Installation, use and operation manual

Pro-C CRAH

D-EIMAH03604-25_00

› UTA Floor Standing

Translation of the original instructions

REV	01
DATE	May 2026
REPLACES	00

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1 Important warnings

The pictogram shows a situation of immediate danger or a dangerous situation that might cause injuries or death.

The pictogram shows that it is necessary to adopt suitable behaviour in order to avoid jeopardising staff safety and cause damages to the equipment.

The pictogram shows particularly important technical information that should be taken into consideration by the people installing or using the equipment.

Purpose of the manual

The purpose of this **manual** is to guide the installer and qualified operator in the installation, maintenance and proper and safe use of the equipment. For this reason, **it is mandatory for all personnel involved in installation, maintenance and supervision of the unit to read this manual.**
Contact the Manufacturer if any points are unclear or difficult to understand.

This manual contains information regarding:
- technical specifications of the unit;
- instructions for transport, handling, installation and assembly;
- use;
- information for instructing personnel authorised for its use;
- maintenance.

All the information provided generally refers to any unit of the Pro-C CRAH range. All units are shipped together with a **technical drawing**, indicating the specific weight and size of the unit received. It must be considered an integral part of this manual, and therefore it must be kept with the utmost care in all its parts.

If the manual or drawing is lost, it is important to request a copy from the Manufacturer, specifying the unit's serial number that can be found on the label on the unit itself.

In the case of divergent information between this manual and the drawing, the drawing will prevail.

Intended use of the unit

This appliance has the function of treating the air intended to condition IT technical environments.
Any other use is not in accordance with the intended use and therefore dangerous.

This range of units is designed to be used in NON-explosive environments.

This range of units is designed for installation inside buildings.

If the unit is used in critical situations, by type of system or environmental context, the customer must identify and adopt the technical and operational measures to avoid damage of any kind.

Safety regulations

SKILLS REQUIRED FOR THE INSTALLATION OF THE UNIT

Installers must perform operations according to their professional qualifications: all activities not within one's expertise (i.e., electrical connections) must be carried out by specialised and qualified staff so as not to endanger one's safety and the safety of the other operators interacting with the unit.

Equipment transport and handling operator: authorised person with recognised expertise in using transport and lifting equipment.

Technical installer: expert technician, sent or authorised by the manufacturer or its representative, with adequate skills and training to install the unit.
Assistant: technician subject to care obligations while lifting and assembling the equipment. He must be suitably trained and informed about the operations to perform and the safety plans of the site/installation location.

In this manual, the technician competent to carry out each operation is specified.

SKILLS REQUIRED FOR THE USE AND MAINTENANCE OF THE UNIT

Generic operator: AUTHORISED to run the unit using commands placed on the keypad of the electrical panel. Performs only unit control operations, power on/off.
Maintenance mechanic (qualified): AUTHORISED to carry out maintenance, adjustments, replacement and repair of mechanical parts. It must be a person competent in mechanical systems, therefore able to perform mechanical maintenance in a satisfactory and safe manner, must possess theoretical preparation and manual experience. NOT AUTHORISED to work on electrical systems.
Manufacturer's technician (qualified): AUTHORISED to perform complicated operations in every situation. Operates in accordance with the user.

Maintenance electrician (qualified): AUTHORISED to perform service of an electric nature, adjustments, maintenance and electrical repairs. AUTHORISED to operate in the presence of an active electrical connection inside the electrical panels and junction boxes. It must be a person competent in electronics and electrical engineering, therefore able to work on electrical systems satisfactorily and safely, must possess theoretical knowledge and proven experience. NOT AUTHORISED to work on mechanical systems.

Installers, users and maintenance technicians CANNOT work on the unit if they:

- are without experience and responsibility or minors;
- are in inadequate psycho-physical conditions;
- do not master the operating cycle of the unit;
- have not attended theoretical/practical training alongside an expert unit operator or user, or alongside a Manufacturer's technician.

In this manual, the technician competent to carry out each operation is specified.

Read this manual carefully before unit installation and maintenance and keep it for any further future consultation by the various operators. Do not remove, tear out or rewrite any part of this manual.

Failure to follow these instructions may cause damage and injuries, even fatal, voids the warranty and relieves the Manufacturer of all liability.

All installation, assembly, electrical connections to the mains and ordinary/extraordinary maintenance must be performed **only by technicians complying with the legal requirements**, after turning off the unit and using personal protective equipment (i.e., gloves, protective goggles, etc.), in compliance with the regulations in force in the country the equipment is to be used in and the laws on safety in the workplace.

Installation, use or maintenance other than those specified in the manual may cause damage, injury or death, invalidate the warranty and relieve the Manufacturer of all liability.

Use protective clothing and suitable equipment while handling or installing the equipment, in order to prevent accidents and safeguard your own and other people's safety. Individuals not assigned to installation or maintenance are NOT allowed to stand or pass through the work area while the unit is assembled.

Before carrying out any installation or maintenance, disconnect the equipment from the power supply and wait at least 240 seconds before carrying out any operation.

Before installing the equipment, check that the systems are in compliance with the regulations in force in the country of use and as indicated on the serial number plate.

It is the responsibility of the user/installer to check the static and dynamic stability relative to the installation and to arrange environments so that **people who are not competent or authorised DO NOT have access to the unit or to its commands**.

It is the responsibility of the user/installer to make sure that **weather conditions** do not affect the safety of persons and property during installation, use and maintenance.

Make sure the air intake is not located near any drains, flue-gases or other contaminating elements.

Do NOT install the equipment in places exposed to strong winds, salt air or open flames.

After installation is complete, instruct the user on the correct use of the unit.
If the equipment does not work or functional or structural alterations are noted, disconnect it from the power supply and contact a service centre authorised by the Manufacturer or Retailer, without attempting to repair it on your own. For any replacements request the use of original spare parts.
Unauthorised actions, tampering or modifications that do not follow the information provided in this manual can cause damage, injuries or fatal accidents and void the warranty.
The serial number plate on the unit provides important technical information, essential in case of unit maintenance or repairs. We recommend that you do not remove, damage or modify it.

In order to ensure correct and safe conditions of use, we recommend you have the unit maintained and checked at least annually by a service centre authorised by the Manufacturer or Dealer.

Maximum acceptable humidity for installation: 5 to 95% RH non-condensing.

Residual risks

Despite having implemented and adopted all the safety measures indicated by applicable regulations, some residual risks remain. In particular, in some operations of replacement, adjustment and tooling maximum attention is always required in order to work in the best possible conditions.

LIST OF OPERATIONS WITH RESIDUAL RISKS

Risks for qualified personnel (electricians and mechanics):

- handling - during unloading and handling it is necessary to pay attention to all the steps listed in this manual regarding the points of reference;
- installation - during installation it is necessary to pay attention to all the steps listed in this manual regarding the points of reference. Moreover, the installer must ensure the static and dynamic stability of the unit's site of installation;
- maintenance - during maintenance it is necessary to pay attention to all the steps listed in this manual, and in particular to high temperatures that may be present in the heat transfer fluid lines to/from the unit;
- cleaning - the unit must be cleaned only when it is switched off, by turning off the switch installed by the electrician and the switch located on the unit itself. The key for interrupting the power supply must be kept by the operator until the end of the cleaning operations. Internal cleaning of the unit must be carried out using the protections required by current regulations. While the inside of the unit does not contain particular hazards, it is necessary to pay the utmost attention so that accidents do not occur during cleaning. The heat exchange coils that have a potentially sharp finned pack must be cleaned using suitable protective goggles and gloves. During adjustment, maintenance and cleaning there are residual risks of variable entity. Being operations that must be performed with guards disabled, it is necessary to pay particular attention in order to avoid damage to persons and things.

Always pay close attention when performing the operations specified above. Remember that these operations must always be performed by authorised personnel.

All work must be completed in accordance with the legal provisions relating to work safety. Remember that the unit in question is an integral part of a larger system that includes other components, depending on the final characteristics of realisation and the mode of use. Therefore, in the end it is the responsibility of the user and assembler to assess the residual risks and their respective preventive measures.

SAFETY DEVICES

The unit is equipped with safety devices to prevent risks of damage to persons and for proper operation. Always pay attention to the symbols and safety devices on the unit. It should **only** operate with the safety devices engaged and with fixed or movable guards installed correctly and in the proper position.

If during installation, use or maintenance the safety devices have been temporarily removed or disabled, the unit can be operated **exclusively** by the qualified technician who made this change. It is **mandatory** to prevent other people's access to the unit. When finished, restore the devices to their proper status as soon as possible.

2 Unit characteristics

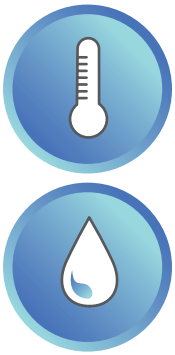
Unit description

Pro-C is a Computer Room Air Handling (CRAH) unit, that is an advanced air-cooling terminal specifically designed for thermo-hygrometric management in mission critical facilities.

The unit consists of two main parts: the fan section and the water-coil section. The two sections are stacked, with their relative order depending on the chosen configuration.

Only for the compact version the unit is developed in a single section. The unit's casing consists of a pre-painted metal framework and insulated paneling. Other main components include the air filters, the control valve and the electrical panel.

Environmental conditions



Pro-C CRAH units are designed for indoor floor installation.
The unit cannot operate in environments containing explosive material and with a high concentration of dust.

Operating environment temperature	from -5 °C to 46 °C
Ambient temperature with the machine off (e.g. storing, handling, etc.)	from -40 °C to 60 °C

Environmental contamination

Depending on the installation operating environment, specific regulations must be followed and all the necessary precautions must be taken to avoid environmental issues (a system that operates in a hospital or chemical environment can have problems different from those in other sectors, even from the point of view of disposal of consumable parts, filters, etc.).
It is mandatory for the buyer to inform and train workers regarding proper procedures.

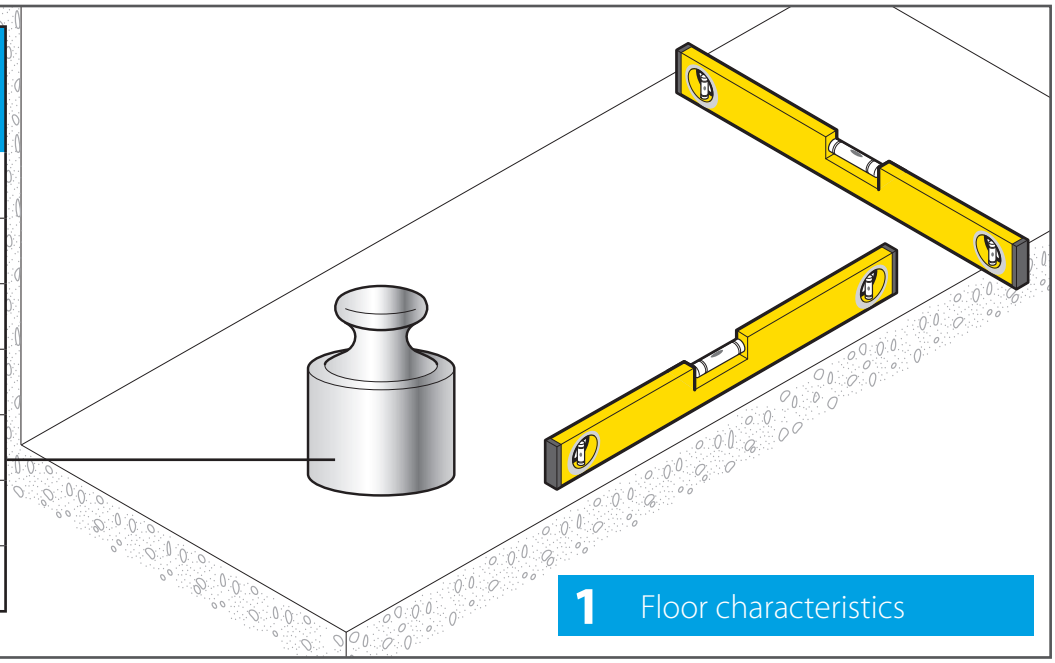
Noise

The units have been designed and manufactured in such a way as to produce sound emissions below the threshold of **80 dB(A)**. It should be noted that every environment has its own acoustic characteristics that can greatly affect the pressure values perceived during operation, therefore it is necessary to consider the noise level data provided as a point of reference, while it is up to the buyer to carry out the specific phonometric surveys on the installation site and in the real conditions the unit will be used.

Floor characteristics

The **floor** where you plan to position the unit **must** be:
- perfectly flat and without any roughness;
- vibration resistant;
- able to **support the weight of the equipment considering an appropriate safety margin** (see the following technical data table).

Size	Total weight [kg]
10	470
15	590
20	880
25	1050
30	1270
35	1420
40	1660

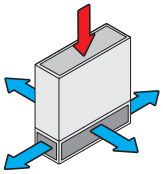
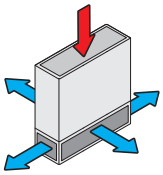
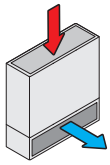
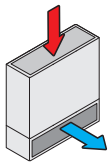
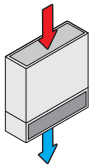
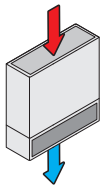
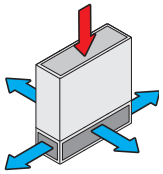
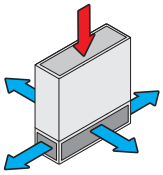
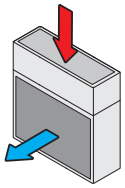
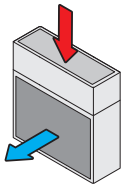


1 Floor characteristics

Technical data

Dimensions table					
Size	Fan number	Width [mm]	Depth [mm]	Height coil section [mm]	Height fan section [mm]
10	1	890	890	1975	675
15	1	1340	890	1975	675
20	2	1740	890	1975	675
25	2	2190	890	1975	675
30	3	2590	890	1975	675
35	3	3040	890	1975	675
40	4	3440	890	1975	675

Weight Table				
Size	Gross weight with packaging [kg]	Device weight [kg]	Filter weight [kg]	Fan weight [kg]
10	536	470	7,5	49,2
15	671	590	15	49,2
20	979	880	22,5	98,4
25	1173	1050	30	98,4
30	1405	1270	37,5	147,6
35	1573	1420	37,5	147,6
40	1828	1660	45	196,8

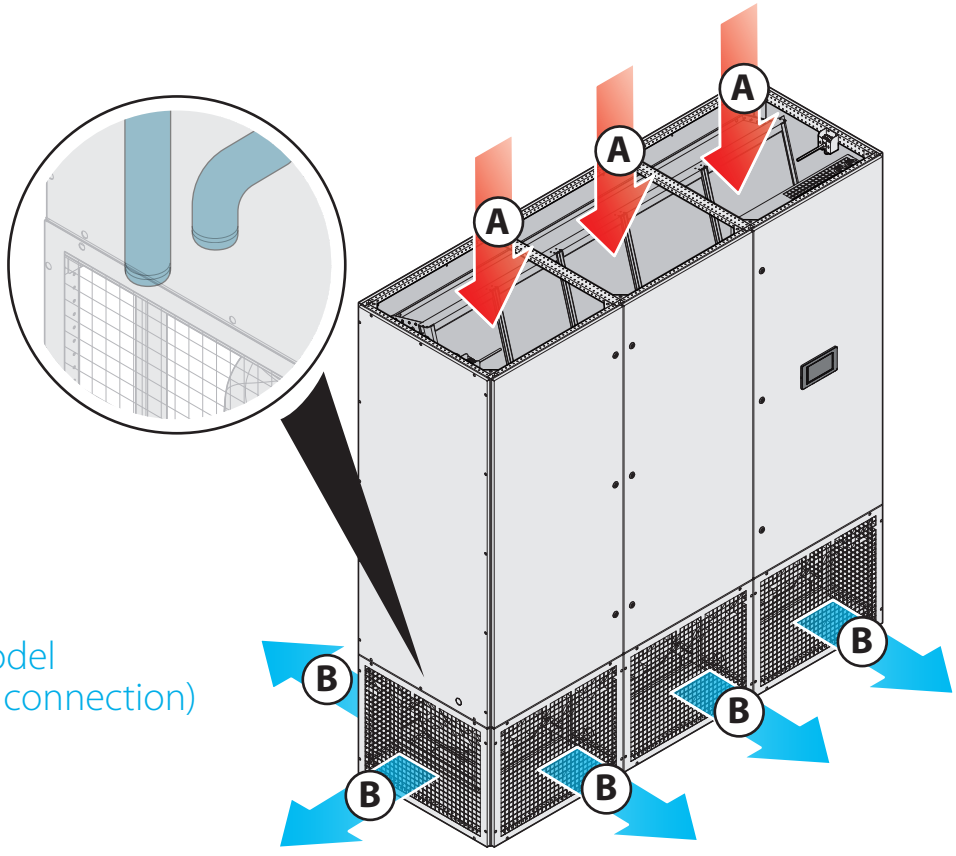
Configurations						
Code	Configuration	Design	Fan position	Image	Outlet surface conf	Connections position
ACx-xx-E-xxxx	Raised floor	Split	Bottom		Front + Lat	Right
ACx-xx-D-xxxx	Raised floor	Split	Bottom		Front + Lat	Left
ACx-xx-F-xxxx	Hard floor	Split	Bottom		Front	Right
ACx-xx-G-xxxx	Hard floor	Split	Bottom		Front	Left
ACx-xx-L-xxxx	Raised floor	Split	Bottom		Front + Lat + Rear	Right
ACx-xx-K-xxxx	Raised floor	Split	Bottom		Front + Lat + Rear	Left
ACx-xx-M-xxxx	Raised floor	Split	Bottom		Front + Lat + Rear	Right
ACx-xx-N-xxxx	Raised floor	Split	Bottom		Front + Lat + Rear	Left
ACx-xx-T-xxxx	Hard floor	Split	Top		Displacement	Right
ACx-xx-U-xxxx	Hard floor	Split	Top		Displacement	Left

Performance table						
Size	Airflow [mc/h]	NSCC [kW]	P absorbed [kW]	EER [kW/kW]	Power supply [V / ph / Hz]	FLA [A]
10	9300	30,3	1,6	19,6	400 / 3 / 50	5,8
15	12500	40,8	2,1	19,9	400 / 3 / 50	5,8
20	21000	68,5	3,5	19,9	400 / 3 / 50	11,6
25	24000	72,3	3,8	19,3	400 / 3 / 50	11,6
30	32500	106,0	5,2	20,6	400 / 3 / 50	17,4
35	36500	119,0	6,1	19,7	400 / 3 / 50	17,4
40	45000	146,8	7,2	20,5	400 / 3 / 50	23,2

Performance calculated at the following conditions:

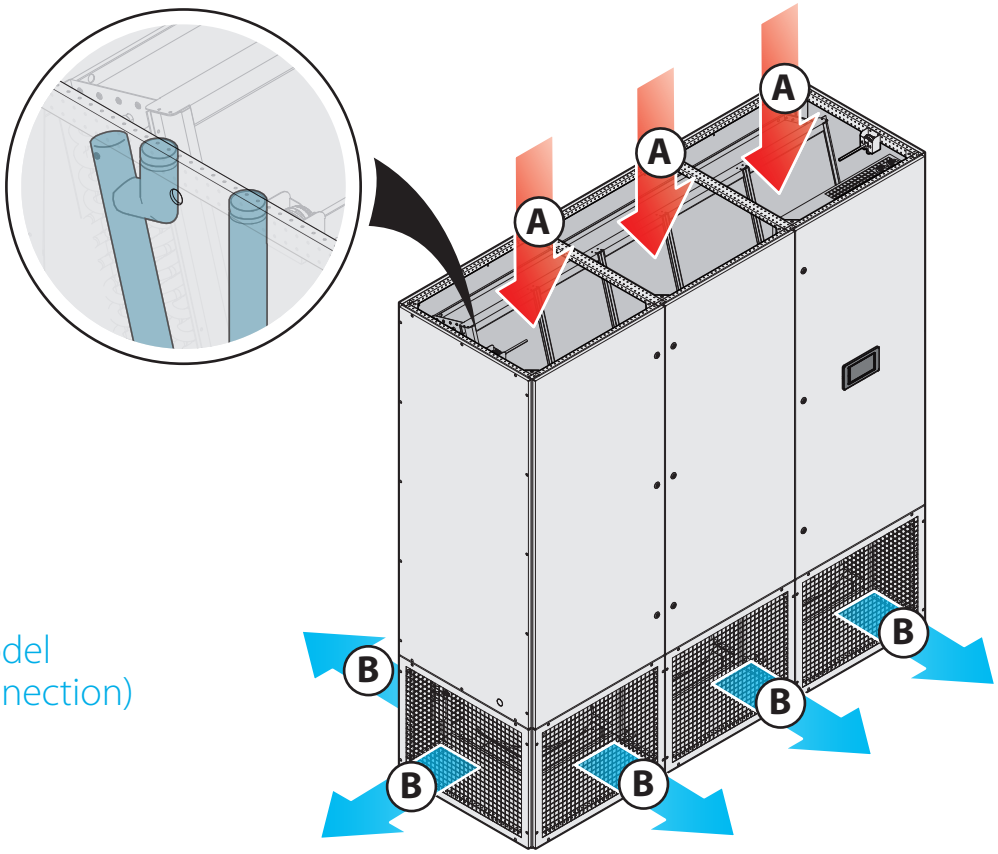
- ACB-F configuration
- Fluid water 0% glycol
- Water inlet/outlet temperatures 20/28 °C
- Air return/supply temperatures 35/25 °C
- Air return relative humidity 30%
- Site altitude 0 m slm
- ESP 20 Pa
- Air filter Iso Coarse 60% (G4)
- Pressure indiependent energy valve

2 Unit description and air flows



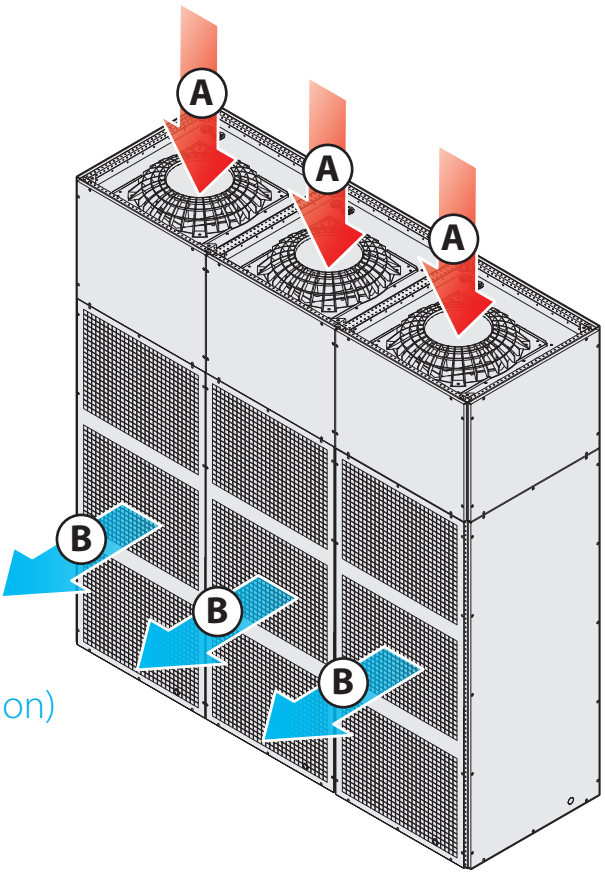
Bottom fan model
(Bottom water connection)

A Return air
B Supply air



Bottom fan model (Top water connection)

A Return air
B Supply air



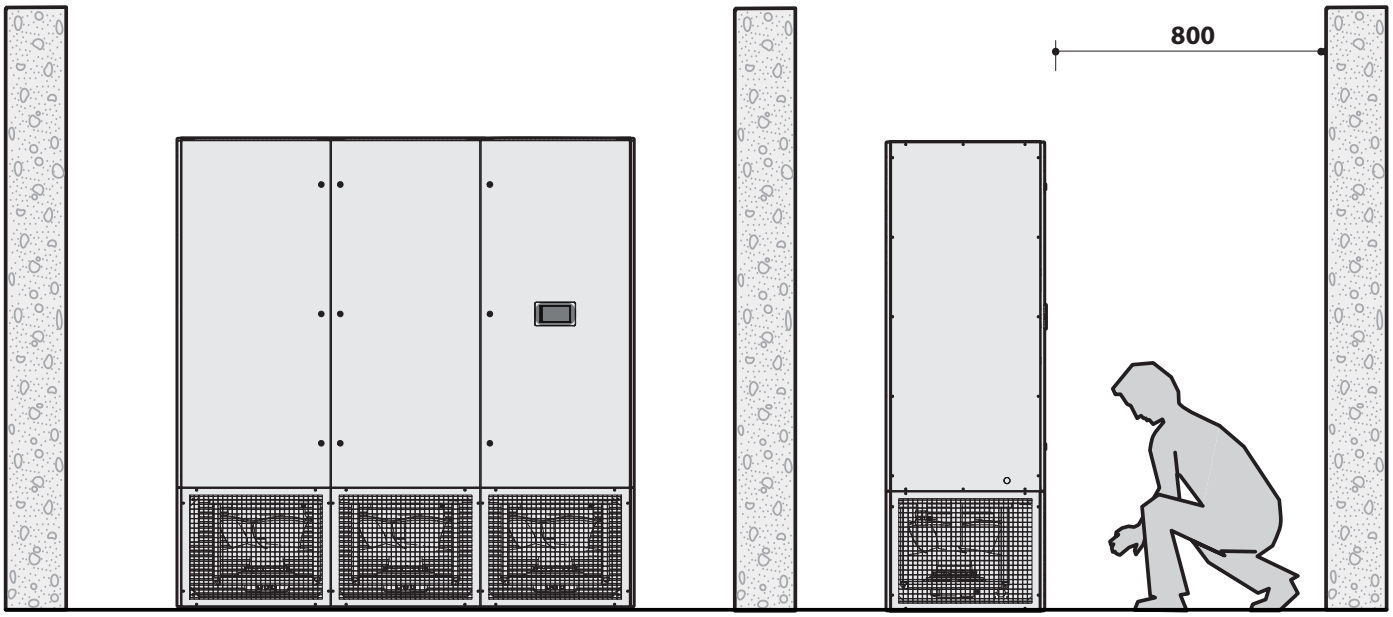
Top fan model (Top water connection)

A Return air
B Supply air

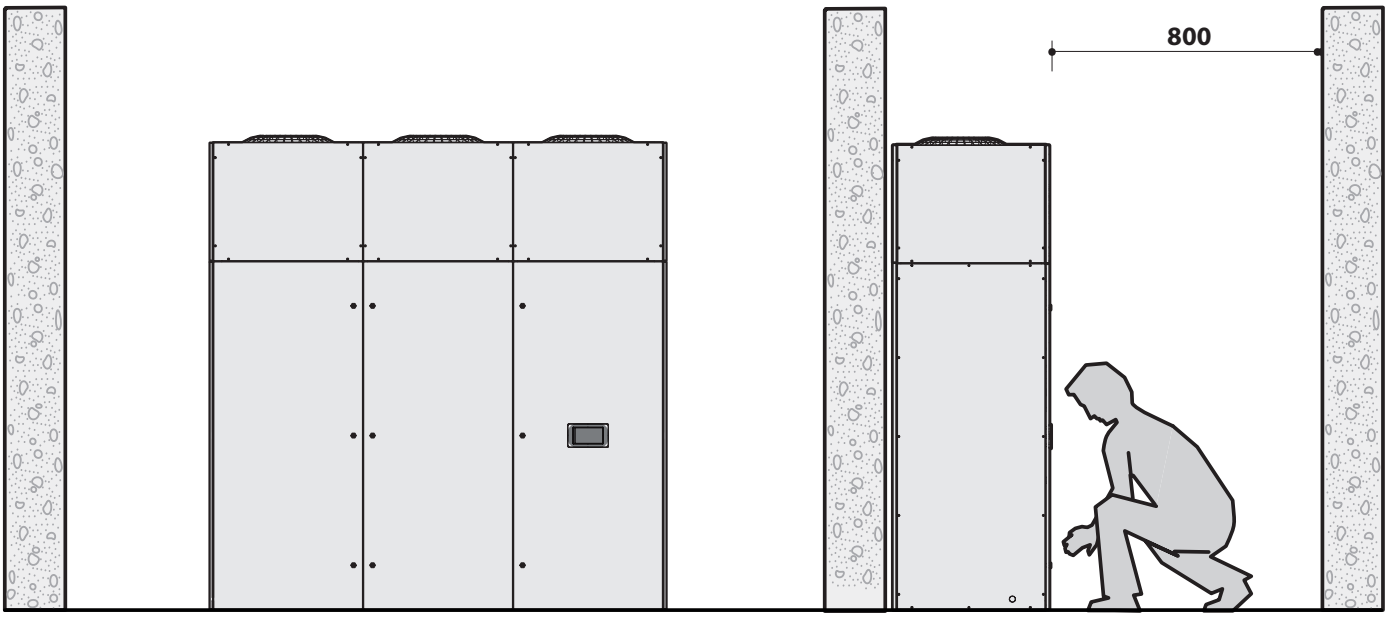
Footprint and clearance measurements

Make sure to leave 800 mm in front of the unit for servicing.

Bottom fan model



Top fan model

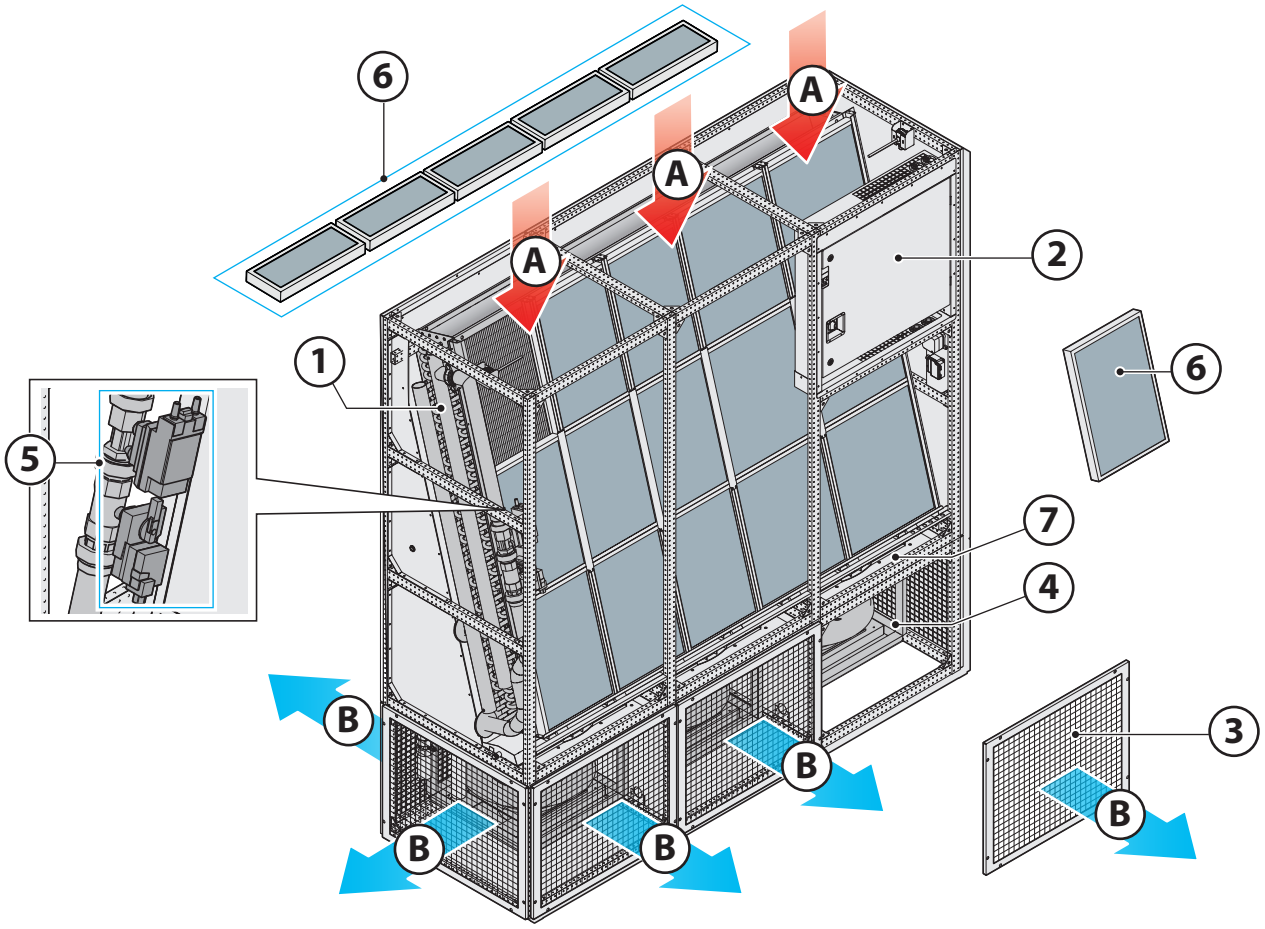


Summary of unit operation

LEGEND

1. Water coil
2. Electrical panel
3. Outflow grid
4. EC fan
5. PICV valve
6. Synthetic air filter
7. Drain Pan

Bottom fan model



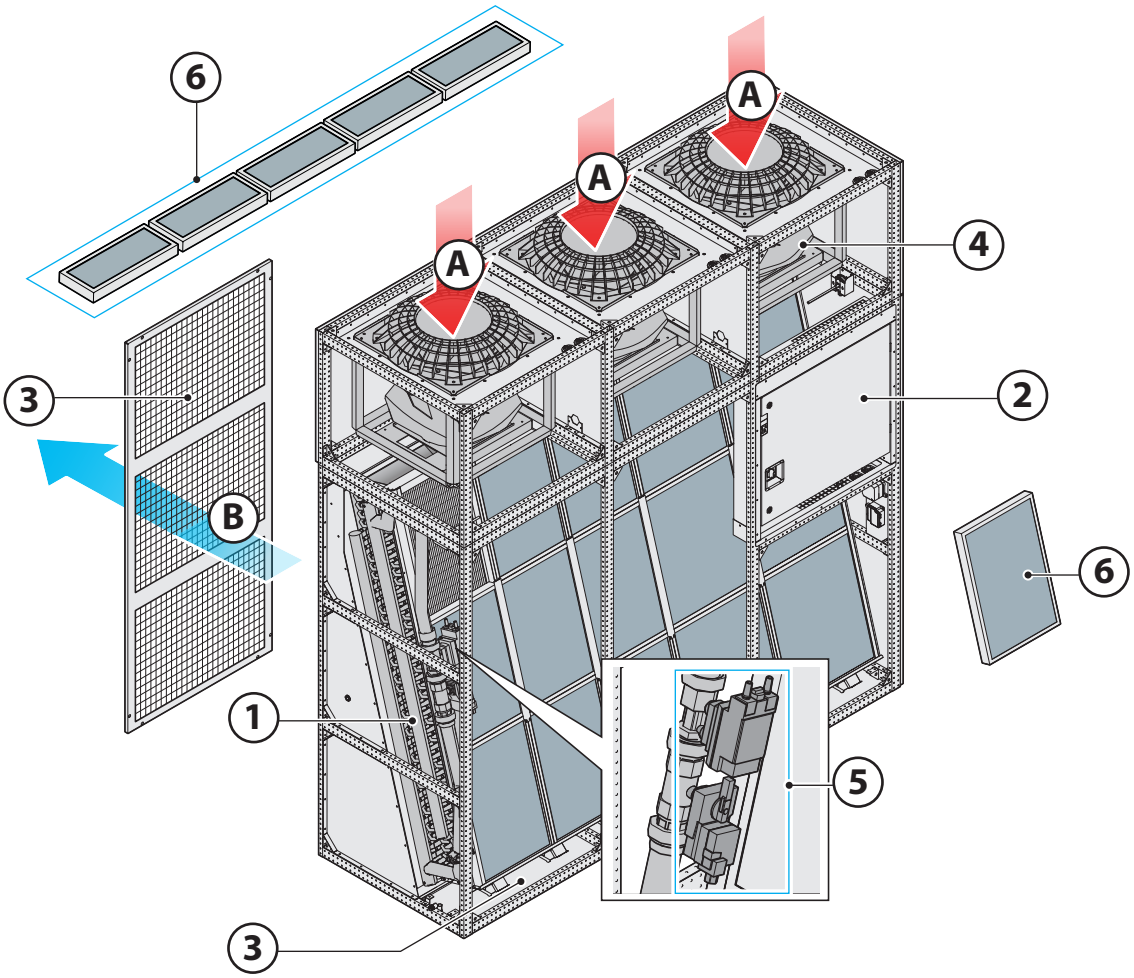
A Return air
B Supply air

POS.	COMPONENT NAME	CONSTRUCTION MATERIAL
4	EC fan	Steel frame, composite impeller
6	Synthetic air filter	Galvanised steel frame, fibreglass filter unit

LEGEND

1. Water coil
2. Electrical panel
3. Outflow grid
4. EC fan
5. PICV valve
6. Synthetic air filter

Top fan model



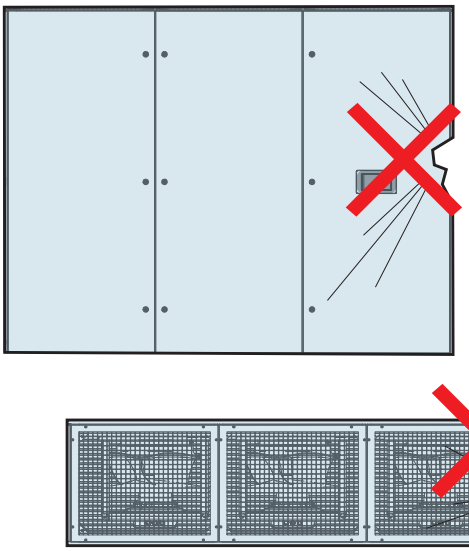
A Return air
B Supply air

POS.	COMPONENT NAME	CONSTRUCTION MATERIAL
4	EC fan	Steel frame, composite impeller
6	Synthetic air filter	Galvanised steel frame, fibreglass filter unit

3 Receipt of the packages

Handle the equipment following the Manufacturer's instructions on the packaging and in this manual.
Always use personal protective equipment.

The means and method of transport must be chosen by the transport operator according to the type, weight and size of the unit. If necessary, draw up a "safety plan" to guarantee the safety of the people directly involved.



Upon receipt of the unit check the integrity of the packaging and the amount of packages sent:

A) there is visible damage/missing packages: **do not** proceed with the installation, but **immediately** notify the manufacturer and the carrier who made the delivery.
Alternatively you can accept the shipment "subject to verification": this will make it possible to open the cartons and check if the internal components are indeed damaged. In the latter case, as noted previously, **promptly** notify the Manufacturer and the carrier that made the delivery.
Before opening the packages, it is recommended to take good quality pictures to document the damage.

B) There is NO visible damage: move the unit to the site of installation.

4 Transport

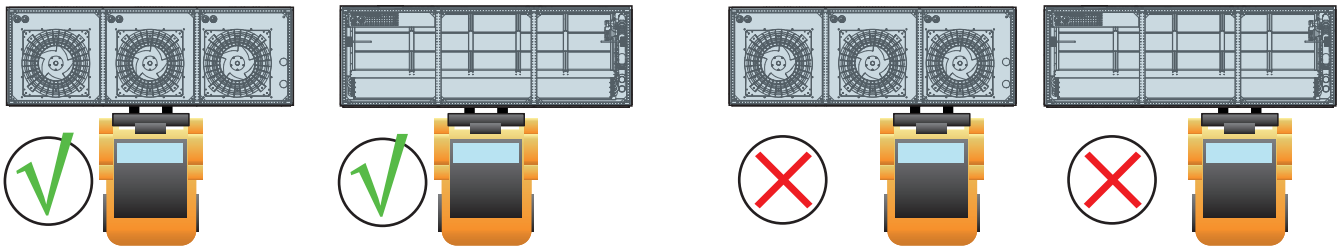
The unit is divided into two sections: FAN and COIL. Each section is supplied on a separate pallet.

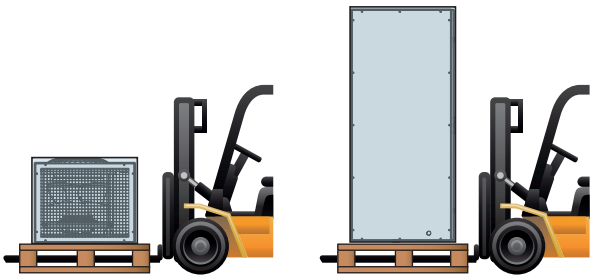
The packages must be transported with a transpallet or a forklift, suitable for the weight and size of the package. The choice of the most appropriate means and way remains the responsibility of the transport operator.

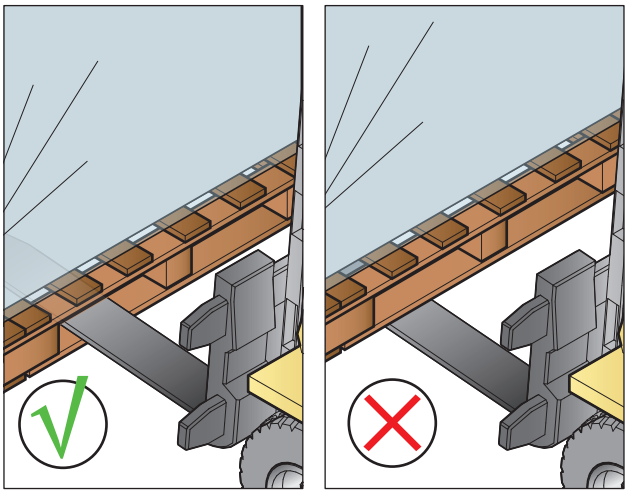
The figure **7** on the next page shows the correct forking direction of the unit according to the size and sections; always make sure to keep the centre of gravity of the load balanced.

The operating area must be perfectly free from objects or people not involved in the transport.

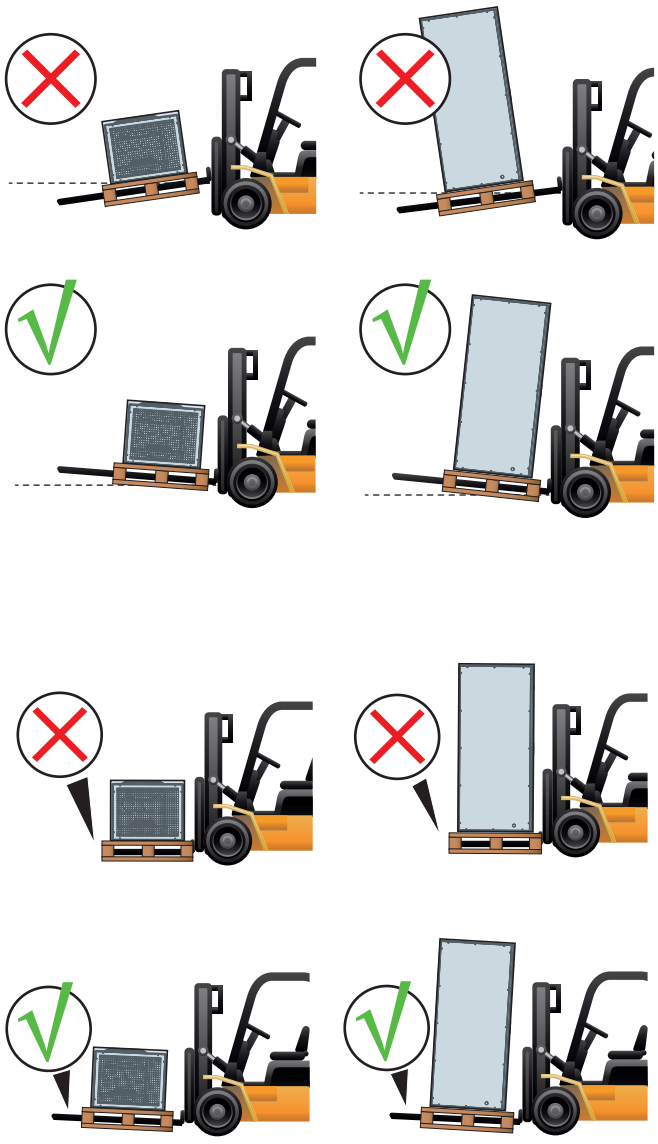
Transport the equipment carefully, in perfect psycho-physical shape, avoiding sudden manoeuvres and equipped with personal protective equipment (gloves, safety shoes, etc.).







Lift the unit by inserting the forks into the holes provided in the support base



3 Correct transport of the unit

5 Unpacking and verification of integrity

We recommend the equipment be unpacked after moving it to its installation location and only when it is to be installed. This operation must be performed using personal protection equipment (i.e., gloves, safety shoes, etc.).

Do not leave the packing unattended: it is potentially harmful to children and animals (suffocation hazard).

Some packing materials must be kept for future use (wooden crates, pallets, etc.), while those that cannot be reused (i.e., polystyrene, strapping, etc.) must be disposed of in compliance with the regulations in force in the country of installation: this will protect the environment!

After unpacking

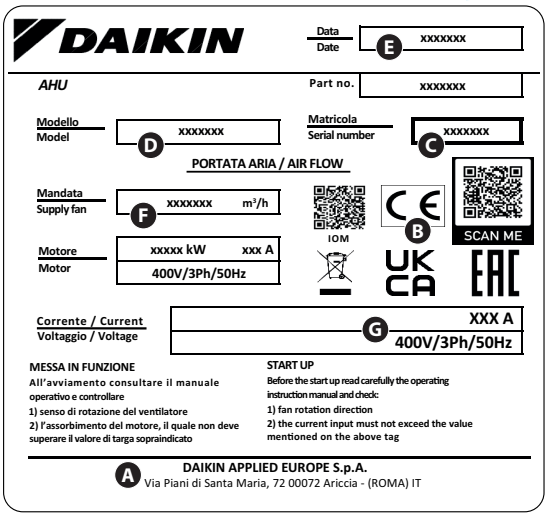
After unpacking, check the received contents:

- **Installation and operation manual (IOM)**
- **Wiring diagram**
- **Declaration of conformity**

Check therefore that you have received all the components and that they are undamaged.
In case of damaged or missing parts:

- **do not move, install or repair** damaged components and the unit in general.
- **take quality photos** to document the damage.
- **find the serial number plate** on the unit and note the unit's serial number.
- **immediately** notify the carrier that delivered the unit.
- **promptly** contact the Manufacturer (keep available the serial number of your unit).

Please note that complaints or claims of damage reported after 10 days of receipt of the unit cannot be accepted.



A: Manufacturer's name and data
DAIKIN APPLIED EUROPE S.P.A.
Via Piani di Santa Maria, 72 - 00072 Ariccia (Roma) - Italy
Tel: (+39) 06 93 73 11 - Fax: (+39) 06 93 74 014
B: CE marking
C: Unit serial number
D: Model
E: Date of manufacture
F: Supply air flow rate
G: Electrical specifications (frequency, number of phases, absorption in plate conditions)

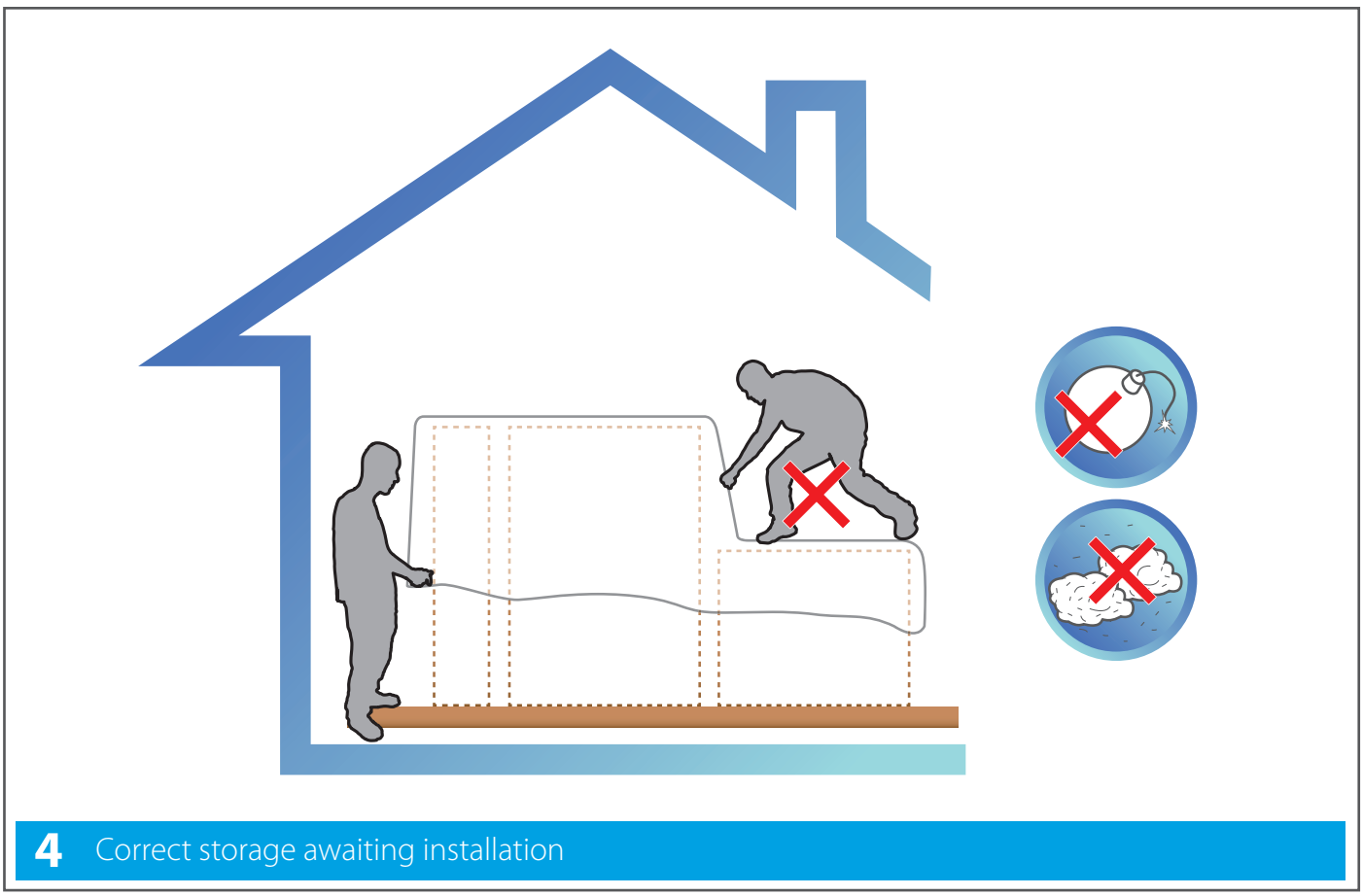
Storage waiting for installation

4 Waiting for the installation, the components of the unit and the relative documents must be stored in an area that:

- is dedicated exclusively to the storage of the units.
- is protected from the weather (preferably prepare a closed area), with adequate temperature and humidity.
- is accessible only to operators tasked with the assembly.
- can support the weight of the equipment (check the load rating) and has a stable floor.
- is free from other components, especially if they are potentially explosive/incendiary/toxic.

If you cannot proceed with the installation straight away:

- check periodically that the above-mentioned conditions about the storage area are guaranteed.
- cover the unit with a sheet.
- always provide an insulating base (e.g., wood blocks) between the floor and the unit itself.



4 Correct storage awaiting installation

Any movement carried out after unpacking must be done with the doors closed. Do not move the units by pulling on the doors, if present, the uprights or other protruding parts that are not an integral part of the structure.

Do not step on the units!

6 Installation

All installation, assembly, electrical connections to the power supply and extraordinary maintenance must be performed **only by qualified personnel authorised by the Retailer or Manufacturer**, in compliance with the regulations in force in the country the equipment is to be used and the standards on the systems and safety in the workplace.

During installation, the area must be free from people and objects not used for the assembly.

Before starting, make sure you have all the necessary equipment.
Use only equipment that is in good condition and undamaged.

Maximum installation altitude: The altitude of the installation room must be less than 1,000 meters above sea level (at higher altitudes the electric motors deliver powers lower than the nominal ones)

Installation procedure

Before installation, read the safety instructions on the first pages of this manual. Contact the Manufacturer if any points are unclear or not perfectly understandable. A check mark next to each step will help to confirm complete and proper installation.

- ☐ **PHASE 0: TRANSPORT OF THE UNITS TO THE PLACE OF INSTALLATION**
- ☐ **PHASE 1: UNIT ASSEMBLY**
- ☐ **PHASE 2: CHECKING THE UNIT AND THE ARRANGEMENTS**
- ☐ **PHASE 3: ELECTRICAL CONNECTIONS**
- ☐ **PHASE 4: COIL CONNECTION**
- ☐ **PHASE 5: EXTERNAL PIPE CONNECTIONS**
- ☐ **PHASE 6: ENERGY VALVE TEMPERATURE SENSOR CONNECTION**
- ☐ **PHASE 7: CONNECTION TO A DRAIN**
- ☐ **PHASE 8: COMMISSIONING ACTIVITIES**

After installation store this manual and the assembly sheet that accompanied the unit in a place that is dry and clean. This way it will be accessible to operators in the future who need to consult it.
Do not remove, tear out or write on any part of this manual, besides the spaces set out for notes:

PHASE 0: TRANSPORT OF THE UNITS TO THE PLACE OF INSTALLATION

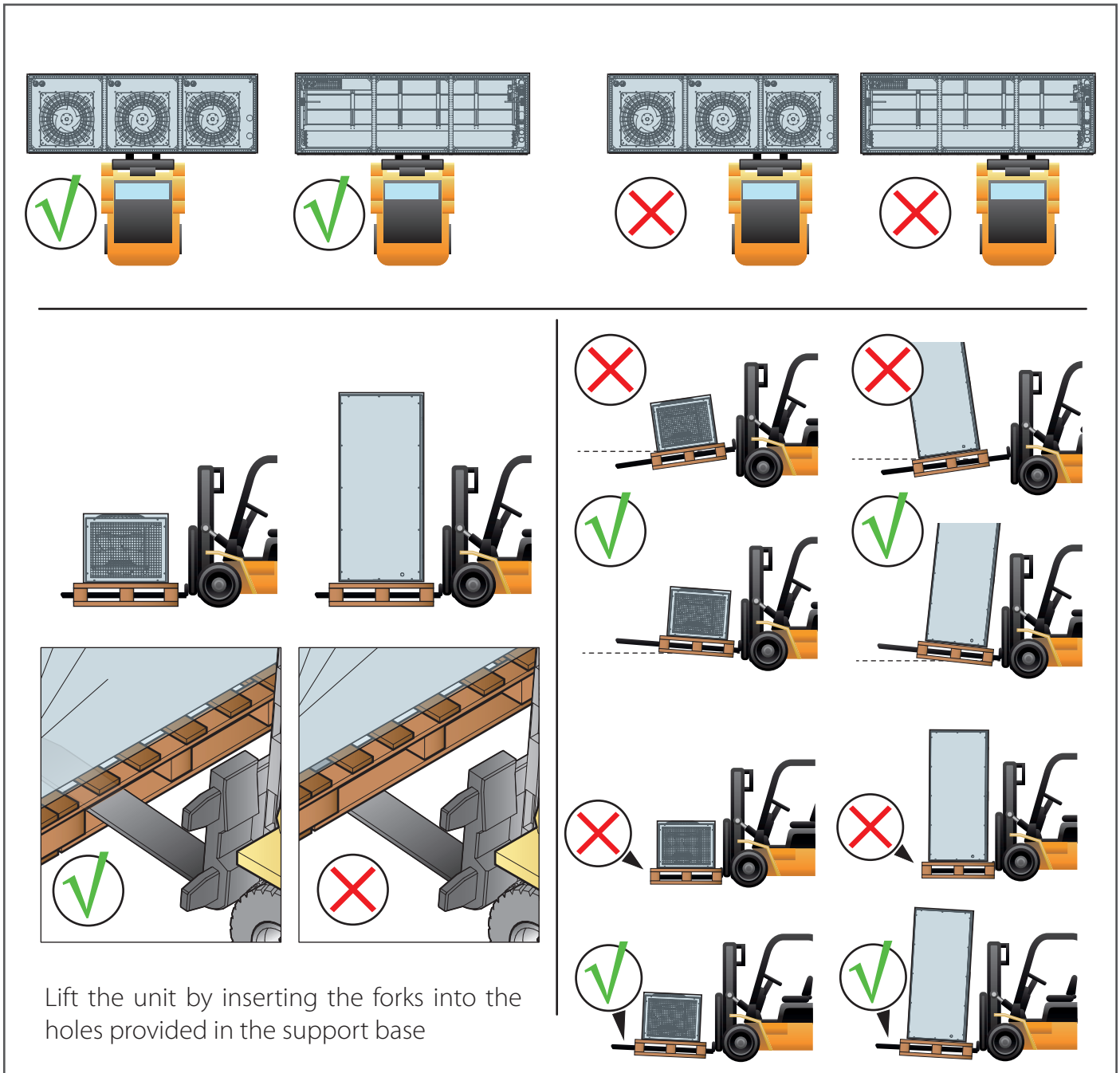
Transport the units until they reach the place intended for installation.

The units must be transported with a transpallet or a forklift, suitable for the weight and size of the package. The choice of the most appropriate means and way remains the responsibility of the transport operator.

The figure **5** below shows the correct forking direction of the unit according to the size and the sections; always make sure to keep the centre of gravity of the load balanced.

The operating area must be perfectly free from objects or people not involved in the transport.

Transport the equipment carefully, avoiding sudden manoeuvres and equipped with personal protective equipment (gloves, safety shoes, etc.).



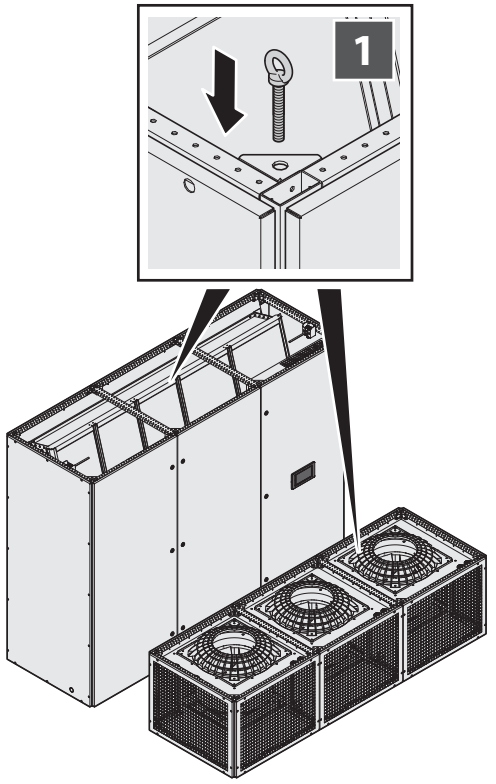
Lift the unit by inserting the forks into the holes provided in the support base

5 Correct transport of the unit

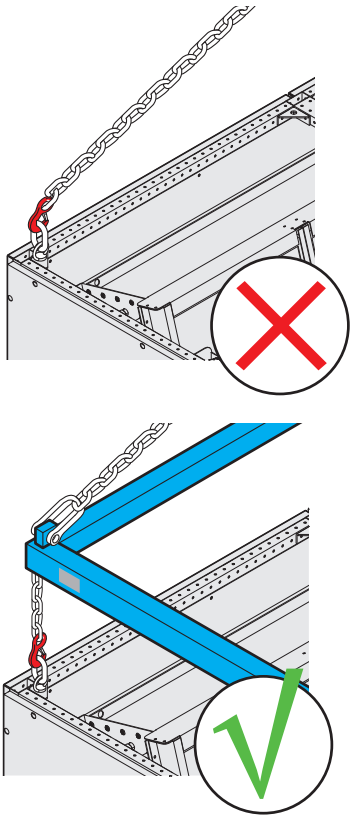
PHASE 1: UNIT ASSEMBLY

1 **2** Attach the eyebolts to the corners of the two sections following the procedure shown in the images.

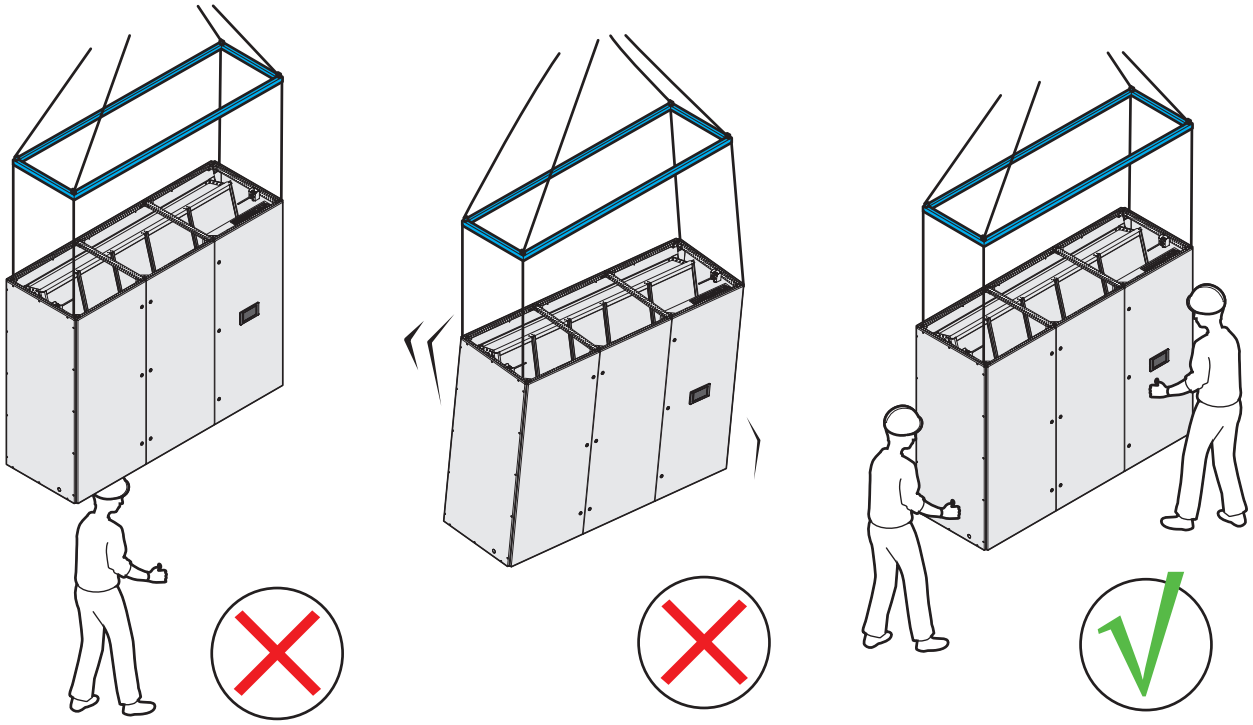
After step **3** the procedures vary depending on the model of the unit. Once the section has been moved to the base of the unit, remove the eyebolts, place the upper section on top of the lower section and fasten them together.



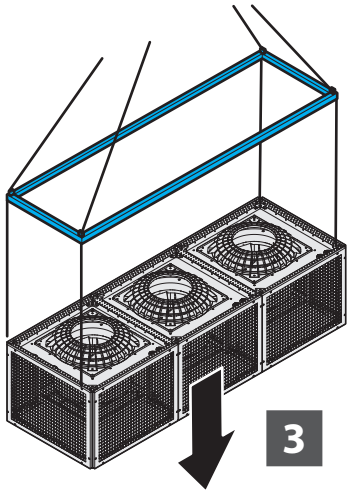
2

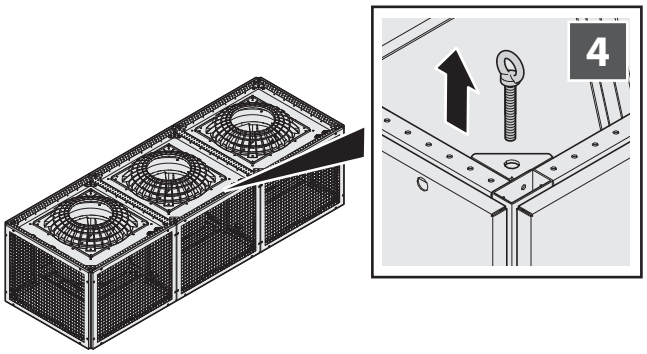


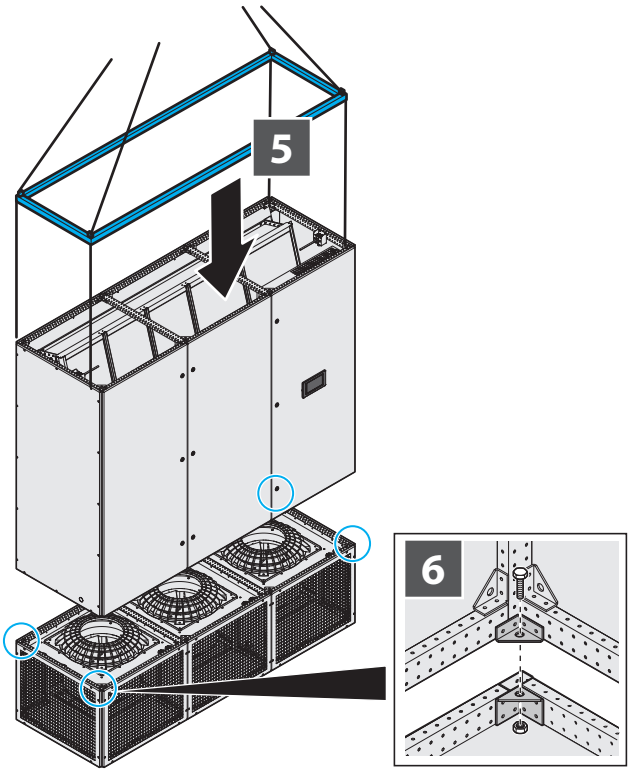
6 Correct transport of the unit sections



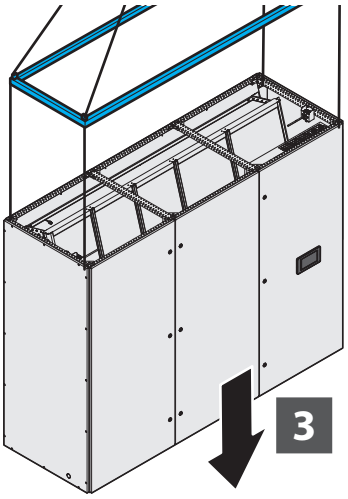
Bottom fan

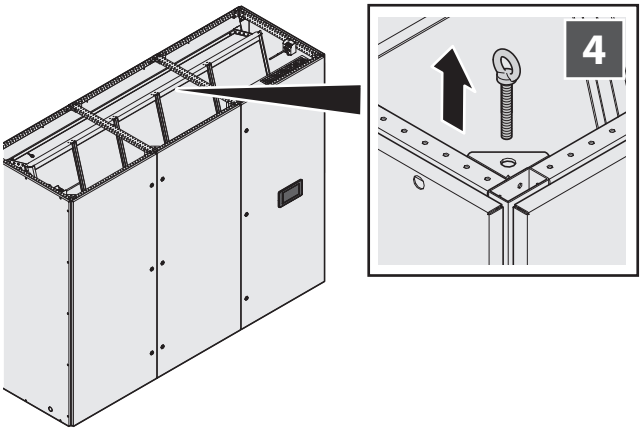


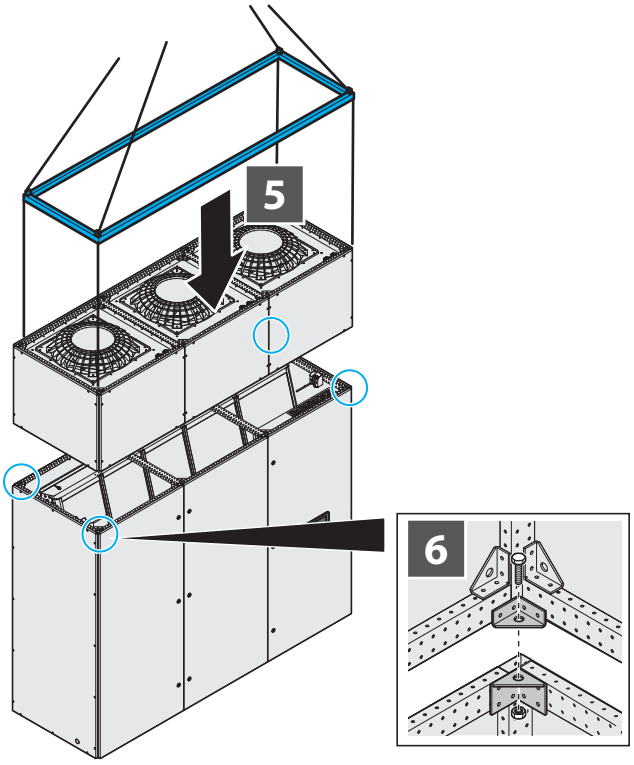




Top fan







7 Correct stacking of the two sections of the unit

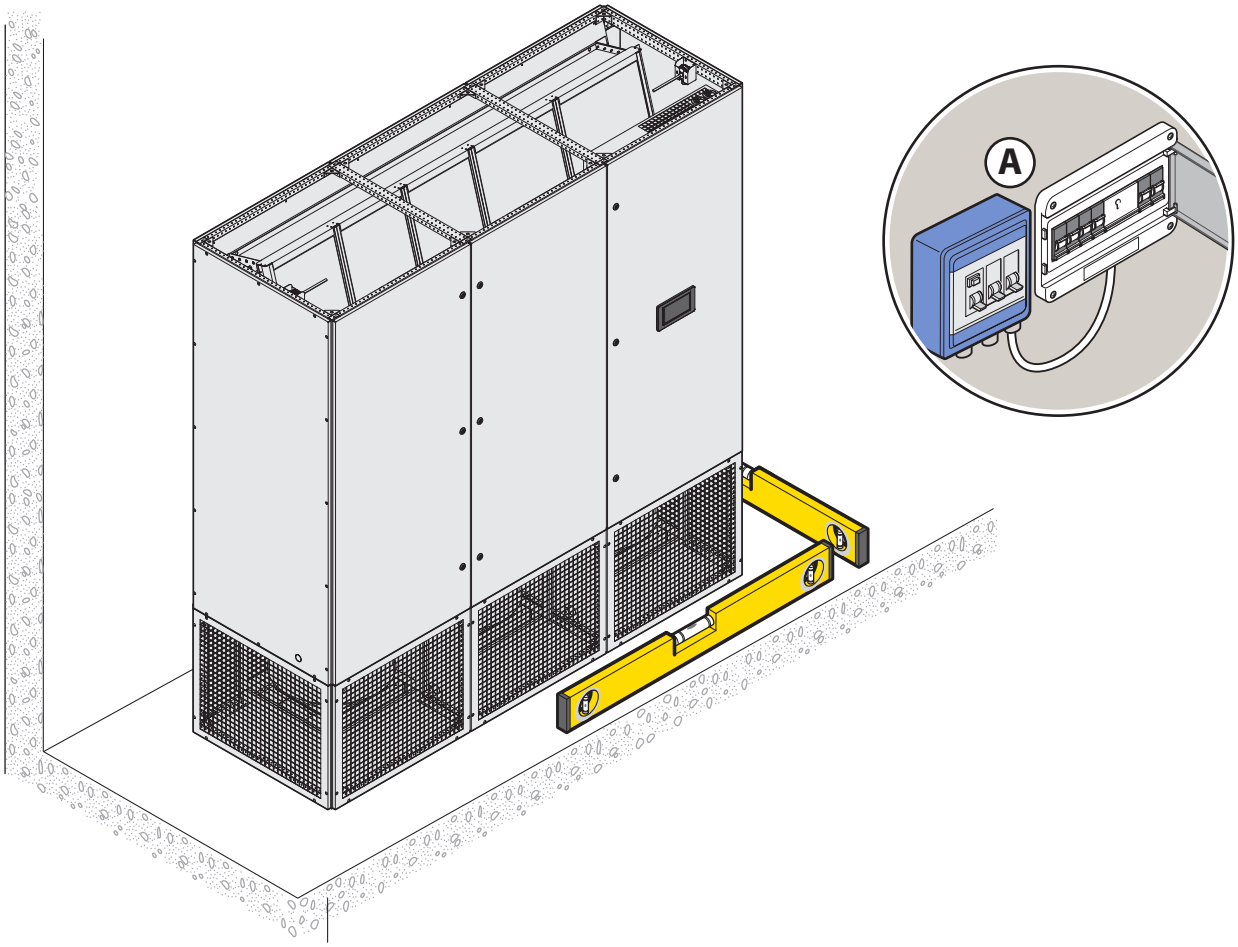
PHASE 2: CHECKING THE UNIT AND THE ARRANGEMENTS

8 Check that the following have been planned at the installation site:

- (A) an **electrical system** compliant with current regulations and with specifications that meet the needs of the unit;
- (B) Drainage system that the unit's drain must be connected to (operation to be performed by the installer)
- (C) an **aeraulic system** with ducts for conveying air into the rooms.
- (D) chilled water inlet
- (E) chilled water outlet

Check that the **floor** of the place chosen for installation is:

- perfectly **flat and without any roughness**,
- vibration **resistant**,
- **able to support the weight of the equipment** considering an appropriate safety margin (see technical data table on page 8).

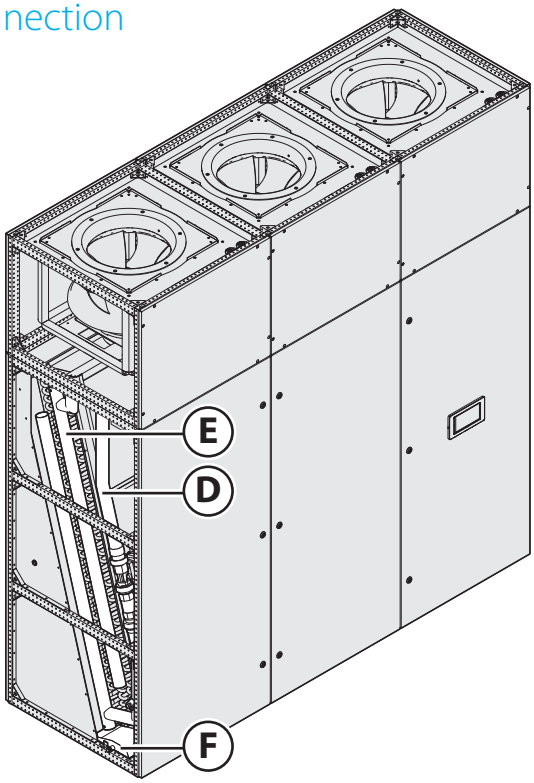


8 System preparation

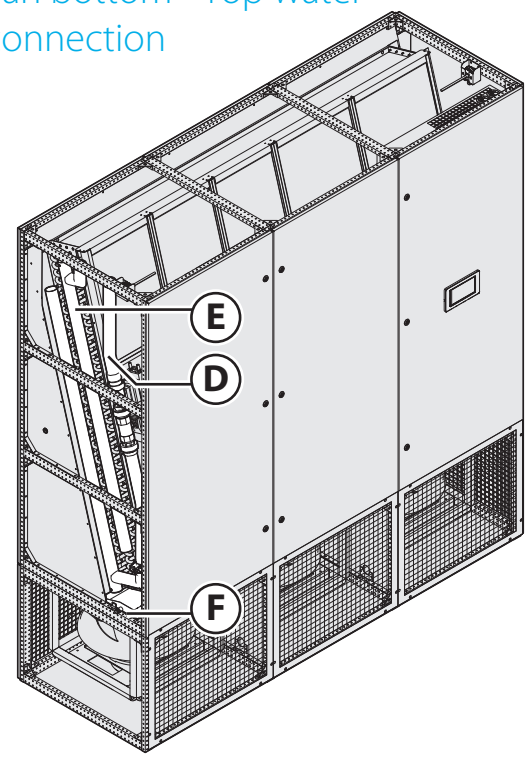
PIPEWORK INSTRUCTIONS

- (D) chilled water inlet
- (E) chilled water outlet
- (F) drain

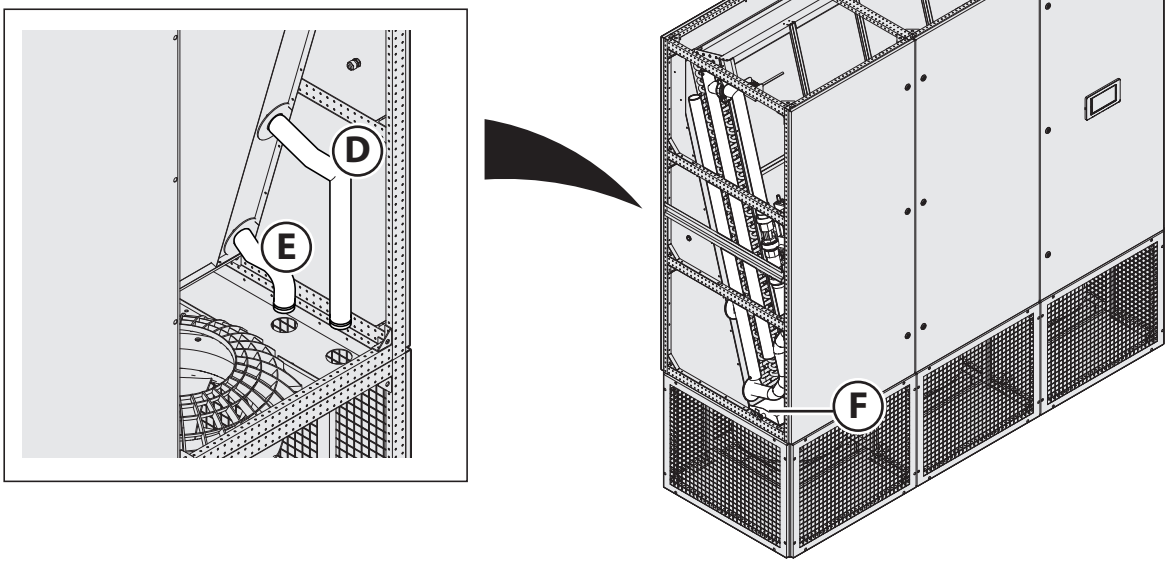
Fan Top - Top Water connection



Fan bottom - Top water connection



Fan bottom - Bottom water connection



PHASE 3: ELECTRICAL CONNECTIONS

SAFETY WARNINGS

For the **power supply** it is necessary to connect the unit to an electrical panel in compliance with current regulations.

The Manufacturer is not responsible for connections made in a manner that does not comply with regulations, with the specifications of this manual, and in the event of tampering with any electrical component of the unit.

Before connecting the electrical panel, make sure that:
- the voltage and frequency of the network correspond to the parameters of the unit.
- the electrical system being connected has sufficient capacity to supply the nominal electric power of the unit to be installed and meets current regulations.
- **A Residual Current Device" (RCD) device is installed.**

The electrical connection must be:

- made by qualified personnel after cutting off the facility's power supply;
- performed in a fixed and permanent manner, without intermediate splices, in compliance with the regulations of the country of installation.
- adequate to the absorption of the unit (see technical specifications).
- provided with a functioning grounded plug. For multiple units it is necessary to connect each unit to the ground connection or combine them all with metal ties.
- preferably situated in a dedicated room, **locked** and protected from the weather. If there is also a key switch, the key must be removed when cutting the power supply and returned to its position only after finishing service operations.
- install a **40A circuit breaker system** or a system suited to the unit absorption.

During the electrical connection, make sure that **no person**, other than the one who is working on the system, has access to the electrical rooms or switches.

The actual supply voltage of the users must not deviate more than 10% from the expected normal voltage. Higher voltage differences cause damage to users and to the electrical system, malfunctioning of fans, noise level. It is therefore essential to check the alignment of the actual voltage values with the nominal values. The line frequency must be between 0.99 and 1.01 of the nominal value; up to 0.98 and 1.02 for a short time. The voltage unbalance must not exceed a 2% deviation. The voltage must not be interrupted for more than 3 ms in any random cycle and more than 1 s must elapse between two successive interruptions. The voltage dips must not exceed 20% of the RMS voltage of the supply line. More than 1 s must elapse between successive dips. The harmonic distortion shall not exceed 12% of the total r.m.s. voltage between active conductors, considering the sum of the harmonics from the 2nd to the 30th.

After connecting, make sure that:
- the ground connection is sufficient (using the appropriate instrument). An incorrect connection, ineffective and lacking the grounding circuit, is contrary to safety regulations and is a source of danger and can damage the components of the unit.
- the motor rotation direction is correct.
- the wiring and motor power draw are correct.

Additional warnings regarding the power connection
- A suitable differential protection must be installed upstream of the machine's power connection points, in order to isolate each of its elements in the event of a malfunction; the choice of the differential protection device must not conflict with the provisions of the law, local regulations, the characteristics of the electrical system of the plant and of the machine itself. The unit is compatible with the TT-TN power supply systems.

HOW TO MAKE THE CONNECTION

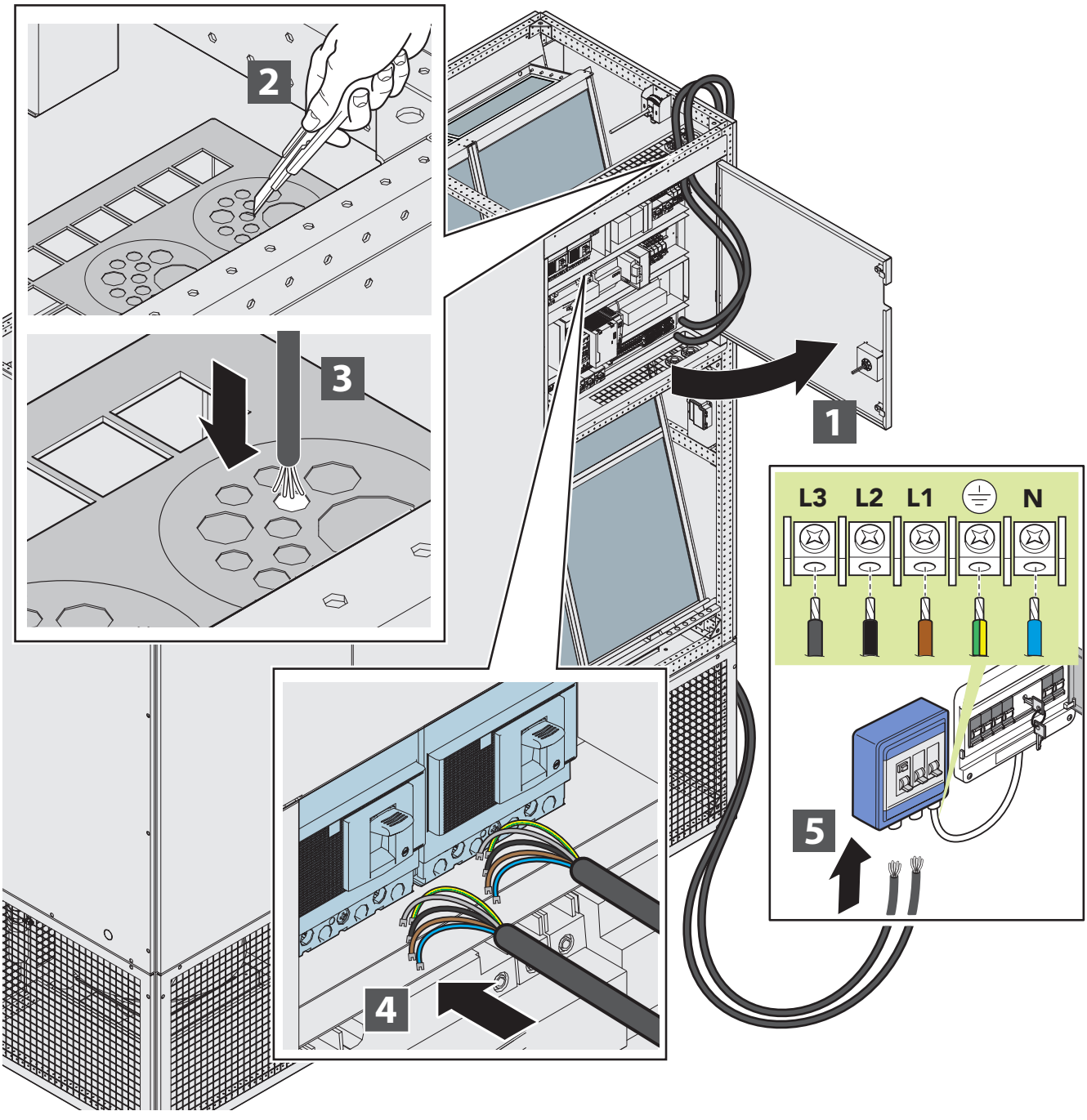
1 Open the electrical panel.

2 **3** Cut a hole in the cable gland to the required diameter. Insert the cable through the hole in the cable gland

4 Connect one end of the electrical cable to the terminal block inside the unit. **For the unit's connection to the three-phase power supply, refer to the instructions in step 11 on page 28.**

5 Connect the other end of the cable to the mains

9 Electrical connection bottom fan



HOW TO MAKE THE CONNECTION

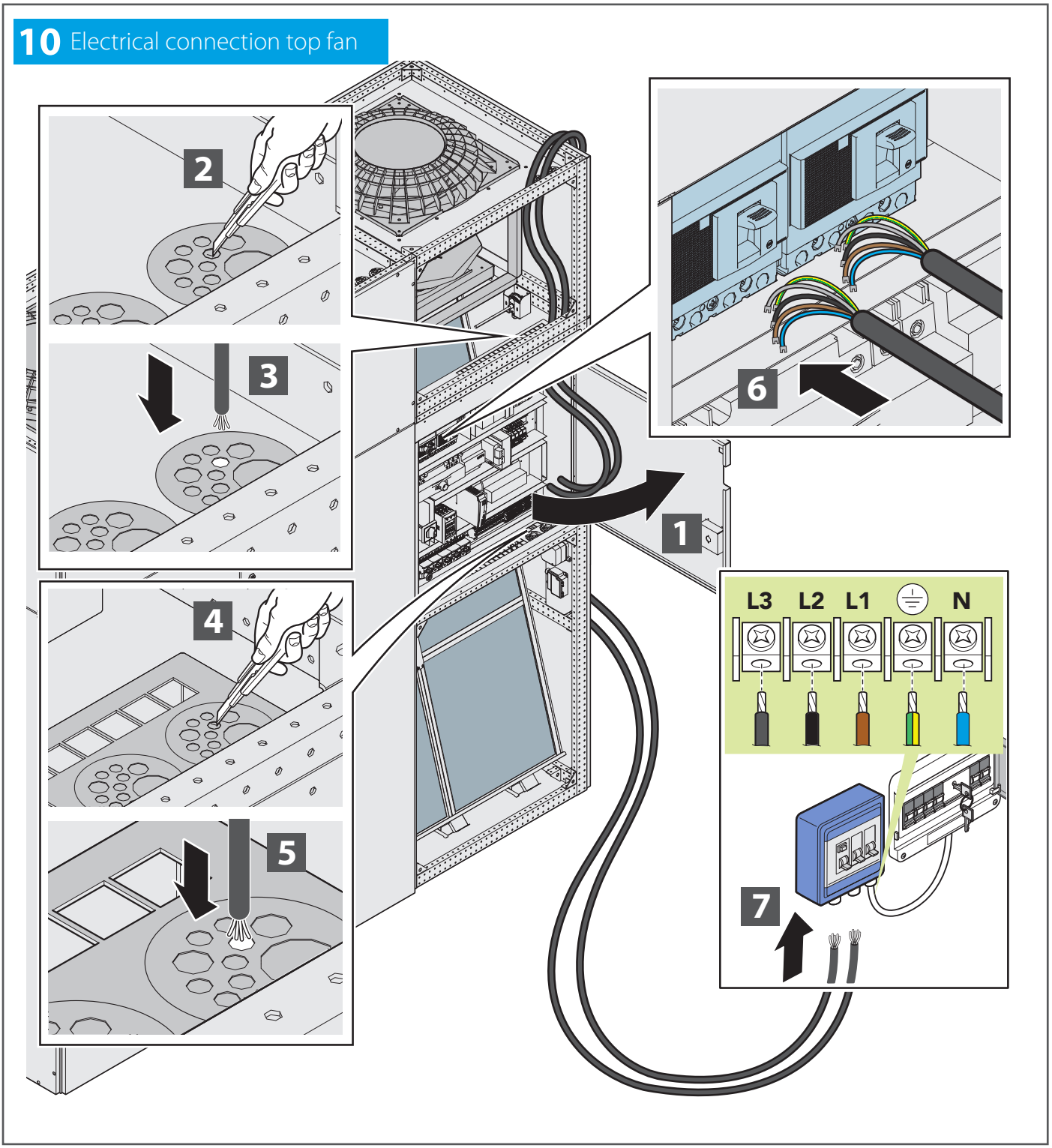
1 Open the electrical panel.

2 **3** Cut a hole in the cable gland to the required diameter. Insert the cable through the hole in the cable gland. Repeat the same procedure for steps **4** **5** .

6 Connect one end of the electrical cable to the terminal block inside the unit. **For the unit's connection to the three-phase power supply, refer to the instructions in step 11 on page 28.**

7 Connect the other end of the cable to the mains

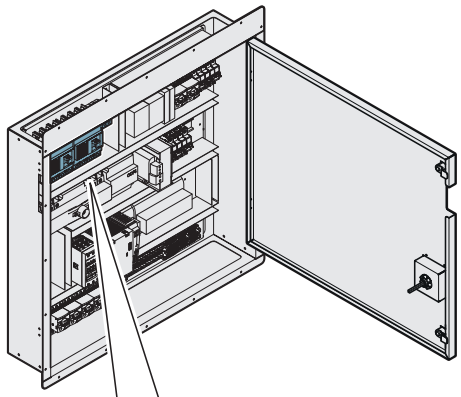
10 Electrical connection top fan



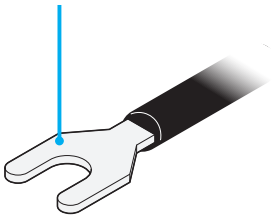
HOW TO WIRE THE POWER CABLES TO THE PANEL

Wire the cables as shown in step **11** . Use cables with fork terminals.
Always refer to the wiring diagram that is specific to the unit that you bought (it was shipped with the unit). If it is not on the unit or has been lost, contact the salesperson of reference who will send a copy (specify the unit's serial number).
For conductors with a cross-section below 16 mm^2, the earth cable must have the same cross-section as the conductors.

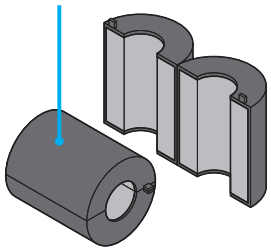
11 Power connection to the panel



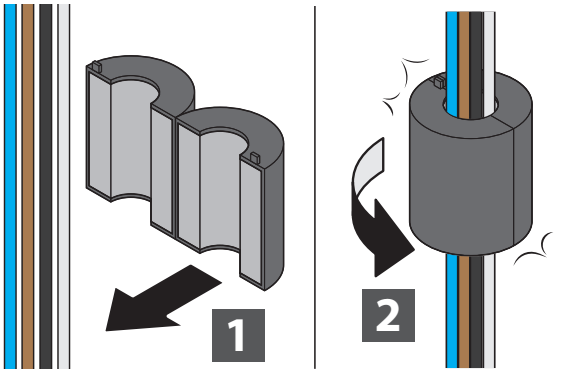
Use cables with fork terminals.



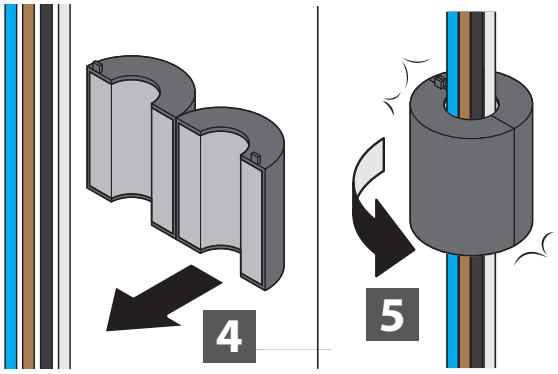
Ferrite 75, provided

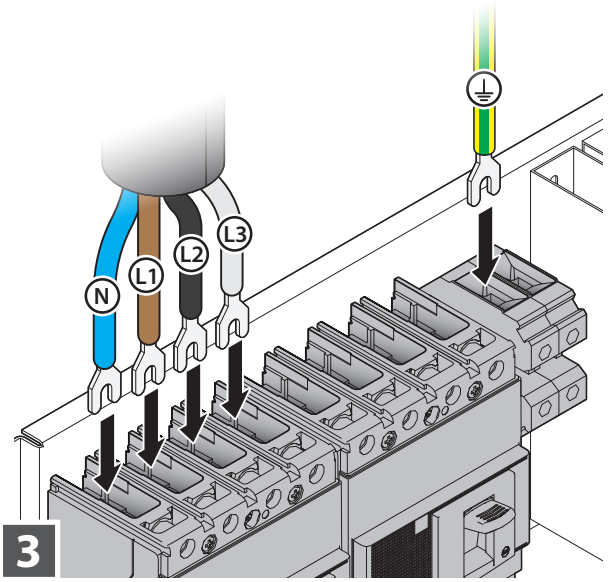


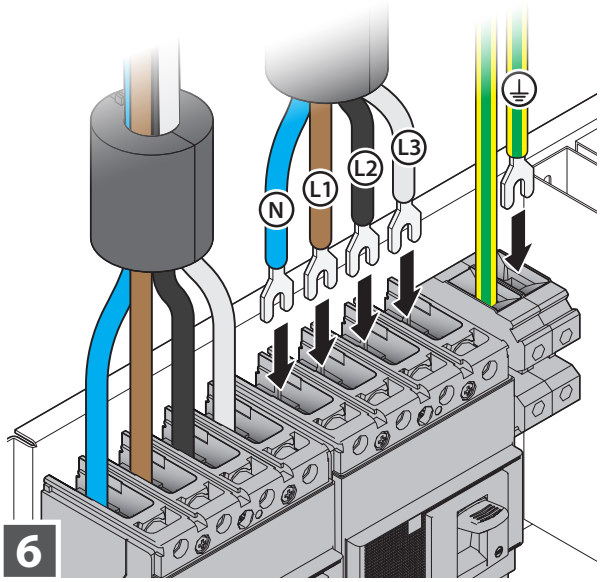
Line **1**



Line **2**

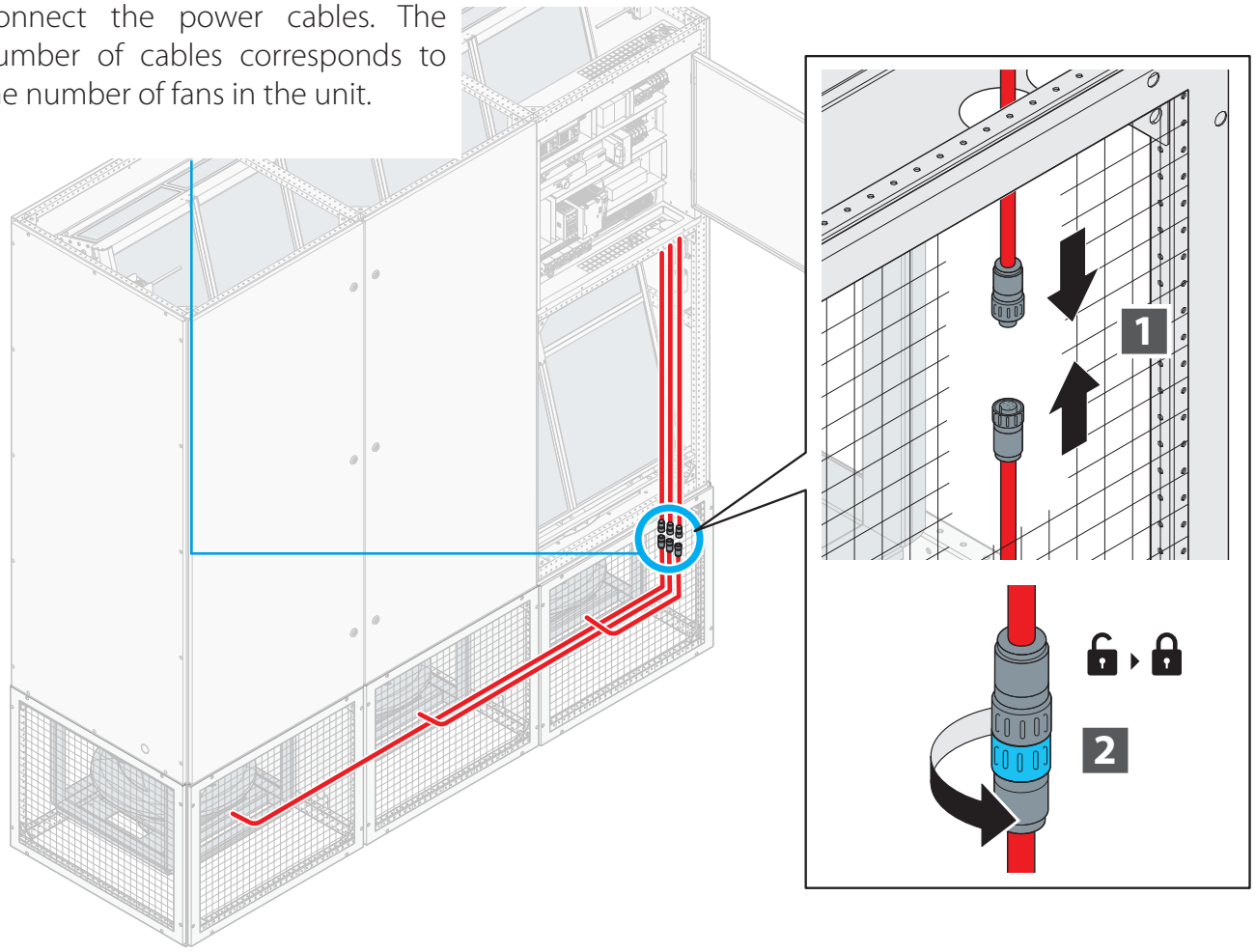




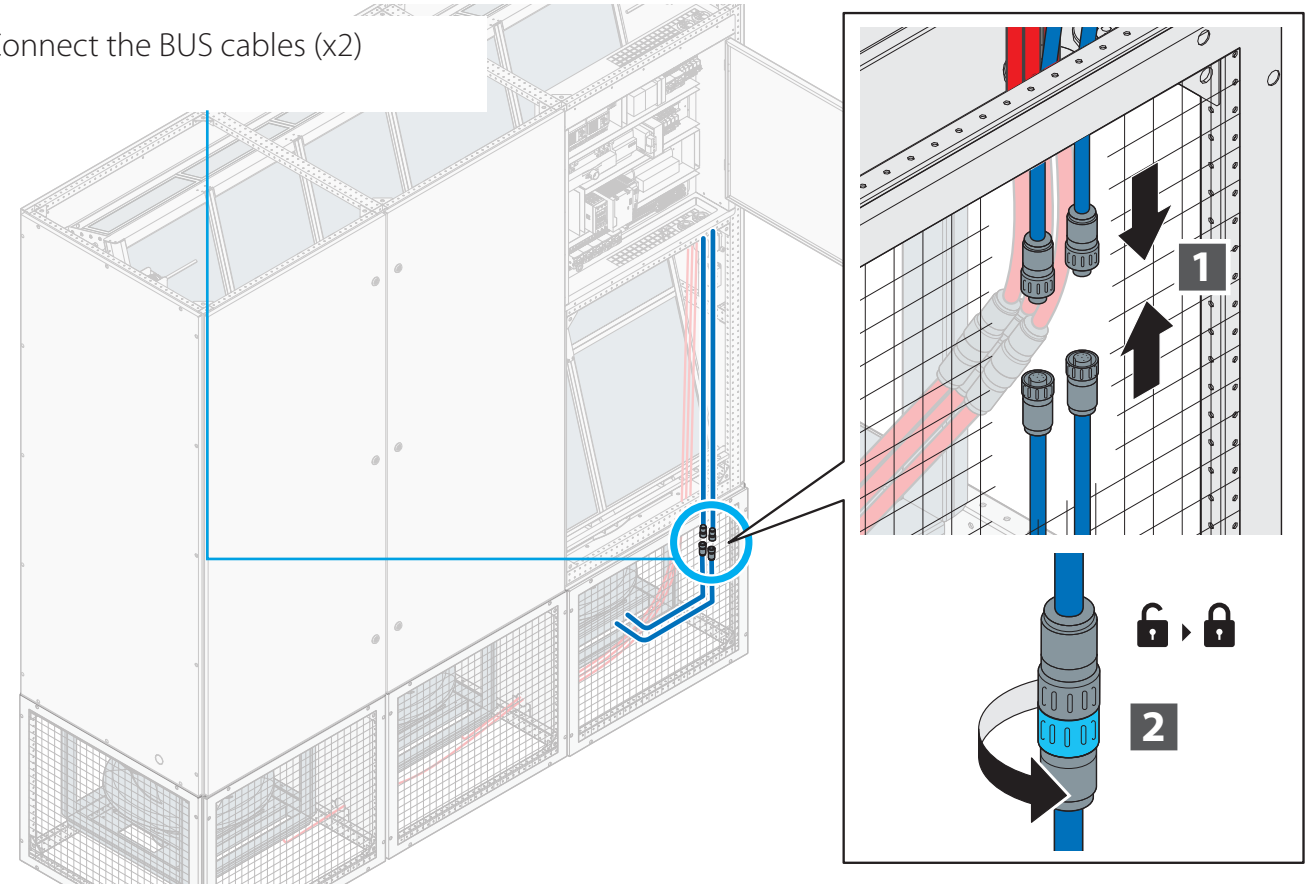


12 BUS and Power cables connection (units with bottom fan)

Connect the power cables. The number of cables corresponds to the number of fans in the unit.

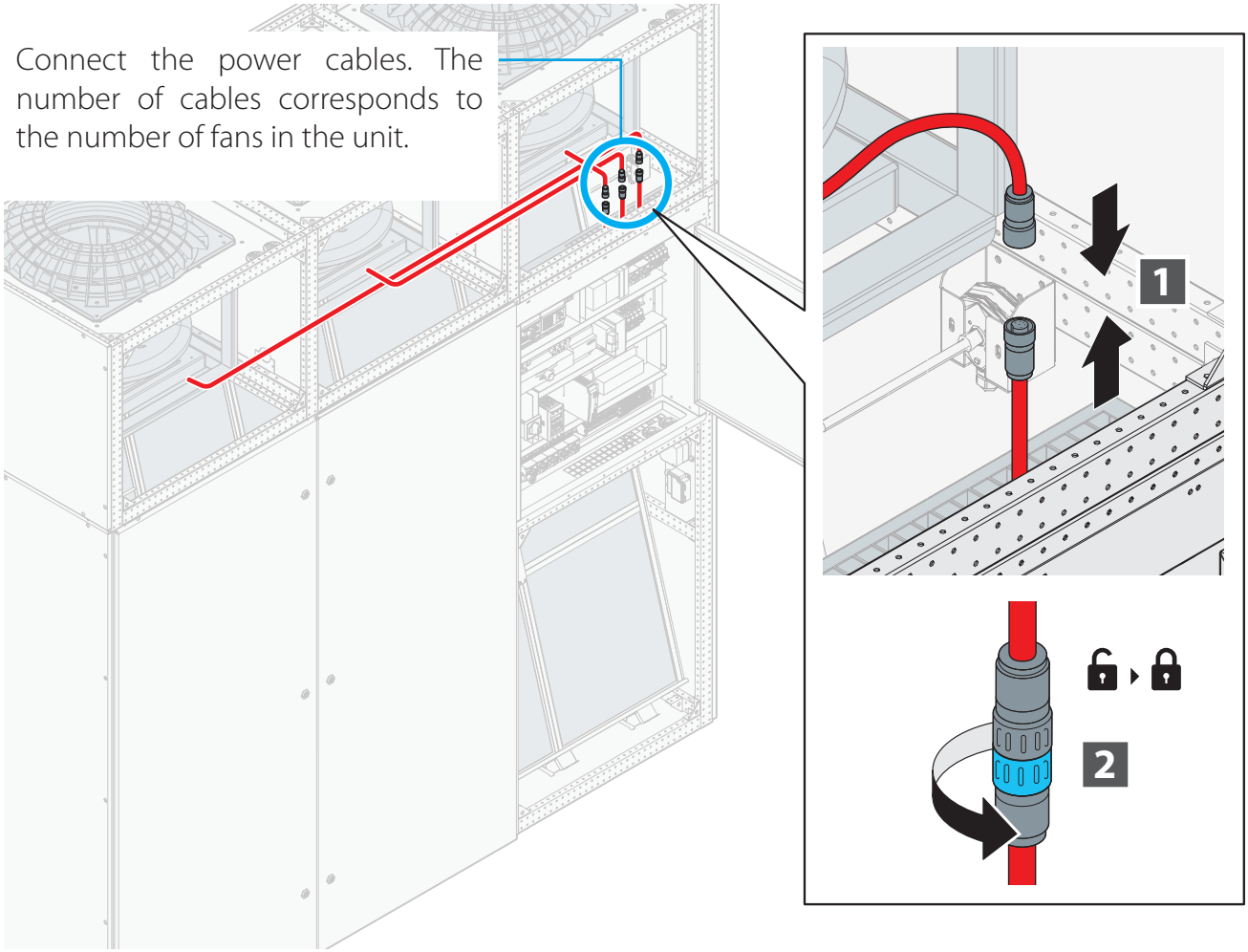


Connect the BUS cables (x2)

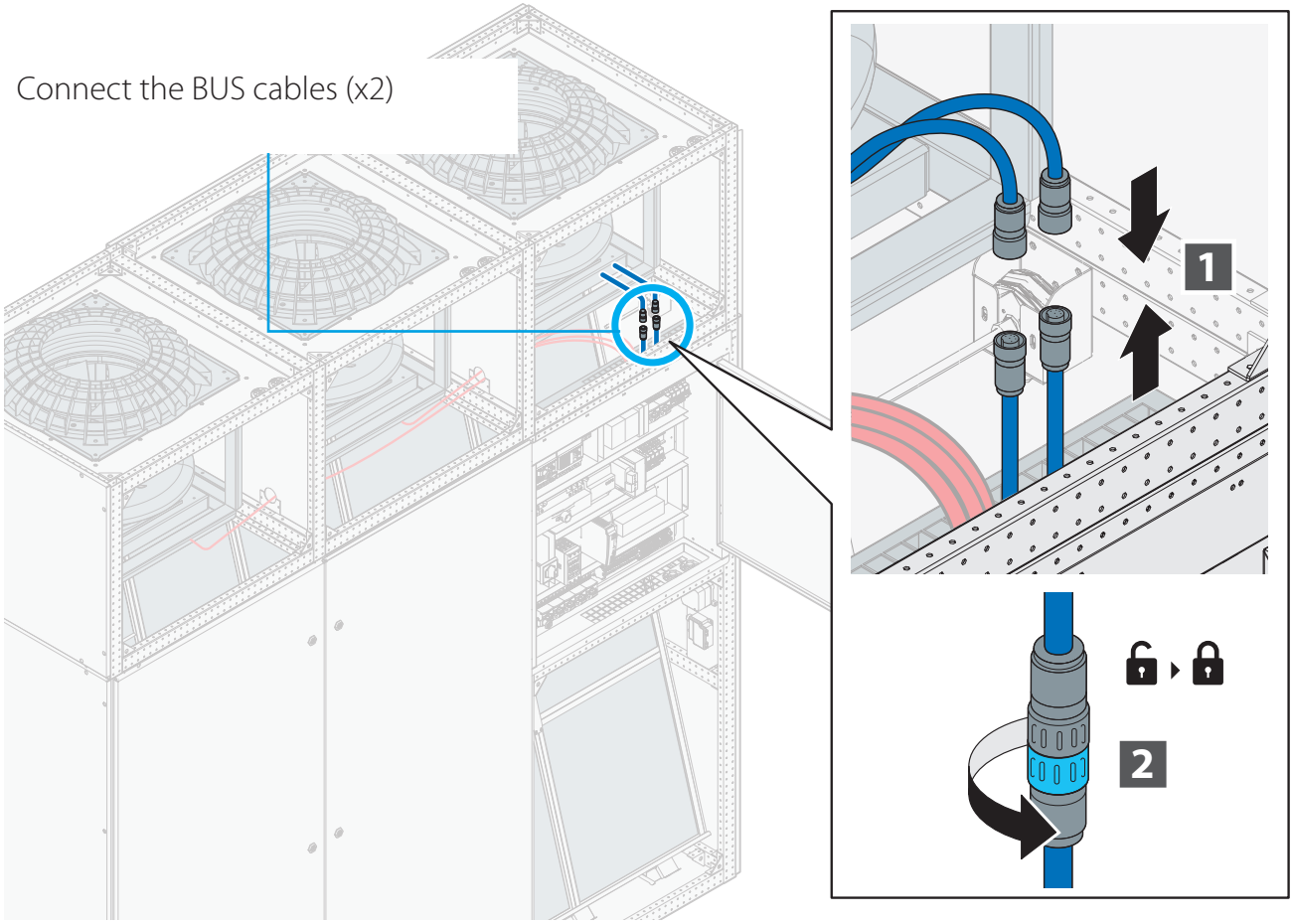


16 BUS and Power cables connection (units with top fan)

Connect the power cables. The number of cables corresponds to the number of fans in the unit.



Connect the BUS cables (x2)



PHASE 4: COIL CONNECTION **Bottom fan – Bottom water connection**

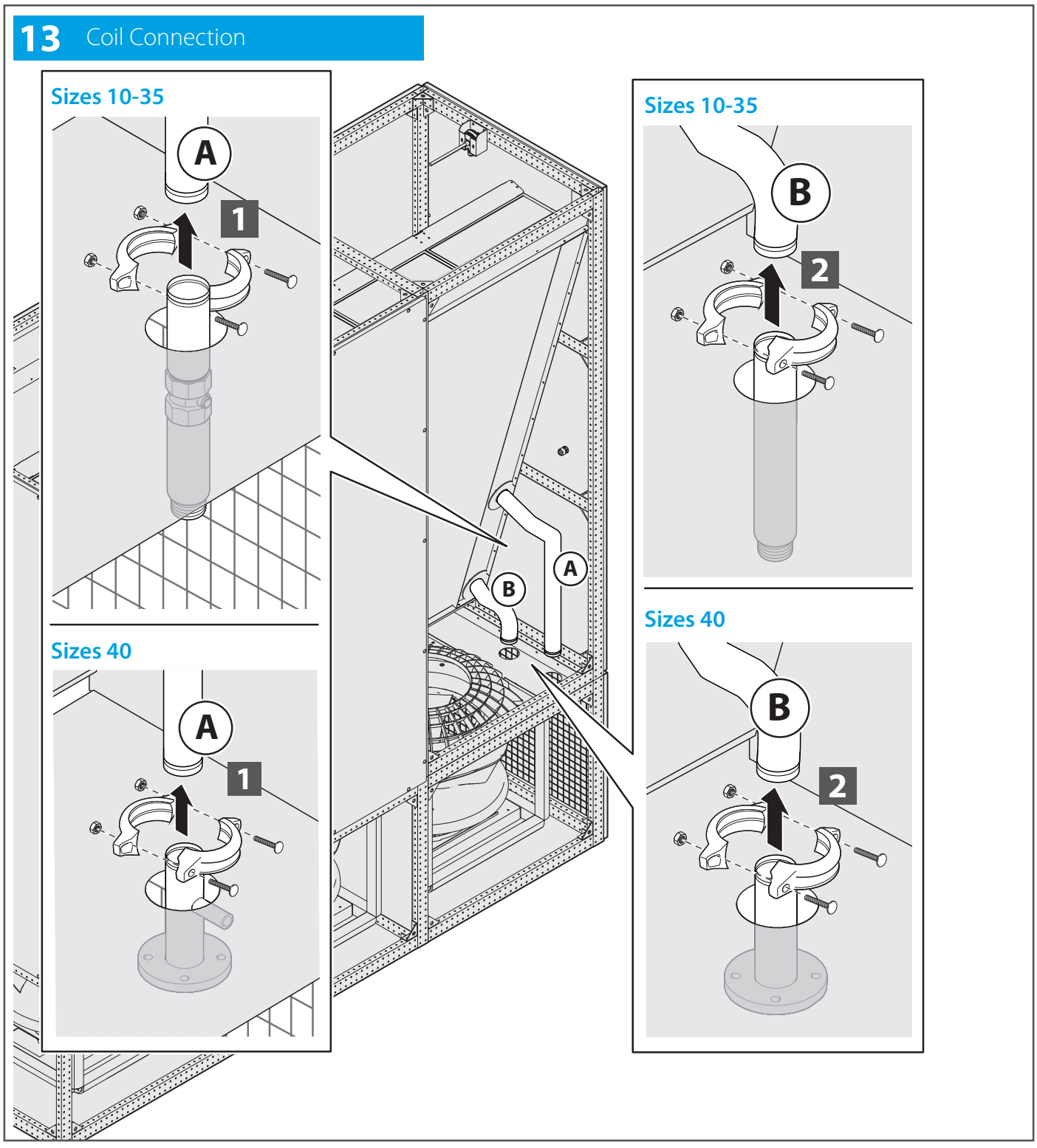
Extensions are supplied with the units. The extensions are connected to the pipework by means of dedicated fittings.

1 Connect the extension to the end of the inlet pipe. A T-well housing a temperature probe is inserted between the two inlet pipe extensions.

2 Connect the extension to the end of the outlet pipe.

A **Chilled water inlet**

B **Chilled water outlet**



PHASE 4: COIL CONNECTION **Bottom fan – Top water connection**

Extensions are supplied with the units. The extensions are connected to the pipework by means of dedicated fittings.

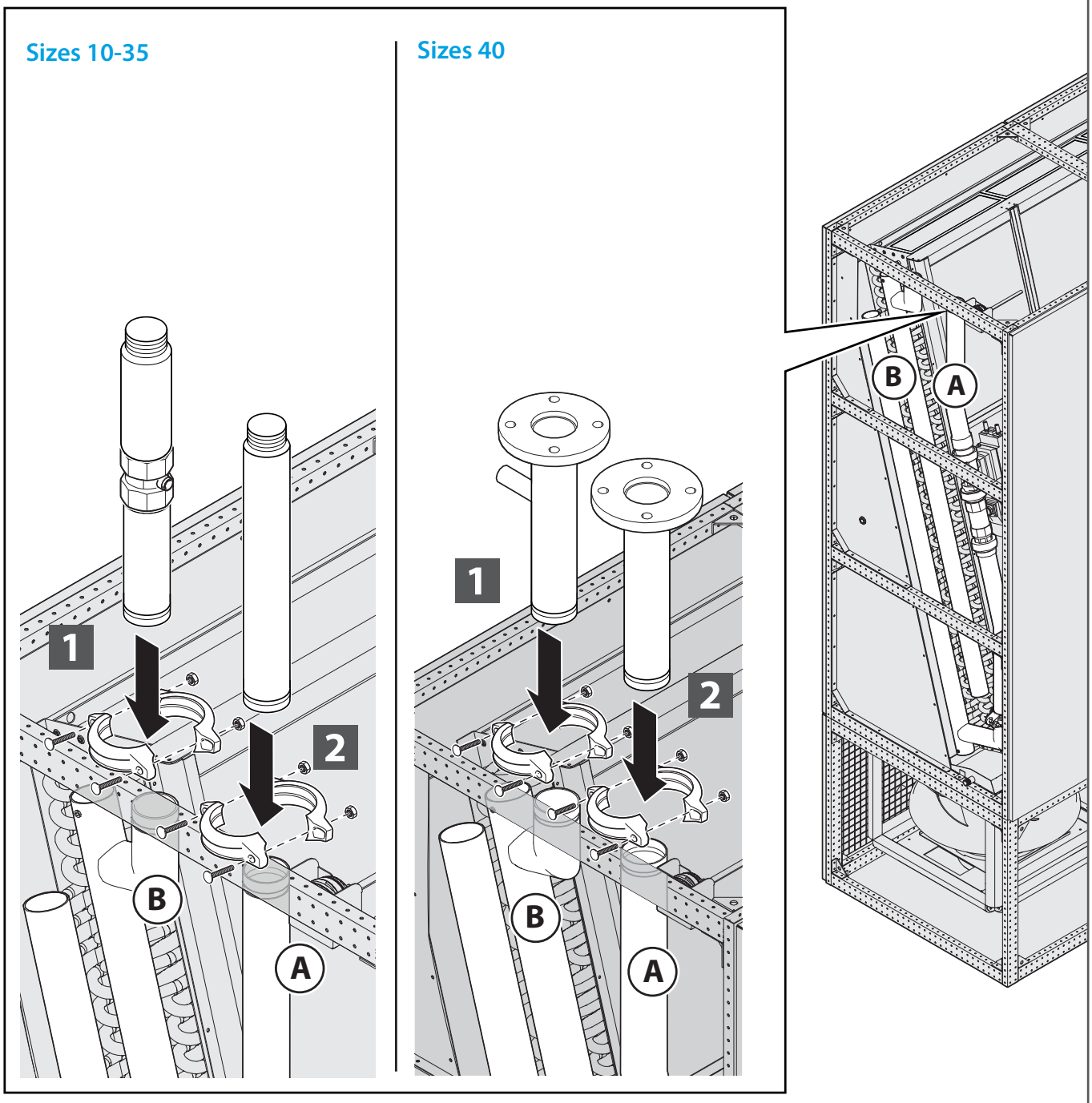
1 Connect the extension to the end of the outlet pipe. A T-well housing a temperature probe is inserted between the two outlet pipe extensions.

2 Connect the extension to the end of the inlet pipe.

A **Chilled water inlet**

B **Chilled water outlet**

14 Coil Connection



PHASE 4: COIL CONNECTION **Top fan**

Extensions are supplied with the units. The extensions are connected to the pipework by means of dedicated fittings.

1 Connect the extension to the end of the outlet pipe. A T-well housing a temperature probe is inserted between the two outlet pipe extensions.

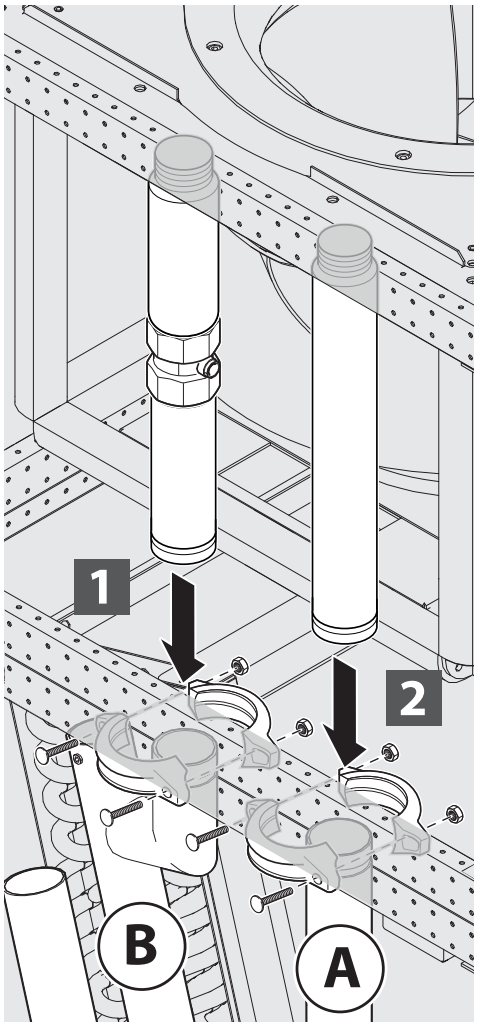
2 Connect the extension to the end of the inlet pipe.

A **Chilled water inlet**

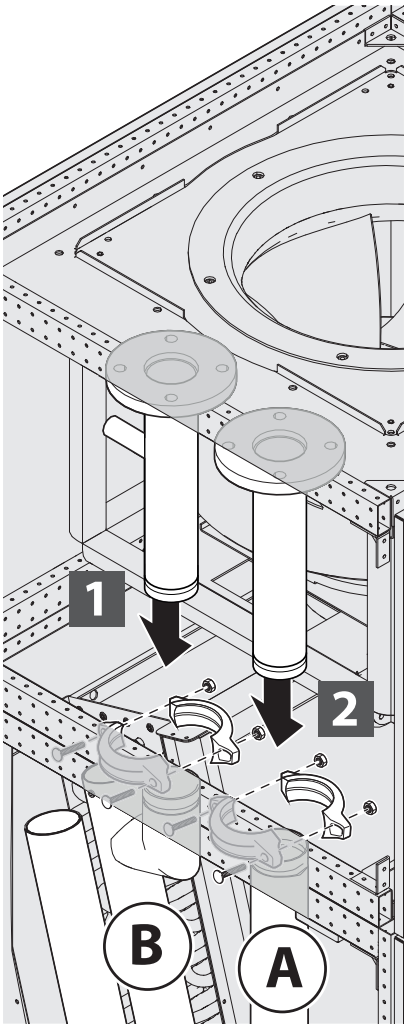
B **Chilled water outlet**

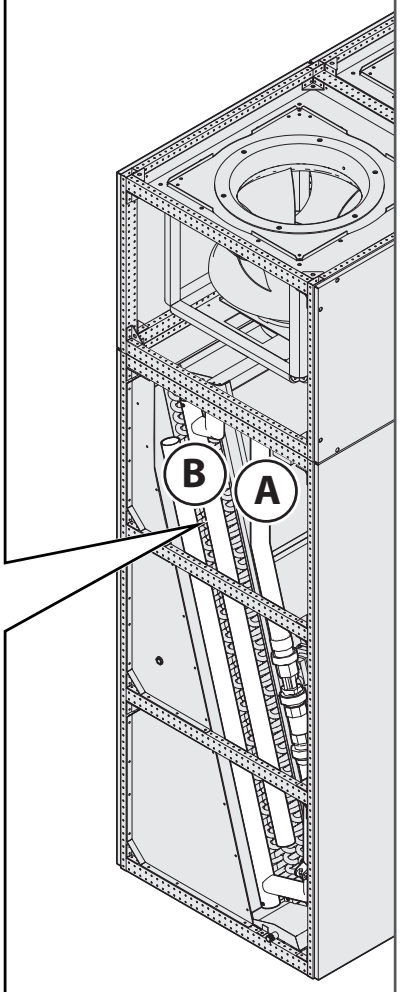
15 Coil Connection

Sizes 10-35



Sizes 40



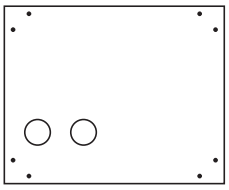


PHASE 5: EXTERNAL PIPE CONNECTIONS
Top fan – Top water connection

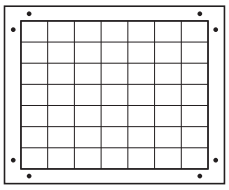
Please refer to the instructions for this step **(phase 5)** only if it has been chosen the "external hydronic connections" option. The ones provided below are the instructions for standard cases of side and front connections. If a customized solution has been agreed upon, please refer to the specific addendum document.

16 **Lateral** connections

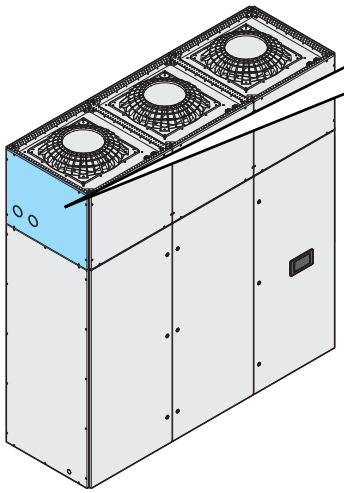
TYPE A

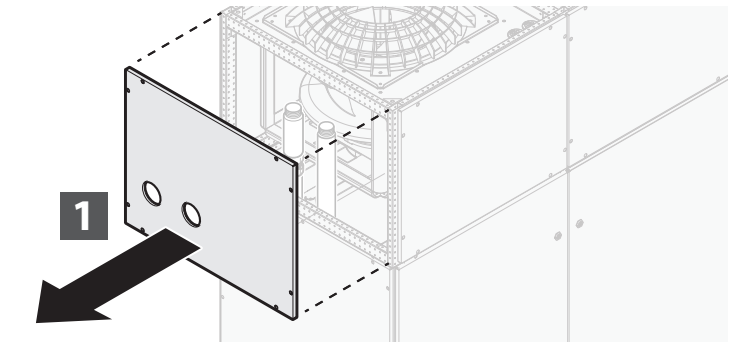


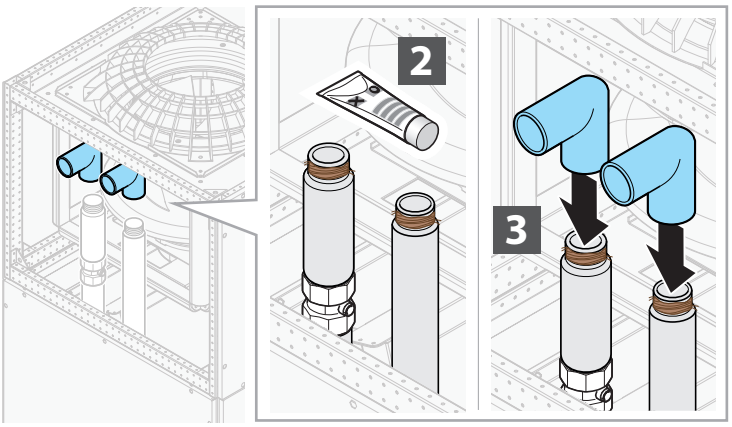
TYPE B

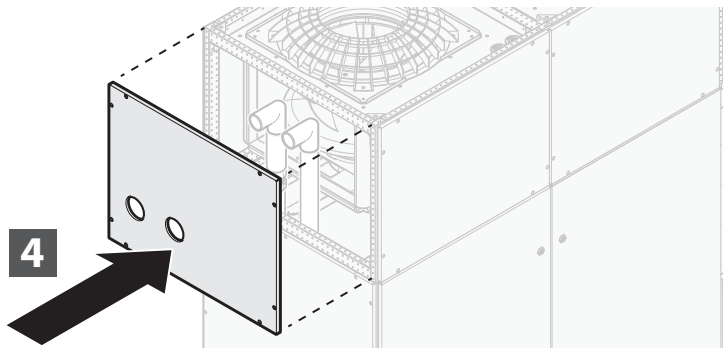


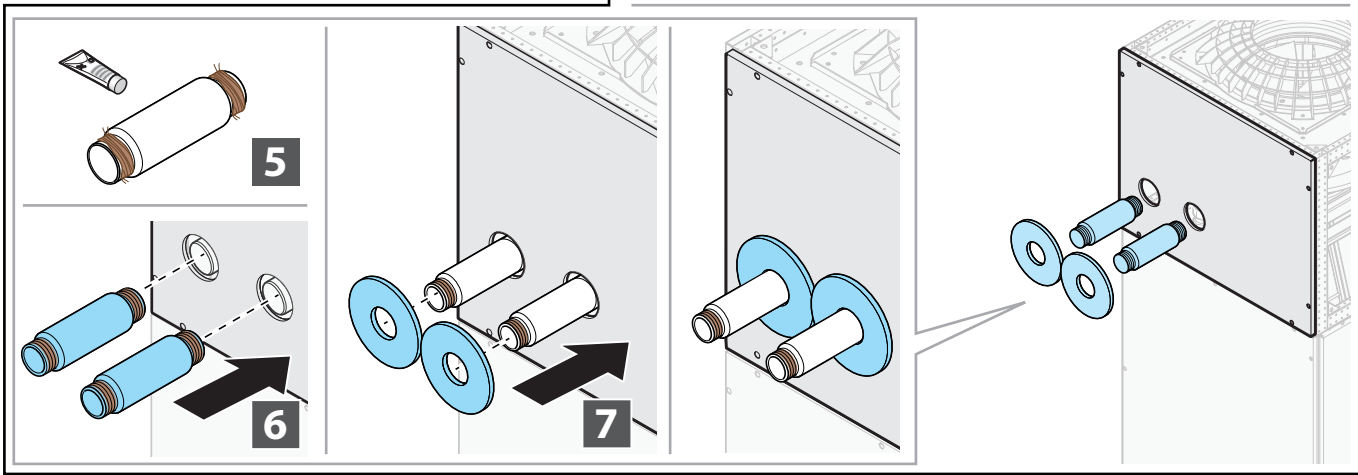
Depending on the chosen configuration, the perforated panel for the pipes passage can be full (type A) or grilled (type B).









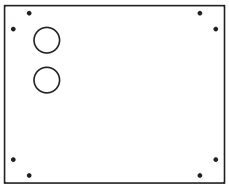


PHASE 5: EXTERNAL PIPE CONNECTIONS
Top fan – Top water connection

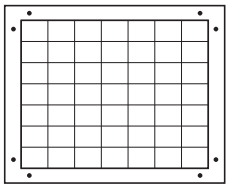
Please refer to the instructions for this step **(phase 5)** only if it has been chosen the "external hydronic connections" option. The ones provided below are the instructions for standard cases of side and front connections. If a customized solution has been agreed upon, please refer to the specific addendum document.

17 **Front/Rear** connections

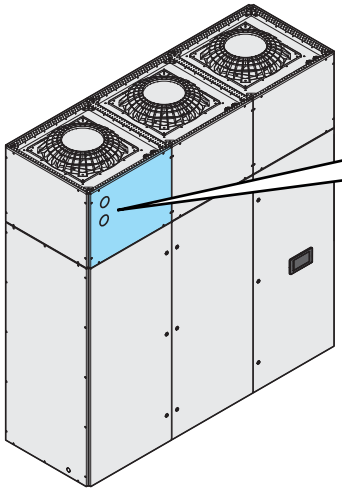
TYPE A

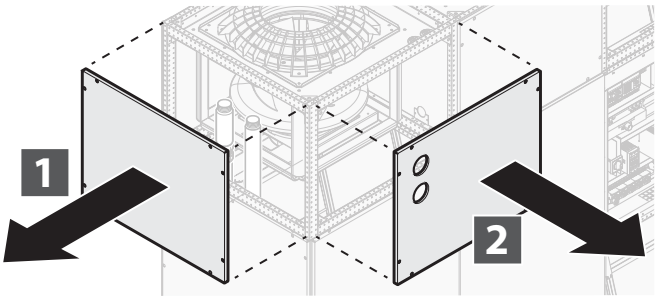


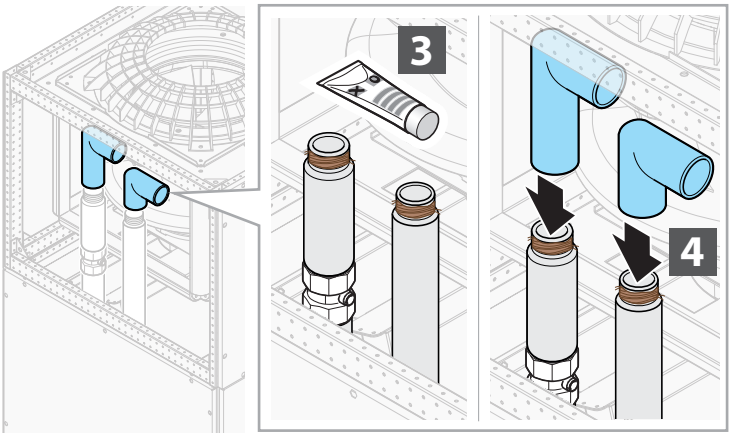
TYPE B

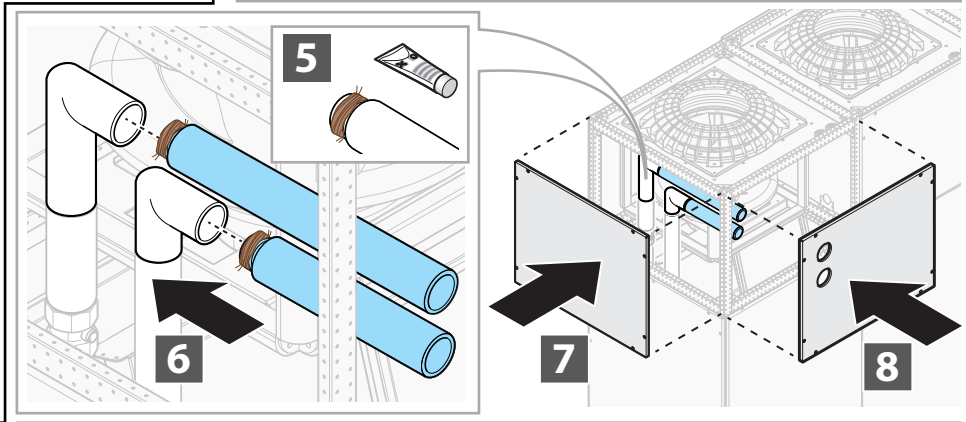


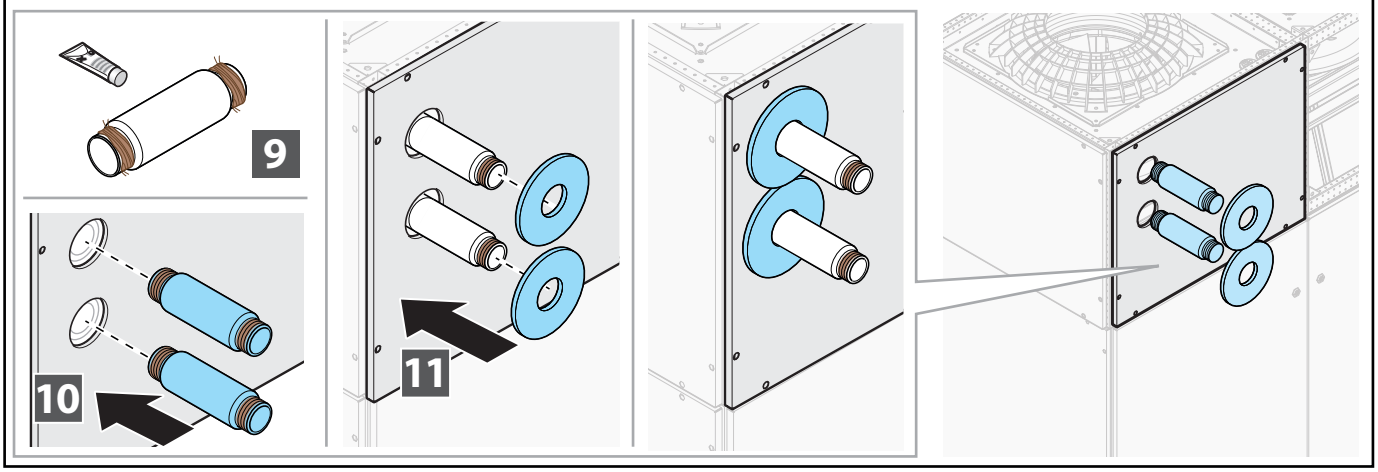
Depending on the chosen configuration, the perforated panel for the pipes passage can be full (type A) or grilled (type B).









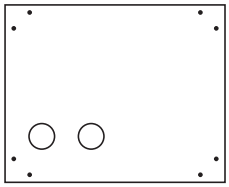


PHASE 5: EXTERNAL PIPE CONNECTIONS
Bottom fan – Bottom water connection

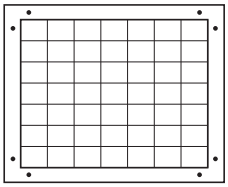
Please refer to the instructions for this step **(phase 5)** only if it has been chosen the "external hydronic connections" option. The ones provided below are the instructions for standard cases of side and front connections. If a customized solution has been agreed upon, please refer to the specific addendum document.

18 **Lateral** connections

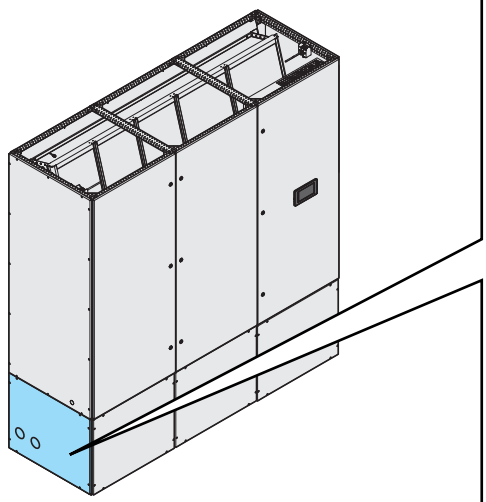
TYPE A

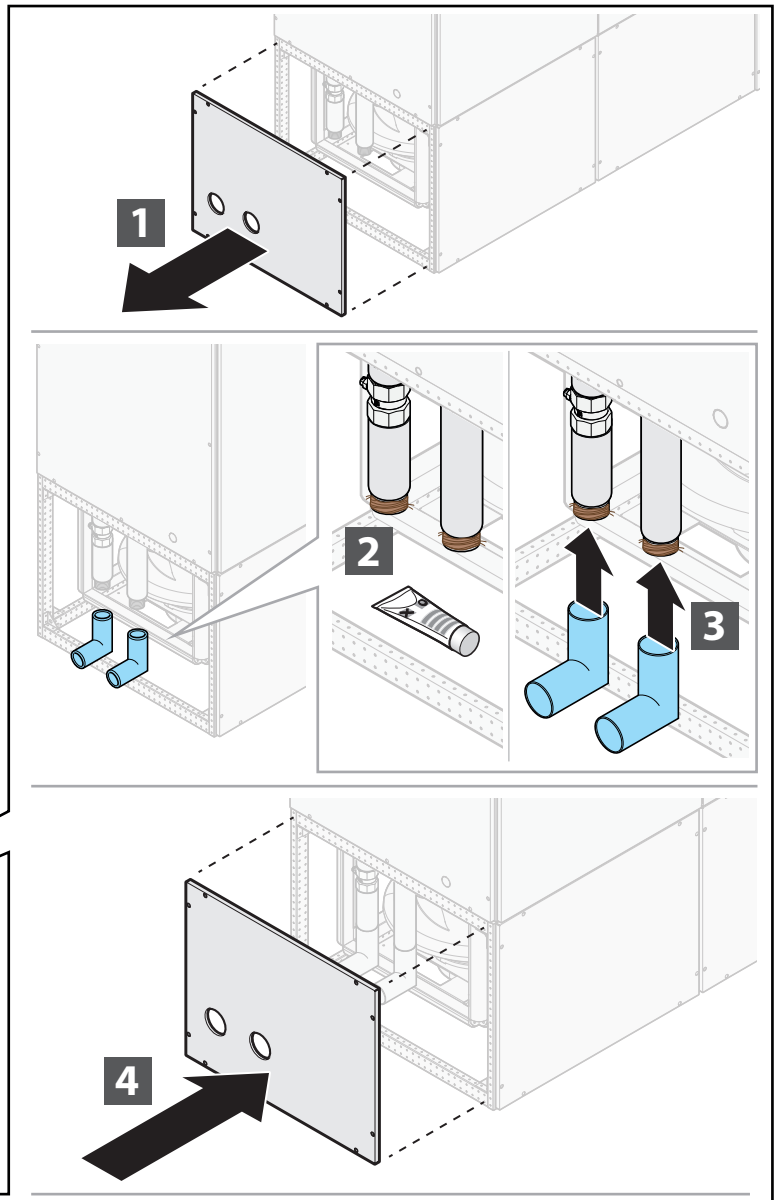


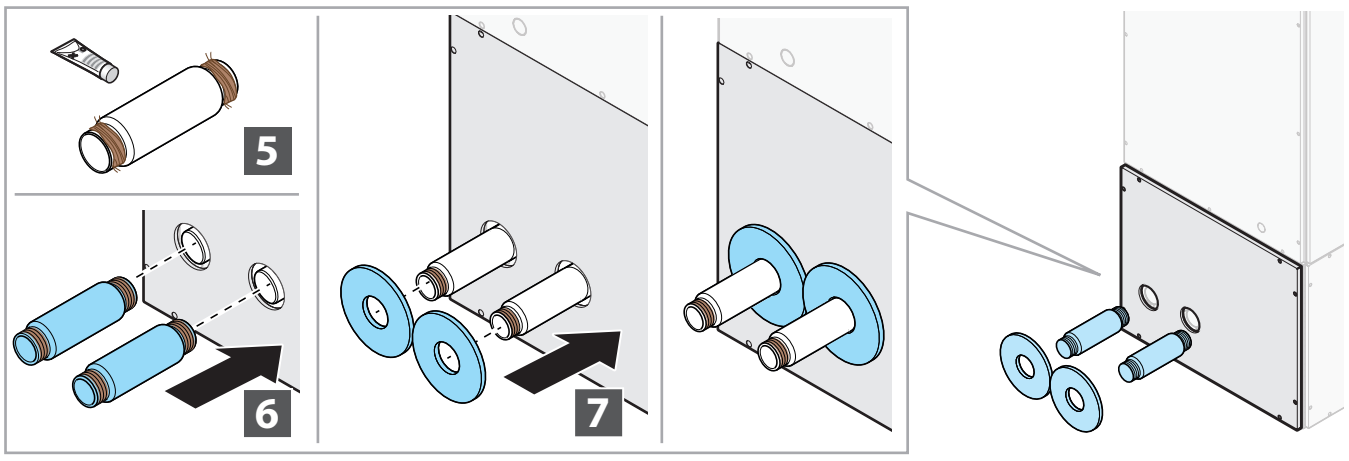
TYPE B



Depending on the chosen configuration, the perforated panel for the pipes passage can be full (type A) or grilled (type B).





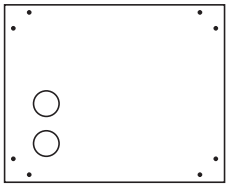


PHASE 5: EXTERNAL PIPE CONNECTIONS
Bottom fan – Bottom water connection

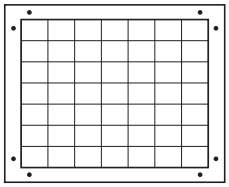
Please refer to the instructions for this step **(phase 5)** only if it has been chosen the "external hydronic connections" option. The ones provided below are the instructions for standard cases of side and front connections. If a customized solution has been agreed upon, please refer to the specific addendum document.

19 **Front/Rear** connections

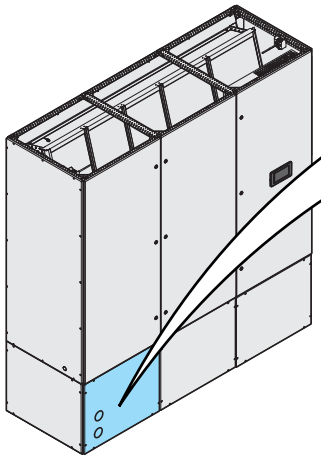
TYPE A

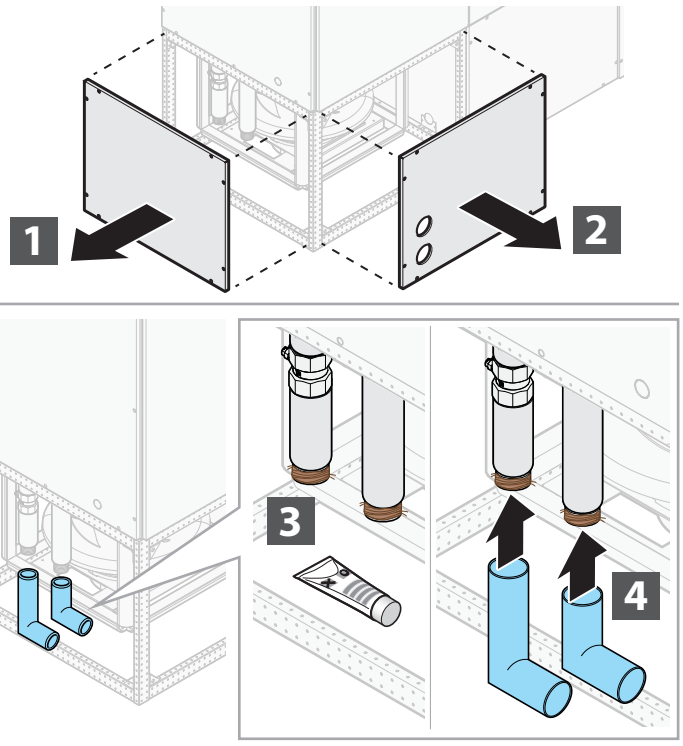


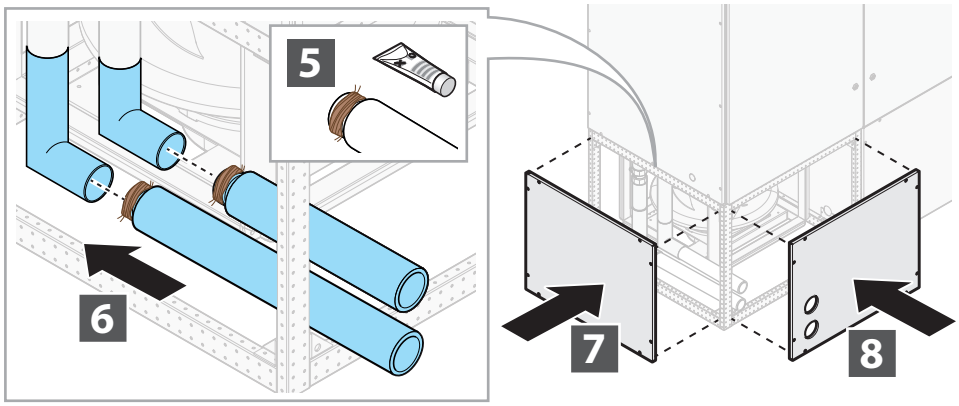
TYPE B

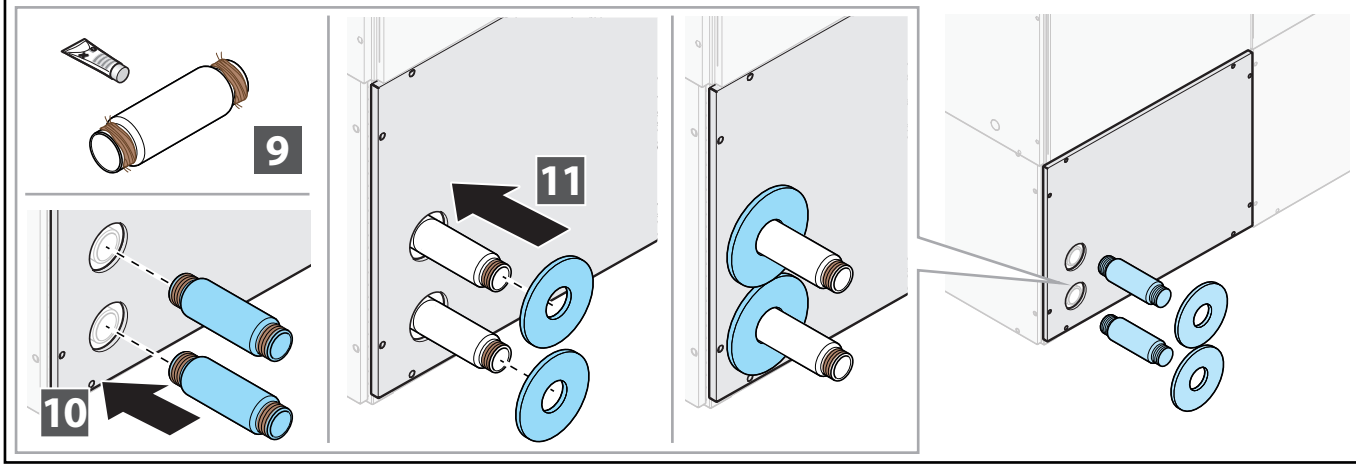


Depending on the chosen configuration, the perforated panel for the pipes passage can be full (type A) or grilled (type B).









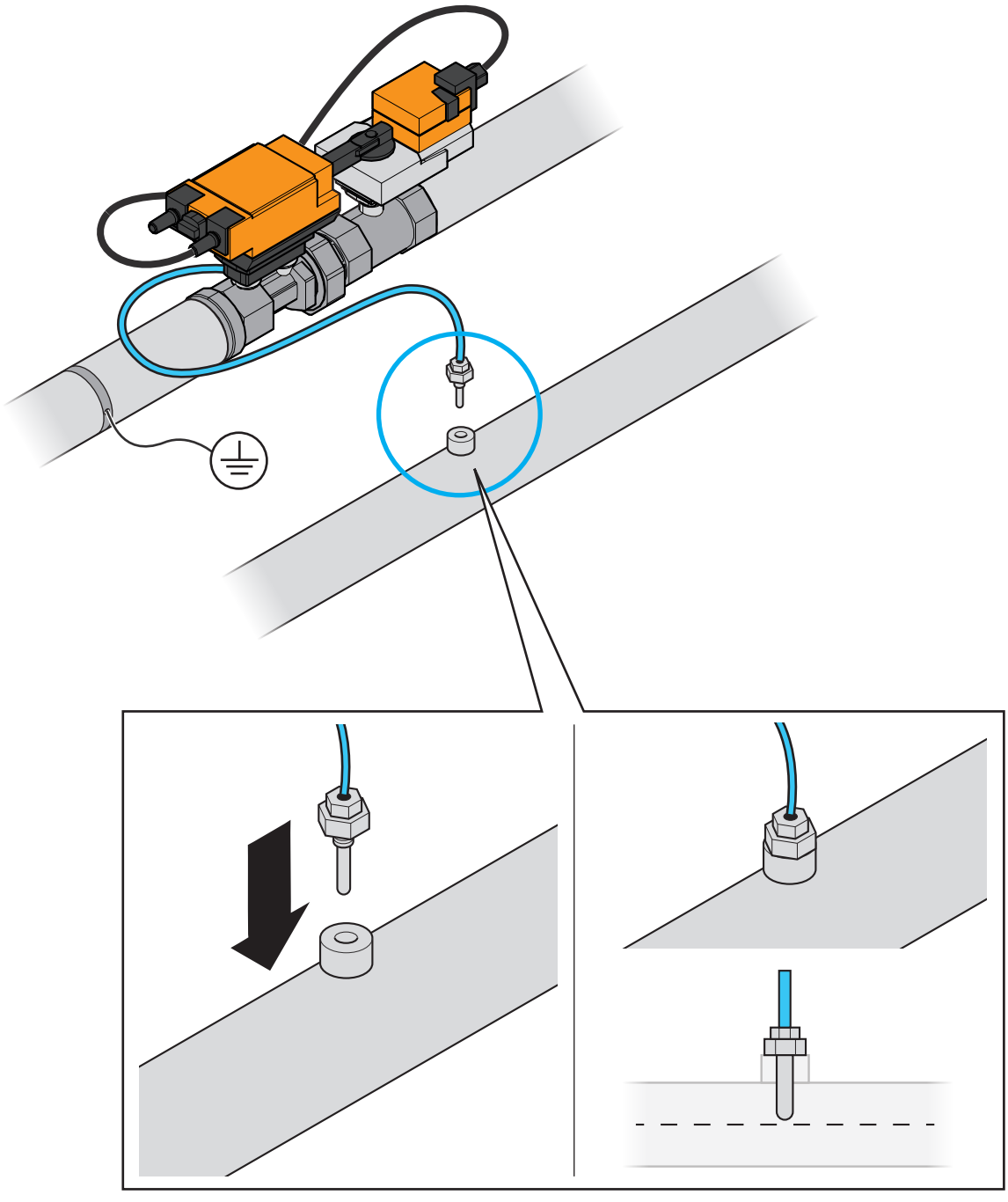
PHASE 6: ENERGY VALVE TEMPERATURE SENSOR CONNECTION

The energy valve's external **temperature probe (T1)** must be installed in the dedicated housing in the pipe opposite the one where the valve is installed. It will therefore be located:

- before the user if the valve is located on the return line.
- after the user if the valve is located on the supply line.

Note that wires between the valve and the temperature probe cannot be shortened or lengthened.

20 Energy valve temperature sensor connection

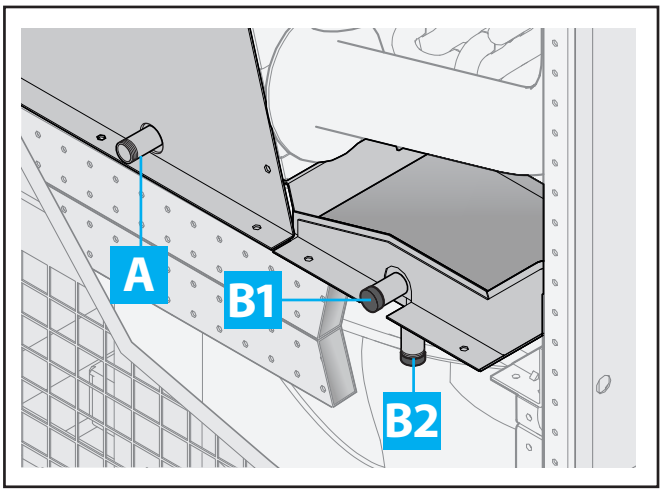


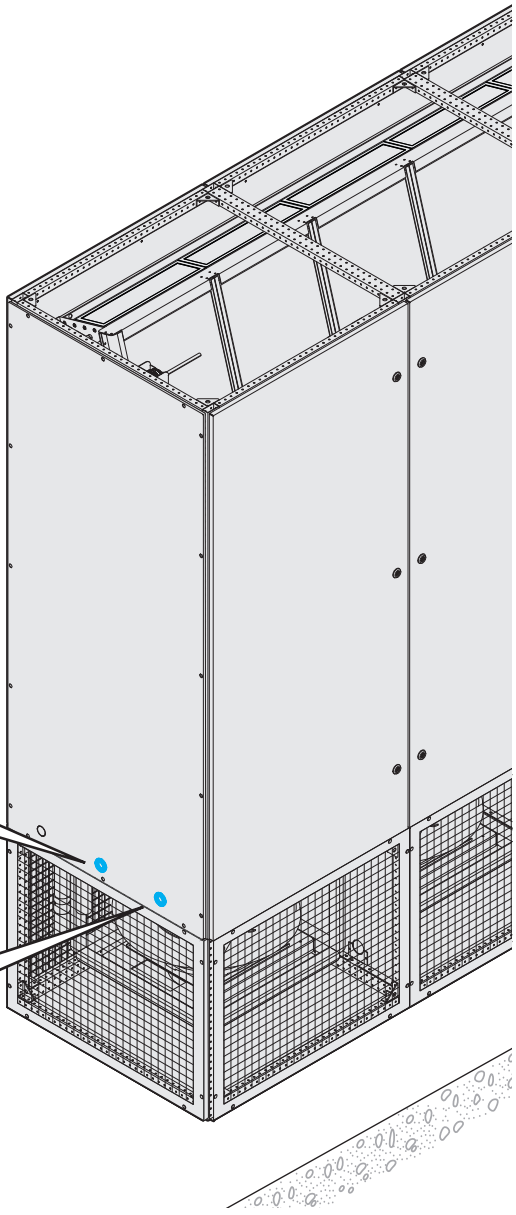
PHASE 7: CONNECTION TO A DRAIN

A - Condensate drain connection – bottom/top fan: **1** Cut out the knock-out on the side of the unit, **2** and connect the drainpipe to the outlet. **A** .

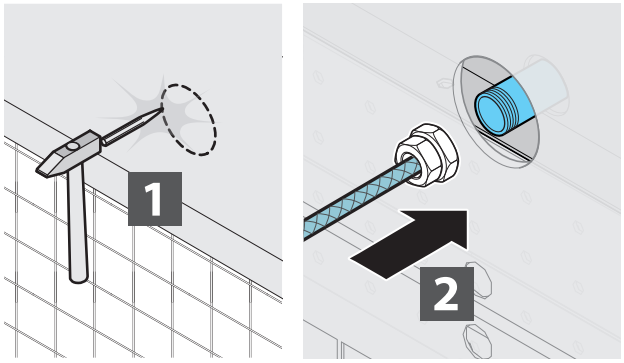
B - Leakage pan drain connection: The drain pan allows to connect to two different points for emptying (**B1** and **B2**), one on the side and one under the pan. **1** Cut out the knock-out on the side of the unit, **2** remove the cap from the connection before the use.

21 Bottom fan

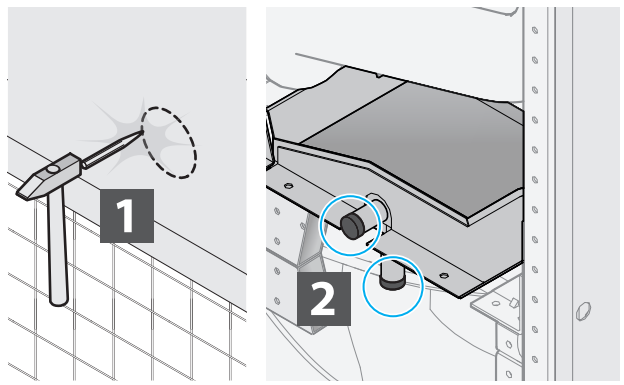




Condensate drain connection **A**



Leakage pan drain connection **B**



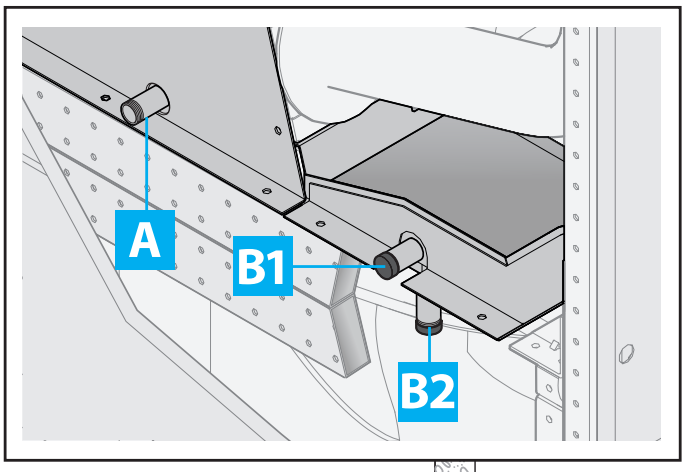
*** Water connections to the drainage system are the installer's responsibility**

PHASE 7: CONNECTION TO A DRAIN

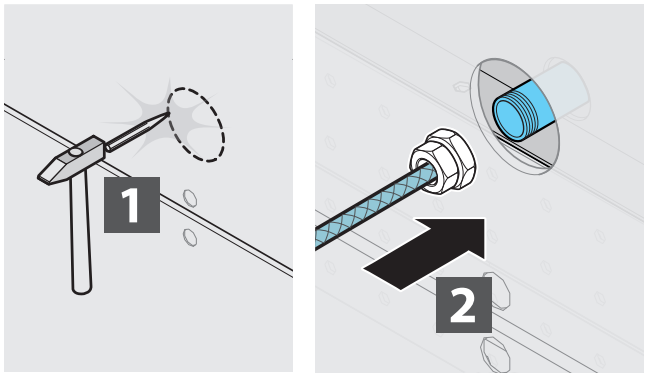
A - Condensate drain connection – bottom/top fan: **1** Cut out the knock-out on the side of the unit, **2** and connect the drainpipe to the outlet. **A** .

B - Leakage pan drain connection: The drain pan allows to connect to two different points for emptying (**B1** and **B2**), one on the side and one under the pan. **1** Cut out the knock-out on the side of the unit, **2** remove the cap from the connection before the use.

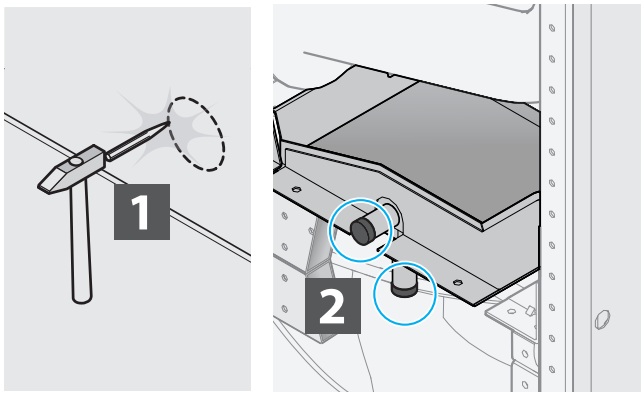
22 Top fan

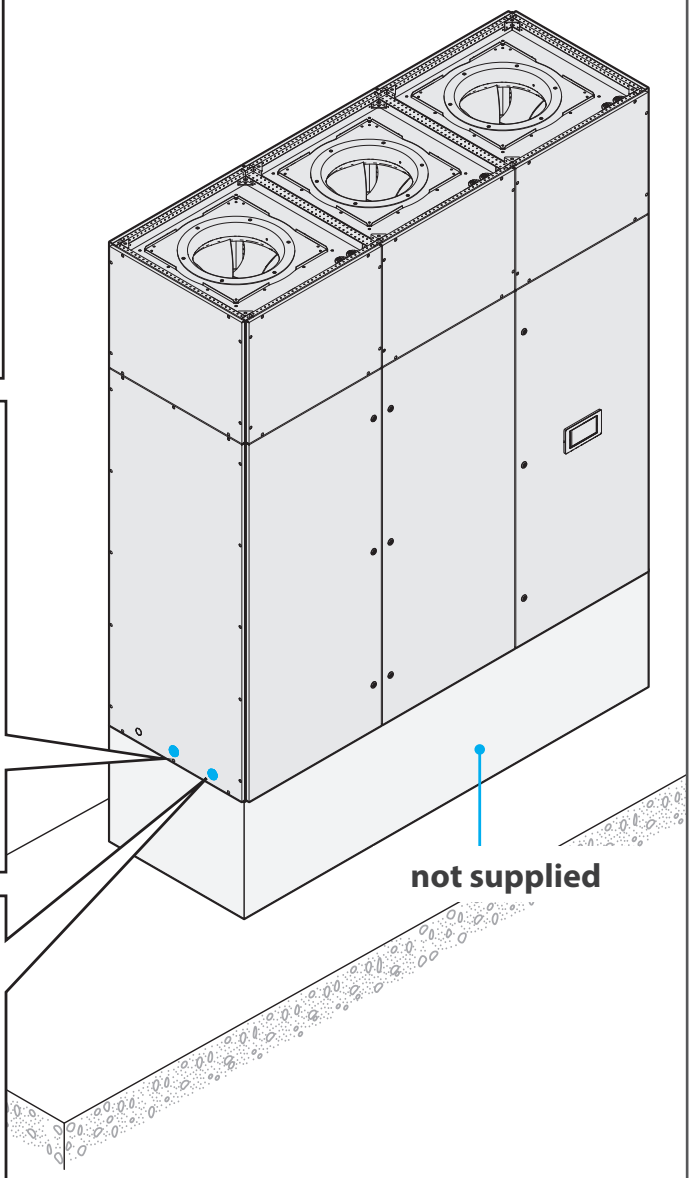


Condensate drain connection **A**



Leakage pan drain connection **B**





*** Water connections to the drainage system are the installer's responsibility**

PHASE 8: COMMISSIONING ACTIVITIES

To commission the unit it is necessary to (tick with "√" the operations completed):

	check for accurate fluid inlet and outlet pipe connections to the expansion coils
	check that the connections of the inlet and outlet pipes to the coil are leak-free
	check that there is a suitable siphon for all the water being drained.
	check unit integrity.
	check that the electrical connections have been made correctly.
	remove extraneous materials (e.g., assembly sheets, tools, clips, etc.) and dirt (footprints, dust, etc.) from inside the sections.

PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment should be used when operating the unit, suitable for use in accordance with company criteria and rules.
During the maintenance of the unit, other preventive measures are recommended in addition to the above: safety shoes, gloves, suitable clothing, always compatible with the use and in accordance with company regulations.

TRAINING

It is the responsibility of the unit buyer/user to provide adequate instruction and training to unit operators.

OPTIONAL

In agreed cases, additional training may be provided through the one-on-one instruction of operators by the Manufacturer's technical staff.

7 Maintenance

Safety precautions for maintenance

Ordinary and extraordinary maintenance must be carried out **solely by the operator assigned to perform maintenance** (maintenance mechanic and electrician) according to the regulations in force in the country of use and respecting the laws regarding systems and work safety. Remember that, by operator assigned to perform maintenance is meant the person who can work on the unit to perform ordinary and extraordinary maintenance, repairs and fine-tuning. This person must be an expert operator, properly instructed and trained, given the risks involved in such operations.

Before performing any ordinary and extraordinary maintenance, the unit **must always be stopped (by disconnecting from the mains)** and **the EMERGENCY button engaged**. The switch must have a key that must be removed and held by the operator who will perform the operations until the end of the maintenance itself.

It is absolutely prohibited to remove any protections from moving parts and unit protection devices with the unit connected to the power supply or operational. Adjustments made with safety devices disengaged must be performed **by a single person**, expert and authorised, and during this activity it is necessary to prevent access to the area of the unit by other people. Upon completing the adjustments with safety devices disengaged, the protections must be re-engaged as soon as possible.

During maintenance, the operating space surrounding the unit must be free of obstacles, clean and well lit. It is prohibited for unqualified people to pass through or remain in this space.

Use personal protective clothing (safety shoes, safety glasses, gloves, etc.) compliant with regulations.

Before carrying out repairs or other work on the unit, **always declare out loud** your intentions to other operators who are located in the unit area and make sure that they have heard and understood the warning.

Ordinary maintenance

Proper maintenance of the systems maintains efficiency (reducing costs) and consistent performance over time, and increase the usable life of the equipment.

ACTIVITY	FREQUENCY			
	A	B	C	D
General cleaning of the unit.		√		
Replacing the filters (when they have deteriorated).	**in case of alarm**			
Clean the finned surfaces of the heat exchange coils (if provided) with a compressed air jet and soft brush.	√			
Empty and clean the condensate drain pans.		√		
Visual inspection for corrosion, limescale, release of fibrous substances, any damage, abnormal vibrations, etc. (if possible, it is advisable to extract the components for a more thorough inspection).		√		
Check condensate drain and cleaning of siphons.	√			
Check the impeller and various devices, with removal of any buildup.	√			
Check the integrity of piping connected to pressure gauges and pressure switches.		√		
Check the electrical ground connection.		√		
Power connection terminal tightness	√			

A: annual
B: every 6 months
C: every 3 months
D: monthly

GENERAL INFORMATION ON CLEANING PROCEDURES

Read the safety instructions at the beginning of this manual and on page 42

Warning: turn off the unit before ordinary and extraordinary maintenance and wait at least 240 seconds before carrying out any maintenance.

You should consult with your supplier of chemical products to choose the most suitable for cleaning the unit components.

For the cleaning method refer to the instructions of the detergent manufacturer and carefully read the safety data sheet (SDS).

As general guidelines, refer to the following rules:

- always use personal protection (safety shoes, safety glasses, gloves, etc.).
- use mild products (pH between 8 and 9) for washing and disinfecting, in normal concentrations. Detergents must not be toxic, corrosive, flammable or abrasive.
- use a soft cloth or bristle brushes that do not damage the stainless steel surfaces.
- if you use water jets, the pressure should be less than 1.5 bar and the temperature must not exceed 60 °C.
- clean components like motors, damper motors, bearings, Pitot tubes, filters and electronic sensors (if applicable), do not spray water directly on them.
- after cleaning make sure that you have not damaged the electrical parts and the gaskets.
- cleaning operations should not involve the lubricated parts, like impeller shafts, because this could affect their good operation and create problems with durability.
- for the cleaning of finned components or dampers use an industrial vacuum cleaner and/or a compressor. Attention, the compressed air flow must run opposite to the direction of air flow through the unit.
- to clean plastic components such as tapping points, grommets, cable glands, connecting tubes and clicks, use a cloth soaked in alcohol. We recommend carrying out the operation during the general cleaning of the unit and when replacing the filters. If cleaning with the alcohol-soaked cloth is insufficient, replace the plastic components

VENTS

Periodically check that there are no new sources of contamination near the air intake. Each component must be checked periodically for the presence of contamination, damage and corrosion. The gasket can be protected with glycerine-based lubricants or replaced with a new one, if worn.

FAN ASSEMBLY

The unit must be disconnected from the power supply when cleaning the fans.

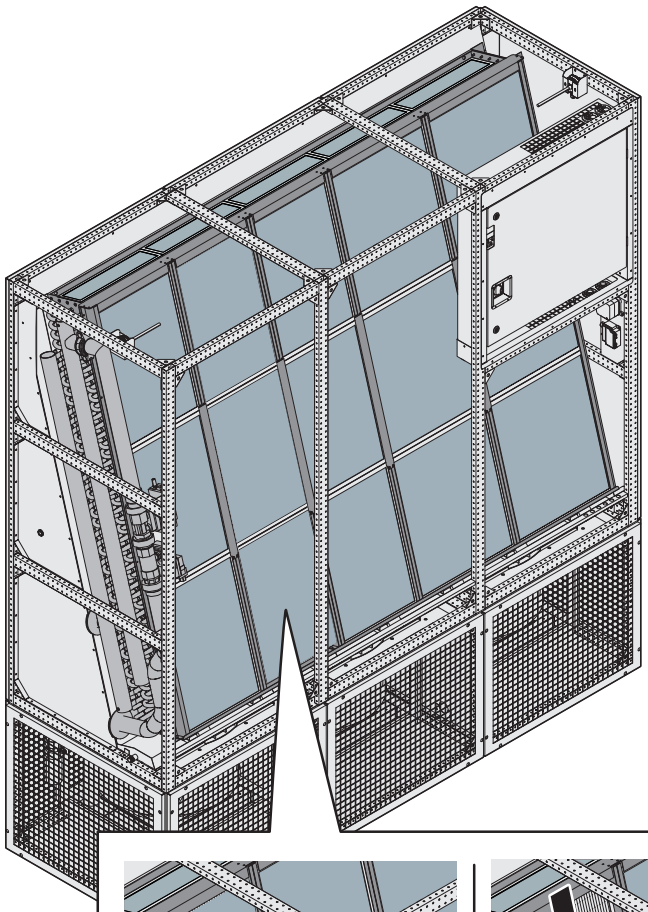
Fans can be cleaned with compressed air or by brushing them with soap and water or with a neutral detergent.
Finish the cleaning by rotating the fan by hand to verify the absence of abnormal noises.

FILTER REPLACEMENT

The unit must NOT be running when the filters are removed to avoid drawing in outside air that might be contaminated.

23 Filters should be replaced every 3-4 months. Remove them following the procedure shown in the figure, extract the new filters from the packaging (in which they are supplied to avoid deterioration during transport and stay on site), insert them in the special containment section, paying attention to their correct positioning.

Remove the filters from their packaging only when ready to install them to avoid getting them dirty and contaminating them.

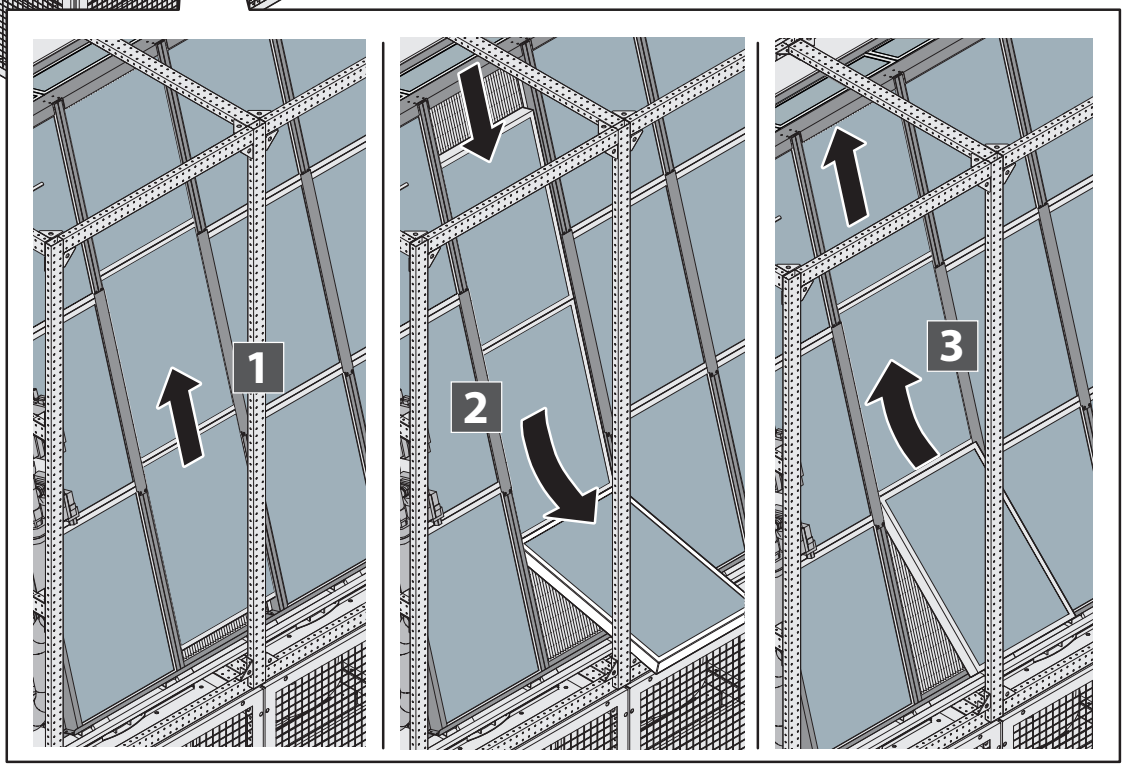


Make sure that the inside of the filter is not contaminated by external agents.

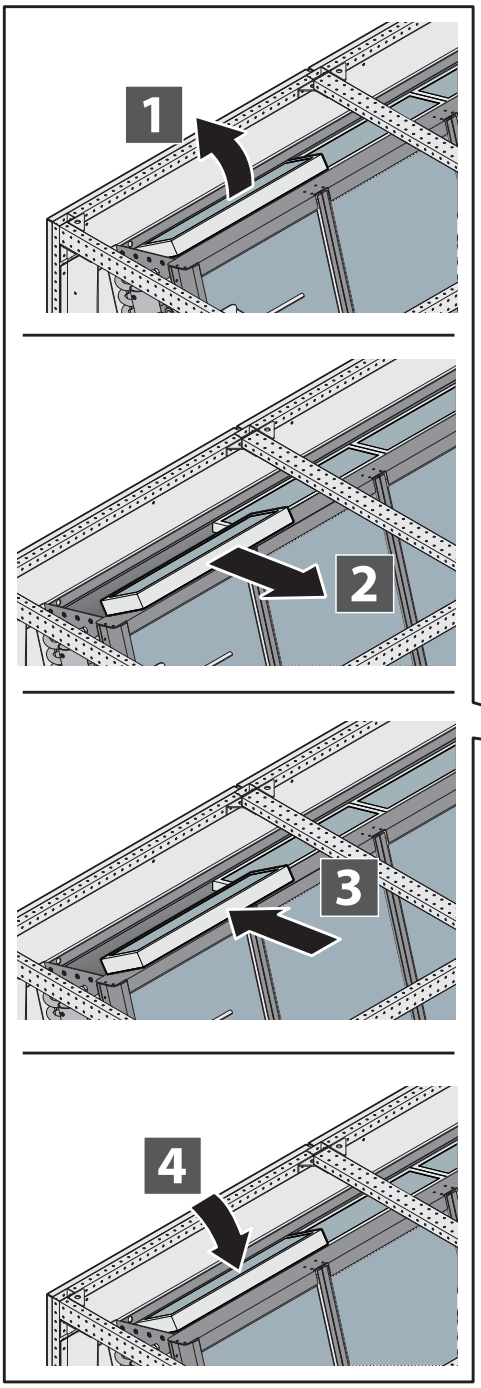
This operation should be carried out about one hour after the first start-up of the unit, the period during which the ducts are cleaned of dust and various debris. Proceeding in this way preserves the filtering sections that cannot be regenerated.

Remove the filters from below, slightly lifting the last filter **1** and tilting it outwards **2** .

Insert the new filters starting from the bottom, stacking them one by one **3** pushing the filters on top.

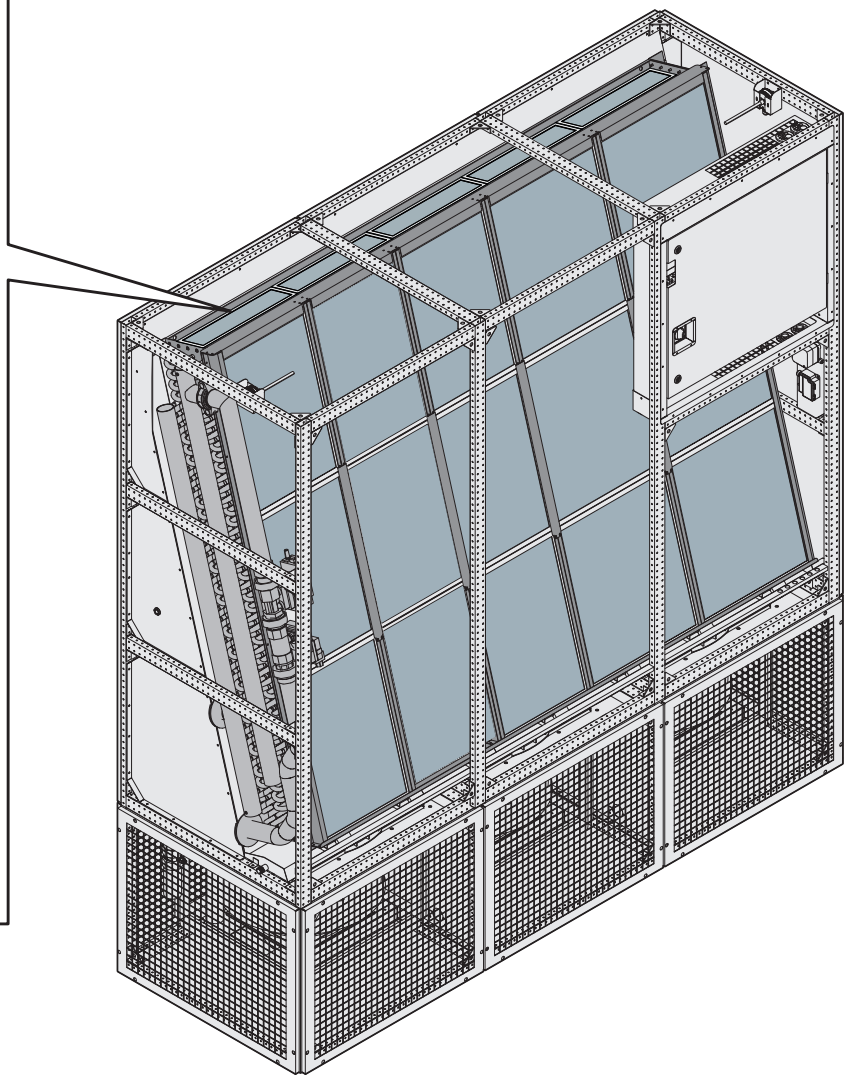


23 Bottom filter replacement



Make sure that the inside of the filter is not contaminated by external agents.
This operation should be carried out about one hour after the first start-up of the unit, the period during which the ducts are cleaned of dust and various debris. Proceeding in this way preserves the filtering sections that cannot be regenerated.

Remove the flexible top coil filters by tilting them upwards and pulling them out from the front **1** **2**.
Insert the new flexible filters by sliding them in from the front and pushing them down to fit into their slots **3** **4**.



24 Top filter replacement

Extraordinary maintenance

Turn off the unit before routine maintenance and wait at least 240 seconds before performing maintenance.

One cannot predict extraordinary maintenance as it is normally due to effects of wear or fatigue caused by the incorrect operation of the unit.

REPLACEMENT OF PARTS

The replacement of parts should be performed by expert personnel:

- qualified maintenance mechanic
- qualified maintenance electrician
- manufacturer technician

The unit is designed to be able to perform all the servicing necessary to maintain good efficiency of the components. However, it sometimes happens that a component fails due to malfunction or wear, so for replacement refer to the executive drawing.

These are the components that may need replacement:

- filters
- fans

For some of these operations of a general nature we will not enter into detail as these are operations that fall within the abilities and professional expertise of the staff assigned to perform them.

CONSUMABLE COMPONENTS - SPARE PARTS

During the operation of the unit there are particular mechanical and electrical components that are most subject to wear. These parts must be monitored in order to carry out their replacement or repair before they cause problems to the correct operation of the unit with consequent downtime.

Disposal of used materials - waste

The unit is made with metal, plastic and electronic components.
All these components must be disposed of in compliance with local disposal laws and, where applicable, with those transposing Directive 2012/19/EU (WEEE).

Diagnostics

GENERAL DIAGNOSTICS

The unit's electrical system includes quality electromechanical components and is therefore extremely durable and reliable over time.
Should there be any malfunctions due to malfunctions of electrical components it will be necessary to act as follows:

- check the fuses of the power supply for the control circuits and if necessary replace them with fuses having the same specifications.
- check if the thermal protection switch for the motor has been triggered or if its fuses have blown.

If this has occurred, it may be caused by:
- motor overload due to mechanical problems. They need to be solved.
- incorrect supply voltage. Verify the protection trip threshold.
- malfunction and/or short circuits in the motor. Identify and replace the failed component.

ELECTRICAL MAINTENANCE

Do not modify the unit for any reason and do not add other devices.
The manufacturer is not liable for resulting malfunctions and problems.
Further clarification is available by contacting the manufacturer's Customer Service.

Troubleshooting table

MALFUNCTION TYPE	COMPONENT	POSSIBLE CAUSE/SOLUTION
NOISE LEVEL	Fan impeller	Impeller deformed, unbalanced or loose
		Nozzle damaged
		Foreign bodies in the fan
	Motor	Incorrect supply voltage
		Worn bearings
		Contact between the rotor and stator
	Ducts (units with ducts and spigots only)	Excessive speed in the ducts
INSUFFICIENT AIR FLOW	Ducts	Load losses superior to the demand
		Obstructions in the ducts
	Filters	too dirty
	Heat exchange coils	too dirty
EXCESSIVE AIR FLOW	Ducts	Load losses inferior to the demand
		Ducts too large
		Terminals not installed
	Unit	Filters not inserted
		Access doors open
INSUFFICIENT THERMAL EFFICIENCY	Heat exchange coil	Incorrect connection of inlet/outlet piping
		Heat exchange coil dirty
		Air bubbles in the pipes
		Excessive air flow
	Fluid	Temperature different from the project
		Incorrect regulation bodies
WATER LEAK	Fan section	Leak from the coil due to corrosion
		Dragging of drops due to high air velocity
		Clogged "overflow" drain

Repair log

DATE	SERVICE TYPE	TIME REQUIRED	SIGNATURE

Repair log

DATE	SERVICE TYPE	TIME REQUIRED	SIGNATURE

DAIKIN APPLIED EUROPE S.p.A. Via Piani S. Maria, 72 - 00072 Ariccia (Rome) Italy - www.daikinapplied.eu