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Mod: AN201-PED/A

Production code: ATB201

Diamond
catering equipment

Instruction manual **COMMERCIAL** units

Gebrauchsanweisungen Kühlaggregate im ***GEWERBEEINSATZ***

Manual de instrucciones unidades **COMERCIALES**

Mode d'emploi unités ***COMMERCIALES***

Manual de instruções unidades **COMERCIAIS**

Manuale istruzioni unità ***COMMERCIALI***

CE
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JANUARY 2012

➔ *The data of the manufacturer are indicated on the label identifying the unit, which is on the right side of the condensing unit.*

➔ *The unit documentation consists of:*
- **Instruction manual;**
- **Instrumentation book;**
- **Wiring diagram and relative legend;**
- **Refrigerating system diagram and relative legend;**

➔ *For a correct use of the refrigerating units, read carefully the manual and follow scrupulously the instructions written in it.*
The manufacturer disclaims all responsibility for injuries to persons or damages to things due to the non-observance of the instructions of this manual.

➔ *This manual has to be kept with care for any other references.*

➔ *It is forbidden the total or partial reproducing of this manual without the written authorization of the manufacturer.*

➔ *The manufacturer reserves the right to make the necessary changes at any time.*

The manual is divided into the following subjects:

❍ **1** ❍ ***GENERAL INSTRUCTIONS***
❍ **2** ❍ ***INSTALLATION***
❍ **3** ❍ ***REFRIGERATING CONNECTION***
❍ **4** ❍ ***ELECTRIC CONNECTION***
❍ **5** ❍ ***HYDRAULIC CONNECTION***
❍ **6** ❍ ***DESCRIPTION OF THE UNIT***
❍ **7** ❍ ***COMMISSIONING***
❍ **8** ❍ ***USE***
❍ **9** ❍ ***CONTROLS***
❍ **10** ❍ ***PROTECTIONS AND SAFETIES***
❍ **11** ❍ ***CLEANING, MAINTENANCE AND FAILURES***

TECHNICAL SPECIFICATIONS

	Low pressure side (LP)	High pressure side (HP)
PS	16,5 bar	28 bar
TS [min / max]	-40°C / +50°C	-10°C / +80°C

❍ 1 ❍ *GENERAL INSTRUCTIONS*

❖ The refrigerating unit is manufactured by respecting the regulations 73/23/CEE (low voltage), 89/336/CEE (electromagnetic compatibility) and the subsequent modifications.

❖ Read carefully the labels on the unit, do not cover them for any reason and replace them immediately if they are damaged.

❖ Do not store inflammable materials near the unit.

❖ Do not remove the protections or the panels that have to be taken off with tools.

❖ Do not use the unit in an explosive atmosphere.

❖ Do not wash the unit with direct or under pressure water jets, or with noxious substances.

❖ Do not put liquid containers on the unit.

❖ Place the unit far from sources of heat and of moisture.

❖ Pay attention not to damage the supply cable by bending, crushing or stress.

❖ Do not use the unit if the supply cable is damaged.

❖ The unit does not cause harmful vibrations; they are anyway below 2,5 m/s^2 on the superior limbs and 0,5 m/s^2 on the other parts of the body.
In normal conditions, the unit does not cause harmful vibrations to the surroundings.
The greatest vibrations are caused by the compressor; for this reason all the compressors, installed on our units, are provided with shock absorber feet (silent block or other similar methods) and they are connected to the refrigerating circuit through flexible pipes.

❖ Do not turn off the water interception tap while the unit is working.

❖ Pay attention to children and other people in the working area.

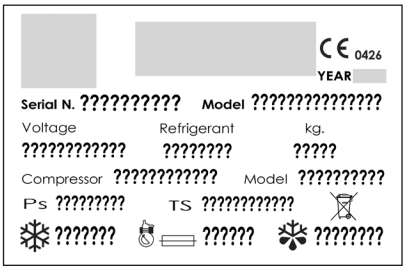
❖ In case of fire use a dry-chemical extinguisher.

❖ If during the work, unexpected problems crop up, act immediately on the main switch, which is on the switchboard of the unit.

Introduction:

Take the unit to the place of work; control if all the details concerning the installation have been arranged i.e. electric supply: holes in the walls for the units or for the drainpipes, the eventual unions for the water feed line.

The label identifying the unit is on the right side of the condensing unit, in the corner high above on the left.



❍ 2 ❍ *INSTALLATION*

The installation has to be executed by skilled workers who have the necessary technical qualifications established by the country where the unit is installed.

Proceed with the installation by following the drawings of the mounting diagrams (**See diagrams a÷z$_2$**) and what below-described:

➢ **Wall-mounting units**: With the help of the forklift truck take the unit in correspondence with the installation hole, then introduce it in the place prepared; when the unit will be in the definitive position, make holes in correspondence with the fixing supports (**fig. 2-1**) and finish the positioning by using the screws provided (**fig. 2-2**). As concerns the units forms 4 and 5, after having made holes for the fixing (**fig. 2-3**) you have to mount bolts, nuts, washers and support plates provided together with the unit (**fig. 2-4**). Inject polyurethane or other insulating material in the split between the perimeter of the hole in the cold room wall and the unit insulated panel.

➢ **Straddle units**: Make sure that the cold room ceiling has not been mounted, then take the unit in correspondence with the installation holes and introduce it in the place prepared. When the unit will be in the definitive position, install the cold room ceiling, then make holes in correspondence with the fixing supports (**fig. 2-1**) and use the screws provided (**fig. 2-2**). Unscrew the spacer blocks that lie on the evaporating side by means of the nut till its base leans on the cold room wall (**fig. 2-5**); screw the nut again forcing till the evaporator is levelled (**fig. 2-6**). Join the drainpipe, making it pass through the hole made in the cold room wall and then introducing it in the plastic union that lies on the condensing side back (**fig. 2-7**). Inject polyurethane or other insulating material in the splits left around the evaporator supports.

➢ **Ceiling units**: By using a forklift truck, take the unit near the hole made in the cold room ceiling, then put it in the place foreseen. Remove the lifting cable and keep it for an eventual future use. Inject polyurethane or other insulating material in the split between the perimeter of the hole in the cold room ceiling and the unit insulated panel.

➢ **Split and Bi Block units**: Put the evaporating unit in the definitive position by means of the forklift truck, make holes in the ceiling in correspondence with those already present on the bearing beams of the unit (**fig. 2-8**). Fix the evaporator to the wall following the right procedure: threaded bars passed through, like those provided (**fig. 2-9**), or expansive inserts or something else according to the structure of the cold room ceiling. Inject insulating material round the holes in the ceiling.
On the wall, where the condensing unit of the units form 1, 2, 3 is going to be installed, fix expansive inserts with hook supplied with the unit (as concerns the dimensions, see the mounting diagram). Take the condensing unit to its definitive place and hang it on the hooks just fixed in such a way that they stick perfectly in the buttonholes that lie on the back of the condensing unit (**fig. 2-10**). The condensing units forms 4 and 5 have to be fixed as normally done for the Wall-mounting units of the same form (**figures 2-3** and **2-4**). The horizontal condensing unit does not need any fixing.

➢ **Condensing units**: See what is described as concerns the installation of the condensing units of the Split models.

N.B. For an optimal use of the Condensing unit it is advisable to connect it with an evaporating unit, asking the distributor for the exact corresponding model. If an evaporator of a different brand or model is installed, the installer has to check if its technical characteristics are in accordance with the dimensioning foreseen by the manufacturer of the Condensing unit; that should not be the case, it is possible to execute the necessary changes only after having consulted the manufacturer.

➢ **Evaporating units**: See what is described as concerns the installation of the evaporator of the Split models.

N.B. For an optimal use of the Evaporating unit it is advisable to connect it with an condensing unit, asking the distributor for the exact corresponding model. If a condensing unit of a different brand or model is installed, the installer has to check if its technical characteristics are in accordance with the dimensioning foreseen by the manufacturer of the Evaporating unit; that should not be the case, it is possible to execute the necessary changes only after having consulted the manufacturer.

If the unit is installed in a cold room set indoors, make sure that the room is good aired.

N.B. Make sure that the wall and the ceiling, on which the unit has to be fixed, can bear the weight indicated in the relative table (**tab. 1**).

N.B. Remember that any time you have to move the unit, you have to lift it up and never push or drag it.

➢ **Lamp holder of the cold room light**: Open the lamp holder by loosening the screws (**fig. 2-11**) , make holes in the points indicated (**fig. 2-12**), then with the screws provided or another sitable system fix the bottom of the lamp holder to the cold room wall (**fig. 2-13**) and near enough to the unit (maximum distance 1,5 m), so that it would not be necessary to lengthen the corresponding cable. After having connected the cable (see paragraph “ELECTRIC CONNECTION”), screw in the lamp and close the lamp holder again.

➤ **Remote control panel**: Open the board by loosening the screws that are in the corners or on the front side flanks (**fig. 2-14**). On some remote control panel models it is necessary to make holes in the little round hollows which are on the bottom of the box near the corners (**fig. 2-15**) and whose centre coincides with the centre of the bearing feet on the back. Fix the panel in a correct way (self-tapping screws, expansive inserts, etc.) using the present or just made holes (**fig. 2-16**); on some models caps are provided to close the fixing hollows (**fig. 2-17**). Make the eventual electric connections (see paragraph "ELECTRIC CONNECTION") and close the panel again.

❍ 3 ❍ *REFRIGERATING CONNECTION*

The refrigeration connection has to be executed by skilled workers who have the necessary technical qualifications established by the Country where the unit is installed.

To execute this connection, which is necessary on the Split and Bi Block models, you have to use the pipes provided with the units or those suggested in the relative table (**tab. 2**).

Usually the pipe installation is executed first of all positioning them and then connecting the unions provided with victualic couplings.

During the positioning of the suction pipe, remember that it has to lean lightly towards the compressor (**fig. 3-1**). In case there are rising tracts, it is necessary to make one or more syphons (**fig. 3-2**) before the vertical tract in order to make the return of the oil to the compressor easy; it is very important that the syphons have not too marked curvatures or sinks, specially when the section of the pipe is very large (**fig. 3-3**). As regards the liquid delivery pipe you have not to follow particular rules except for the beauty and the functionality; for this reason this pipe is normally put beside the suction pipe, certainly without making any syphons (**fig. 3-3**). Both pipes have to be fixed to the wall near the bends and on the straight tracts every 1,5 - 2 metres (**fig. 3-4**).
When the pipe positioning has been finished, the unions have to be joined. During this operation make sure that the connecting pipe is perfectly perpendicular to the surface on which the fixed union is fastened; in any case before tightening firmly the union, make sure that the screw thread has entered correctly. In case the union is a flange to be welded, remove the movable part of the union and then weld it with the pipe. Fix the two union parts again by interposing the gasket. In the Bi Block models, when the pipe connection has been finished, you have to create the vacuum in them and in the evaporator (the compressor- condenser- liquid receiver group is already under gas pressure); after having done this, the outlet shut-off valves of the liquid receiver and the suction shut-off valves of the compressor can be turned on, putting in this way the whole system under pressure. When the unit has been already set in motion, control if it would be necessary to fill up the system with gas or oil.

❍ 4 ❍ *ELECTRIC CONNECTION*

The electric connection has to be executed by skilled workers who have the necessary technical qualifications established by the Country where the unit is installed.

Control that the voltage on the line corresponds with that indicated on the label fixed to the supply cable of the unit.
The supply cable has to be well spread out (avoid rolling up or placing over), in a place not exposed to possible hits or tampering done by minors and it has not to be near liquid or water and heat sources, it has not to be damaged (if it was damaged, it should be replaced by skilled workers).
Use supply cables of the type and with the section suggested by the manufacturer, as indicated in the relative table (**tab. 3**).
In case of replacement of the supply cable, make sure that the protection against the water penetration has been respected.

The electric supply system has to be provided with earth fault breaker or with a general automatic switch with an efficient floor outlet. If there is not any electric safety, an omnipolar switch has to be installed by skilled workers according to the safety regulations in force, with an opening distance of the contacts equal or superior to 3 mm.
The manufacturer disclaims all responsibility, if these accident prevention-regulations are not observed.

In the Split models the condensing unit has to be connected with the evaporator: the cable that has to be used, whose characteristics are indicated in the relative table (**tab. 3**), is that coming out from the left side of the condensing unit.

In the Bi Block models the condensing unit has to be connected with the evaporator: the cable (not supplied) that has to be used is indicated in the relative table (**tab. 3**).

The connection of the evaporator of the Split units has to be executed as follows:
remove the screws on the front side of the basin (**fig. 4-1**) so that those lying on the back side could act as a pivot and consequently the part to which the fans are fixed could open (**fig. 4-2**). Take the lid off the connection box (**fig. 4-3**), make the cables pass through both the cable glands that lie on the flank and through those lying on the connection box (**fig. 4-4**). Then execute the connection respecting the numerations indicated on the wires and on the terminal board labels. Tighten the cable glands so that the cables inside the evaporator could be well taut, close the connection box again and finally close the evaporator frame by using the screws previously removed.

The connection of the evaporator of the Horizontal Bi Block units forms 1, 2, 3a has to be executed by following the same instructions concerning the connection of the evaporator of the Split units.
After having connected the evaporator, connect the condensing unit in the following way:
remove the unit front panel (**fig. 4-14**). Open the switchboard. Make the cables pass through both the cable glands that lie on the right flank of the condensing unit and through those lying on the right flank of the switchboard (**fig. 4-15**); then execute the connection by respecting the numerations indicated on the terminal board.
Close the switchboard and install the front panel again.

The connection of the evaporator of the Bi Block units and Horizontal Bi Block units forms 3b, 4, 5 has to be executed as follows:
take the right side of the evaporator off (**fig. 4-5**) and open the electric connection box (If the boxes are more than one, the connection box is always the lowest one). Open the switchboard of the condensing unit (in the units form 6 you have to open the panel set below on the left side of the unit, then open the plastic boxes). Insert the cables in the protection pipes (**fig. 4-6**), then carry out the connection respecting the numerations indicated on the terminal board of the condensing unit switchboard and of the connection box of the evaporator as indicated in the wiring diagram.

Cold room light cable (present on all units except the Split, Bi Block and Condensing units): has to be connected, by respecting the polarities, with the lamp holder supplied with the unit that should be already positioned (see paragraph "INSTALLATION"). Insert the lamp supplied in the lamp holder; in case of replacement of the lamp, use an incandescent lamp with a highest power of 60 W. A peak load of 200 W can be connected to the cable.

N.B. The cable gets voltage from the unit switchboard: do not connect it to an external supply.

Door heater cable (only on the low temperature units): is prepared to supply the antifreezing heater that usually lies inside the door gasket as concerns the cold rooms working at low temperature. It can be used to supply the eventual compensation valve provided with the unit as well: the important thing is not to exceed the peak load that the cable can bear equal to 200 W. To execute the connection is necessary to respect the polarities.

N.B. The cable gets voltage from the unit switchboard: do not connect it to an external supply.

Door microswitch cable (only on the units with electronic control panel): is predisposed for the connection of an eventual microswitch that the user has to install on the cold room door. During the connection it is possible to work things in such a way that the electronic control panel operates automatically the light switching on and the stop of the fans or of the whole unit, when the cold room door is opened. It is also possible to select these functions through the programming of the parameters of the electronic control panel. The two poles of the cable are to be connected to the microswitch contact that is closed when the door is closed. If no microswitch is connected, the two wires have to remain connected to each other as delivered. In the Split and Bi Block units there is not the cable coming out of the unit, however the electronic control panel is predisposed for the connection.

N.B. The cable gets voltage from the unit switchboard: do not connect it to an external supply.

➤ **Condensing Units**: On the terminal board lying on the back side of the electric switchboard, there is the possibility to install a thermostat (or any other instrument) that controls the unit working; to execute this connection act as follows:
remove the fixing screws of the front side (**fig. 4-7**), take the front side off after having disconnected the ground wire (**fig. 4-8**), remove the fixing screws of the electric switchboard (**fig. 4-9**), take the switchboard off its proper place (**fig. 4-10**), place the switchboard carefully laying it on the front side so as to manage to approach the protection fixed on the back (**fig. 4-11**), remove the screws fixing the protection (**fig. 4-12**), take the plastic protection off and remove the bridge between the terminals marked with the letters "ne" (**fig. 4-13**) and, instead of it, connect the thermostat contact. Repeat all the operations in the opposite order till the beginning conditions are restored.
In some models, above all of the Horizontal condensing units, the terminal board is inside the electric switchboard.

➤ **Evaporating units**: See what is described as concerns the connection of the evaporator of the Split models.

The connection of the unit supply cable has to be made respecting the colour of the wires.

If the supply provides for the remote control panel, this is delivered with the cable and already connected. If, in case of not standard supplies, the control panel is not connected, the connections have to be executed respecting the wiring diagram and the numerations of the terminals and of the wires.

N.B. To limit the damages due to electrical noises, we suggest placing the cold room cable, the remote control panel cable and the probe cable as far as possible from the cables with a high power; anyway prevent the above-mentioned cables from crossing the power ones.
If the unit is supplied by a power generator, make sure that the signal is perfectly sinusoidal: a square wave could cause noises which can damage the electronic instrument.

Every time you connect an evaporator or a remote control panel, a ground connection is to be executed; for this purpose near the terminal boards there is a screw or a terminal with the symbol ⏚ to which the ground cable has to be linked.

The ground connection of the unit is compulsory. Furthermore the unit has to be included in an equipotential system. The connection is done by a terminal marked with the symbol ⏚ set near the entrance of the line cable in the unit.

❍ 5 ❍ *HYDRAULIC CONNECTION*

This paragraph deals with the connection of the water condensers (only for the units provided with them) and of the condensed water drains.
To connect the condensers you have to use pipes with a 3/8" diameter (except in the Wall-mounting units forms 4 and 5 in which the pipe diameter is 5/8") that have to be inserted in the machine tapers respecting the inlet and outlet indications. These machine tapers are to be screwed tightly so as to be sure that water cannot enter them.
Place the interception tap of the water feed line within the reach of the user.
To improve the efficiency and the working service of the unit verify if:

- the water temperature is between 20 and 30°C for the units with condensation by tower water and between 5 and 20°C for the units with condensation by well water;
- the water pressure is between 1 and 5 bar.

The drains are joined in the following points:

- in the **Wall-mounting and Straddle units (forms 1, 2 and 3)** under the condensing side on the right (**fig. 5-1**);
- in the **Wall-mounting units (forms 4 and 5)** under the condensing side in its middle point near the wall (**fig. 5-2**);
- in the **Ceiling units, where the water is thrown away**, on the evaporator by using the pipe that lies on the front or back side of the basin (**fig. 5-3**);
- in the **Ceiling units with water drain evaporation basin** on the condensing side under the condensing battery (**fig. 5-4**);
- in the **Split, Bi Block and Evaporating units** on the evaporator by using the union fixed in the lower point of the basin (**fig. 5-5**).

- The water drainpipe has to lean at least 3 cm every metre in length.
- As regards the models, where the water is thrown away, we have to underline that the draining tract in the cold room has to be as short as possible and a slope even greater than that above-mentioned has to be guaranteed: this will be useful to avoid icing up.
- On all models, which are not provided with a condensed water drain evaporation basin, a syphon has to be made on the draining tract outside the cold room (**fig. 5-6**) and furthermore, if the temperature of the installation place falls below 0°C, it is necessary to insulate the drainpipe.

N.B. An incorrect installation could cause injuries to people and damages to things for which the manufacturer cannot be considered responsible.

❍ 6 ❍ *DESCRIPTION OF THE UNIT*

The main components are indicated in the **fig. 6-A**.
Description of the controls and of the instruments on the switchboard front panel **fig. 6-B**.

6-1 - **Electronic instrumentation (electronic control panel or instrument)**: you can find the corresponding instructions in the enclosed handbook.

6-2 - **Main switch (in the units provided with an electronic control panel it lies in the keyboard)**: it is used to supply the auxiliary circuit.

6-3 - **Cold room light switch (in the units provided with an electronic control panel it lies in the keyboard)**: it is used to supply the cable that is to be connected to the lamp for the cold room illumination.

❍ 7 ❍ *COMMISSIONING*

✓ Before actuating the main switch make sure that the unit is provided with compressor preheating system. In this case, to execute the preheating the unit is to be supplied, even though the main switch has not to be switched on so that only the compressor crankcase heater is supplied.
✓ Leave the machine in this condition for a few hours; the duration of this preheating phase depends on the temperature of the place where the unit is set: the higher the temperature is, the less this phase lasts (3 hours), the colder the climate is, the more the preheating-time has to last (8÷10 hours).
✓ At the end of the preheating, set the main switch in the "start" position or press the "ON/OFF" button of the remote control panel.

N.B. If the instrument does not start, control if the unit is provided with a voltage monitor (par. 10-3); in this case you have to wait for the counting end of this device (about 6 minutes).

❍ 8 ❍ *USE*

For a correct use, the product has always to be put in the cold room with a maximum temperature of 5°C higher than the preservation one and you have to reduce the openings of the cold room door to the minimum necessary; furthermore when you position the product in the cold room, make sure that it does not obstruct the correct flow of air through the evaporator.

The optimal working conditions are at a temperature between 15°C and 40°C and with moisture between 30 and 95%.

Utilization:

High and **Medium** temperature models: .....*Preservation of fresh products*
Low temperature models: .....*Preservation of frozen products*

❖ The units have to be used only for these purposes.

❖ Utilizations different from those above-mentioned are not allowed.

❖ The manufacturer disclaims all responsibility for injuries to persons or damages to things due to an inappropriate, wrong or irrational use.

❍ 9 ❍ *CONTROLS*

The devices that control the unit working are the following (**fig. 9-A**):

9-1 ***Electronic control instrumentation***

It can be of two types: the electronic control panel (standard on the VT, SF, SV and CS models) or the instrument (for the VS, AC, SL models). The same instrumentation type is installed on the units provided with remote control panael.
The main differences consist in the fact that the electronic control panel has many more functions than the instrument, furthermore has a separate keyboard from the power side and the main switch and the cold room light switch are located in its inside. Both equipments perform the functions of room thermostat and defrost control, besides many other functions described in the specific handbook enclosed with the documentation, in which the instructions for their use and programming are indicated as well.

9-2 ***Fan pressure switch***

It is a device that is installed only on specific request (standard on the Bi Block units forms 4 and 5) and it is used as a regulator of the con densation pressure; its use is absolutely necessary when the unit is installed outdoors, where the temperature can be 0°C or even lower.
The control happens as follows: the pressure switch is connected on the supply line of one of the condenser fans and it is in communication with the compressor delivery line. When the pressure on this line is higher than the programmed value of the pressure switch,

the fan is set in motion in order to increase condensation, on the contrary if the pressure is lower, the fan stops to avoid an excessive condensation. The pressure switch is fixed next to the compressor, it is calibrated at 15 bar in the units with R22 refrigerant and at 18 bar in the units with R404A refrigerant. The differential is calibrated at 2,5 bar.

9-3 *Condenser fan speed regulator*

It is standard on the Wall-mounting models forms 4 and 5; furthermore, instead of the fan pressure switch, a condenser fan speed regulator can be installed on request: when this electronic device, which does not control directly the gas pressure coming from the compressor but the temperature of gas already condensed, is employed, the regulation of the condensing temperature is linear and no more "with steps" as it is described with regard to the fan pressure switch. Practically speaking, there is no more an ON-OFF working of the fan and the consequent variation of condensation as regards the calibration value, in this case in fact, after a brief initial period of adjustment, the fans reach a speed that allows to maintain a constant condensing temperature. The speed regulator is fixed inside the switchboard and it is calibrated in the factory; the speed regulator probe lies on the contrary in a proper housing placed on the outlet pipe of the condenser.
If, in case of a failure, it is necessary to replace the speed regulator or the corresponding probe and the spare part is not immediately available, you can anyway set the machine in motion by excluding this regulation. In order to do it, set the speed regulator bypass switch (**fig. 9-3a**) (it is inside the switchboard) in the position "1". After having changed the damaged part, remember to restore the original functioning.

Instructions for the regulation
- Change of the setpoint:
the setpoint is the temperature value to which corresponds an outlet voltage of 0 Volt. The setpoint can be modified by the "Set" trimmer, which has a regulation field from 0 to 60°C. It is calibrated in the factory at 35°C.
- Change of the differential:
The differential is the temperature value that, if it is added to the setpoint value, comes to the value corresponding to the highest outlet voltage (230V). It can be changed by the "Differential" trimmer, within the limit values 3 and 30°C. It is calibrated in the factory at 15°C.
N.B. The trimmers "V min" and "Cut off" have to be set at 0%.

9-4 *Liquid Gas line filter*

It is on the liquid gas line, just after the liquid receiver or, in the units on which there is not the receiver, on the outlet pipe of the condenser.

9-5 *Liquid gas line solenoid valve*

It is installed only on request (standard on the evaporator of the Bi Block units forms 4 and 5). It is installed so as to interrupt the liquid flow when the unit has to stop for the defrost or as the programmed temperature value has been reached: in this way the stop of the unit takes place when the compressor is in vacuum.

9-6 *Capillary tube*

It lies at the entrance of the evaporator and it allows the gas, coming from the liquid gas pipe, to reach the evaporation pressure. It is present in all units, except for the Bi Block units forms 4 and 5.

9-7 *Thermostatic valve*

It is installed only on request instead of the capillary tube, but it is standard on Bi Block units forms 4 and 5. Even though it performs the same function, it is undoubtedly a more sophisticated device that, unlike the capillary tube, can be regulated. The valve calibration is executed in the factory.

9-8 *Liquid indicator*

It is installed only on request, but it is standard on the Bi Block units forms 4 and 5. It is on the left side of the unit and it is visible from outside. The indicator has usually to be controlled when the unit is working: if you notice a persistent transit of gas bubbles, this can mean that there is a lack of gas in the system; on the contrary if the indicator is clear and you notice only some sporadic transit of bubbles, this means that the gas quantity is correct.

9-9 *Suction pressure regulating valve*

It is installed on some low temperature units with defrost by hot gas and up to form 3. It serves to maintain the compressor suction pressure during the defrost within acceptable values. It lies on the suction pipe, near the compressor. It is calibrated in the factory.

9-10 *Switchboard heater*

It is an optional accessory that is required when the unit has to be installed in a place with a very harsh climate (temperature below -10°C for long periods); it serves to maintain inside the switchboard, where it is installed, the right temperature for the correct functioning of the electric components. This device is provided with an inner temperature regulator.

9-11 *Defrost solenoid valve*

It is installed on all units, except the High temperature ones and all Split and Bi Block series. It opens, every time a defrost is requested. In the units up to form 3, hot gas used for the defrost passes directly through the solenoid valve. In the bigger units the solenoid valve operates the deflection valve (9-12) that controls the gas passage. The solenoid valve closes again at the end of the defrost.

9-12 *Defrost deflection valve*

It is on the Wall-mounting units, forms 4 and 5 except the High temperature ones and it serves to deflect the hot gas flow from the condenser to the evaporator to execute the defrost. To work it has to be controlled by a solenoid valve (9-11).

9-13 *Non-return valve of the defrost line*

It is installed on the Wall-mounting units, forms 4 and 5 except the High temperature ones and it lies on the pipe of the defrost line at the entrance of the evaporator. It serves to prevent the liquid formed in the evaporator from flowing back along the defrost line, at the end of the defrost.

9-14 *Defrost heaters*

They lie on the evaporator of all the Split and Bi Block units, except the High temperature ones, ranges and they are used to heat the

evaporating battery during the defrost.

9-15 ***Drain heater***

It is set inside the evaporator drainpipe. It is present on all medium and low temperature units. In the units with defrost by hot gas,

it is controlled by the main switch (when the unit is on, the heater is always working), whereas in the Split and Bi Block units it is electrically connected with the defrost heaters. It is used to discharge the water produced during the defrost, in order to prevent the water freezing inside the drainpipe.

9-16 ***Crankcase heater***

It is standard installed on the compressors of the Wall-mounting and Bi Block units forms 4 and 5; it is used to heat the crankcase before the starting and to keep it hot during the compressor stop.
The heat produced by the heater causes the evaporation of the eventual liquid-state refrigerant that is inside the compressor: in this way the compressor starting stress is reduced and, above all, the valve breaking is avoided, which otherwise could be a consequence of the liquid compression.
It is indispensable when the unit is installed in places with low temperature.
The heater works manually when the unit is connected with the supply line and the main switch is in position "OFF", or it starts up automatically when the unit is executing the refrigerating process.

❍ 10 ❍ *PROTECTIONS AND SAFETIES*

Description of the protection and safety devices (**fig. 10-A**):

10-1 ***High pressure switch***

It serves to interrupt the unit working if the system pressure is too high. After it has tripped, the high pressure switch restarts automatically. The high pressure switch is fixed next to the compressor and there are two different types of it: with fixed calibration or adjustable. In any case the tripping limit has to be 24 bar in the units with R22 refrigerant and 28 bar in the units with R404A refrigerant. The differential is calibrated at 4 bar. It is standard on the three-phase units, but it can be installed on all units on request.

10-2 ***Low pressure switch***

It trips, stopping the unit, when the pressure in the suction circuit falls below the value at which it is calibrated. Its restarting is automatic. Also this pressure switch lies next to the compressor and it can be with fixed regulation or adjustable; in both cases the tripping limit is about -0,3 bar (in the units for cold room temperature of 0°C or even higher, this limit could be slightly higher, maximum 0,1 bar). Normally the differential is 1 bar.
This pressure switch normally trips as a consequence of a failure or a working anomaly. However, if on specific request, the compressor stop in vacuum is forseen, the pressure switch always trips in the following cases:
• stop as the programmed temperature value has been reached in the cold room,
• compressor stop during the defrost phase.

10-3 ***Voltage monitor***

It is an electronic instrument that is installed only on specific request. It serves to interrupt the unit supply when the voltage on the line, at the beginning of the unit, is beyond the programmed limits.
These limits (maximum and minimum) can be regulated; the restarting is automatic when the normal conditions are re-established with a delay that can be programmed on the instrument as well. The monitor is installed inside the switchboard.

*Instructions for the regulation (**Fig. 12-1**)*
- Programming of the counting/and delay time:
If the dip switch (**A**) is on the left and the dip switches (**B**), (**C**) and (**D**) are on the right, the delay time will last about 6 minutes; if the dip switch (**A**) is put on the right, the time will be reduced to 9-10 seconds.
To this time 10, 20, 30 seconds can be added, by moving respectively the dip switches (**B**), (**C**), and (**D**) on the left.
- Change of the voltage limits:
If the dip switches (**E**) and (**F**) are positioned on the left, the monitor will switch on, if the indicated voltage has a 12% higher or lower value than usual. It is possible to increase further the limits by 4% or 8%, moving respectively the dip switches (**E**) and (**F**) on the right.

10-4 ***Fan protection thermocontact***

All the fans used have inside this contact that, if correctly connected, interrupts the fan supply in case of overheating of the corresponding motor winding. This device restarts automatically when the normal conditions are restored; its trip value is fixed by the manufacturer. In some fans the thermocontact is already connected inside the motor.

10-5 ***Fuses and automatic switches***

Each of them has a specific function as indicated in the wiring diagram and in the corresponding legend provided with the unit. If some apparatuses of the unit do not work, we suggest that you should control first of all the efficiency of the fuses or of the automatic switches.

❍ 11 ❍ *CLEANING, MAINTENANCE AND FAILURES*

The maintenance has to be executed by skilled workers who have the necessary technical qualifications established by the country where the unit is installed.

Before doing any maintenance or cleaning works, insulate the unit from any source of electric energy or of waterpower.

To clean the unit, water jets have **NEVER** to be used.

To execute the maintenance and assistance operations, it could be necessary to remove the front panel of the unit condensing side. In accordance with the models, act as follows:

➤ **Wall-mounting, Straddle, Split, Bi Block, Condensing Units and Horizontal Units (form 4 and 5)**: loosen and take the screws off that fix the front panel (**fig. 11-1**) (in the Wall-mounting and Bi Block units form 5 remove the screws only from the right panel), move the lower side (the upper one for the Wall-mounting and Bi Block units forms 4 and 5) of the panel from the unit for about 20 cm, but the upper side (the lower one for the Wall-mounting and Bi Block units forms 4 and 5) of the panel has to remain caught in the flange (**fig. 11-2**); loosen the fixing of the ground cable that joins the front panel from the unit inside (**fig. 11-3**), then lift and remove the panel (**fig. 11-4**). To restore the beginning conditions, repeat the operations in the opposite order.

➤ **Ceiling and Horizontal units forms 1, 2 and 3**: loosen and take the screws off that fix the panel (**fig. 11-5**), move the panel from the unit, so that you could enter the unit with an hand (**fig. 11-6**); loosen the fixing of the ground cable that joins the front panel from the unit inside (**fig. 11-7**), then remove the panel (**fig. 11-8**). To restore the beginning conditions, repeat the operations in the opposite order.

The maintenance concerns above all the cleaning of the air condenser: this operation has to be executed by using an air jet from the inside of the unit towards the outside or by cleaning the external side of the condenser with a long soft bristle brush (**fig. 11-9**). Normally the condenser has to be cleaned once a week; if the place where it is installed is very dusty it could be necessary to clean it more frequently, even once a day.
In case the unit is provided with a water condenser, for its cleaning it is advisable to consult a plumber or a qualified person for the use of descaling tools and materials necessary for these operations. Normally it is enough to execute this type of maintenance once a year except for particular problems due to the hydraulic net; if this happened, you should contact a plumber.
The condensed water drains have to be cleaned as well, and also in this case, among the possible methods, it would be better to use a compressed air jet from the inside of the unit towards the outside. This operation has normally to be executed once a month; for high temperature cold rooms in which a very fat product is preserved, it is necessary to check more frequently the efficiency of the drains, even once a week.
It can happen that, because of an anomaly, a compact ice layer forms on the finned battery of the evaporator. After having determined the cause and repaired the failure, it is absolutely necessary to remove all the ice before setting the machine in motion again. In order to do it, it is possible to execute a manual defrost (See the manual enclosed with the instructions about the electronic instrumentation). In case one defrost is not enough, wait some minutes and then repeat the operation.
If you want to speed up even more the ice melting, execute the following operations: switch off the unit through the main switch, dismantle the metal sides and the evaporator fans, melt the ice by using hot water, then install the fans and the sides again and set the unit in motion.

N.B. In order to remove the ice from the finned battery of the evaporator, you have **NEVER** to use metal or sharpened objects.

Put the maintenance rejection material in the suitable storage places, if they are polluting or not biodegradable.

Failure List:

N.B. In case of every failure concerning the electronic equipment, expect for the non-starting, first of all check that the parameters have been correctly programmed (see the instructions in the corresponding handbook).

The electronic control panel and the electronic instrument are provided with an inner alarm that signals the probe failures, the pressure switch tripping (only on the electronic control panel) and the bad programming of the parameters. These mistakes appear on the display through special codes indicated on the specific instrumentation manual.
If on the display an indication appears which is not an alarm code, a temperature indication or a signalling of particular working conditions, programmed through the parameters (e.g. "dEF" during the defrost), it means that the instrumentation is damaged and you have to replace it.
Normally this failure is due to electrical noises which prevent the working of the microprocessor that control the electronic control panel functioning. For this reason we suggest following the instructions about the positioning of the cables of the units described at chapter 4 "ELECTRIC CONNECTION".

Failure 1

(Units supplied with electronic control panel) After having connected the supply cable and pushed the (ON-OFF) button, the electronic control panel does not start.

CAUSES and REMEDIES

a) Voltage lack or incorrect voltage on the supply line.
✗ Control if the supply voltage corresponds with that indicated on the label of the unit.

b) The voltage monitor is executing the counting (See chapter 7 - COMMISSIONING).
✗ Wait about 10 minutes. If after this interval, the conditions have not changed, control if the voltage has the correct value and if the monitor fuses are efficient; if the fuses are blown, replace them.

c) The electronic control panel is supplied correctly, but it does not start.
✗ The connection between the electronic control panel and the keyboard is interrupted: restore the connection.
✗ The electronic control panel is broken: it is necessary to replace it.

N.B. In all following cases in which it is found out that the failure is due to the electronic control panel, this one has to be replaced even if it is not specified each time.

Failure 2

(Units provided with instrument) After having connected the supply cable and pushed the main switch, the lamp lying on the switch and the instrument do not switch on.

CAUSES and REMEDIES

a) See 1-a

b) The main switch is broken.
→ ✗ Replace the switch.

Failure 3

(Units provided with instrument) After having pushed the main switch, the lamp lying on the switch switches on, but the electronic instrument remains off.

CAUSES and REMEDIES

a) See 1-a

b) The fuse of the auxiliary circuit is blown.
→ ✗ Replace the fuse.

c) See 1-b

d) The electronic instrument transformer is broken.
→ ✗ Replace the transformer.

e) The electronic instrument is broken.
→ ✗ Replace the instrument.

N.B. In all following cases in which it is found out that the failure is due to the electronic instrument, this one has to be replaced even if it is not specified each time.

Failure 4

The electronic control panel starts, the compressor led blinks and the compressor does not start.

CAUSES and REMEDIES

a) Compressor protection counting: wait any minutes, then the compressor should start again.
→ ✗ (Units supplied with electronic control panel) If, after any minutes, this situation persists, check the connection of the door microswitch cable or the efficiency of the door microswitch. Make sure that the cold room door is well closed as well.

Failure 5

(Units supplied with electronic control panel) The alarm led is on and the unit is not working with any indication.

CAUSES and REMEDIES

a) Pressure switch tripping.
→ ✗ If even after the restoring of the normal conditions the unit does not start, check the efficiency of the pressure switch. As concerns the units provided with low pressure switch, check if gas comes out from the unit, if that is the case find the leak and repair the failure.

Failure 6

The compressor does not start, even though the corresponding led is on.

CAUSES and REMEDIES

a) (Wall-mounting and Bi Block units forms 4 and 5) The compressor fuses are blown.
→ ✗ Change the fuses, checking if the cause can be due to an electric failure regarding the compressor motor.

b) (Units provided with instrument) Pressure switch tripping.
→ ✗ See 5-a.

c) The electric components of the compressor supply are damaged (only regarding the monophase compressors).
→ ✗ Check the efficiency of the relays, the condensers and the clixon and, in case they are damaged, change them.

d) Tripping of the compressor inner protection.
→ ✗ (Wall-mounting and Bi Block units forms 4 and 5) Check the efficiency of all the compressor fuses and, if blown, replace them.
→ ✗ Control the supply line, i.e. check if the voltage is correct, if the contacts of the compressor contactor are efficient and if the electric components of the monophase compressor are in good condition. In case some anomalies are found out, restore the optimum working conditions.
→ ✗ Check that the condenser fans (besides the eventual control pressure switch or speed regulator) are working well. If they are broken,
change them.
→ ✗ Check that the condenser is perfectly clean, should that not be the case, clean it following the instructions of the paragraph "MAINTENANCE".
→ ✗ Make sure that gas does not come out from the unit; if there is a gas leak, find it and repair the failure.

Failure 7

Pressing the cold room light switch the relative lamp lights up, but the cold room light remains off.

CAUSES and REMEDIES

a) The supply circuit fuse of the cold room light is blown.

→ ✗ Replace the fuse after having checked that the load connected to the relative cable has an absorption lower than 200 W.

b) The lamp inside the cold room has blown.

→ ✗ Change the lamp.

Failure 8

The unit is working, but the door heater does not function. (Only on the low temperature units)

CAUSES and REMEDIES

a) The supply circuit fuse of the door heater is blown.

→ ✗ Replace the fuse after having checked that the load connected to the relative cable has an absorption lower than 200 W.

b) The heater is broken.

→ ✗ Change the heater.

Failure 9

The requested temperature can not be reached in spite of the uninterrupted working of the unit.

CAUSES and REMEDIES

a) The gas quantity is insufficient.

→ ✗ Execute the gas filling up by joining the manometers, to control the charge. Control if there are leaks, and in that case repair them.

b) Gas passage in both ways of the deflection valve (Wall-mounting units forms 4 and 5).

→ ✗ It is possible to try to repair the valve, even if it is better to change it.

c) The pressure regulating valve is blocked (low temperature units).

→ ✗ Try to calibrate the valve again, even if probably it is to be replaced.

d) Insufficient condensation.

→ ✗ Clean the condenser. If this is not sufficient, check that the correct working conditions of the unit have been respected.

The correct working or installation instructions have not been respected for the following reasons:

e) The product has been introduced in the cold room at too high a temperature.

f) In the cold room there are other sources of heat (e.g. floor drain mouths, etc.).

g) The cold room door is opened too frequently and for too long a period.

h) The goods have been placed too near to the evaporator, and as a consequence they obstruct the correct flow of the air.

→ ✗ Restore the optimal working conditions.

Failure 10

The evaporator frosts too much, irregularly or only in some points.

CAUSES and REMEDIES

a) The gas quantity is insufficient.

→ ✗ Execute the gas filling up by joining the manometers, to control the charge. Control if there are leaks, and in that case repair them.

b) The air circulation on the evaporator is incorrect.

→ ✗ Check the efficiency of the evaporator fans and, if broken, change them.

→ ✗ Make sure that there is anything obstructing, even partially, the air flow at the exit as well as at the entrance of the evaporator, if there are obstacles, it is indispensable to remove them.

c) (Bi Block units forms 4 and 5) Incorrect regulation of the thermostatic valve.

→ ✗ Modify the regulation of the thermostatic valve till obtaining a correct frosting.

Failure 11

On the evaporator there is ice also at the end of the defrost.

CAUSES and REMEDIES

a) The unit is used in conditions slightly different from the optimal ones (still acceptable).

→ ✗ Modify the calibration of the parameters regarding the defrost in order to increase the frequency of the cycles and the value of the defrost termination thermostat.

b) If the ice left is very much, it is possible that the unit does not execute the defrost correctly.

→ ✗ According to the type of the unit, check the efficiency of the solenoid valve, of the heaters or of the deflection valve, i.e. the devices concerning the defrost. If a part is damaged, it is to be replaced.

Failure 12

Ice forms round the evaporator fans.

CAUSES and REMEDIES

a) Hot air comes in through the condensed water drain.

→ ✗ Check that a syphon has been made on the tract of the drain outside the cold room.

b) During the defrost condensed water forms near and on the fans.

→ ✗ Reduce the defrost termination temperature and prolong the dripping time.

Failure 13

Ice forms on the cold room ceiling in front of the evaporator.

CAUSES and REMEDIES

a) Too much steam forms during the defrost and at the end of it the fans restart too soon.

→ ✗ Reduce the defrost termination temperature and prolong the tripping delay time of the fans at the end of the defrost.

Failure 14

Under the evaporator basin there are drippings or ice has formed.

CAUSES and REMEDIES

a) The drainpipe has been clogged by ice as its internal heater is not working.

→ ✗ Check the supply circuit of the heater.

→ ✗ Replace the heater if it is broken.

b) The drainpipe is clogged.

→ ✗ Clean the drainpipe (see "Maintenance").

c) The rings that connect the drainpipes have loosened.

→ ✗ Restore the hydraulic connections.

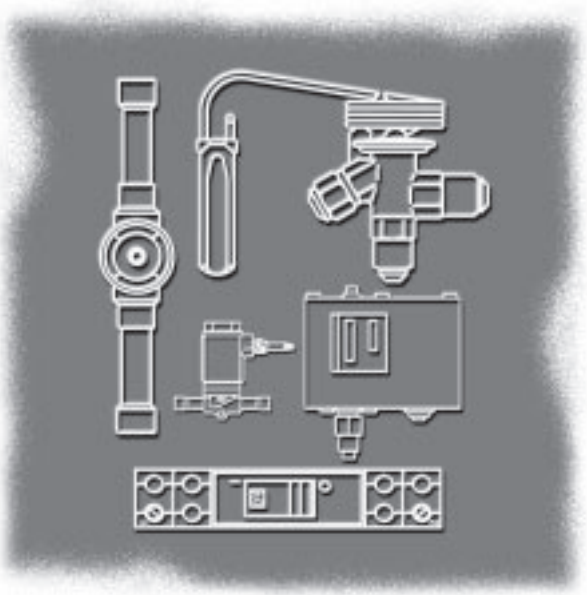
d) The basin has been deformed because of a knock (e.g. during the installation).

→ ✗ If the deformation is slight, you can try to remodel it; should that not be the case change the basin.

✱ *If any failures in the unit working are found, make sure that these are not due to the missed ordinary maintenance. Should that not be the case, ask for the intervention of an authorized assistance centre of ours.*
In case you have to replace some parts, ask a distributor or an authorized reseller for ORIGINAL spare parts.
The spare part list is in the specific catalogue "Spare parts-Price list" that has to be expressly requested to the distributor.

✱ *Every six months the unit has to be controlled by an authorized assistance centre.*

✱ *The unit has not to be left unattended during the scrapping phase, because of the presence of toxic noxious materials (refrigerant) subject to regulations that prescribe the discharge by suitable centres.*



Drawings

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Dibujos

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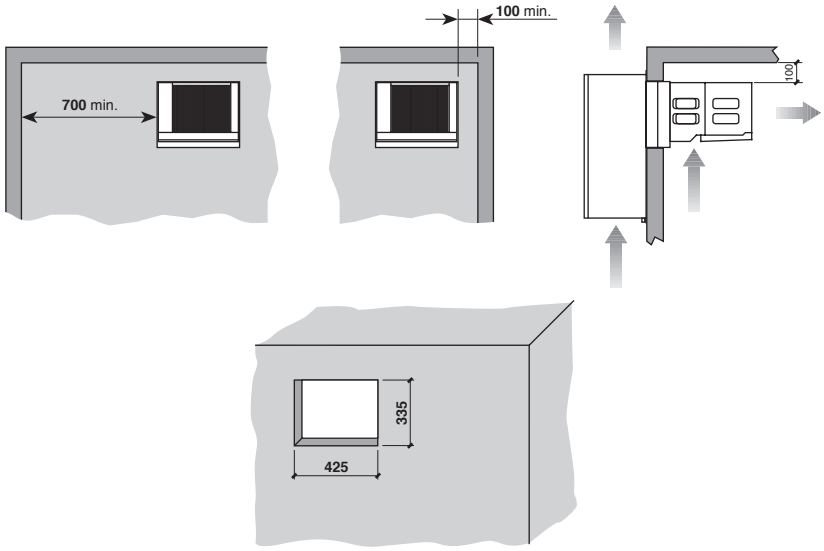

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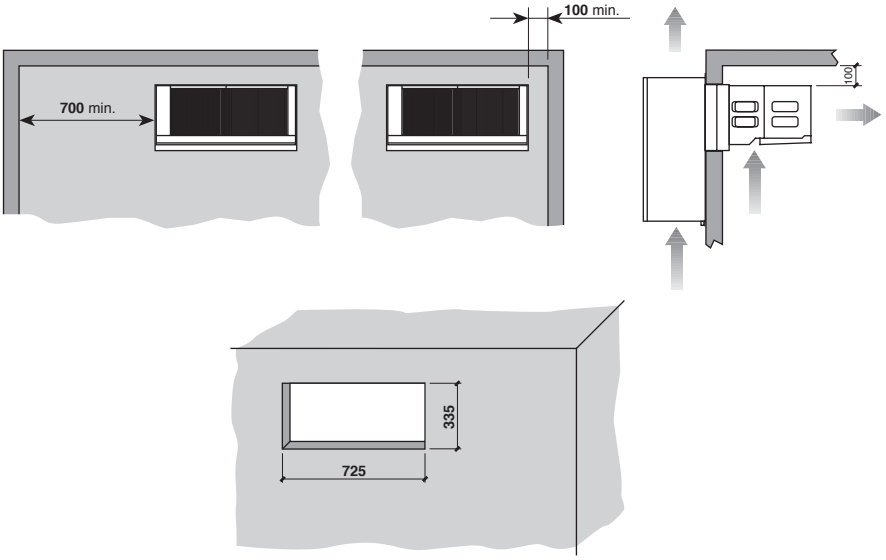

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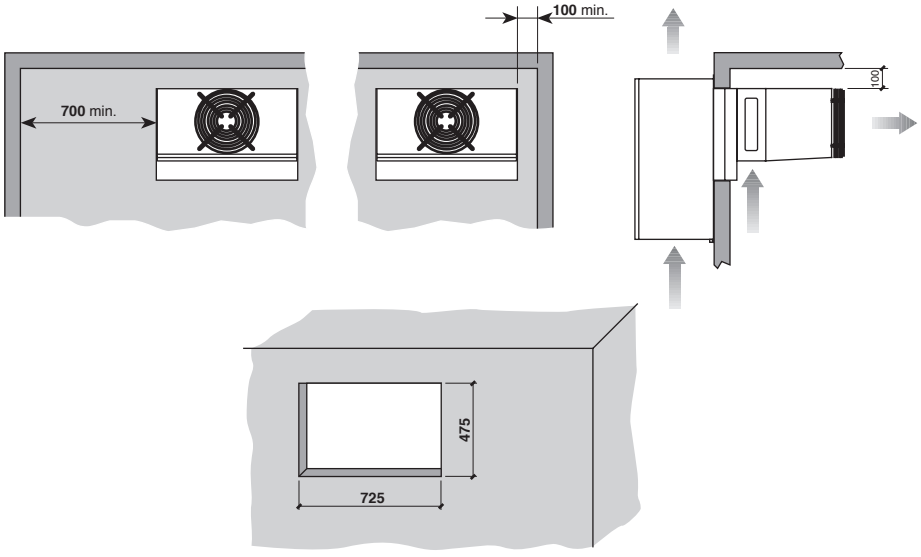

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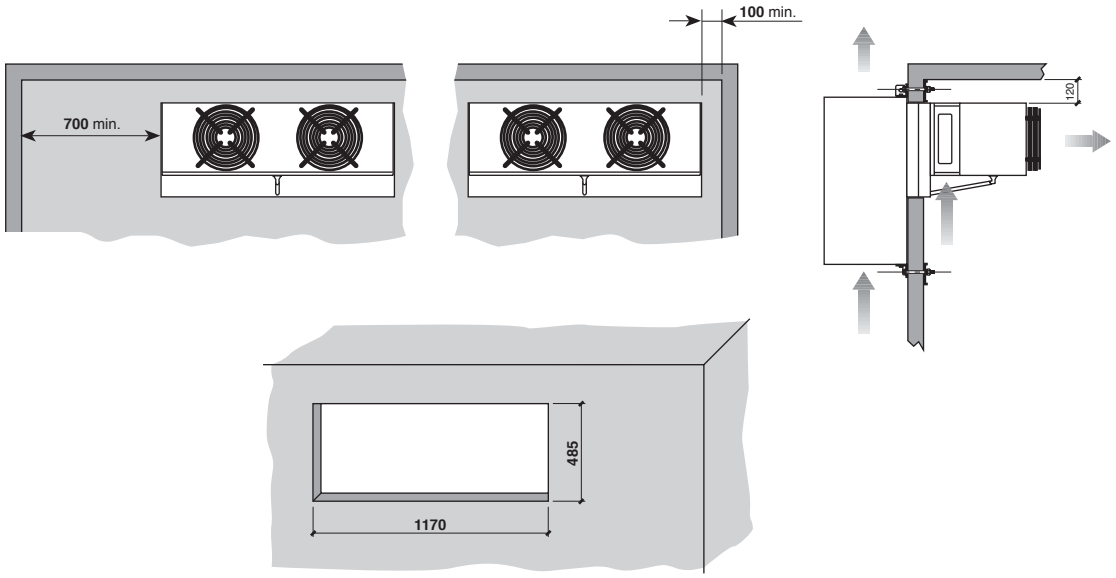

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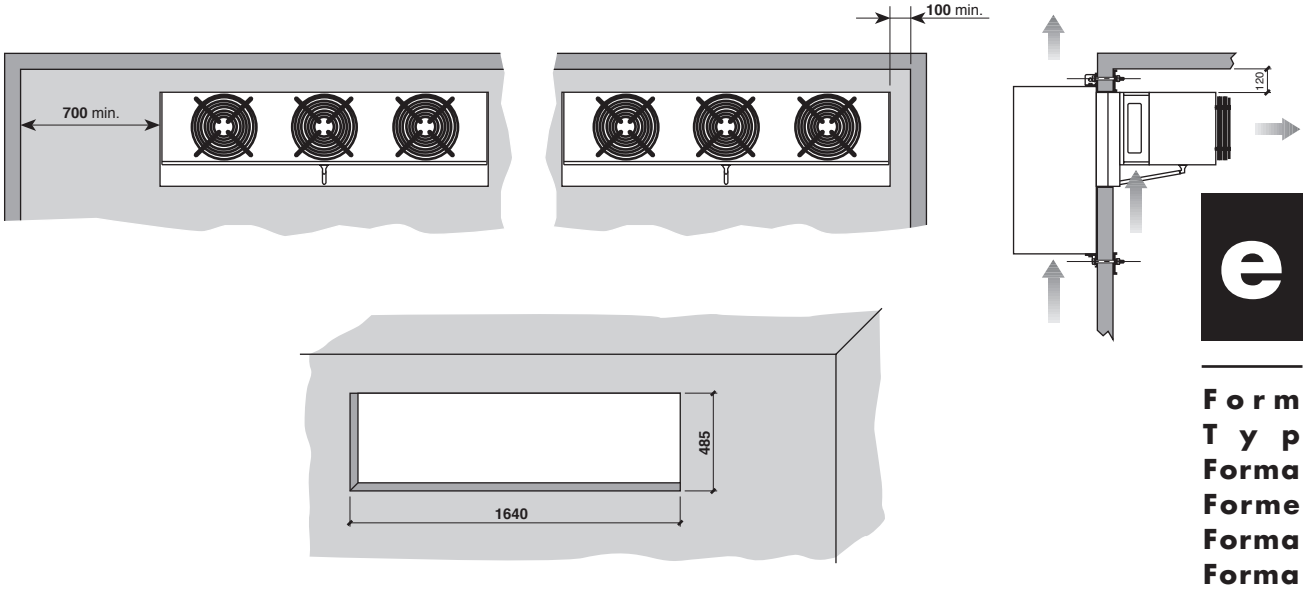

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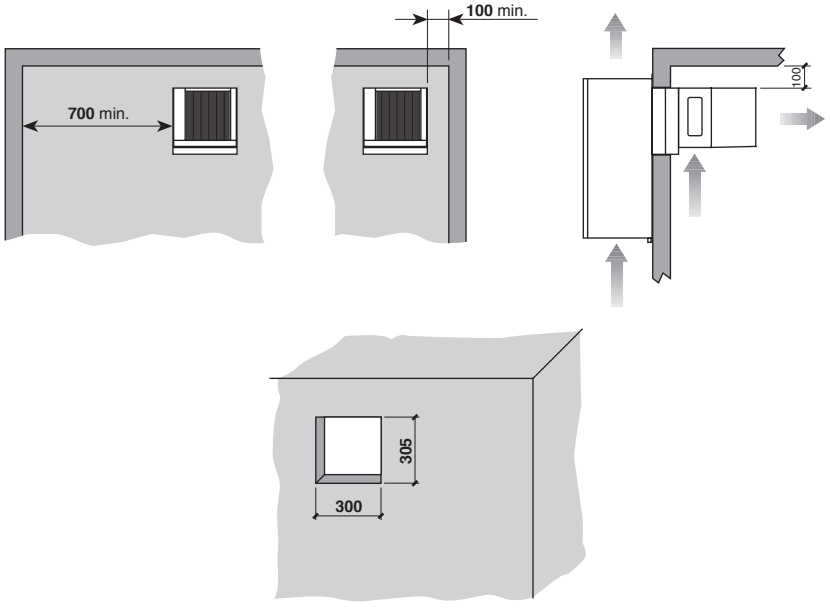

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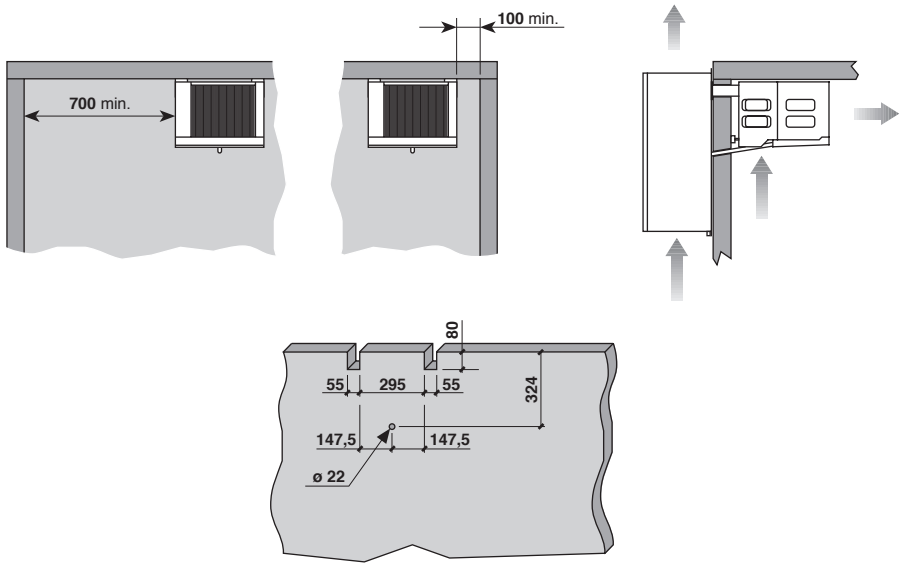

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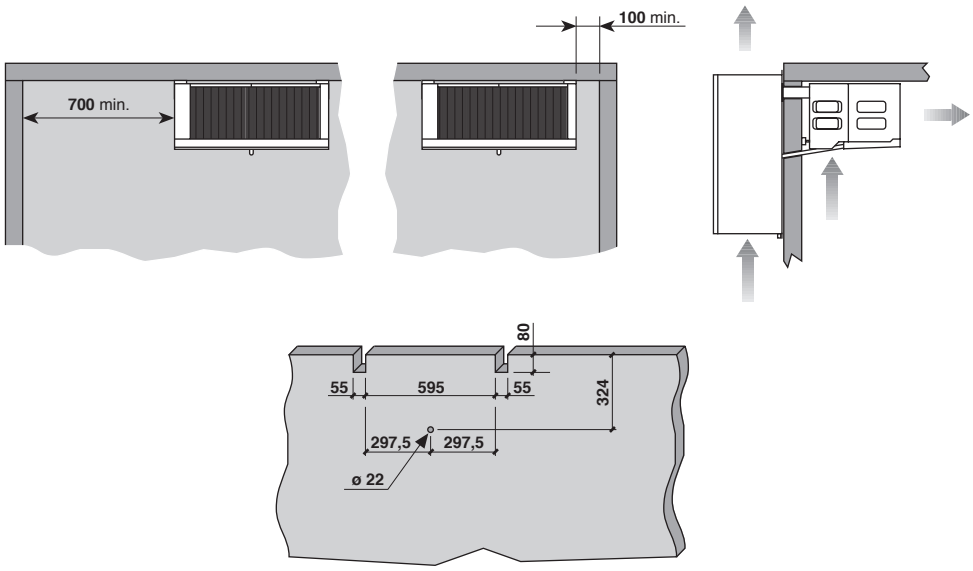

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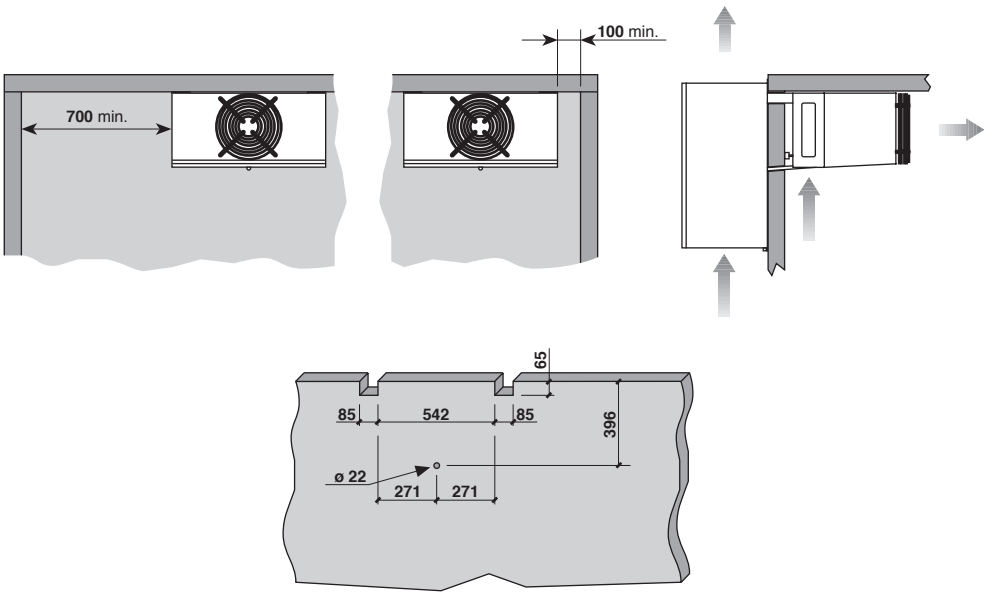

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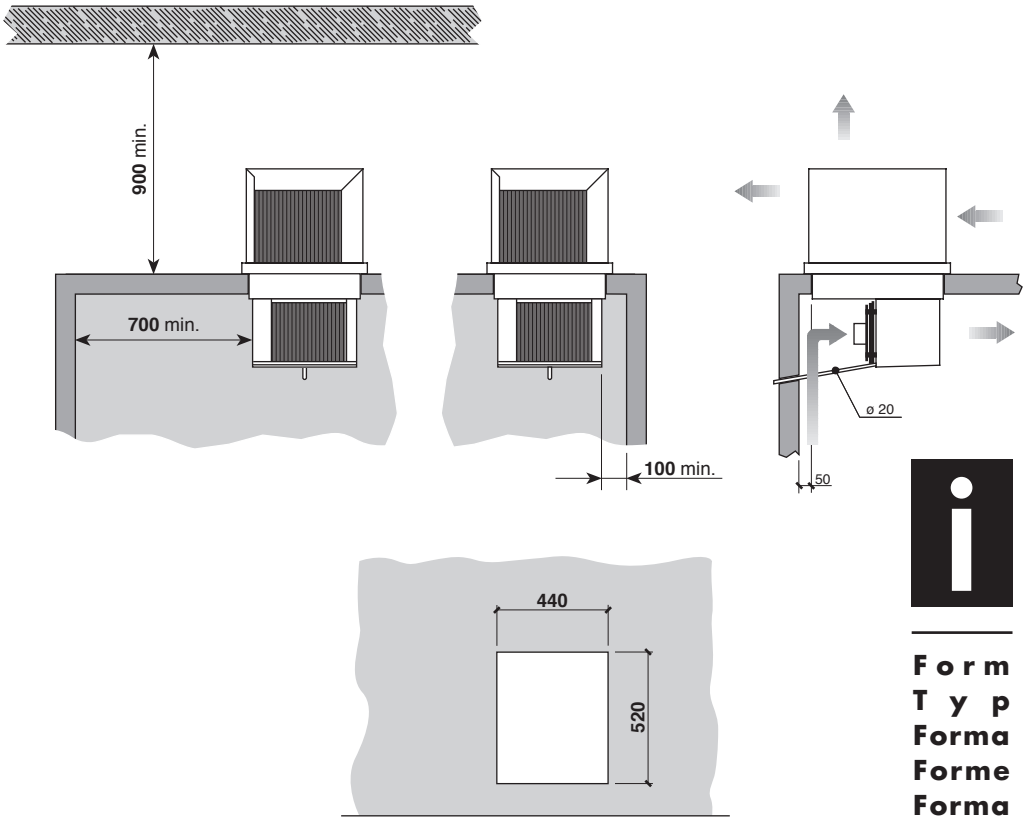

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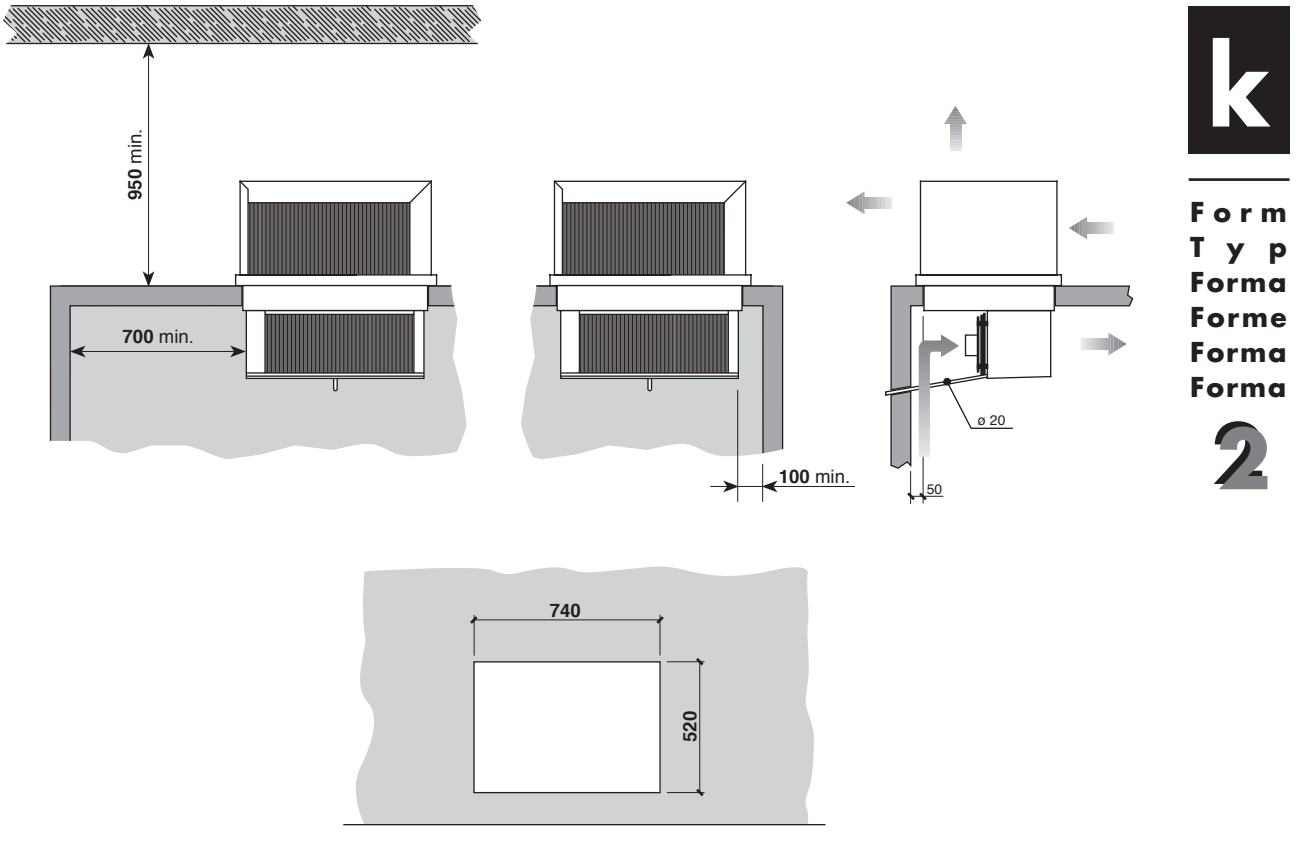

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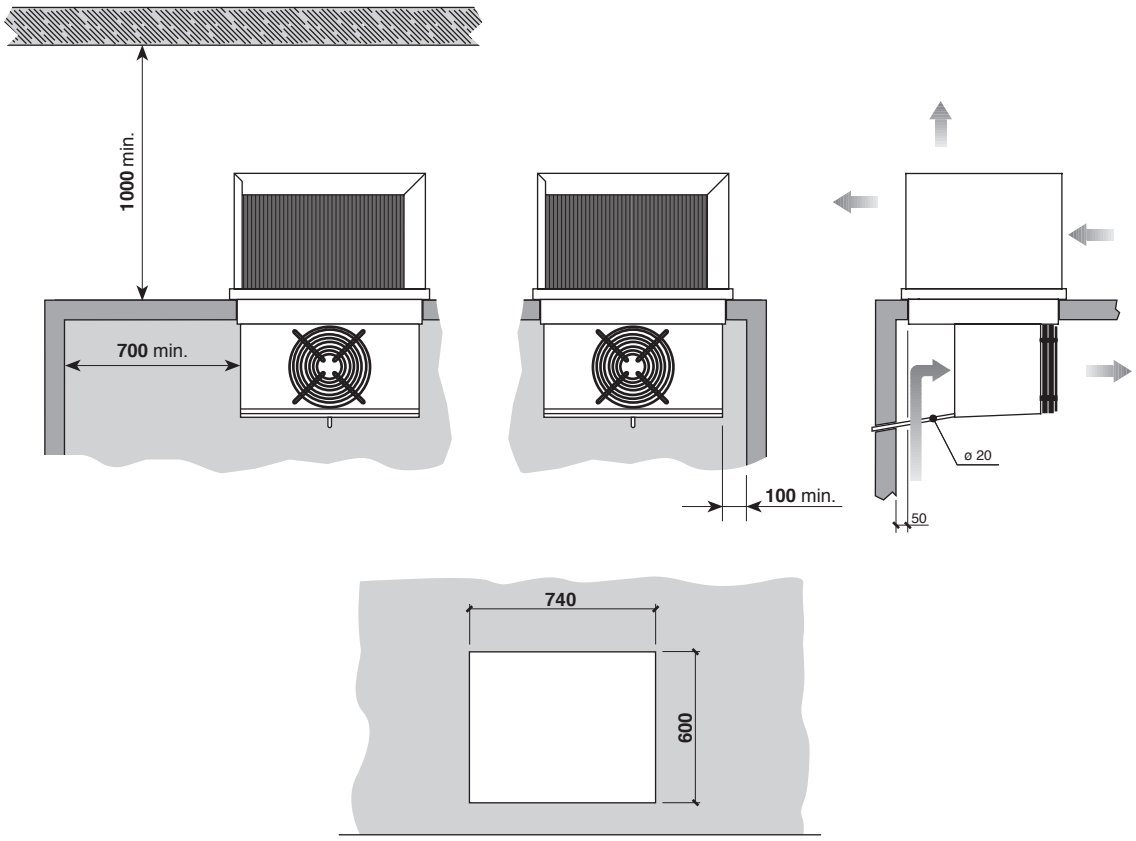
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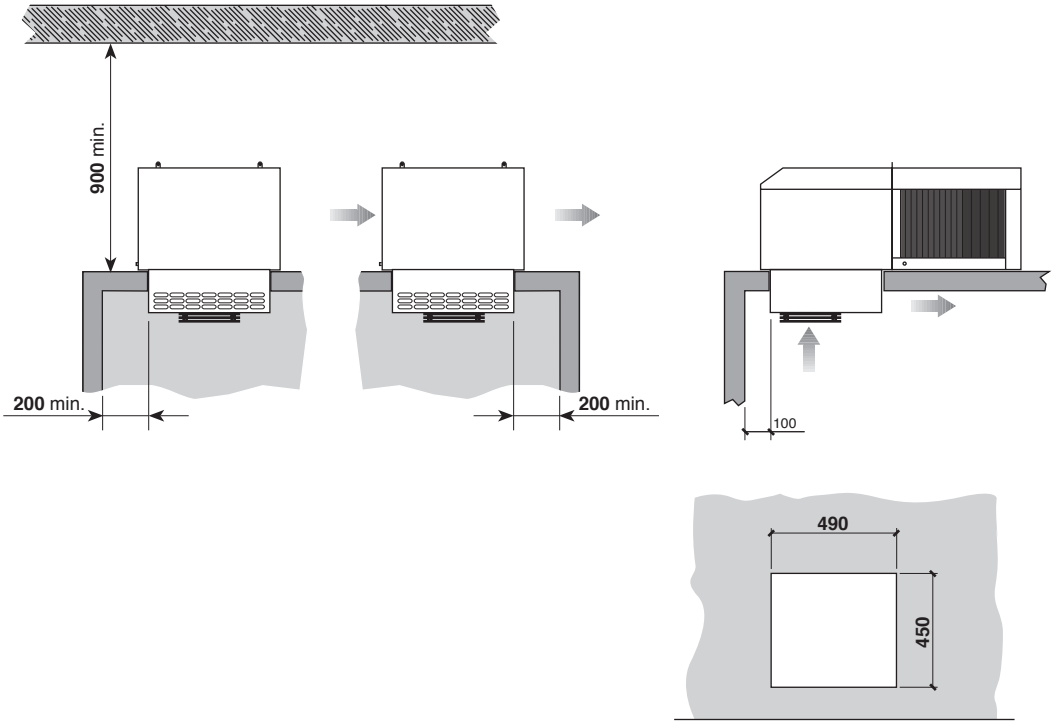
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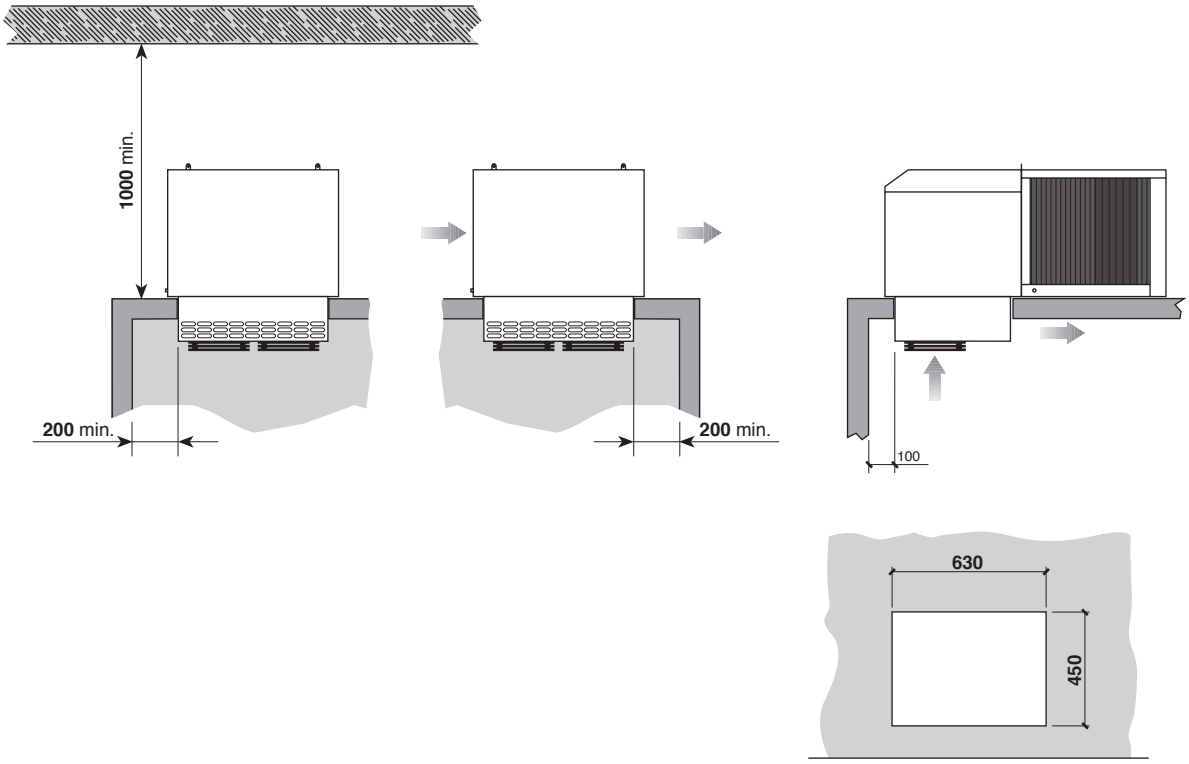

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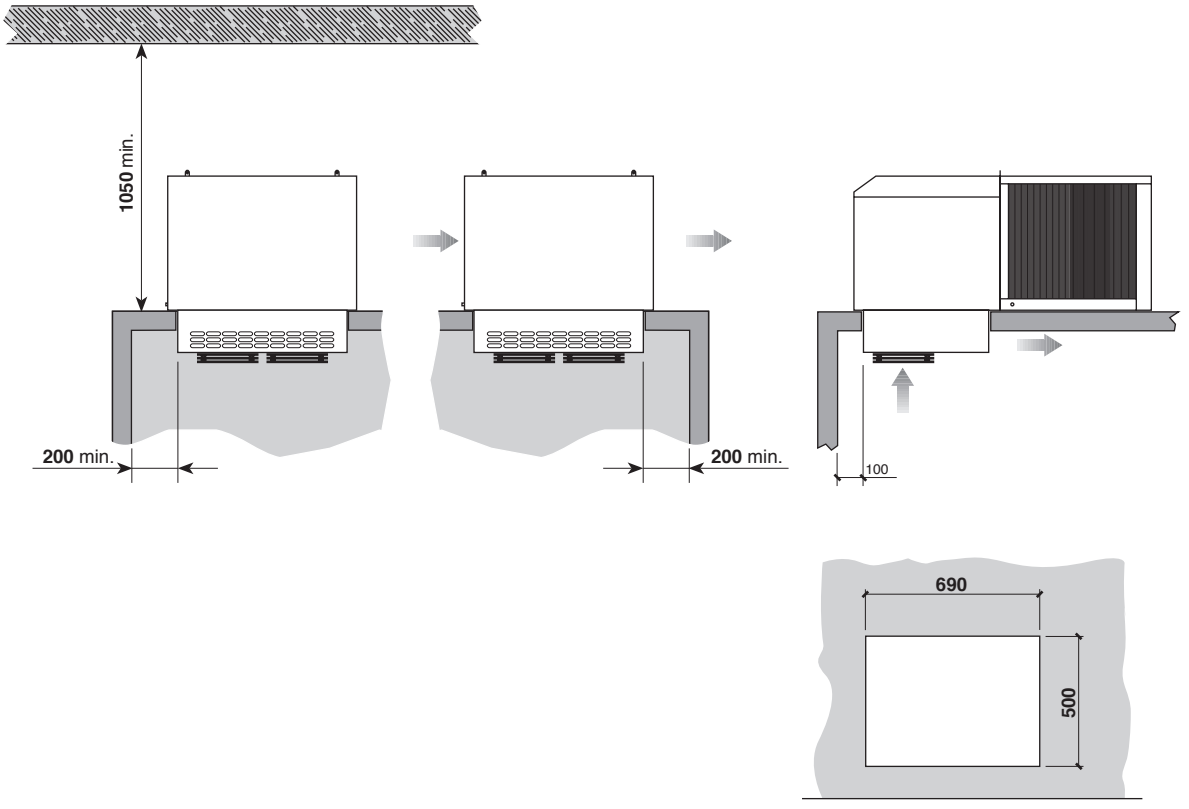

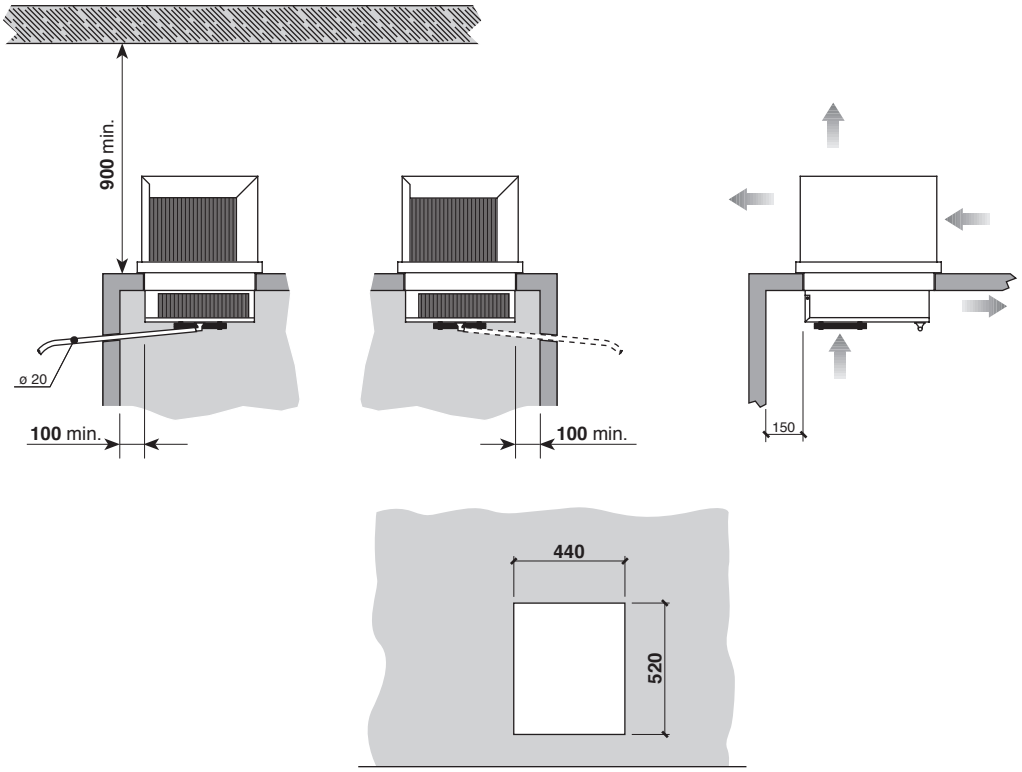

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SPLIT UNITS - CONDENSING UNITS - EVAPORATING UNITS

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UNITÉS SPLIT - UNITÉS DE CONDENSATION - UNITÉS D'ÉVAPORATION

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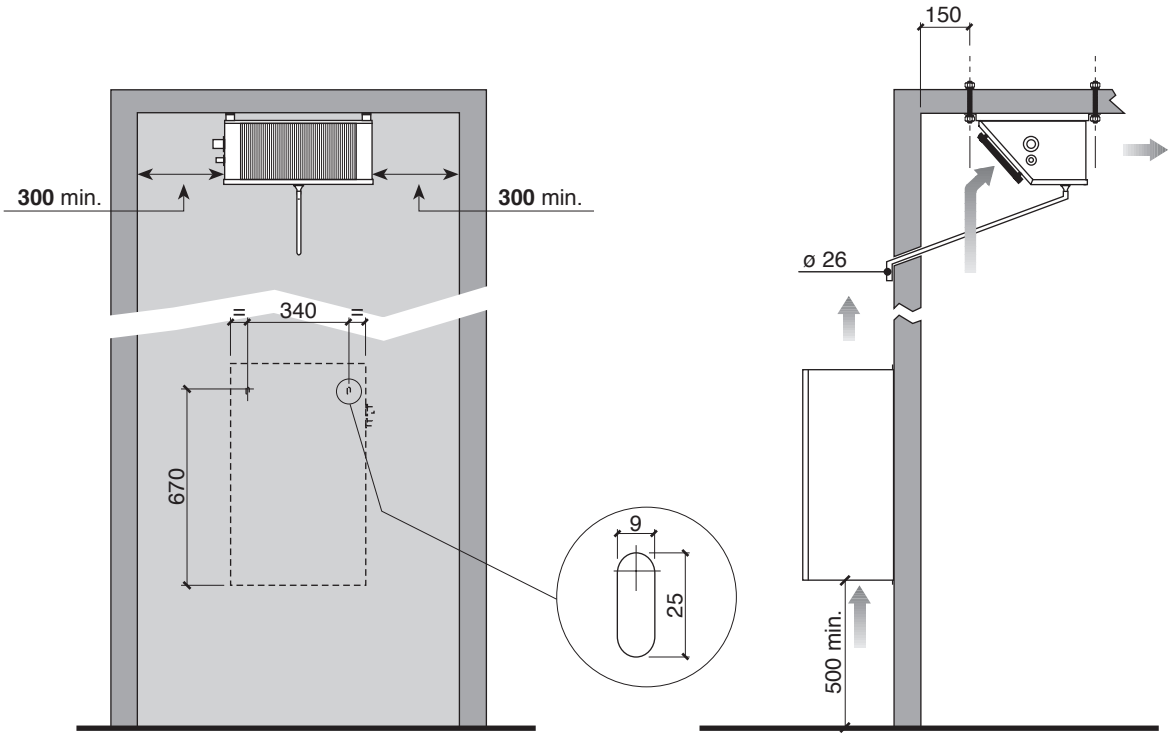

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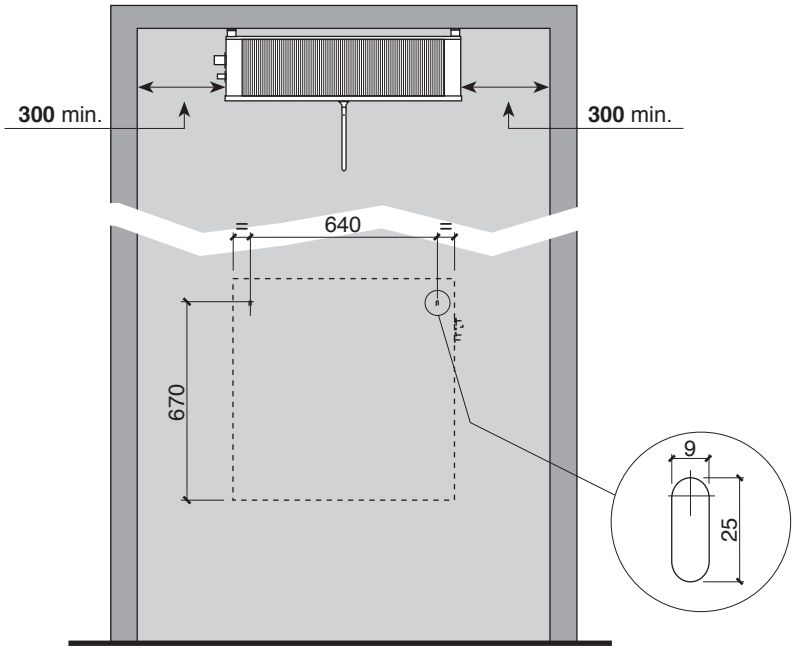

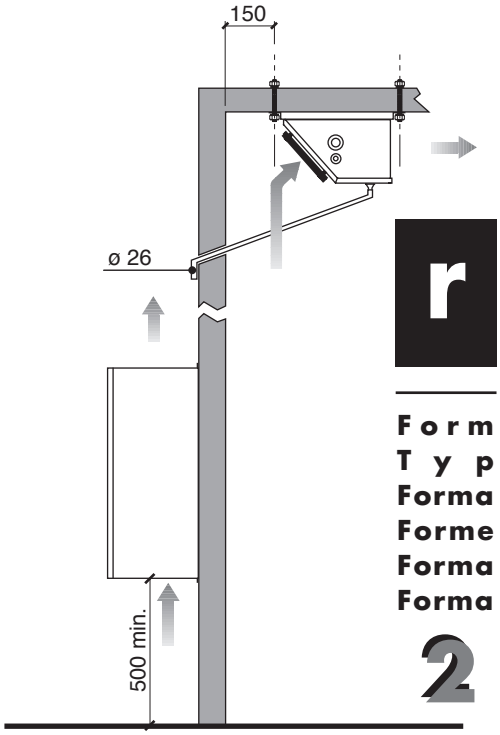

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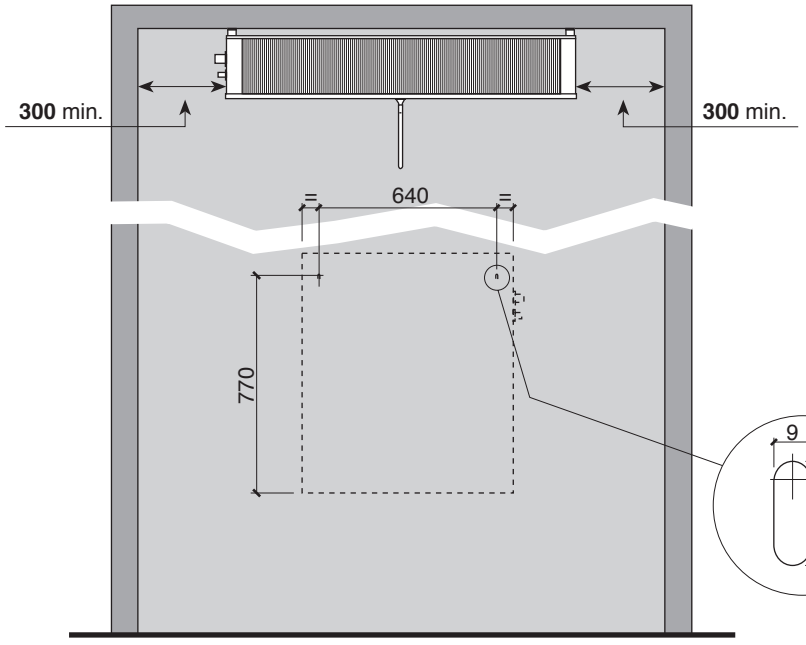

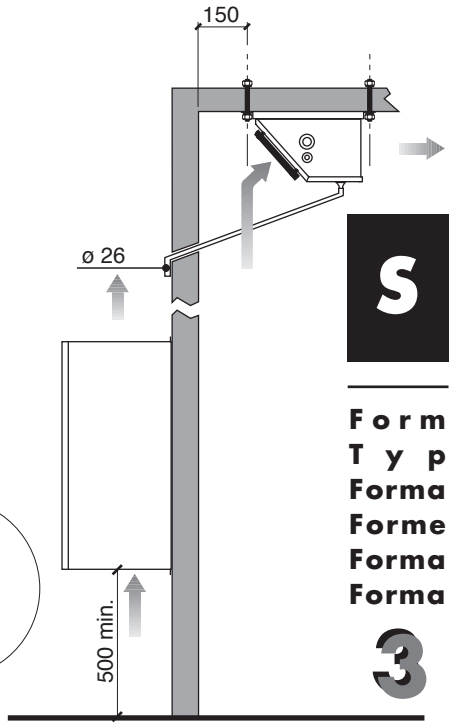

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3

WALL-MOUNTING UNITS
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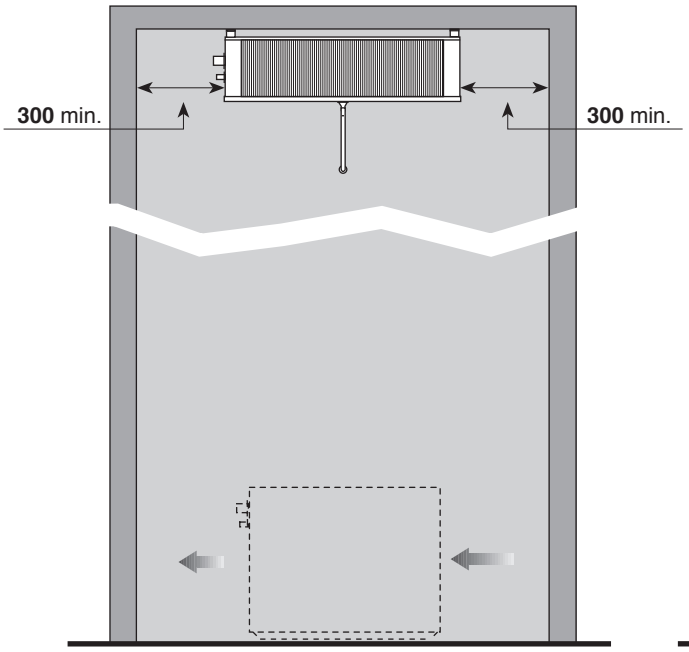
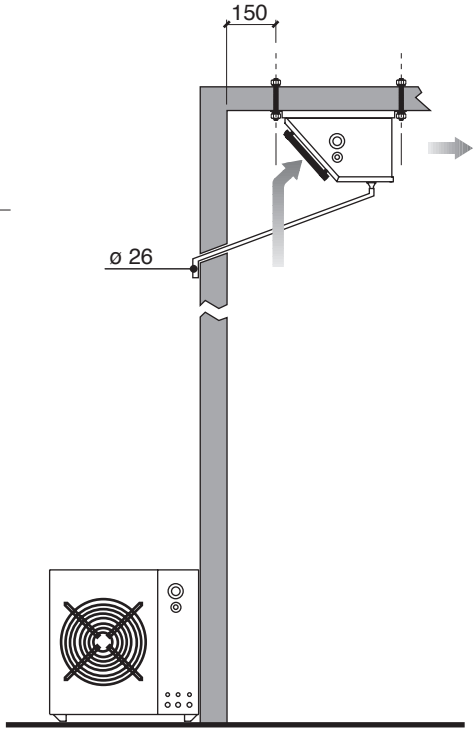
UNITÉS EN PAROI
UNIDADES SPLIT HORIZONTAIS
UNITA' SPLIT ORIZZONTALI





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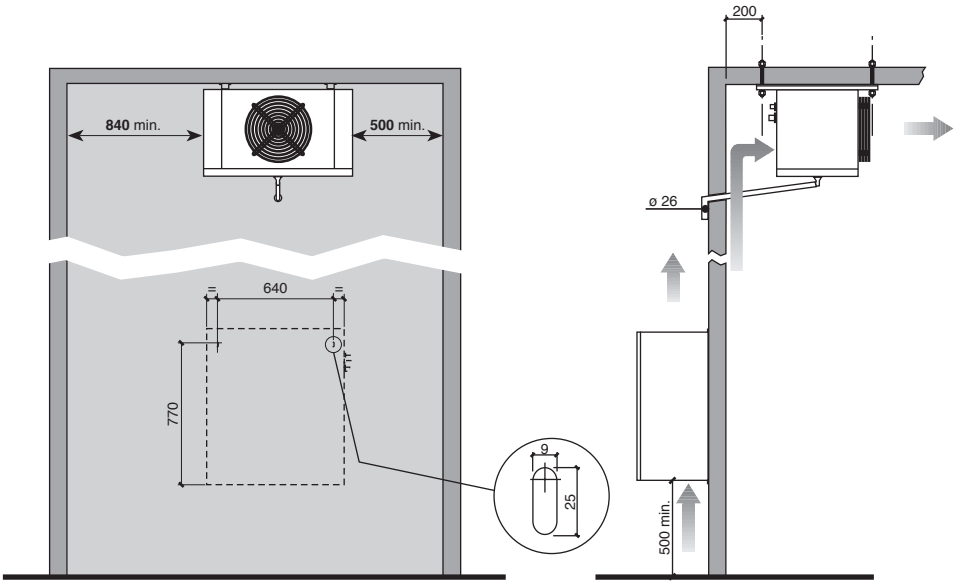
BI BLOCK UNITS
BI BLOCKGERÄTE
UNIDADES BIBLOCK
UNITÉS BI BLOCK
UNIDADES BIBLOCK
UNITA' BI BLOCK



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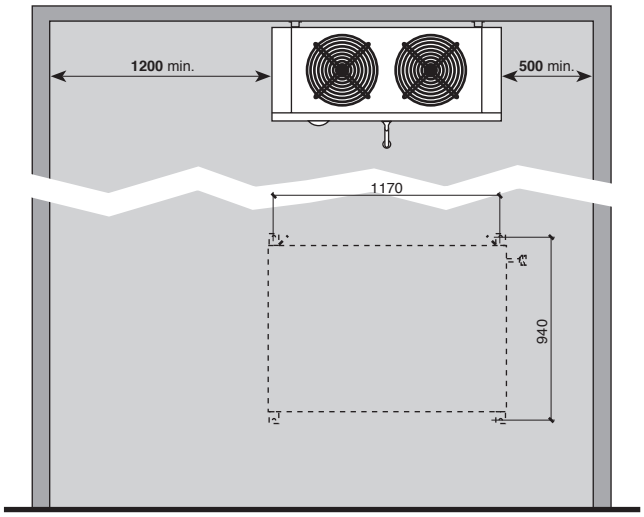

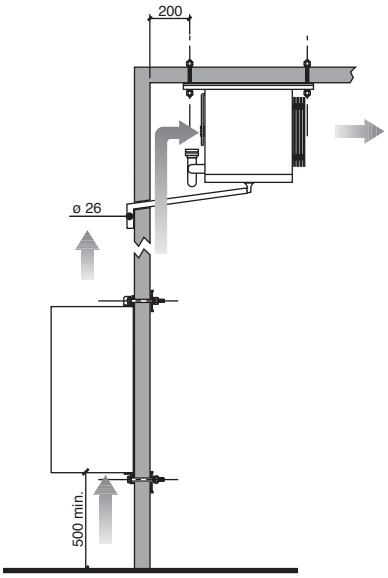

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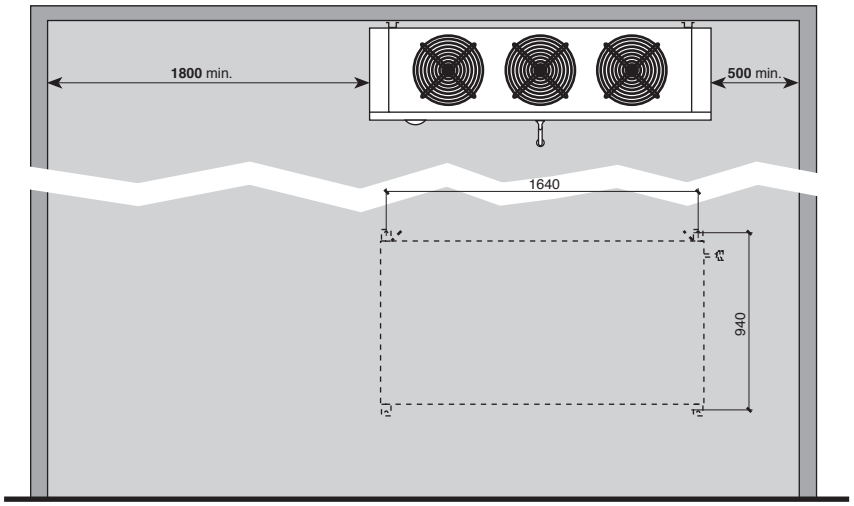

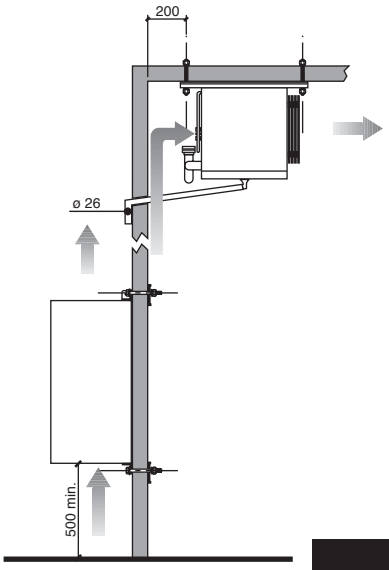

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BI BLOCK UNITS - CONDENSING UNITS / HORIZONTAL

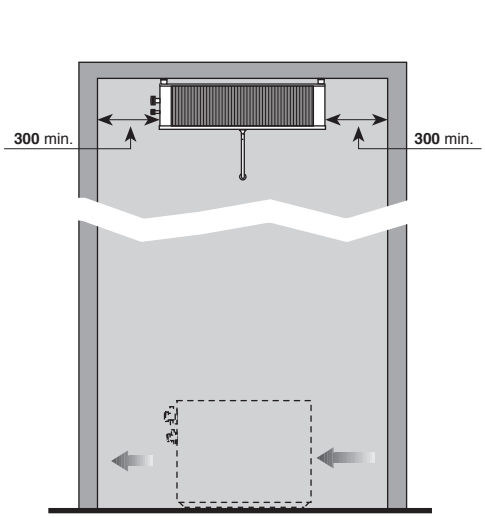
BI BLOCKGERÄTE - VERFLÜSSIGUNGSEINHEITEN / WAAGERECHTEN

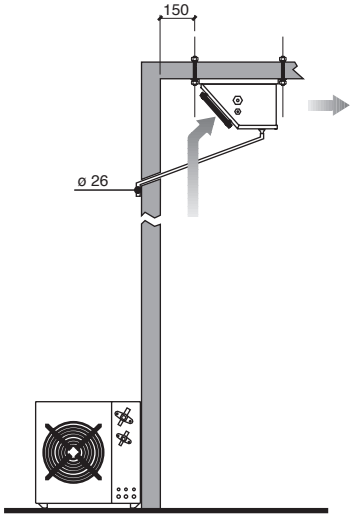
UNIDADES BIBLOCK - UNIDADES CONDENSADORAS / HORIZONTALES

UNITÉS BI BLOCK / UNITÉS DE CONDENSATION / HORIZONTALES

UNIDADES BIBLOCK - UNIDADES CONDENSADORAS / HORIZONTAIS

UNITA' BI BLOCK - UNITA' CONDENSATRICI / ORIZZONTALI





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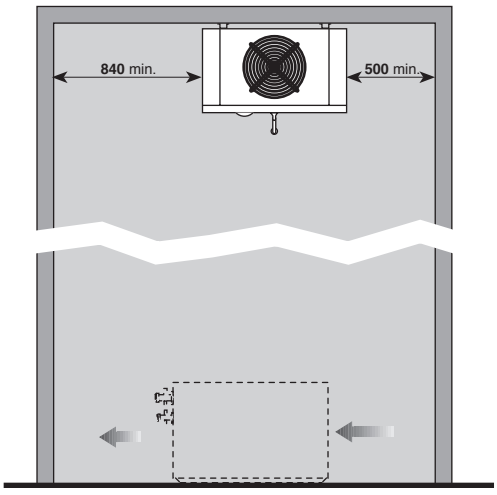

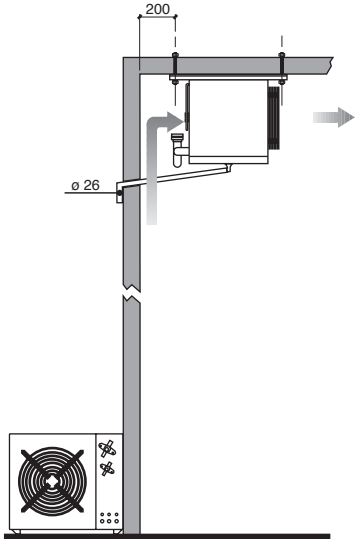

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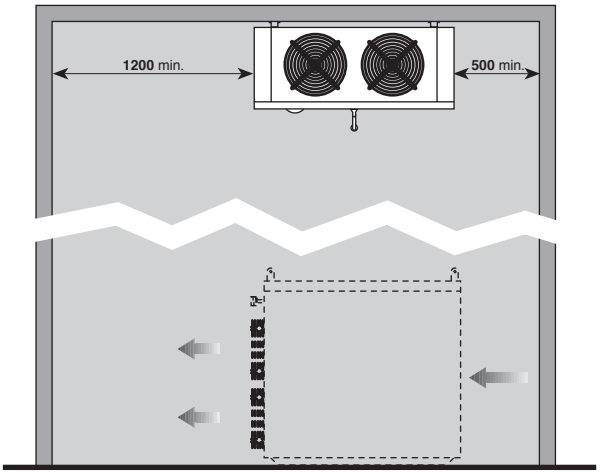

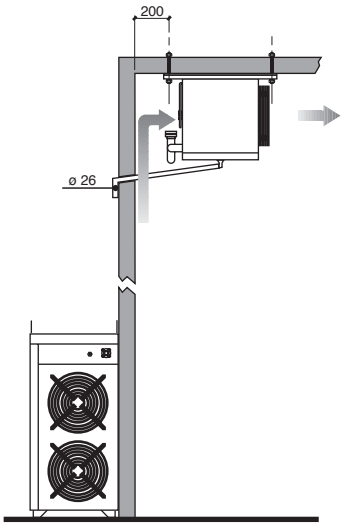

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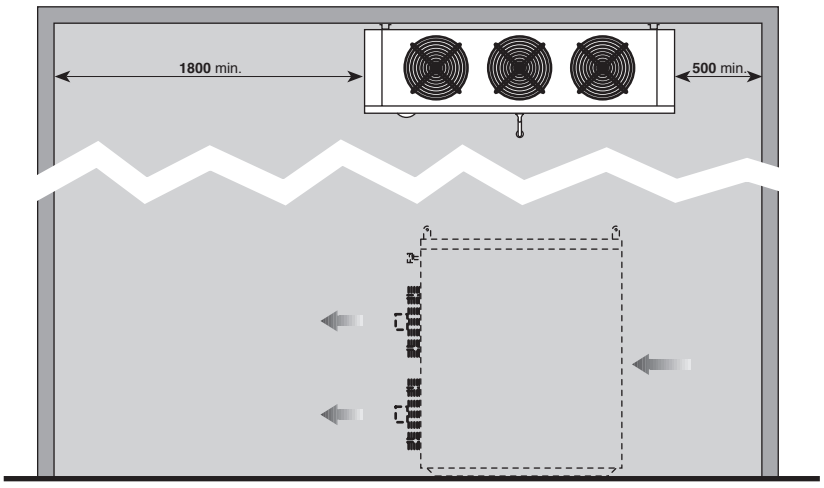

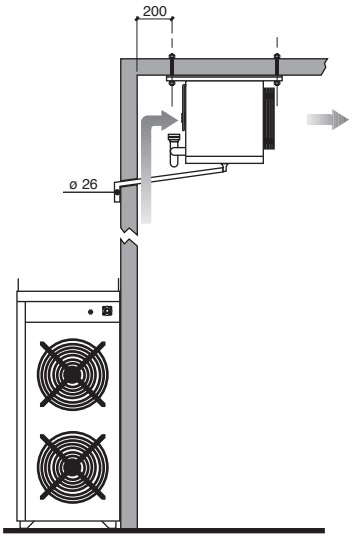

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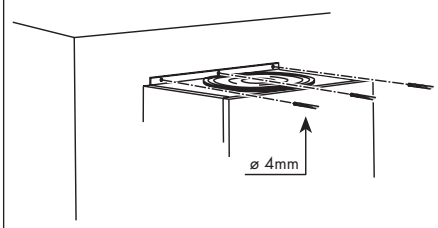

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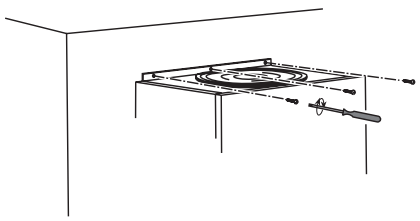

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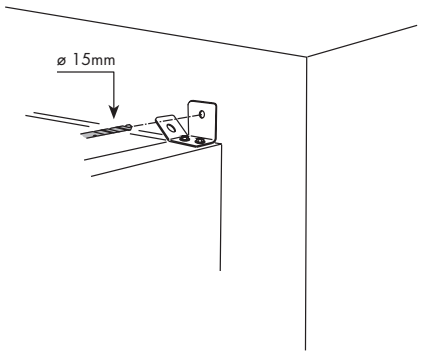

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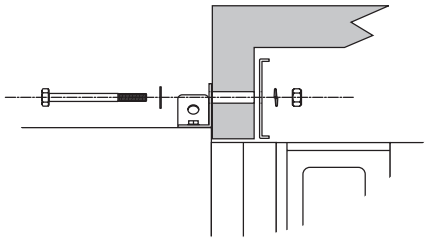

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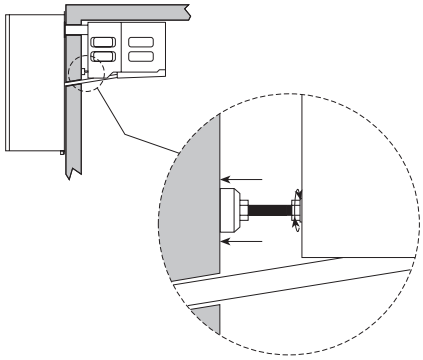

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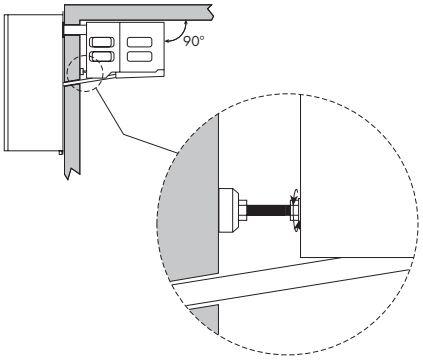

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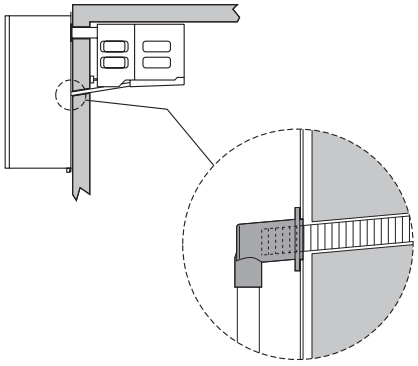

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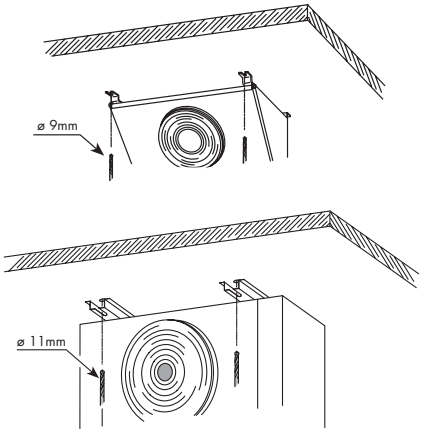

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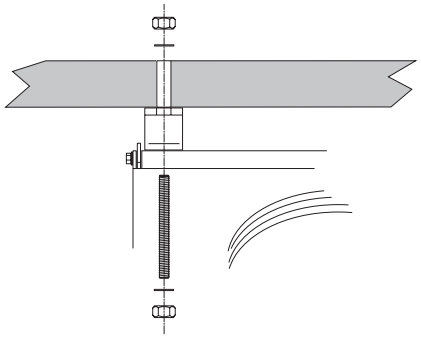

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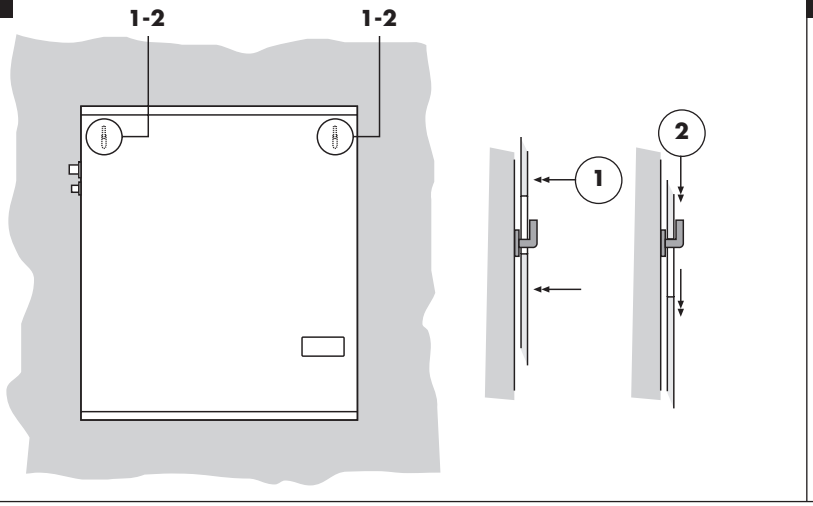

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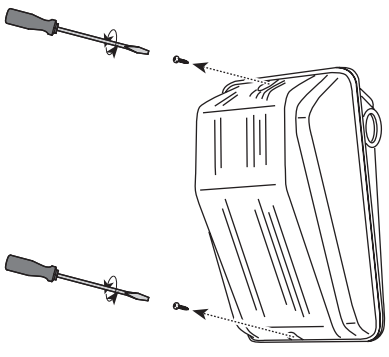

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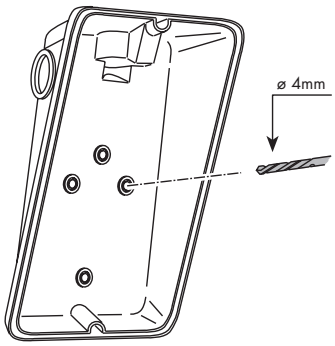

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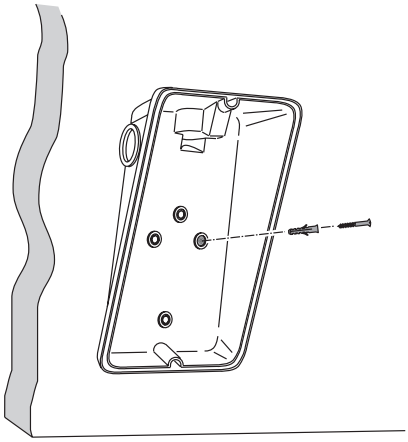

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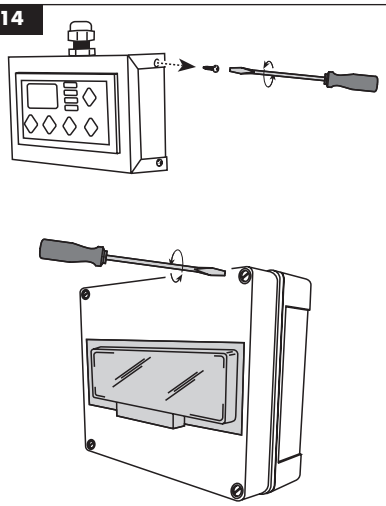

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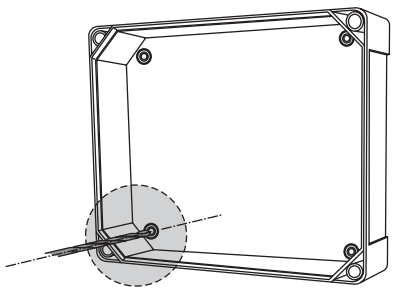

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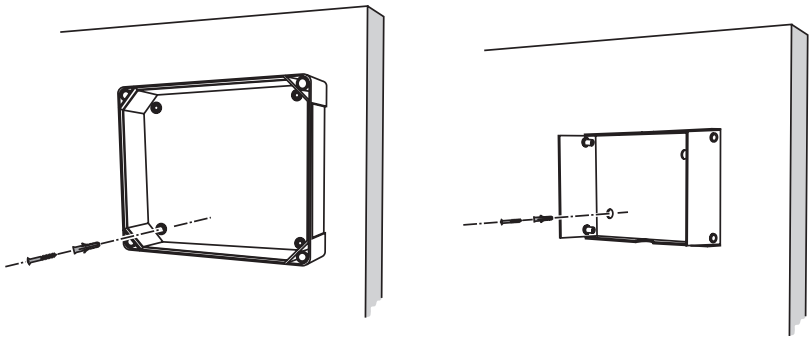

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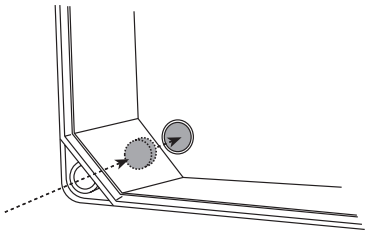

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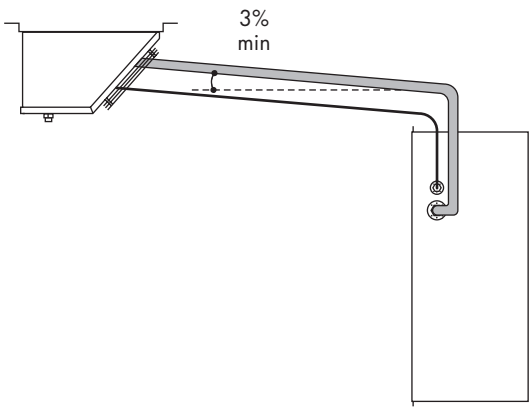

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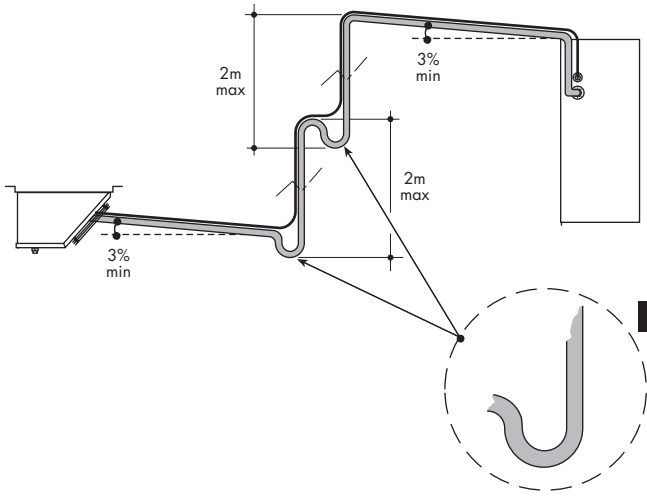

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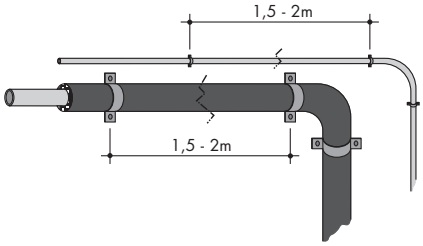

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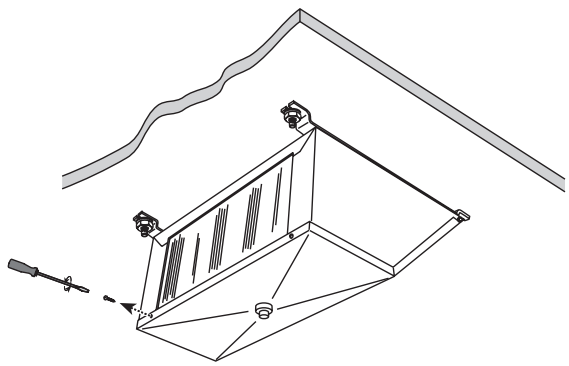

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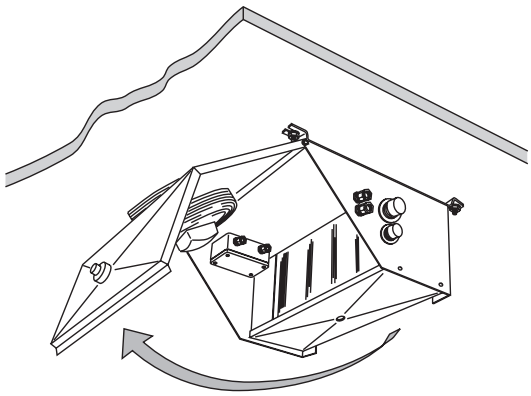

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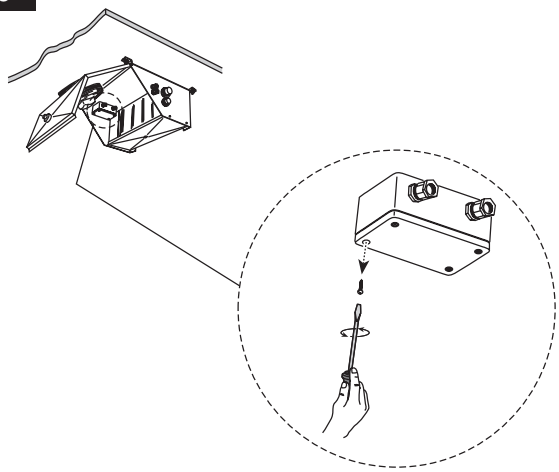

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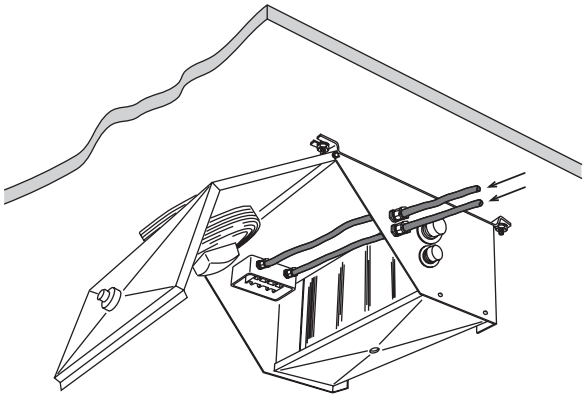

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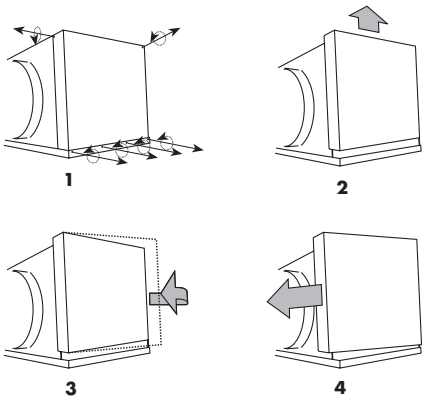

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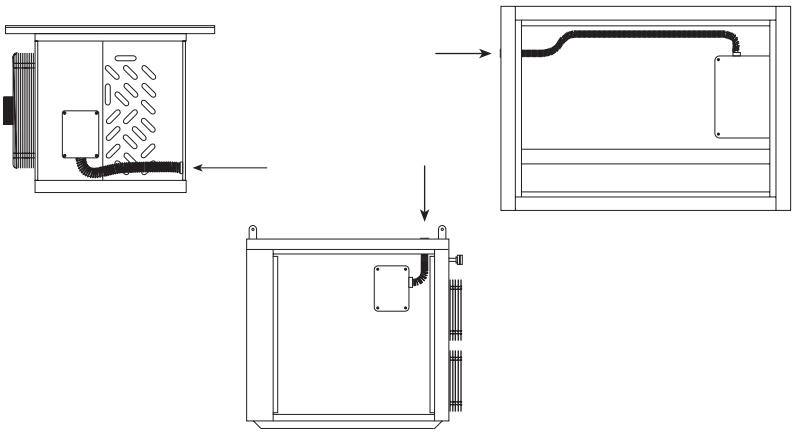

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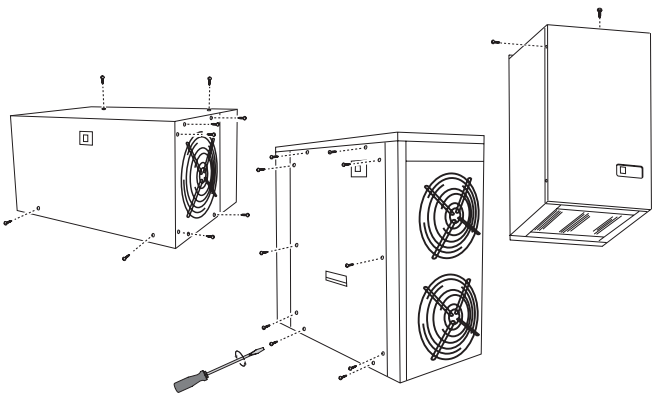

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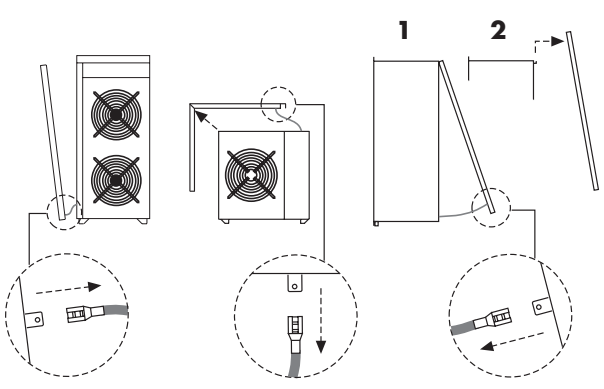

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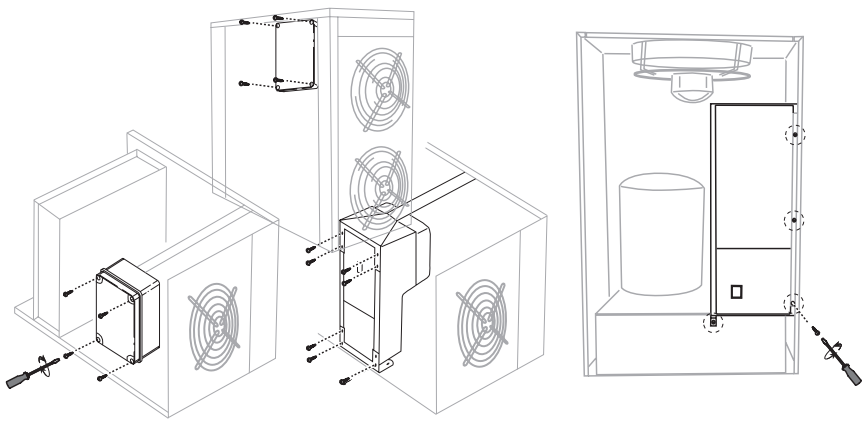

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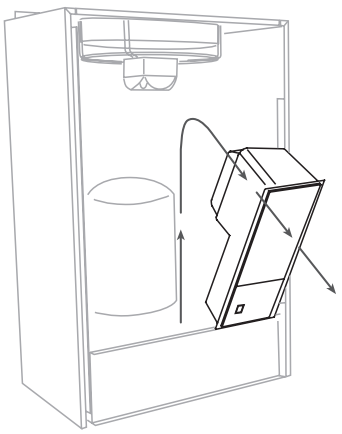

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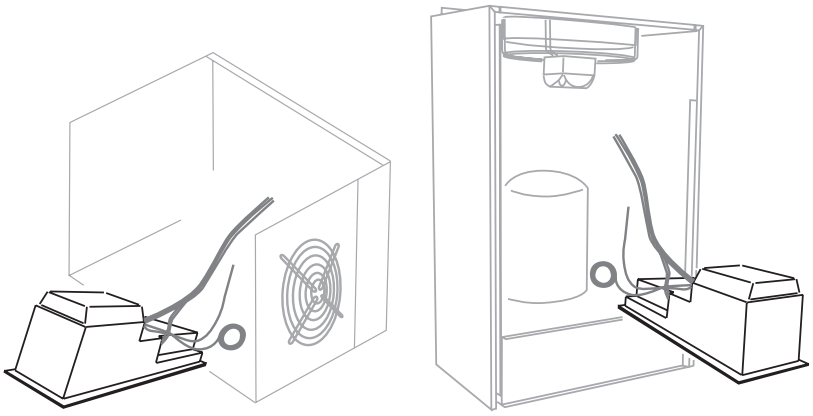

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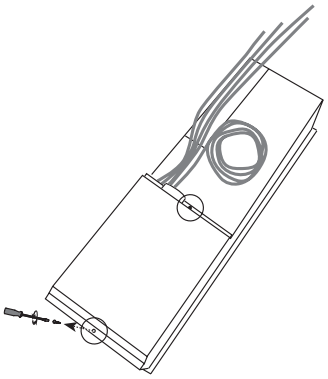

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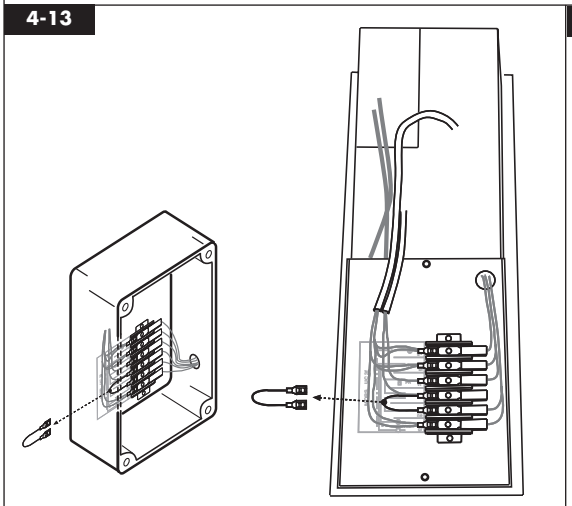

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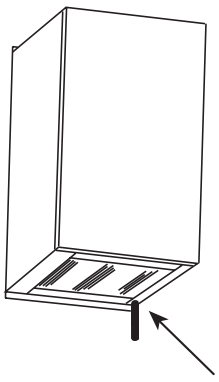

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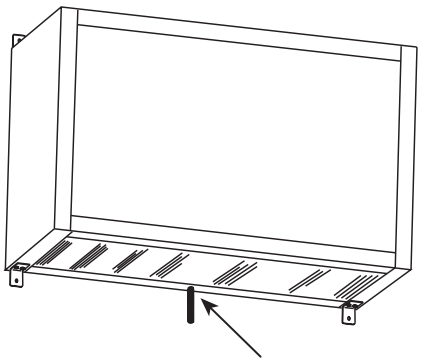

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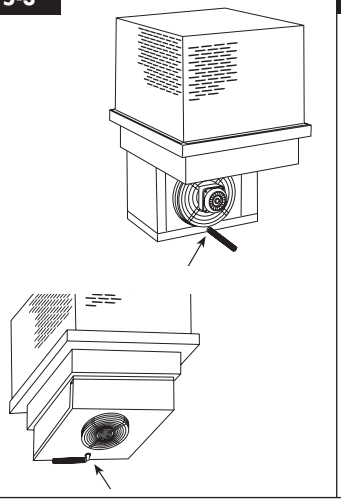

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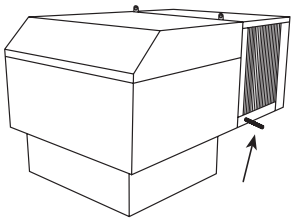

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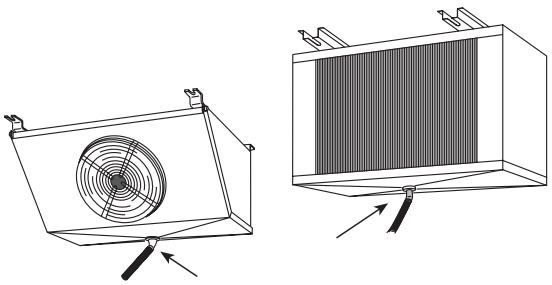

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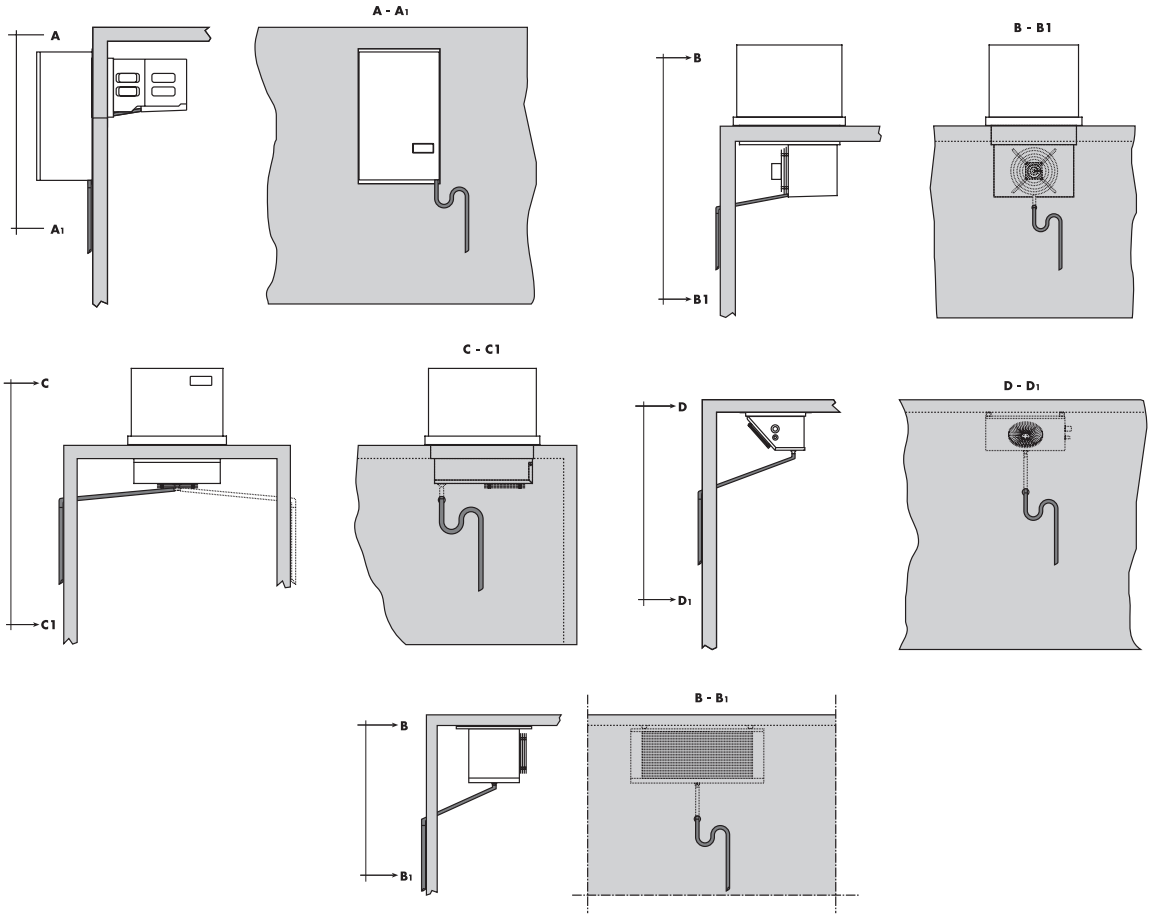

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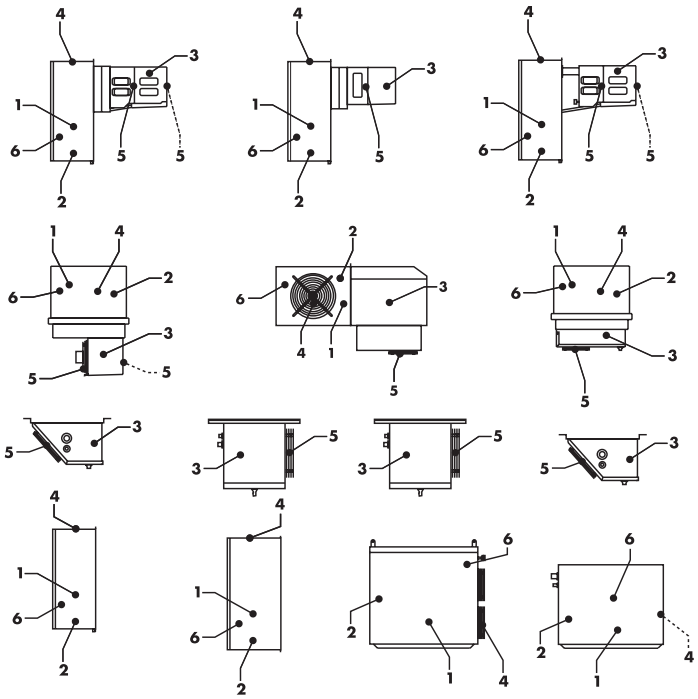

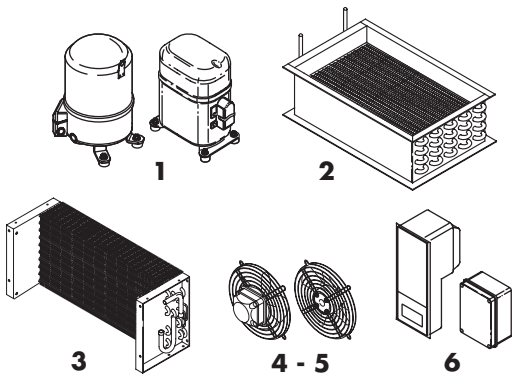

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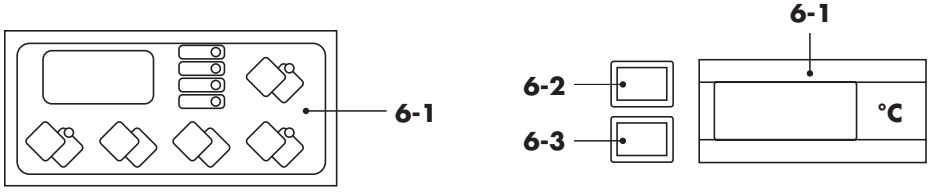

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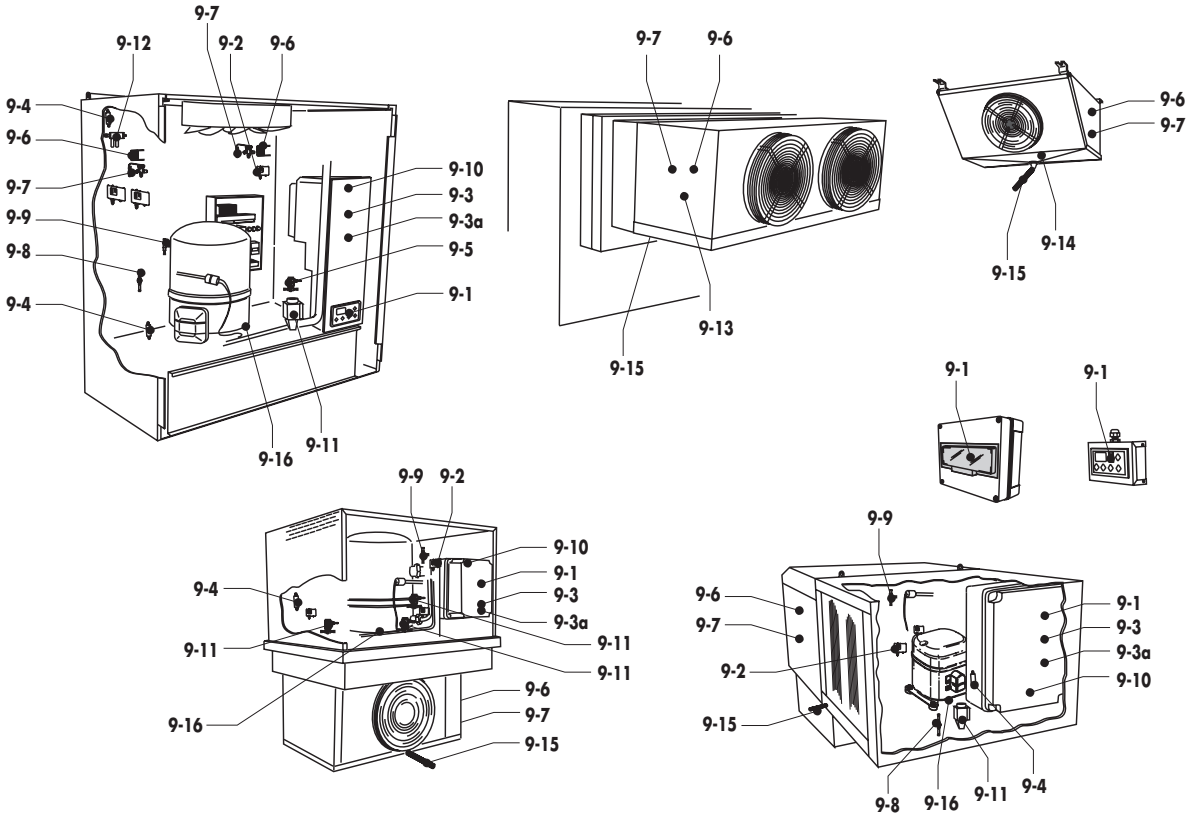

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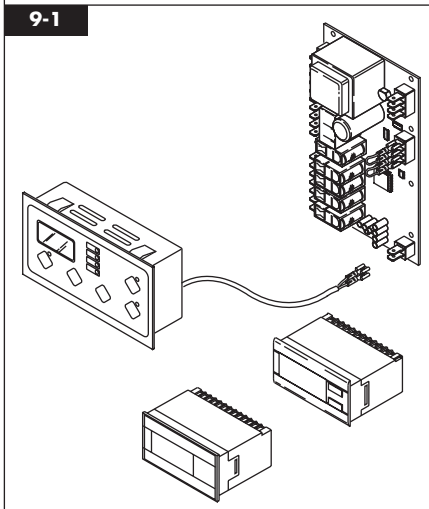

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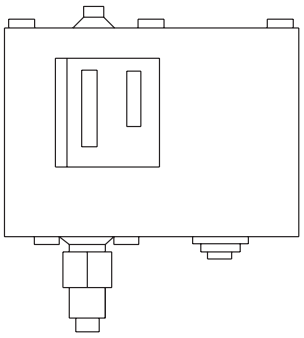

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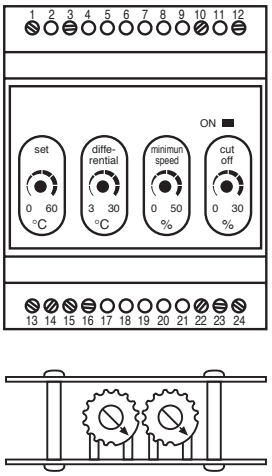

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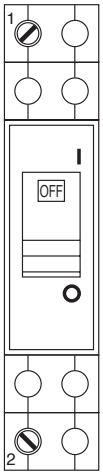

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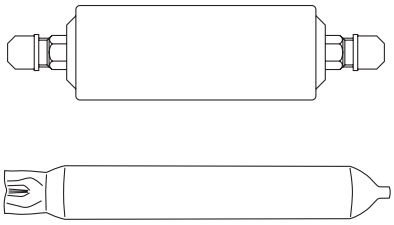

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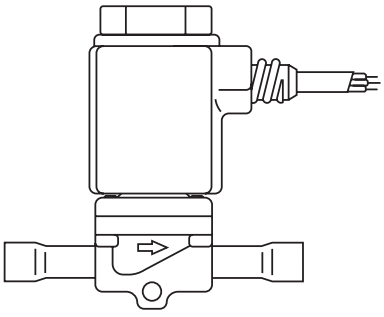

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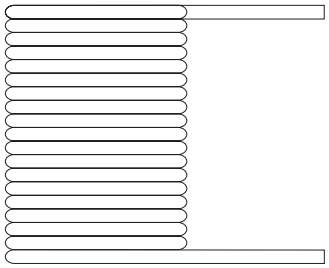

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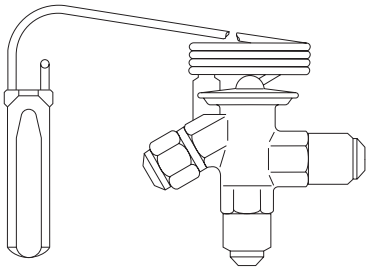

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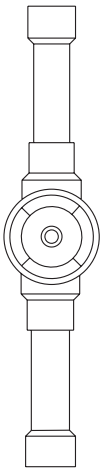

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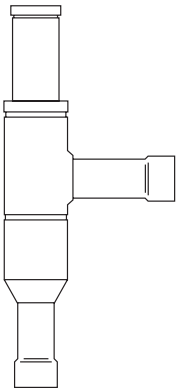

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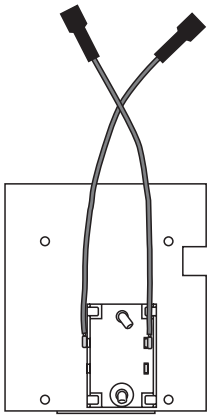

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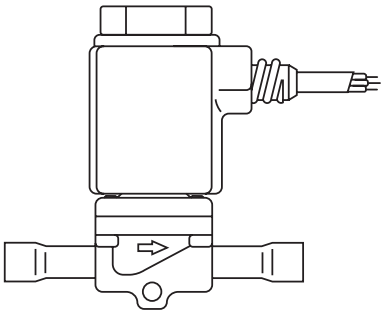

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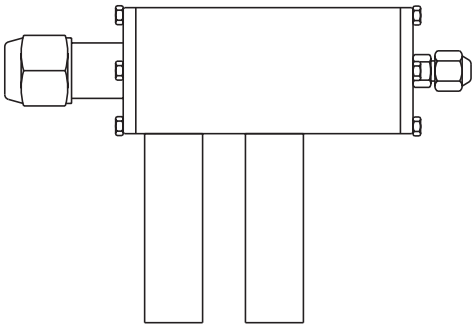

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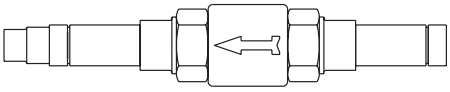

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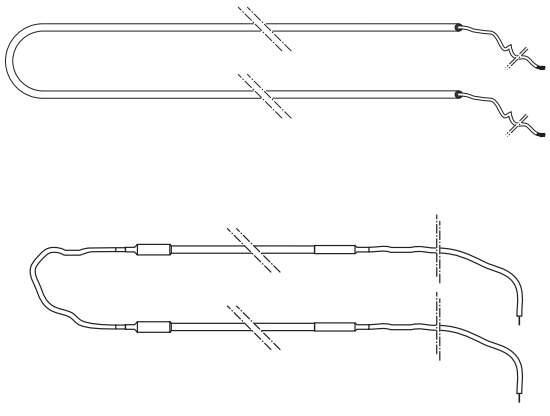

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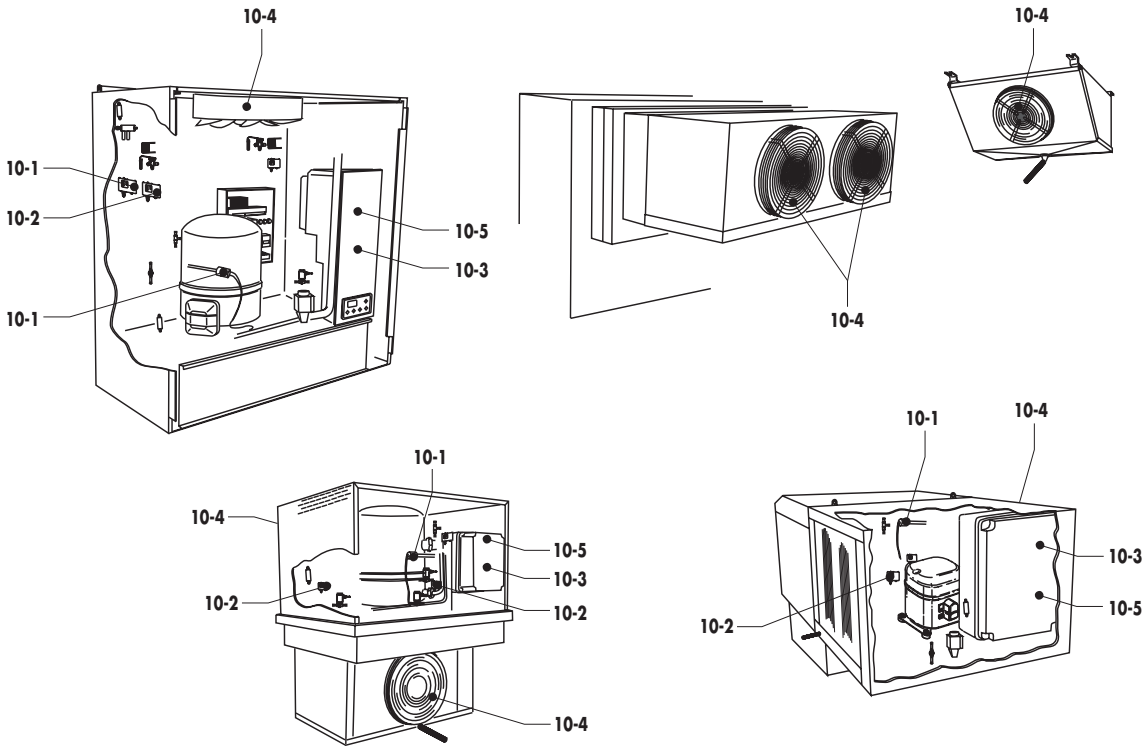

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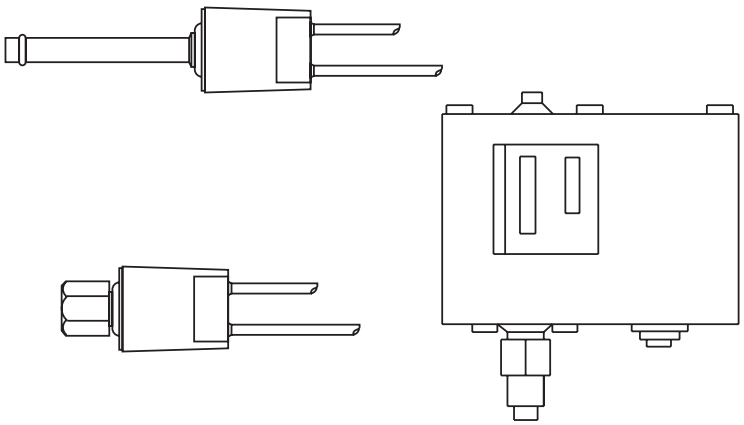

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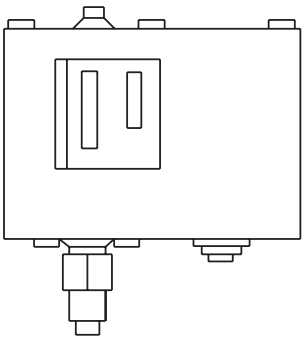

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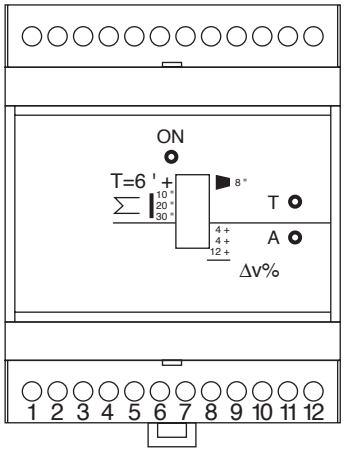

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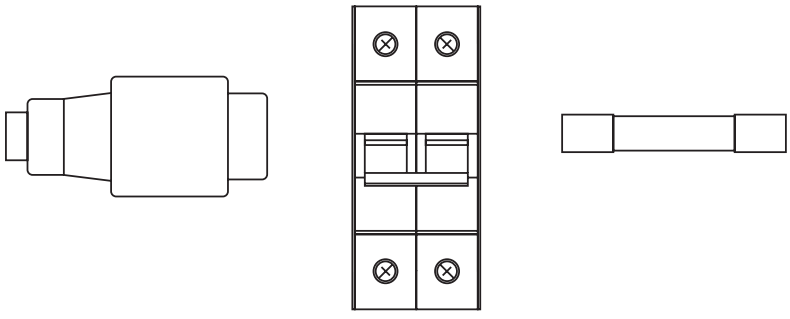

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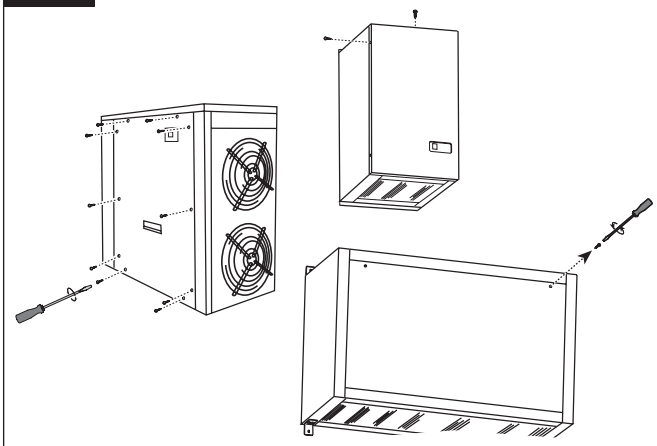

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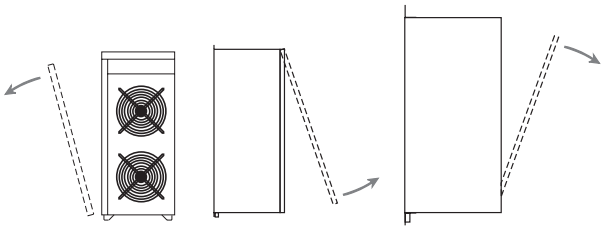

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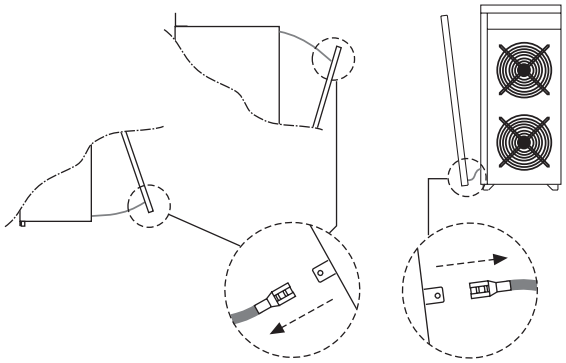

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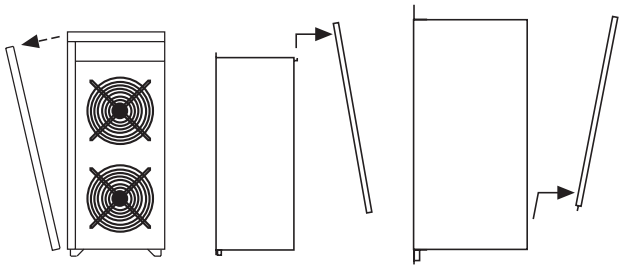

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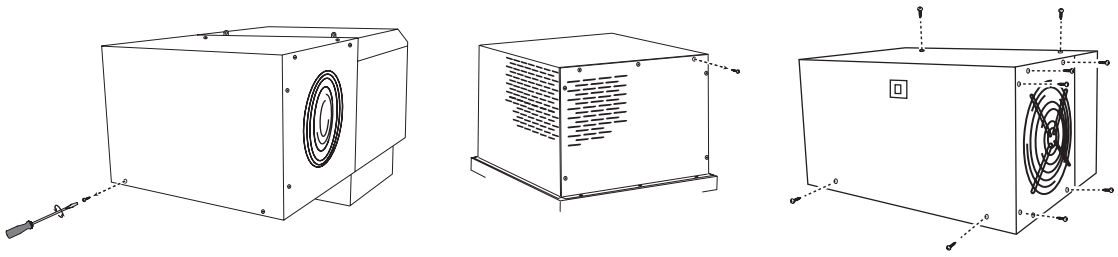

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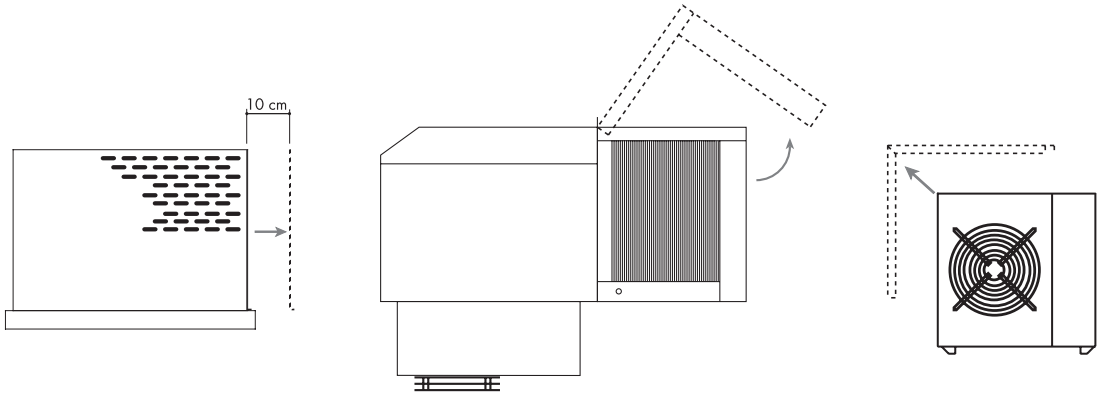

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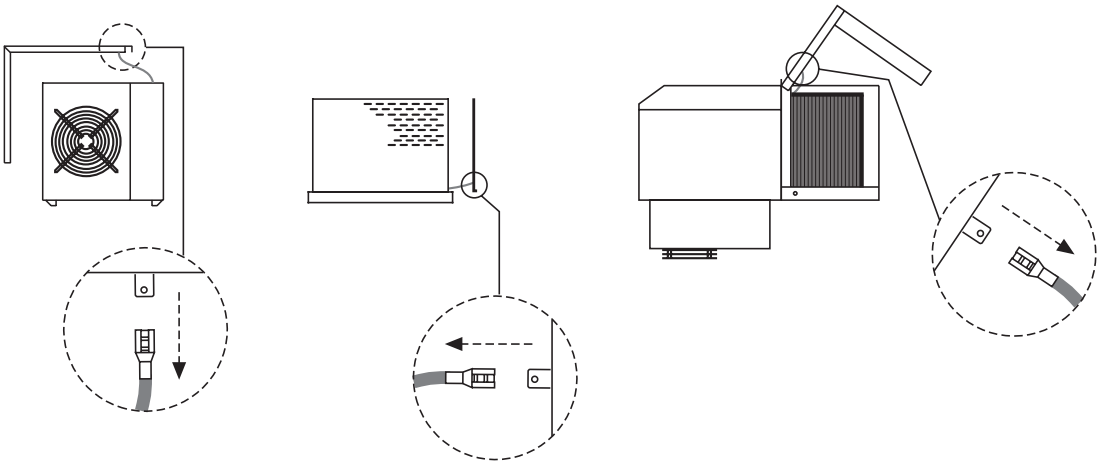

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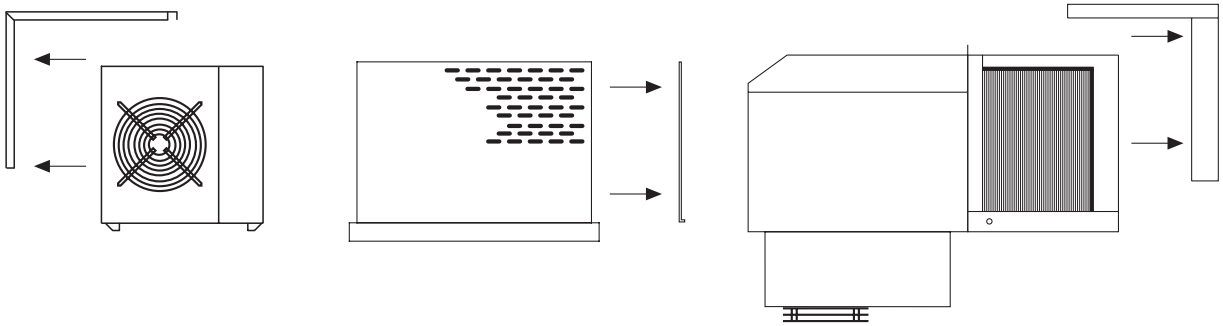

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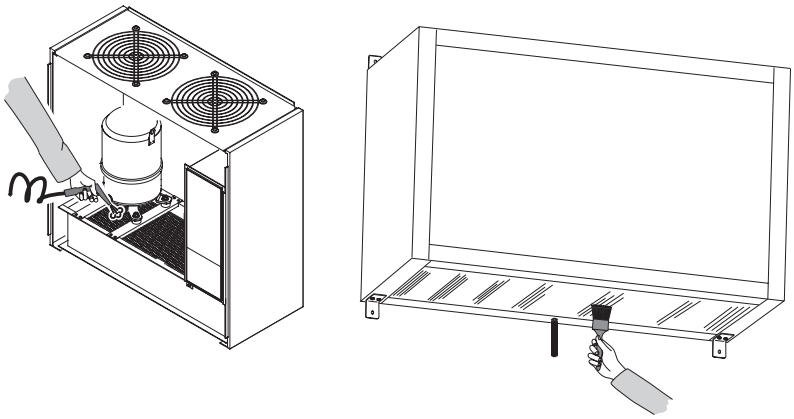

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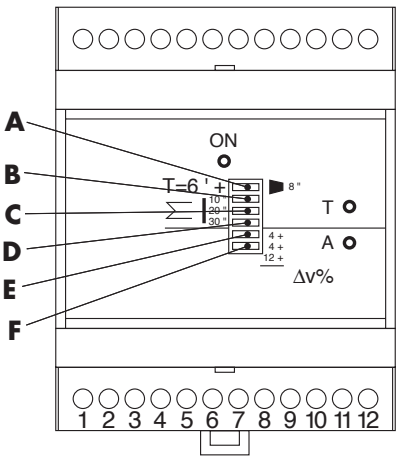

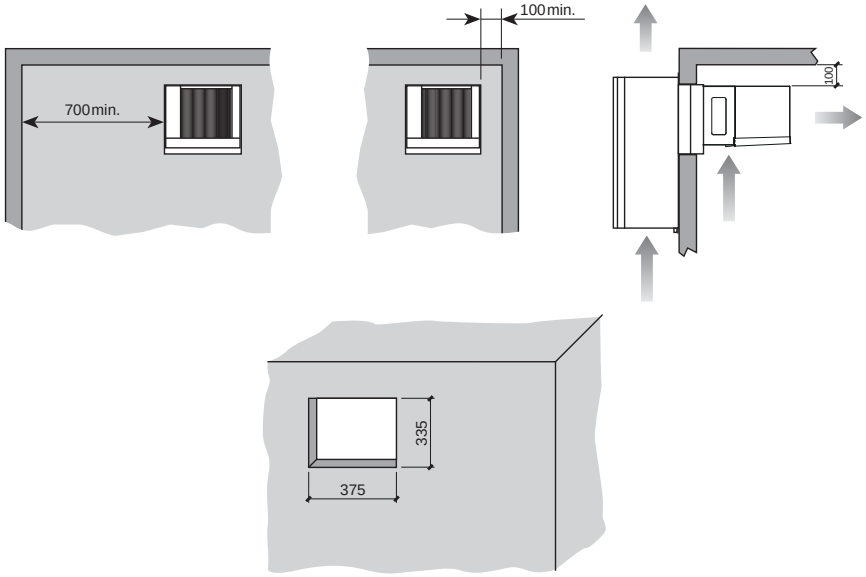

WALL-MOUNTING UNITS "SMALL"

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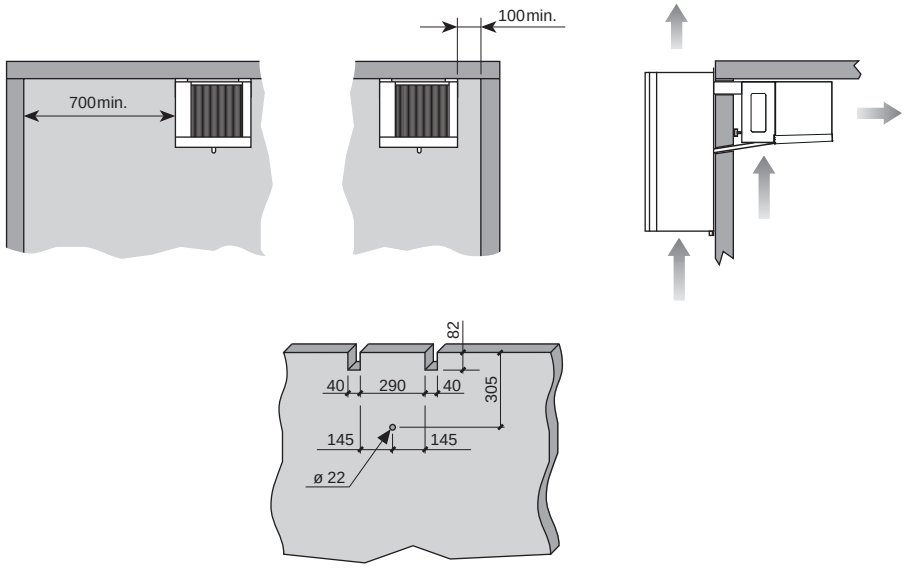

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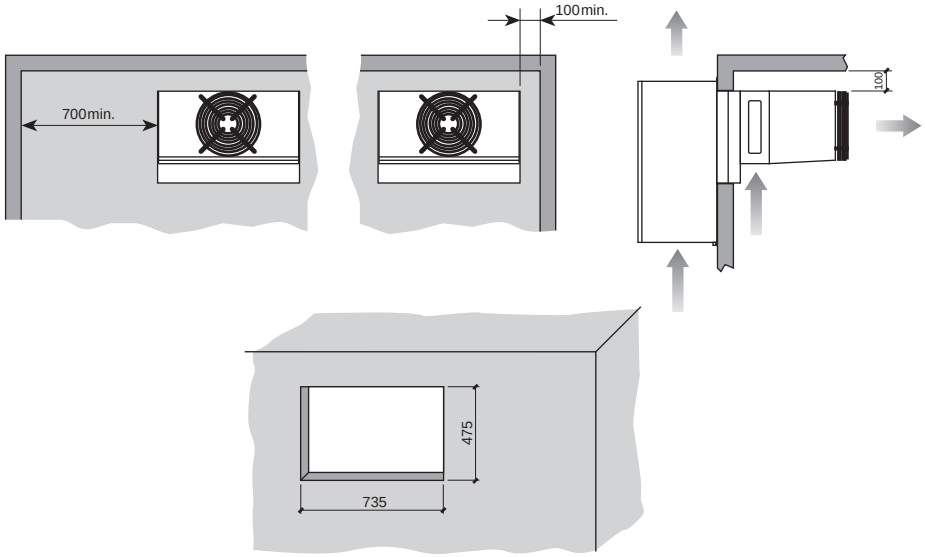

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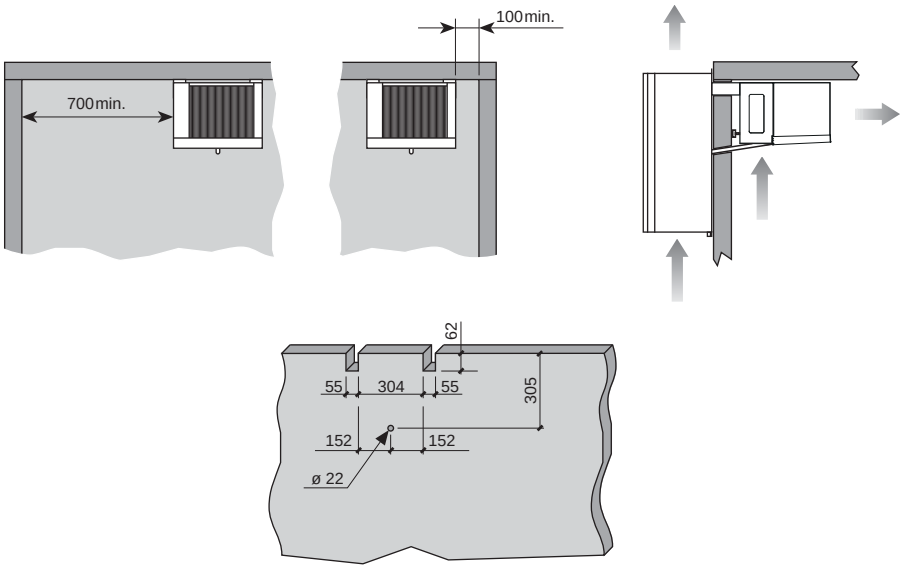

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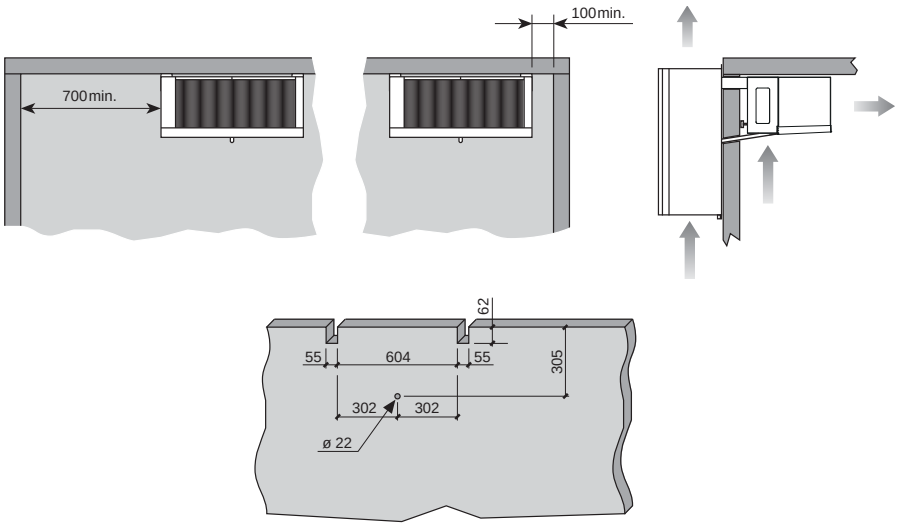

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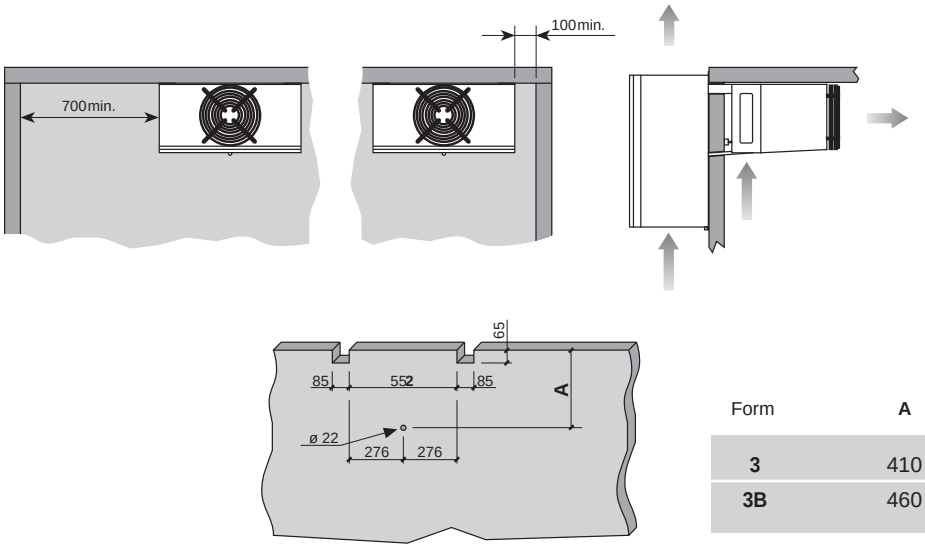

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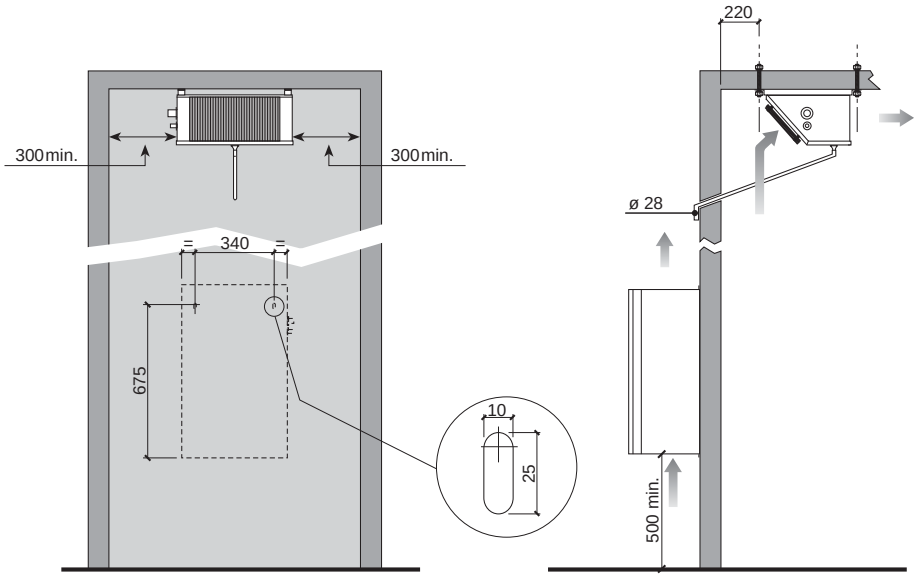

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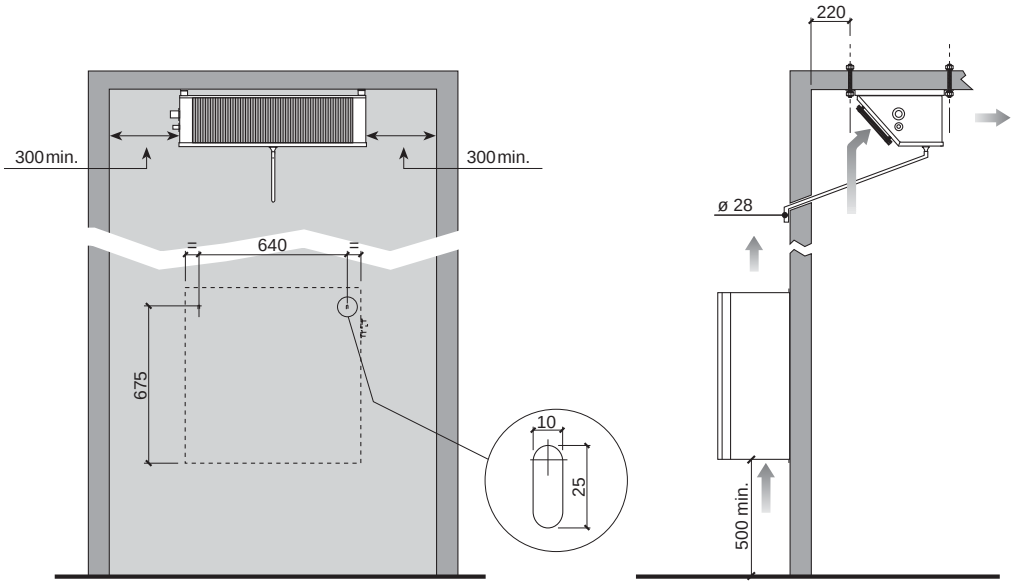

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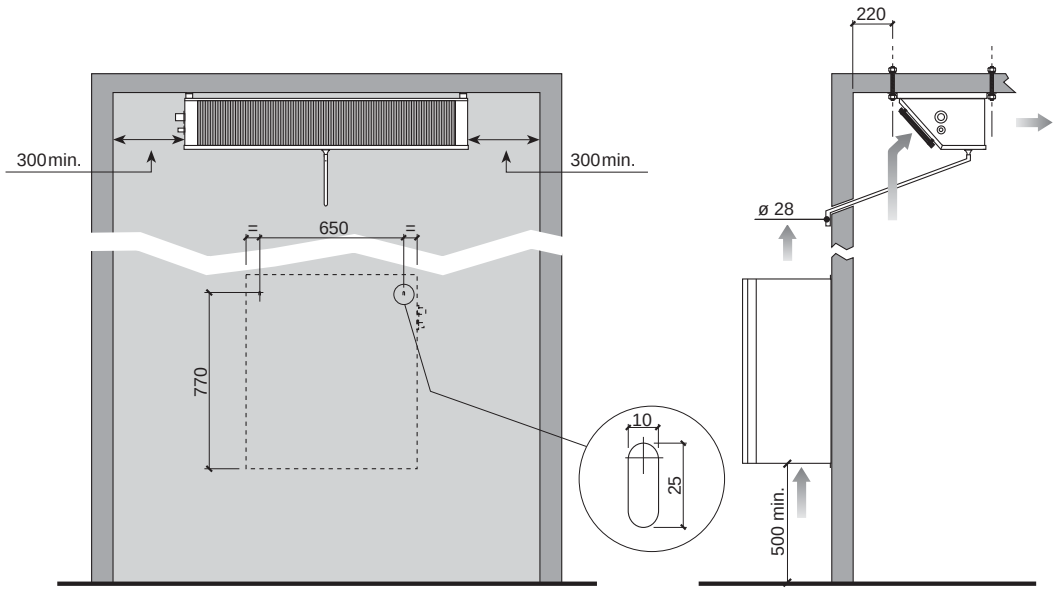

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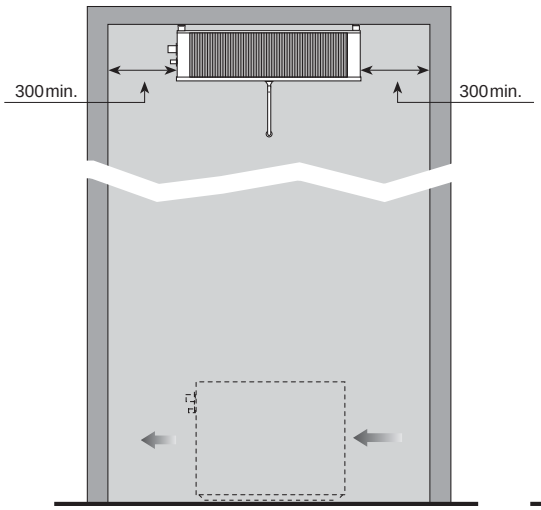

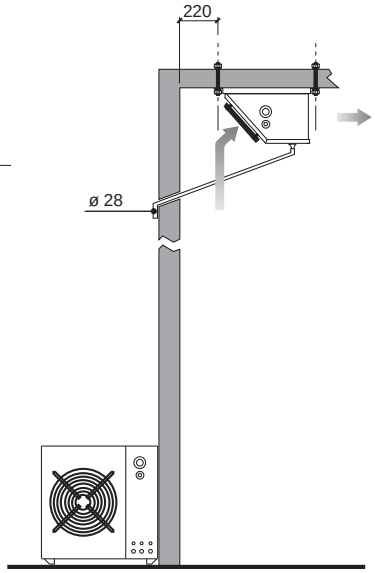

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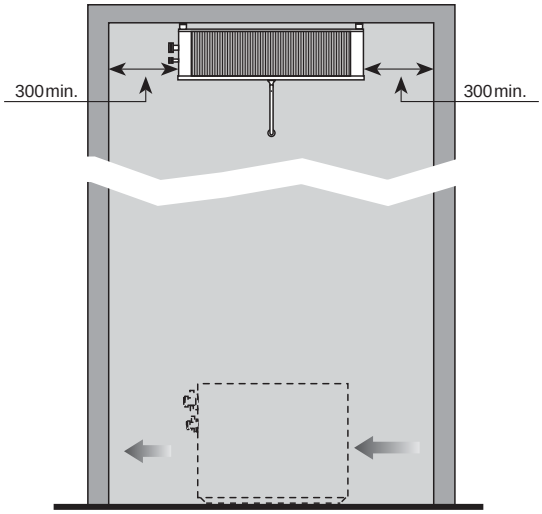

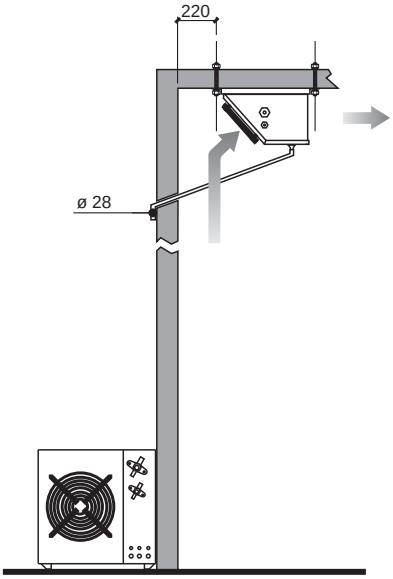

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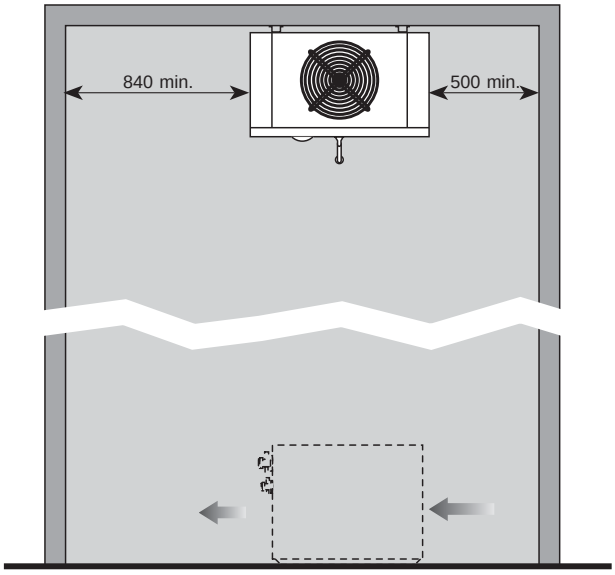

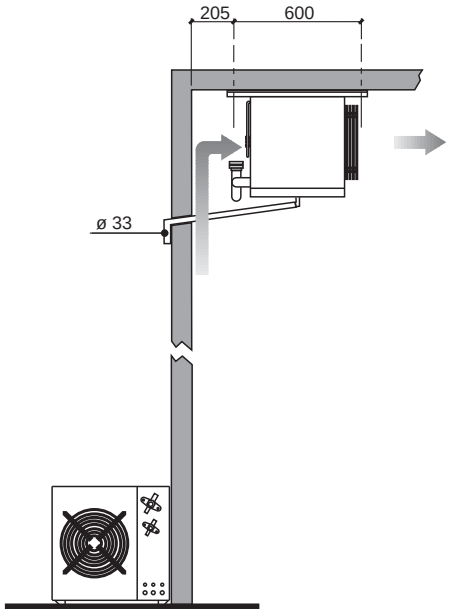

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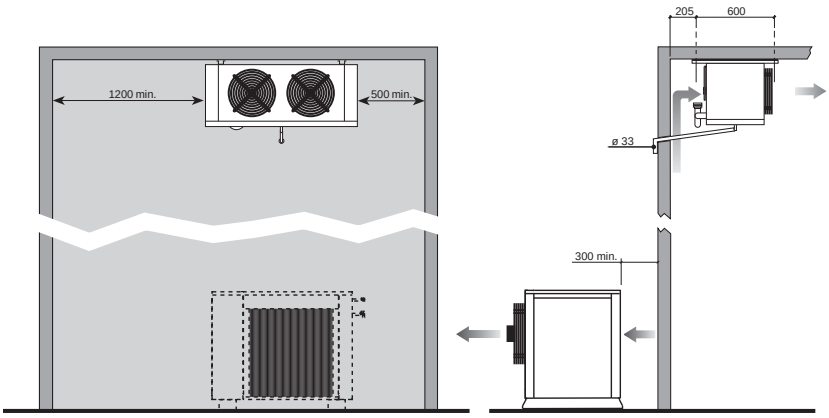

FLOOR COMMERCIAL

BI-BLOCK SYSTEMS

NEW models

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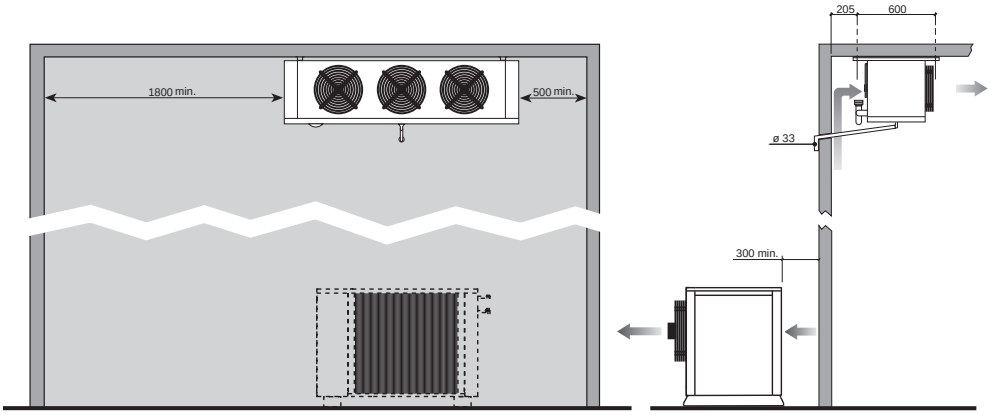

FLOOR COMMERCIAL

BI-BLOCK SYSTEMS

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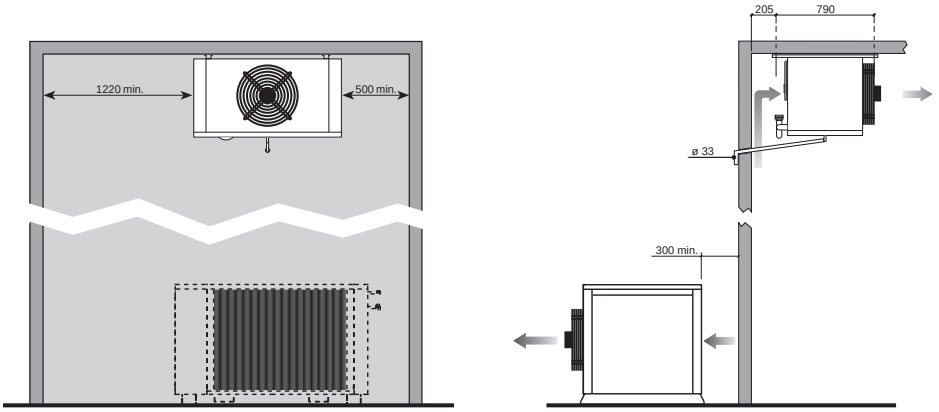

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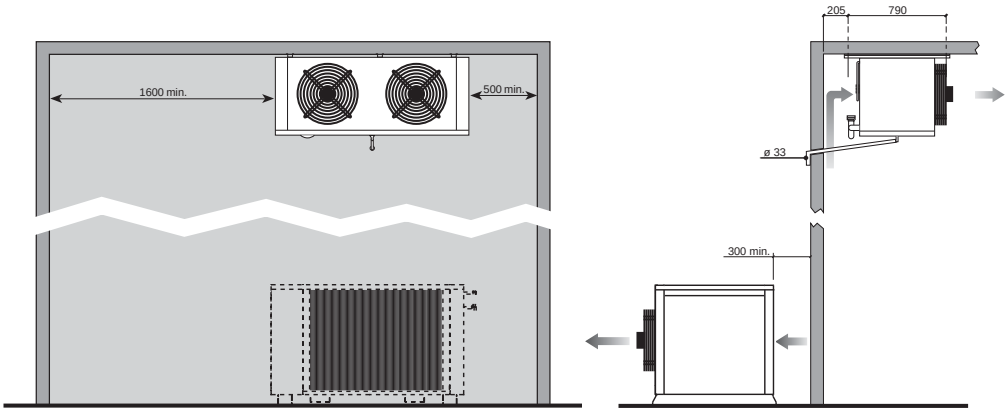

NEW models

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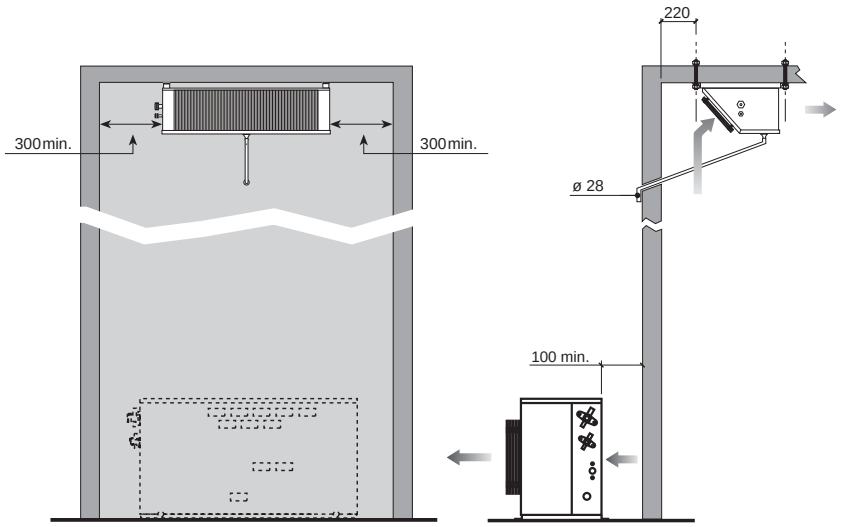
FLOOR COMMERCIAL

BI-BLOCK SYSTEMS



SOUNDPROOF COMMERCIAL

BI-BLOCK UNITS

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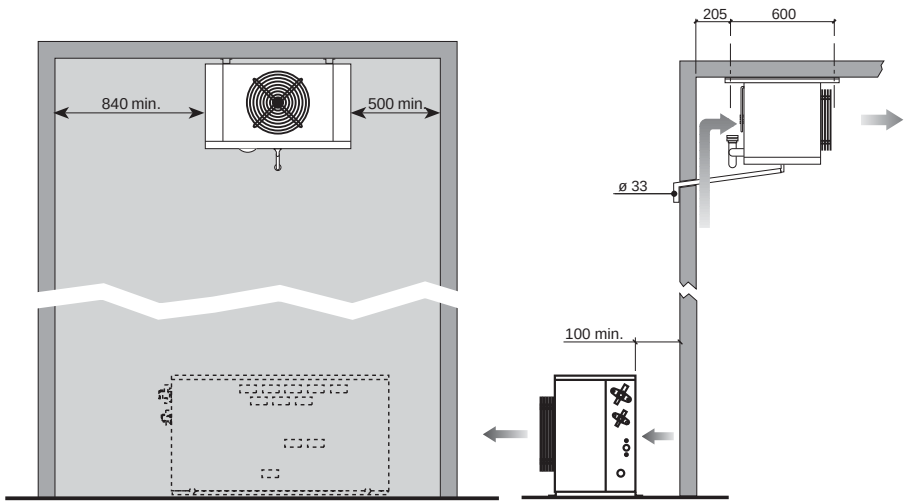
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