their meaning.

1st digit

0 - No fault

1 - Frost protection (the output water temperature dropped below the safe level)

2 - Insufficient flow (the water flow through the heat pump dropped below the minimum level)

3 - Fault of the outdoor unit or communication

4 - Low water pressure (the water pressure in the system is lower than 0.8 bar)

5 - Faulty temperature sensor of the MX communication unit

If the value of the first digit is not 0, the heat pump stops running.

2nd digit

0 - No fault

1 - Faulty temperature sensor of heating (output) water – the sensor is disconnected

2 - Faulty temperature sensor of heating (output) water – the sensor is short-circuited

3 - Faulty temperature sensor of return (input) water – the sensor is disconnected

4 - Faulty temperature sensor of return (input) water – the sensor is short-circuited

If the value of the second digit is not 0, the heat pump stops running.

3rd digit

0 - No fault

1 - Faulty outdoor temperature sensor – the sensor is disconnected

2 - Faulty outdoor temperature sensor – the sensor is short-circuited

3 - Faulty building temperature sensor – the sensor is disconnected

4 - Faulty building temperature sensor – the sensor is short-circuited

5 - Faulty DHW temperature sensor – the sensor is disconnected

6 - Faulty DHW temperature sensor – the sensor is short-circuited

7 - Faulty storage tank temperature sensor – the sensor is disconnected

8 - Faulty storage tank temperature sensor – the sensor is short-circuited

If the value of the 3rd digit is not 0, some of the sensors are defective and the quality of temperature control may be reduced. However, the operation of the heat pump is uninterrupted.

4th digit

0 - No fault

1 - Faulty pool temperature sensor – the sensor is disconnected

2 - Faulty pool temperature sensor – the sensor is short-circuited

3 - Faulty secondary circuit temperature sensor – the sensor is disconnected

4 - Faulty secondary circuit temperature sensor – the sensor is short-circuited

If the value of the 4th digit is not 0, some of the sensors are defective and the quality of temperature control may be reduced. However, the operation of the heat pump is uninterrupted.

6.3 Faults and troubleshooting

If the heat pump signals any of the critical errors (any of the first two digits is not 0), it stops operating. The following text describes typical causes of these errors and how to correct them. If the application of these procedures is not successful, contact a service organization, which will take care of your problem.

During the operation of the heat pump, cooling of the heat exchanger of the outdoor unit causes it to freeze. When the evaporator is frozen, the outdoor unit automatically evaluates this state and starts the defrosting process. The frequency of defrost cycles depends on several factors, the most important of which are air temperature, humidity and required power.
During the evaporator defrosting process, the evaporator is reheated using the energy stored in the heating water and at the same time the fans start running at full speed, which dries the evaporator. During this process, you can see water vapour rising from the evaporator, which may seem like the unit is burning. However, in this case, it is not a dangerous state but a normal operating condition, so do not disconnect the outdoor unit from the power supply.

The heat pump user interface in the `States and faults` lists the last ten fault states (codes) of the heat pump. Complete operating data is accessible via the heat pump's web interface.

The controller has the `Fault autoreset` function. Thanks to this function, the heat pump can resume operation after a critical fault has been removed, e.g. a sufficient system flow restored. If the autoreset is activated 5 times, it is clear that this is not a random fault. The heat pump remains in a fault state and requires professional attention. The autoreset function can be restored in the `States and faults` section, which should only be done after consultation with a service organization.

Fault 1xxx

Frost protection. A fault occurs if the output water temperature is lower than the safe limit. The default limit for frost protection is 15 °C. When the output water temperature is lower, the heat pump stops running until the output water temperature reaches a safe level again. Meanwhile, bivalent operation is started. The heat pump starts 30 minutes after reaching a safe temperature.

This fault typically occurs when the system is started, when the system is filled with cold water from the water main.

Another typical situation where this fault occurs is the cooling of the heating water during the defrosting process of the outdoor unit. This can have two causes.

1. Low temperature of heating water (below 25 °C) in the system, where heating water does not carry enough energy to defrost the outdoor unit.
2. The second possible cause is a reduced flow of heating water through the heat pump, e.g. due to a clogged heating water filter.

If the frost protection fault occurs repeatedly, contact a service organization.

Fault 2xxx

Insufficient flow. The insufficient heating water flow fault occurs when the current water flow is lower than required. The value of the required flow directly depends on the current power of the outdoor unit, i.e. the higher the power of the outdoor unit, the higher the required value of the heating water flow. This is also the reason why the fault can occur seemingly randomly, e.g. only when heating the heat water tank, when high power and therefore high heating water flow is required.

A typical cause of a flow fault is clogging of the heating system with dirt. The second possible cause is that the heating system contains a constricted point. This point with an insufficient cross-section (e.g. control valve) affects the total flow, even if the cross-section of all other parts of the heating system is sufficient. Random and short-term faults can also be caused by aeration of the heating system or low pressure of heating water.

All these cases require the attention of a service organization, which locates and eliminates the cause of the fault.

Fault 3xxx

Fault of the outdoor unit or communication. The outdoor unit signals a fault state. If this fault occurs once, it is advisable to try to restart the entire system by switching off all heat pump circuit breakers and switching them on again. If the outdoor unit or communication fault persists after the user interface restarts, call a service organization.

Fault 4xxx

Low water pressure. If the heating system pressure is lower than 0.8 bar, the device stops operating in order to avoid damage to the circulating pump.

The usual cause is leaking heating water. There may also be damage to the expansion vessel or air leak from its bag. To remove the fault, increase the water pressure in the heating system to 1.1–1.5 bar.

If the pressure drop reoccurs, contact a service organization.

Error 4000 may also result in a clogged pressure sensor restrictor. This sensor has a millimetre hole as protection against pressure shocks of the sensor. If water contains too many free minerals, they settle on this hole and block the sensor. The hole must be cleaned and the heating water quality checked and, if necessary, improved.

Fault 5xxx

Faulty temperature sensor of the MX communication module. This fault means that the temperature sensor of the outdoor unit exchanger exhibits values outside the valid range and it is apparently faulty. For this reason, the heat pump stops running, as the loss of information about the exchanger temperature may lead to its damage.

In the event of this fault, contact a service organization.

Fault x1xx a x2xx

Faulty temperature sensor of output water. If the heating water temperature sensor fails, the heat pump stops running, because the indoor unit can be damaged due to an unknown temperature of output water.

The temperature sensor must be repaired or replaced with a new one, so contact a service organization.

Fault x3xx a x4xx

Faulty temperature sensor of return water. If the return water temperature sensor fails, the heat pump stops running, because the indoor unit can be damaged due to an unknown temperature of return water.

The temperature sensor must be repaired or replaced with a new one, so contact a service organization.

6.4 Status messages

Status messages are displayed in the same section as faults, but in the third and fourth position when reading from the left. If the code of any status message is active, it is only an informative message about the given fact. The operation of the heat pump is not interrupted. The displayed states are sorted by priority, where the number 1 has the highest priority. If state 7 is active, it means that no status with a lower numerical value is active.
Status 0 means that all available temperature sensors are connected and working correctly.

Status xx1x and xx2x

This status means that the outdoor temperature sensor is disconnected or faulty. When operating without an outdoor temperature sensor, the output water temperature is not controlled according to the set weather compensation curve, but

is heated continuously to the temperature set by the weather compensation curve for an outdoor temperature of +19 °C. To correct this, contact a service organization.

Status xx3x and xx4x

This status means that the indoor temperature sensor is disconnected or faulty. The indoor temperature sensor is not a standard part of the heat pump installation and it is therefore possible that this status will be displayed permanently. When operating without an indoor temperature sensor, the automatic weather compensation curve correction function is not available, but the heat pump operation is not interrupted.

To repair or add the temperature sensor, contact a service organization.

Status xx5x and xx6x

This status means that the DHW tank temperature sensor is disconnected or faulty. When operating without a DHW temperature sensor, the tank will not be heated.

To correct this, contact a service organization.

Status xx7x and xx8x

This status means that the storage tank temperature sensor is disconnected or faulty. If the storage tank is not part of the heat pump installation, this status may be displayed permanently. When operating the heat pump with a faulty storage tank temperature sensor, storage tank heating will be stopped until the fault is removed. Other functions of the heat pump remain unchanged.

To correct this, contact a service organization.

Status xxx1 and xxx2

This status means that the pool circuit temperature sensor is disconnected or faulty. If your installation includes a pool water heating circuit, the heating will be stopped until the fault is removed. However, other circuits of the heat pump remain unchanged.

To correct this, contact a service organization.

Status xxx3 and xxx4

This status means that the secondary circuit temperature sensor is disconnected or faulty. If your installation includes a secondary heating circuit, this circuit is stopped until the fault is removed. However, other circuits of the heat pump remain unchanged.

To correct this, contact a service organization.

6.5 Protective functions

! All protective functions are active only when the indoor unit is powered and device circuit breakers are on.

These are protective mechanisms that take care of the safety of the heat pump and protect it from damage or destruction. The following overview lists and explains these safety functions. This list primarily aims to explain the behaviour of the heat pump to the end user or to aid a service organization. In no case it encourages making changes to the product itself or in the service offer. Improper handling can damage or destroy the product.

Frost protection – static (output water temperature)

If the indoor unit is powered, the temperature of the indoor unit's output water sensor is monitored. If the water temperature drops below +5 °C, it activates the circulating pump and the first stage of the integrated bivalent source (2 kW). As soon as the water temperature in the heating system rises above +5 °C, both the circulating pump and the bivalent source stop.

This protection is active even if heating is turned off.

Frost protection – during operation

If during operation (heating) the temperature of output water drops below the set value (the default value is 11 °C), the outdoor unit stops and the integrated bivalent source activates to heat the heating water. After achieving an output water temperature of 11 °C, the bivalent source keeps heating the heating water for another 30 minutes. After this period, the device keeps operating as standard with the outdoor unit.

This protection usually activates when the outdoor unit is defrosting and the flow is insufficient (or when there is low thermal energy in the system).

The value can be set in the service settings as parameter T frost. This protection is linked to the autoreset function.

Flow monitoring – monitoring depending on the outdoor unit power

To maintain the declared efficiency of the heat pump and safe operation, it is necessary to maintain a sufficient flow of heating water. The minimum flow is given by the relationship between the outdoor unit power and the required power of the circulating pump. Values of minimum flow for individual types of heat pumps are listed in the table in ch. "Design documents".

This protection is linked to the autoreset function.

Flow monitoring – monitoring of critical flow

If during the operation of the circulating pump the flow value drops below 300 l/h (fixed value) or below the min. flow according to Figure **Minimum water flow for individual power types** in the *Installation Manual, ch. Hydraulic Circuit*, a flow error is triggered and the circulating pump automatic venting program is started.

Venting is performed in cycles, where in each cycle the circulating pump first idles for 10 seconds and then works at full power for 10 seconds. These cycles are repeated continuously until the required minimum flow value is achieved.

Flow monitoring – flow change during defrosting and cooling

When the outdoor unit is defrosting, the power of the circulating pump is automatically increased to 100 %. If the heat pump is switched to cooling, the circulating pump is not controlled proportionally, but continuously running at full 100 % power.

Water pressure monitoring – heating/cooling water pressure

The loss of pressure in the heating system is a serious problem, so when the pressure in the heating system drops below the set value, the entire system stops.

The critical pressure value can be set in the service settings under `Minimum water pressure`.

This protection is linked to the autoreset function.

Sensor monitoring – critical sensors

The operation of the heat pump requires two temperature sensors. The output water temperature sensor and the return water temperature sensor. If the values indicated by the sensor fall outside the range (-50 °C to +120 °C), the heat pump stops.

This protection is linked to the autoreset function.

Sensor monitoring – other sensors

A fault of other non-critical sensors is only signalled. It does not affect the primary operation of the heat pump. It affects only the relevant section to which the temperature sensor belongs. For example, if the DHW sensor shows a fault, DHW heating will be interrupted.

Outdoor unit failure

A fault of the outdoor unit is only signalled. It does not affect the primary operation of the heat pump. If the outdoor unit supplies insufficient or no power, the system automatically uses the integrated bivalent source and signals a fault of the outdoor unit.

Compressor heating

After switching on the heat pump or restoring its power after an outage, only the bivalent source is used for a certain time. During this time, the outdoor unit is in compressor box heating mode.

By default, this protection is not active (set to zero time), but it is recommended to set this protection in installations where longer power outages often occur.

This protective function can be set in the service settings under “Delayed start”.

Output water temperature limits

It limits the user setting of desired temperatures to a pre-set range. The range can be set in the service settings under `Minimum output water temperature` and `Maximum output water temperature`. The default values are 20 °C for minimum temperature and 60 °C for maximum temperature.

Restart

Protection of the compressor against frequent starts that happen during unit cycling. This occurs when the minimum power that the heat pump can deliver is higher than the instantaneous loss of the building. This function prevents overly frequent starts and thus prolongs the service life of the compressor. The default setting is 10 minutes and 5 %. This means that the outdoor unit starts up again after 10 minutes at the earliest and after an increase in the outdoor unit power requirement by more than 5 %.

Both parameters can be set in the service settings as Restart and Restart Threshold.

Cooling water temperature deficit

Protection against low water temperature during cooling, when the cooling water temperature drops below the set limit. The limit temperature for shutting down the outdoor unit and cooling is set as the cooling water temperature minus the cooling water temperature deficit. After the output water again reaches a higher temperature than the set cooling water temperature, the heat pump resumes cooling.

The `Cooling water temperature deficit` parameter can be changed in the service settings.

Fault autoreset

Automatic resumption of operation after some faults have subsided is a function that helps eliminate random problems on the device. It can automatically restore operation up to 5 times. If the fault or faults occur more than 5 times, the operation of the heat pump will not be resumed until the operator or service technician has intervened.

6.6 Service organization

If you need to contact a service organization, primarily contact the organization that installed the heat pump.

7. Maintenance of the device and components

Thanks to its design, the heat pump is easy to maintain. Basic maintenance is to be performed by a service organization during regular annual inspection. During this inspection, the service organization shall check all important parts of the heat pump, especially the operation of the refrigerant circuit.

Regular inspections and maintenance of the indoor and outdoor unit of the heat pump and heating system help prevent more serious faults and damage. We recommend having a service organization perform a general inspection once a year.

To maintain correct and, above all, efficient operation, we recommend checking the condition of the whole system at least once a month. This means checking the indoor unit display for a fault or abnormal sounds or behaviour. Similarly, make sure the outdoor unit is operating correctly and does not make unusual noises. It is also important to check the condition and cleanliness of the outdoor unit exchanger and regularly check the state of the hot water tank.

7.1 Maintenance of the outdoor unit

For proper function and the required efficiency, make sure that the outdoor unit always has good air access. Therefore, it is necessary to regularly check the condition of the fin heat exchanged for clogging, e.g. by leaves/blossoms fallen from trees, dust, snow or ice. Clean the fin exchanger carefully with non-pressurized water. The fins are very fine and could be damaged. The refrigerant and electrical system may only be inspected by a certified service technician.
If the unit is snow-covered so that the snow prevents the air from flowing freely, remove the snow. If the evaporator is covered with a layer of ice, remove this ice by pouring hot water over it until all the ice has melted.

Do not use high-pressure cleaners or any mechanical aids (brushes, etc.). Before cleaning the fins of the outdoor unit, switch off the main circuit breaker in the indoor unit!

Maintenance and cleaning of all components must be performed in the non-powered state.

If the outdoor unit exchanger is obstructed (dust, leaves, ice) or the entire outdoor unit is covered with snow, the device loses power, efficiency, or cannot be operated at all.

7.2 Maintenance of the indoor unit

The indoor unit requires only minimum maintenance. The device does not contain components that require maintenance by the user. Use only a damp cloth to clean its surface. Take extra care when the device is in operation and powered. We recommend performing maintenance on the indoor unit outside the heating/cooling season in the non-powered state.

We recommend having the entire heat pump inspected regularly once a year by a service technician of the installation company.

Maintenance and cleaning of all components must be performed in the non-powered state.

7.3 Maintenance of the DHW tank

To maintain the correct and, above all, efficient operation of the DHW tank, check the sediment content in the tank at least once every 2 years. Once every two years (once a year for stainless steel tanks), also check the condition of the anode rod and replace it if necessary.

In addition, observe the requirements of the tank manufacturer.

7.4 Maintenance plan

	every month	every year	every 2 years	every 5 years
Check failures, status messages, operation	●			
Clean heating water filters, check the flow of heating water		●		
Check the pressure of expansion tank			●	
Check the safety valve function		●		
Check, desludge the DHW tank			●	
Check, replace the DHW tank anode rod – enamel tank			●	
Check, replace the DHW tank anode rod – stainless steel tank		●		
Check the circulating pump function		●		
Check the outdoor unit exchanger		●		
Check the indoor unit exchanger				●
Check the heating water quality				●
Check the bivalent source function				●
Check the wiring and hydro equipment (ser. organisation)		●		

● required maintenance ● recommended maintenance

Figure 7.1: Maintenance plan

8. Design documentation

8.1 Connection of the heat pump to the heating system

Designing

The impact of the quality of the heating system design is as important as the influence of the quality of water or materials used. Insufficient heat transfer fluid flow leads to an increase in condensation temperature and thus a significant deterioration in COP. A poorly designed control system has the same effect. Conversely, high flow rates lead to corrosion and erosion. Insufficient size of the expansion vessel is directly related to the possibility of corrosion of the heating system.

Installation and commissioning

Seemingly insignificant changes during execution, compared to the project, can lead to the condition that the heating system is defect-prone. Joint quality, welding and soldering procedures, flushing and first firing are the cornerstones of user satisfaction. Installation of the heating system with non-qualified people, in order to save costs, is an intolerable risk.

Used materials and equipment

This issue basically depends on the heating system design. The designer should refrain from solutions where the result is a material-mixed system, e.g. copper pipes, aluminum radiators, steel boiler. In real life, such a system cannot be protected against different types of corrosion. It is always worthwhile to use materials with appropriate certification. This also applies to auxiliary materials such as seals, fluxes and solders. A common cause of overall corrosion of the heating system is the use of plastic pipes without oxygen barrier for underfloor heating.

The quality of circulation water

The circulation water quality is decisive for the long-term trouble-free operation of the heating system. The properties of water used as the heat transfer fluid vary different depending on the location of the borehole and water sources. It is necessary to realize that water, which in all parameters corresponds to drinking quality, usually does not suit heating systems without treatment. For heating systems, it is important to know parameters such as hardness, salinity, acidity and dissolved gas content in water.

The water hardness determines the amount of Ca2+ a Mg2+ salts contained, which, by varying the solubility under operating conditions, form virtually insoluble carbonates. Scale is excreted predominantly on the bivalent source and exerts its negative effects by the following mechanism. At the beginning, it creates a compact thermal insulation layer. This reduces the overall output of the source and also causes local overheating of the exchanger. Due to uneven dilatation at the overheating area, the compactness of the layer is impaired. Pieces of the limescale peel off and get into the circulating water and gradually clog both the refrigerant exchanger and the control valves. During limescale formation, carbon dioxide is released, causing aeration of the system and, under favourable conditions, surface corrosion. In addition, it is necessary to replenish missing water which is largely untreated and re-injects unwanted influences into the system.

The salinity is the sum of all dissolved salts in the water. In practice, these are Na+, K+, Fe2+ cations and Cl- and SO42- anions. Fe2, Cl- and SO42- ions pose danger as they support the heating system corrosion processes. Water salinity is directly proportional to its electrical conductivity. High water salinity promotes electrolytic corrosion, especially when using various types of metals (copper, iron).

An important criterion for the corrosion behaviour of the system is its acidity - pH. In order to minimize the corrosive effect of water, pH should correspond to the materials used. For example, it is important to note that a steel-compliant pH does not suit aluminum and vice versa.

The content of dissolved gases in water depends on its temperature and gas pressure. For heating water, relevant air contains mainly N_2, O_2 a CO_2. Nitrogen, from the chemical regime point of view, is harmless, but from the operational point of

view has an adverse effect, decreases the temperature capacity of water, increases compression work and causes cavitation noise. Oxygen and carbon dioxide are corrosive and need to be removed from water. Most of the dissolved gases can be removed from the heating system by deaerating. However, it is not possible to remove gases from the circulating water completely.

When properly vented, this is a relatively small amount of gas whose effects do not have a major impact on the long service life and reliability of the heating system. Residual oxygen and carbon dioxide are consumed in corrosion reactions and consequently corrosion ceases. The greatest danger is when oxygen enters into the system repeatedly. In practice, this is the most common cause of corrosion of the heating system. The reason may be a leak in the system, unsuitable parameters of the expansion vessel, the quality of the sealing elements and the used plastic elements. Beware that for instance underfloor heating made of plastic piping with oxygen barrier corresponding to the regulation does not form a 100% oxygen diffusion barrier. In this case, oxygen enters the system repeatedly and the corrosion processes do not stop spontaneously. Here, it is necessary to repeatedly use preparations that bind the oxygen in question.

Principles for commissioning and operating a hot water heating system

In modern hot water systems, inadequate care for the quality of filling and circulating water, or installation, commissioning, and operation becomes clearly evident very soon. The aim of this text is to highlight the principles related to this issue.

1) The quality of filling and circulation water - Valid standard dealing with water quality ČSN 07 7401 is obligatory for hot water systems up to 115 °C ° with nominal output higher than 60 kW. Water according to this standard is also fully suitable for systems with lower output. However, the treatment of water to the extent given by this standard for small systems (flats, family houses) is not realistic in practice.

Generally recommended operating water parameters:

- pH 6,5-8,5
- conductivity up to 350 μs/cm
- hardness 2 - 6 °dH
- NO bacteria
- No mechanical impurities

Steel corrosion:

- at pH above 8.5 satisfactory
- at pH above 10 is negligible

Copper corrosion:

- at pH above 10 is considerable
- at pH between 8.5 to 9 is moderate

Aluminum corrosion:

- at pH above 7.5 is considerable
- at pH 6.5 to 7.5 is acceptable
- when using drinking water, it is necessary to dispense chemicals against corrosion and to stabilize water hardness
- for material-mixed heating systems (steel, copper, aluminum), it is necessary to chemicals that are specifically designed for the given system
- check the chemical content at least once a year (before the heating season) and refill, if necessary

2) Flushing out a new heating system - The ČSN 06 0310 standard for central heating design and installation according to Article 132 prescribes flushing the equipment before testing and commissioning. The purpose of this obligation is to remove unwanted impurities from the heating system. These are mainly mechanical impurities, fats and oils, residual products after

welding and soldering.

- if possible, use softened water (max. 5.6 N0), drinking water without treatment is also applicable
- dispense suitable non-foaming degreasing agent for removing grease and oils according to the instructions for use in the filling water (cold or warm water alone does not remove oil and grease)
- set the maximum circulation water flow (open control valves, pump capacity set to maximum)
- heat the heating system by half output of the boiler to about 6 °C (keep slow temperature rise especially when non-softened water is used to minimize scale formation)
- operate the system for about 1/2 hour after heating the water
- after cooling the system to approx. 40 °C, drain rinsing water out, while observing the regulation about waste water
- clean filters from mechanical impurities
- without delay, fill the system with permanent filling

3) Setting the pressure expansion vessel parameters - The selected volume and pressure parameters of the expansion vessel are important for long-term trouble-free operation of the heating system. The required volume of the pressure expansion vessel is determined according to ČSN 06 0830. Insufficient volume and unsatisfactory pressure conditions of the expansion vessel lead to repeated aeration and corrosion of the heating system. The heating system designer should ensure the correct volume of the expansion vessel. We recommend that the installer sets the pressure parameters as follows. The user should check these parameters once a year.

Gas overpressure (Pn) in the expansion vessel

- when adjusting the gas overpressure, the expansion vessel must be without water
- pressure Pn should be 0.2 bar higher than the static water column height (Pst) of the heating system (vertical distance between the expansion vessel and the highest point of the heating system ⟶ 1m = 0,1bar)

Filling water pressure setting (Pf)

- by opening all the control valves, allow the system to fill without problems
- the filling water pressure Pf should be 0.3 to 0.5 bar higher than the gas pressure (Pn) in the expansion vessel. The filling water pressure is checked when cold with a pressure gauge on the water side after venting.

Adjusting safety pressure (Psv)

- the safety pressure Psv should be 0.5 bar higher than the operating pressure (Pe) of the system heated up to operating maximum. This is true when the safety pressure Psv <5 bar. If Psv > 5 bars, then Pe + 0,9 Psv.

4) Venting the heating system - Venting is a process that is repeatedly done upon filling, commissioning and operating the heating system. We recommend that you follow these guidelines:

- when filling the heating system, venting should be carried out continuously
- final venting to be carried out at maximum operating temperature of circulating water
- carry out venting after approx. 5 minutes of standstill of the circulation pump at all deaeration points of the heating system
- repeat venting after several days of operation

5) Hot water system commissioning - The system is filled with permanent filling (treated water according to point 1) and after successful leak test it is possible to commission the heating system. Adhere to the following principles:

- first heat up by slow start of the heat pump performance
- deaerate as described above
- conduct operational tests to the extent agreed between the investor and the implementer

6) Operation of the heating system - As a rule, the first season of operation is linked with the heating test and fine-tuning of the whole system. We recommend that you follow these guidelines:

- check the tightness of the heating system, do not react to water loss by mere water refilling
- check the filter clogging condition and if necessary, clean the filters
- drain the system only in case of necessary repairs and leave it empty only for as short as possible
- if there is a risk of freezing, the problem can be solved by using antifreeze and not by draining the system
- regularly check and maintain the individual elements (pump, boiler, control elements, expansion vessel) according to the relevant instructions for use
- check the quality of circulating water at the start of each heating season and add appropriate chemical agents as needed

Technical options and chemicals for protection of hot water heating systems

The action of hard untreated water and the associated corrosion processes in the heating system are generally known. Therefore, there are a number of manufacturers of "chemicals and equipment for heating system" for treatment of filling and circulation water, corrosion protection and cleaning of already clogged heating systems.

The manufacturer is not authorized to recommend a specific agent. The manufacturer and user share the responsibility for choice of agent, method of application, technical effect and guarantee. When choosing "chemicals for heating systems", it is necessary to proceed very carefully, preferably after agreement with the manufacturer. Only if you know the hardness and aggressiveness of the filling water, the material composition of the heating system (steel, cast iron, copper, plastic, aluminum and their various combinations), a professional choice can be made for given type of heating system (self-weight, forced circulation with expansion vessel, underfloor heating. It is equally important to maintain the initial dosage, as well as replenish the "heating system chemicals" during operation. A professional product should be supplied with a methodology for determining its current concentration in circulating water.

Another options of water treatment on cation exchanger or reverse osmosis desalination are not applicable for small systems out of economical reasons. For the same reasons, options of physical water treatment for small heating systems narrow down to magnetic treatment that prevents scale formation.

A common question is how to get the "heating system chemical agents" into the system. In addition to the inventiveness of the installers and operators, there are professional flow-through containers for chemical dosing or pressure pumps for refilling during operation.

The author of the chapter "Connection of the heat pump to the heating circuit" of the installation manual: Ing. Jozef Gulyás Organization: KORADO a.s. Česká Třebová

8.2 Hydraulic circuit

The NeoRé heat pump is designed to be as simple to install as possible. All important elements of the hydraulic circuit are integrated in the indoor unit. The indoor unit includes a powerful circulation pump, an exchanger, a three-way zone valve for DHW charging, an 8-liter expansion vessel, a 6kW electric boiler, a DN20 / 2.5bar safety valve. When designing a hydraulic circuit, it is necessary to take into account the high demands of heat pumps for sufficient flow of heating water. The NeoRé heat pump can operate without an accumulation vessel.

In this case, the following requirements must be met. The heat pump must not be shut down from the heating system. The heat pump must have enough heat energy that is taken back during defrosting the outdoor unit. It is not recommended to use thermostatic valves, by-pass with pressure differential valve or mixing valve (typically a four-way valve).

If a non-return valve must be used in a hydraulic circuit without a storage tank, it is possible that the unit will report insufficient flow at low pump speed. It is then necessary to increase the minimum possible speed of the circulation pump according to the situation. The temperature control of heating water for the heating system is determined by the equithermal regulation that is a part of the indoor unit control system. If it is necessary to use control elements that control more than 25% of the heating water flow, it is necessary to use an accumulation vessel. In no case is it recommended to use a hydraulic dynamic pressure equalizer (torus) to connect the heat pump to the heating system. Use of the equilizer, due to its temperature gradient, impairs the efficiency of the heat pump significantly. We only use an anuloid to connect a bivalent source (if needed) to the heating water circuit.

When using a non-return valve, it is necessary to set the minimum circulation pump output to 60% or according to the non-return valve behaviour.

If an accumulation tank is used, it is necessary to ensure the same flow (at least under full load) between the primary and secondary sides of the hydraulic circuit. Recommended dimension of the accumulation tank (at least): 14.6 liters per kW heat pump output.

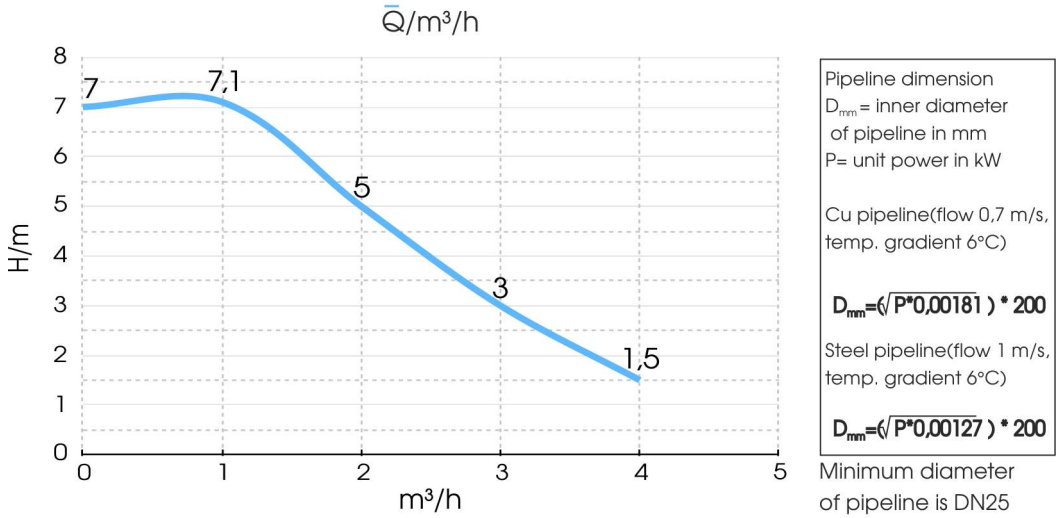


Figure 8.1: Parameters of the indoor unit hydraulic output (including complete equipment)

A variable capacity circulation pump is installed in the heat pump. The minimum flow, below which the heat pump will be shut down, is shown in the following graph.

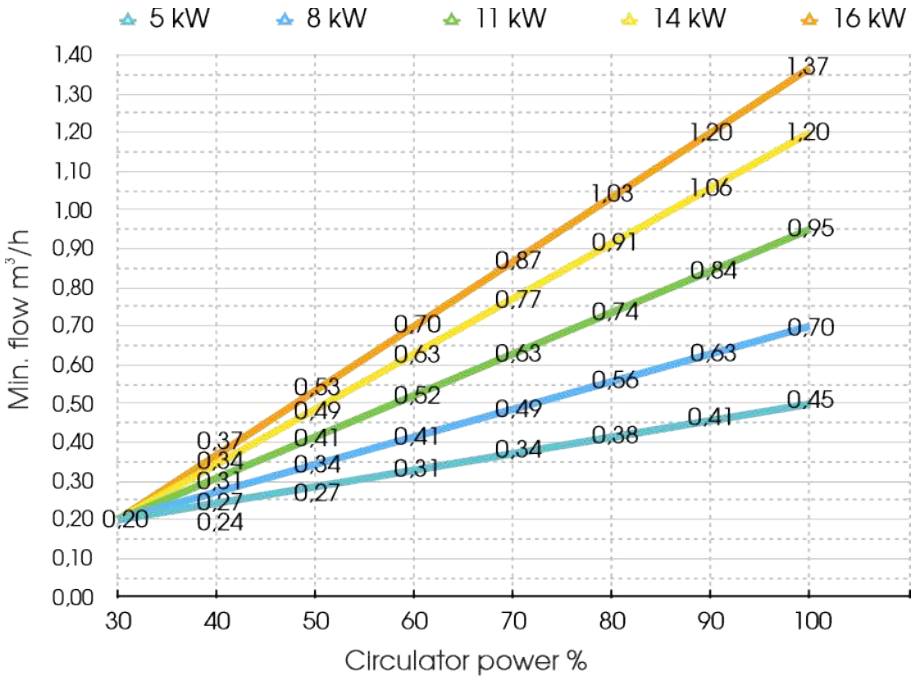


Figure 8.2: Minimum heating water flow for individual power types

8.3 Heating - range of working temperatures

The NeoRé heat pump can operate only within the output water temperature range according to the graph 8.3 - Working range of output water temperature. The heating system must be designed according to these requirements.

The working temperature range must also be taken into account when heating an unheated building (especially in the case of newly completed buildings in winter) and during floor drying. Drying floors with underfloor heating in winter using an air-water heat pump (especially without storage tank) is problematic.

The heat pump must have sufficient heat energy in the heating system during defrosting. This energy must be in the temperature level according to the graph of working range.

For drying floors in winter, it is allowed to use the outdoor unit until a part of moisture is removed from the floor and the return temperature reaches the working range. This can be achieved by an initial heating using then electric boiler only. (The outdoor unit stays off at the breaker)

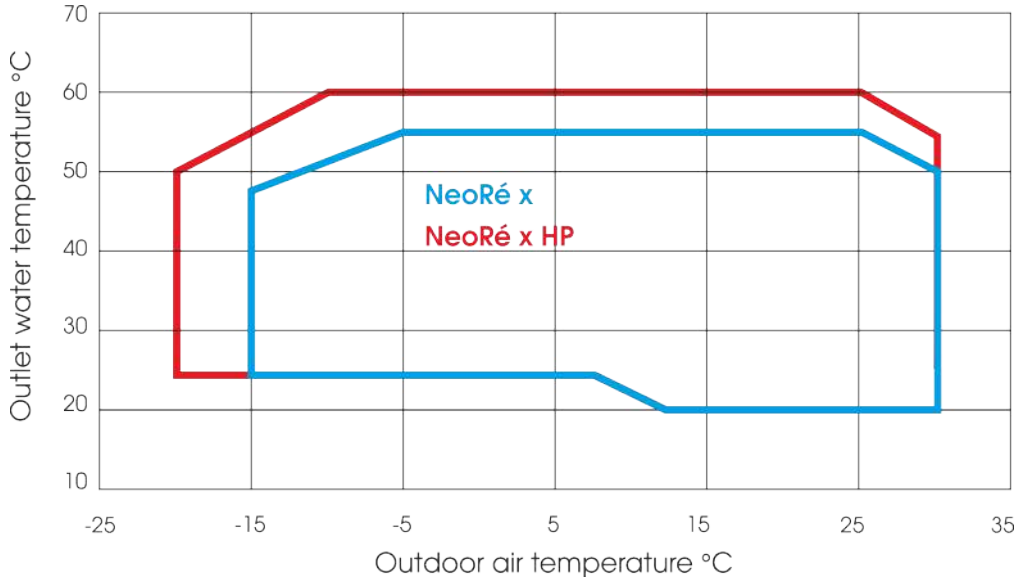


Figure 8.3: Outlet water working temperature range

! When drying floors with underfloor heating in winter, a large amount of energy is consumed (depending on the size of the building) and it is expensive. Especially if you use inappropriate electricity rate (e.g. D01d rate).

8.3.1 Floor drying program

Floor drying screen (Fig. 8.4) is divided into two parts, the left for adjusting and the right for control.

Five time periods can be selected in the table on the left of the screen, while the output water temperature and time range for which the temperature is to be maintained, can be selected for each period. The individual time slots follow each other, and after entering the end time of one section, the start time of the next section is automatically adjusted. The total time of floor drying can be up to 480 hours.

At the top right of the screen, there is `Counter status`, which shows how many hours of the floor drying process have passed and the currently set output water temperature.

There are two switches under this information. The switch `Drying` activates the floor drying process. With the same switch, the running process can be paused and restarted. The second switch `Reset` timer resets the floor drying process timer and can be restarted.

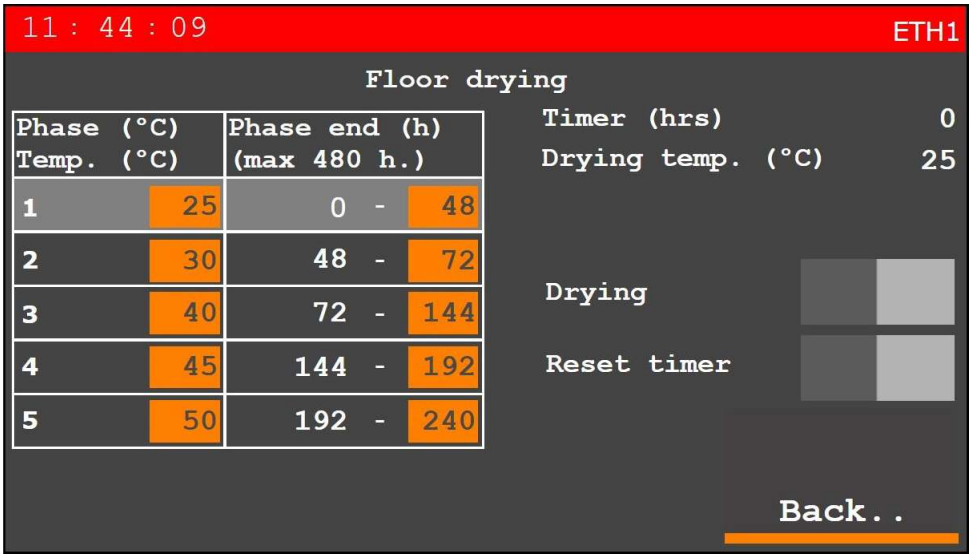


Figure 8.4: Service access section 2 ➞ Floor drying process

Drying floors with the heat pump in winter can only be started when the return water temperature exceeds 20°C. Otherwise, if you do not have another heat source, you must use a built-in or external electric boiler.

Failure to follow this advice will cause the heat pump to malfunction and it can result in damage.

The drying program in the heat pump is only a tool to simplify the drying process. When drying, it is always necessary to comply with the requirements of the floor technology supplier (floor screeds, floor coverings, etc.). It is also necessary to monitor the humidity level in the building so that it cannot result in damage of the building or its internal equipment (plasterboard ceiling, electrical equipment, wooden interior elements, etc.).

Floor drying must always be coordinated with other suppliers.

8.4 Cooling - range of working temperatures

The NeoRé heat pump can only be operated in cooling mode if there is no water condensation on any element of the cooling system. It is therefore only suitable for large area cooling systems such as cooling ceilings, etc.

The flooring system can also be used for cooling, but a very limited cooling capacity of such a system is to be expected.

The recommended cooling water temperature is 19 to 22 °C, provided this temperature is outside the condensation zone.

The maximum range of cooling water temperatures is 18 to 25 °C.

The general recommendation is to use cooling ahead of expected high outdoor temperatures and use cooling without interruption.

In the case of use with cooling ceiling systems, a self-regulating effect occurs where the cooling capacity of the system depends on the temperature gradient of the ceiling surface and the room temperature. This maintains the natural temperature difference between the outdoor temperature and the room temperature.

In applications with the probability of dew formation due to exceeding the dew point, it is necessary to use a dew point sensor at the place where most dew can be expected. In case of higher count of critical places could be used up to four dew point sensors. Cooling water temperature is managed that it is always 2 °C higher, than the highes dew point temperature.

8.4.1 Dew point table

	Room temperature °C			
relative humidity %	25	26	27	28
50 %	13,8	14,7	15,6	16,5
60 %	16,6	17,6	18,5	19,5
70 %	19	20	21	22
80 %	21,3	22,2	23,2	24,2
90 %	23,2	24,2	25	26,2

Table 8.1: Dew point temperature in ° C

8.5 Acoustic parameters

The following tables show the acoustic performance values of each outdoor unit type in standard mode and in night attenuation mode (second table). Furthermore, the acoustic pressure values for both modes in the model environment and at varying distances from the outdoor unit are listed.

Acoustic power in standard mode

Type	Acoustic power (dBA)	Acoustic pressure (dBA)									
		1m		**3m**	thuja	**5m**	thuja	**7m**	thuja	**10m**	thuja
NeoRé 5 TG	58	50	x	40	36	36	32	33	29	30	26
NeoRé 8 TG	60	52	x	42	38	38	34	35	31	32	28
NeoRé 11 TG	62	54	x	44	40	40	36	37	33	34	30
NeoRé 14 TG	62	54	x	44	40	40	36	37	33	34	30
NeoRé 16 TG	64	56	x	46	42	42	38	39	35	36	32
NeoRé 8 TG HP	58	50	x	40	36	36	32	33	29	30	26
NeoRé 11 TG HP	59,5	52	x	42	38	38	34	35	31	32	28
NeoRé 14 TG HP	59,5	52	x	42	38	38	34	35	31	32	28
NeoRé 16 TG HP	60,5	53	x	43	39	39	35	36	32	33	29

Acoustic power in silent mode

Type	Acoustic power (dBA)	Acoustic pressure (dBA)									
		1m		**3m**	thuja	**5m**	thuja	**7m**	thuja	**10m**	thuja
NeoRé 5 TG	53	45	x	35	31	31	27	28	24	25	21
NeoRé 8 TG	55	47	x	37	33	33	29	30	26	27	23
NeoRé 11 TG	57	49	x	39	35	35	31	32	28	29	25
NeoRé 14 TG	57	49	x	39	35	35	31	32	28	29	25
NeoRé 16 TG	59	51	x	41	37	37	33	34	30	31	27
NeoRé 8 TG HP	53	45	x	35	31	31	27	28	24	25	21
NeoRé 11 TG HP	54,5	47	x	37	33	33	29	30	26	27	18
NeoRé 14 TG HP	54,5	47	x	37	33	33	29	30	26	27	18
NeoRé 16 TG HP	55,5	48	x	38	34	34	30	31	27	28	19

x - 1,5m ahead of outdoor unit may not be any barrier. Beacuse of this acoustic pressure is not measured in distance of 1m.

Figure 8.5: Acoustic parameters

9. Technical data

9.1 Electrical wiring diagram of the indoor unit

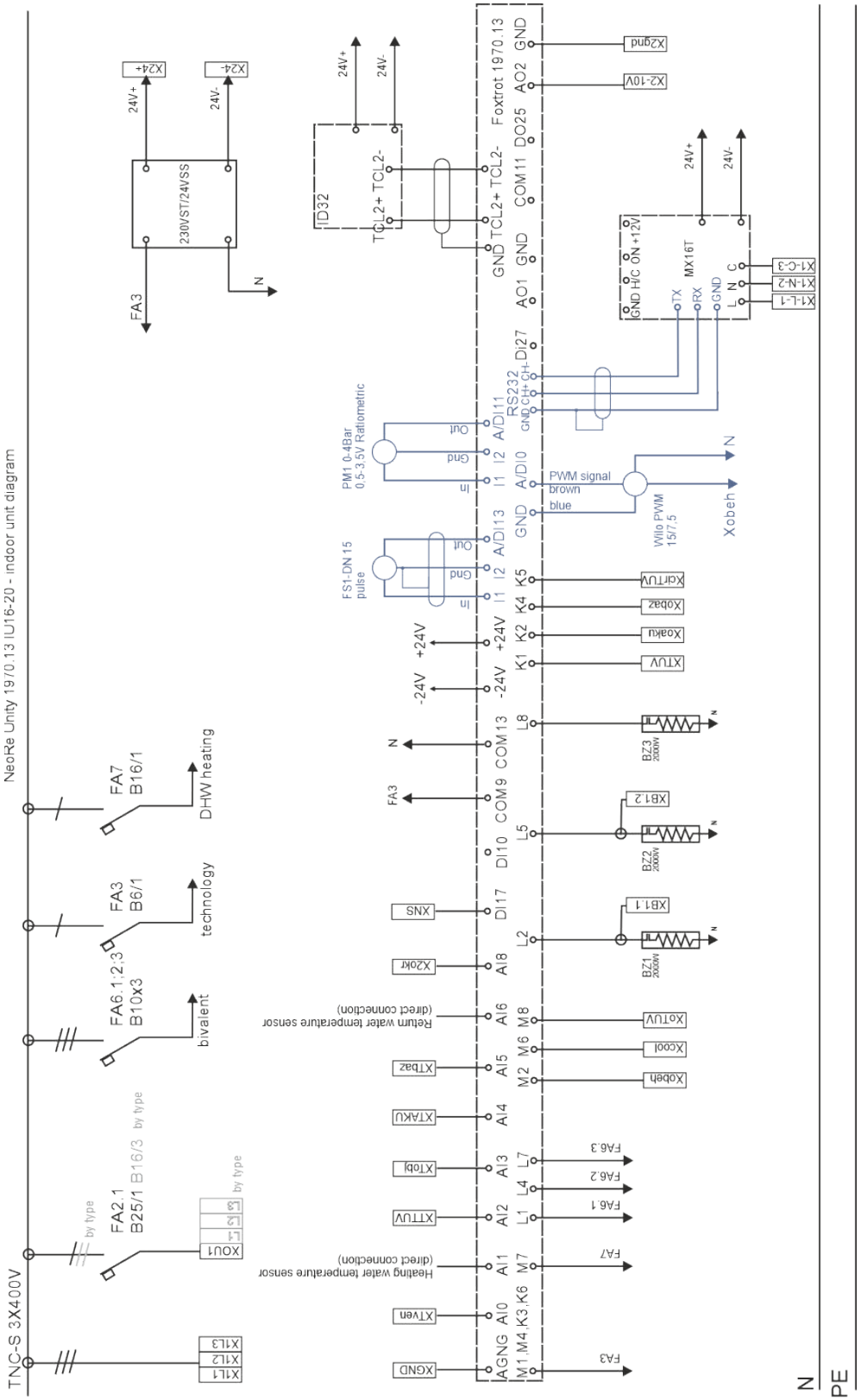
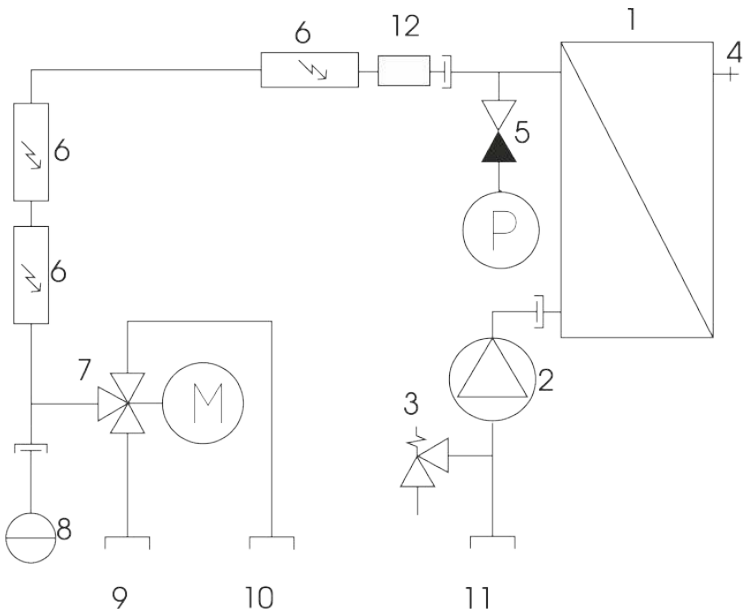


Figure 9.1: Electrical wiring diagram of the indoor unit

9.2 Hydraulic wiring diagram of the indoor unit



1. Exchanger refrigerant/water
2. Circulator
3. Safety valve 2,5 Bar
4. Manual bleeding valve
5. Pressure sensor 0-4 Bar
6. Electric heater 2kW
7. 3-way valve
8. Expansion tank 8l
9. Heating water output
10. DHW heating water output
11. Return water inlet
12. Flowmeter

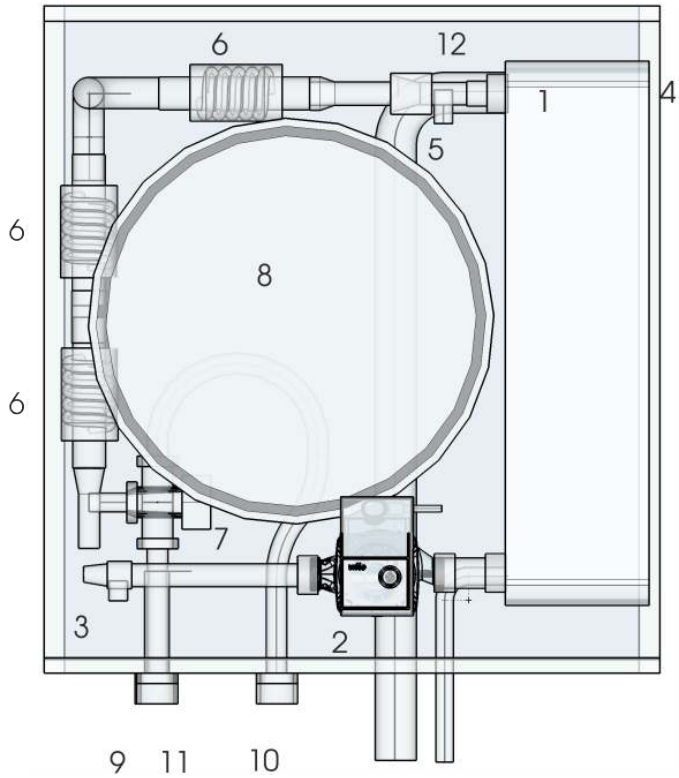
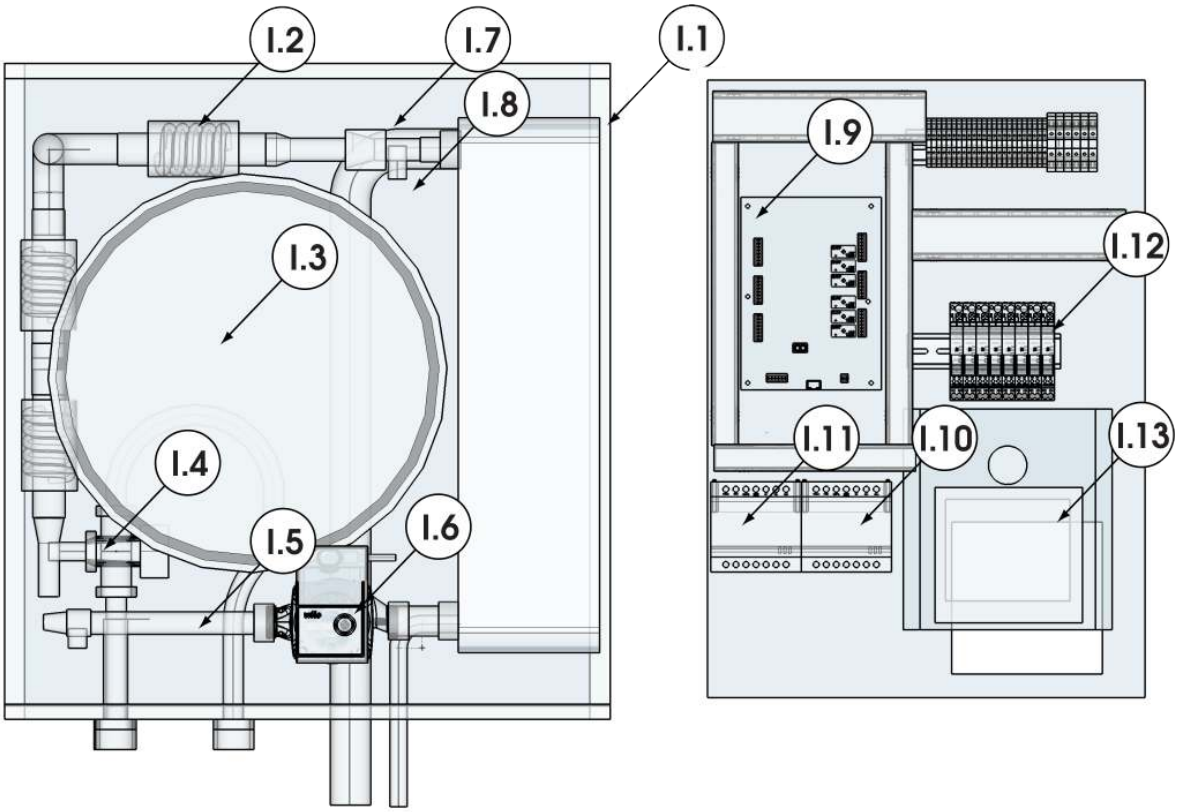


Figure 9.2: Hydraulic wiring diagram of the indoor unit

9.3 Structural BOM



Label	Description	Part number
I.1	Exchanger	I0002090001
I.2	Electric heater with output	I0002090002
I.3	Expansion tank	I0002090003
I.4	3-way valve with pipes	I0002090004
I.5	Output part	I0002090005
I.6	Circulator	I0002090006
I.7	Flowmeter	I0002090007
I.8	Pressure sensor	I0002090008
I.9	Control unit	I0002090009
I.10	Low-voltage source	I0002090010
I.11	MX communication	I0002090011
I.12	Breaker (specification)	I0002090012
I.13	Control panel	I0002090013

Figure 9.3: Structural BOM

9.4 Dimensions

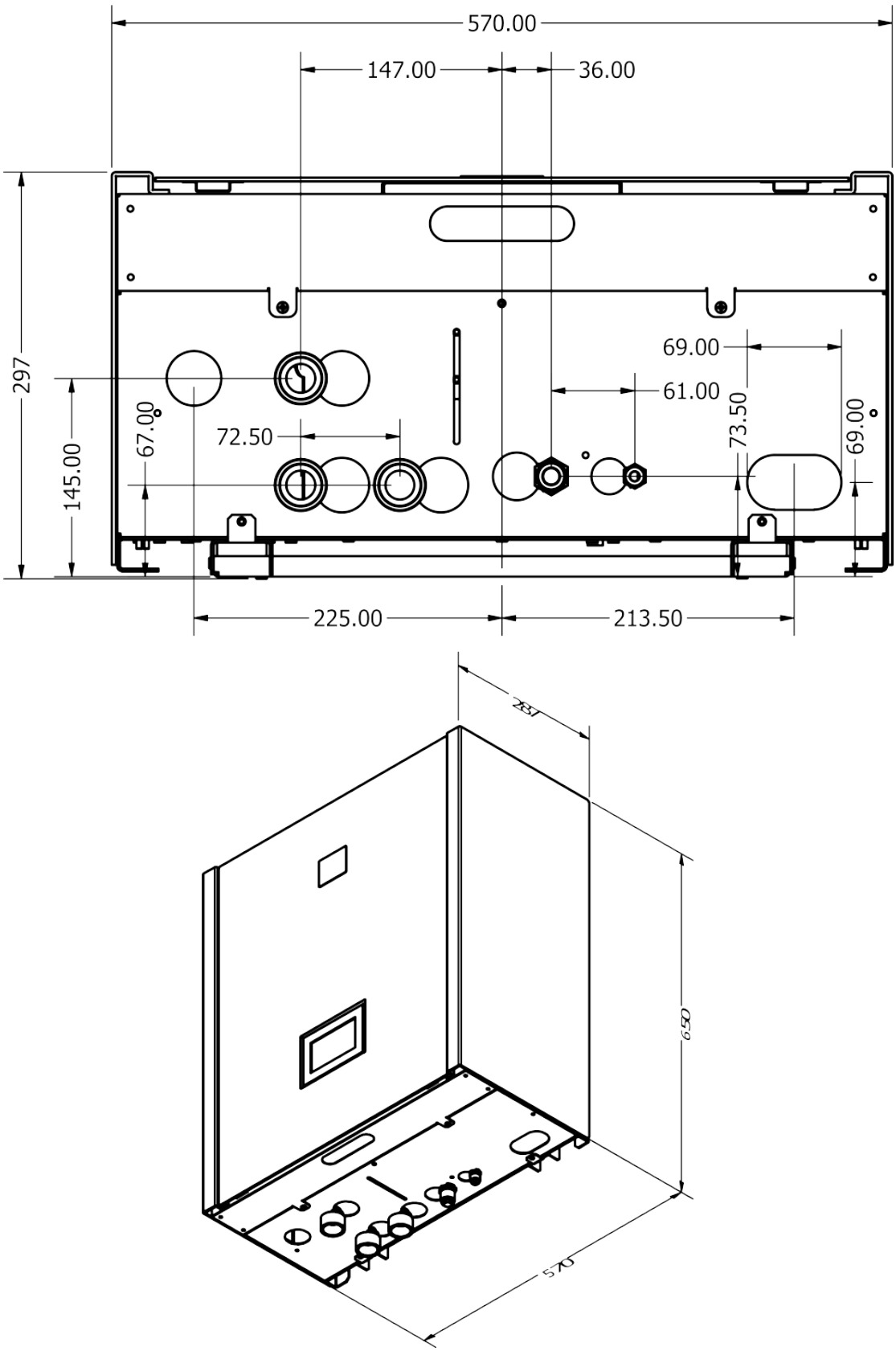


Figure 9.4: Dimensions

9.5 Dimensions of the wall bracket (pad)

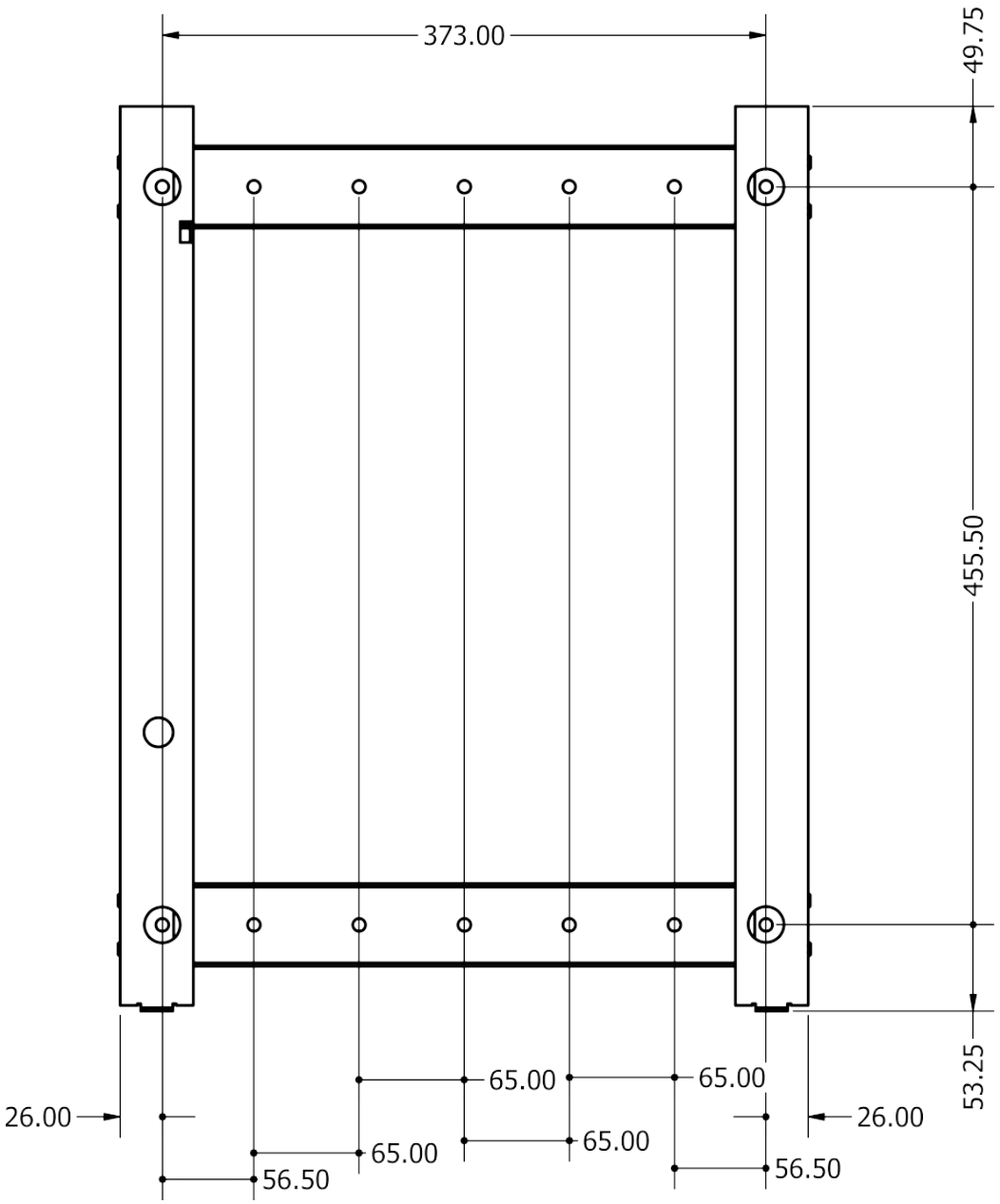


Figure 9.5: Dimensions of the wall bracket (pad)

9.6 Removing the cover

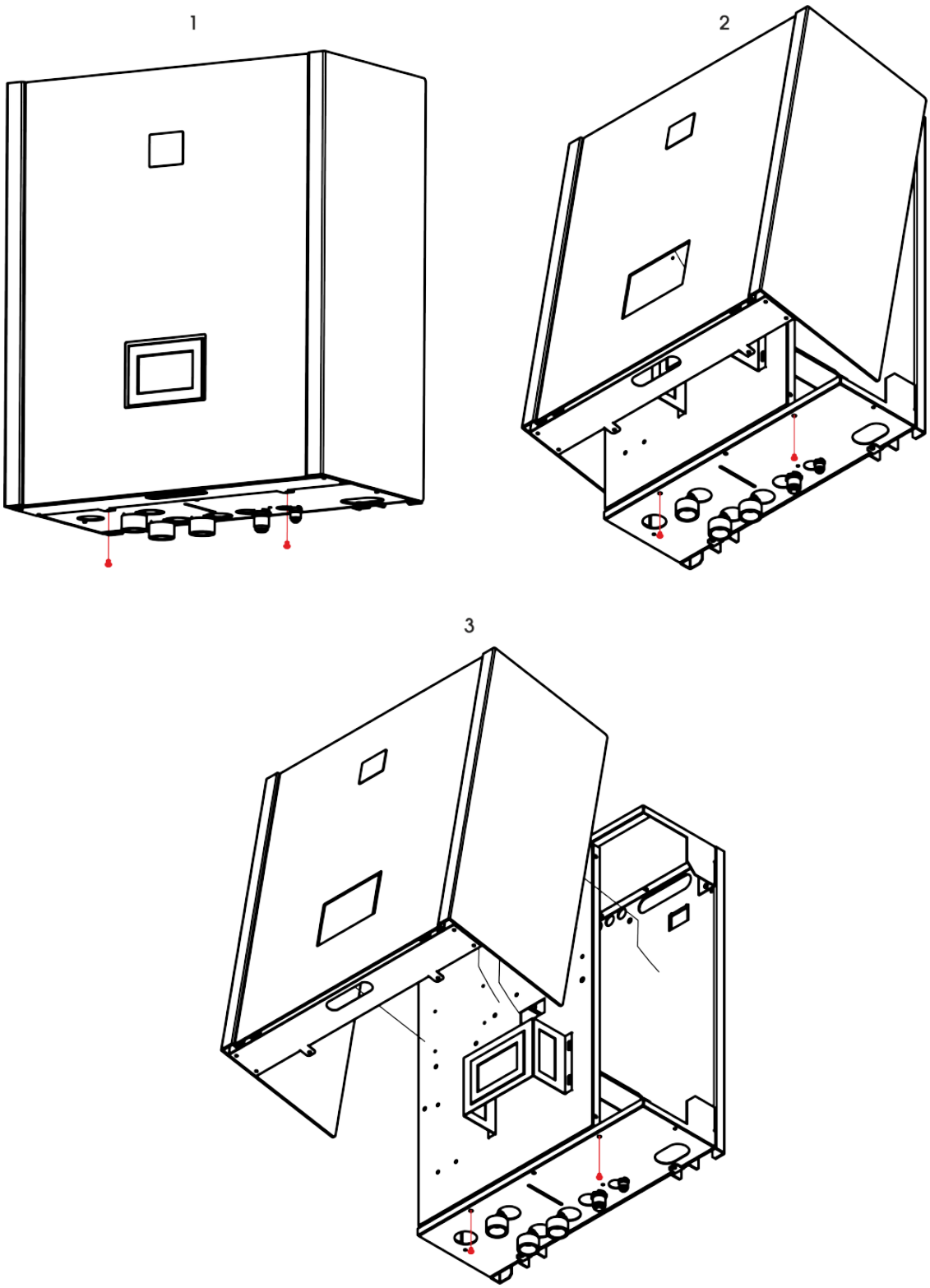


Figure 9.6: Removing the cover

10. Manufacturer contact

MANUFACTURER NEOTA CZ s.r.o.
Štefánikova 75/8
602 00 Brno, Czech Republic
Company ID No. 27759431
VAT ID No. CZ27759431

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10.1 Documents for download

All product documentation is also available online at www.neota.cz/en/downloads in PDF format.

10.2 Online manuals

You can use QR codes to quickly load manuals in your mobile phone.

USER MANUAL
NeoRé TG

INSTALLATION MANUAL
NeoRé TG