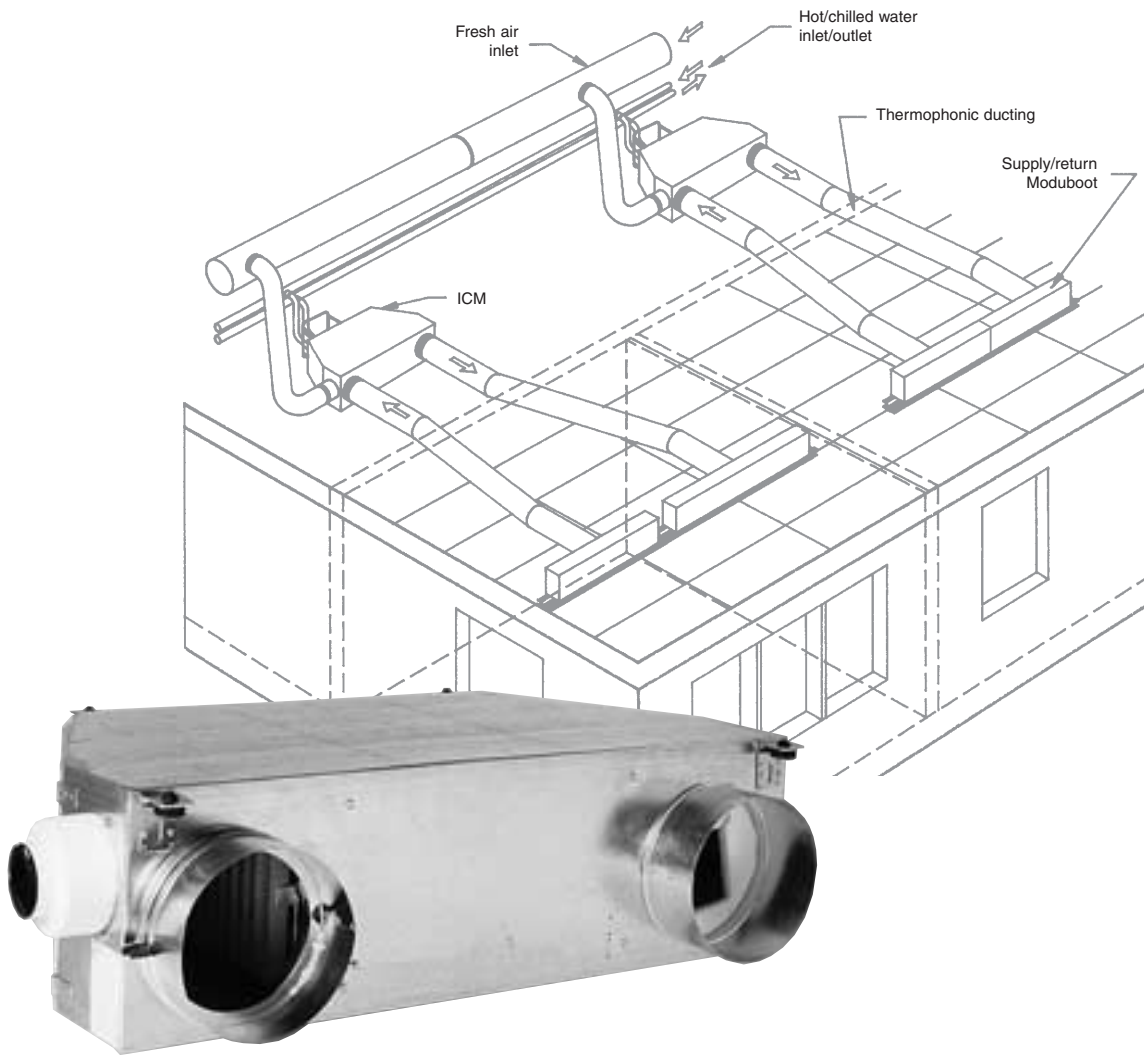




42BJ ICM - Sizes 1.3-2.3-4.4

Individual Comfort Module for variable air flow systems



Installation manual



Quality Management System Approval

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The photo shown on the front cover is solely for information, and not contractually binding. The manufacturer reserves the right to make changes without previous notification.

1 - INTRODUCTION

The Carrier 42BJ ICM is a compact fan coil designed specifically to air condition individual rooms ranging in area between 25 and 50 m². There are three sizes and three possible motor drive selections to ensure close matching of capability and required duty.

The main components of the unit are a centrifugal fan, a fresh air inlet with adjustable air quantity, a throw-away filter, a chilled water cooling coil and a hot water heating coil and/or an electric resistance heater.

Flexible, thermally and acoustically insulated ducts connect ICMs units to one or more plenums in the ceiling void which feed unobtrusive linear ceiling diffusers (typically Carrier Moduboot 35BD/35SR units) supplying the individual rooms or zones.

The total air conditioning system comprises one or more Carrier air- or water-cooled chillers and one air handler which supplies fresh air to the Carrier 42BJ ICMs. The ICMs may be installed above false ceilings or floor voids but away from occupied zones, ideally in centre areas where they are easily connected to hot water and chilled water circuits as well as to the fresh air supply.

These circuits, normally installed in the corridors and halls, never pass through the conditioned spaces. Only the passive elements of the system, the 35BD/35SR diffusers and their relatively short connecting ducts, are within the space which they serve.

Noise levels, or precisely the absence of noise, are a critical criterion in determining the design of an air conditioning system and its components.

Low inherent noise was a key factor in the design of the ICM. This and its high available static pressure, enabling it to be installed well away from especially noise-sensitive areas, expand its field of application to embrace study rooms, consultation rooms and like areas where ambient noise is itself naturally very low.

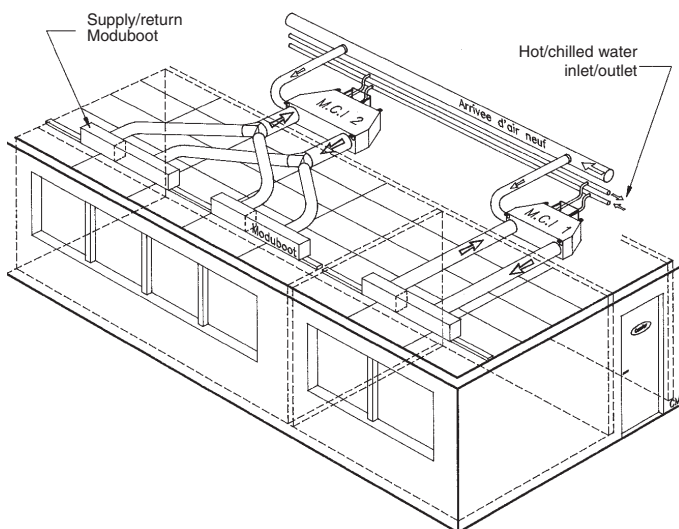
Low noise and remoteness from the space which it serves, permitting easy servicing, are key attributes influencing the selection of an air conditioning system.

The top of the range ICM can have a Carrier Maestro Zone Controller with each room occupant having his or her own Zone User Interface (ZUI), on a wall or desk, with which to select the preferred comfort level:

- Room ambient temperature
- Lighting on or off
- Venetian blinds raised or lowered and their inclination
- Control ventilation air
- Select Occupied or Unoccupied mode at each ICM to control energy usage.

Further, with these models, connection to a building energy management system (BMS) allows all units to be controlled centrally to satisfy overriding criteria or to respond to local selections.

The central energy management system controls, continuously, the comfort level in each zone and gives instant reaction to system inputs to achieve optimum energy usage without disturbing individual comfort level selections.



2 - FEATURES

2.1 - Physical and electrical data

| 42BJ ICM | | Size 1.3 | Size 2.3 | Size 4.4 |
|--|-------------------------|--------------|--------------|--------------|
| Nominal air flow | l/s (m ³ /h) | 144 (520) | 189 (680) | 264 (950) |
| Total cooling capacity - cold water coil* | kW | 2.88 | 4.44 | 6.01 |
| Heating capacity - hot water coil** | kW | 1.68 | 2.50 | 3.79 |
| Power supply 230 V - 1 ph - 50 Hz | U % | ± 10 | ± 10 | ± 10 |
| Operating weight (6 row coil and control) | kg | 31 | 40 | 60 |
| Water coil | | | | |
| With 3/8 in copper tubes, aluminium fins at 1.6 mm spacing, purge valve and 1/2 in. screw connection: | | | | |
| • Test pressure | kPa | 2400 | 2400 | 2400 |
| • Operating pressure | kPa | 1600 | 1600 | 1600 |
| 5-row coil: | | | | |
| • Number of passes | | 2 | 3 | 3 |
| • Water content | l | 0.90 | 1.20 | 1.50 |
| Monobloc 6-row coil: | | | | |
| • No. of rows | | | | |
| - Cooling | | 5 | 5 | 5 |
| - Heating | | 1 | 1 | 1 |
| • No. of passes: | | | | |
| - Cooling | | 2 | 3 | 3 |
| - Heating | | 1 | 1 | 1 |
| • Water content | | | | |
| - Cooling | l | 0.90 | 1.20 | 1.50 |
| - Heating | l | 0.20 | 0.29 | 0.45 |
| Electric heater | | | | |
| • Maximum capacity | kW | 1.70 | 1.90 | 1.76 |
| • Current draw ± 15% | A | 11 | 11 | 11 |
| • VDE, CE, UL and CSA approved | | | | |
| • Power input at zero flow | W | 80 | 80 | 80 |
| Fan | | | | |
| • Forward-curved blade centrifugal fan, single wheel: | | single inlet | double inlet | double inlet |
| • Max. air flow | l/s (m ³ /h) | 144 (520) | 189 (680) | 264 (950) |
| • Static pressure at nominal air flow*** (without electric heater) | Pa | 145 | 120 | 85 |
| Fan motor | | | | |
| 230 V - 1 ph - 50 Hz, 2-pole asynchronous, permanent capacitor, inherent overload protection, class B insulation, varnish class F, IP 44 | | | | |
| • Maximum power input at 230 V*** | W | 175 | 240 | 181 |
| • Minimum output voltage from electronic speed controller | V | 80 | 80 | 80 |
| • Nominal current*** | A | 0.77 | 1.04 | 0.81 |
| • Starting current | A | 3.04 | 4.44 | 3.36 |
| Air filter | | | | |
| Throwaway, 55 mm thick, fire rating medium M1, metal frame | | | | |
| • Dimensions | mm | 240 x 400 | 240 x 550 | 315 x 550 |
| • High efficiency filter type F5 | | | | |
| • Pressure drop, clean, nominal air flow | Pa | 30 | 35 | 40 |
| Fresh air connection: | | | | |
| • Outside diameter | mm | 125 | 125 | 125 |
| • Constant minimum air flow (-10% ; + 20%) | l/s (m ³ /h) | 8.3 (30) | 8.3 (30) | 8.3 (30) |
| • Constant maximum air flow (-10% ; + 20%) | l/s (m ³ /h) | 44.4 (160) | 44.4 (160) | 44.4 (160) |
| • ΔP (upstream/downstream) | | | | |
| - Controller at 8.3 l/s (30 m ³ /h) | Pa | 50 - 200 | 50 - 200 | 50 - 200 |
| - Controller at 44.4 l/s (160 m ³ /h) | Pa | 70 - 200 | 70 - 200 | 70 - 200 |

ICM Water connections

ICM modules are designed and tested for 16 bar operating pressure. The total operating circuit of the ICM is guaranteed for an operating pressure of 10 bar.

Contact your local Carrier representative for advice when an application calls for an operating pressure of 16 bar.

Legend:

* Based upon water entering at 6°C, room air at 25°C dry bulb, 50% relative humidity, 5 K ΔT and nominal air flow.

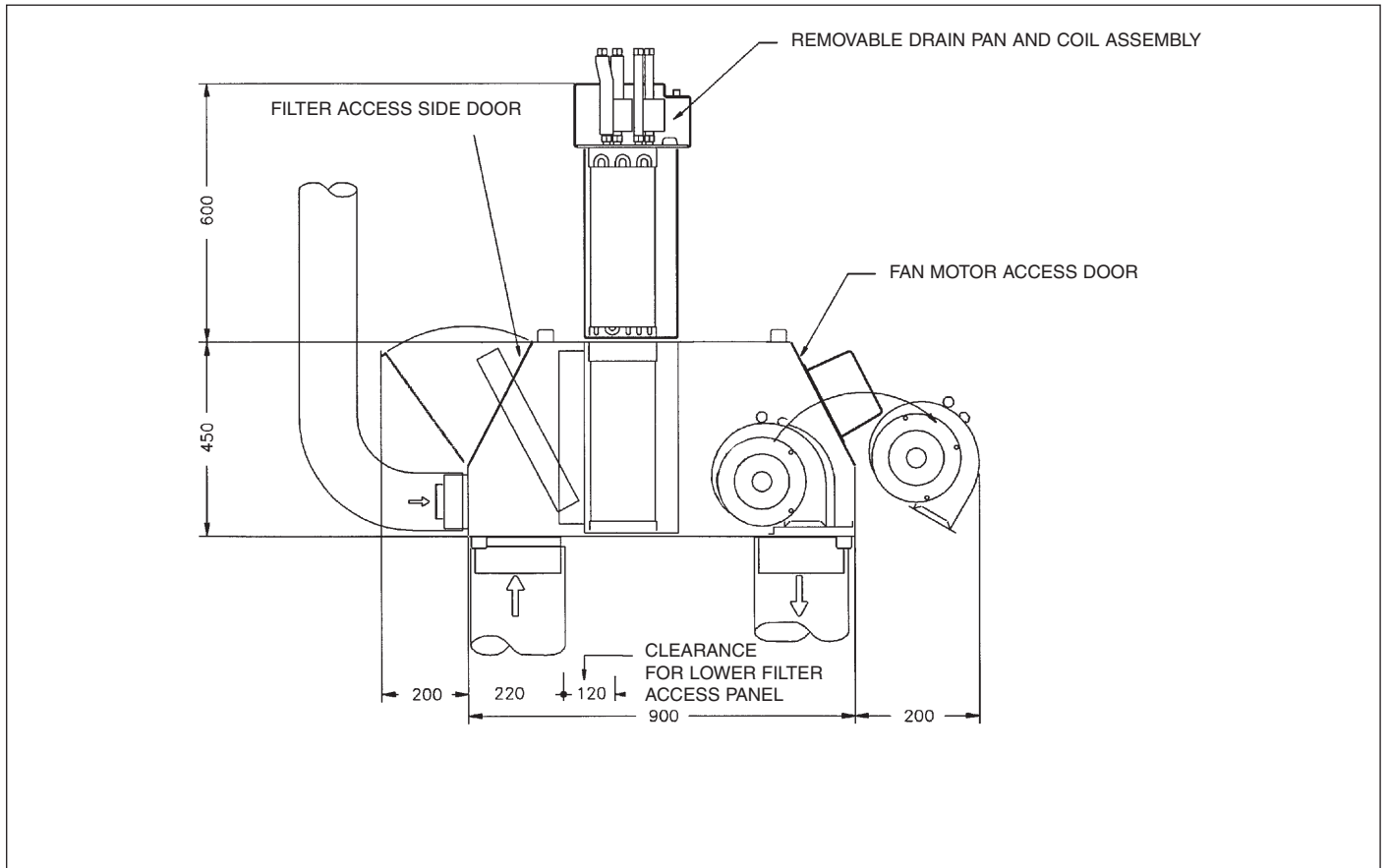
** Based upon water entering at 50°C, room air at 19°C, 10 K ΔT and nominal air flow.

*** Refer to extended electrical data table

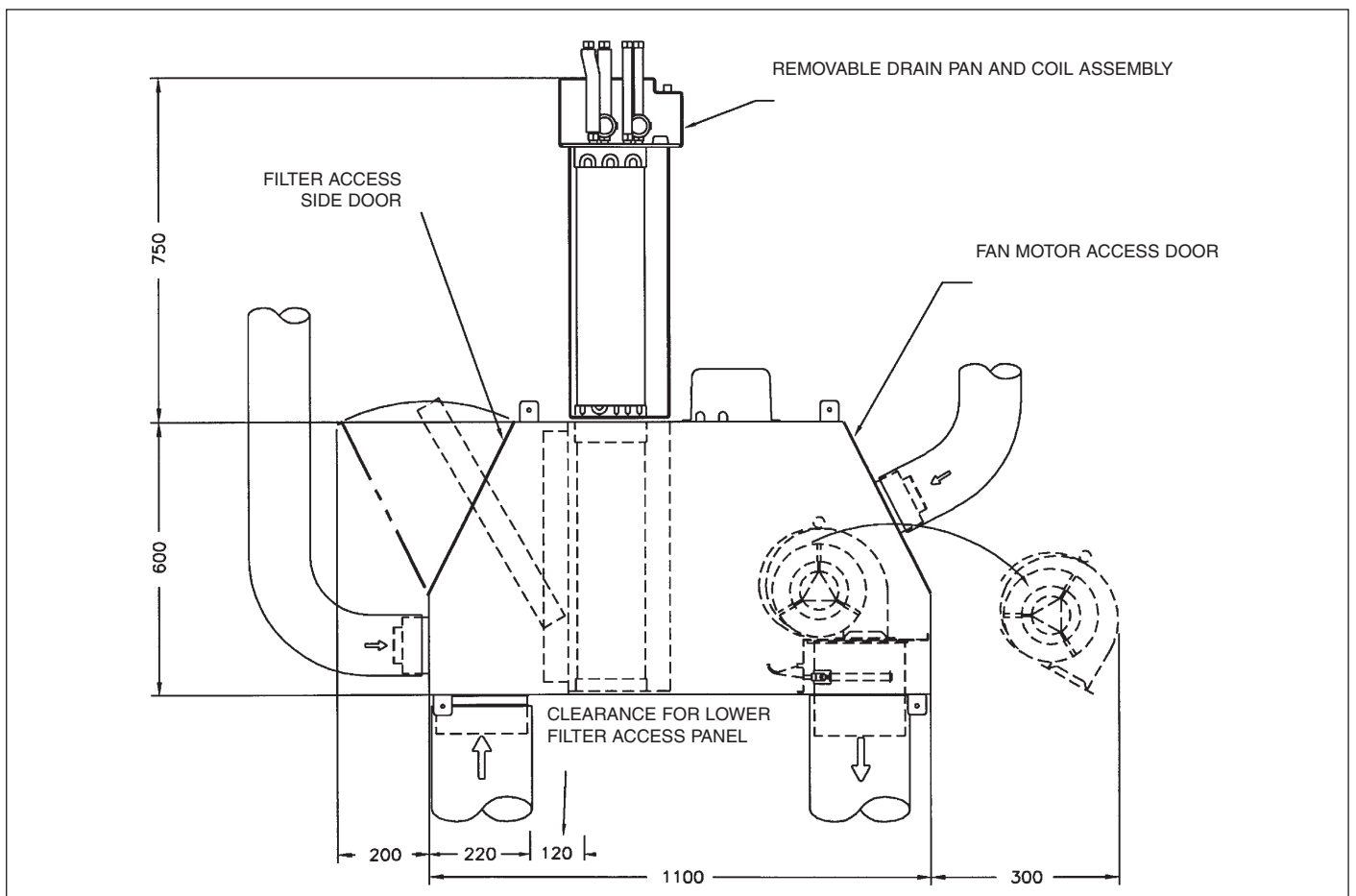
2.2 - Dimensional drawings

2.2.1 - Required service space, mm

Size 1.3



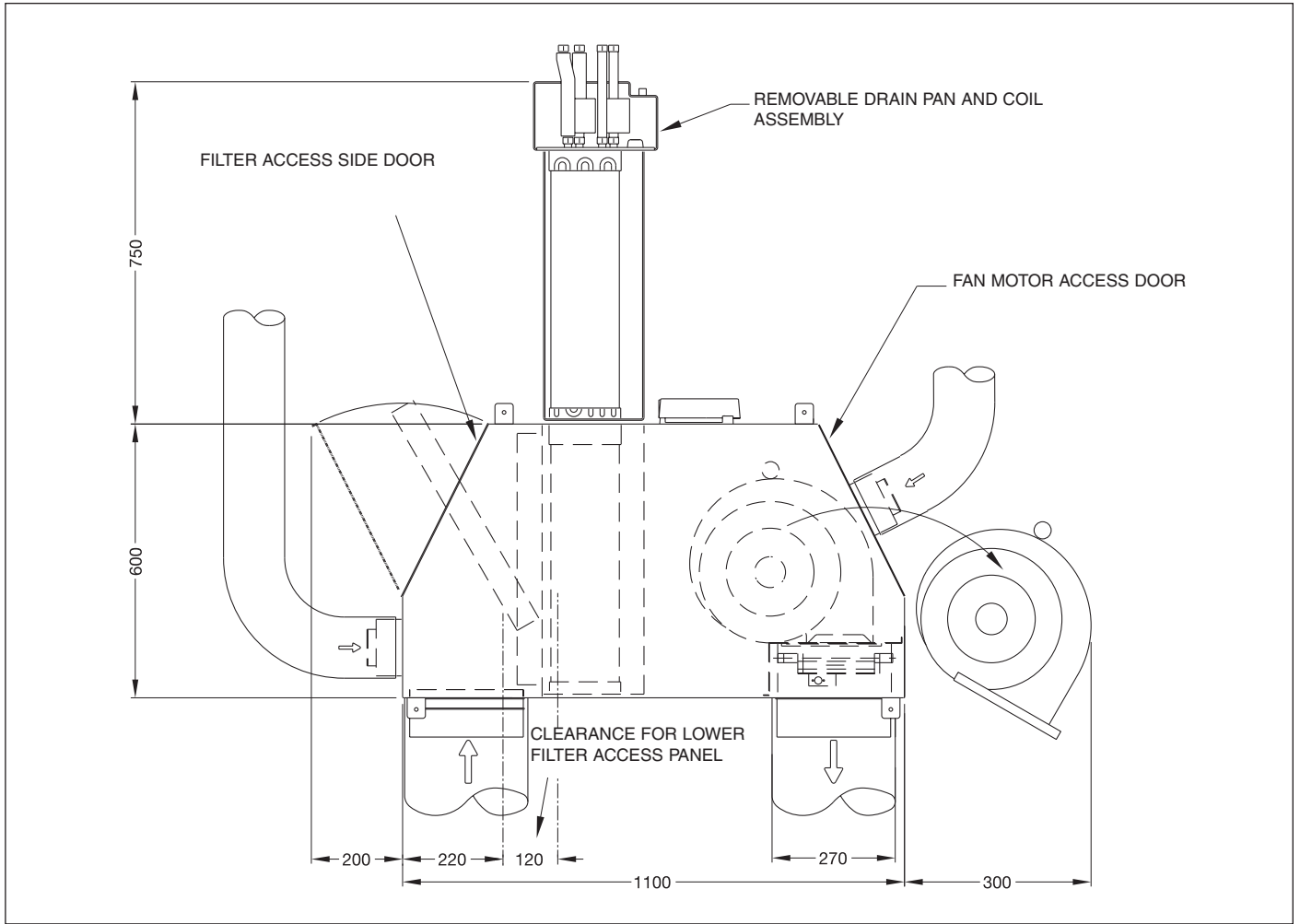
Size 2.3



2.2 - Dimensional drawings (continued)

2.2.1 - Required service space, mm

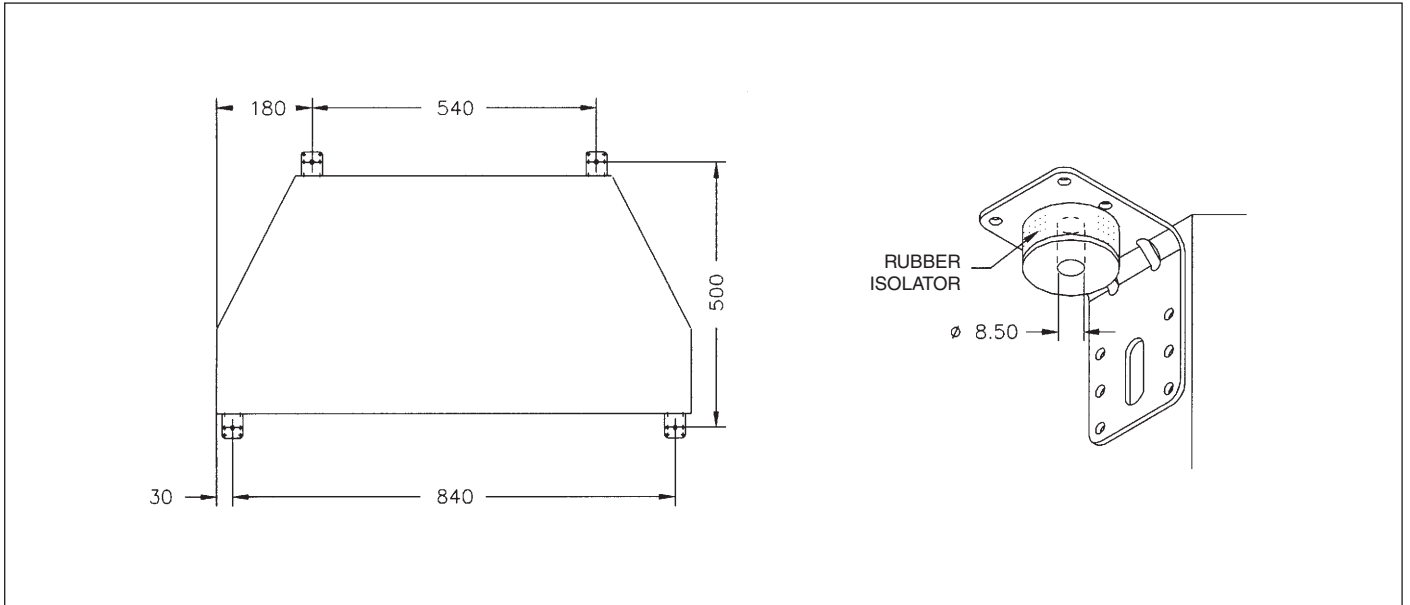
Size 4.4



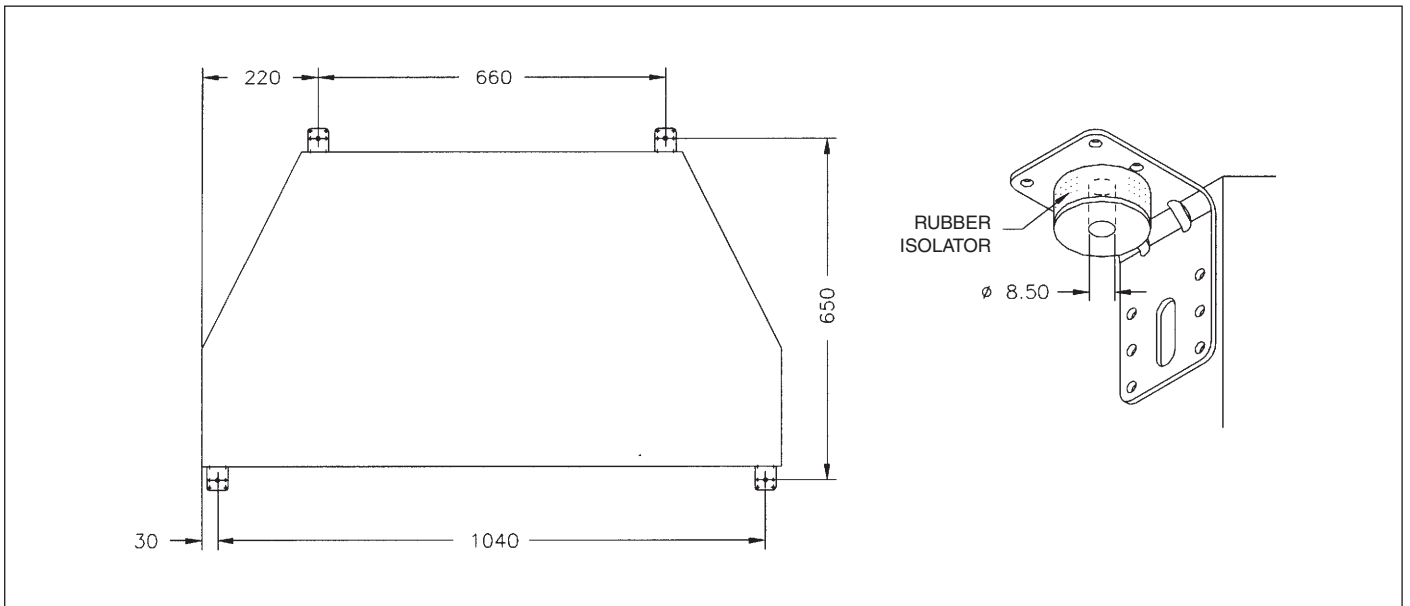
2.2 - Dimensional drawings (continued)

2.2.2 - Template for locating threaded hangers, mm

Size 1.3



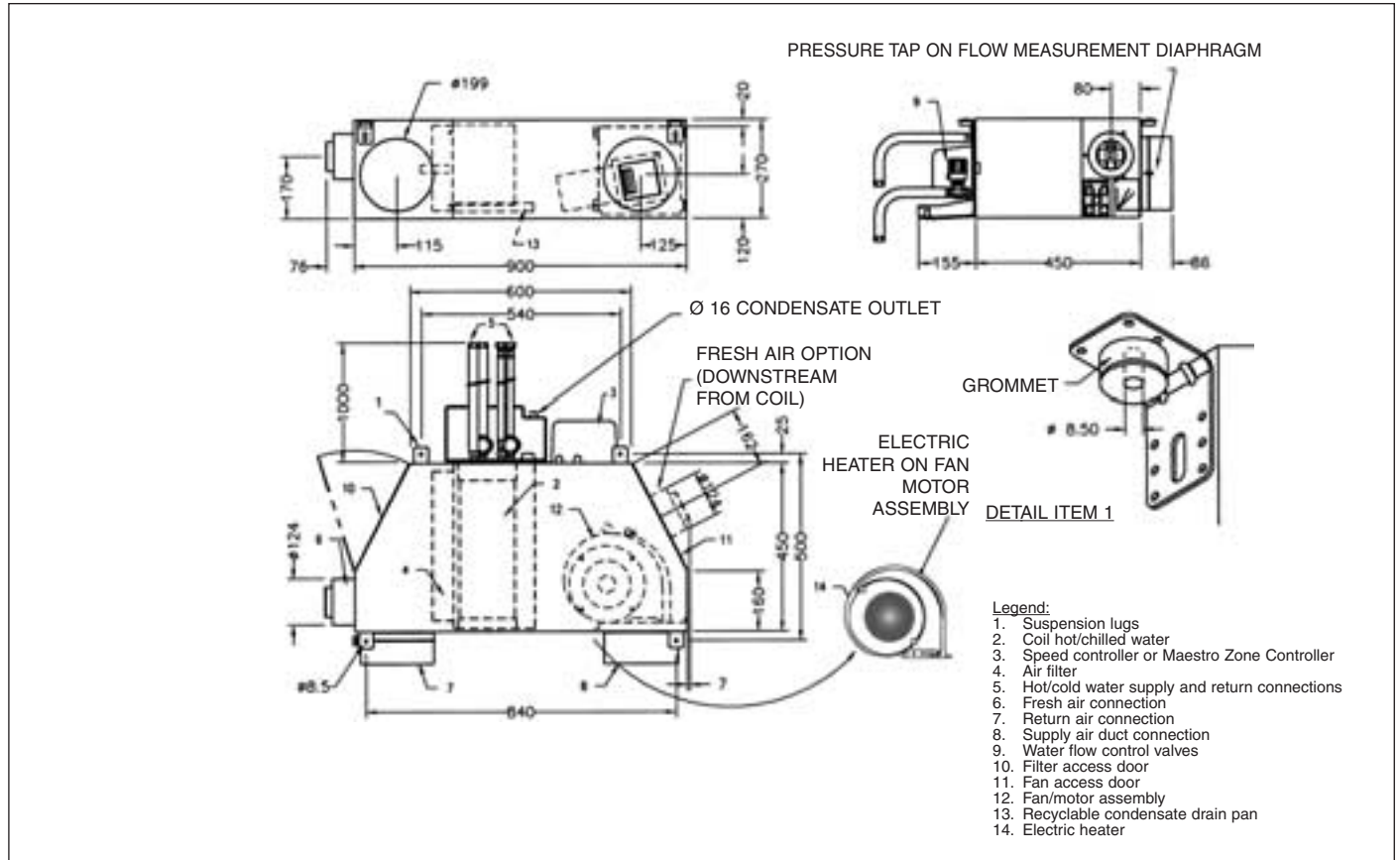
Sizes 2.3 & 4.4



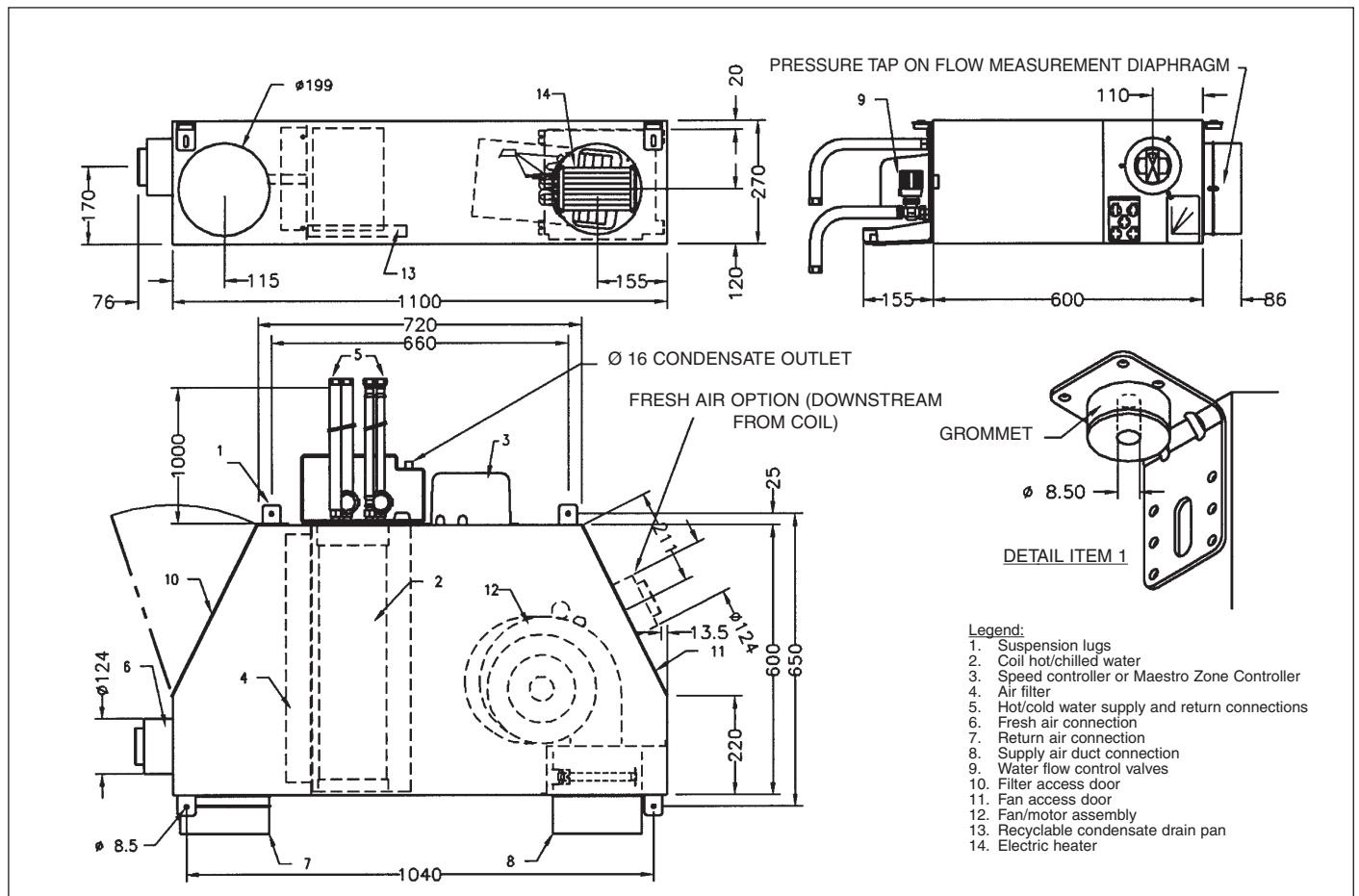
2.2 - Dimensional drawings (continued)

2.2.3 - Dimensions, mm

Size 1.3



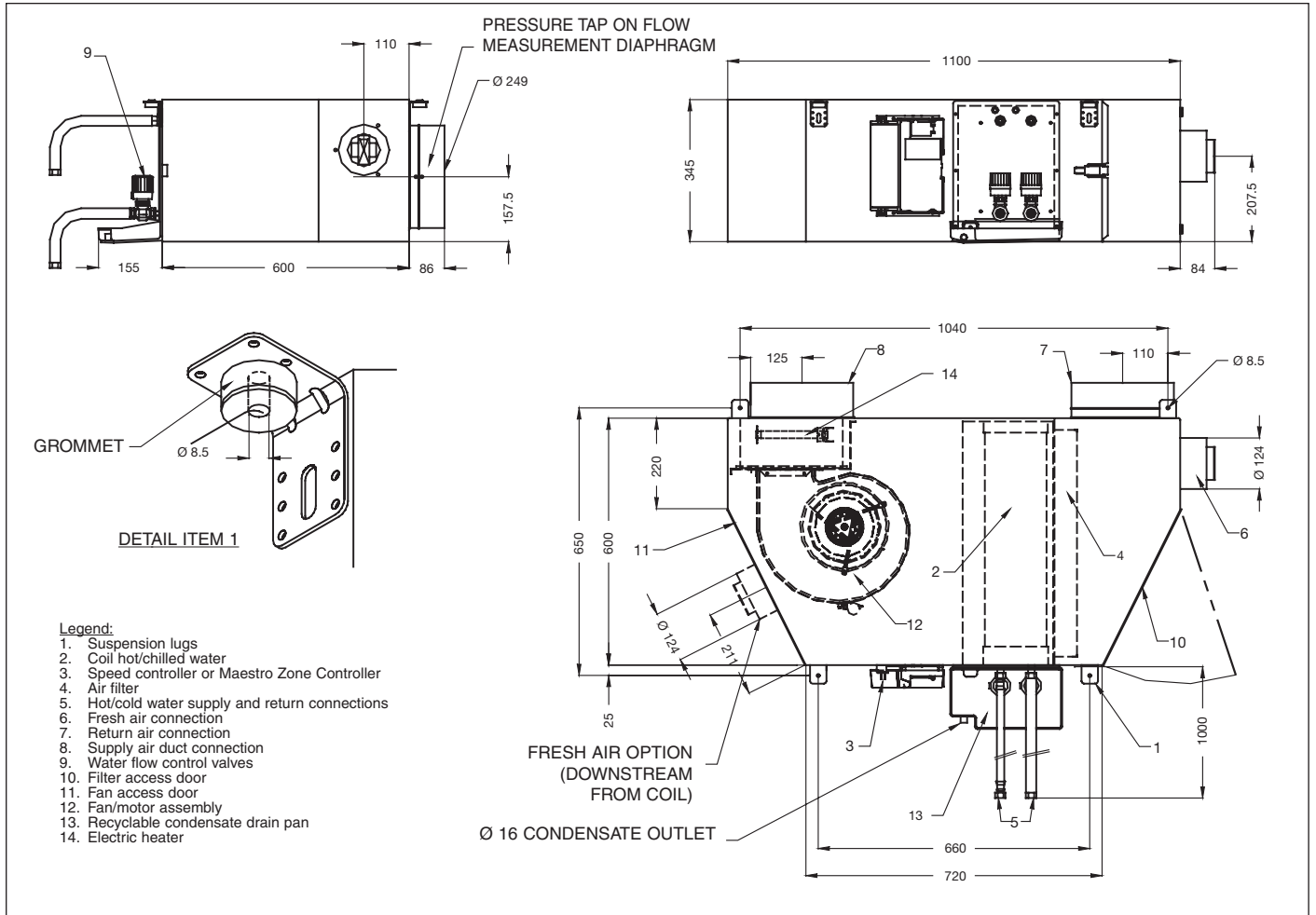
Size 2.3



2.2 - Dimensional drawings (continued)

2.2.3 - Dimensions, mm

Taille 4.4



2.3 - ICM packaging

Packaged on wooden pallets of 10 ICM units and protected by heat-shrunk or stretchable plastic film.

NOTE:

If “Export” packaging is needed, please contact your local Carrier representative.

| | Palletized | | | | |
|----------|------------------|-------------|------------|-------------|-------------|
| | Units per pallet | Length (mm) | Width (mm) | Height (mm) | Weight (kg) |
| Size 1.3 | 10 | 1600 | 1100 | 1500 | 320 |
| Size 2.3 | 10 | 1700 | 1350 | 1500 | 450 |
| Size 4.4 | 6 | 1800 | 1350 | 1200 | 410 |

NOTE:

When receiving a shipment of units, check at once that none of the packages has been damaged. To maintain the protection of the packaging as long as possible, do not open any package until just before a unit is to be installed.

2.4 - Receiving a shipment - installation methods

When receiving a shipment, check the condition of the goods and report any damage in transit to the shipping company. Do not unpack the units until just before they are due to be installed, and make sure they are as close as possible to the installation site when unpacking them. Do not stack the units and do not place heavy articles of any sort on them.

WARNING:

When moving the units do not use water pipe connections or condensate drain stubs, valves or flexible pipes as handles.

The presence of electrical components creates hazards to those installing and servicing these units. Only properly qualified electricians may be authorized to instal, service and repair these units. Some routine maintenance such as cleaning of the coils and filter replacement may be entrusted to non-skilled personnel. Before carrying out any work, qualified technicians must familiarize themselves with the contents of this manual and all informative tags and labels attached to the units. It is essential to adhere to all applicable safety regulations. Wear eye protectors, work gloves and non-flammable clothing when soldering or brazing. Always have a fire extinguisher of the appropriate type close at hand.

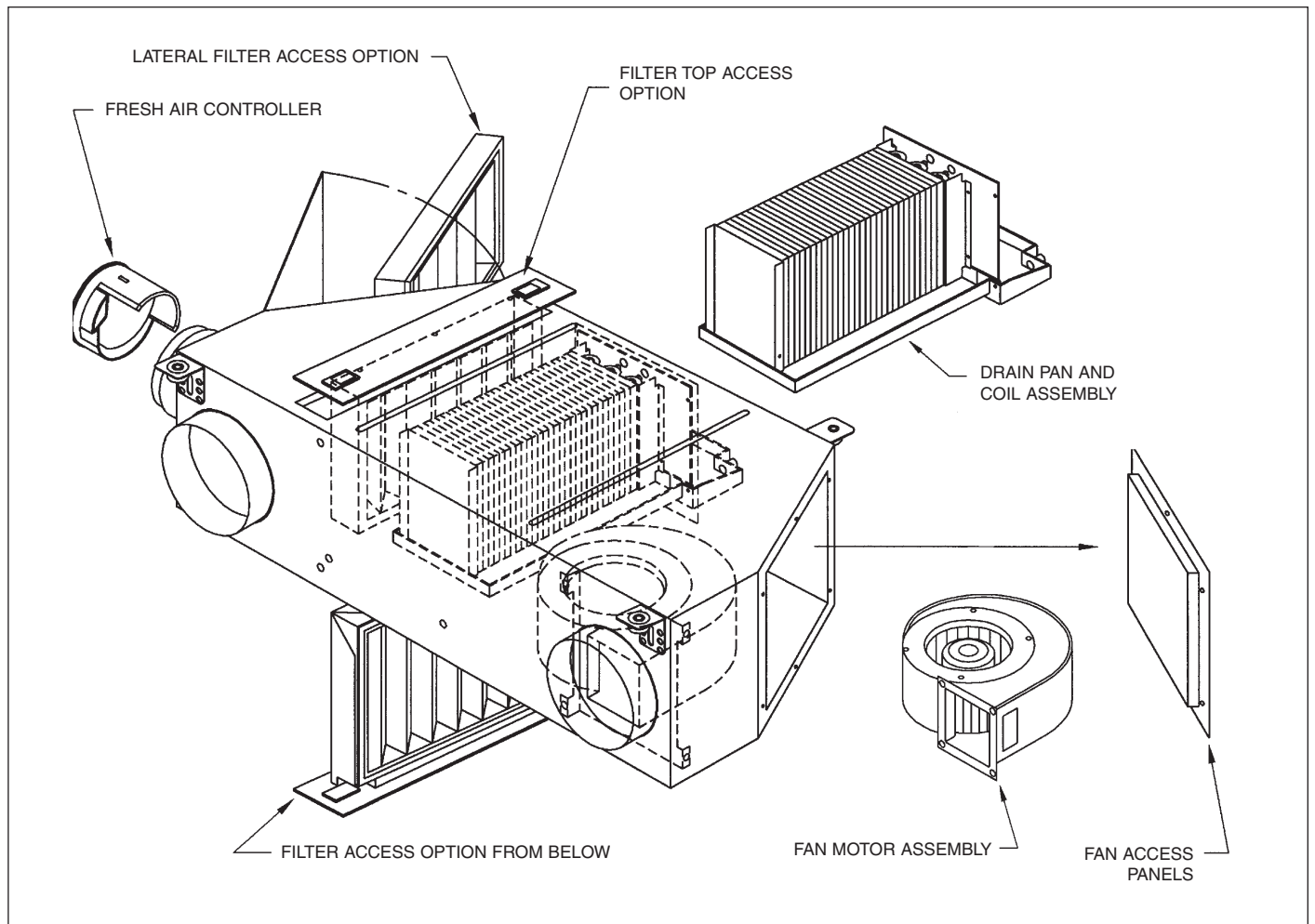
WARNING:

Disconnect the power supply to the unit and to any accessories before carrying out any work on a unit.

Do not instal a unit where flammable gases or products of an acidic or alkaline character may be present. The copper/aluminium coil or plastic components inside the unit could suffer irreparable corrosion damage in their presence.

WARNING:

Failure to take proper account of the above advice and unauthorised modification of the electrical connections will render the warranty on the product null and void.



3 - SAFETY CONSIDERATIONS

3.1 - General

Installing, commissioning and servicing of the various components which make up the different control loops can be dangerous unless certain aspects of the installation, such as the presence of mains electricity and hot or chilled-water in the air conditioning equipment, are taken into account.

Only specially trained and qualified technicians and installers who have been fully trained on the product concerned are authorised to instal, commission and service this equipment.

During servicing work, it is essential to apply all recommendations and instructions given in service leaflets, on labels or in the instructions delivered with the equipment, and to comply with any other relevant instructions.

Definition of the pictograms used



Electrical Danger



Caution hand hazard



General Danger

Comply with all the safety rules and regulations currently in force.

Wear eye protectors and work gloves.

Take care when moving or positioning equipment.

3.2 - Precautions against electrocution

Only electricians who are qualified to the level recommended by the IEC (International Electrotechnical Commission) in its standard IEC 364, corresponding to Europe HD 384, France NFC 15 100 and UK IEE Wiring Regulations, may have access to electrical components. In particular it is obligatory to disconnect all electrical power supplies to the unit and its accessories before carrying out any work. Disconnect the main power supply with an isolating device (not supplied by Carrier).

IMPORTANT:

The components, which make up the different control loops described in this manual include electronic items. As such, they may generate or be harmed by electromagnetic interference unless they are installed and used in accordance with these instructions. The components making up these control systems conform to the requirements of electromagnetic compatibility in residential and industrial areas. They also comply with the low-voltage directive.

3.3 - General installation recommendations

IMPORTANT:

The MAESTRO controller, power module, controls loops with speed controllers or in general units fitted with controls loops must have an isolating device upstream (for example a double-pole circuit breaker). If necessary, an easily operated emergency stop device (such as a punch-button switch) must cut off the power to all equipment. These safety devices shall be sized and installed in accordance with IEC Recommendation 364, corresponding to Europe HD 384, France NFC 15 100 and UK IEE Wiring Regulations. These devices are not supplied by Carrier.

In general terms the following rules must be applied:

- Units must be provided with overvoltage protection upstream (not supplied by Carrier)

| | Upstream overvoltage protection |
|------------------------------|---------------------------------|
| Unit without electric heater | T2A |
| Unit with electric heater | T16A |

- Units must be protected by a differential type earth leakage current device (not supplied by Carrier)
- The power disconnection device must be clearly labelled to identify which items of equipment are connected to it.
- The wiring of the components which make up the different control systems and the communication buses must be carried out in accordance with the latest rules and regulations by professional installers.
- The power supply cable must be doubly insulated and fixed using an appropriate cable clamp or the cable clamp supplied with the MAESTRO controller. The cable must be clamped on the outer insulation.
- The control loop components must be installed in an environment, which conforms to their index of protection (IP).

The maximum level of pollution is normally pollutant (level 2) and installation category II.

- The low-voltage wiring (communication bus) must be kept physically separate from the power wiring.
- In order to avoid interference with the communication links:
 - Keep low-voltage wiring away from power cables and avoid using the same cable run (a maximum of 300 mm in common with the 230 VAC, 30 A cable)
 - Do not pass low-voltage wires through loops in the power cables
 - Do not connect heavy inductive loads to the same electrical supply (circuit breaker) used by the controllers, power modules or speed controllers.
 - Use the screened cable type recommended by Carrier and make sure all cables are connected to the controllers and power modules.

3.4 - Conformity

This equipment has been declared to be in conformity with the main requirements of the directive by virtue of using the following standards:

- Electromagnetic compatibility: 89/336/EEC
- Low-voltage directive: 73/23/EEC

4 - INSTALLING THE 42BJ ICM

4.1 - Matching the unit to the false ceiling

Before beginning the installation process it is advisable to become familiar with the overall drawing of the installation. A mounting template will assist in making a plan. Your local Carrier representative can provide one. All components of the installation must be coordinated on the drawing: ICMs, 35BD/35SR Moduboots, supply and return air ducts, and fitting the false ceiling.

4.2 - Safety precautions

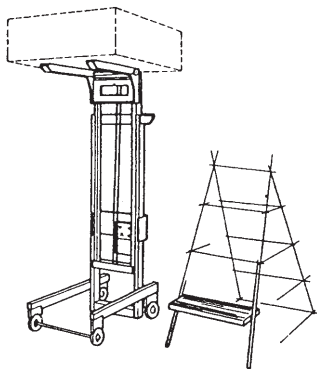
During the installation process, remove all debris from the ducts so that nothing is left behind that might damage the unit.

4.3 - Installation procedure

a) Set the ICM on the ground approximately above or below the spot where it is to be installed in the ceiling or floor void.

• Ceiling void installation:

A hydraulic lift and a folding ladder will make the task easier.



• Floor void installation:

Install the adjustable rubber feet on the unit. These are available as optional accessories from your local Carrier representative.

b) Confirm that the clearances around the unit are sufficient to allow proper and speedy maintenance. Refer to earlier pages specifying the clearances required.

c) Offer the template up to the ceiling and mark the position of the threaded hangers.

The method of fixing the threaded hangers (not supplied by Carrier) will depend upon the nature and condition of the ceiling. If in doubt seek professional advice. The maximum diameter of the hangers is 8 mm.

WARNING:

When moving a unit do not use the water pipe connections, condensate drain pan, valves, flexible pipes or electrical cables as handles.

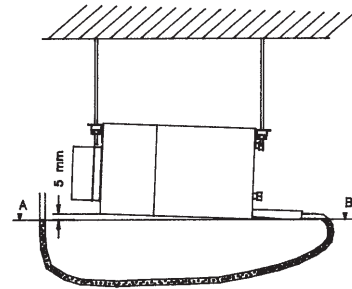
Lift the unit and align it on the threaded hangers. Screw the nuts on loosely.

NOTE:

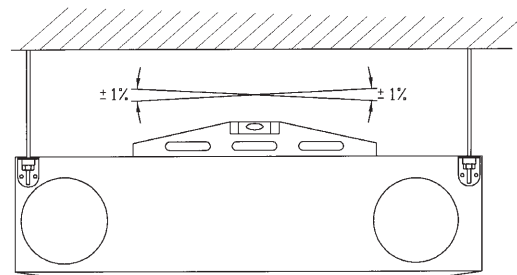
At this point do not tighten the nuts fully and do not clamp the unit up to the ceiling. The nuts will be adjusted finally when the unit has been connected to the pipework and ducts and levelled.

d) Level the unit

Adjust the hanger nuts so that the condensate drain pan is about 5 mm below the opposite side of the unit. Check that the slope is adequate by connecting a 2 m length of 16 mm transparent pipe to the drain stub. Empty some water into the drain pan until the water level in the pipe is at the lower edge of the drain pan.



The water level in the opposite end of the pipe should be about 5 mm below the base of the drain pan. Refer to the figure above.

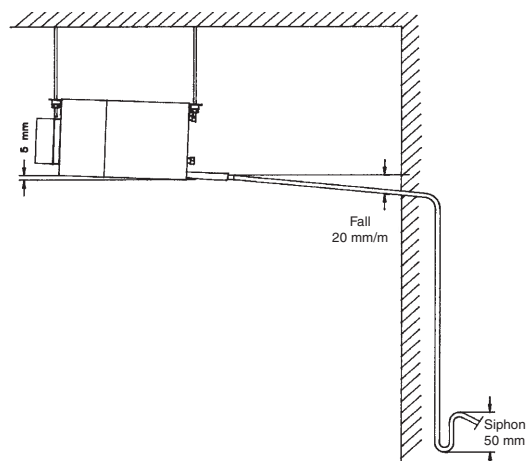


e) Condensate drain pipe

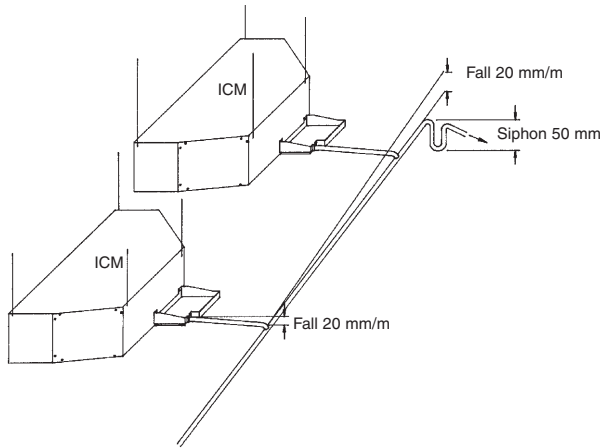
Use clear 16 mm bore plastic cold water pipe and provide a fall of 20 mm/m over the whole horizontal pipe run. Install a 50 mm (minimum) siphon to prevent gases and odours from flowing back into the ceiling void.

NOTE:

The condensate drain pipe has to be secured to the drain pan by a collar (not supplied by Carrier).



When several units are connected to a common collector, use the piping scheme shown in the diagram below.



f) Instal ceiling void air diffusers as shown in the drawing for the room that is to be air conditioned.

Connect the supply and return air duct to the corresponding collars on both the diffuser plenum and the ICM. When the unit and the false ceiling have been installed, and before start-up, remove the protective film from the diffuser.

NOTE:

ICMs are connected to the diffusers by ducts. The pressure drop in the ducts must be compatible with the capacity of the unit. The inner surfaces of the duct must be as smooth as possible. Avoid sharp bends.

Check that there are no leaks or kinks, and that there is no dirt or installation debris inside the ducts. Debris within the ducts might damage the fan wheel and the damper in the air diffusers.

Check local noise level regulations and if necessary, add sound attenuator.

g) For ICMs with the fresh air inlet option, connect the fresh air supply duct.

h) When installation is complete - i.e. the ICM is installed in the false ceiling or floor void, air ducts are complete, water manifolds are in position with stop valves ready on the connection stubs, and electrical installation is prepared - then connect the flexible water pipes (see “Flexible water pipes” in a later section).

Every flexible pipe has a 1/2" gas screw connector.

Ensure that a gasket (not supplied by Carrier) is installed between the screw connector and the stop valve.

i) When all units are installed, open the stop valves on the manifolds, bleed and then pressurize the circuits. To bleed the coils, remove the plastic plugs on the coil access door and then slightly undo the bleed screws with a screwdriver. Close the valve firmly when all air has escaped.

j) Make the electrical connections.

Do not switch on the power until all connections are made and secured and all protective covers are in place. The installation can then be started.

4.4 - Removing an ICM

WARNING:

Disconnect the power supply before carrying out any work on an ICM.

a) Switch off the power supply at the isolator provided for the purpose during installation (isolator not supplied by Carrier).

b) Disconnect the power supply cables:

- Maestro Zone Controller

Disconnect the power supply cable and the earth wire fitted with a flat tag. Disconnect the quick connect coupler linking the Zone User Interface (ZUI) to the ICM. Where appropriate disconnect the quick connect cable for the BMS bus. Disconnect the quick connect coupler for the window contact.

- Electromechanical controller with speed controller and wall-mounted thermostat

Remove the two hexagon head screws (8 mm AF) securing the ABS protective cover.

Disconnect the quick connect power supply cable from the thermostat (8 wires) and withdraw the earth wire complete with its flat tag.

c) Close the isolating valves on the manifolds.

d) Disconnect the flexible water pipes by unscrewing the 1/2" gas connectors.

WARNING:

Since the flexible water pipes do not have drain valves, a receiver must be provided to allow the cooling coil to be drained. The coil water capacity of the ICM size 2.3 is 1.2 litres.

e) Disconnect the supply air and return air ducts and the fresh air duct if fitted.

f) Disconnect the flexible condensate drain pipe. Drain the siphon into a suitable vessel.

g) Support the unit and release it gently by unscrewing the four nuts on the screwed hangers. Lower the unit carefully.

5 - FRESH AIR

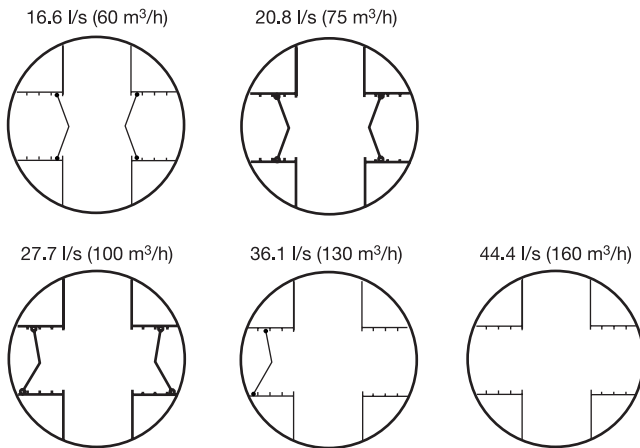
5.1 - Constant flow fresh air controller

The 42BJ ICM can be fitted with a constant fresh air flow controller allowing the number of air changes to be controlled. It is vital to choose the correct constant fresh air flow controller for the use to which the room or zone concerned will be put.

The following range of controllers is available:

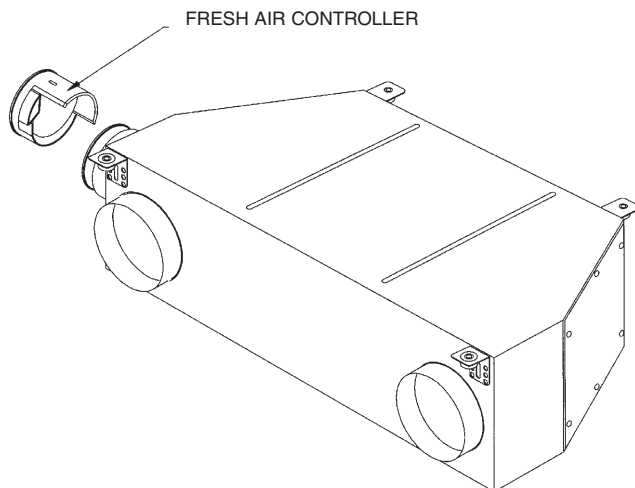
- 8.3 l/s or 30 m³/h (-10% ; +20%)
- 16.6 l/s or 60 m³/h (-10% ; +20%)

The fresh air supply inlet is located upstream of the water coil. The 125 mm collar which houses the flow controller is made of ABS.



The 60 m³/h or 16.6 l/s fresh air controller may be modified on site by relocating or removing two plastic restricters in order to increase its constant fresh air flow capacity to a maximum of 160 m³/h or 44.4 l/s.

A label on the ICM shows how to readjust the two plastic restricters.

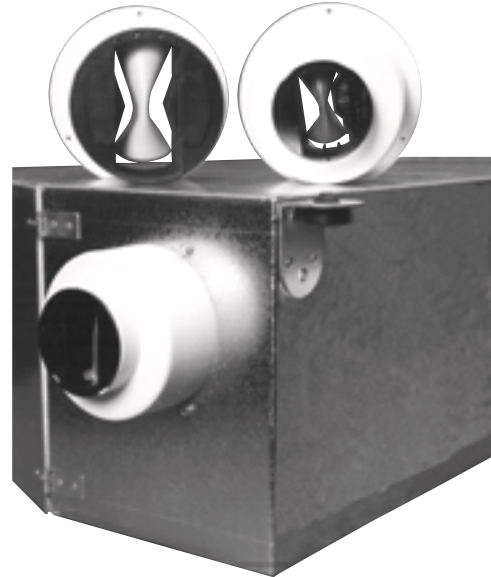


Modification procedure

- Disconnect the fresh air duct from the plastic spigot on the ICM.
- Remove the fresh air controller from inside the spigot.
- Move or relocate the two plastic restricters.
- Replace the fresh air controller in the spigot.
- Reconnect the fresh air duct to the spigot.

NOTE:

Two types of plastic spigot may be fitted to the ICM, depending on the capacity of the fresh air controller chosen. One spigot can accept only the 8.3 l/s or 30 m³/h controller. The other one can accept only the field modifiable 16.6 l/s or 60 m³/h controller. This means there is no possibility of mixing up the two types of controller during installation or servicing.



IMPORTANT:

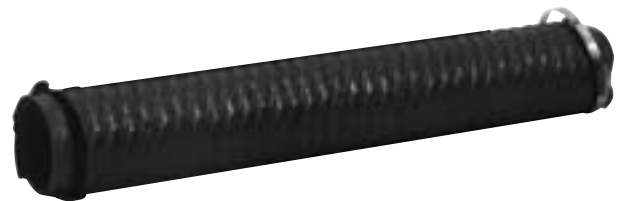
If the ICM is fitted with a return air temperature sensor, the constant fresh air flow rate must not exceed 50% of the air flow rate delivered by the unit at minimum speed.

NOTE:

To operate correctly, the 8.3 l/s or 30 m³/h constant fresh air flow controller requires a differential pressure in the range 50 Pa to 200 Pa. The 16.6 l/s or 60 m³/h constant fresh air controller requires a differential pressure in the range 70 Pa to 200 Pa.

5.2 - Fresh air duct as optional accessory

Flexible fresh air duct, diameter 125 mm, maximum length 0.5 m, fitted with two coupling sleeves integral with the duct (the duct fire rating is M1).



6 - FAN MOTOR ASSEMBLY

6.1 - Description

The ICM has either a single inlet or double inlet high static pressure fan motor assembly.

It uses a 230 V \pm 10%, 50 Hz single phase power supply and runs at variable speed under the control of either a Carrier numeric Controller or other speed controller specified by Carrier.

6.2 - Removing the fan assembly

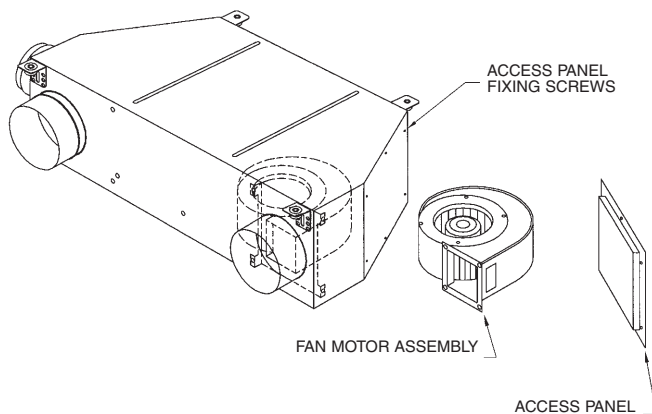
WARNING:

Disconnect the power supply to the ICM before carrying out any work on the unit.

If the fan develops a fault the whole assembly must be removed and replaced.

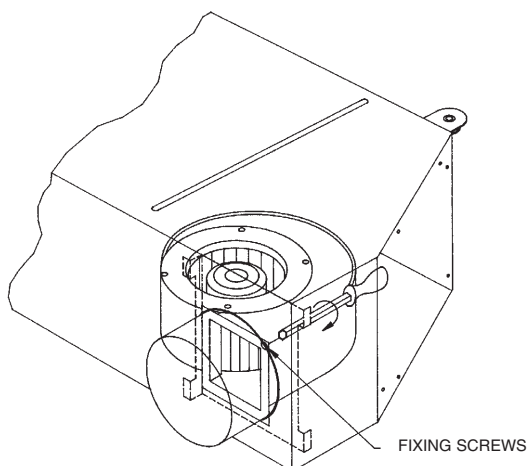
a) Loosen the duct-securing collar, disconnect the fresh air duct and then disconnect the power supply cable to the fresh air valve if fitted.

b) Unscrew the 6 hexagon head screws (8 mm AF) securing the fan access panel. Remove the panel.



c) Disconnect the quick connect power supply cable for the fan motor assembly.

d) Disconnect the electric heater supply cable if fitted (size 1.1 or 1.2 ICM). The cable has three wires terminating in flat spade connectors.



e) The fan assembly is held in place by one hexagon head screw (8 mm AF) and three lugs. Remove this screw and slide the assembly free of the lugs.

f) Remove the two hexagon head screws (8 mm AF) securing the electric heater to the casing and remove the heater.

g) Replace the fan motor assembly and follow the procedure in reverse order to complete the installation.

WARNING:

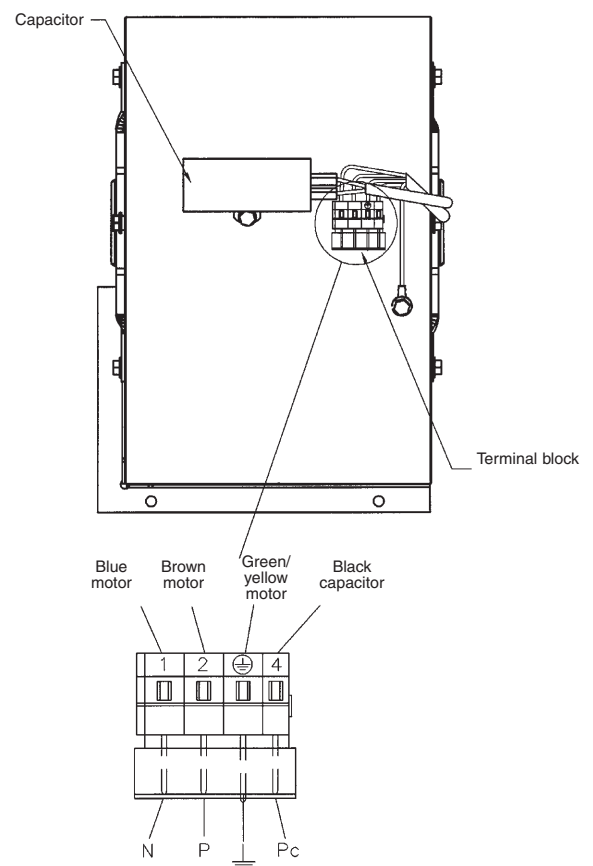
The electrical connections to the fan motor must be made in accordance with the labels on the connector block.

Terminal 4: Split phase with permanently connected capacitor - connect the black wire

Terminal 2: Primary phase - connect the brown wire

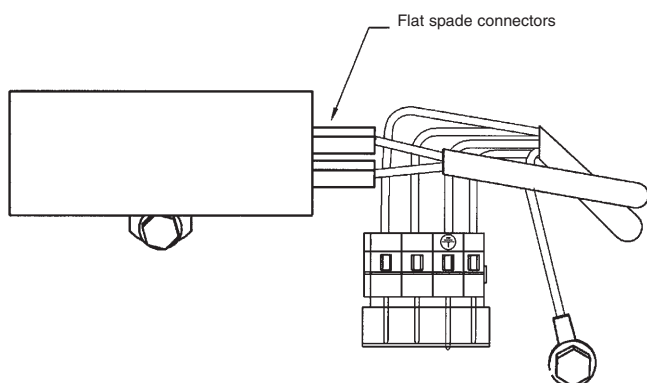
Terminal 1: Neutral - connect the blue wire

\perp *Earth: connect the green/yellow wire*



6.3 - Replacing the capacitor

- a) Disconnect the power supply to the ICM before carrying out any work on the unit.
- b) Loosen the securing collar and disconnect the fresh air supply duct.
- c) Unscrew the 6 hexagon head screws securing the fan access panel. Remove the panel.
- d) Unscrew the capacitor securing collar(s). Each collar is held in place by a hexagon head screw (8 mm AF).
- e) Disconnect the capacitor by withdrawing the flat spade connectors from the back of the capacitor.
- f) Reversing the above procedure, replace, secure and connect the new capacitor.



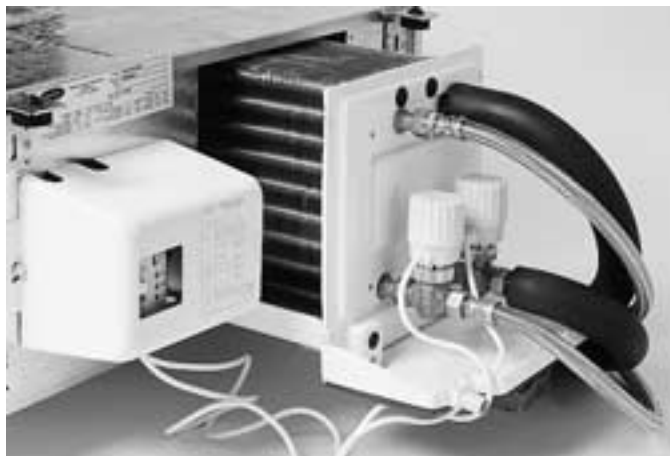
7 - WATER COIL

7.1 - Removing the water coil

WARNING:

Disconnect the power supply to the ICM before carrying out any work on the unit.

- a) Close the isolating valves on the manifolds.
- b) Unscrew the 1/2" gas connections to disconnect the flexible water pipes.
- c) Disconnect the quick connect power supply cables at the Carrier numeric controller. Do not disconnect the on/off valves used with the electromechanical controller (wall-mounted thermostat).
- d) Remove the two-way or three-way water flow control valve bodies. Depending how the ICM is configured, the coupling on a three-way valve may be fitted with a heating/cooling changeover switch. If so, do not remove it.
- e) Disconnect the flexible condensate drain pipe which is held in place by a collar (the collar is not supplied by Carrier).
- f) Remove the 4 hexagon head screws (8 mm AF) and slide out the coil and drain pan assembly.



- g) Reverse the removal procedure described above to instal the replacement coil and drain pan assembly. Ensure that all joints are made correctly and are leaktight.

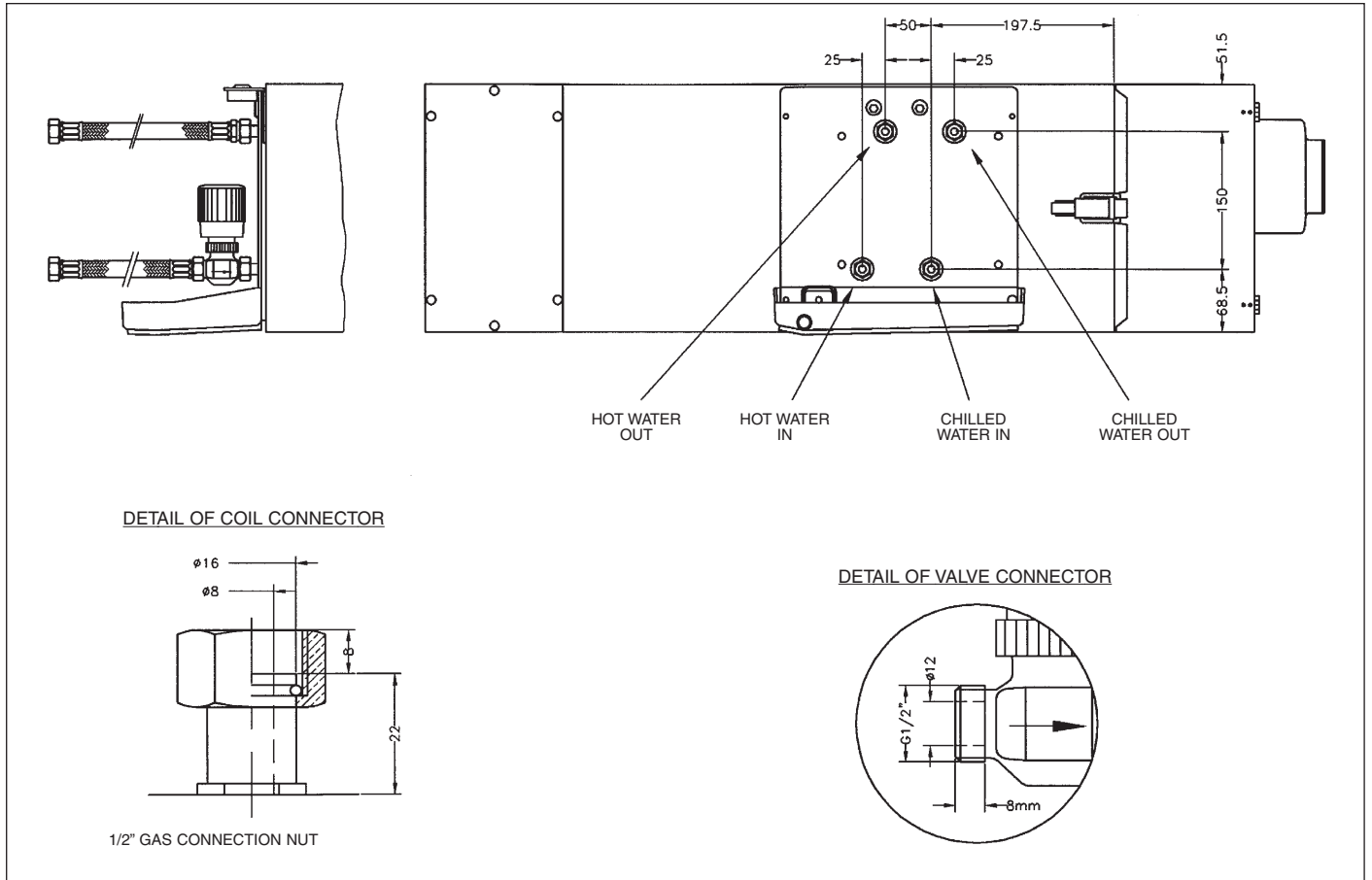
WARNING:

Bleed all air from the coil when it is refilled.

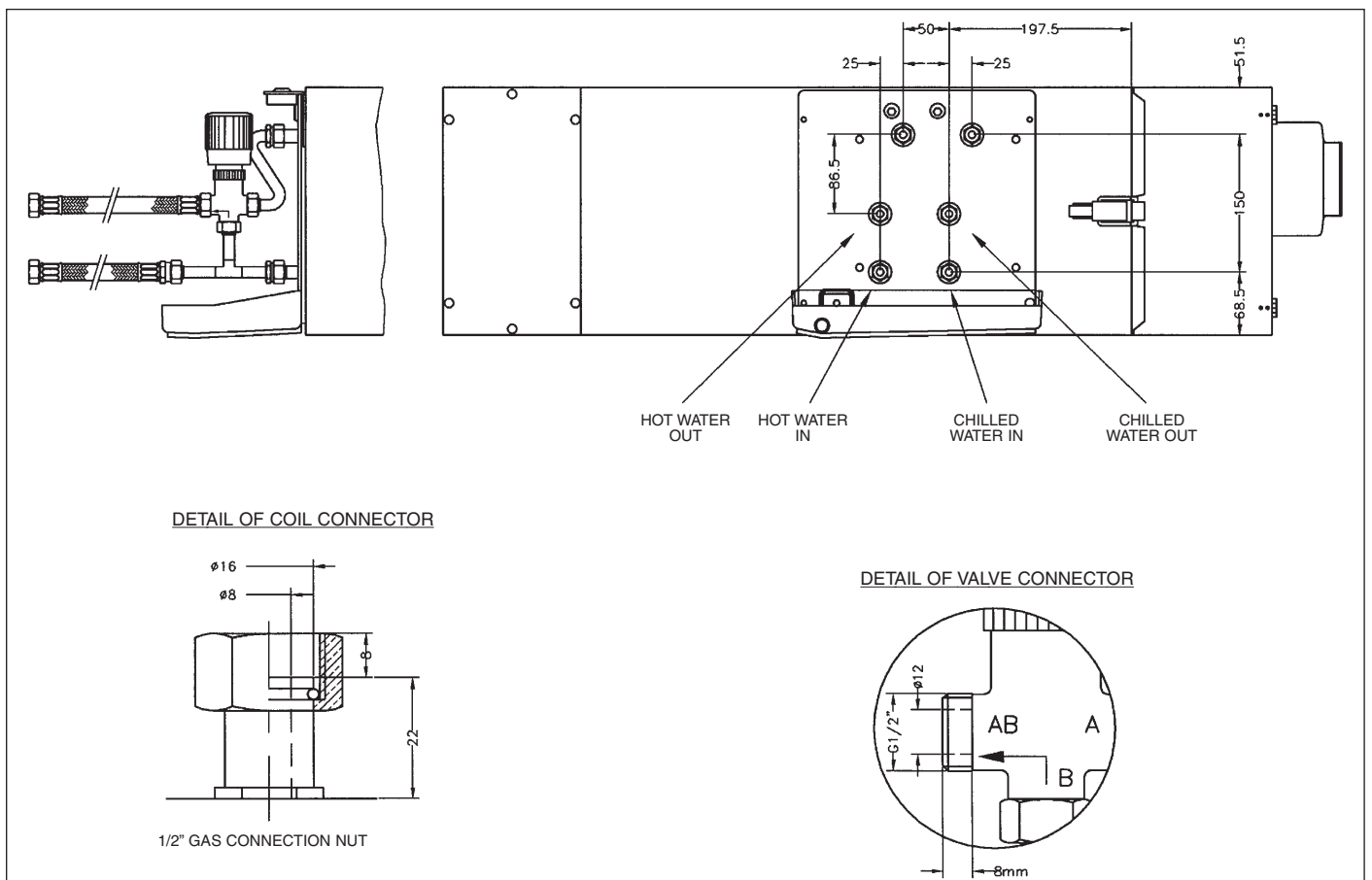
7.3 - Coil inlet/outlet positions

7.3.1 - Sizes 1.3 and 2.3

Two-way valves



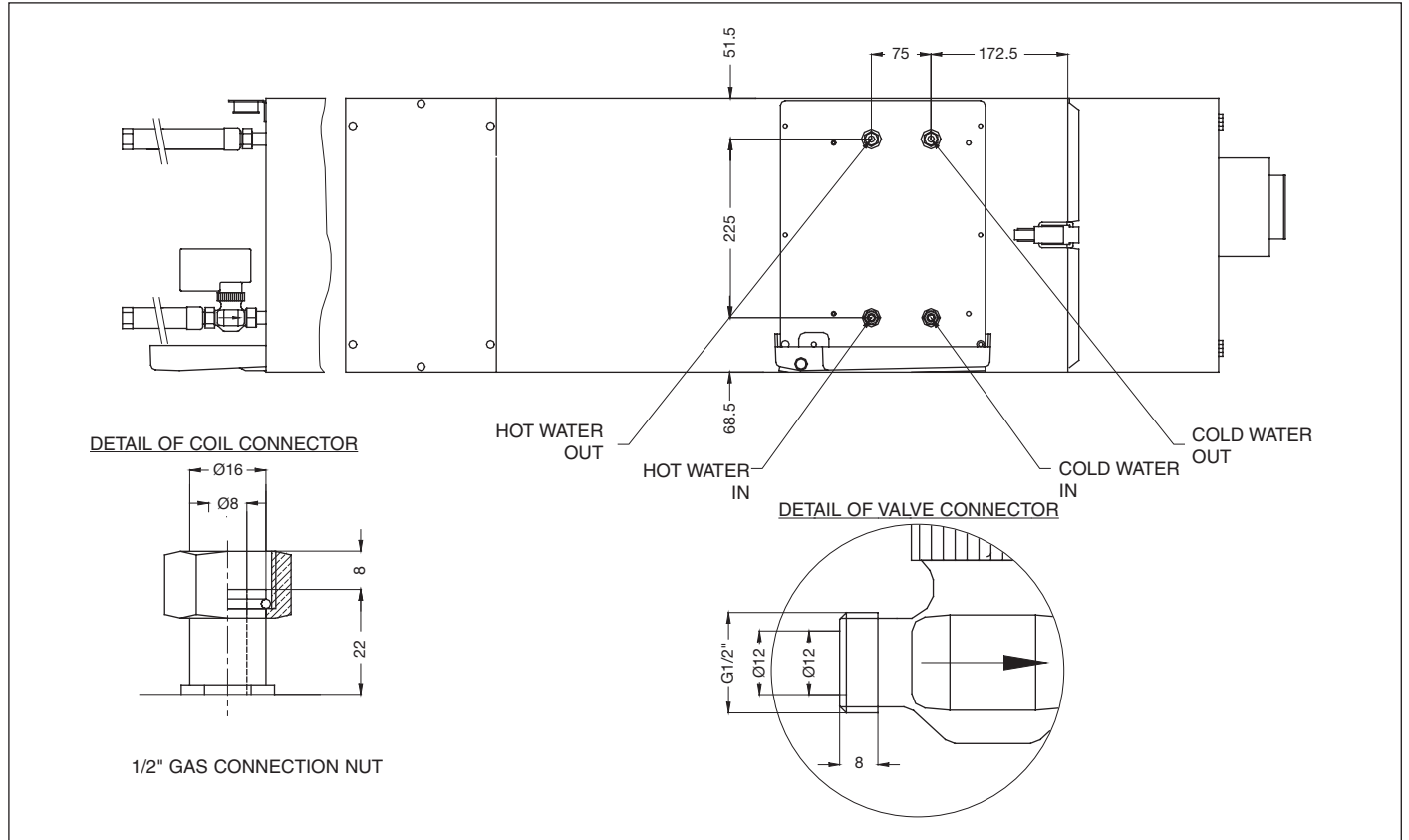
Three-way valves



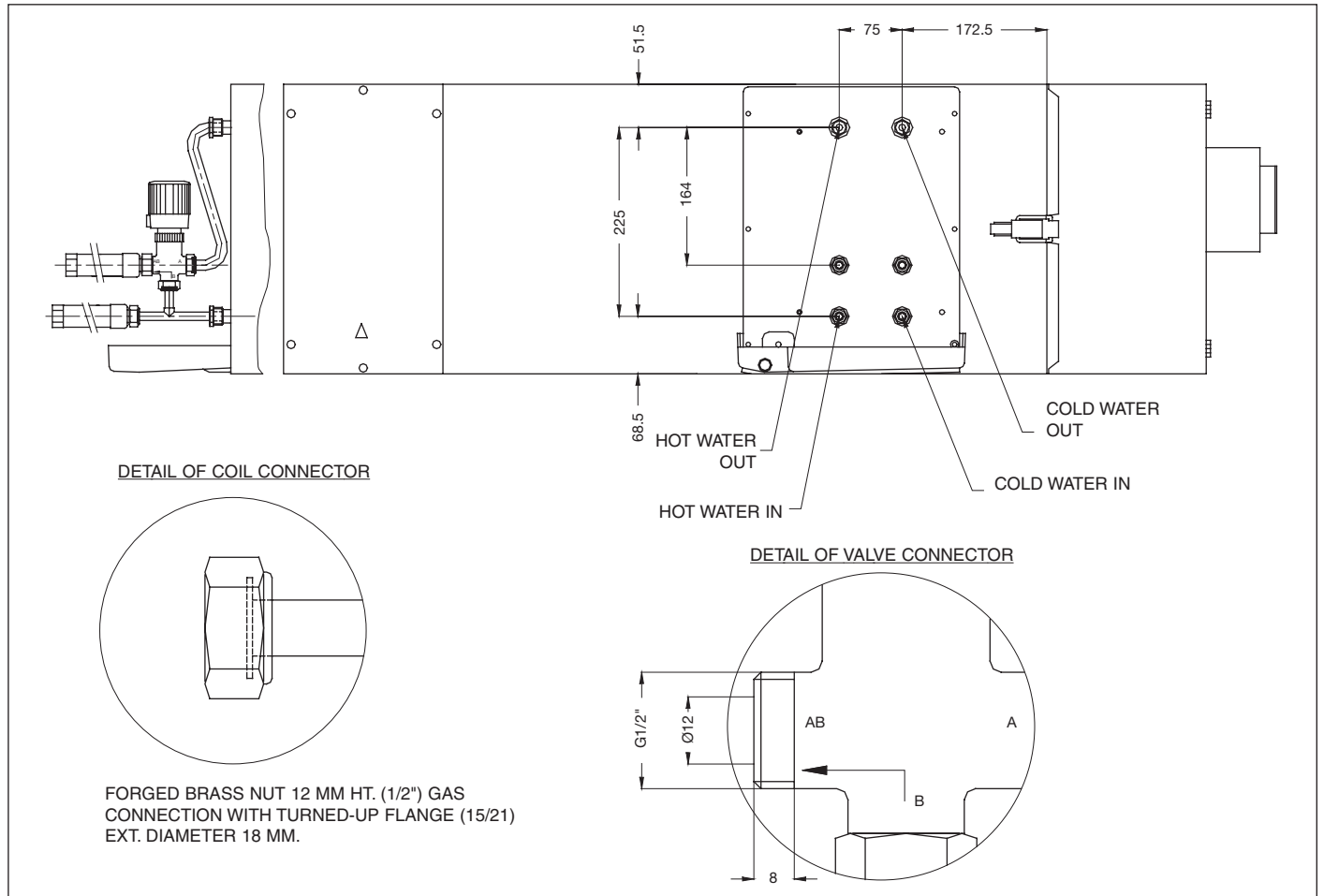
7.3 - Coil inlet/outlet positions, continued

7.3.2 - Size 4.4

Two-way valves



Three-way valves



8 - WATER FLOW CONTROL VALVES

8.1 - Electrothermal actuator (on/off)

This on/off type actuator is used with a Carrier room thermostat (electromechanical controller) and the Carrier numeric controller.

NOTE:

The electrothermal actuator is delivered in the normally closed position regardless of the two-way or three-way valve body used (way A-AB closed in the case of a three-way valve).

Therefore to enable the installation to be filled with water, the water circuits to be equalised and the units to be purged, the valves will have to be opened by sending a command from the wall thermostats.

8.2 - Replacing actuators

The actuators on both the chilled water and the hot water valves may be replaced if either develops a fault.

a) Disconnect the power supply to the unit before carrying out any work on a unit.

b) Disconnect the actuator power supply cable.

• On/off type actuator used with a Carrier numeric controller:

Disconnect the quick connect power supply cable on the actuator.

• On/off actuator used with a wall-mounted thermostat:

Remove the plastic protection cap (held in place with two hexagon head (8 mm AF) screws). Disconnect the quick connect power supply cable on the actuator. This can be done by using a screwdriver to press down on the spring tongue and pulling out the wire from the appropriate terminal.

c) Uncouple the faulty actuator. Reverse the removal procedure described above when installing the replacement motor.

WARNING:

Ensure that the actuator is firmly screwed to the valve body (maximum torque 15 N/m).

8.3 - Electrical circuit diagrams for actuators

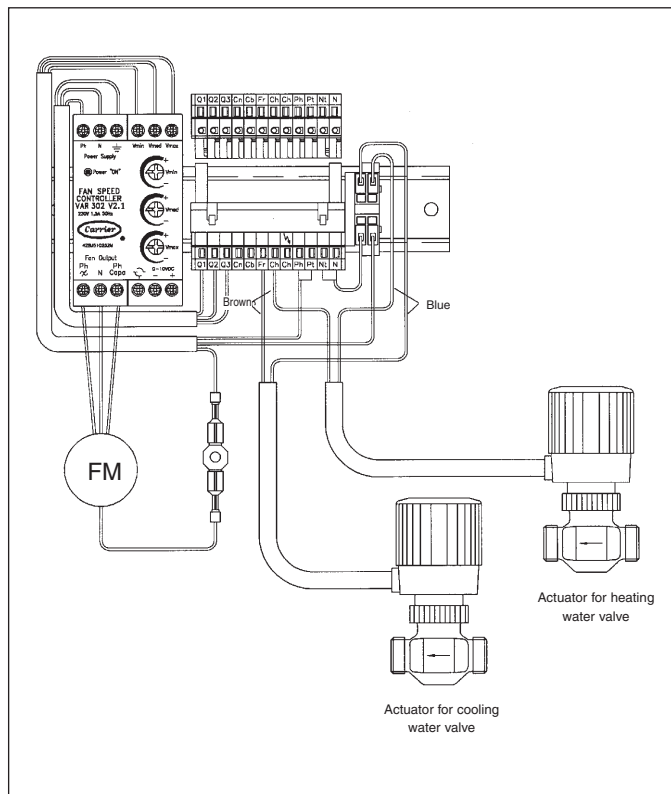
8.3.1 - Carrier numeric controller

NOTE:

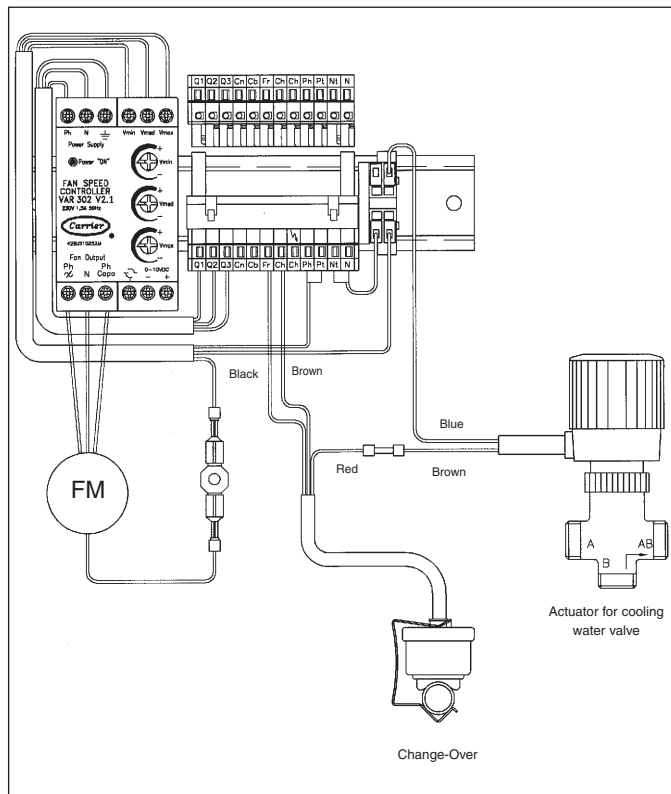
For further information, please refer to the selection manual, installation manual and start-up handbook for the Carrier numeric controller.

8.3.2 - Electromechanical controller with fan speed controller

4 pipes



2 pipes changeover



8.4 - Replacing a valve body

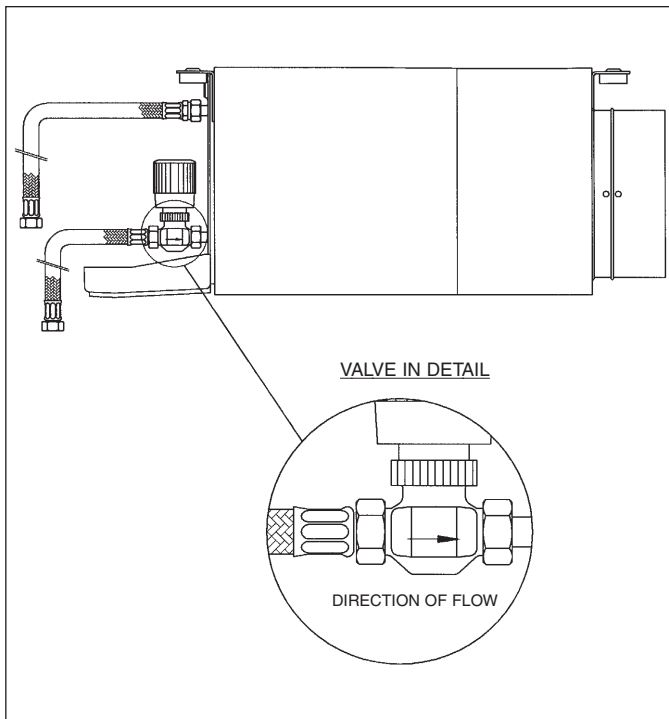
- a) Disconnect the power supply to the unit before carrying out any work on a unit.
- b) Close the isolating valves on the manifolds.
- c) Uncouple the actuator from the valve body.
- d) Disconnect the 1/2" gas connection nut on the flexible water pipe from the valve to be replaced.
- e) Unscrew and remove the valve body to be replaced (1/2" gas connection).
- f) Instal a new valve body on the coil (do not forget the joint).
- g) Reconnect the flexible water pipe.
- h) Reinstall the actuator ensuring that it is securely screwed to the valve body.
- i) Tighten all water pipes ensuring that all seals are correctly installed (torque 15 N/m).
- j) Open the isolating valves on the manifolds and bleed all air from the system.
- k) Check that there are no leaks and restart the ICM.

WARNING:

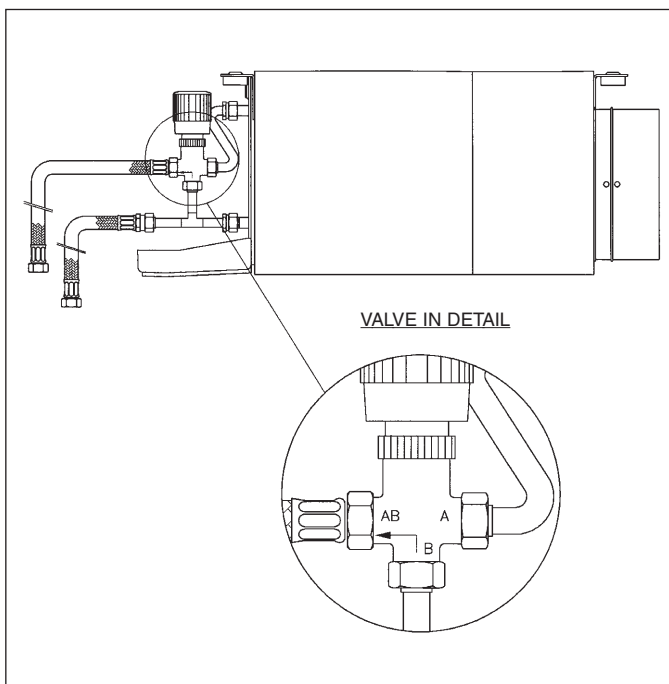
When replacing a valve always ensure that the direction of flow through the valve is as shown by the arrow on the valve body.

If the direction of flow is wrong, the valve will deteriorate rapidly.

Two-way valve body



Three-way valve body



9 - FLEXIBLE WATER PIPES

Materials

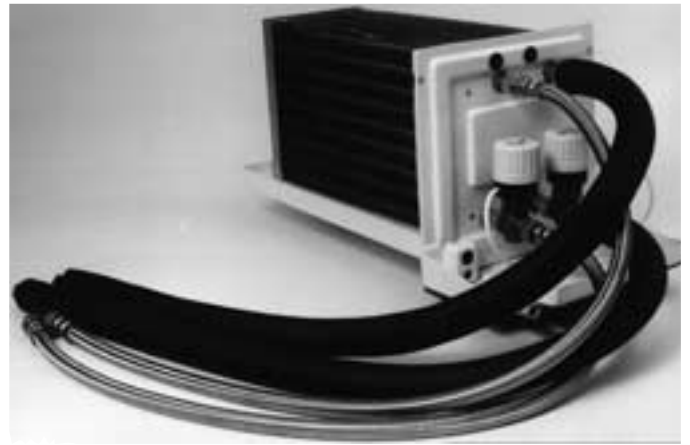
- Pipes: MEPD-based elastomer (modified ethylene-propylene-diene)
- Braid: 304L stainless steel
- Insulation: cell foam rubber to M1 fire rating (chilled water pipes only, 9 mm thickness).

Characteristics

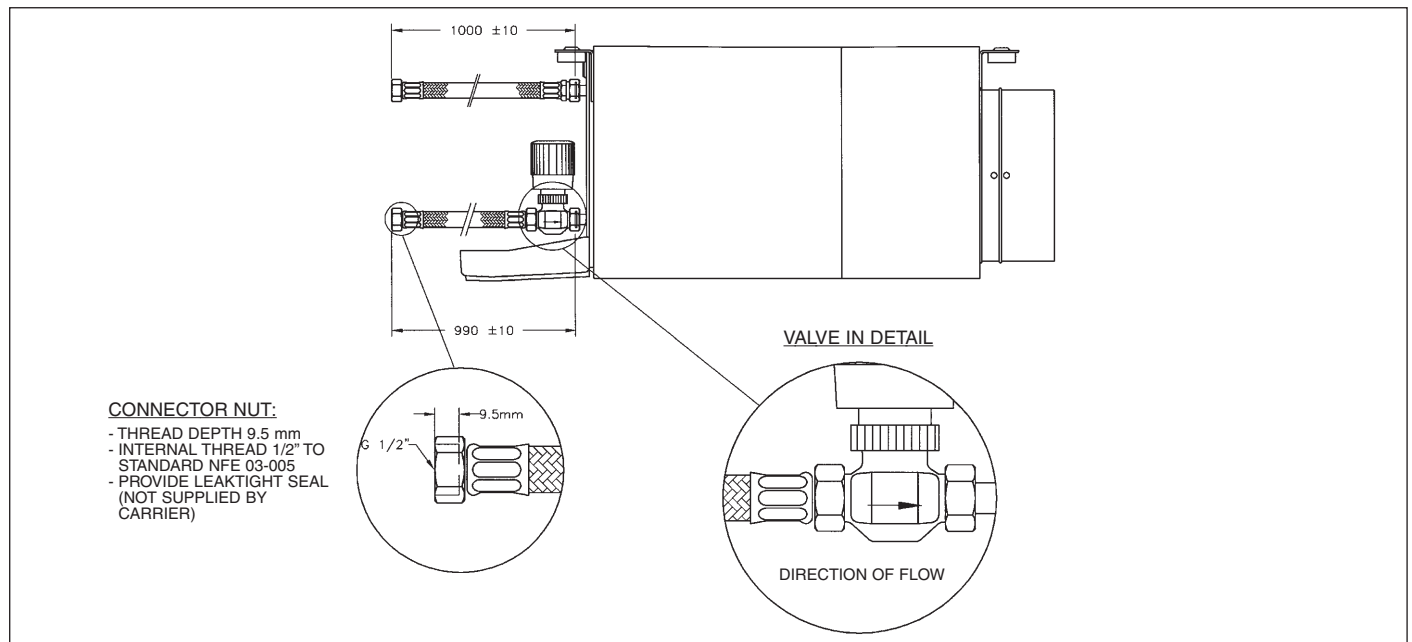
- Minimum bending radius: 35 mm non-insulated, 75 mm insulated.

The flexible water pipes are designed to carry treated or untreated water (maximum 40% concentration of ethylene glycol or propylene glycol).

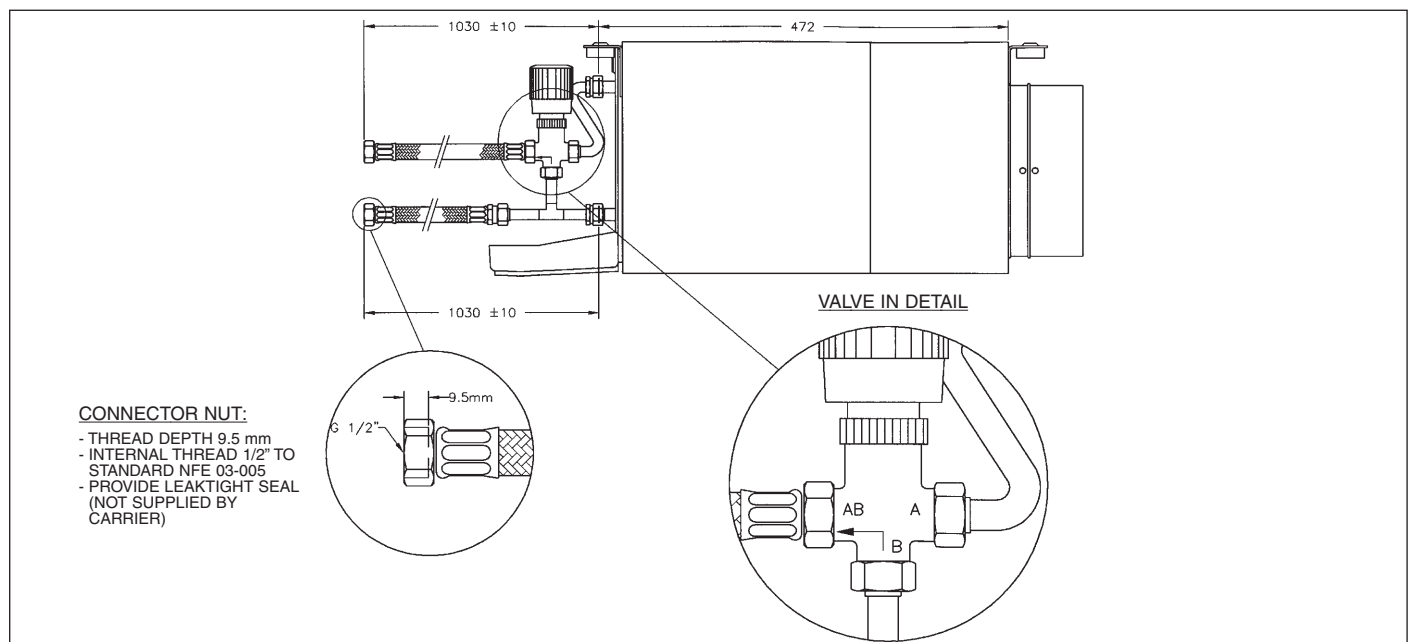
- Maximum hot water temperature 90°C.
- Operating pressure: 16 bar
- Test pressure: 24 bar
- Connections: 1/2" BSP threaded nut, embossed.



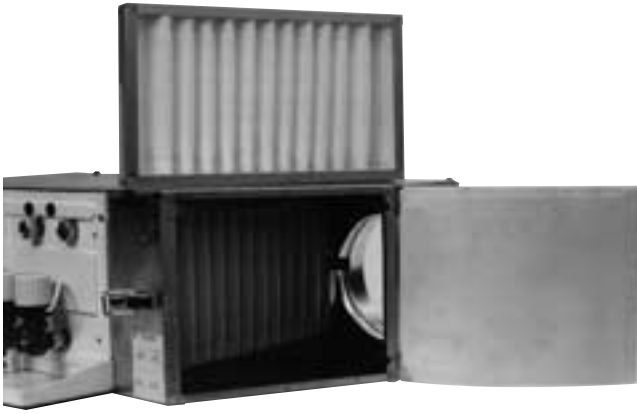
9.1 - Two-way valves



9.2 - Three-way valves



10 - REPLACING THE AIR FILTER



Air filters should be changed regularly. How often this is needed depends on the cleanliness of the working environment and the rate at which the filter becomes clogged.

If clogged filters are not changed they can increase the pressure drop, trapped dust particles may be given off and entrained in the air supply, and the general performance of the ICM may be degraded as the air flow reduces.

NOTE:

The condensate drain pan is located at the suction end of the fan, and could therefore overflow if the air filter became clogged. This is because the partial vacuum inside the unit could stop the condensate from draining normally.

10.2.1 - Access from the side

To access the filter, open the latch, open the hinged access door and remove the filter from its housing by releasing the two clips which hold it in place.

When replacing the filter, make sure that the sealing gasket is against the internal metal housing.

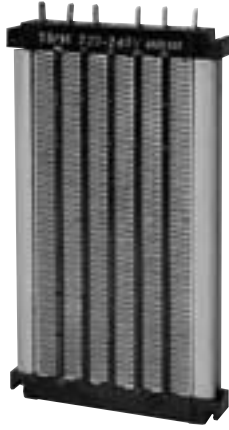
10.2.2 - Access from above or below

In these situations the filter is installed in a removable plug-in unit. To replace the filter assembly, disengage the two latches and withdraw the plug-in unit. Remove the old filter and insert a new one ensuring that the sealing gasket is against the internal metal housing.

NOTE:

When installing an ICM in a ceiling void, check that no T-bars will obstruct access to the filter or prevent the plug-in unit from being withdrawn.

11 - ELECTRIC HEATER



11.2 - Replacing the electric heater

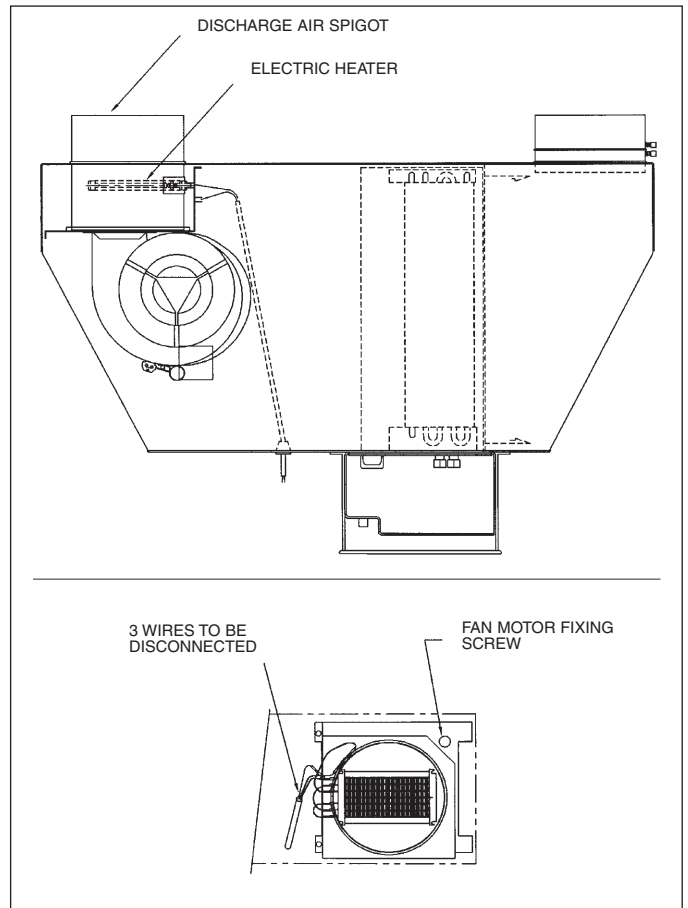
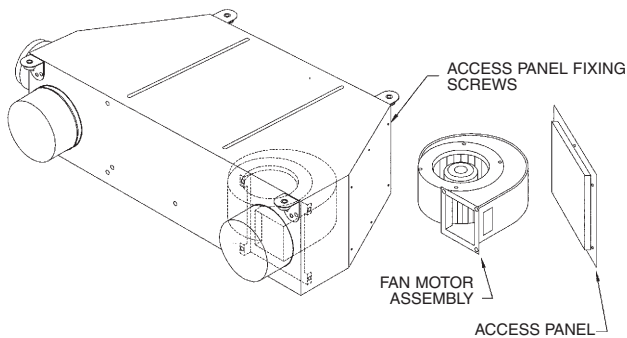
CAUTION:

It is vital to disconnect the ICM from the general power supply before carrying out any work on the electric heater.

If the electric heater develops a fault, the assembly must be removed and replaced; the fan unit will have to be removed to make this possible.

- a) Remove the collar securing the fresh air duct.
- b) Remove the fan motor access panel (secured by 6 hexagon head screws).
- c) Disconnect the quick connect power supply cable on the fan motor.

The electric heater is in the discharge air outlet.



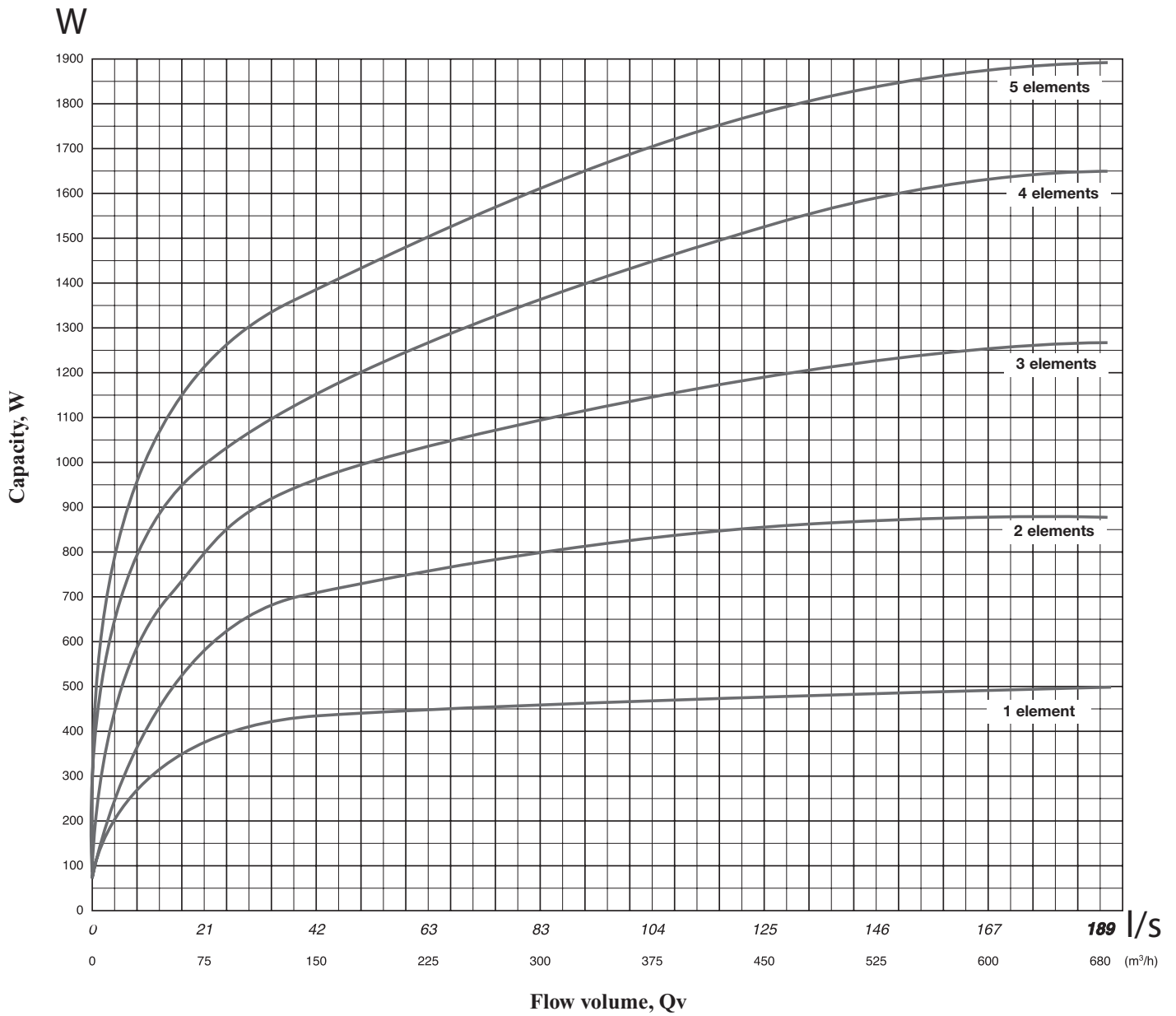
- d) Unscrew the fan motor assembly fixing screw and slide the assembly free of the lugs. Remove the fan motor assembly.
- e) Disconnect the electric heater cable (3 wires terminating in flat spade connectors).
- f) Release the heater mounting from the discharge air spigot by unscrewing the single hexagon head screw (complete with washer) and remove the heater.
- g) Replace the defective heater.
- h) Use the above procedure in reverse to instal the new heater and to reinstall the fan motor assembly.

WARNING:

Do not touch the heater elements when the heater is switched on.

11.2 - Electric heater performance

ICM sizes 1.3 and 2.3



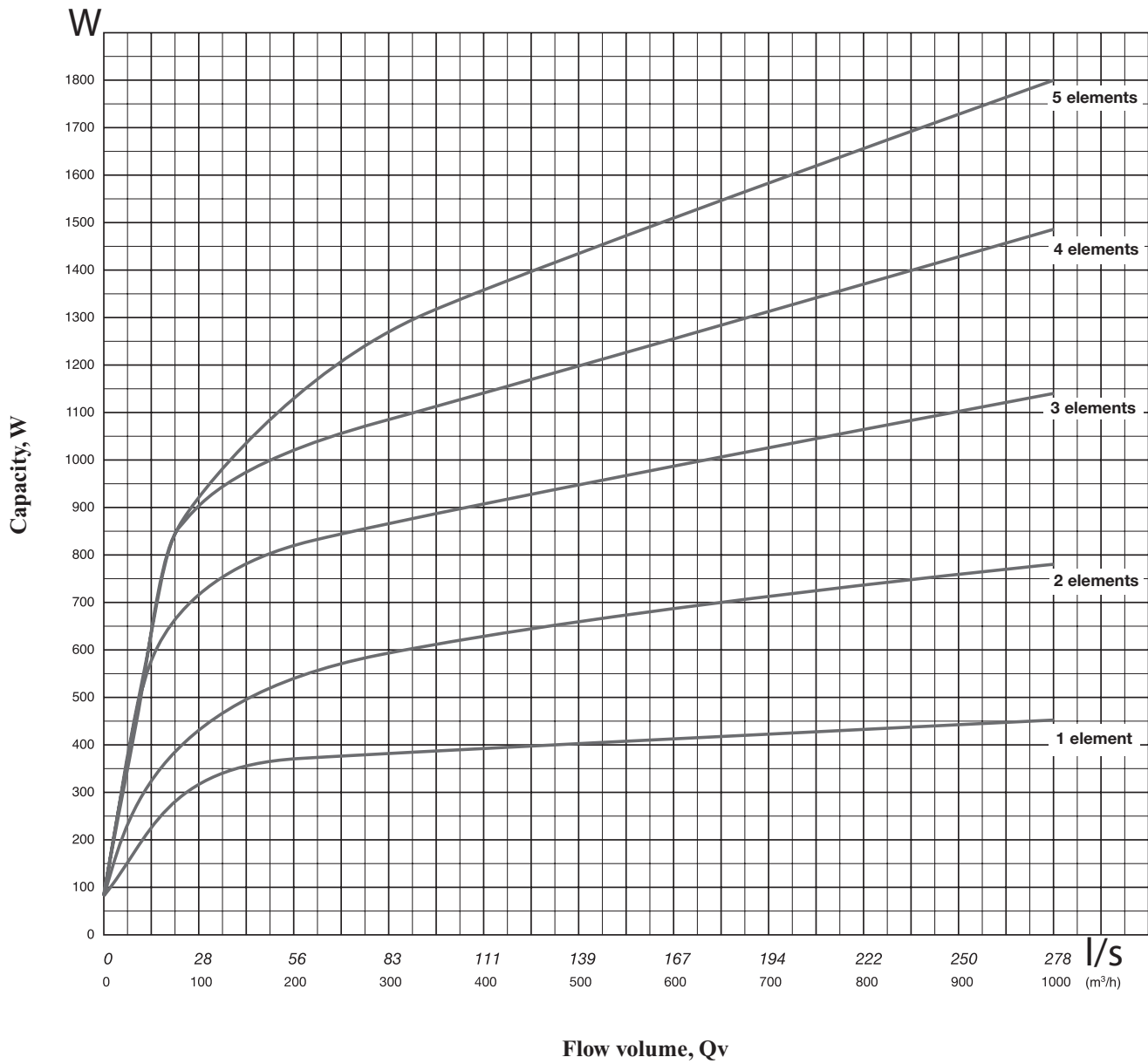
NOTE:

Data obtained with an entering air temperature of 19°C.

Supply voltage: 230 V a.c.

11.2 - Electric heater performance, continued

11.3.3 - ICM size 4.4



NOTE:
Data obtained with an entering air temperature of 19°C.
Supply voltage: 230 V a.c.

12 - FLOW MEASUREMENT DEVICE

12.1 - Description

A diaphragm measures the returned air flow rate through the ICM.

The total air flow treated by the ICM is the sum of the returned air flow and the fresh air flow. The diaphragm is accurate, reliable, fast and silent. Using an electronic pressure gauge it is possible to determine the air flow simply by interpolating from a chart provided on the unit.

NOTE:

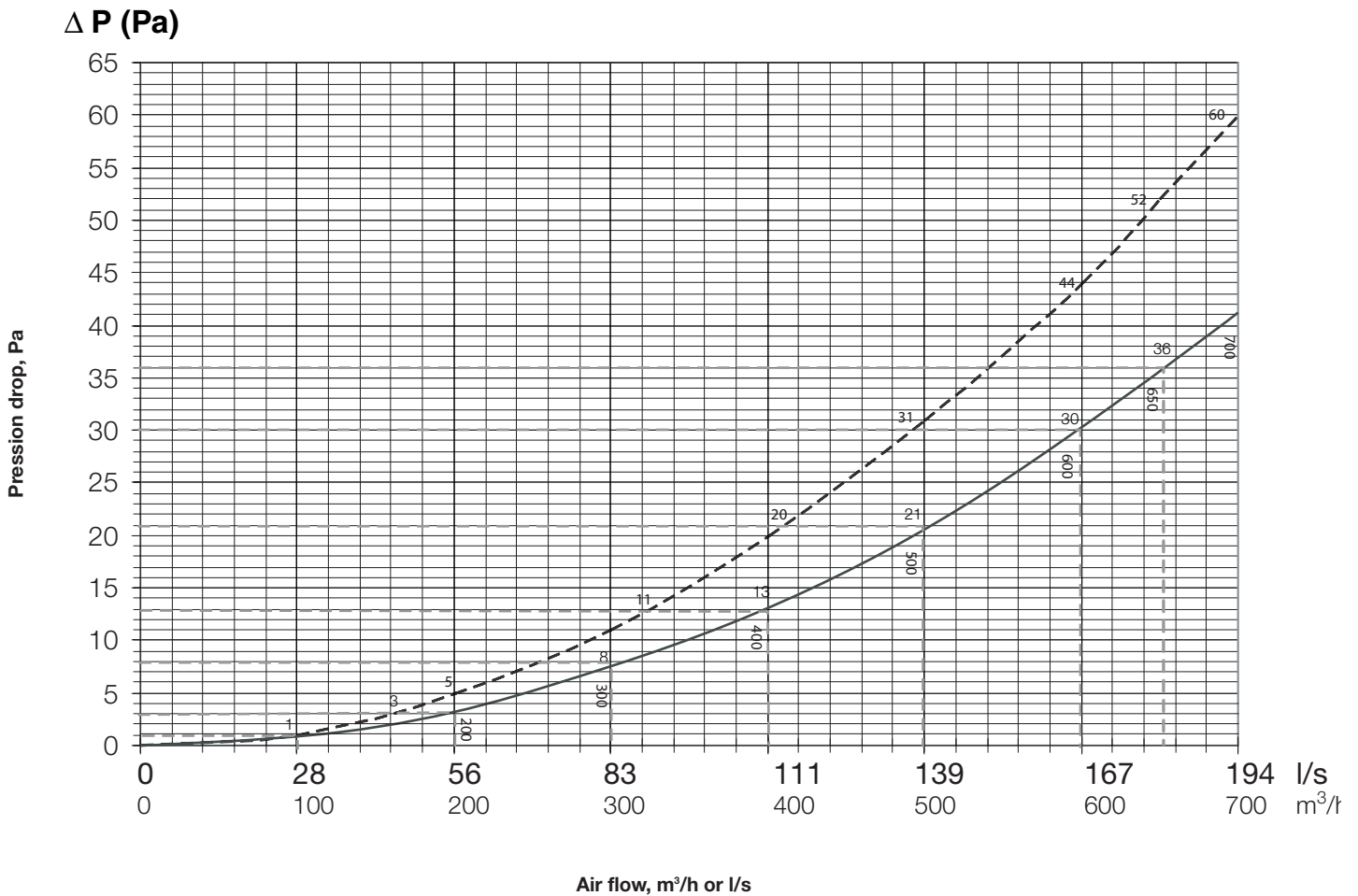
To measure the air flow, there must be a straight length of duct at least four times as long as its own diameter located upstream of the diaphragm.



12.2 - Pressure diaphragm characteristics

12.2.1 - ICM sizes 1.3 and 2.3, 200 mm spigot diameter

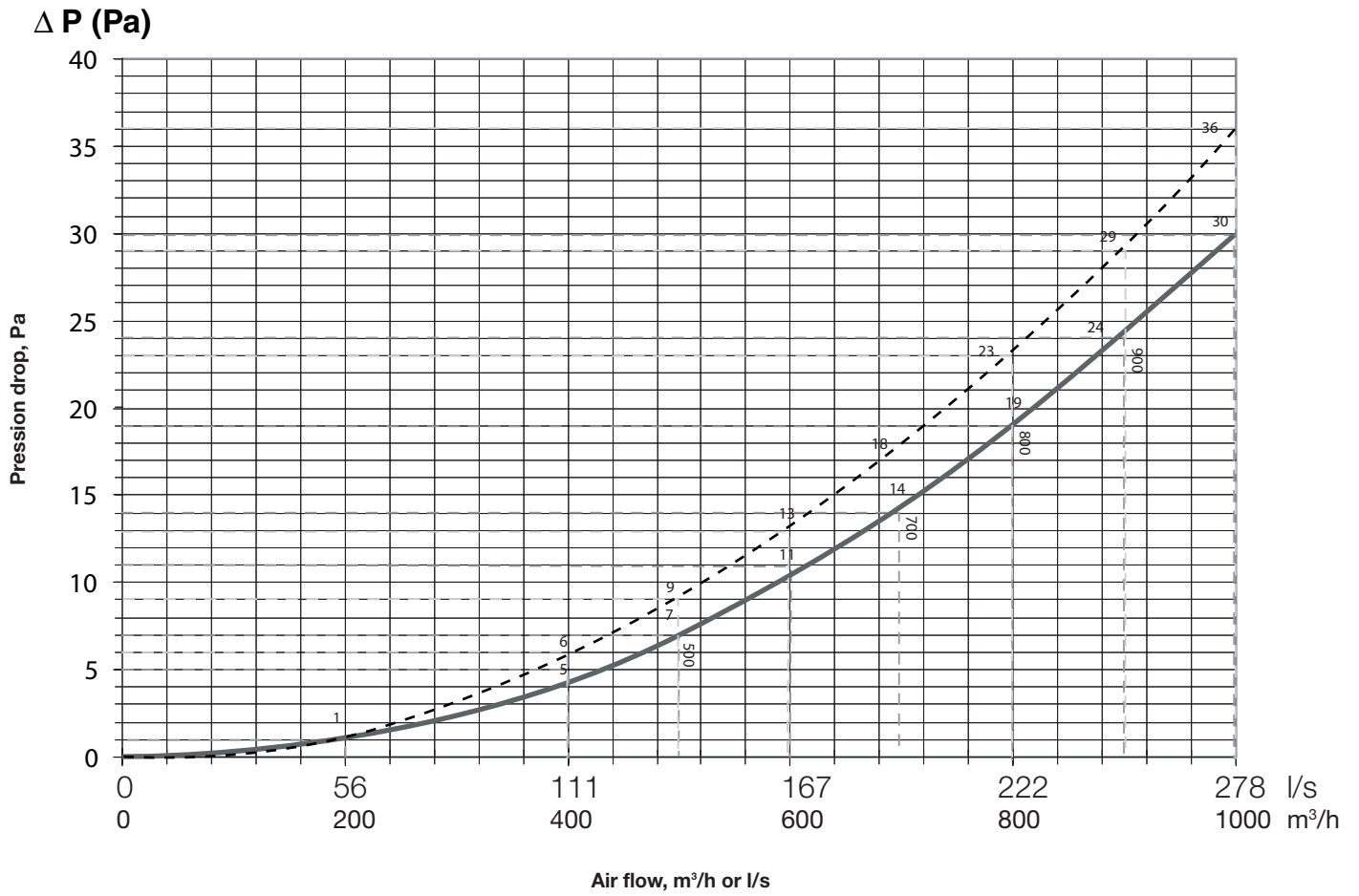
Pressure drop (Pa) as a function of air flow (m³/h or l/s)



12.2 - Pressure diaphragm characteristics (continued)

12.2.2 - ICM size 4, 250 mm spigot diameter

Pressure drop (Pa) as a function of air flow (m³/h or l/s)



13 - CONTROLLER

13.1 - Carrier numeric controller

At the top of the range, each ICM is fitted with a programmable numeric controller.

The main functions of the controller are:

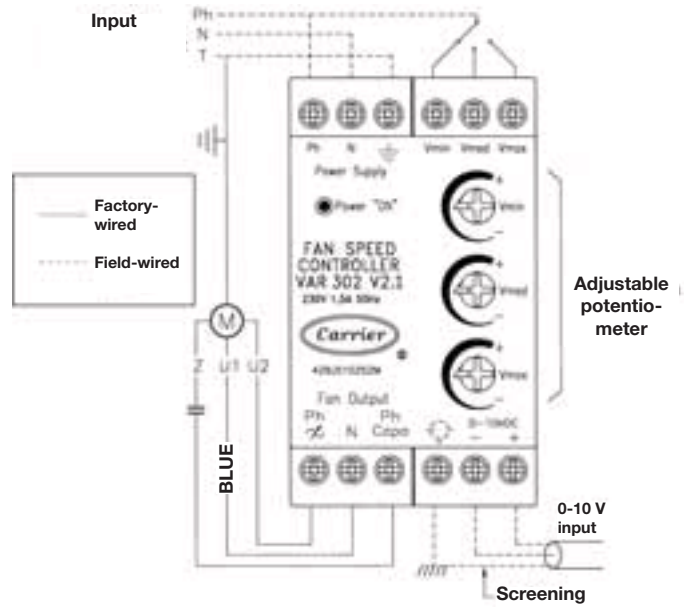
- Controlling room temperature
- Raising, lowering and adjusting the angle of venetian blinds (optional)
- Brightening and dimming light sources (optional)
- Selecting occupied or unoccupied mode through a ZUI or wall thermostat.
- Controlling ventilation (e.g. by selecting forced ventilation mode).

NOTE:

For further information, please refer to the selection manual, installation manual or start-up handbook for the Carrier numeric controller.



13.1.1 - Fan speed controller



Inputting a preselected speed

This input gives three speed settings to the speed controller. The speeds are each adjustable by a potentiometer on the face of the controller.

Setting the speed is achieved when the supply power is applied to one of the 3 input pre-selections.

Speed control potentiometer ranges are:

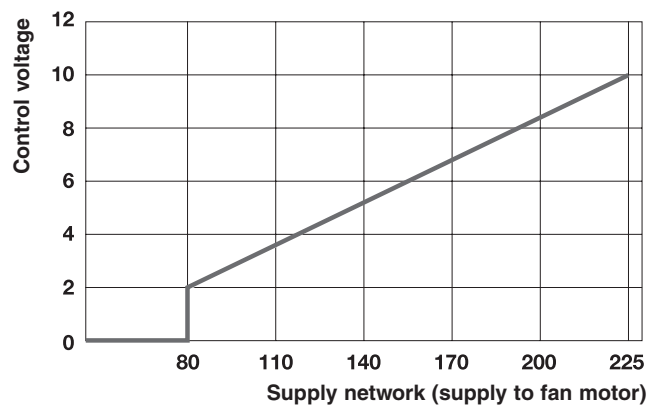
- low speed: 80 to 120 V (± 15 V)
- medium speed: 110 to 170 V (± 15 V)
- high speed: 160 to 225 V (± 15 V)

The output ranges are given for a supply network input voltage of 230 V a.c. (RMS).

Control input 0-10 V DC

This signal has two operating bands:

- between 0 and 2 V (± 150 mV), the output is zero
- between 2 V (± 150 mV) and 10 V, the output ranges from 80 V (± 15 V) to 225 V (± 15 V), for an input voltage of 230 V a.c.



WARNING:

Only one of the 2 different control inputs should be selected, otherwise the fan speed controller will be damaged.

13.1.2 - General characteristics

Selection of inputting a preselected speed or control input 0 to 10 V is automatic. A LED on the face of the controller shows when it is on.

NOTE:

Note that the controller has a circuit which forces the selection of high speed for two seconds when:

- *Power is switched on*
- *An input control signal from 0 to 10 V at a level higher than 2 V is established*
- *A speed is selected*
- Power supply: 230 V \pm 10%
- Output voltage range: 80 to 225 V (\pm 15 V)
- Screw terminal connections: size 2 x 1.5 mm²
- Full load starting capability
- Overload capacity: + 50% of maximum power for one minute
- DIN enclosure, 12 screw terminals
- IP 201 protection
- Operating environment: + 5°C to + 40°C, 85% to 40% RH
- Power input 2.5 VA
- CE compliance:
 - in accordance with EMC directive 89/336/EEC,
 - in accordance with low-voltage directive 73/23/EEC dated 19/02/73 as amended by directive 93/68/EEC dated 22/07/93.

The speed control option also has a terminal block for connecting control valve cables or electric heater cables as appropriate.

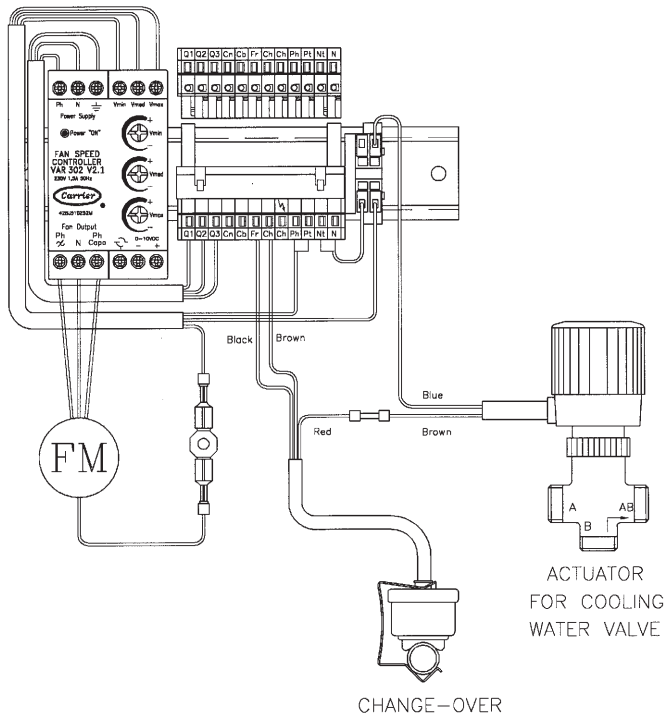
The controller and terminal block are protected by an ABS cover.

The Carrier speed controller is the indispensable interface between the ICM and proprietary controllers of the fan coil type.

The inclusion of an air flow meter in the ICM as standard will be an important plus factor with system designers and installers.

13.2 - The various ICM configurations available

Each ICM can be fitted with one or two on/off valves, two or three ways and flexible water pipes, depending how the unit is configured.



a) The ICM is fitted with a speed controller and a 5-row cooling coil which operates in cooling mode only (2 pipes).

Operates in “cooling” mode only.

This option includes a 2-way on/off valve and two insulated flexible water pipes.

b) The ICM is fitted with a speed controller and a 5-row cooling or heating coil (2 pipes with changeover).

Operates in cooling or heating mode. This application is of the heat pump type.

This option includes a 3-way on/off valve, a heating/cooling changeover switch and two insulated flexible water pipes.

c) The ICM is fitted with a speed controller, a 5-row cooling coil and a 1-row heating coil (4 pipes).

Operates in cooling and heating mode in sequence.

This option includes 2 on/off valves with 2 ways, and 4 flexible water pipes, 2 of which are insulated and 2 uninsulated.

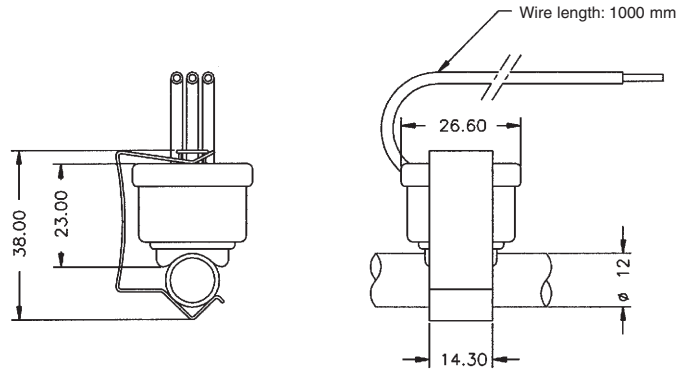
d) The ICM is fitted with a speed controller, a 5-row cooling coil and an electric heater (2 pipes and 2 wires).

Operates in cooling mode or heating mode with electric heater in sequence.

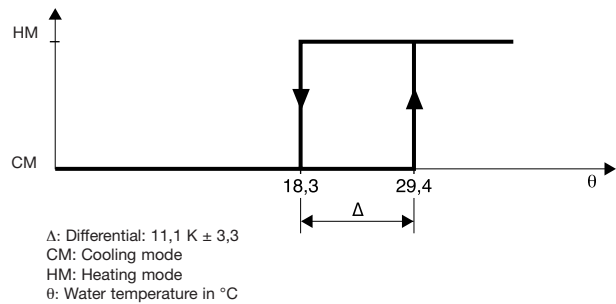
This option includes a 2-way on/off valve, 2 insulated flexible water pipes and 1 power relay for controlling the electric heater.

13.3 - Technical specifications for the heating/cooling changeover switch

The heating/cooling changeover switch is designed to be installed straight onto the couplings of the 3-way valves on the ICM. It detects temperature changes in the fluid circulating in the primary water circuit. A changeover switch operates according to the water temperature in accordance with the diagram below.



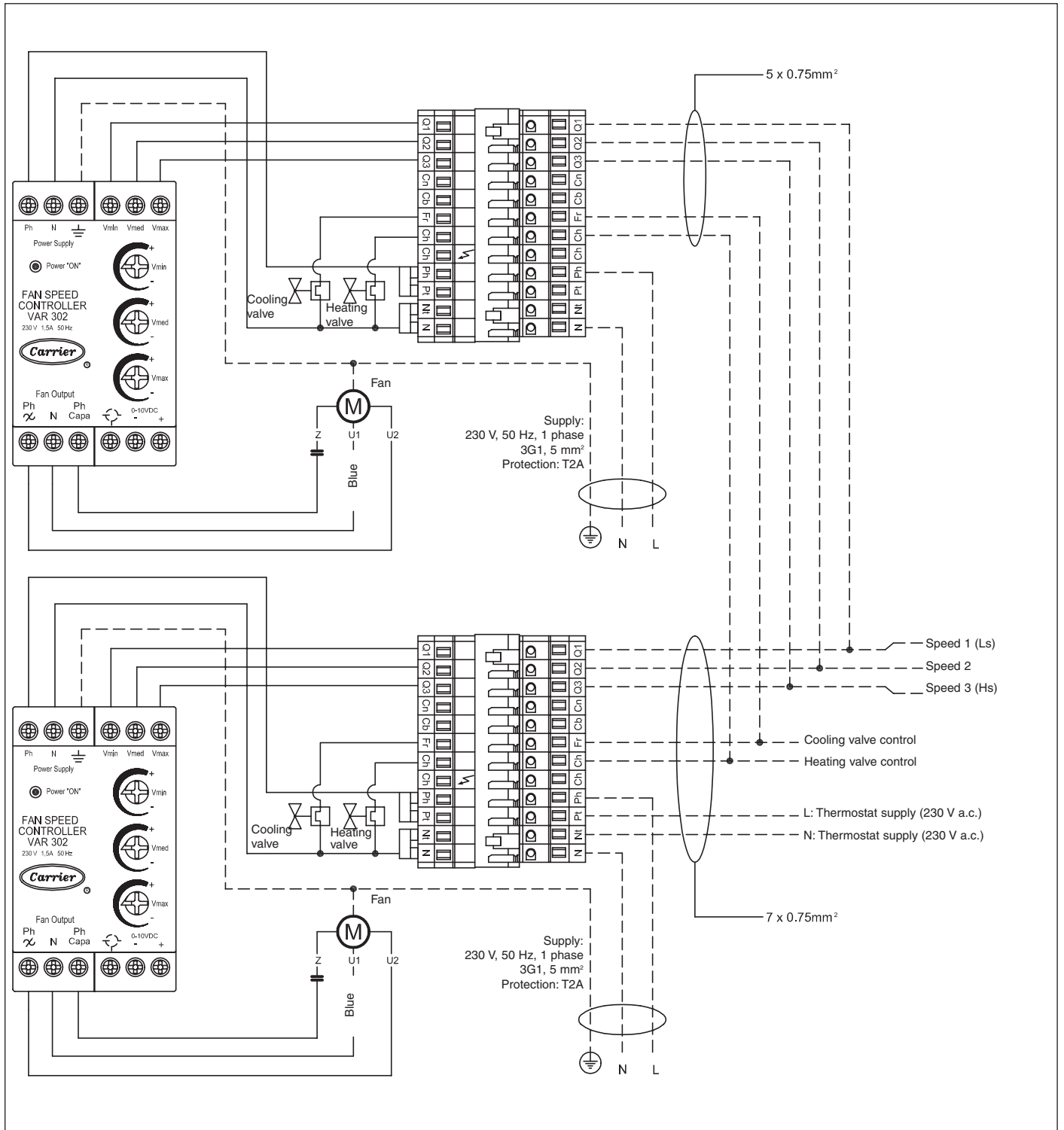
When a heating/cooling changeover switch is connected between the room thermostat and the water flow control valve, the changeover between heating and cooling modes takes place automatically in accordance with the following diagram.



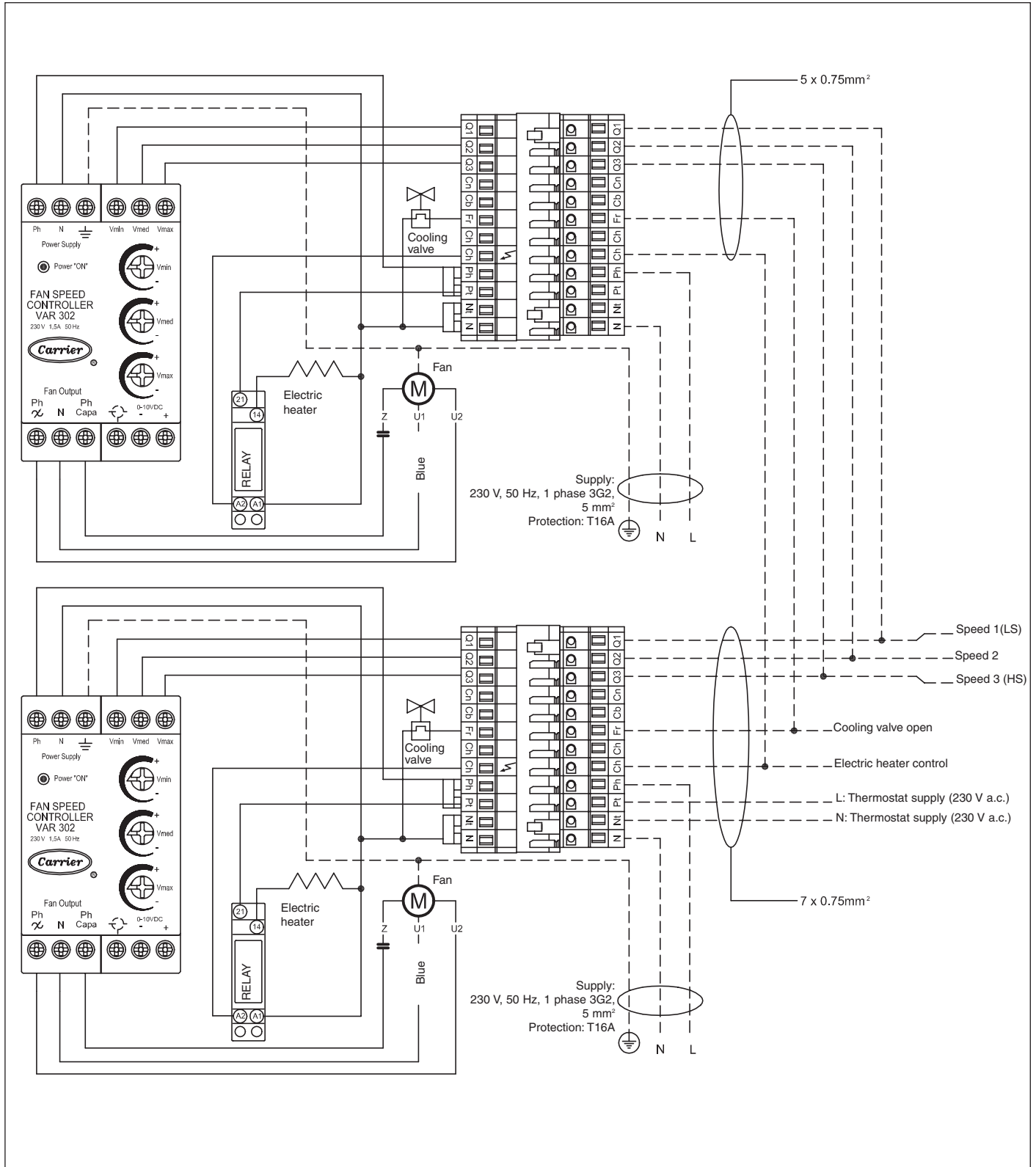
13.4 - Master/slave control

With the high capacity fan speed controller it is possible to link up to 5 ICMs to one Carrier thermostat with no additional relays. Electrothermal 230 V.a.c. on/off actuators are used. When electric heaters are used with a cooling coil the heater power contactor must be used.

13.4.1 - 4 pipe configurations



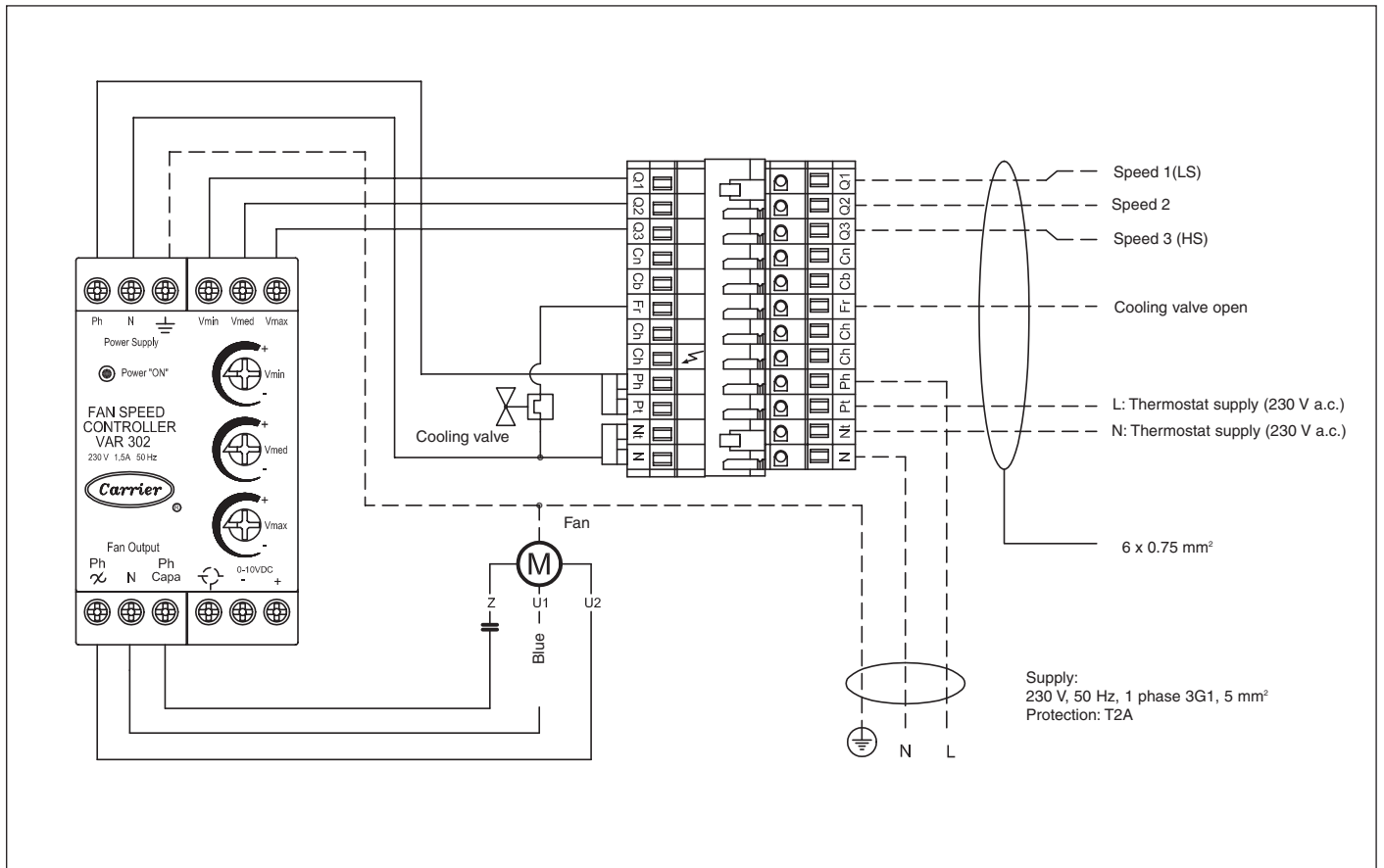
13.4.2 - 2 pipe configuration and electric heater



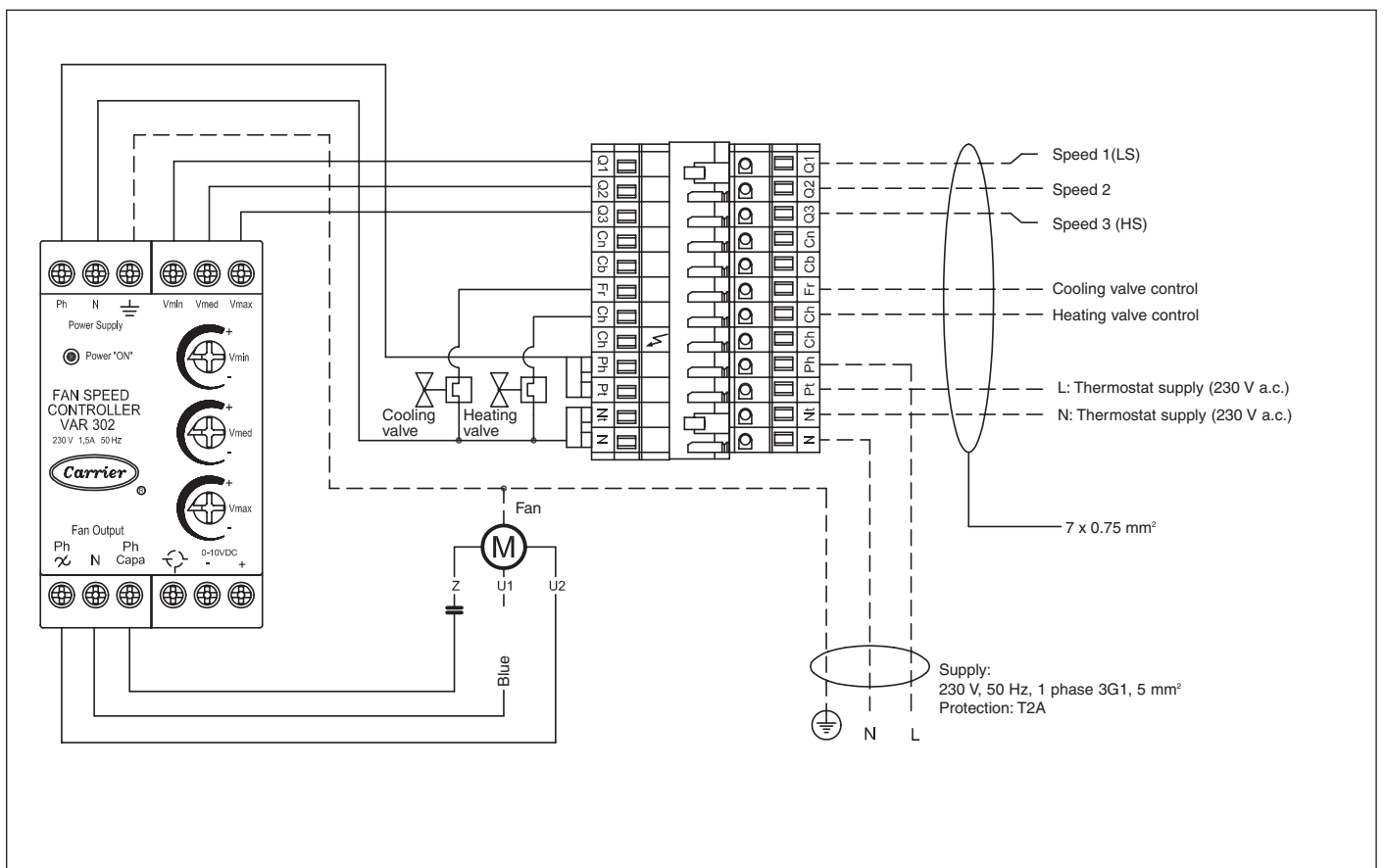
13.5 - Wiring diagrams

The ICM unit can be delivered without a control system, that is, without valves or flexible water pipes, but with the fan cable bundle connected to the speed controller and the electric heater connected to the power relay (depending on the configuration). If this option is chosen, the ICM is delivered with a terminal strip and a plastic protective cover.

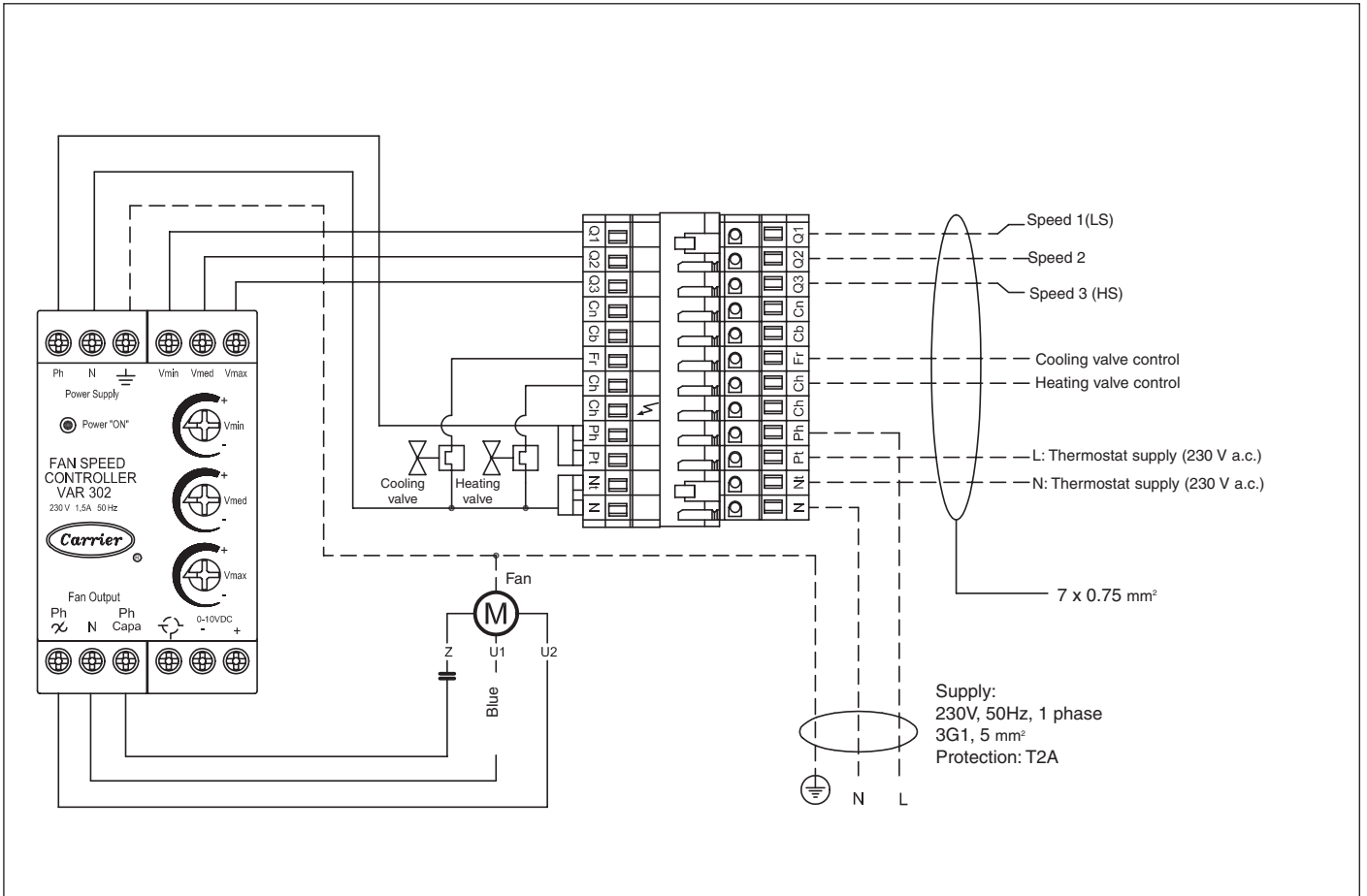
5-row cooling coil (2 pipes)



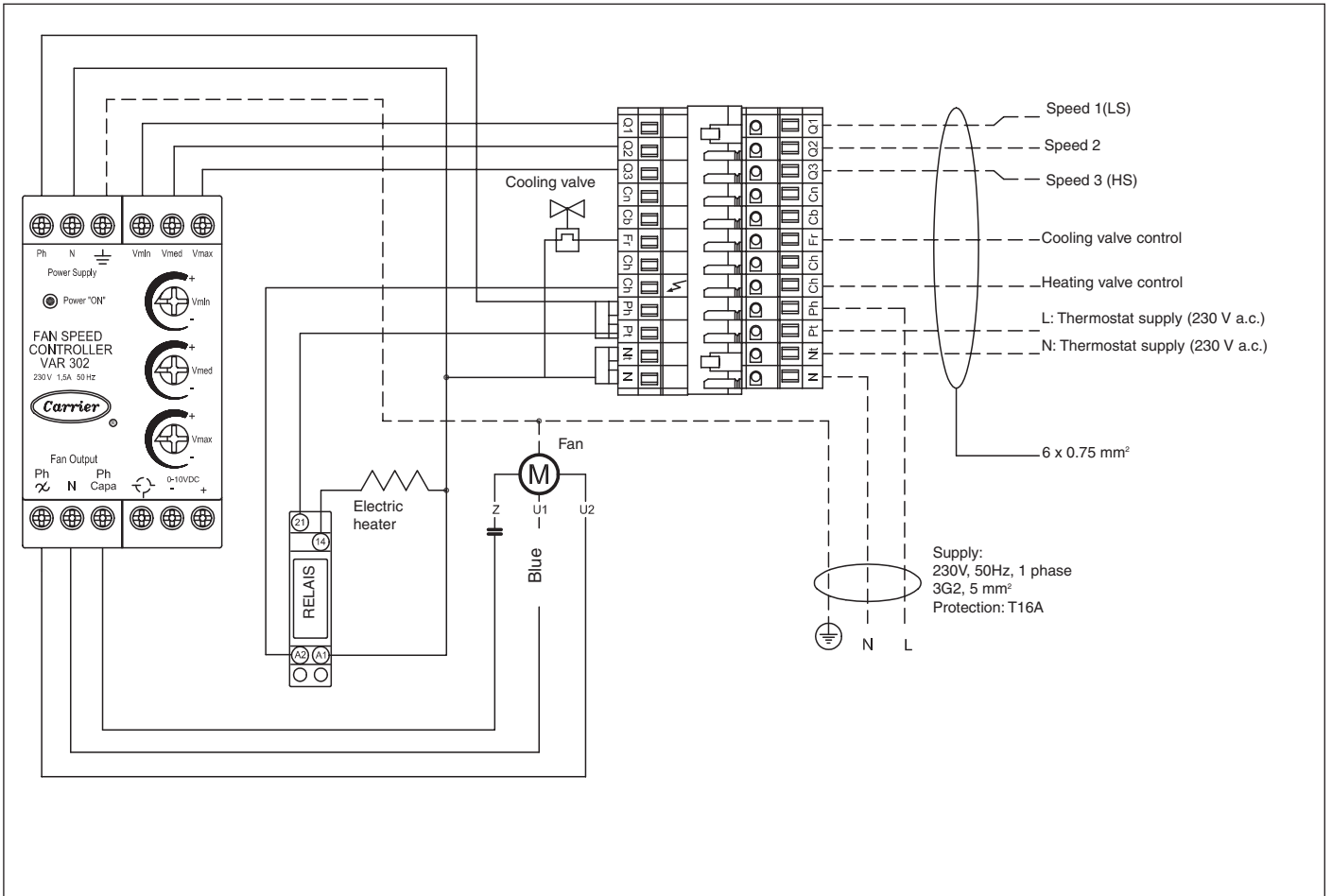
5-row coil with heating/cooling changeover (2 pipe change-over)



14.6.3 - 6-row coil, 5 rows cooling, 1 row heating (4 pipes)



5-row cooling coil and PTC electric heater



14 - ACCESSORIES

14.1 - Adjustable feet for installing an ICM in a false floor void

14.1.1 - Introduction

An ICM may be installed in a floor void. Adjustable feet with built-in vibration absorbers are available as optional extras for installation on site. For further information please contact your local Carrier representative.

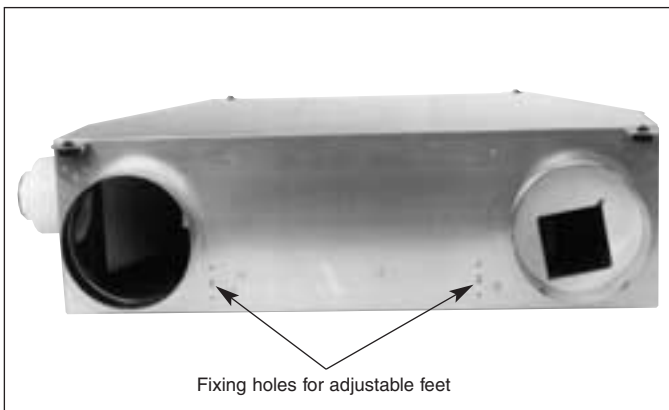
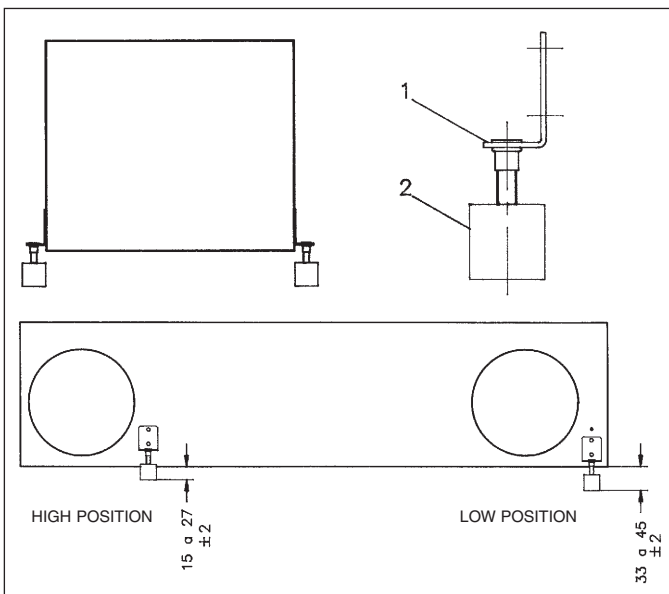
14.1.2 - Procedure for fitting

a) Instal angle bracket 1 using the screws supplied.

There are two possible height settings with different adjustment ranges:

- high setting: adjustment range 15 to 27 mm,
- low setting: adjustment range 33 to 45 mm.

b) Screw foot 2 in or out according to the height needed.



14.2 - Condensate drain pump



14.2.1 - Introduction

An ICM can be fitted with a condensate drain pump, preferably before but if necessary after the unit has been installed in a false floor or ceiling.

14.2.2 - Procedure for fitting

a) Compare the contents of the parts kit with those shown in the figure in chapter 14.2.3.

b) Instal the detector block support bracket.

- Instal the aluminium detector block bracket on the condensate drain pan as shown in Fig. 2-A (chapter 14.2.4).

NOTE:

The detector support bracket must be installed horizontally as shown in Fig. 2-B, chapter 14.2.4 (maximum angle 15°).

c) Instal the detector block

- Use the rubber tube supplied to connect the detector to the condensate drain (Fig. 2-B, chapter 14.2.4).
- Connect the 6 mm bore flexible tube to the outlet stub on the detector.
- Connect the small 6 mm bore flexible tube to the vent outlet of the detector block

The rubber tube must be secured to the outlet stub on the condensate drain pan by a collar (not supplied by Carrier).

- Attach the plastic detector block support to the aluminium bracket with the double-sided adhesive tape supplied (Fig. 2-B, chapter 14.2.4), and then, clip the detector block to the plastic bracket.

NOTE:

The detector must be installed horizontally (maximum angle 15°).

d) Instal the pump support bracket

- The pump support bracket can be installed in either of two positions on the fan motor access door as shown in the figure in chapter 14.2.4. Bend the support bracket into a right angle to suit the chosen location of the pump.

e) Instal the pump

- The pump can be installed anywhere and can be up to 2.5 m above the unit.
- Using the 2 screws supplied, fix the pump to the metal support bracket fixed to the fan motor access panel.

NOTE:

There must be a space left around the pump unit so that it is provided with cooling when operating for long periods of time.

The pump unit must not be immersed or placed outside of the premises or in damp place.

f) Connect the detector to the pump

- Connect the telephone type RJ11 connector to the pump.
- Connect the 6 mm bore flexible tube to the ribbed outlet on the pump as shown in Fig. 3.
- The arrow on the pump body shows the direction of water flow.

g) Connect the pump

Connect the 6 mm bore flexible tube between the ribbed outlet on the pump and the common condensate drain.

h) Mains connection

- Connect the power supply of the ICM to the mains supply (as shown in Fig. 3) by means of:
 - an interconnexion cable (HO VVF) with 0.75 mm² length, provided with an electric protection and isolating device (not supplied) conforming to IEC 345 standard on phase and neutral
 - a fuse on phase of 630 mA.

WARNING:

Before power supply, make sure that the cover of the pump unit is properly closed.

i) Connect the alarm

The condensate level detector consists of a float which can detect three different levels:

- Pump on level: 17 mm ± 2 mm of condensate. When this level is exceeded the pump will start automatically.
- Pump off level: 11 mm ± 2 mm of condensate. When the pump has been operating, it will shut off when the level falls below this threshold.
- Alarm level: 21 mm ± 2 mm of condensate. This situation generates an alarm from which recovery is by means of a dry-reed output. If the alarm threshold is reached or exceeded, the condensate drain pump keeps running.

The alarm condition applies if the condensate level is above the alarm threshold.

The alarm condition no longer applies when the level is below the alarm threshold.

The device includes a potential-free changeover switch with a capacitance of 8 A/250 V (resistive load)

The alarm contact on the drain pump is a “Normally Open” or “Normally Closed” type, and therefore:

If the condensate level is below the alarm threshold (no alarm condition), the contact is open if the wiring is NO or closed if the wiring is NC.

If the condensate level is above the alarm threshold (alarm condition), the contact is closed if the wiring is NO or open if the wiring is NC.

j) Function test

Tip a small quantity of water into the drain pan. Check that the pump starts, draws water away and stops when the water level falls. Add more water until the alarm operates.

k) Service

Timing: at the beginning of the season.

Clean the detection unit and the filter. Disconnect from mains supply before opening.

Remove the lid, remove the filter, remove the float, clean the detection unit and the float using a solution of water containing 5% bleach. Replace the float in its initial position (magnet faced upwards), reinstall the filter, reinstall the lid and screw it down. Carry out an operating test on the pump and the alarm. If the air conditioner is installed in areas liable to cause of favour extensive contamination of the condensate water, clean more frequently.

l) Features of the condensate drain pump

Maximum flow: 10 l/h (0,0028 l/s)

Maximum lift: 60 kPa

Maximum suction: 25 kPa

Power supply: 230 V ± 10% ; 50 Hz ; single phase

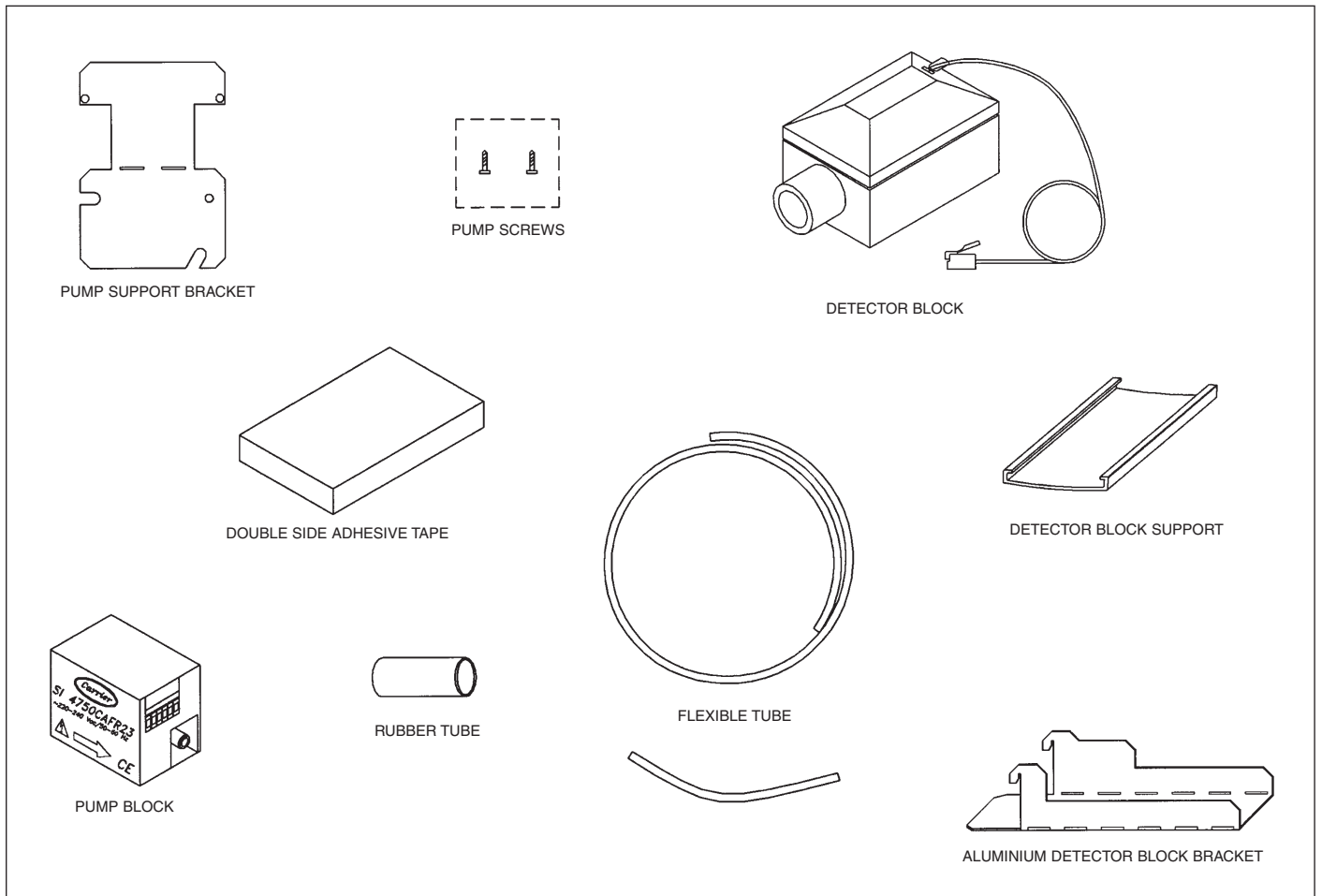
Power consumption: 18 VA

Accessories: filter kit, antibacterial tablets.

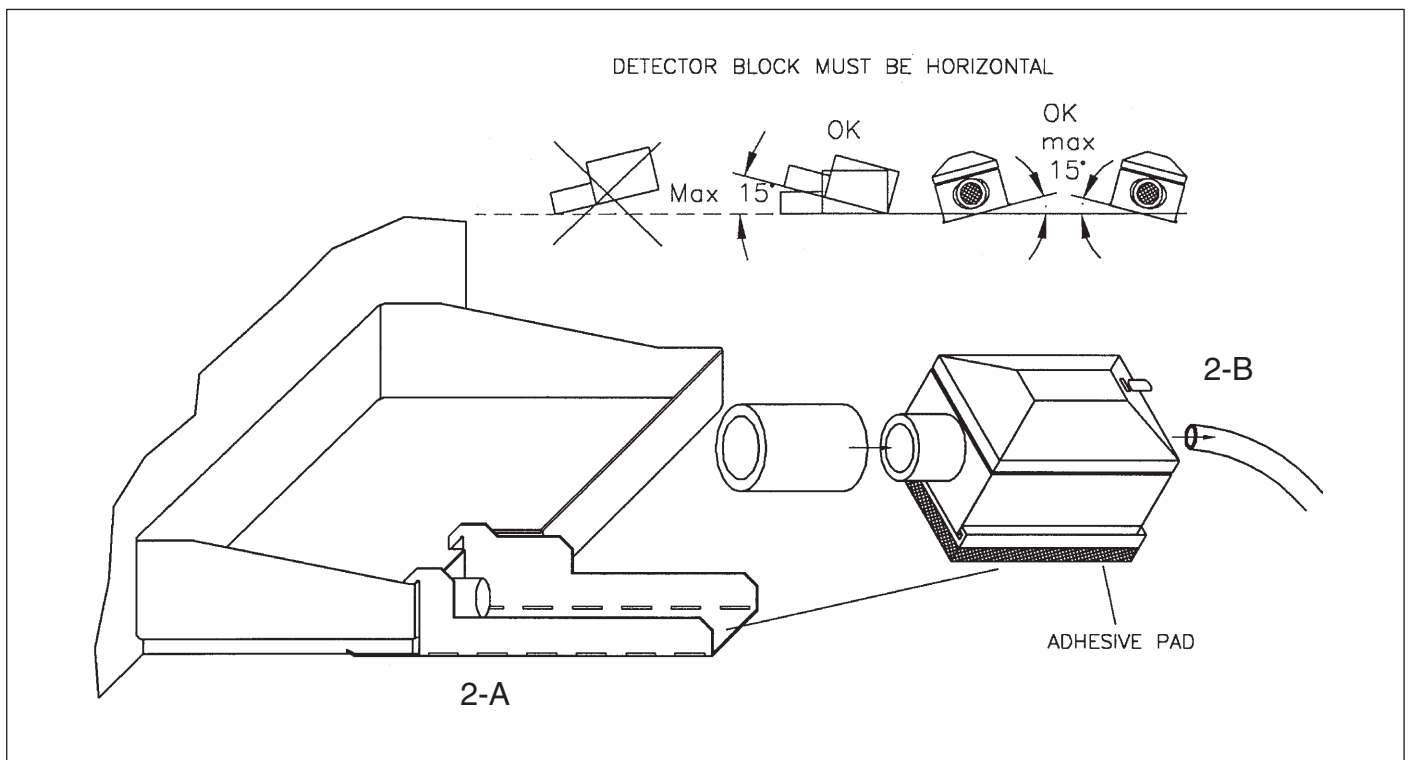
m) Safety

- The alarm contact will prevent overflow (cutting-off the cooling)
- An auto-reset thermal circuit breaker with a cut-off temperature 70°C
- Earth connection of pump
- Safety transformer as per standard EN 60 742
- Housing made of ABS

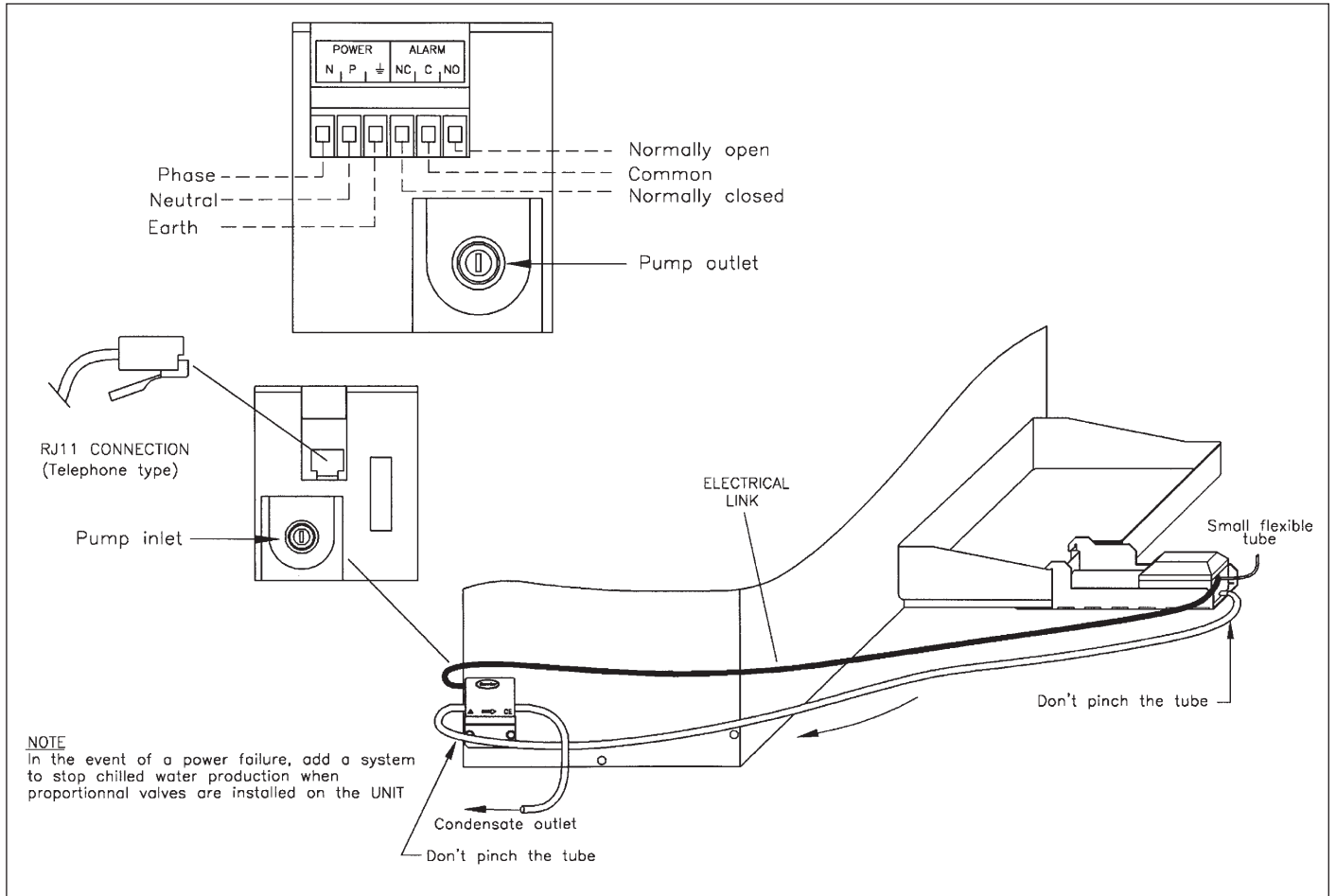
14.2.3 - Pump kit (Fig. 1)



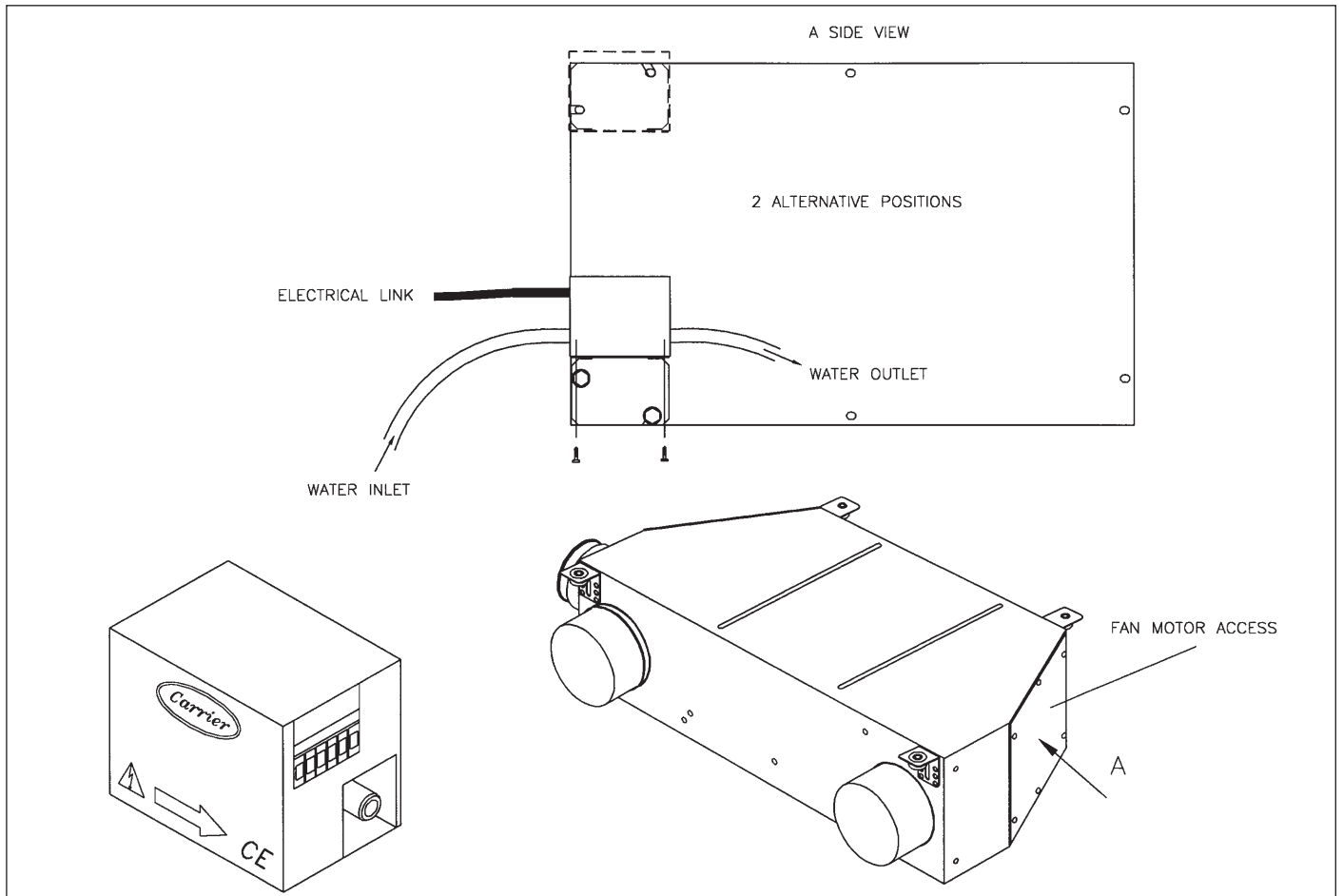
14.2.4 - Installing the detector on the drain pan (Fig. 2)



14.2.5 - Pump connections (Fig. 3)



14.2.6 - Pump block installation (Fig. 4)



15 - 42BJ ICM CHARACTERISTICS

15.1 - Electrical data

15.1.1 - ICM size 1.3 with electric heater and 5-row coil

| U (V) | I (A) | P (W) | r/s | Qv m ³ /h | Qv l/s | Pressure Pa |
|-------|-------|-------|-----|----------------------|--------|-------------|
| 230 | 0.95 | 217 | 32 | 561 | 156 | 30 |
| 230 | 0.94 | 216 | 33 | 544 | 151 | 50 |
| 230 | 0.93 | 214 | 35 | 517 | 144 | 101 |
| 230 | 0.89 | 202 | 37 | 515 | 143 | 140 |
| 200 | 0.86 | 170 | 29 | 450 | 125 | 50 |
| 200 | 0.84 | 169 | 31 | 444 | 123 | 90 |
| 200 | 0.80 | 160 | 35 | 408 | 113 | 150 |
| 170 | 0.77 | 129 | 24 | 369 | 103 | 30 |
| 170 | 0.74 | 125 | 29 | 365 | 101 | 81 |
| 170 | 0.72 | 123 | 31 | 335 | 93 | 125 |
| 140 | 0.63 | 88 | 21 | 299 | 83 | 31 |
| 140 | 0.63 | 87 | 25 | 254 | 71 | 81 |
| 140 | 0.61 | 85 | 28 | 224 | 62 | 130 |
| 110 | 0.50 | 55 | 17 | 204 | 57 | 26 |
| 110 | 0.50 | 54 | 19 | 175 | 49 | 50 |
| 110 | 0.50 | 55 | 22 | 150 | 42 | 75 |
| 80 | 0.37 | 29 | 14 | 111 | 31 | 25 |
| 80 | 0.37 | 29 | 17 | 69 | 19 | 51 |

15.1.2 - ICM size 2.3 without electric heater, and 5 + 1 row coil

| U (V) | I (A) | P (W) | r/s | Qv m ³ /h | Qv l/s | Pressure Pa |
|-------|-------|-------|-----|----------------------|--------|-------------|
| 230 | 1.04 | 240 | 32 | 682 | 189 | 120 |
| 230 | 0.98 | 223 | 36 | 615 | 171 | 194 |
| 230 | 0.92 | 207 | 38 | 551 | 153 | 258 |
| 230 | 0.86 | 193 | 40 | 480 | 133 | 320 |
| 230 | 0.82 | 180 | 41 | 404 | 112 | 390 |
| 230 | 0.78 | 171 | 42 | 344 | 96 | 438 |
| 230 | 0.73 | 156 | 43 | 265 | 74 | 475 |
| 230 | 0.70 | 146 | 44 | 206 | 57 | 490 |
| 230 | 0.67 | 135 | 45 | 134 | 37 | 499 |
| 200 | 0.96 | 194 | 29 | 570 | 158 | 91 |
| 200 | 0.92 | 185 | 32 | 527 | 146 | 162 |
| 200 | 0.86 | 172 | 35 | 461 | 128 | 234 |
| 200 | 0.80 | 158 | 38 | 388 | 108 | 297 |
| 200 | 0.76 | 148 | 40 | 321 | 89 | 354 |
| 200 | 0.71 | 137 | 41 | 253 | 70 | 416 |
| 200 | 0.66 | 124 | 43 | 184 | 51 | 460 |
| 200 | 0.63 | 116 | 44 | 115 | 32 | 472 |
| 170 | 0.86 | 148 | 24 | 449 | 125 | 57 |
| 170 | 0.82 | 140 | 28 | 410 | 114 | 128 |
| 170 | 0.78 | 132 | 32 | 350 | 97 | 200 |
| 170 | 0.73 | 124 | 35 | 285 | 79 | 271 |
| 170 | 0.68 | 115 | 38 | 225 | 63 | 340 |
| 170 | 0.64 | 106 | 40 | 173 | 48 | 384 |
| 170 | 0.60 | 98 | 41 | 94 | 26 | 426 |
| 140 | 0.73 | 104 | 20 | 330 | 92 | 40 |
| 140 | 0.72 | 102 | 22 | 303 | 84 | 76 |
| 140 | 0.69 | 98 | 26 | 252 | 70 | 138 |
| 140 | 0.66 | 94 | 30 | 202 | 56 | 207 |
| 140 | 0.61 | 86 | 34 | 134 | 37 | 282 |
| 140 | 0.57 | 80 | 37 | 70 | 19 | 336 |
| 110 | 0.58 | 68 | 15 | 236 | 66 | 18 |
| 110 | 0.56 | 65 | 20 | 161 | 45 | 82 |
| 110 | 0.54 | 62 | 27 | 90 | 25 | 166 |
| 110 | 0.52 | 59 | 29 | 48 | 13 | 199 |
| 80 | 0.42 | 36 | 11 | 140 | 39 | 11 |
| 80 | 0.41 | 35 | 14 | 92 | 26 | 37 |
| 80 | 0.40 | 34 | 17 | 30 | 8 | 65 |

Legend

- U : Fan motor power supply
- I : Current draw
- P : Power input to the fan motor, numeric controller or speed controller
- r/s : Fan motor rotation speed
- Qv : Air flow
- Pressure : Available static pressure

15.1.3 - ICM size 4.4 without electrical heater, and 6-row cooling coil

| U (V) | I (A) | P (W) | r/s | Qv m ³ /h | Qv l/s | Pression Pa |
|-------|-------|-------|-----|----------------------|--------|-------------|
| 230 | 0,85 | 189 | 21 | 1012 | 281 | 59 |
| 230 | 0,82 | 183 | 21 | 961 | 267 | 78 |
| 230 | 0,80 | 176 | 21 | 898 | 249 | 100 |
| 230 | 0,77 | 171 | 22 | 837 | 233 | 119 |
| 230 | 0,74 | 162 | 22 | 752 | 209 | 141 |
| 230 | 0,71 | 154 | 22 | 645 | 179 | 166 |
| 230 | 0,68 | 144 | 23 | 522 | 145 | 190 |
| 230 | 0,65 | 131 | 23 | 400 | 111 | 205 |
| 230 | 0,61 | 126 | 24 | 188 | 52 | 229 |
| 200 | 0,82 | 164 | 19 | 988 | 274 | 31 |
| 200 | 0,78 | 155 | 20 | 911 | 253 | 65 |
| 200 | 0,75 | 149 | 20 | 859 | 239 | 85 |
| 200 | 0,72 | 142 | 21 | 784 | 218 | 112 |
| 200 | 0,69 | 135 | 21 | 718 | 199 | 131 |
| 200 | 0,65 | 128 | 22 | 629 | 175 | 153 |
| 200 | 0,60 | 117 | 22 | 491 | 136 | 180 |
| 200 | 0,53 | 101 | 23 | 258 | 72 | 210 |
| 200 | 0,50 | 95 | 24 | 100 | 28 | 230 |
| 170 | 0,73 | 124 | 18 | 783 | 217 | 62 |
| 170 | 0,70 | 119 | 19 | 732 | 203 | 84 |
| 170 | 0,67 | 114 | 19 | 687 | 191 | 101 |
| 170 | 0,64 | 108 | 20 | 627 | 174 | 120 |
| 170 | 0,58 | 99 | 21 | 518 | 144 | 149 |
| 170 | 0,51 | 86 | 22 | 349 | 97 | 185 |
| 170 | 0,46 | 77 | 23 | 197 | 55 | 206 |
| 170 | 0,44 | 75 | 23 | 98 | 27 | 219 |
| 140 | 0,66 | 92 | 16 | 608 | 169 | 59 |
| 140 | 0,62 | 86 | 18 | 541 | 150 | 91 |
| 140 | 0,57 | 79 | 19 | 464 | 129 | 120 |
| 140 | 0,51 | 71 | 21 | 354 | 98 | 153 |
| 140 | 0,45 | 64 | 21 | 226 | 63 | 180 |
| 140 | 0,42 | 59 | 22 | 124 | 34 | 199 |
| 140 | 0,40 | 57 | 22 | 39 | 11 | 210 |
| 110 | 0,56 | 60 | 14 | 387 | 108 | 57 |
| 110 | 0,50 | 55 | 17 | 307 | 85 | 103 |
| 110 | 0,45 | 49 | 19 | 203 | 56 | 139 |
| 110 | 0,41 | 46 | 20 | 121 | 34 | 161 |
| 110 | 0,39 | 43 | 21 | 19 | 5 | 185 |
| 80 | 0,44 | 34 | 11 | 215 | 60 | 31 |
| 80 | 0,43 | 34 | 13 | 210 | 58 | 33 |
| 80 | 0,41 | 32 | 14 | 135 | 37 | 72 |
| 80 | 0,38 | 30 | 16 | 24 | 7 | 108 |

15.1.4 - ICM size 4.4 with electrical heater, and 5-row cooling coil

| U (V) | I (A) | P (W) | r/s | Qv m ³ /h | Qv l/s | Pression Pa |
|-------|-------|-------|-----|----------------------|--------|-------------|
| 230 | 0,82 | 182 | 21 | 964 | 268 | 37 |
| 230 | 0,78 | 182 | 22 | 862 | 239 | 80 |
| 230 | 0,76 | 168 | 22 | 811 | 225 | 98 |
| 230 | 0,72 | 159 | 22 | 708 | 197 | 130 |
| 230 | 0,69 | 151 | 23 | 603 | 168 | 156 |
| 230 | 0,66 | 142 | 23 | 499 | 139 | 178 |
| 230 | 0,64 | 136 | 23 | 405 | 112 | 195 |
| 230 | 0,62 | 130 | 23 | 311 | 86 | 210 |
| 230 | 0,61 | 127 | 24 | 239 | 67 | 218 |
| 230 | 0,60 | 125 | 24 | 171 | 47 | 227 |
| 230 | 0,59 | 123 | 24 | 97 | 66 | 237 |
| 200 | 0,75 | 150 | 20 | 873 | 242 | 46 |
| 200 | 0,72 | 143 | 21 | 812 | 226 | 70 |
| 200 | 0,67 | 133 | 21 | 695 | 193 | 114 |
| 200 | 0,59 | 117 | 22 | 506 | 140 | 164 |
| 200 | 0,55 | 109 | 23 | 396 | 110 | 184 |
| 200 | 0,52 | 101 | 23 | 277 | 77 | 202 |
| 200 | 0,50 | 97 | 23 | 178 | 49 | 214 |
| 200 | 0,49 | 96 | 24 | 109 | 30 | 222 |
| 170 | 0,71 | 121 | 18 | 761 | 211 | 46 |
| 170 | 0,67 | 114 | 19 | 700 | 194 | 77 |
| 170 | 0,62 | 106 | 20 | 596 | 166 | 114 |
| 170 | 0,57 | 98 | 21 | 498 | 138 | 142 |
| 170 | 0,52 | 89 | 22 | 396 | 110 | 166 |
| 170 | 0,48 | 83 | 22 | 304 | 84 | 183 |
| 170 | 0,46 | 78 | 23 | 218 | 61 | 197 |
| 170 | 0,44 | 75 | 23 | 125 | 35 | 208 |
| 140 | 0,65 | 90 | 17 | 595 | 165 | 47 |
| 140 | 0,59 | 82 | 18 | 497 | 138 | 95 |
| 140 | 0,53 | 74 | 20 | 404 | 112 | 132 |
| 140 | 0,46 | 65 | 21 | 287 | 80 | 164 |
| 140 | 0,43 | 62 | 22 | 204 | 57 | 182 |
| 140 | 0,41 | 58 | 22 | 95 | 26 | 199 |
| 110 | 0,55 | 61 | 14 | 404 | 112 | 43 |
| 110 | 0,51 | 56 | 17 | 325 | 90 | 87 |
| 110 | 0,45 | 50 | 19 | 233 | 65 | 127 |
| 110 | 0,43 | 48 | 20 | 179 | 50 | 143 |
| 110 | 0,40 | 48 | 20 | 82 | 23 | 169 |
| 80 | 0,43 | 34 | 11 | 216 | 60 | 33 |
| 80 | 0,41 | 33 | 13 | 180 | 50 | 52 |
| 80 | 0,41 | 3 | 14 | 146 | 64 | 64 |
| 80 | 0,39 | 31 | 15 | 69 | 19 | 79 |

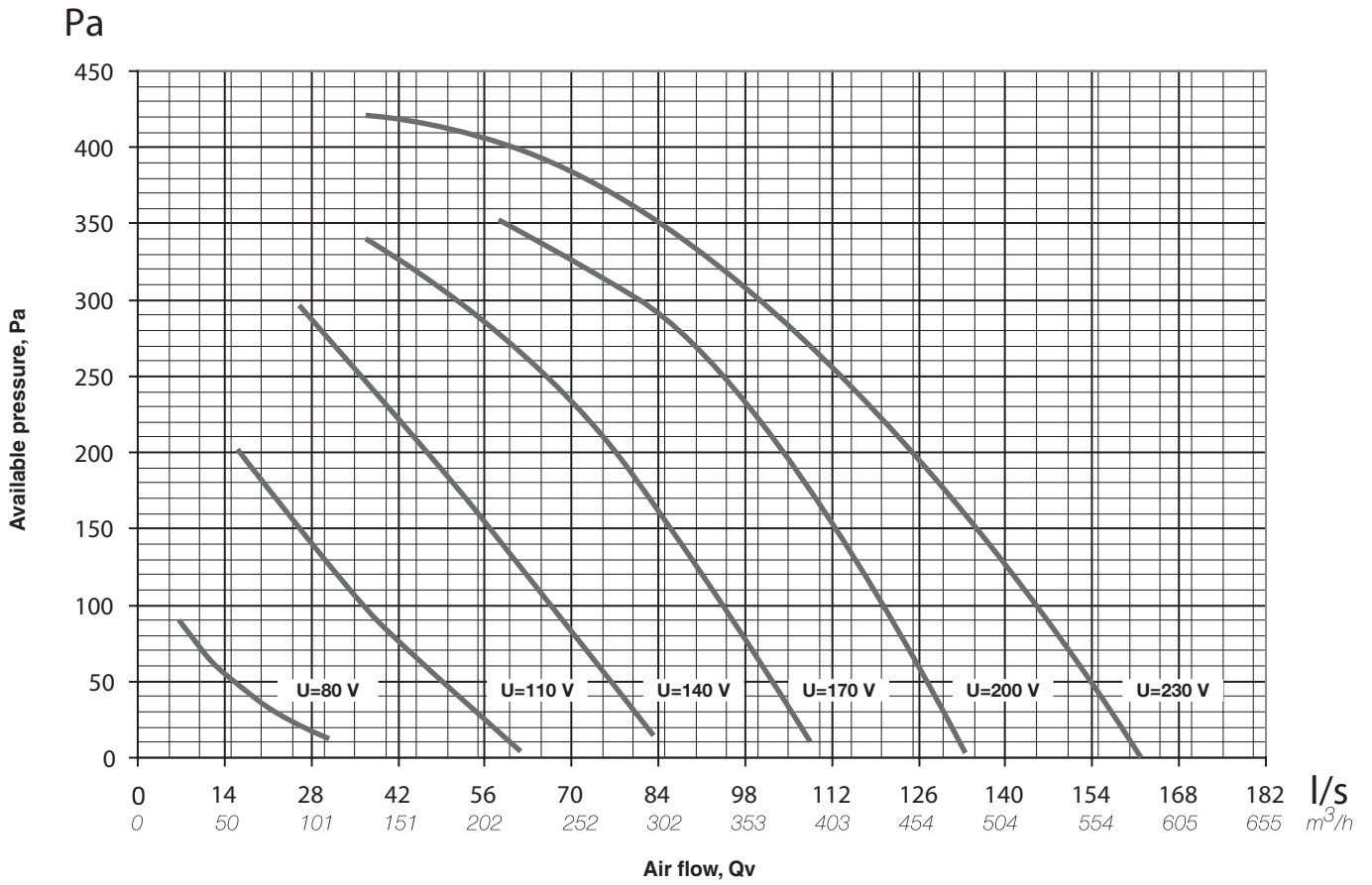
Legend

- U : Fan motor power supply
- I : Current draw
- P : Power input to the fan motor, numeric controller or speed controller
- r/s : Fan motor rotation speed
- Qv : Air flow
- Pressure : Available static pressure

15.2 - Air flow/available static pressure data

15.2.1 - ICM size 1.3

Available static pressure curve (Pa) as a function of air flow (m³/h or l/s)



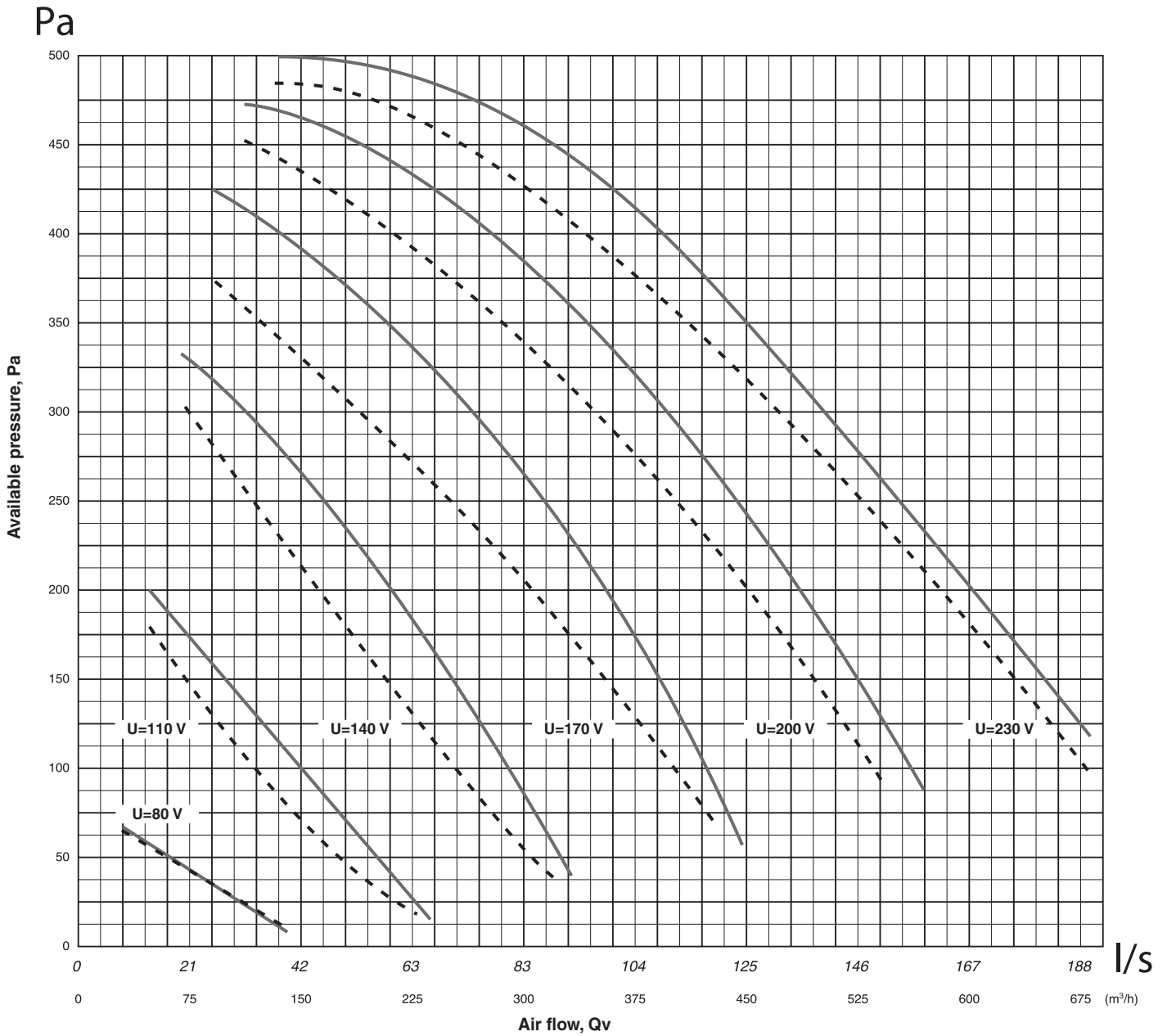
Legend

- Without electric heater (with 6-row water coil)
- U Fan motor power supply

15.2 - Air flow/available static pressure data (continued)

15.2.2 - ICM size 2.3

Available static pressure curve (Pa) as a function of air flow (m³/h or l/s)



Legend

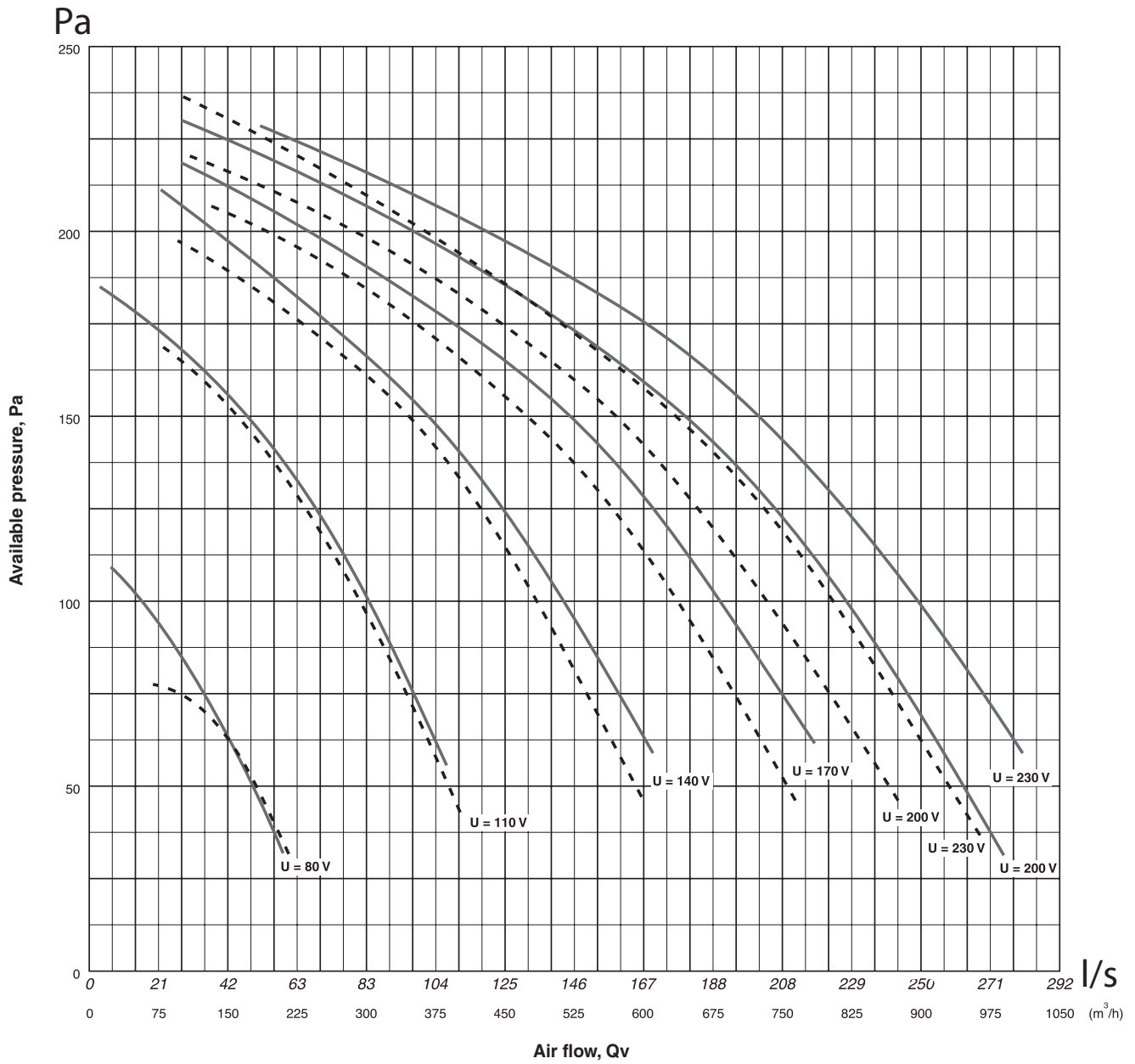
- Without electric heater (with 6-row water coil)
- - - With electric heater (with 5-row water coil)
- U Fan motor power supply

IMPORTANT: The curves were derived by smoothing, based on the information contained in the electrical data table.

15.2 - Air flow/available static pressure data (continued)

15.2.3 - ICM size 4.4

Available static pressure curve (Pa) as a function of air flow (m³/h or l/s)



Legend

- Without electric heater (with 6-row water coil)
- - - With electric heater (with 5-row water coil)
- U Fan motor power supply

IMPORTANT: The curves were derived by smoothing, based on the information contained in the electrical data table.

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