



INSTALLATION GUIDE

Elve

Outdoor unit

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

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1 Introduction

1.1 Product documentation

The following documents are available for this product:

- **Installation Guide.** Gives thorough information on how to install the product. Supplied with the product on delivery and available for download, see below.
- **Wiring Diagram** for the product, intended for fault tracing and service. Available for download, see below .
- **User Guide** is intended for the end user and must be handed over and gone through with the end user when installation and commissioning is completed. Supplied with the product on delivery.
- **Technical Description** contains information about the product's function, fault tracing and technical data. Available for download, see below.
- **Country specific instructions** and forms are available where relevant. Supplied with the product on delivery.

Documents not delivered with the outdoor unit are available for download at: www.thermia.com

1.2 Symbols

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

The symbols are displayed to the left of the text and three different symbols are used to indicate the degree of danger:

Danger



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

Warning



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

Caution



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

A fourth symbol is used to give practical information or tips on how to perform a procedure.

Note



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

1.3 Symbols on product labels

1.3.1 General



Warning, danger!



Read the documentation provided.



Read the documentation provided.



Warning, hazardous electrical voltage!



Warning, hot surfaces!



Warning, moving parts!



Warning, risk of crushing injury!



This appliance is charged with R290, a highly flammable refrigerant.

1.3.2 Electrical components



Component, ordinary delivery according to proposed system solutions.



Components, accessories according to proposed system solutions.

1.3.3 Pipe connections



Tap water



Air bleeding



Heating system



Outdoor unit



Expansion tank with safety valve



Water heater

2 Important information/Safety regulation

2.1 General safety precautions

Carefully follow the precautions listed in this document because they are essential to guarantee the safety of the product. Store the manuals in a safe place in order to be able to use as reference after installation and remember to hand the manuals over to the new owner if the product unit is sold or transferred. To prevent serious damage on the system and injuries to users, precautions and other notices shall be observed.

2.2 Refrigerant general

Note



Service maintenance and repair shall be performed by certified personnel only.

Note



Compliance with national gas regulations shall be observed.

2.3 Refrigerant R290



This appliance is charged with R290, a highly flammable refrigerant.

Warning Storing appliance with R290 refrigerant



In accordance to IEC60335-2-40:2022, prior to installation, the application shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating appliance, an operating electric heater or a hot surface with a temperature above 370°C). Not adhering to this standard can lead to serious personal injury and/or material damage.

Warning Gas leak detection



Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. Do not pierce or burn. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system. Not adhering to these instructions can lead to serious personal injury and/or material damage.

2.4 Installation notes regarding refrigerant

Caution



Note that the refrigerant R290 has no odour!

- Do not cut, pierce, or burn the refrigerant container or pipes.
- Do not use means to accelerate the defrosting process for example with an open flame or other methods besides the outdoor unit's defrosting program.
- Installation must be carried out by qualified personnel. Additionally, refer to applicable regulations and laws.
- Do not work in a confined place.
- Make sure that the work area is safe from flammable substances.
- The units are not explosion proof so they must be installed with no risk of explosion.
- Do not install where there is a risk of combustible gas leakage.
- After installation, check for leakage.
- Never directly touch any accidental leaking refrigerant. This could result in severe wounds caused by frostbite.

2.5 Water quality

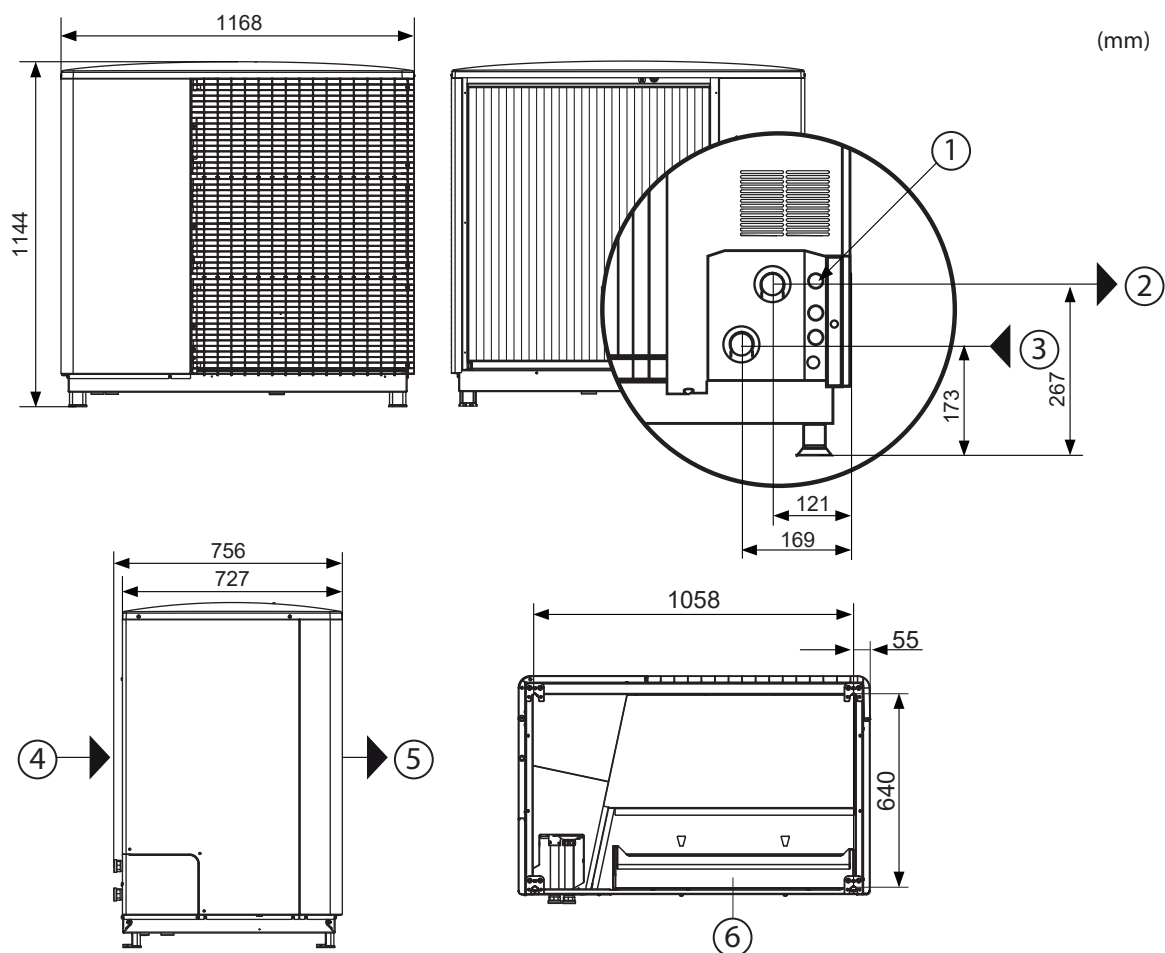
This product and its components are developed to reliably and efficiently work with water qualities in line with VDI 2035. In practice this means that some general precautions should be taken:

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

3 Outdoor unit data

3.1 Dimensions and connections

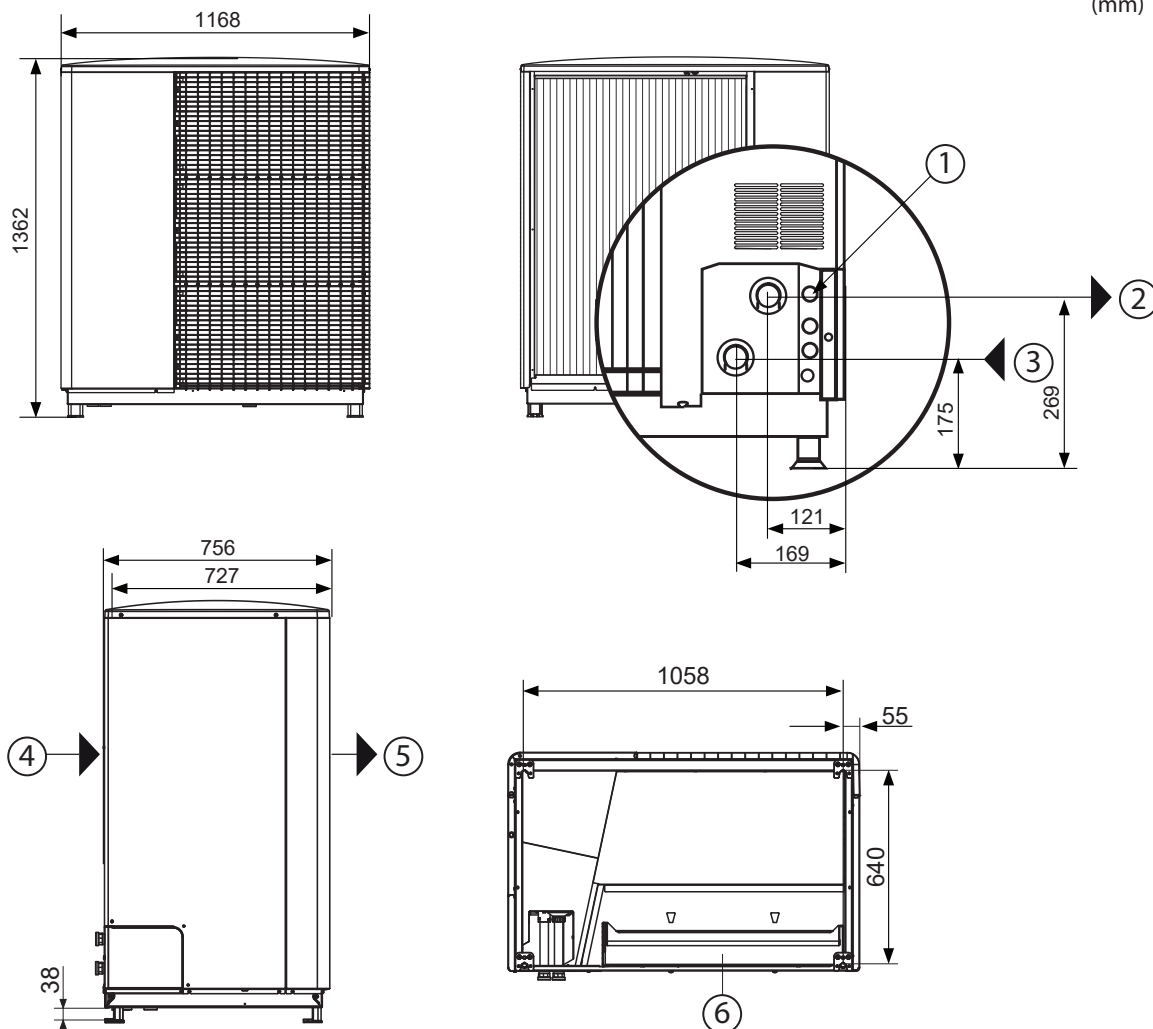
Elve L 400V



1. Entry electrical cables
2. Supply line Ø28 mm, G32
3. Return line Ø28 mm, G32
4. Back side/air intake
5. Front side/air discharge
6. Condensate drain DN50 (accessory)

Elve XL 400V

(mm)



1. Entry electrical cables
2. Supply line Ø28 mm, G32
3. Return line Ø28 mm, G32
4. Back side/air intake
5. Front side/air discharge
6. Condensate drain DN50 (accessory)

4 Preparing installation for the outdoor unit

The outdoor unit shall be installed in compliance with the spaces described in the installation manual, to ensure accessibility from both sides and allow repairs or maintenance operations to be carried out. If units are installed without complying with procedures, additional expenses can be generated because special harnesses, ladders, scaffolding or any other elevation system for repair and service will NOT be considered part of the warranty and will be charged to the end customer.

Caution



Incorrect positioning of the outdoor unit risks reduction of performance.

Caution



In areas with heavy snowfall, piled snow could block the air intake. To avoid this, install a frame that is higher than estimated snow fall. In addition, install a snow-proof hood to avoid snow from covering the outdoor unit.

Caution

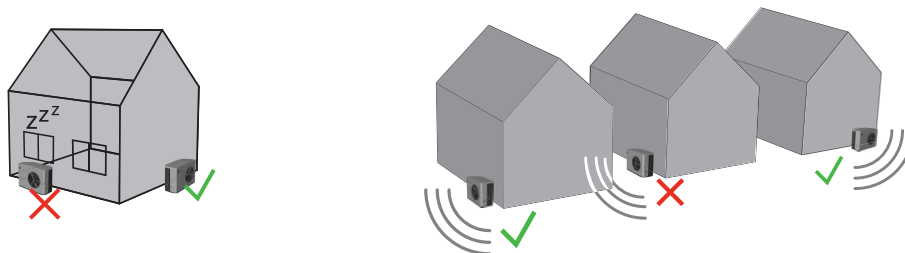
The outdoor unit may not be enclosed.

4.1 Placement of the outdoor unit

Avoid locating the outdoor unit:

Before doing any ground work, make sure to know where to place the outdoor unit with regards to the surroundings, such as: wind direction; walls; neighbours etc.

Avoid placing the outdoor unit close to bedroom or living room windows. Preferable placement is instead on solid walls facing away from any close neighbouring houses or facilities. See images below.



- Close to windows, air vent ducts or walls to bedrooms etc.
- Facing nearby neighbours.
- In an inner corner of the building. It gives a very large effect on the direction of sound propagation.

4.1.1 Safety zone

Warning



In case of a leakage the refrigerant must not be able to enter the indoor under any circumstances. The safety zone shall not have any building openings such as: windows, doors, light wells, flat roof windows, air inlet / outlet of ventilation systems, etc.

Warning



R-290 refrigerant is heavier than air and can be collected on the ground. The safety zone area shall be free from depressions, cavities, or unstable ground conditions.

Warning



The safety zone should not extend to intact buildings, neighboring or public spaces.

Warning

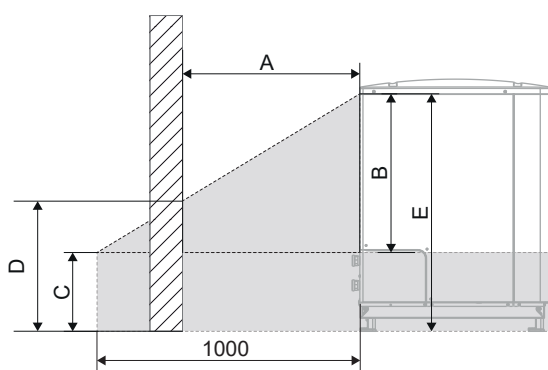


The safety zone cannot be modified later to violate the protection rules.



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

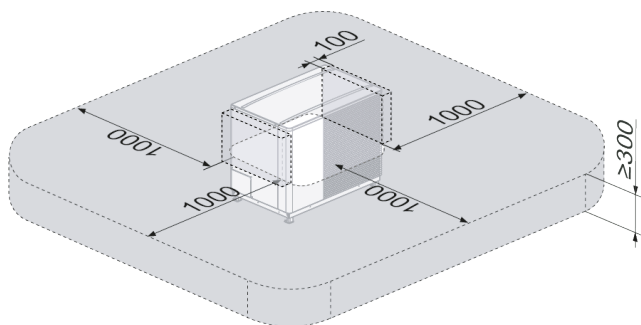
- The refrigerant must not enter the interior of the building through openings.
- The refrigerant must not enter the drain network.
- Avoid cavities $> 0.5 \text{ m}^3$ in which the refrigerant can accumulate.



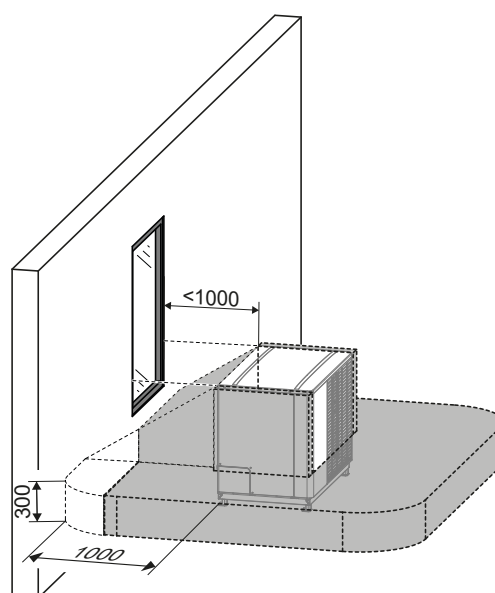
Elve L						
A	>1000	1000	800	600	400	250
B	0	789	789	789	789	789
C	0	300	300	300	300	300

Elve L						
D	0	300	458	616	773	892
E	1089	1089	1089	1089	1089	1089
Elve XL						
A	>1000	1000	800	600	400	250
B	0	1010	71010	1010	1010	1010
C	0	300	300	300	300	300
D	0	300	502	704	906	1058
E	1310	1310	1310	1310	1310	1310

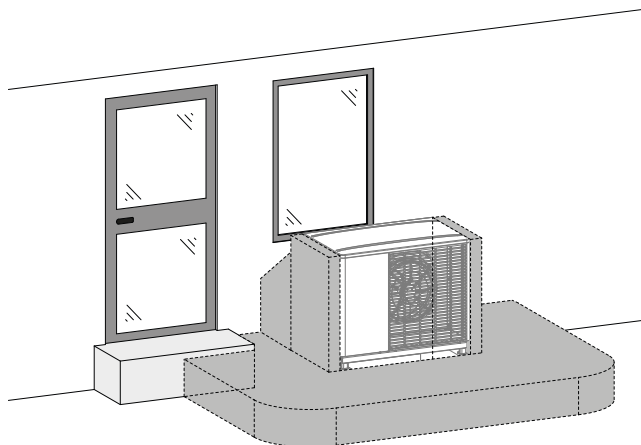
Safety zone when installed in open aria



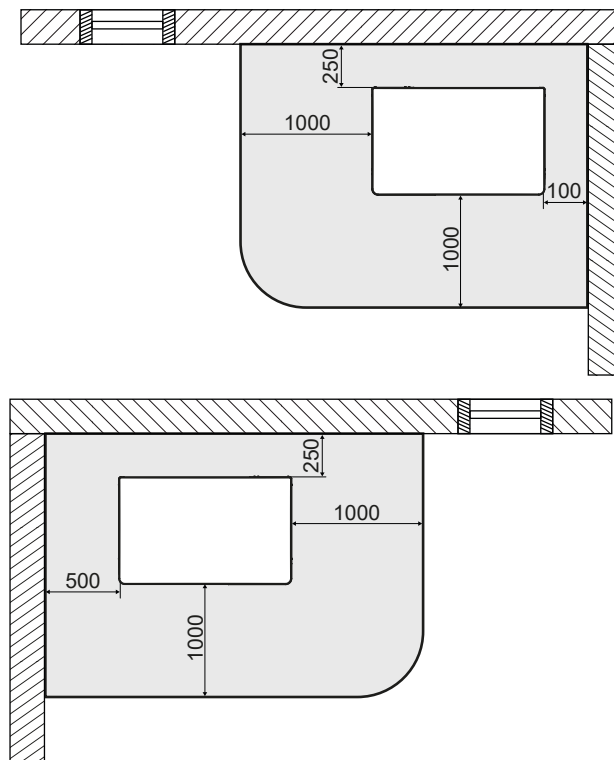
Safety zone when installed in front of a wall



Safety zone when installed in front of a wall with bracket



Safety zone when installed a corner of a building
This is not recommended due to noise.

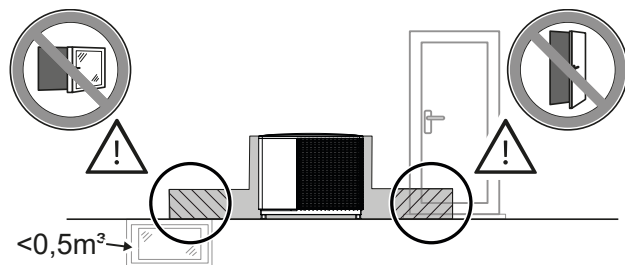


Options for reducing the size of the safety zone

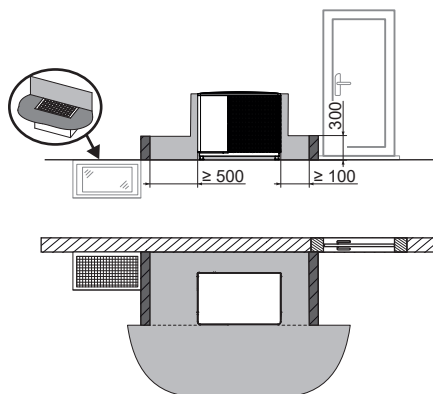
If the safety zone cannot be maintained due to building characteristics at the installation site, you can implement the following measures.

Close the openings (doors, windows light wells e.g.) permanently to prevent R290 from entering the building in the event of a leak. To do this, remove the window handle, for example, and secure the opening against reopening.

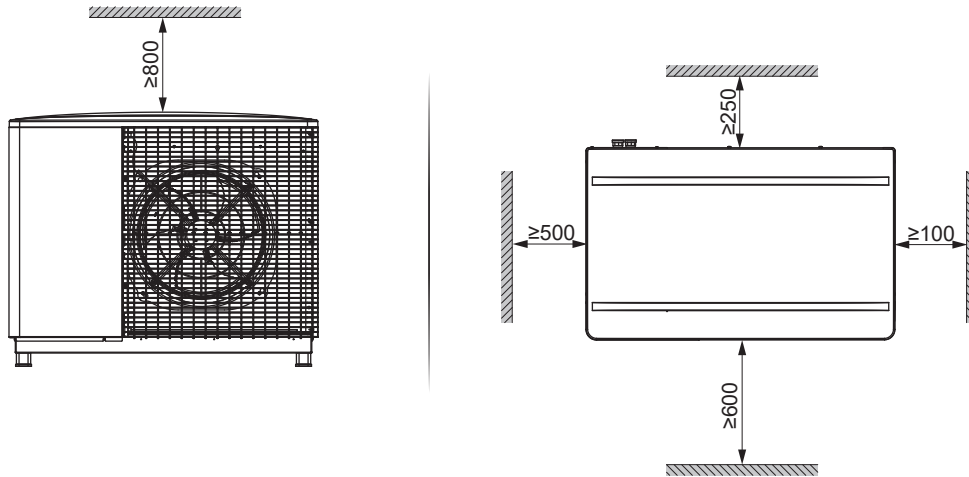
Option 1



Option 2



4.1.2 Minimum clearances



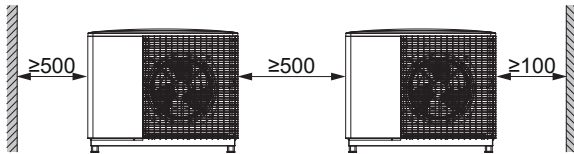
Maintain the minimum clearances in order to ensure trouble-free operation of the appliance and to allow enough space for maintenance work.

Always make sure to consider the safety zone!

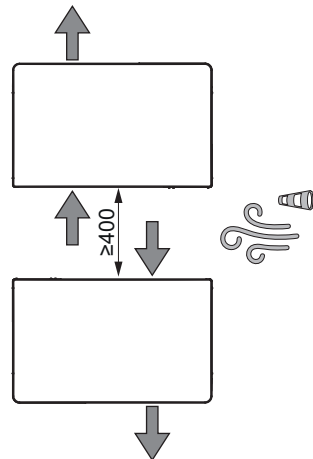
4.1.3 Minimum clearances with cascades

Always make sure to consider the safety zone!

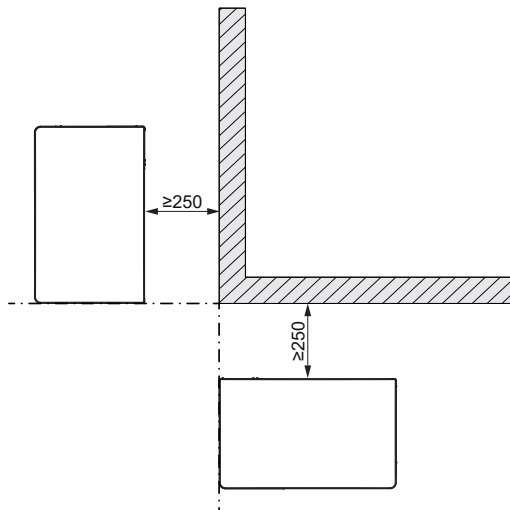
Two units, side by side



Two units, back to back



Two units around a corner



4.1.4 Noise information

Consideration to prevent noise

To prevent disturbing noise from the outdoor unit the following recommendations should be observed:

- In the event the outdoor unit is positioned on a vibration sensitive base, vibration dampers should be used. The vibration dampers must be correctly dimensioned with regard to the outdoor unit's weight so that static spring depression of at least 2 mm is obtained in all mounting components.
- Connection of the heat transfer fluid to the outdoor unit must be made using a flexible hose to prevent transmission of vibration to building construction and the pipe system, see Flexible hoses.
- Ensure that pipes at lead-ins are not lying against the walls.
- Ensure that the electrical supply cable does not provide a path for vibration because it is overstretched.
- In cases where attachment of pipes to sensitive construction elements cannot be avoided, special elastic pipe attachments should be used.

4.2 Drainage

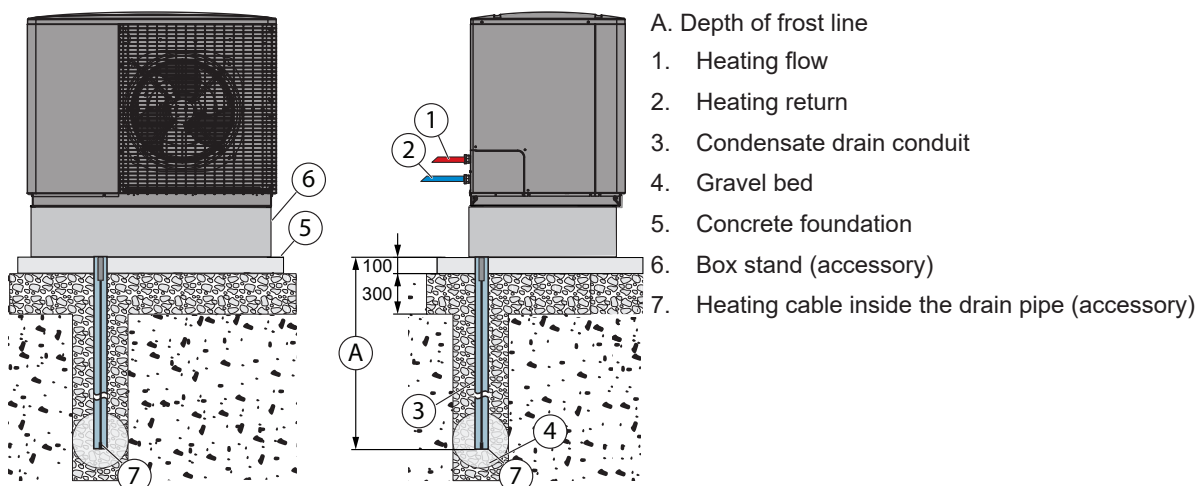
Note



If the condensed water is not directed away from the house or any other specific drainage, a moisture barrier should be used on the foundation to the house, to avoid water/moisture damage.

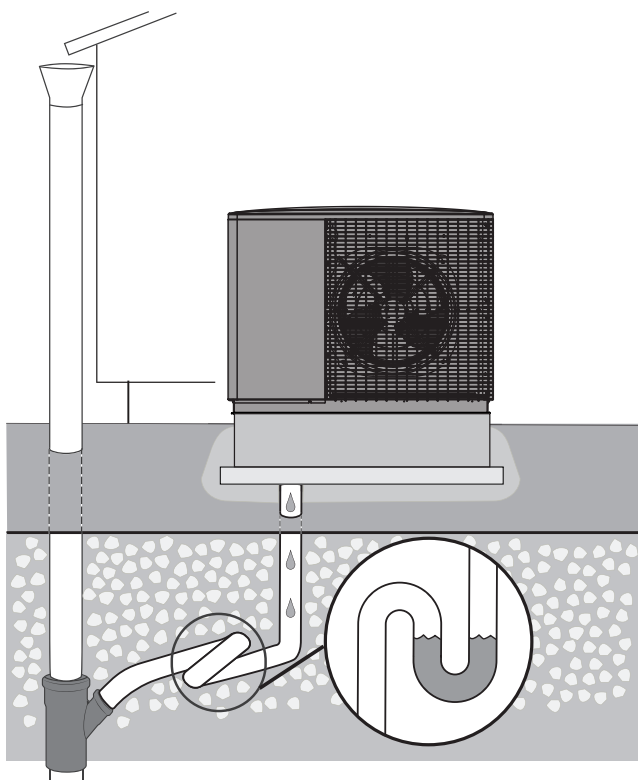
When using the application in the heating mode, ice may accumulate. During defrosting, the condensed water must be drained off safely. Make a 400mm space between the bottom of the outdoor unit and the ground for installation.

Consider the frost depth of the region to know how deep to go (A).

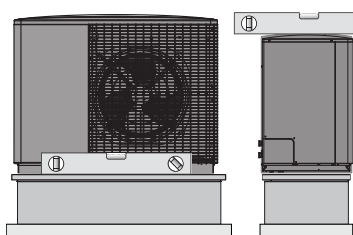


4.2.1 Drain work

Additional solution for drainage.



- The outdoor unit must be positioned outdoors on a stable base that can take the total weight of the unit.
- Secure all four mounting points on a stable base, for example one of the two the stands specifically designed for this product (sold separately) or a cast foundation.
- If a cast foundation is made, make sure that the dimensions cover the horizontal plane area of the unit, with extra length with regards for fastening the bolts (to make sure that there is no risk of the foundation to crack due to drilling too close to the edge).
- Make sure the water lock is installed at a frost-free depth with a heating cable.
- Make sure drainage water is kept outdoor!



Check with a spirit level that the outdoor unit is installed horizontally.

Caution



Make sure that the condensed water runs well out of the outdoor unit at low ambient temperatures. If drain work is not effective for releasing condensed water in cold conditions, it can cause the unit to get damaged from ice building up.

Caution



If drain work is not adequate, it can lead to system performance degradation and system damages.

5 Transporting and setting up the outdoor unit

Caution



The outdoor unit must always be transported and stored upright in a dry environment. Secure the outdoor so that it cannot tip over during transportation.

Caution



If the outdoor unit is tilted more than 30°, in any direction, it may become seriously damaged as the oil in the compressor can run out in the pressure pipe and therefore prevent normal functionality.

Warning



Wear protective gloves to unpack, move, install, and service the unit to avoid your hands being injured, for instance by sharp edges.

Caution



Make sure to safely dispose of packing materials. They can be hazardous to children.

Note

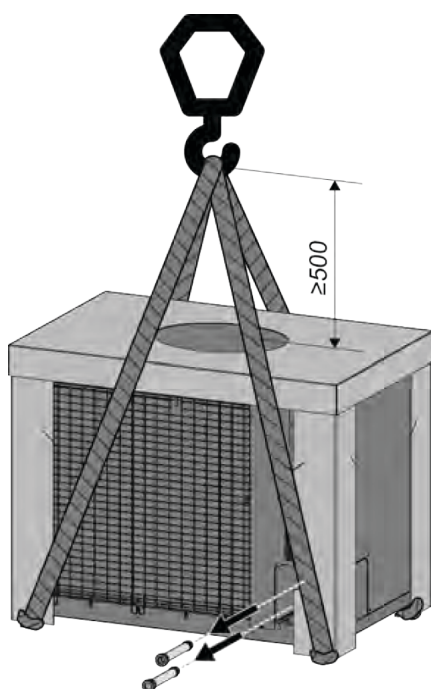


All the materials used for the manufacture and packaging of the air to water outdoor unit are recyclable.

- Do not tilt the product more than 30° when carrying it. Do not lay the product down sideways!
- Pay attention to the approximate center of gravity (3), which is off center to the left, facing the front. See images below.
- Select the moving route in advance and make sure that it is free from obstacles.
- The surface of the heat exchanger is sharp. Be careful not to get injured while moving and installing. Use protective gloves.

Moving the outdoor unit with wire rope

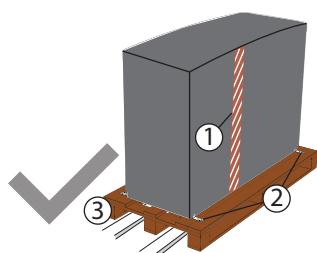
To avoid damaging the appliance during transport, leave it in its packaging.



- Carefully open the packaging at all four feet.
 - Fold the cardboard flaps up against the appliance.
 - Open the packaging around the hydraulic connection.
 - Remove the straight pipes from the hydraulic connections by releasing the retaining clips upwards.
 - Push the retaining clips back onto the connectors.
 - Remove the appliance from the pallet.
 - **WARNING:** The carrying straps are not suitable for transport by crane. Attach a sling directly to each appliance foot.
 - Position the crane hook approximately 50 cm above the appliance.
 - Attach the four slings to the crane hook.
 - Guide the straps over the front and rear of the appliance. Ensure that the straps do not press on the hydraulic connections at the rear of the appliance.
 - Lift the appliance carefully.
- The appliance hangs at a slight angle on the crane because the side with the refrigerant circuit is heavier.

Moving the outdoor unit with a forklift

Lift the outdoor unit carefully from the left side (facing the front) (3), due to the center of gravity (1). Be careful not to damage the outdoor unit.



1. Approximate center of gravity
2. Fastening screws, both front and back side
3. Correct side for forklift

5.1 Unpacking

Warning



Wear protective gloves to unpack, move, install, and service the unit to avoid your hands being injured, for instance by sharp edges.

Caution



Make sure to safely dispose of packing materials. They can be hazardous to children.

Note



All the materials used for the manufacture and packaging of the air to water outdoor unit are recyclable.

5.2 Delivery check

Caution



Inspect the product shipped and check for any transport damage. If the product is damaged, **DO NOT INSTALL**. Immediately let the carrier or retailer know (if the installer or the authorized technician has collected the material from the retailer).

6 Checklist before installing

Before installing the unit, make sure to check the following:

- The maximum water pressure of the unit is 2.5 bar static pressure.
- The unit is designed to be used in a closed-loop system. Do not use any other components which are designed only for an open-loop system.
- Never use Zn-coated parts in the radiator and fresh water circuit.
- All hydraulic parts including field piping must be insulated to prevent freezing and to reduce heat loss and condensation.
- Charging : Charge the water until a pressure of 1~1,5 bar by using make-up water assembly (Field supply). (The water pressure indicated on the manometer will vary depending on the water temperature) The nominal water pressure in the system should remain minimum 1.0 bar at all times to avoid air entering the water system.
- Air venting; Make sure that air should be vented from the system at start-up or after installing/ servicing. The air venting valve must be opened during charging the water in order to remove all air in the circuit, and a make-up water assembly allows water into the system continuously.
- Make sure that the manual air venting valve is located at the highest point of the radiator water circuit.
- Select piping diameter in relation to required water flow and available external static pressure of the circulation pumps.
- It is recommended to clean the system using chemical cleaning agents, begin with acid and finish with alkali.
- The distance between the outdoor unit and the indoor unit must be kept as short as possible in order to reduce pressure drop losses.

7 Piping installation

Caution



Piping installation must be carried out in accordance with applicable local rules and regulations. Follow applicable local and national regulations.

Caution



To prevent leaks, ensure that there are no stresses in the connecting pipes!

Caution



It is important that the heating system is vented for air after installation. Manual air ventilation valves must be installed where necessary.

Caution



If outdoor temperature falls below freezing and there is insufficient or no circulation of water in the pipes to the outdoor unit, there is a risk of freezing and potential damage to the system.

Caution



If cooling function will be used, it is very important to insulate all pipes from condensation.

Note



In addition to applicable local rules and regulations the installation should be carried out in a manner that prevents vibrations from the product being transmitted into the house causing noise.

Note



If there is any risk of groundwater infiltration at wall lead-ins for water pipes, watertight grommets must be used.

Note



Ensure that the pipe installation is carried out in accordance with the dimensions and connection diagrams.

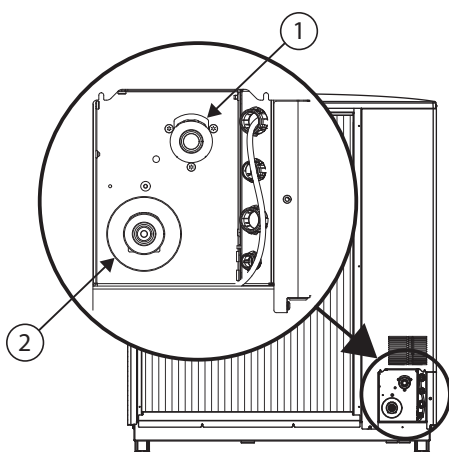
7.1 Connecting pipes

Connecting the heating system supply and return lines to the outdoor unit

Caution



Be careful not to deform the unit piping by using excessive force when connecting the piping. Deformation of the piping can cause the unit to malfunction.



1. Supply line connection, Ø28mm, G32
2. Return line connection, Ø28mm, G32

7.2 Water volume in the heating system

A sufficient water volume is required as a buffer to enable effective defrosting without causing excessive temperature drops or unstable system operation.

Make sure that a free flow is always possible in the heating circuit. Very small water volumes or stop in the heating circuit may cause operational disturbances. A recommended amount of water, shown in the table below, should be contained in an open circuit in the heating system or in a buffer tank.

If the heating system itself holds just the amount of water described in the table, a volume tank is not needed, but recommended.

Insufficient water volume may result in:

- Frequent start and stop cycles increase mechanical wear and reduce system efficiency.
- Lower efficiency due to unstable operating conditions and insufficient heat transfer.
- Increased wear from frequent cycling and inadequate operating conditions may shorten compressor life span.

Warning



In order to avoid operational disturbances of the outdoor unit, a minimum amount of water must be contained in the heating system.

Note



Cascade installations must include buffer tank sufficient to meet the minimum water volume requirements in the table.

Single installation	Elve L	Elve XL
1 outdoor unit	54 L	76 L
Cascade	Elve L	Elve XL
2 outdoor units	108 L	152 L
3 outdoor units	162 L	228 L
4 outdoor units	216 L	304 L

7.2.1 Flow rate data

Flow rate requirement	Unit	Elve L	Elve XL
Minimum flow rate, heating	l/min	7	9
Minimum flow rate, defrosting	l/min	12	15
Minimum flow rate, cooling	l/min	12	15
kVS value	m³/h	3,53	3,83

7.3 Piping insulation

The complete water circuit, including all piping, must be insulated to prevent condensation during cooling operation and reduction of the heating and cooling capacity as well as prevention of freezing of the outdoor water piping during winter time.

Freezing protection insulation

The recommended insulation thickness is twice the inner diameter of the pipe to prevent freezing in outdoor water piping.

Condense protection insulation

If the temperature is higher than 30°C and the humidity is higher than relative humidity 80%. The recommended insulation thickness should be at least 20 mm in order to avoid condensation on the surface of the sealing

7.4 Integrated automatic air vent valve and safety valve

Integrated automatic air vent valve is factory-fitted in the open position. The heating system is ventilated automatically. The air vent valve must not and cannot be closed.

Note



Attach the supplied instruction label to the outdoor unit about restriction of having additional automatic air vent valve and safety valve in the system. (The label is included in the document set delivered with the outdoor unit.)

Caution

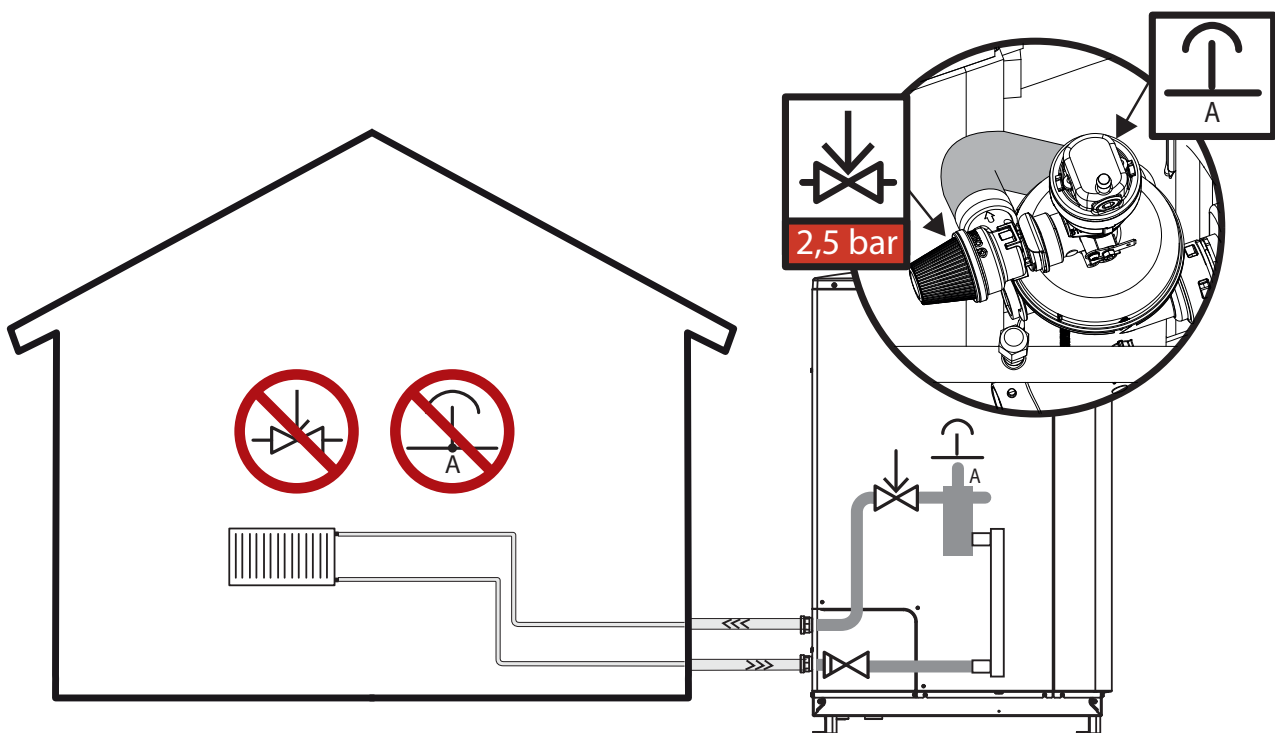


Make sure no safety valves are installed in the indoor system! Since the outdoor unit uses a flammable refrigerant no safety valves should be fitted in the indoor system. If a connection leak would occur the safety valve in the outdoor unit should evacuate the gas outdoors.

Caution



Make sure no automatic air vents are installed in the indoor system! Since the outdoor unit uses a flammable refrigerant no automatic air vent should be fitted in the indoor system. If a connection leak would occur the automatic air vent in the outdoor unit should evacuate the gas outdoors.

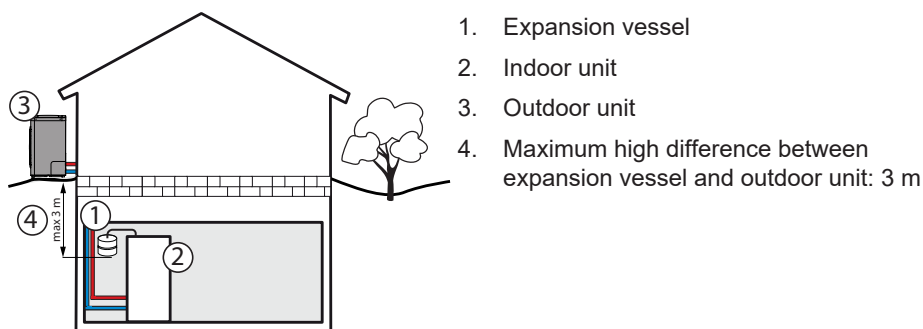


7.4.1 Maximum expansion vessel volume

- Maximum expansion vessel volume: **50 L**
- Minimum system pressure: **1,0 bar**

7.4.2 Maximum height difference between expansion vessel and outdoor unit

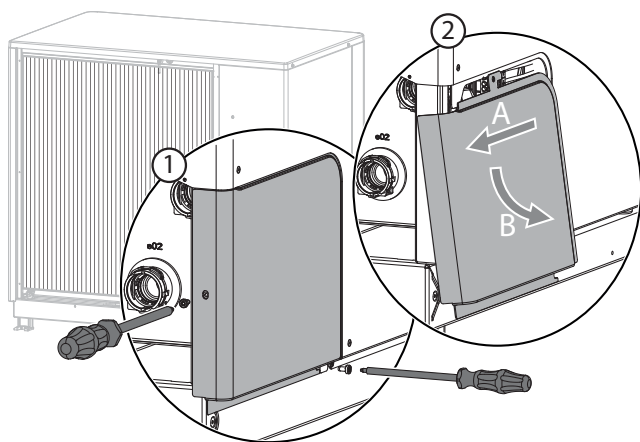
If the expansion vessel is positioned in a vertically lower position than the outdoor unit, the vertical distance between the expansion vessel and the outdoor unit must not exceed 3 meters. Greater height differences increase the pressure in the expansion vessel. This may lead to excessive compression of the expansion volume before the safety valve in the outdoor unit opens, which in case of a connection leak may result in the gas volume exceeding the allowable limits.



8 Electrical Installation

8.1 Power supply

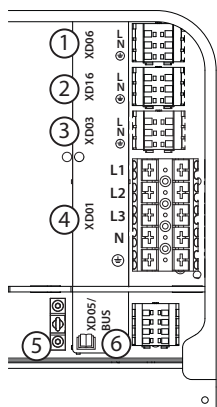
Access to the terminal area:



Outdoor terminal connections

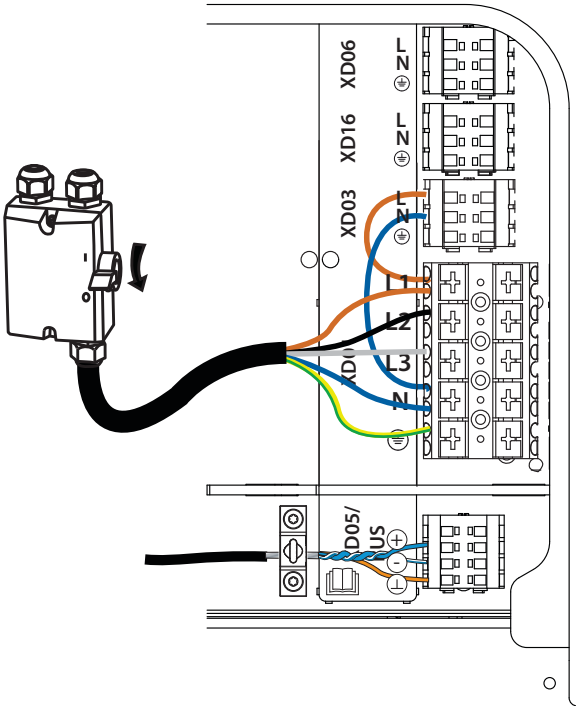
Inputs for the outdoor unit according to the picture and table below:

XD05/ BUS	XD01	X D03	XD16	XD06

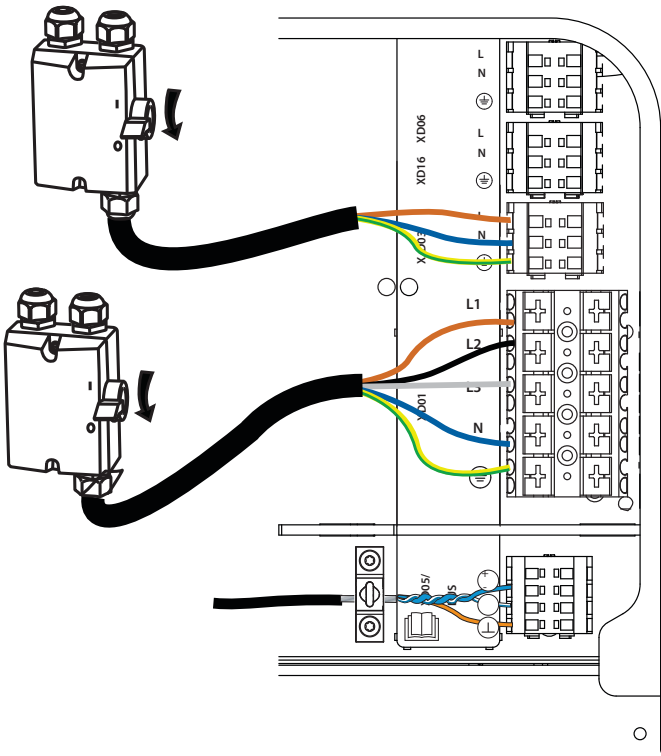


1. **XD06** Pipe trace heating cable. L, N, PE
2. **XD16** Defrost pan heater. L, N, PE
3. **XD03** Control voltage. L, N, PE
4. **XD01** Compressor L1, L2, L3, N, PE
5. Earth terminal for shielding the BUS cable **Note:** BUS cable must be UV-resistant twisted pair, shielded cable, minimum: 0,75mm², 4 wire, maximum length 30 m
6. BUS

8.1.1 Connection with one electrical mains supply



8.1.2 Connection with two electrical mains supply



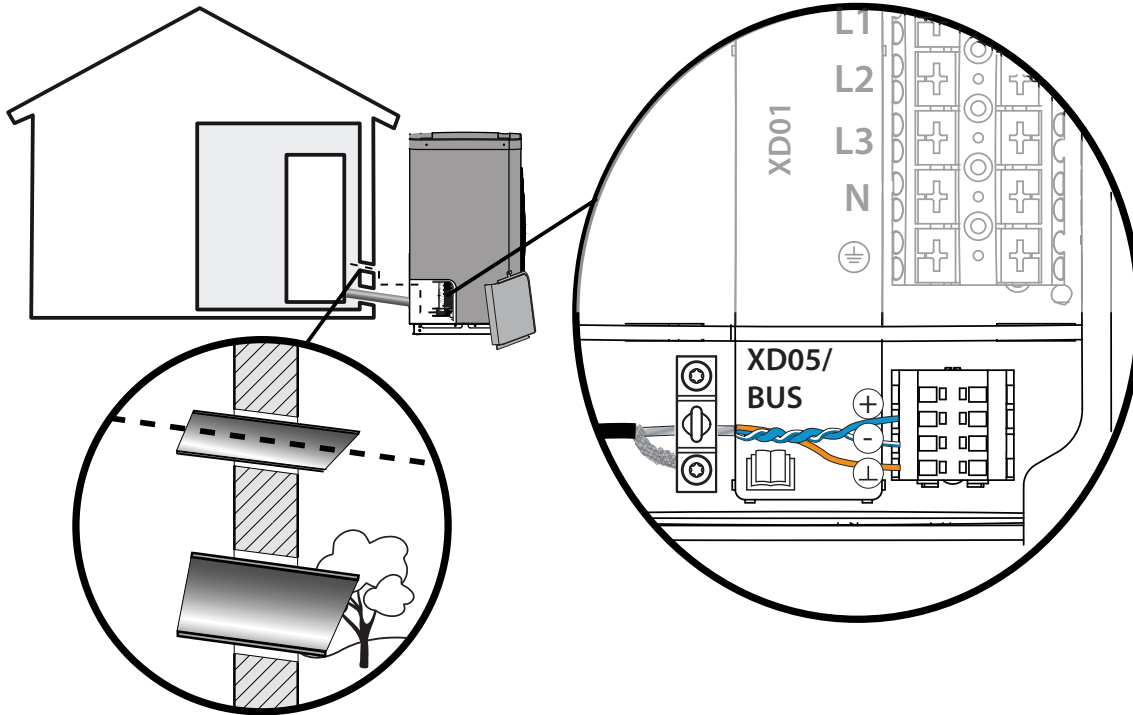
Remove jumpers!

8.1.3 Fuse table

Recommended minimum fuse sizes (recommended characteristic is C).

	Unit	Elve L	Elve XL
Compressor fuse protection	A	3 x10	3 x 16

8.2 Communication BUS



Note! BUS cable must be UV-resistant twisted pair, shielded cable, minimum: 0,75mm², 4 wire and maximum length 30m.

9 In the event of preparing for cascade installation

9.1 Access the DIP switch

DIP switch positions has to be set manually in the outdoor unit. To access the switch, remove covers according to following steps.

To reach the switches on some models, having something to stand on may be helpful.

Warning

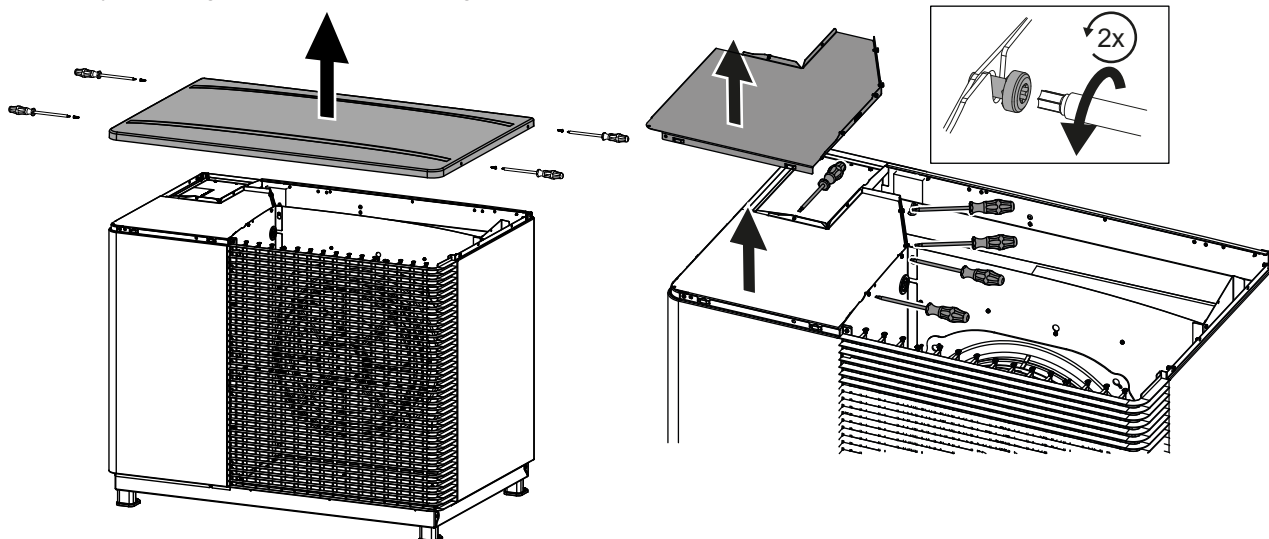


If you work on the appliance while it is still live, you are at risk of electrocution. Following disconnection from the power supply, parts of the appliance may remain energized for 5 minutes until the inverter capacitors have discharged.

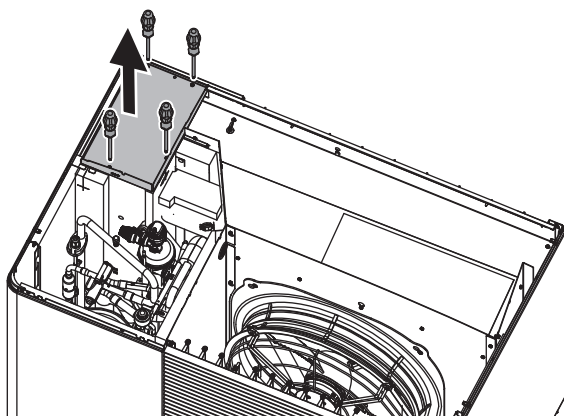
Before working on the appliance, isolate it from the power supply.

The location and access to the card may vary depending on the model. The image below is an example, but the card is generally located in the same place on all models.

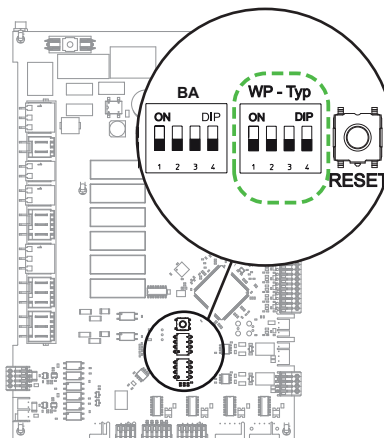
1. Start by removing the top cover according to the picture.
2. Loosen the screws for the cover.



3. Loosen the screws to the card cover.

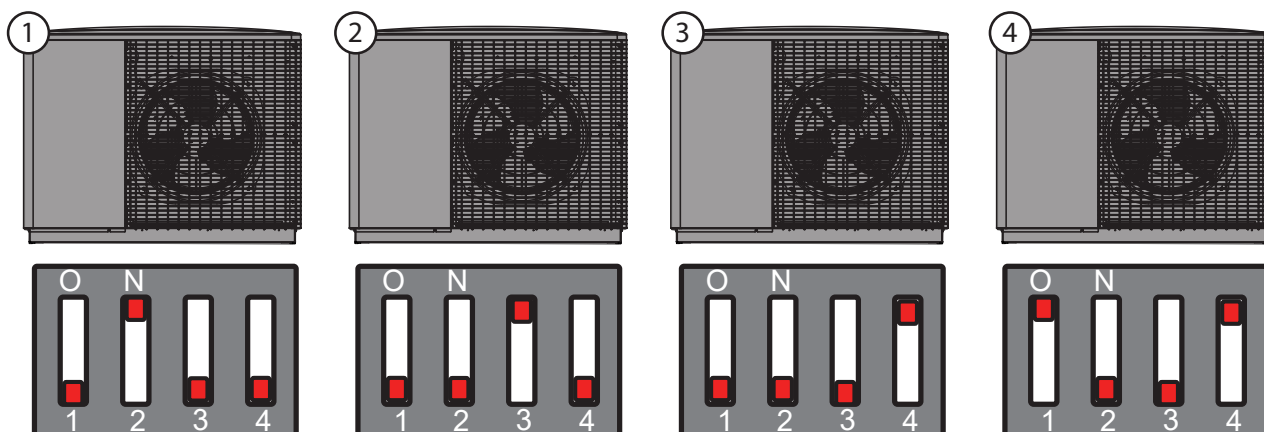


4. Location of DIP switch on the card



9.2 Cascade DIP switch settings

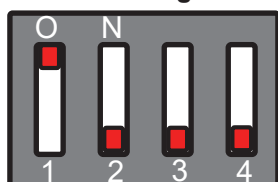
Up to four units can be installed in cascade installation. Make the individual setting for each unit as described below.



Switch	Unit 1	Unit 2	unit 3	unit 4
1	-	-	-	x
2	x	-	-	-
3	-	x	-	-
4	-	-	x	x

Once the individual settings are made, the covers are reassembled onto the unit.

Default setting from factory:



10 Checking the installation

10.1 Checking the electrical installation

Before turning on electrical power, check the electrical installation according to the checklist below:

Electrical checklist

- | | |
|--------------------------|--|
| ☐ | Main circuit breaker is installed. (Not included in the delivery.) |
| ☐ | Correct fuses (see table) are installed. |
| ☐ | Outdoor sensor are correctly positioned. |
| ☐ | Communication cable between outdoor unit and indoor unit are correctly connected, including the shielded connection. |

Note



Communication cable must be UV-resistant twisted pair data/telephone shielded, 0.75mm², 4 wire, maximum length of 30m.

10.2 Checking the piping installation

Before filling the heating system, check the piping installation according to the checklist below:

Piping checklist

- | | |
|--------------------------|--|
| ☐ | The pipe connections are in accordance with the connection diagram. |
| ☐ | Flexible hoses are installed on the outdoor unit supply and return lines. |
| ☐ | All applicable pipework are sufficiently insulated to prevent condensation in cooling operating or risk of freezing outdoor water piping during winter . |

Before commissioning the unit, make sure to also check the following:

- Do not operate the system with closed valves because it results in damaging the outdoor unit.

Note



If the water volume in the heating system is insufficient, alarms may occur and system functions or performance may be degraded.



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