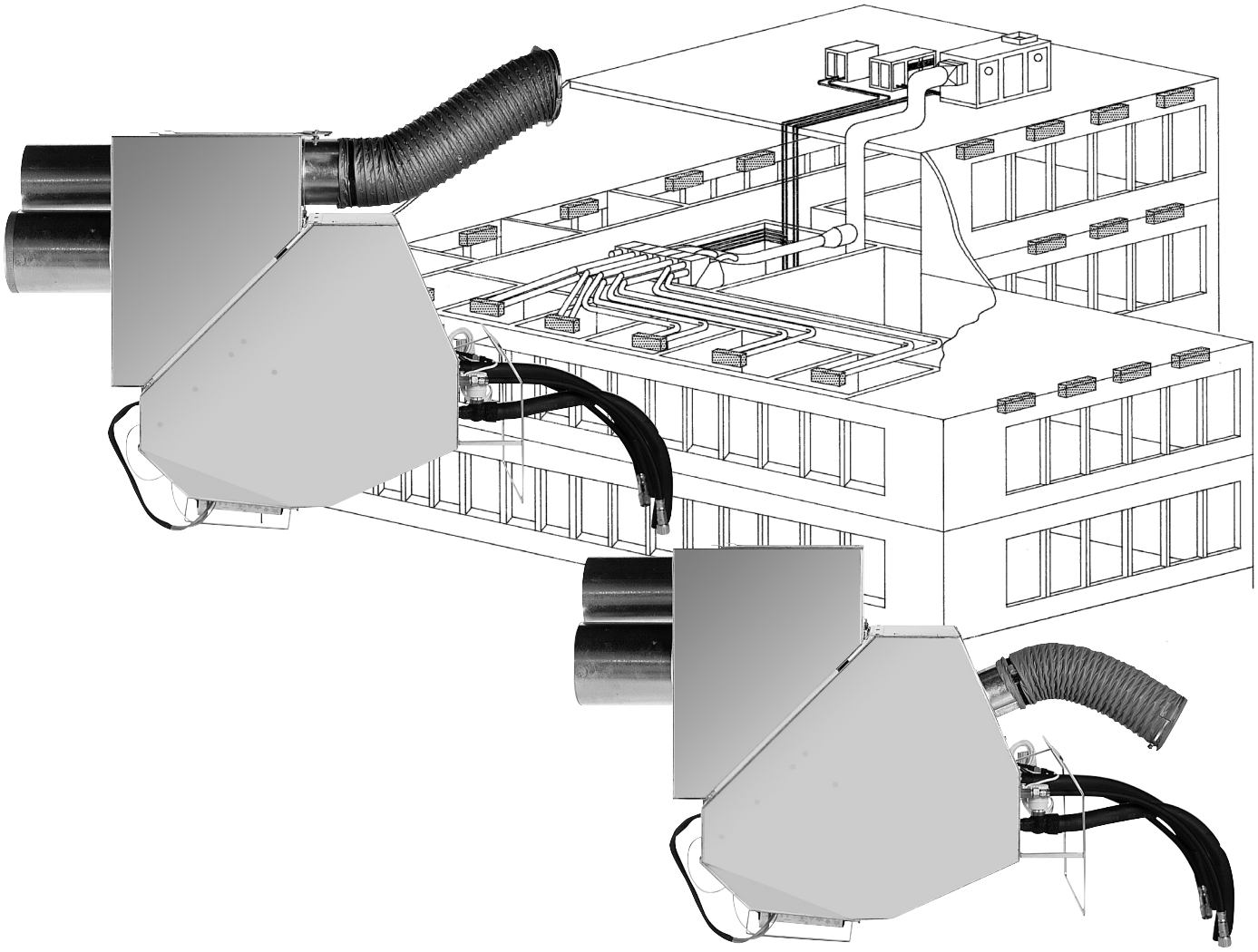
Carrier

42GR ATM

Air Treatment Module

Nominal air flow, size 1: 97 l/s - 350 m^3/h
size 2: 139 l/s - 500 m^3/h



Installation manual

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

CONTENTS

1 - INTRODUCTION

The 42GR Air Treatment Module (ATM) is something more than a simple air conditioner which enables room air temperature to be controlled. It is a total, integrated comfort system in the building.

The Carrier 42GR is a compact central station air handler in two sizes able to supply conditioned air at rates from 97 l/s to 139 l/s to rooms with floor areas from 25 to 40 m^2. The main components of the unit are a centrifugal fan, an air filter, a hot water heating coil or an electric resistance heater and a chilled water cooling coil. The unit is controlled by a Carrier numeric controller or similar.

The 42GR is connected, on site, through two flexible ducts (low thermal conductivity, low noise transmission supplied by others) to one or more high induction plenums fitted with Carrier linear diffusers in the false ceiling. Typically, these will be Carrier Moduboot 35BD/35SR units with each one serving an individual room or zone and providing both supply air and return air paths according to diffuser model.

The top of the range 42GR ATM can have a Carrier numeric controller. Each room occupant then has his or her own Zone User Interface control module, on a wall (with a mounting base) or desk, with which to select the preferred comfort level:

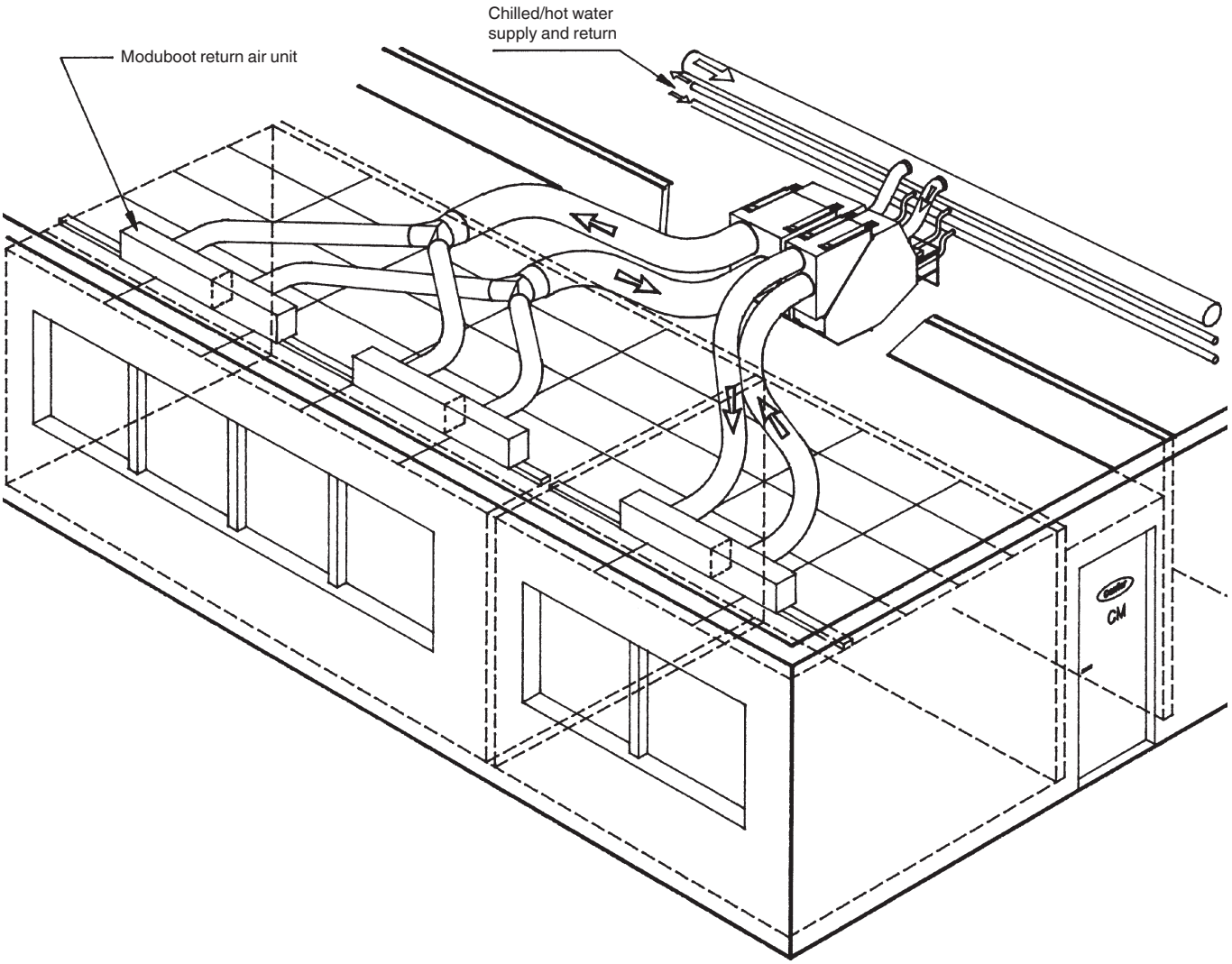
- Room ambient temperature
- Select Occupied or Unoccupied mode at each 42GR ATM to control energy usage
- Ventilation air (the rate of air replacement)
- Lighting on or off
- Blinds raised or lowered and their inclination

In addition, connection to a central Building Management System allows units to be controlled individually to satisfy overriding criteria or to respond to local regulations.

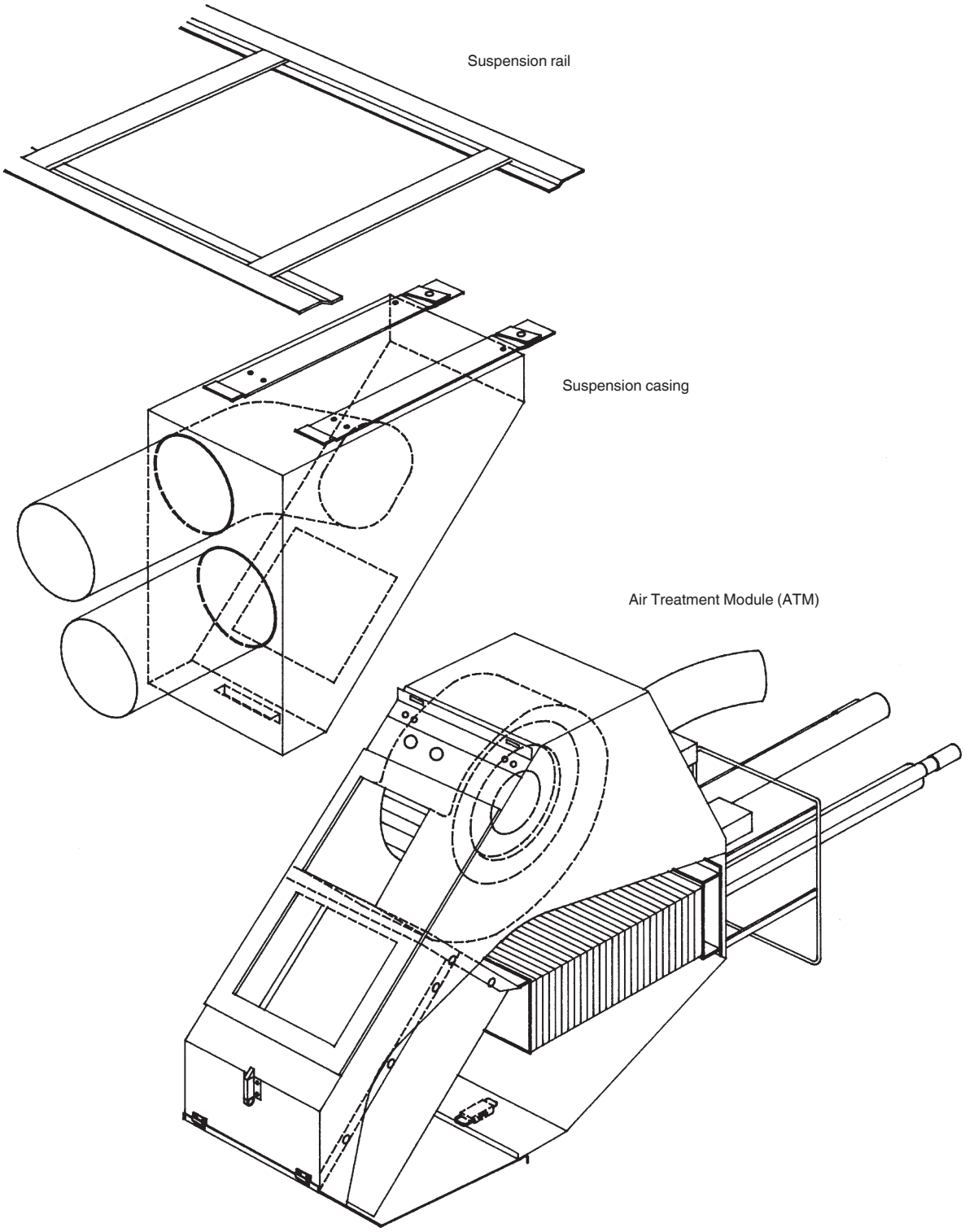
The 42GR ATM is designed to be installed in a machine room close to the centre of the space to be air conditioned. Modules can be installed side by side and their high static pressure capability allow them to be used with long ducts.

With the 42GR ATM located centrally in one machine room, service and maintenance are considerably easier.

WARNING: Switch off the electrical power supply before doing any work on the unit.



ATM: 3 main components



2 - FEATURES

2.1 - Physical and electrical data

42GR ATM		Size 1	Size 2
Nominal air flow	l/s (m^3/h)	97 (350)	139 (500)
Total cooling capacity (at nominal air flow)*	kW	2.8	4.1
Sensible cooling capacity (at nominal air flow)*	kW	1.9	2.7
Heating capacity (at nominal air flow)**	kW	1.2	2.2
Power supply 230 V-1 ph- 50 Hz	U%	± 15	± 15
Operating weight (6-row coil)	kg	35	50
Water coil		3/8" copper tubes, aluminium fins at 1.8 mm spacing, test pressure 24 bar, operating pressure 16 bar	
• 6-row coil: 5 cooling rows, 1 heating row			
• 5-row cooling coil			
• Cooling water volume	l	0.83	1.5
• Heating water volume	l	0.17	0.3
PTC electric heater (Positive Temperature Coefficient)			
• Max. capacity at nominal air flow	kW	1.7	1.8
• Current draw ± 15%	A	11	11
• Power input at zero flow	W	80	80
• VDE, CE, UL and CSA codes approved			
Fan			
• Centrifugal fan, single wheel		single inlet	double inlet
- Nominal air flow	l/s (m^3/h)	97 (350)	139 (500)
- Static pressure at nominal air flow	Pa	310	320
Fan motor		230 V-1 ph-50 Hz, 2-pole open asynchronous, permanent capacitor, inherent overload protection, class B insulation, varnish class F, connected to a speed controller.	
• Protection index	IP	44	44
• Max. power input at 230 VAC+	W	143	208
• Min. output from electronic speed controller (RMS)	V	80	80
• Nominal current+	A	0.64	0.91
• Starting current	A	2.56	3.64
Air filter		Throwaway, 55 mm thick, type F5, fire rating medium M1, metal frame	
• Dimensions	mm	225 x 350	395 x 350
• Pressure drop, clean			
- air flow 97 l/s	Pa	35	–
- air flow 139 l/s	Pa	–	35
Fresh air connection on ATM***			
• External diameter	mm	75	125
• Constant air flow (-10%, + 20%)	l/s (m^3/h)	8.3 (30)	16.6 (60)
• ΔP (upstream/downstream)	Pa	50/200	70/200

Water connections

42GR modules are designed and tested for 16 bar operating pressure. The total operating circuit of the ATM 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.

* 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.

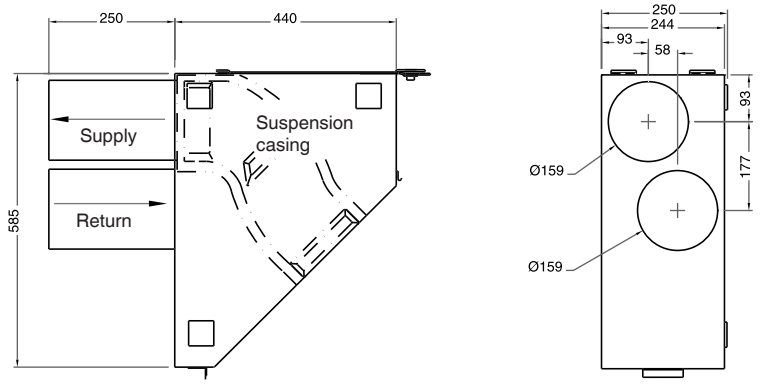
*** In the case of the size 2 ATM, the fresh air controller may be modified on site by relocating or removing two plastic restricters in order to increase its constant fresh air flow capacity to 20,8 (75), 27,7 (100), 36,1 (130), 44,4 l/s (160 m^3/h)

\+ Refer to extended electrical data table

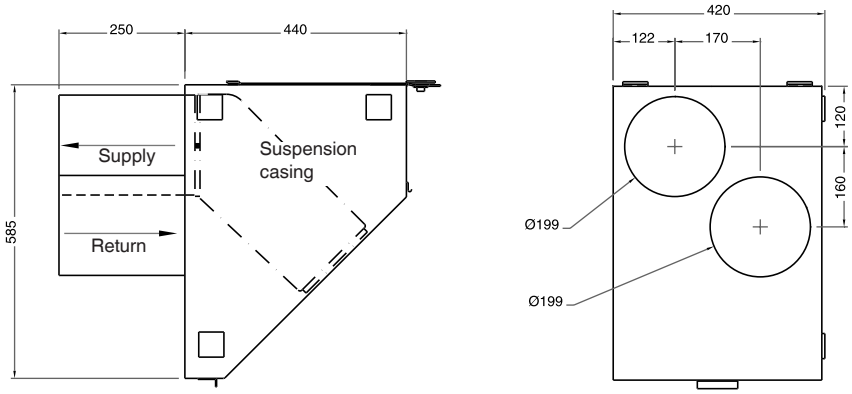
2.2 - Suspension casing drawings

Standard suspension casing, mm

Size 1

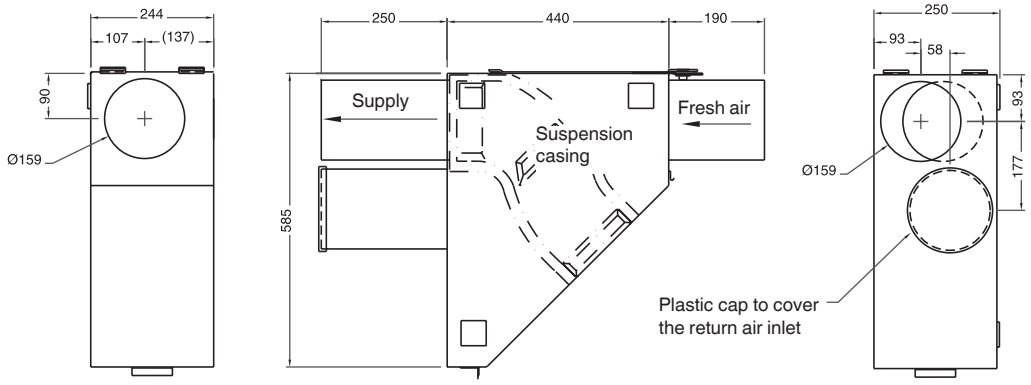


Size 2

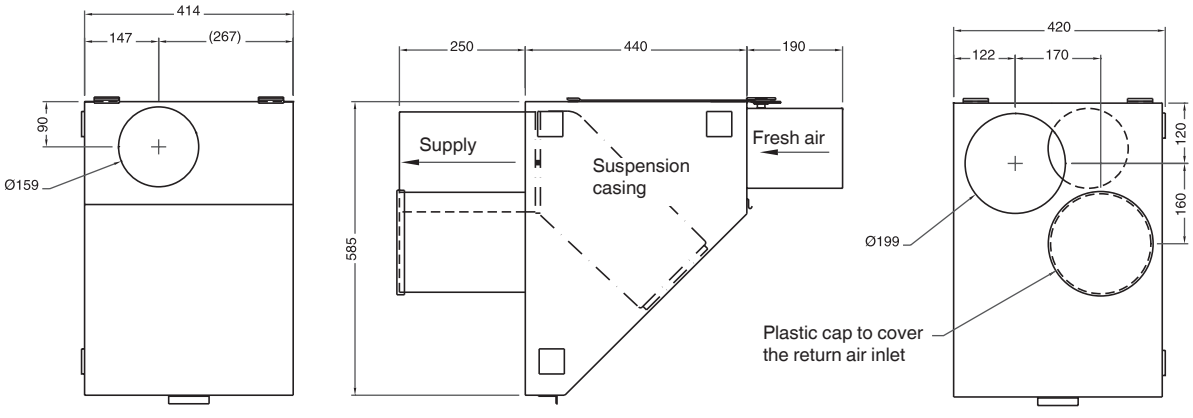


All fresh air suspension casing, mm

Size 1

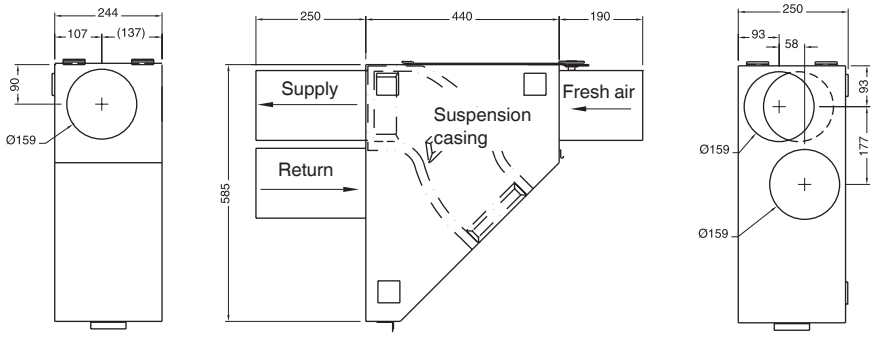


Size 2

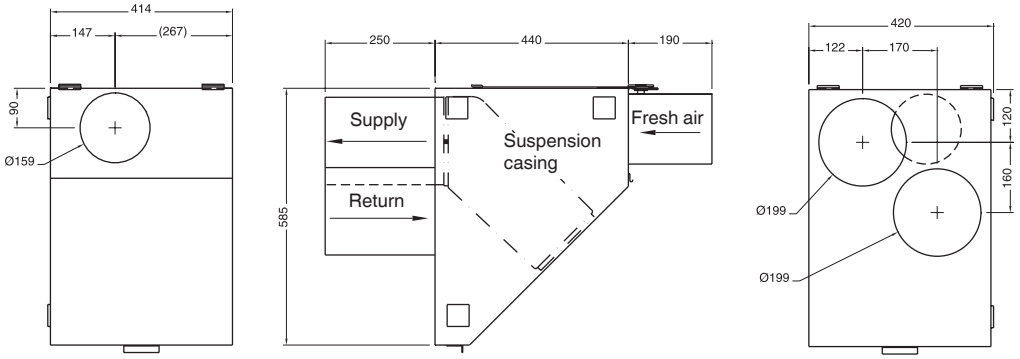


Constant fresh air volume suspension casing, mm

Size 1

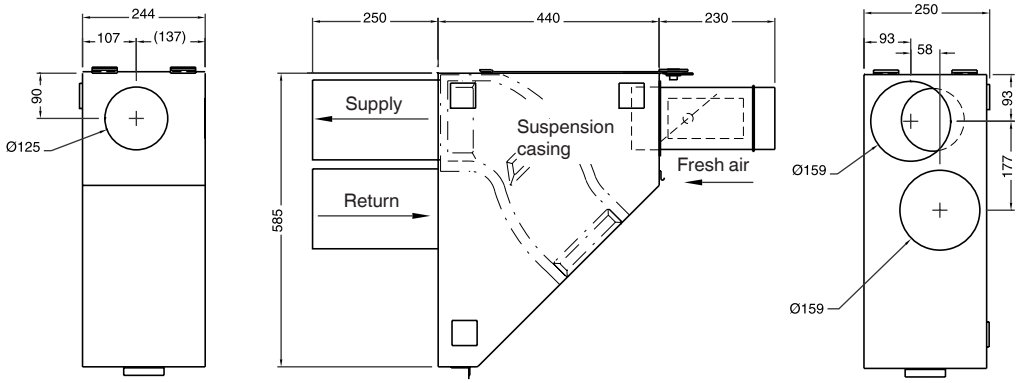


Size 2

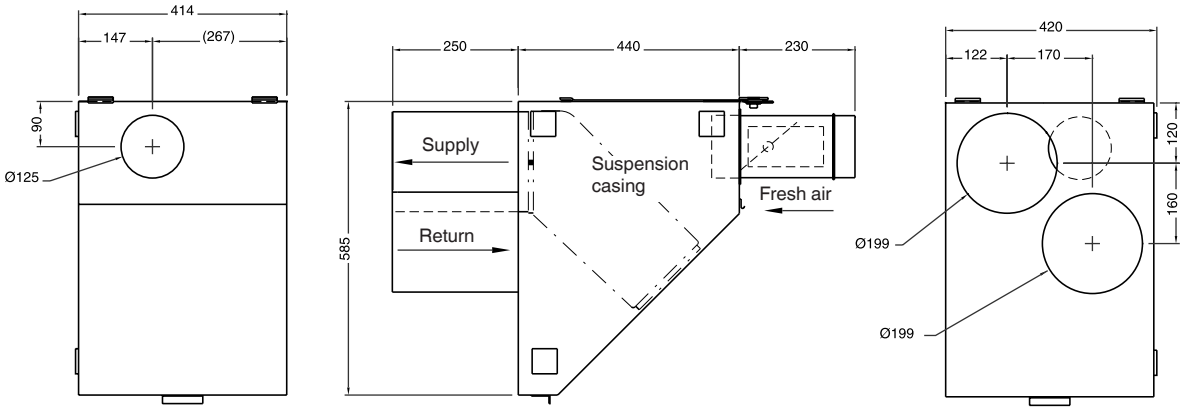


Variable fresh air volume suspension casing, mm

Size 1



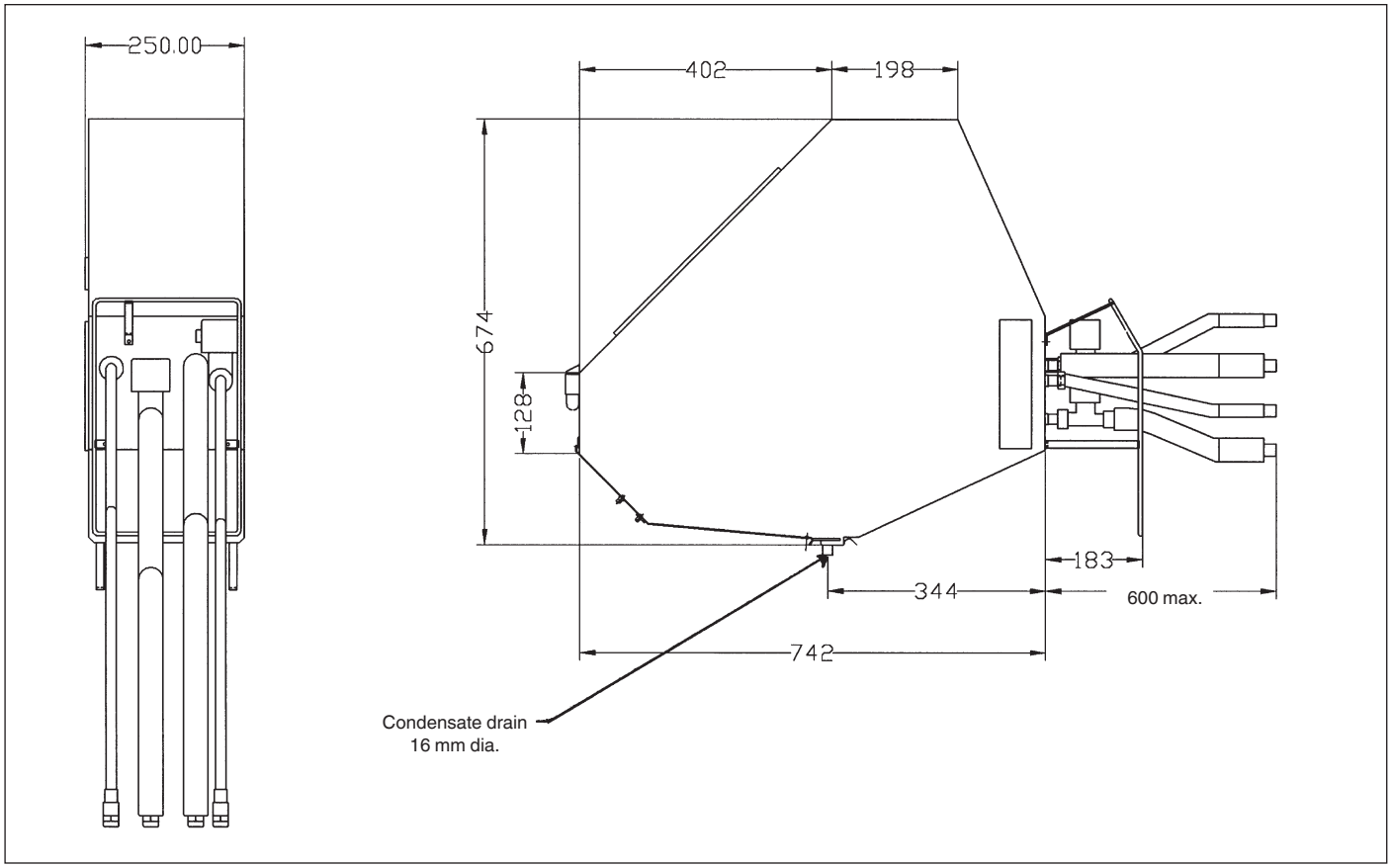
Size 2



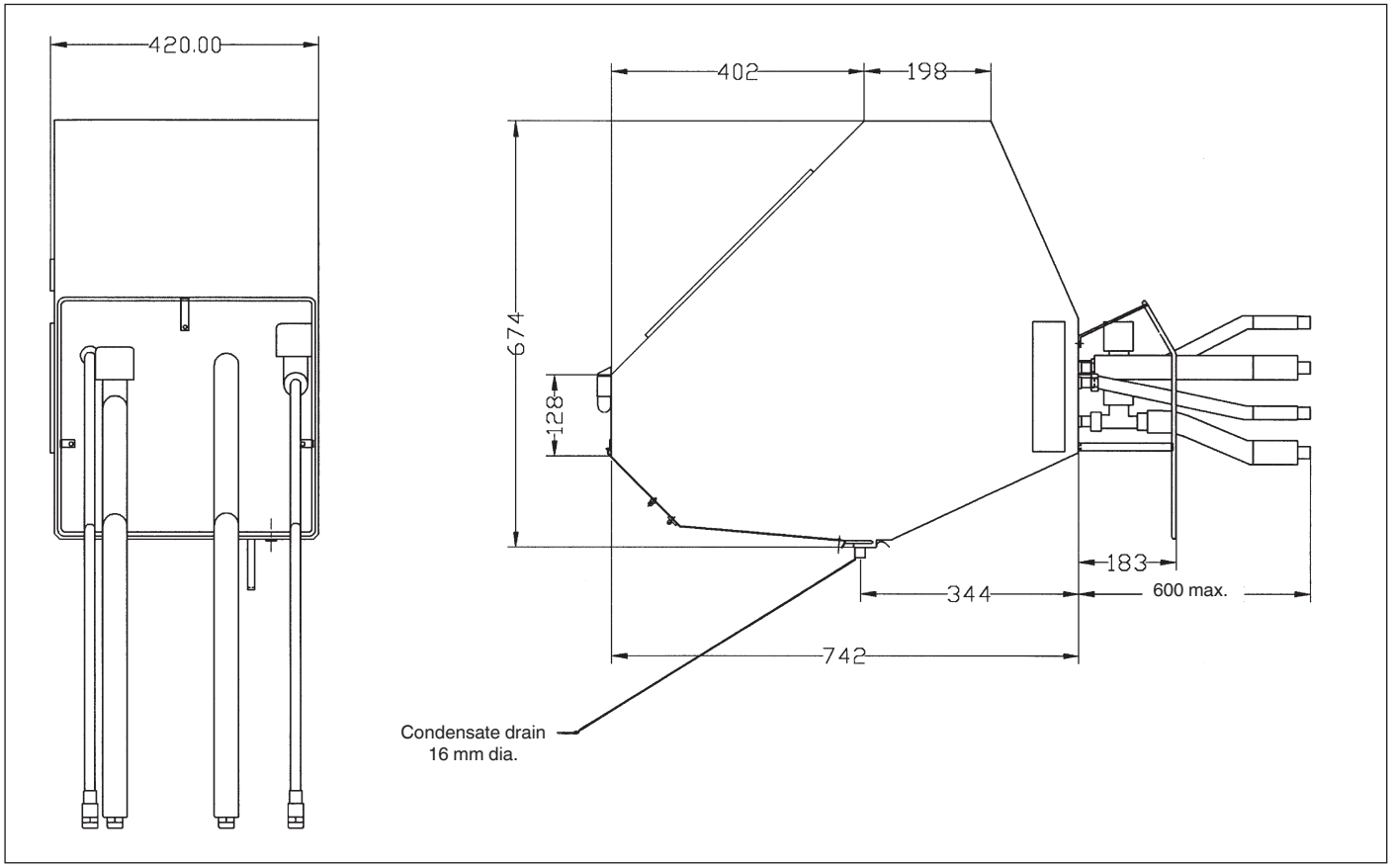
2.3 - Dimensional drawings

2.3.1 - ATM with no fresh air inlet

42GR size 1, mm

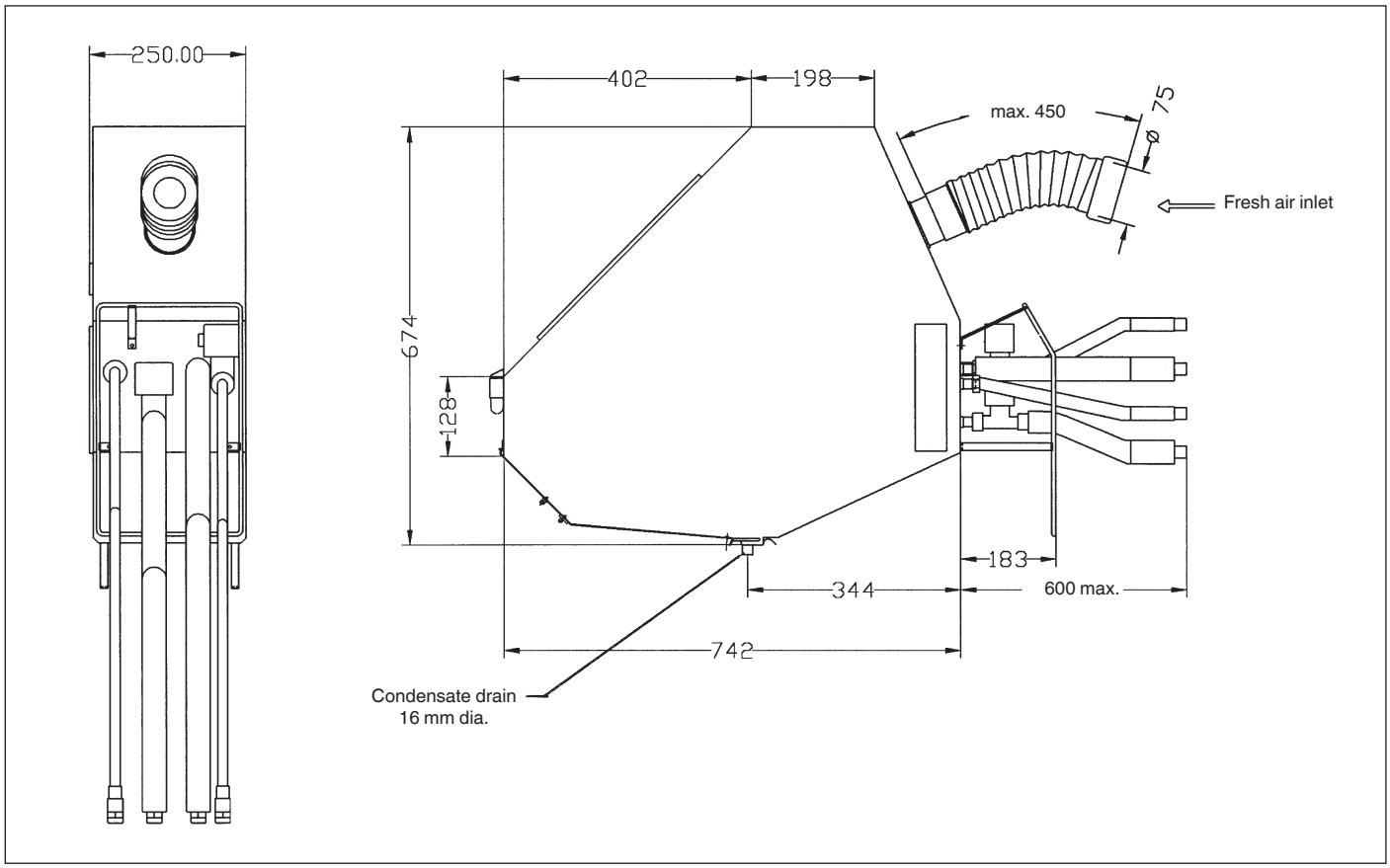


42GR size 2, mm

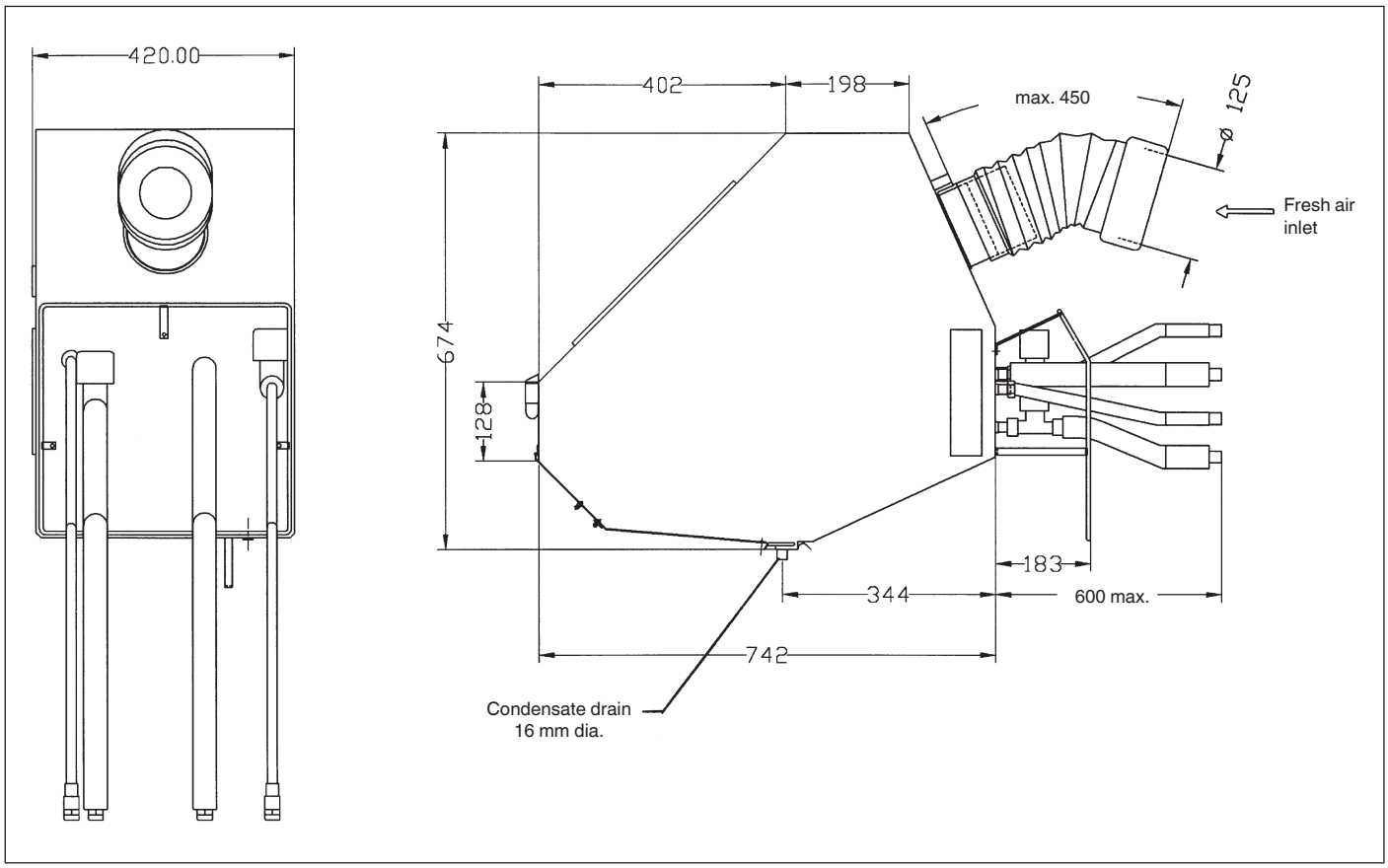


2.3.2 - ATM with fresh air inlet

42GR size 1, mm

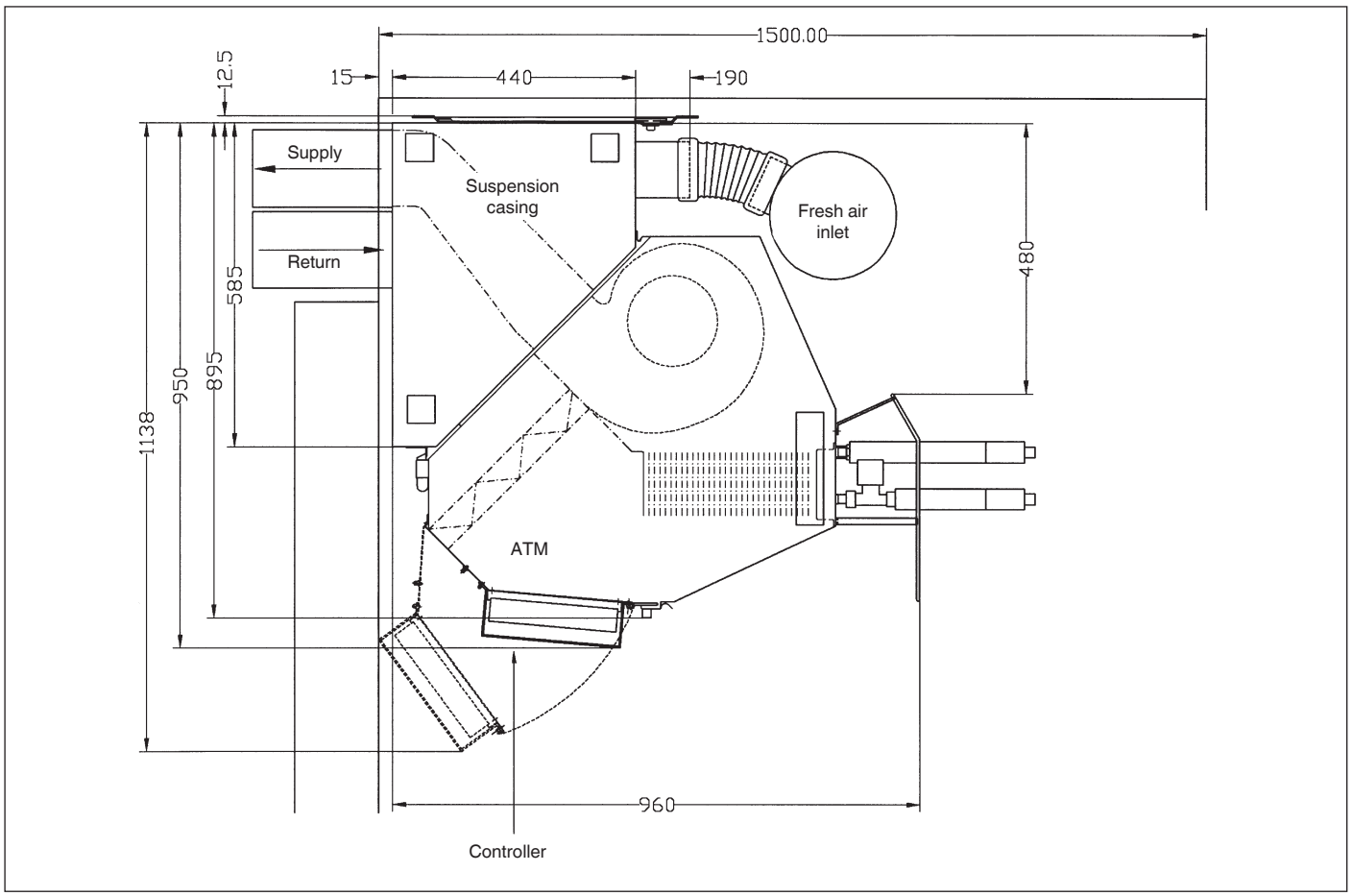


42GR size 2, mm

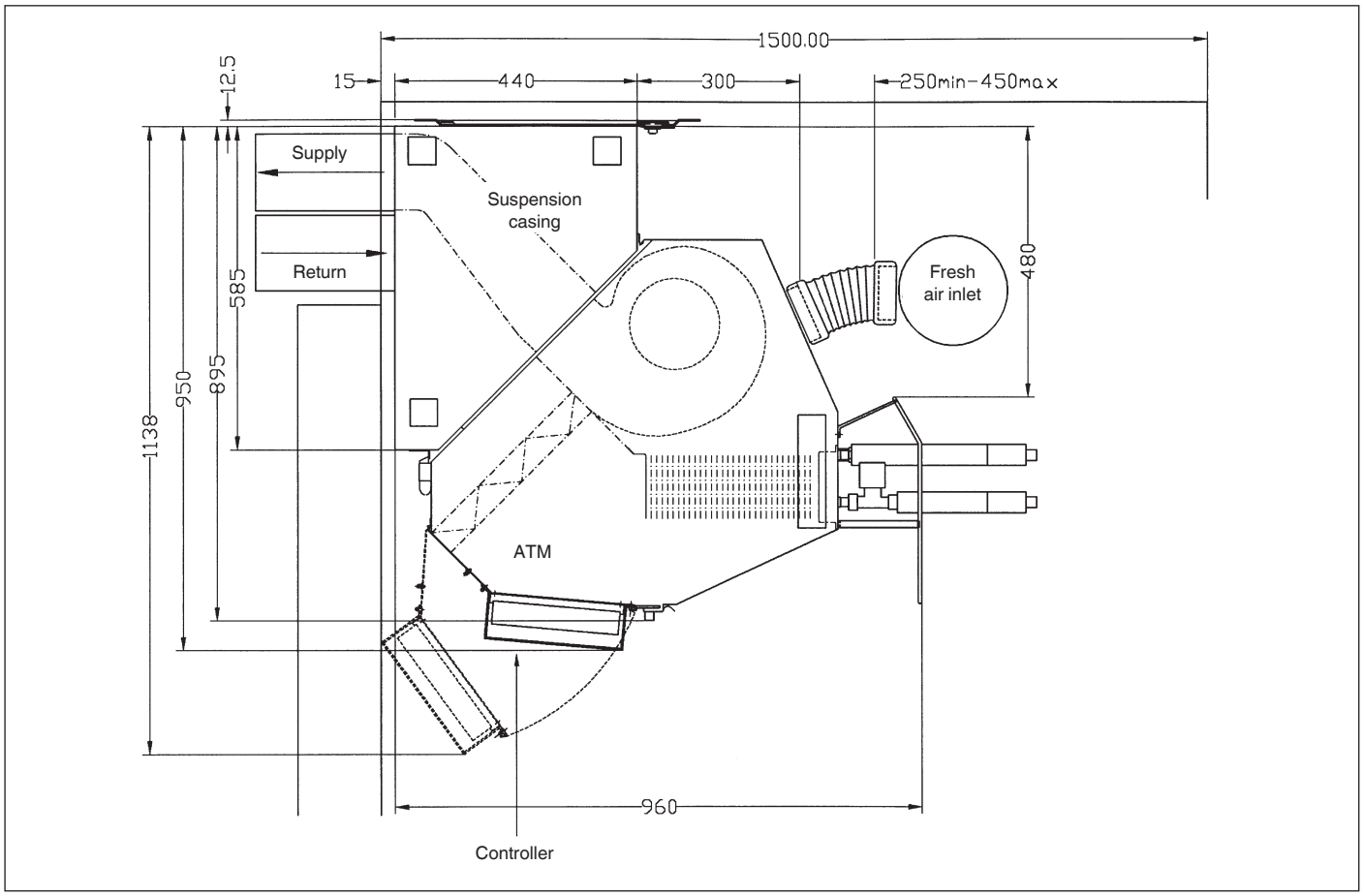


2.4 - Dimensional drawings

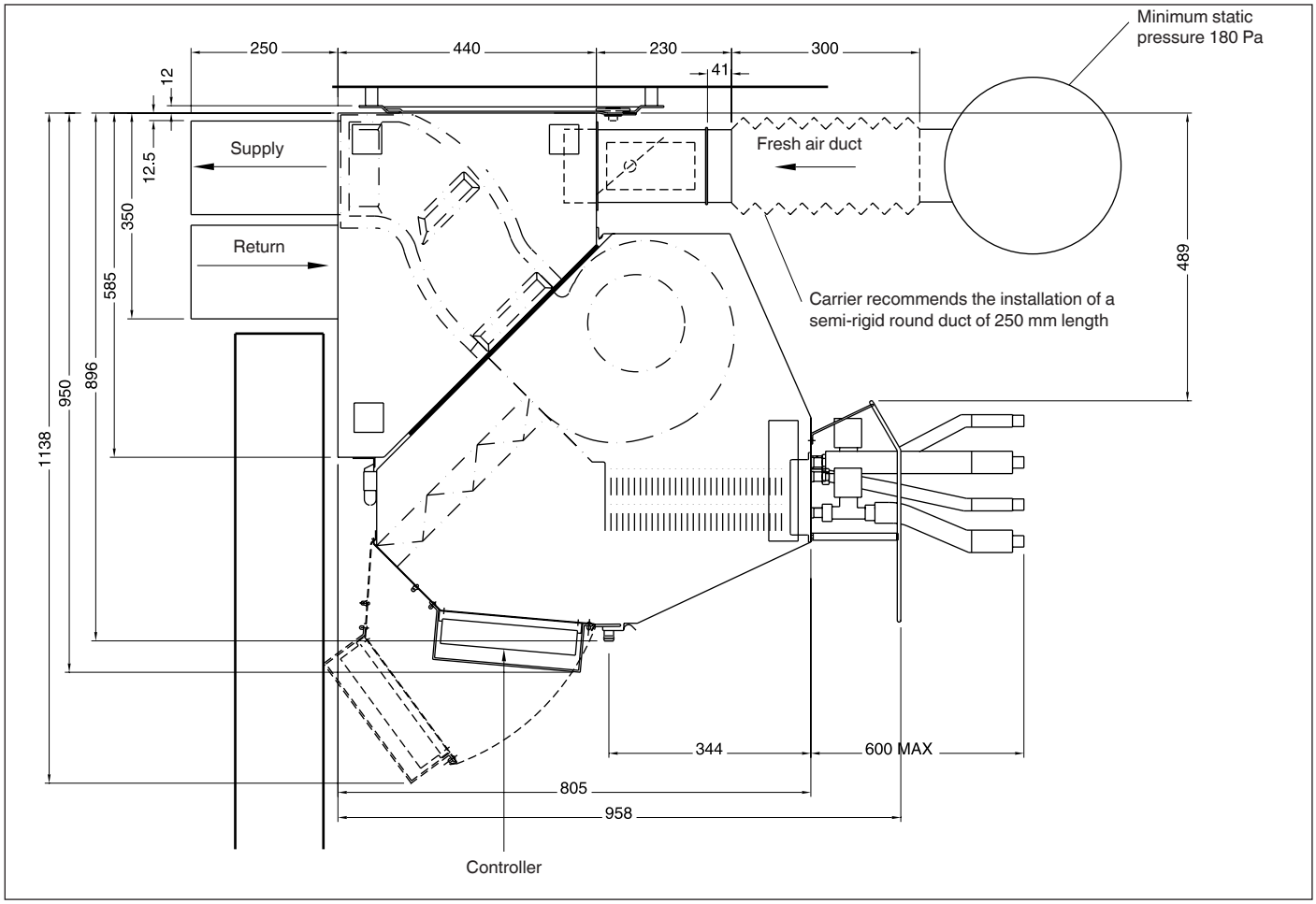
ATM with all fresh air or constant fresh air volume suspension casing, mm



ATM with standard suspension casing, mm



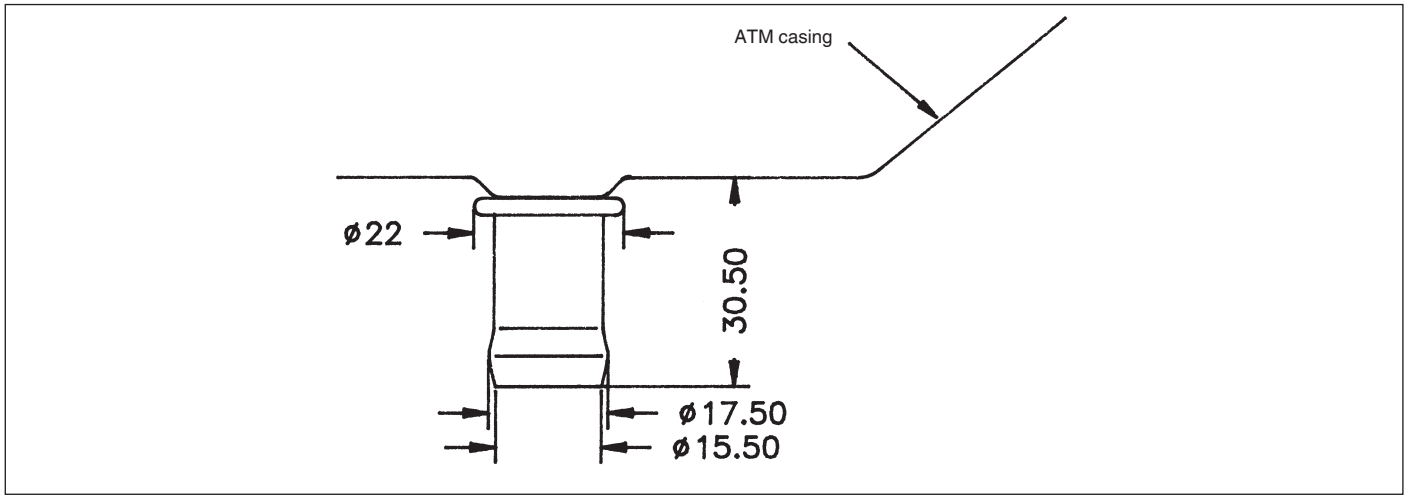
ATM with variable fresh air volume suspension casing, mm



NOTE: The semi-rigid duct is not supplied by Carrier, and must be installed in the straightest line possible to prevent any air flow problems (maximum length without bends).

2.5 - Condensate drain dimensions, mm

Connection for 16 mm bore flexible tube



The condensate drain pipe must be installed before the unit is switched on. A siphon not less than 100 mm deep (such as a U-bend in the drain pipe) must be installed in order to prevent foul odours being drawn back into the conditioned space.

2.6 - Suspension casings - packaging

Casings are shipped on wooden pallets and covered overall with protective plastic film wrapping, in quantities shown in the table.

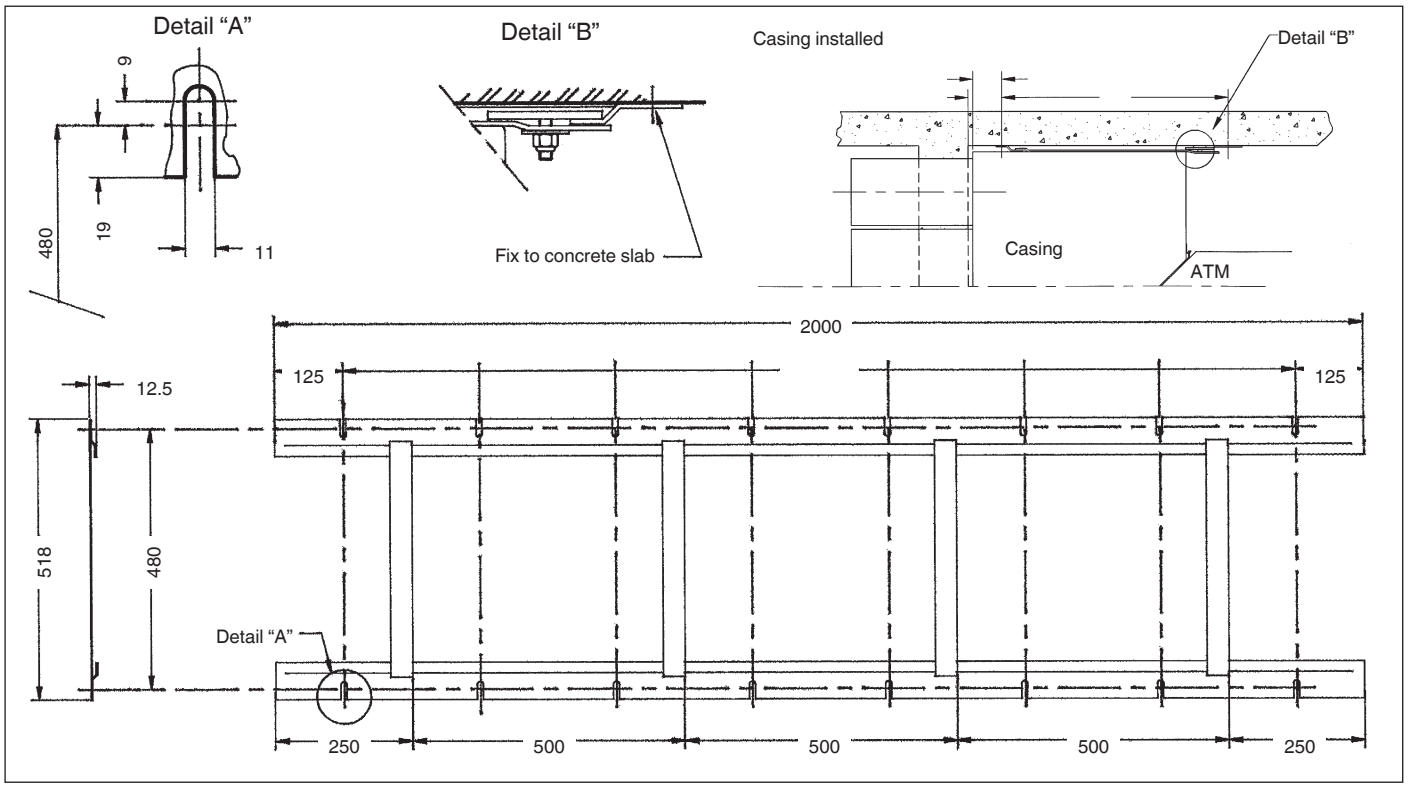
	Units per pallet	Pallet Length (mm)	Width (mm)	Height (mm)	Weight (kg)
Casing size 1	20	1100	1600	1420	185
Casing size 2	12	1100	1600	1420	165
ATM size 1	10	1100	1600	1420	310
ATM size 2	5	1100	1600	1420	265

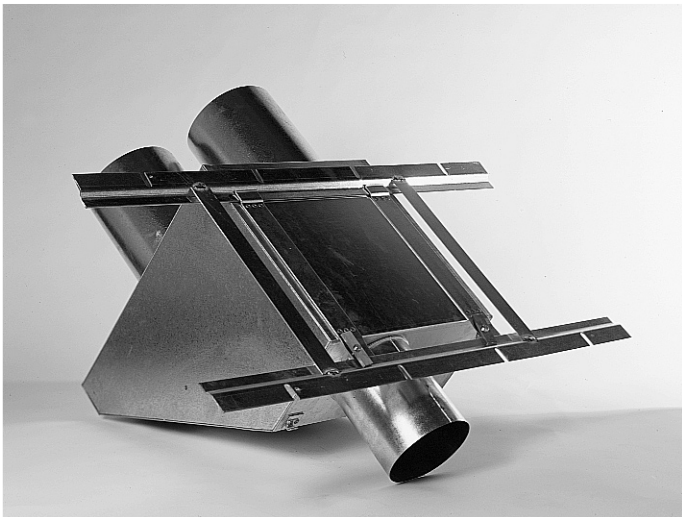
Immediately check for damage in transit when any shipment is received.

To protect against damage and contamination, leave all packages fully wrapped until the units are about to be installed.

For the same reasons leave the air inlets and outlets covered with the protective film until the air ducts are about to be connected.

2.7 - Suspension rails





The suspension rail, which will carry the ATM casings, must be fixed rigidly to the concrete slab over the machine room.

Rails are shipped in packages of five 2 m rails. This is sufficient for 40 ATMs size 1 or 23 ATMs size 2. Rails can be cut to length as required.

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 install, 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

UV-C light: do not look directly at this light without protective glasses.

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 numeric 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 over-voltage protection upstream (not supplied by Carrier).

	Upstream over-voltage 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 disconnexion 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 numeric 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 - SUSPENSION CASING

This carries the ATM itself and provides the means for traversing the machine room partition. It comprises a non-insulated plenum within which an insulated duct carries the supply air.

The modular design allows these units to be installed while building proceeds so that air ducts and the false ceiling can be installed much sooner than is usual. The operative section of the ATM need not be installed until just before the tenants arrive. They can be ordered for delivery very late in the building cycle - a very important financial consideration where major installations are involved.

There are 4 types of suspension casing. The selection parameters are explained:

WARNING: Once installed with ducts connected and the false ceiling completed, it is almost impossible to remove these units.

With the exception of the removable constant air flow controllers and the electronic fresh air flow control module, there are no wearing parts in these casings.

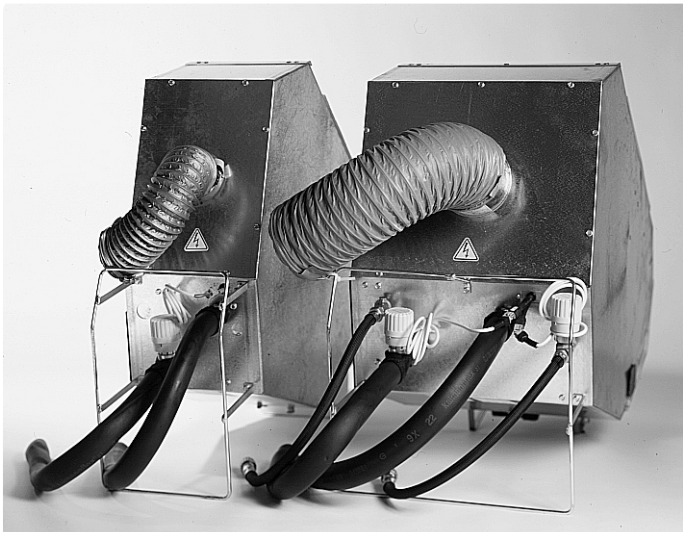
Ducts connect the casings to the diffusers. The pressure drops through the ducts must be compatible with the performance of the ATMs. The internal duct surfaces must be as smooth as possible. Avoid sharp bends. Check that there are no leaks and that they have not become fouled during installation.

Protect the ducts against the ingress of building debris which could be sucked into the unit possibly damaging the fan and the thermostatic damper on the diffuser.

As required by local sound emission codes install sound-absorbing and damping materials.

5 - AIR TREATMENT MODULE

5.1 - Installation



The Air Treatment Module (ATM) is generally the last component to be installed when all else is done. There are three reasons for this:

- Avoidance of damage to the units while heavy work is still in progress
- Releasing capital
- Keeping work areas as free of clutter as possible.

When the site is ready for the modules - casings are hooked onto the rails, air ducts are connected, water manifolds and shut-off valves are in place on their connection spigots, electrical installation is complete - only a few minutes are needed to install the module, make the hydraulic and electrical connections and connect the condensate drain. Adequate filter access and manoeuvring space will have been provided (refer to the dimensional drawings).

WARNING: Do not use the water valves or pipes or the electrical cables as handles for manoeuvring the modules. They may suffer serious damage.

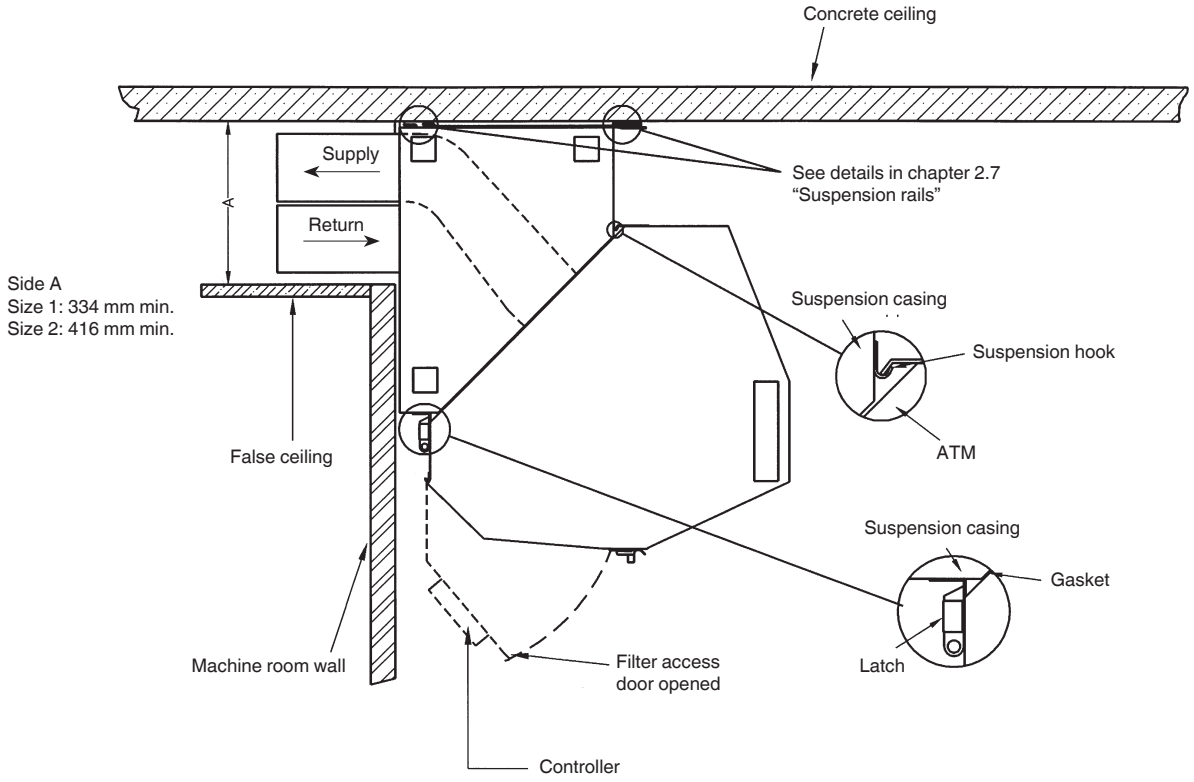
To fix the ATM on its casing, first hook it onto the suspension hooks provided then push it against the casing. This has the effect of compressing the gasket and locking the suspension latch. Next connect the water pipes. When all modules are installed in this way open the shut-off valves on the manifolds, bleed all air from the circuits (bleed valves are on the coil water outlets) then pressurise the system.

Now the electrical connections can be made. Do not switch the power on until the electrical installation is complete.

5.2 - Removal

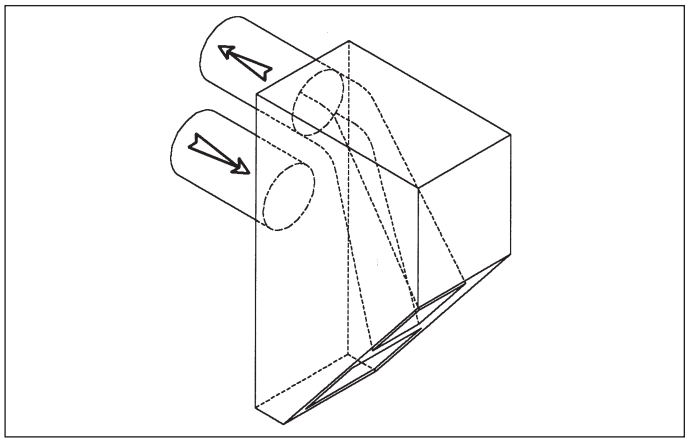
- Disconnect the power supply by switching off the circuit breaker which must have been installed at the outset.
- Disconnect the supply cables.
- Close the water shut-off valves.
- Disconnect the water pipes.
- Disconnect the fresh air supply if fitted.
- Unlatch the suspension latch.
- Gently lower the unit to disengage it from the upper section. Pull it back about 10 mm to disengage it, then remove it.

ATM assembled on its suspension casing



6 - FRESH AIR

6.1 - Standard suspension casing



The ATM can have a fresh air controller to give precise control of the volume of fresh ventilation air admitted to the conditioned space. Space occupancy determines the fresh air requirement and the choice of controller. The size 1 ATM has a 8.3 l/s (30 m^3/h) fresh air controller. A 450 mm length of 80 mm diameter flexible duct (Class M1 fire rated) is supplied with every size 1 ATM.

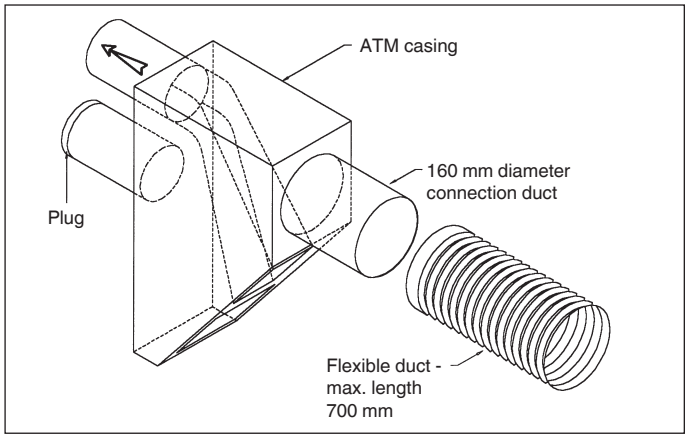
The size 2 ATM has a 16.6 l/s (60 m^3/h) fresh air controller, and a 450 mm length of 125 mm diameter flexible duct (Class M1 fire rated) is supplied with every size 2 ATM.

NOTE: Every duct has a metal collar to connect it to the main fresh air supply duct.

Fresh air controllers need no special maintenance, but can be easily removed. Fresh air must be filtered upstream of the ATM.

Fresh air ducts must be completely clear of debris before the unit is started up.

6.2 - All fresh air suspension casing



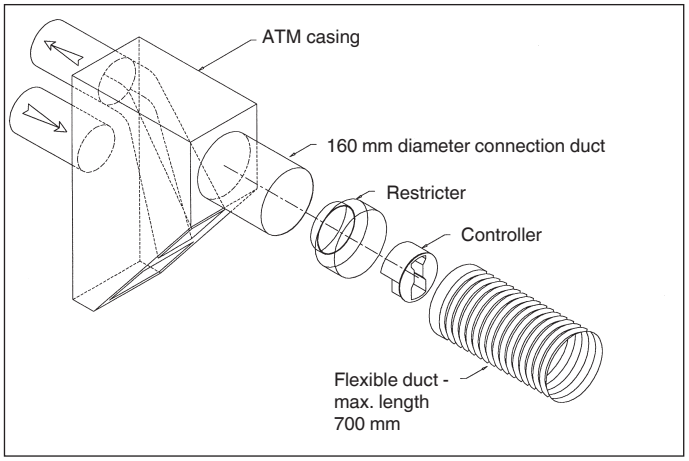
This is for use on an ATM which is intended to operate using fresh air only, such as in a conference room.

The casing is delivered with a plastic plug designed to blank off the return air outlet. This plug can be removed later if a change of use becomes necessary, such as in the event of repartitioning. The all fresh air casing is fitted with a 160 mm diameter air supply collar. Unlike the standard casing, the whole of the air flow passes through the coil and the filter.

This casing is fitted with a 160 mm diameter flexible duct with a metal collar (maximum length 700 mm).

6.3 - Constant fresh air volume suspension casing

ATM without fresh air supply



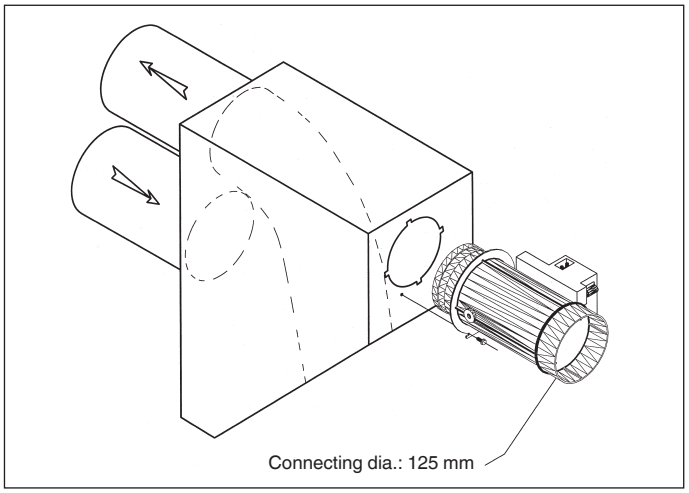
The multi-mode casing can accept the constant fresh air flow controller. Using this casing enables fresh air to be drawn across the ATM coil and ATM filter. It gives the opportunity to select from a wide range of constant air flow controllers:

- Size 1 ATM: 8.3, 16.6-44.4 and 58.3 l/s (30, 60-160 and 210 m^3/h),
- Size 2 ATM: 16.6-44.4, 58.3 and 69.4 l/s (60-160, 210 and 250 m^3/h).

A 160 mm flexible connection duct, 700 mm long, with a metal collar is shipped with this casing.

6.4 - Variable fresh air volume suspension casing

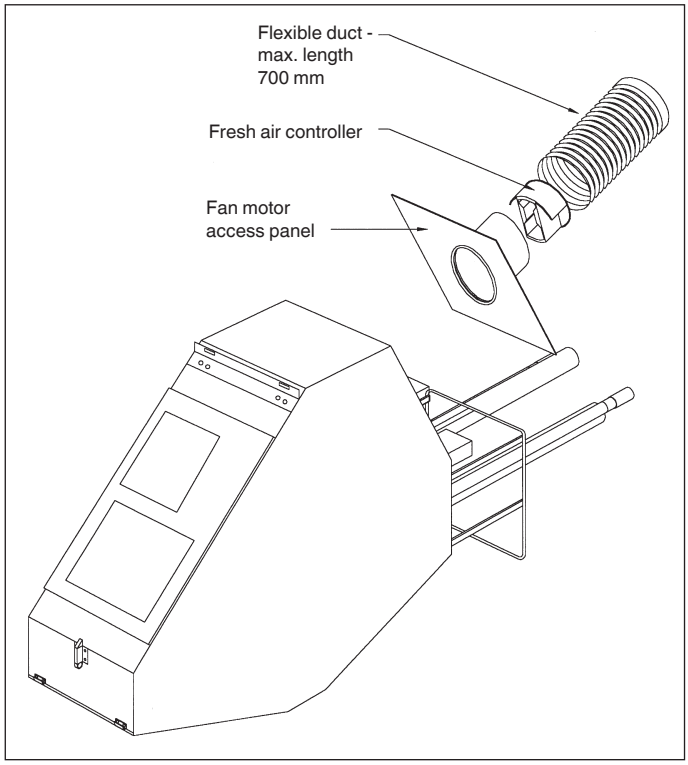
ATM without fresh air supply



The use of this suspension casing permits fresh air treatment across the 42GR coil and filter. It gives access to a wide fresh air flow range from 8.3 to 56 l/s. The fresh air flow can be set on the numeric controller. This casing is supplied without fresh air duct.

6.5 - Air Treatment Module ATM

With important static pressure available at nominal air flow the ATM allows long runs of small diameter duct to be used (160 mm for size 1 and 200 mm for size 2).



Fresh air controller (optional)
The fresh air controller for the ATM gives precise control of the rate at which fresh air ventilation air is introduced and the supply air refresh rate. Selection of the fresh air controller bearing in mind the occupancy of each room or zone is critical.

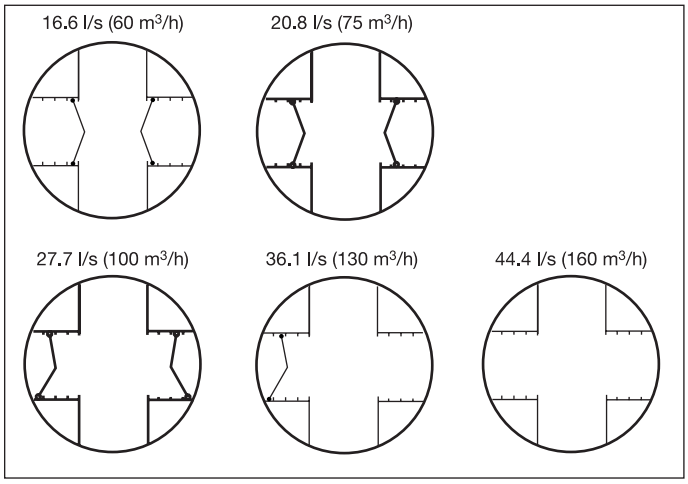
ATM size 1 when equipped with a 8.3 l/s or 30 m^3/h (-10% + 20%) fresh air controller is shipped with a flexible connection duct, with a length of 450 mm maximum and 80 mm diameter.

ATM size 2 when equipped with a 16.6 l/s or 60 m^3/h (-10% + 20%) fresh air controller is shipped with a flexible connection duct, with a length of 450 mm maximum and 125 mm diameter.

NOTE: A metal collar is also shipped with each unit to connect the flexible duct to the main supply duct.

The 16.6 l/s or 60 m^3/h 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 44.4 l/s or 160 m^3/h.

A label on the 42GR shows how to readjust the two plastic restricters.



NOTE: To operate correctly, the 8.3 l/s or 30 m^3/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 m^3/h constant fresh air controller requires a differential pressure in the range 70 Pa to 200 Pa.

Constant fresh air flow controller, adjustable from 16.6 to 44.4 l/s (60 to 160 m^3/h)

7 - FAN MOTOR ASSEMBLY

7.1 - Description

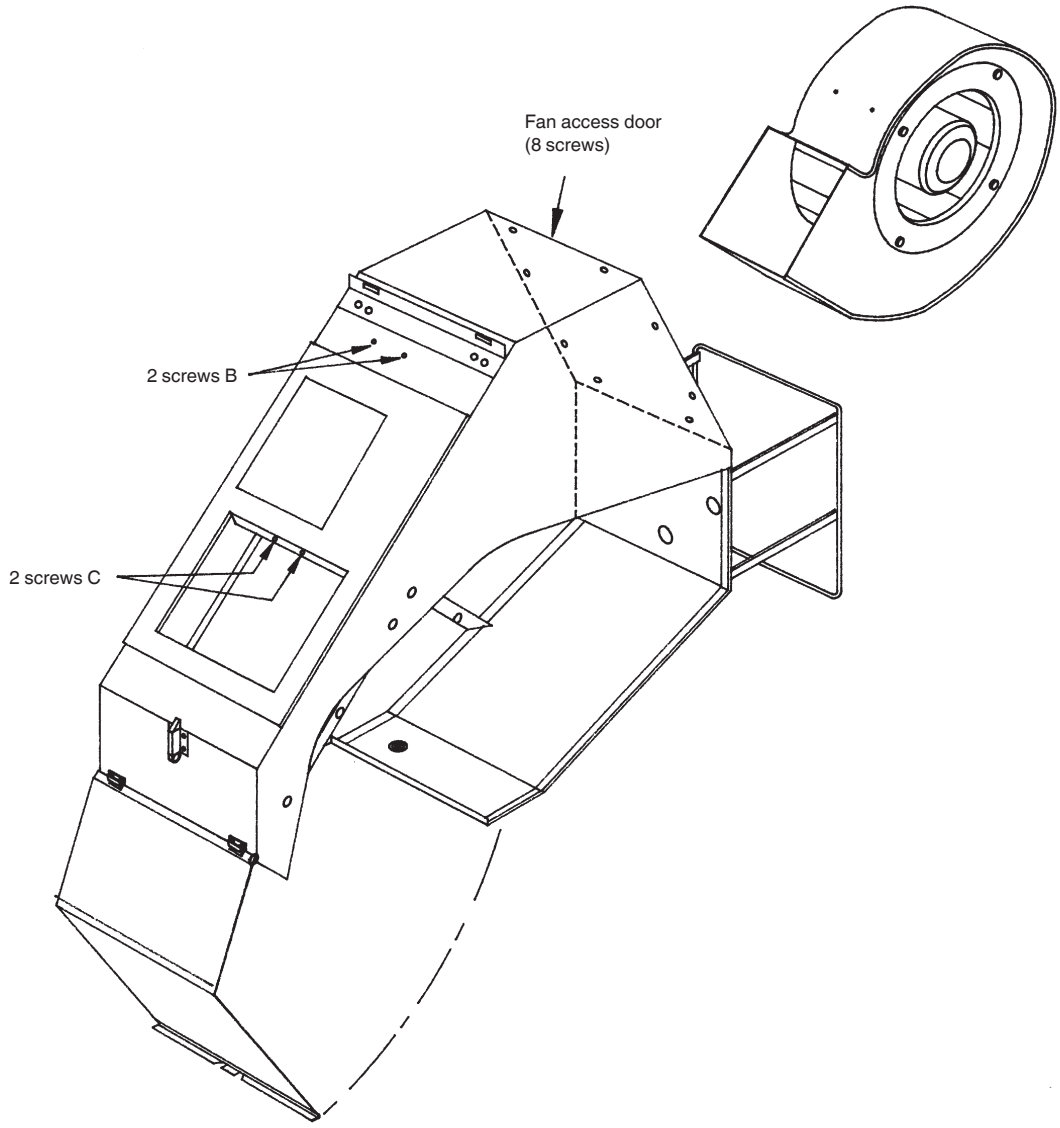
ATMs have backward-curved fans on the size 1 and forward-curved fans on the size 2, to give very high available static pressure. The fan motor is supplied at 230 V. Its speed is varied by either a controller card or a speed controller.

7.2 - Fan motor removal

For the fan motor assembly to be removed, the ATM itself must first be removed. The assembly is accessed through the access door which must therefore be removed.

Disconnect the quick connect power supply cable for the fan motor. Remove screws B and then remove screws C. Follow this procedure in reverse when installing the replacement assembly.

Fan motor removal



8 - WATER COIL

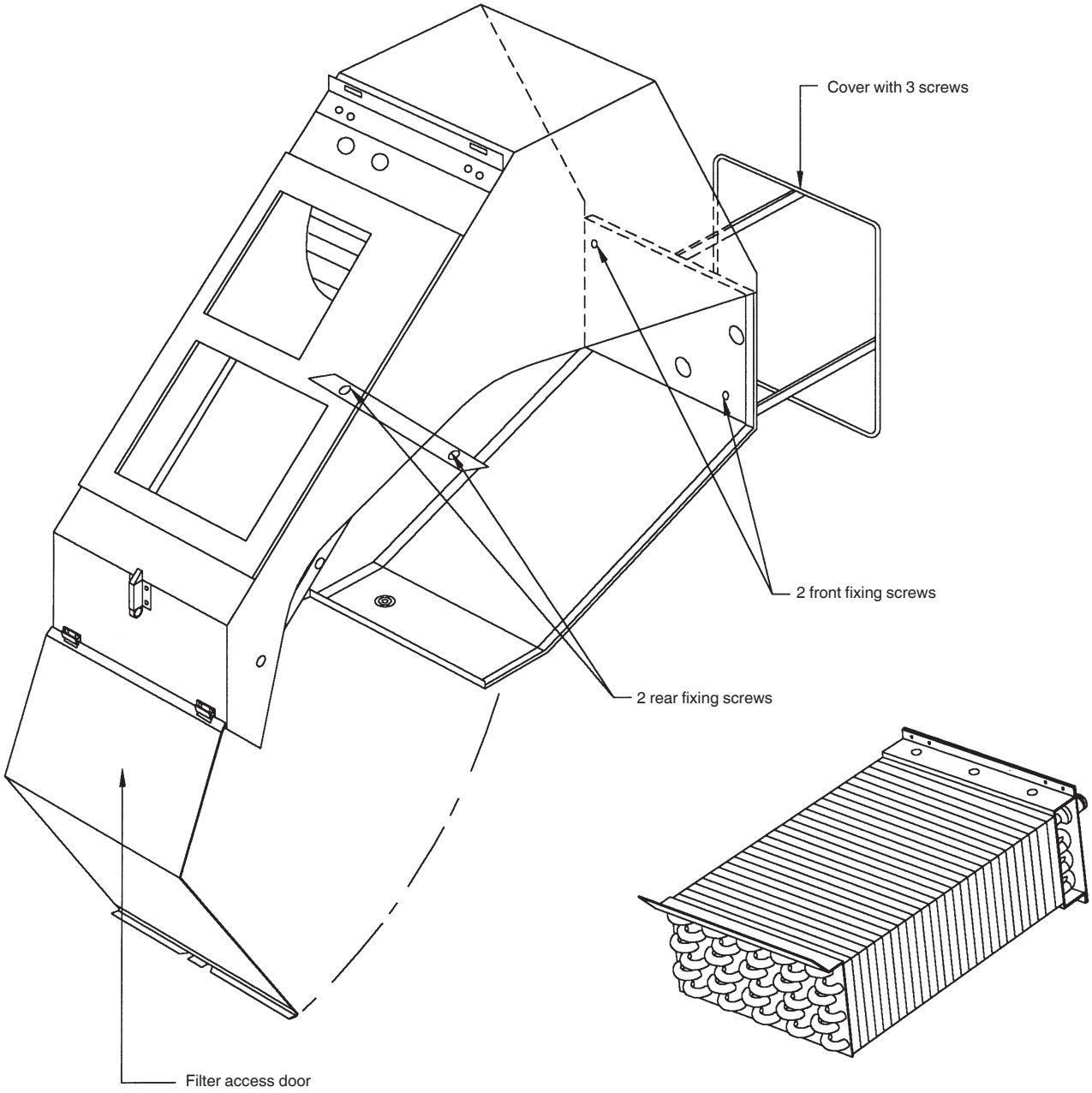
8.1 - Removing the coil

To remove the coil:

- Remove the unit as described on page 16 and set it down flat on its side.
- Remove the valves and the water pipes.
- Open the filter access door.
- Remove the filter.
- Remove the coil fixing screws front and rear.
- Withdraw the bleed valves.
- Remove the nut retaining clips followed by the nuts.
- Withdraw the coil via the filter access door taking care not to damage the insulation stuck to the sides of the coil.
- Reverse the procedure described when installing the replacement coil.

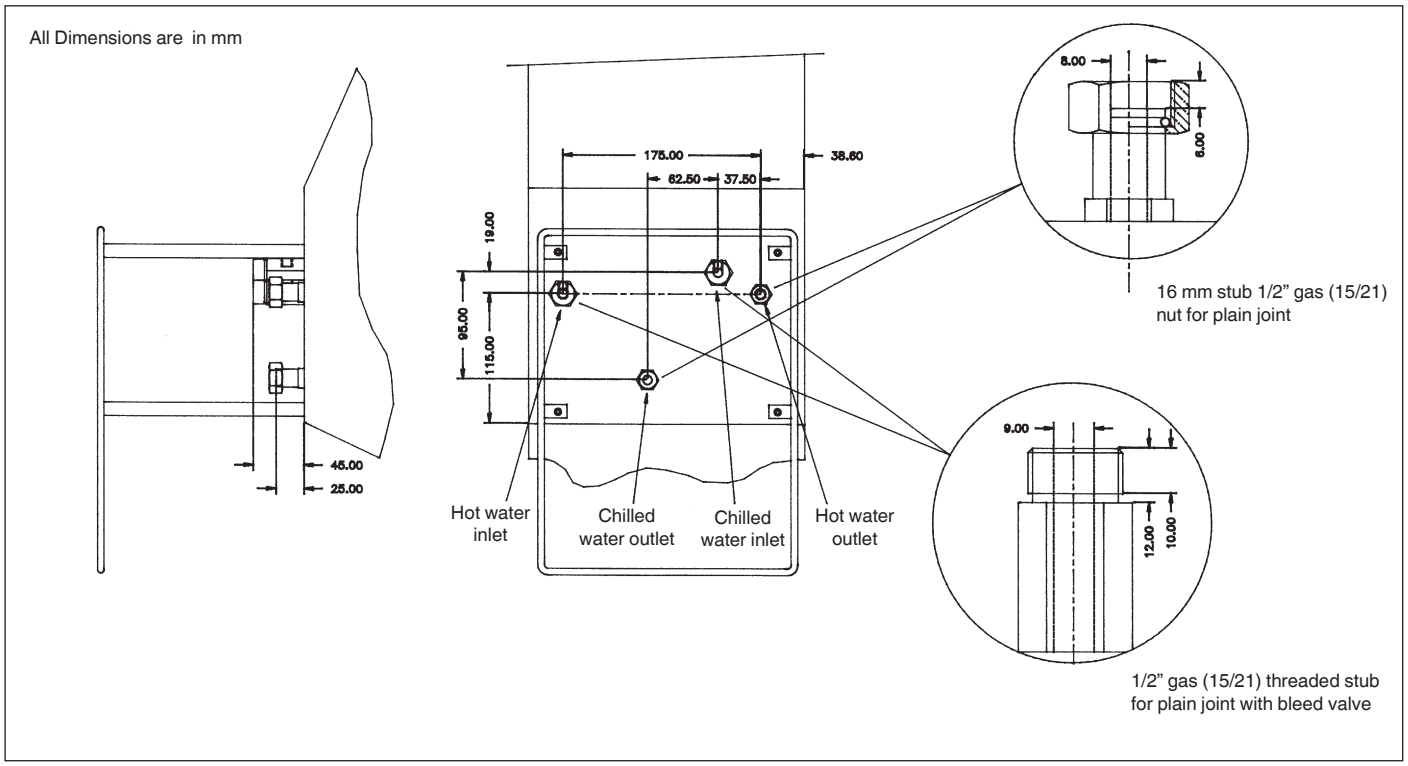
WARNING: Bleed the circuit thoroughly when refilling the circuit with water.

Coil removal

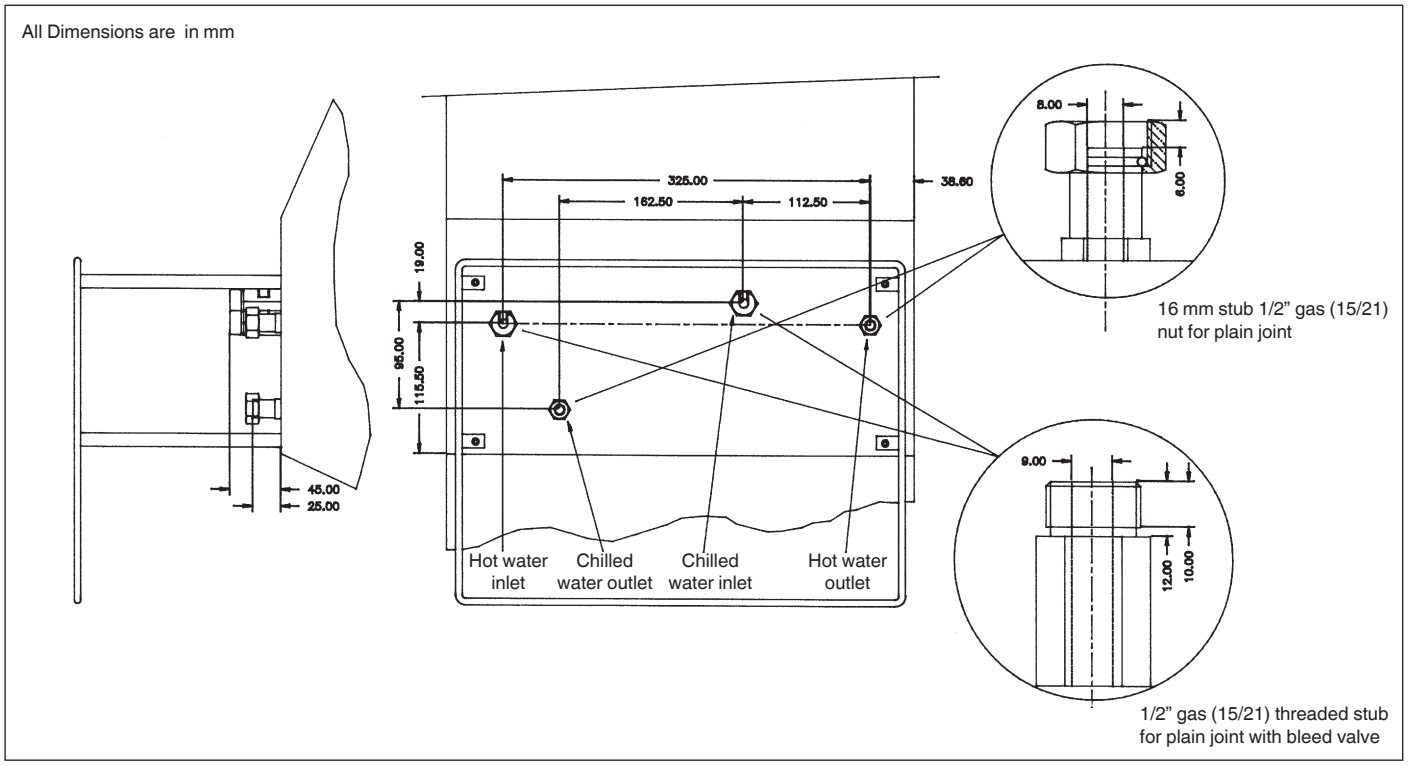


8.2 - Water inlet/outlet connections

Coil connection layout - ATM size 1



Coil connection layout - ATM size 2



9 - WATER FLOW CONTROL VALVES

9.1 - 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.

9.2 - Replacing actuators

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

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

9.3 - Electrical circuit diagrams for actuators

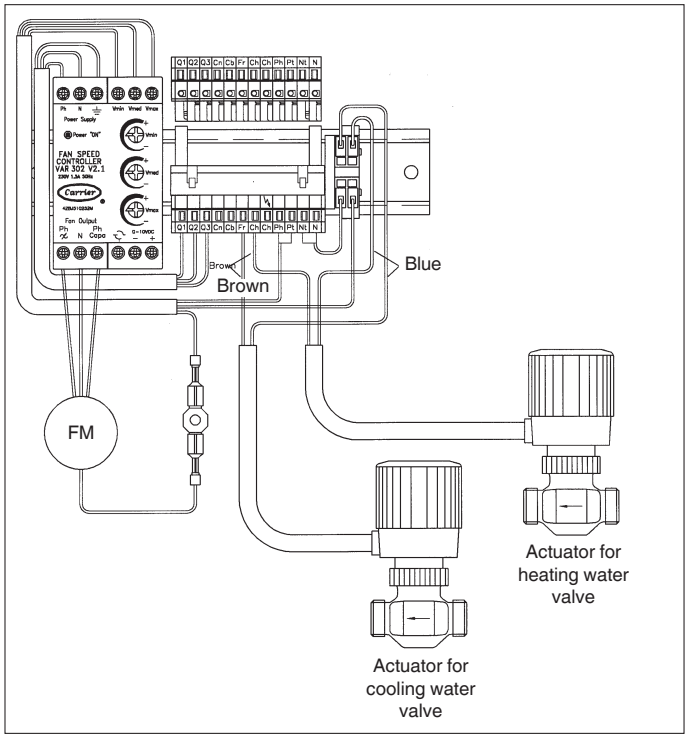
9.3.1 - Carrier numeric controller

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

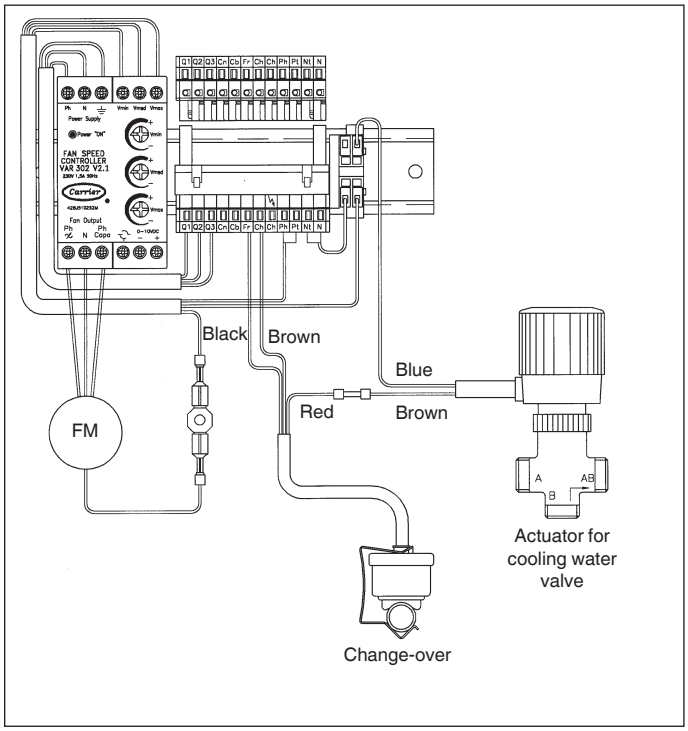
9.3.2 - Electromechanical controller with fan speed controller

4-pipes

Cooling/heating valve actuator connections



Cooling/heating valve actuator connections

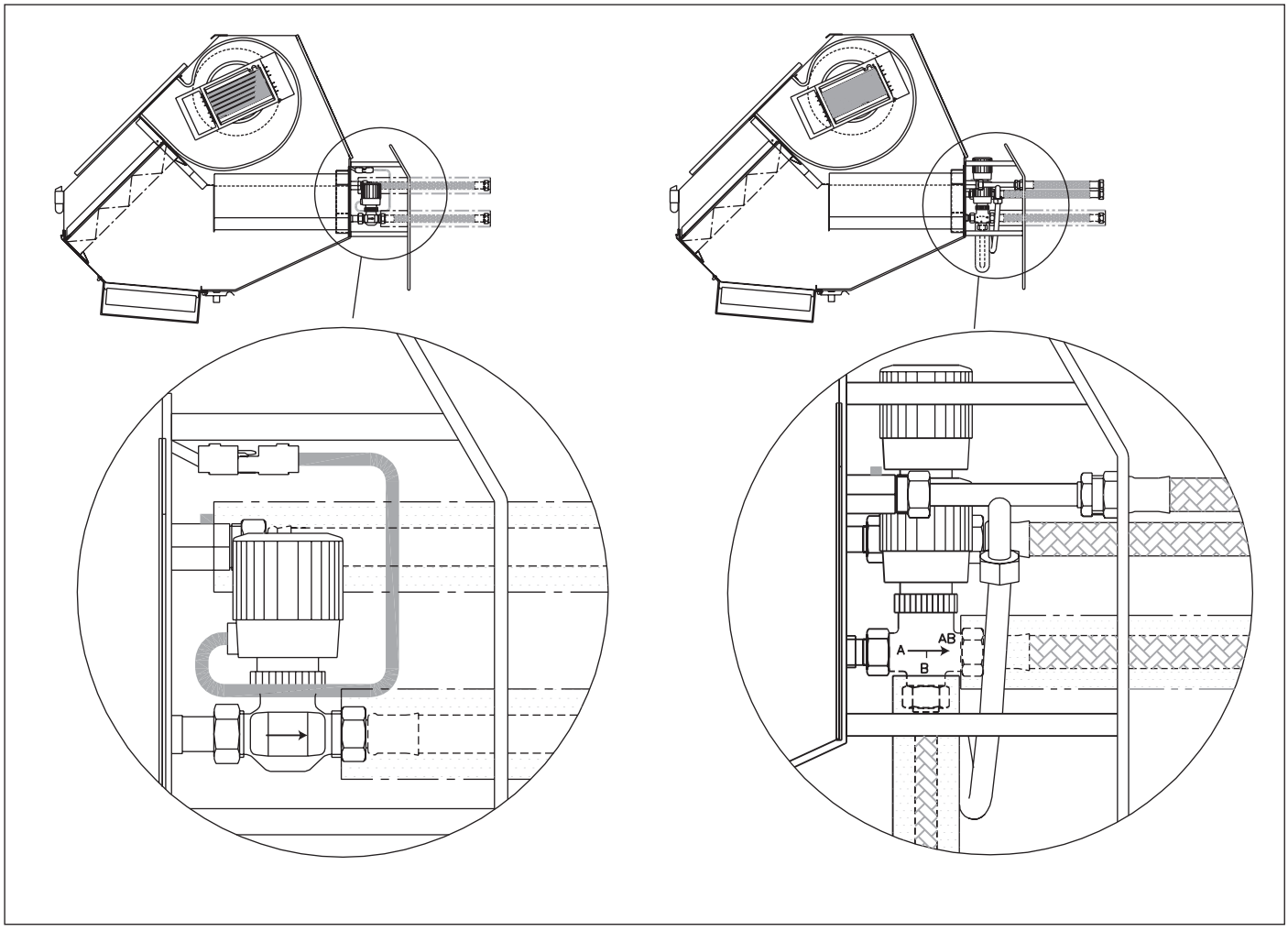


9.4 - Replacing a valve body

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

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.



10 - FLEXIBLE WATER PIPES

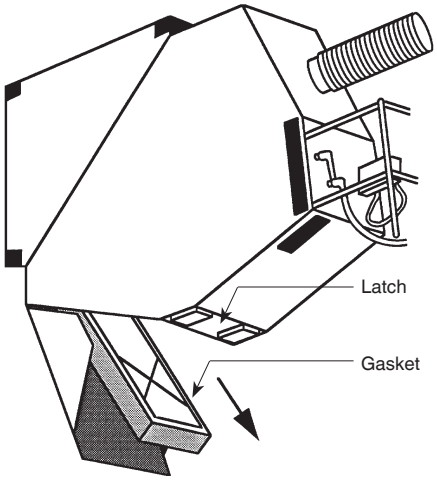
Description

Flexible pipes are used to make the water connections. Pipes are insulated for the chilled water circuit and not insulated for the hot water circuit. Every branch must therefore have an isolating valve.

- 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)
- Minimum bending radius: 72 mm non-insulated, 106 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
- Length: 650 mm

11 - FILTER

Description
ATMs may have a high efficiency filters (type F5 throw-away). The filter can be removed through a door in the underside of the unit. The ease with which the filter can be removed and replaced is an important benefit for service technicians.

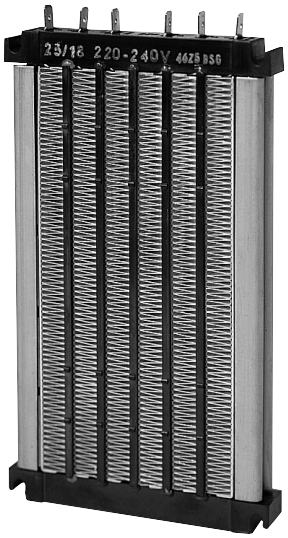


Air filters should be changed regularly. How often this is needed depends on the cleanliness of the working environment and the rate at which the filter becomes clogged.

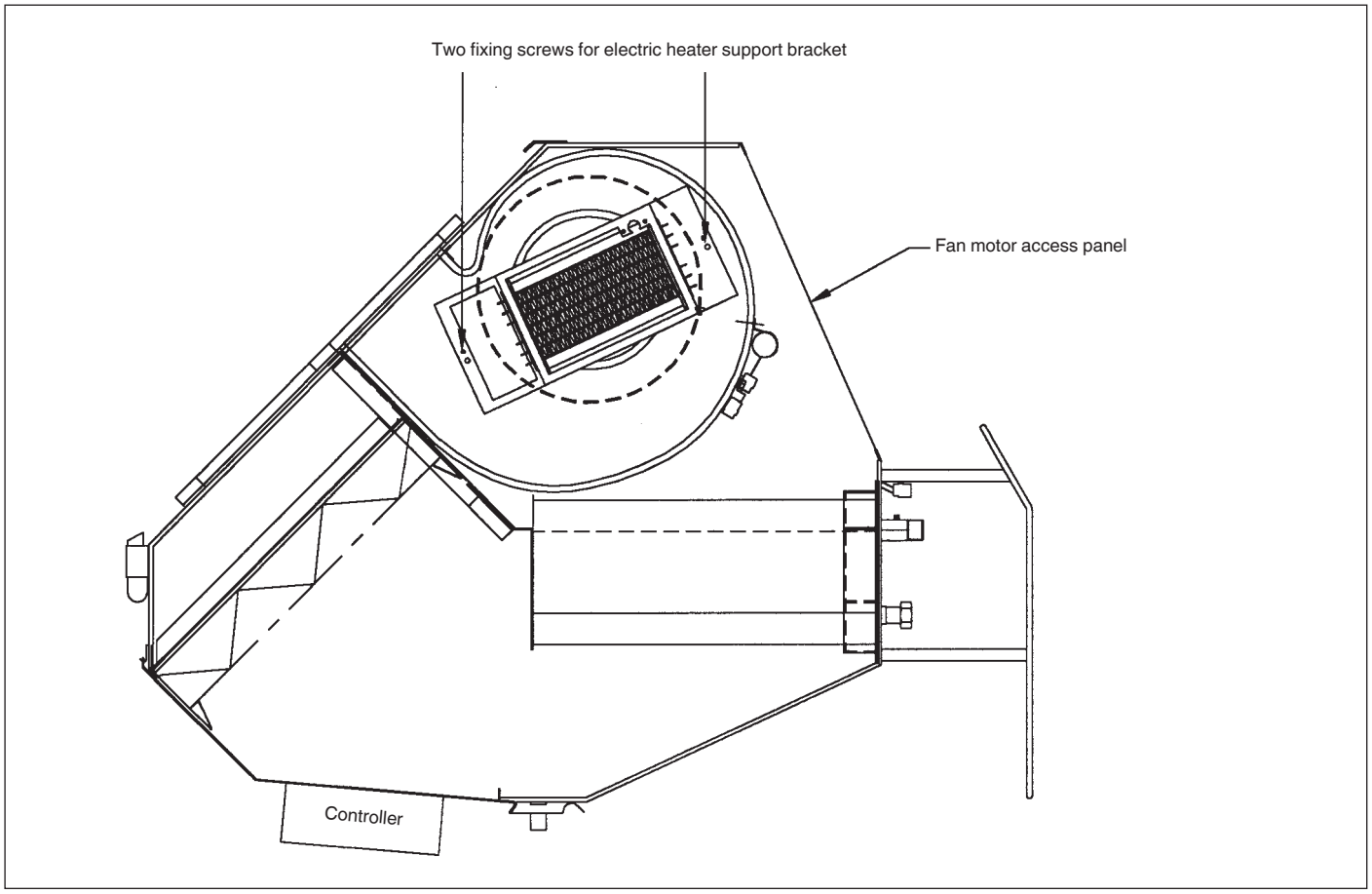
If clogged filters are not changed they can increase the pressure drop, trapped dust particles may be given off and entrained in the air supply, and the general performance of the ATM may be degraded as the air flow reduces.

12 - ELECTRIC HEATER

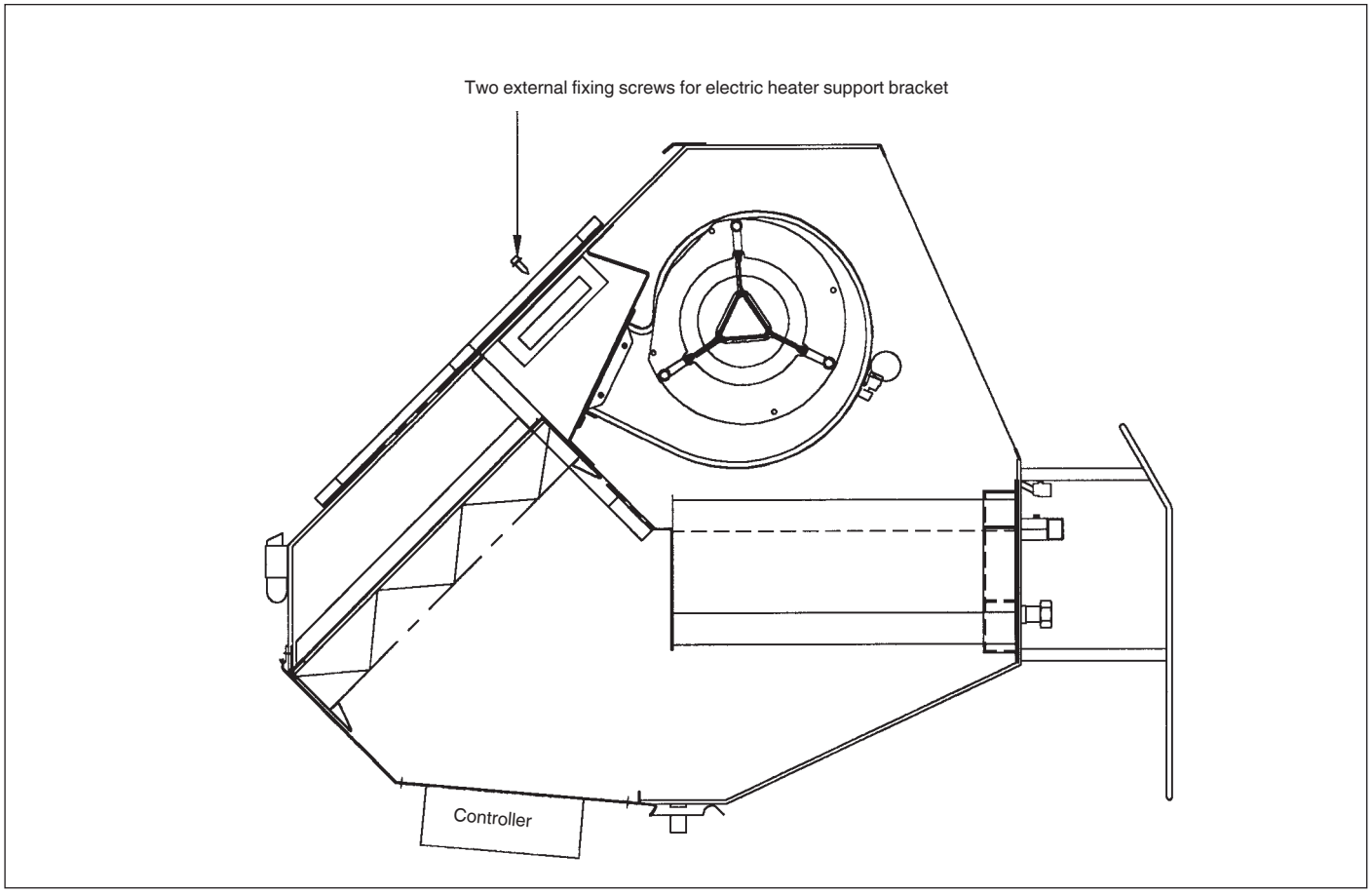
The electric heater may be installed either on the fan inlet (size 1 ATM) or on the fan outlet (size 2 ATM). In both cases the ATM itself must be removed to access the electric heater (see chapter 7: “Fan motor assembly).



12.1 - Removing the electric heater from the ATM size 1



12.2 - Removing the electric heater from the ATM size 2



13 - PERFORMANCES

13.1 - Electrical data

ATM size 1 without electric heater

U (V)	I (A)	P (W)	Fan motor speed (r/s)	Qv (m^3/h)	Qv (l/s)	Pressure (Pa)
230	0.66	147	41.8	390	108.3	250
230	0.64	143	42.3	350	97.5	310
230	0.63	140	42.8	320	88.9	349
230	0.62	137	43.3	290	80.6	391
230	0.6	133	43.7	255	70.8	433
230	0.59	128	44.1	222	61.7	469
230	0.58	124	44.6	182	50.6	516
230	0.56	119	45.1	140	38.9	562
230	0.55	116	45.5	102	28.3	598
230	0.54	111	46.0	63	17.5	629
200	0.61	122	39.8	330	91.7	268
200	0.59	119	40.4	301	83.6	311
200	0.58	116	41.1	277	76.9	348
200	0.56	112	41.7	247	68.6	391
200	0.54	108	42.3	220	61.1	425
200	0.52	104	43.0	184	51.1	473
200	0.5	99	43.5	154	42.8	508
200	0.47	93	44.3	102	28.3	562
200	0.45	88	45.0	66	18.3	602
170	0.59	104	34.9	286	79.4	206
170	0.57	101	35.8	262	72.8	243
170	0.55	98	36.9	237	65.8	286
170	0.53	95	37.8	214	59.4	328
170	0.51	91	38.9	185	51.4	373
170	0.49	87	40.2	152	42.2	427
170	0.47	84	41.3	124	34.4	469
170	0.44	79	42.4	85	23.6	521
170	0.41	73	43.5	52	14.4	561
140	0.57	81	27.2	219	60.8	120
140	0.56	78	29.3	189	52.5	175
140	0.54	75	31.3	162	45.0	228
140	0.52	73	33.2	138	38.3	279
140	0.49	70	35.3	107	29.7	341
140	0.47	67	37.1	78	21.7	396
140	0.45	64	38.7	55	15.3	440
110	0.49	55	21.0	129	35.8	88
110	0.48	54	23.3	103	28.6	130
110	0.47	53	25.2	88	24.4	165
110	0.46	52	27.2	67	18.6	203
80	0.36	30	14.0	82	22.8	37
80	0.36	29	15.3	61	16.9	55
80	0.35	29	16.7	43	11.9	76
80	0.34	28	18.3	29	8.1	89

Legend:

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

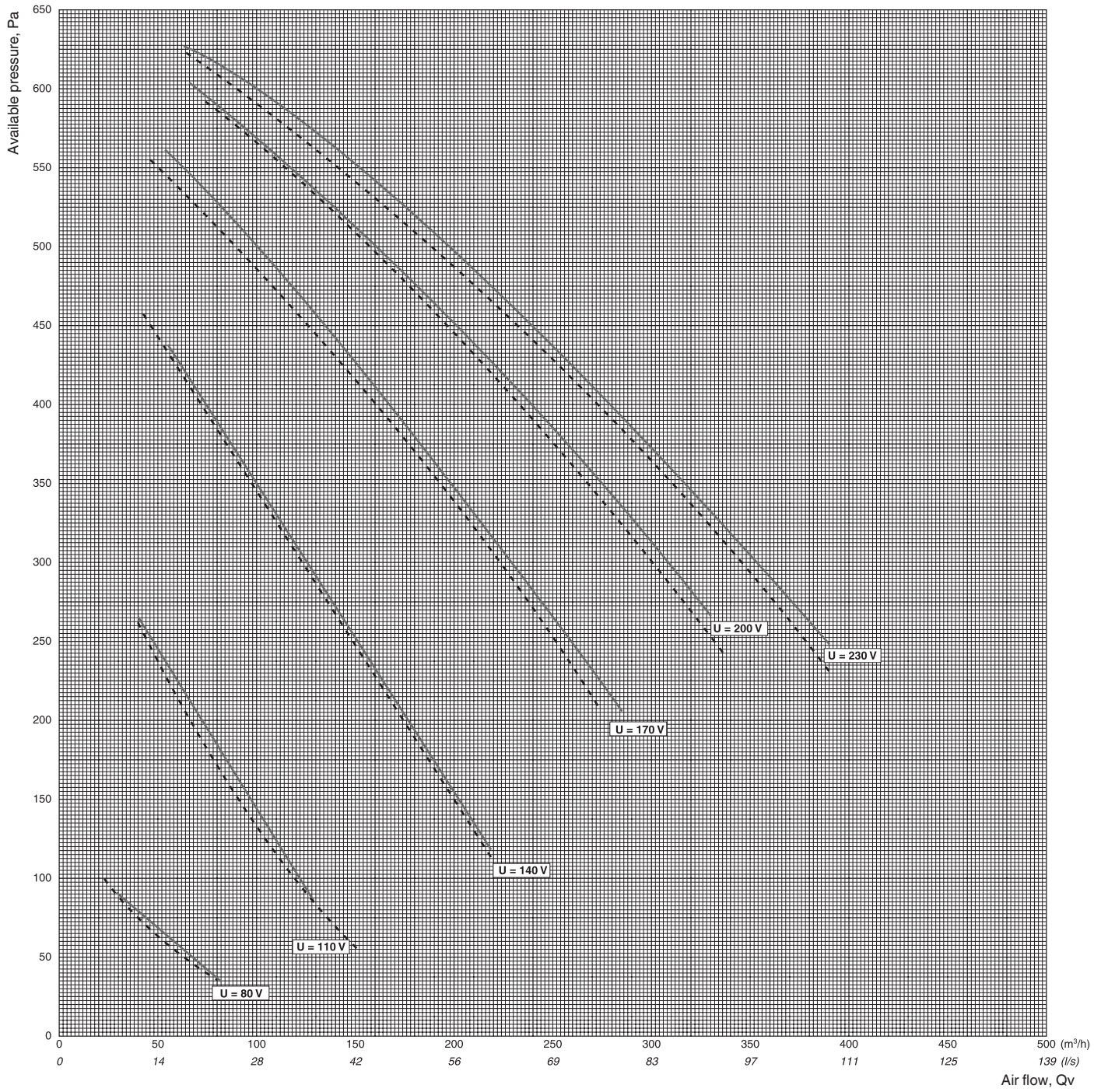
ATM size 2 without electric heater

U (V)	I (A)	P (W)	Fan motor speed (r/s)	Qv (m^3/h)	Qv (l/s)	Pressure (Pa)
230	0.91	208	38.3	500	138.9	320
230	0.87	195	39.4	449	124.7	364
230	0.83	184	40.8	403	111.9	408
230	0.8	175	41.8	360	100.0	435
230	0.77	168	42.4	323	89.7	460
230	0.75	162	43.0	287	79.7	479
230	0.74	157	43.5	247	68.6	499
230	0.72	153	43.8	216	60.0	516
200	0.88	176	34.3	440	122.2	250
200	0.84	166	36.4	398	110.6	311
200	0.8	158	38.1	359	99.7	359
200	0.77	150	39.3	322	89.4	389
200	0.74	142	40.5	277	76.9	421
200	0.72	138	41.2	248	68.9	440
200	0.7	132	41.8	204	56.7	461
170	0.82	140	28.8	367	101.8	167
170	0.78	135	32.0	329	91.4	243
170	0.75	127	34.5	289	80.3	292
170	0.72	122	36.2	258	71.7	325
170	0.7	117	37.2	227	63.1	354
170	0.68	114	38.0	195	54.2	377
170	0.67	112	38.5	172	47.8	397
140	0.71	100	22.1	266	73.9	93
140	0.7	98	25.8	237	65.8	153
140	0.68	97	27.8	217	60.3	188
140	0.66	94	30.0	190	52.8	225
140	0.65	92	31.1	168	46.7	255
140	0.64	90	32.3	144	40.0	279
110	0.57	64	16.3	190	52.8	47
110	0.58	64	19.1	160	44.4	80
110	0.57	64	20.4	140	38.9	99
110	0.57	64	22.3	120	33.3	99
110	0.56	63	24.3	90	25.0	155
80	0.43	35	11.1	121	33.6	20
80	0.42	35	13.3	83	23.1	39
80	0.42	35	14.8	52	14.4	55

13.2 - Air flow/available static pressure data

13.2.1 - ATM size 1

Available static pressure curve (Pa) as a function of air flow (m^3/h or l/s)



Legend:

——— Without electric heater (with 6-row water coil)

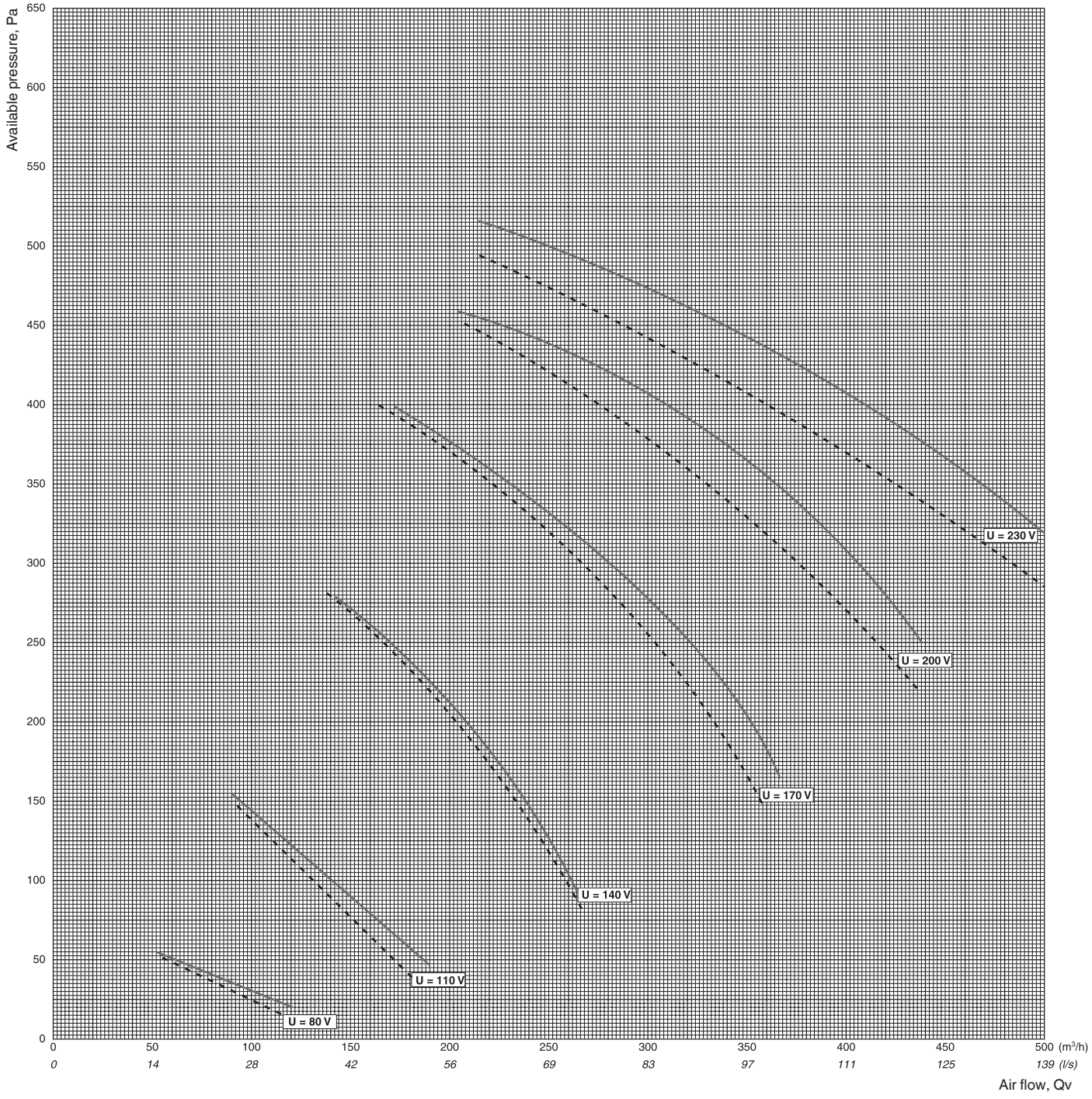
– – – – With electric heater (with 5-row water coil)

U Fan motor power supply

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

13.2.2 - ATM size 2

Available static pressure curve (Pa) as a function of air flow (m^3/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.

14 - CONTROLLER

14.1 - Carrier numeric controller

At the top of the range, each ATM 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 comfort or unoccupied mode through a Zone User Interface 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.

14.2 - Carrier electromechanical controller with fan speed controller

14.2.1 - 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.

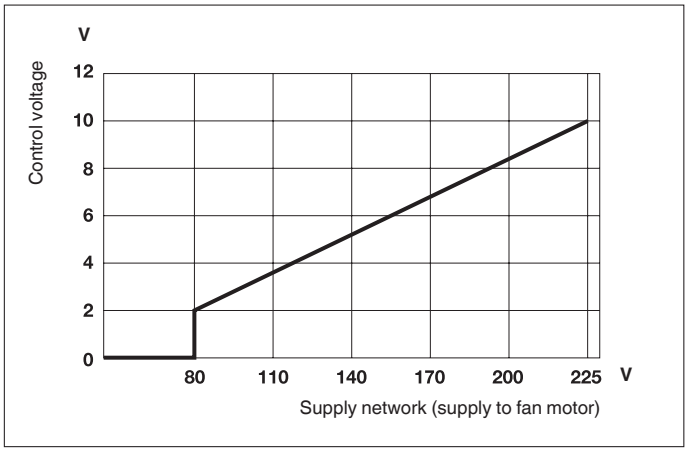
Setting the speed is achieved when the supply power is applied to one of the 3 input pre-selections.

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.d.c.
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.



14.2.2 - General characteristics
Selection of inputting a 230 V.a.c. or 0 to 10 V control input is automatic. An 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 2 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 ± 15%
- Output voltage range: 80 to 225 V (± 15 V)
- Screw terminal connections: size 2 x 1.5 mm^2
- 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 a self-extinguishing ABS plastic cover.

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

14.3 - The various ATM configurations available

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

a) The ATM 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.

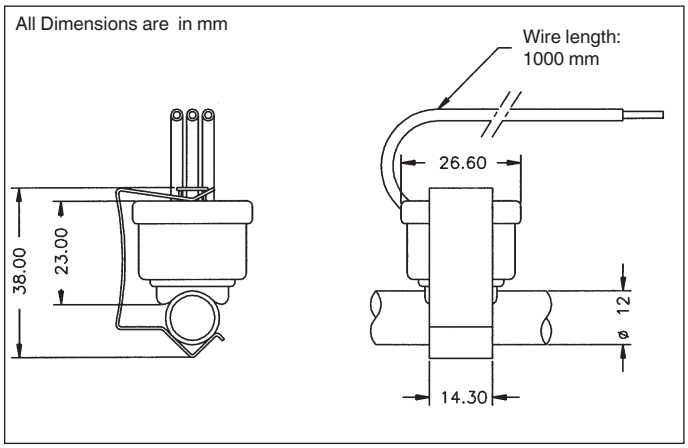
b) The ATM is fitted with a speed controller and a 5-row cooling or heating coil (2 pipes with changeover).
Operates in cooling or heating mode. This application is of the heat pump type.
This option includes a 3-way on/off valve, a heating/cooling changeover switch and two insulated flexible water pipes.

c) The ATM 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 ports, and 4 flexible water pipes, 2 of which are insulated and 2 uninsulated.

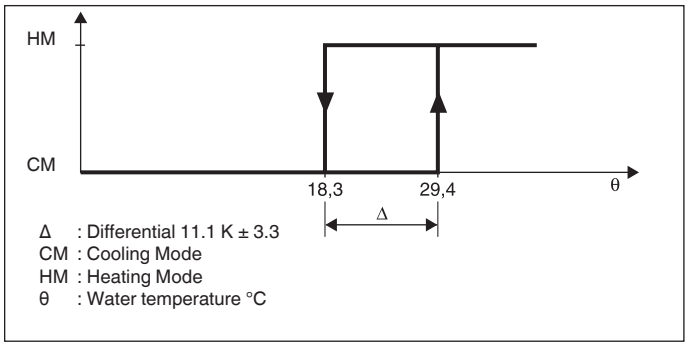
d) The ATM is fitted with a speed controller, a 5-row cooling coil and an electric heater (2 pipes and 2 wires).
Operates in cooling mode or heating mode with electric heater in sequence.
This option includes a 2-way on/off valve, 2 insulated flexible water pipes and 1 power relay for controlling the electric heater.

14.4 - 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 ATM. 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.



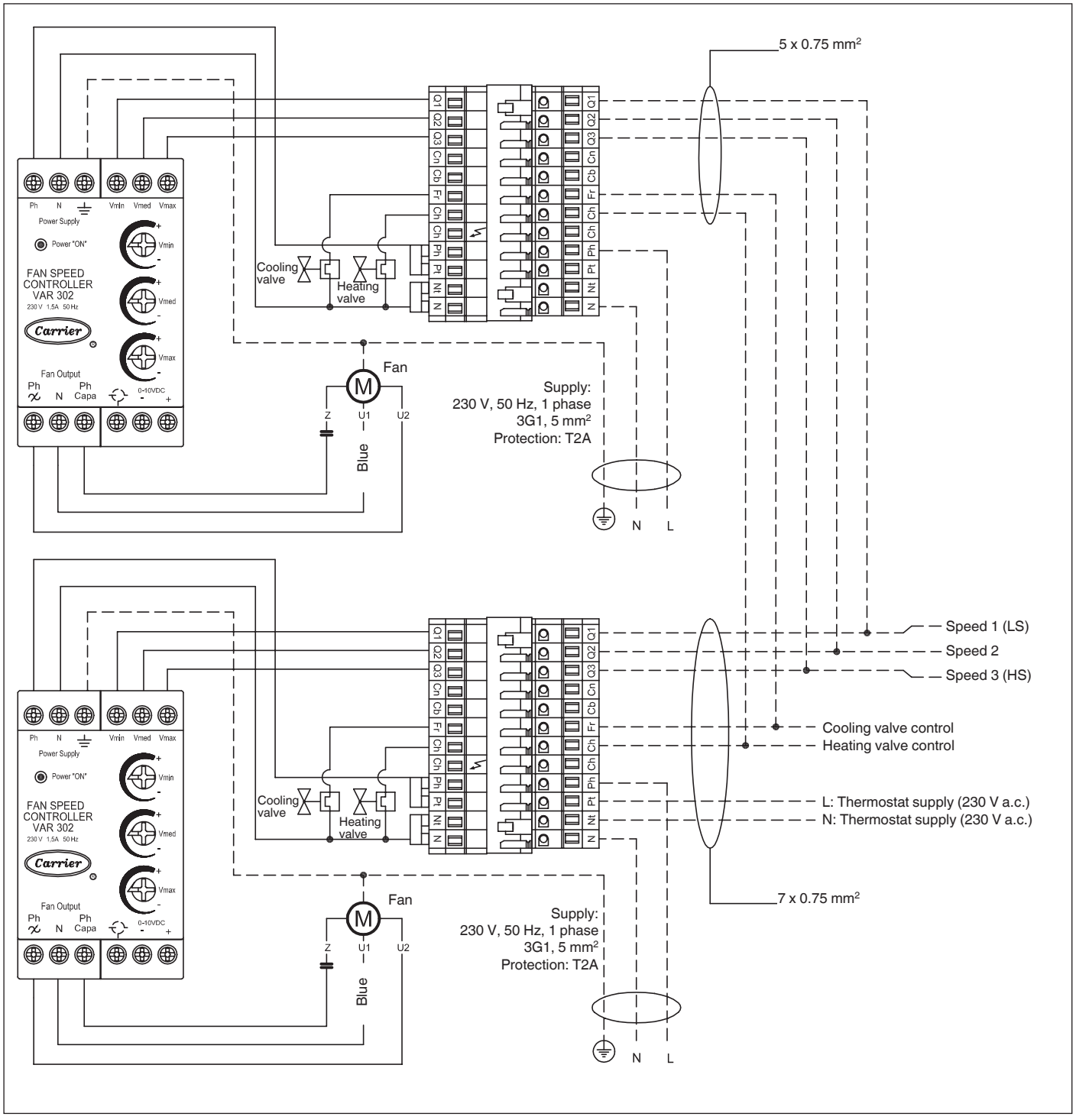
When a heating/cooling changeover switch is connected between the room thermostat and the water flow control valve, the changeover between heating and cooling modes takes place automatically in accordance with the following diagram.



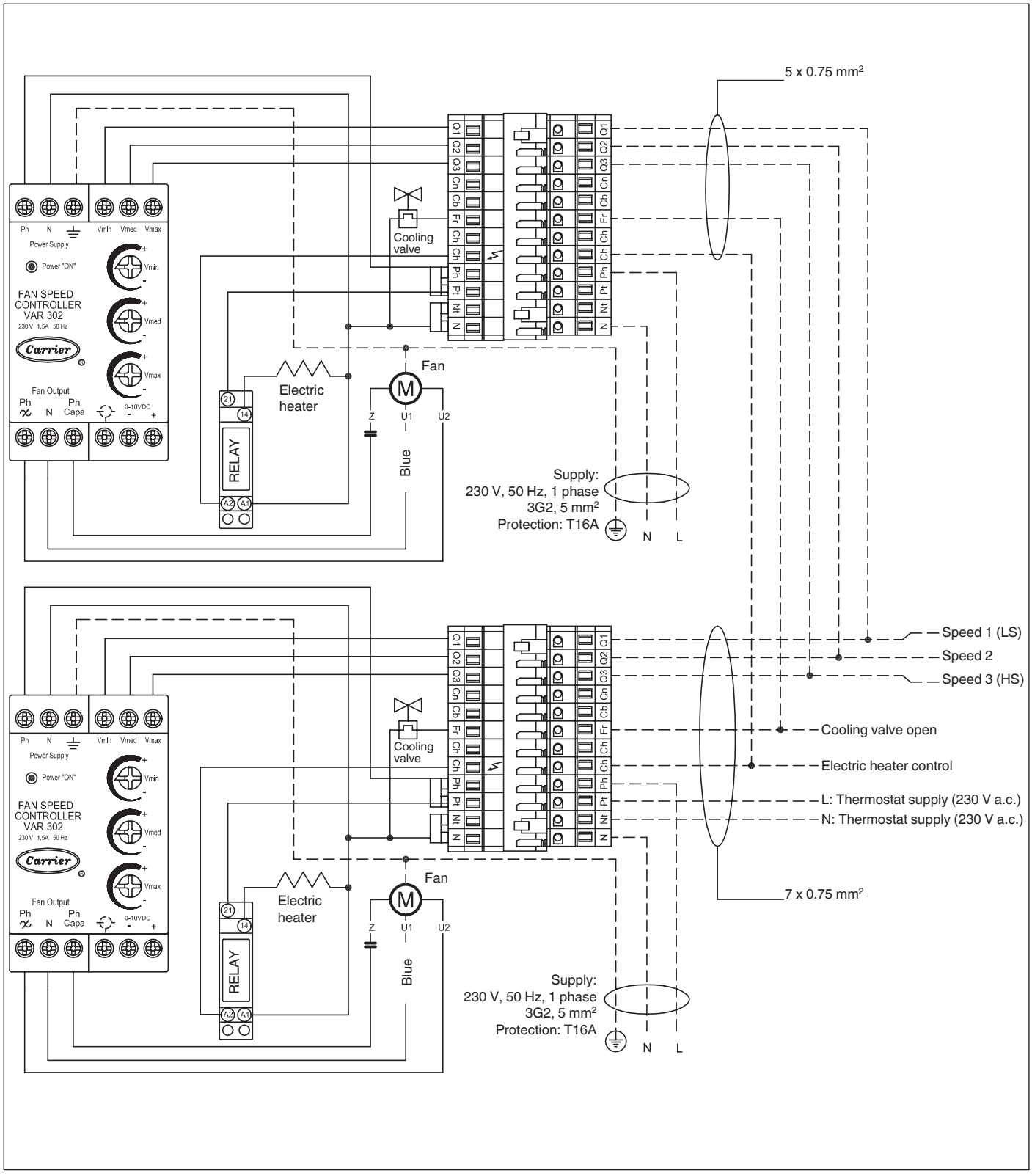
14.5 - Master/slave control

With the high capacity fan speed controller it is possible to link up to 5 ATMs 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.

14.5.1 - 4-pipe configurations



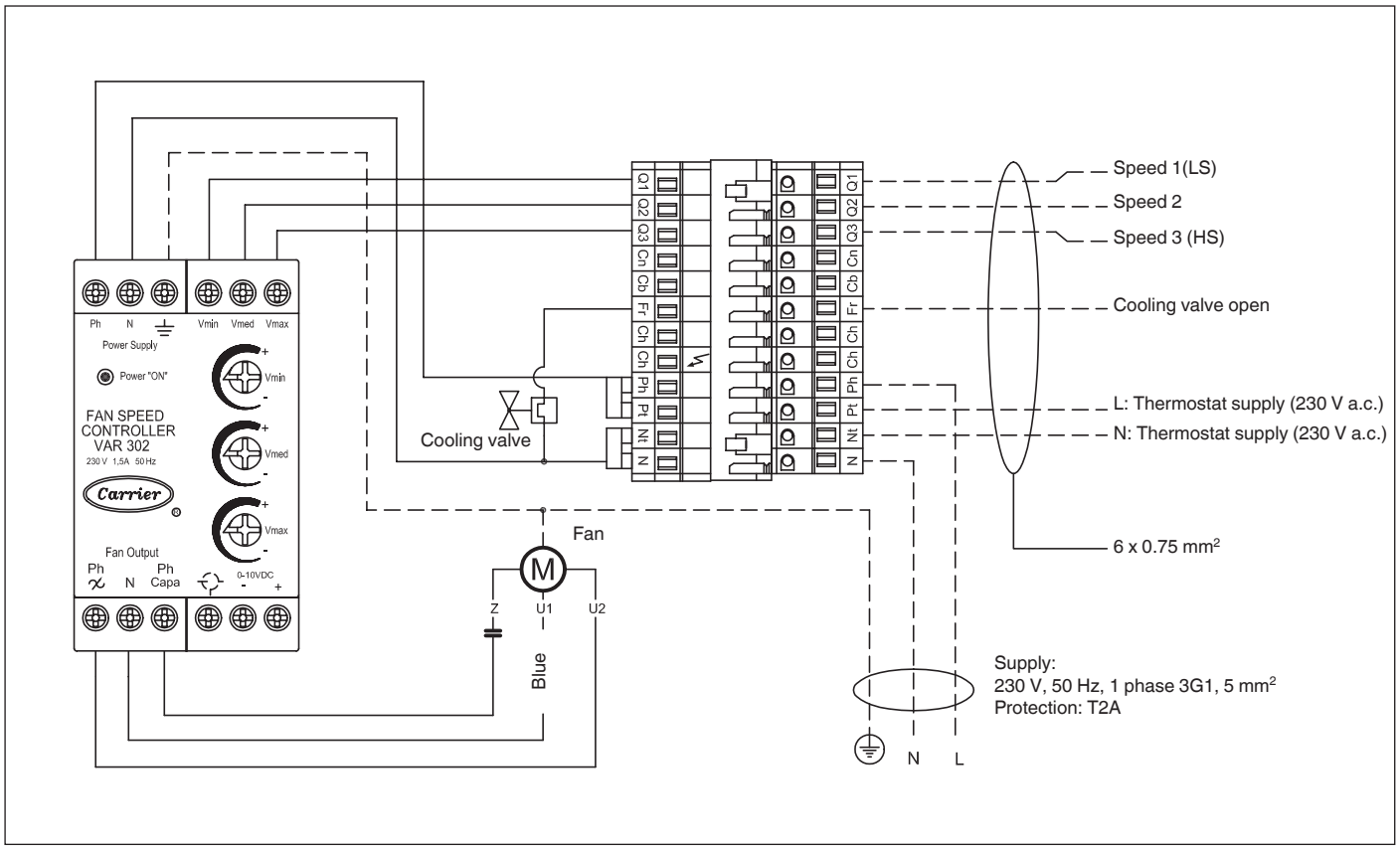
14.5.2 - 2-pipe configuration and electric heater



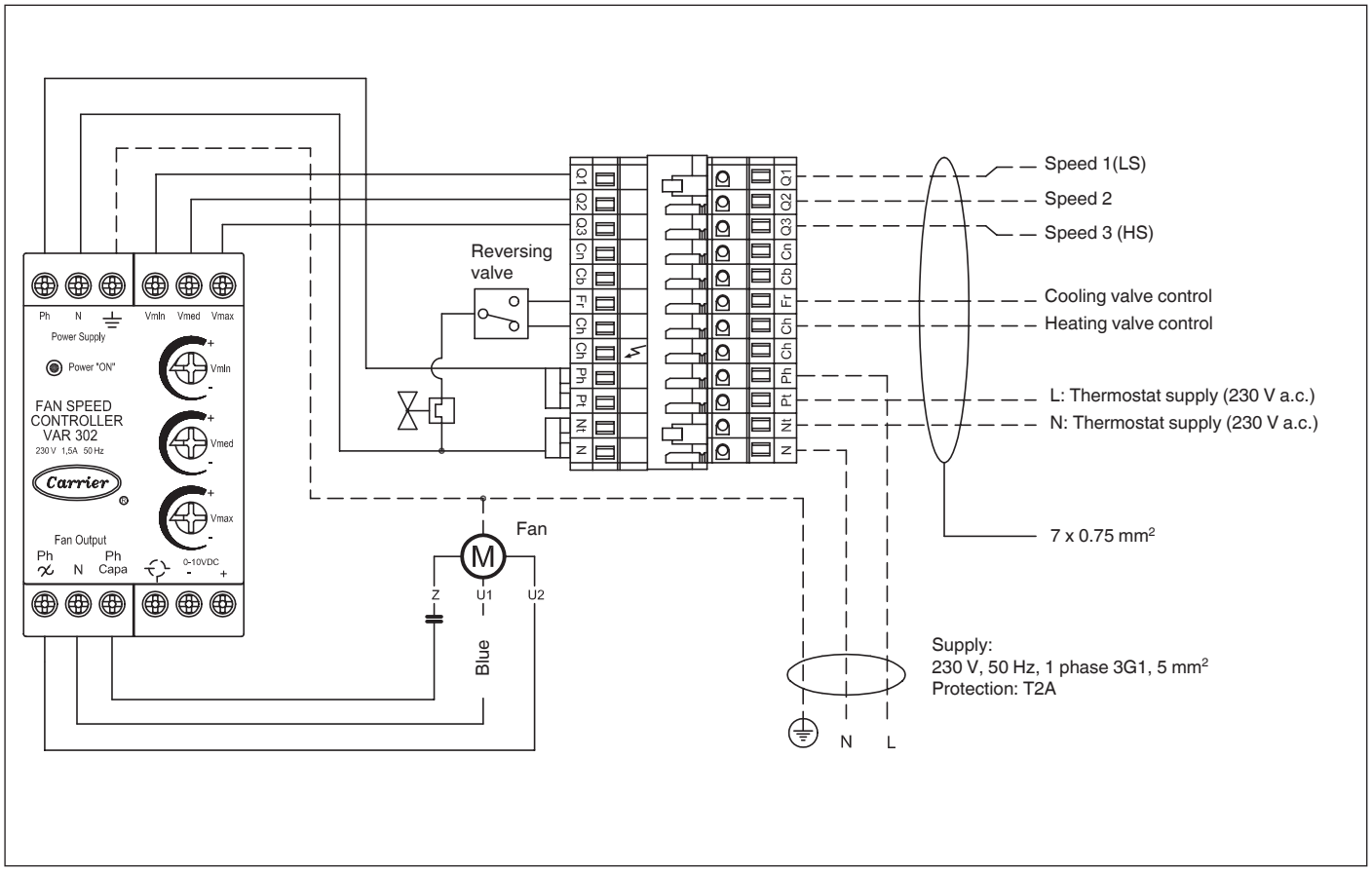
14.6 - Wiring diagrams

The ATM 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 ATM is delivered with a terminal strip and a plastic protective cover.

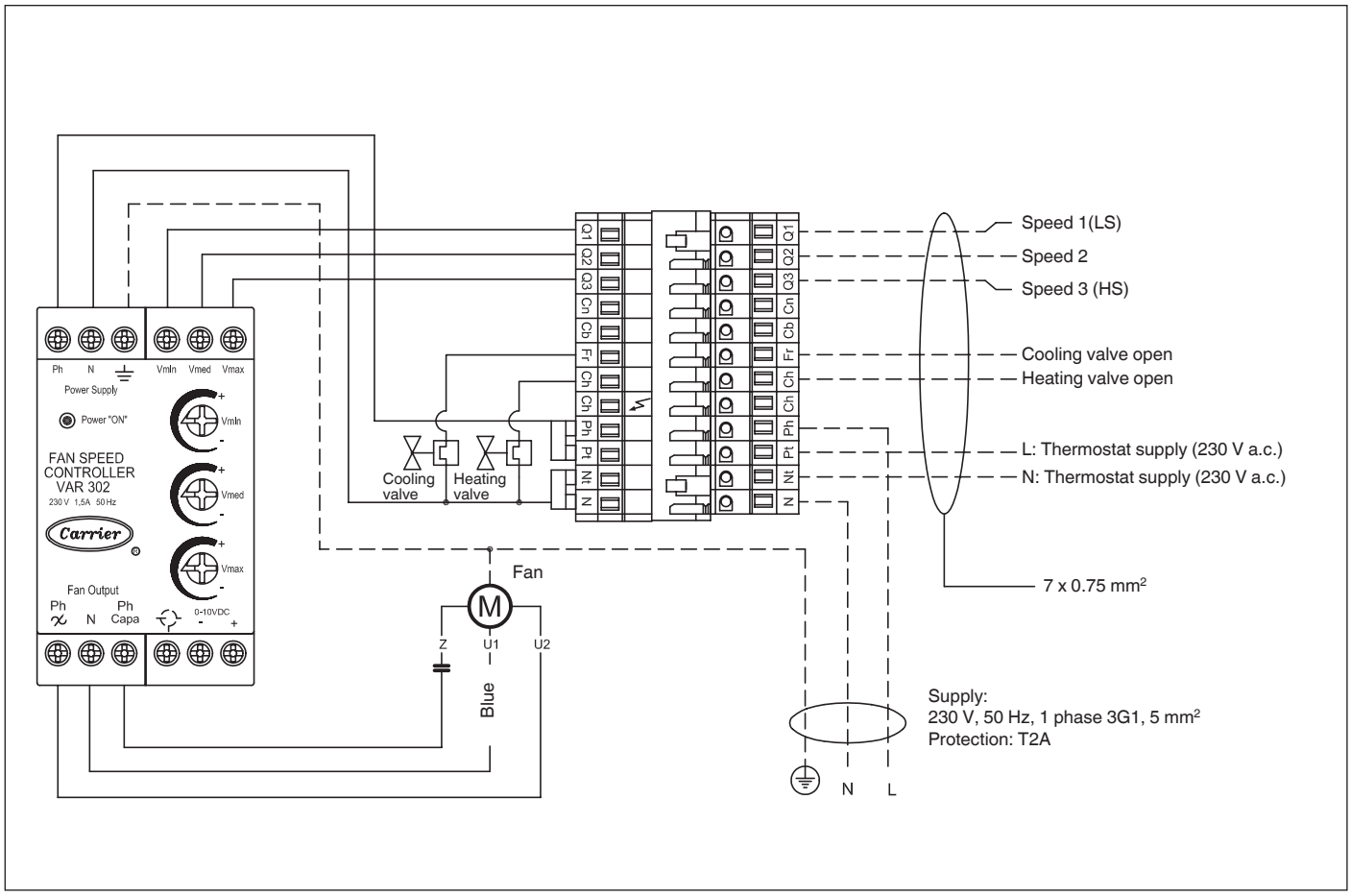
14.6.1 - 5-row cooling coil (2 pipes)



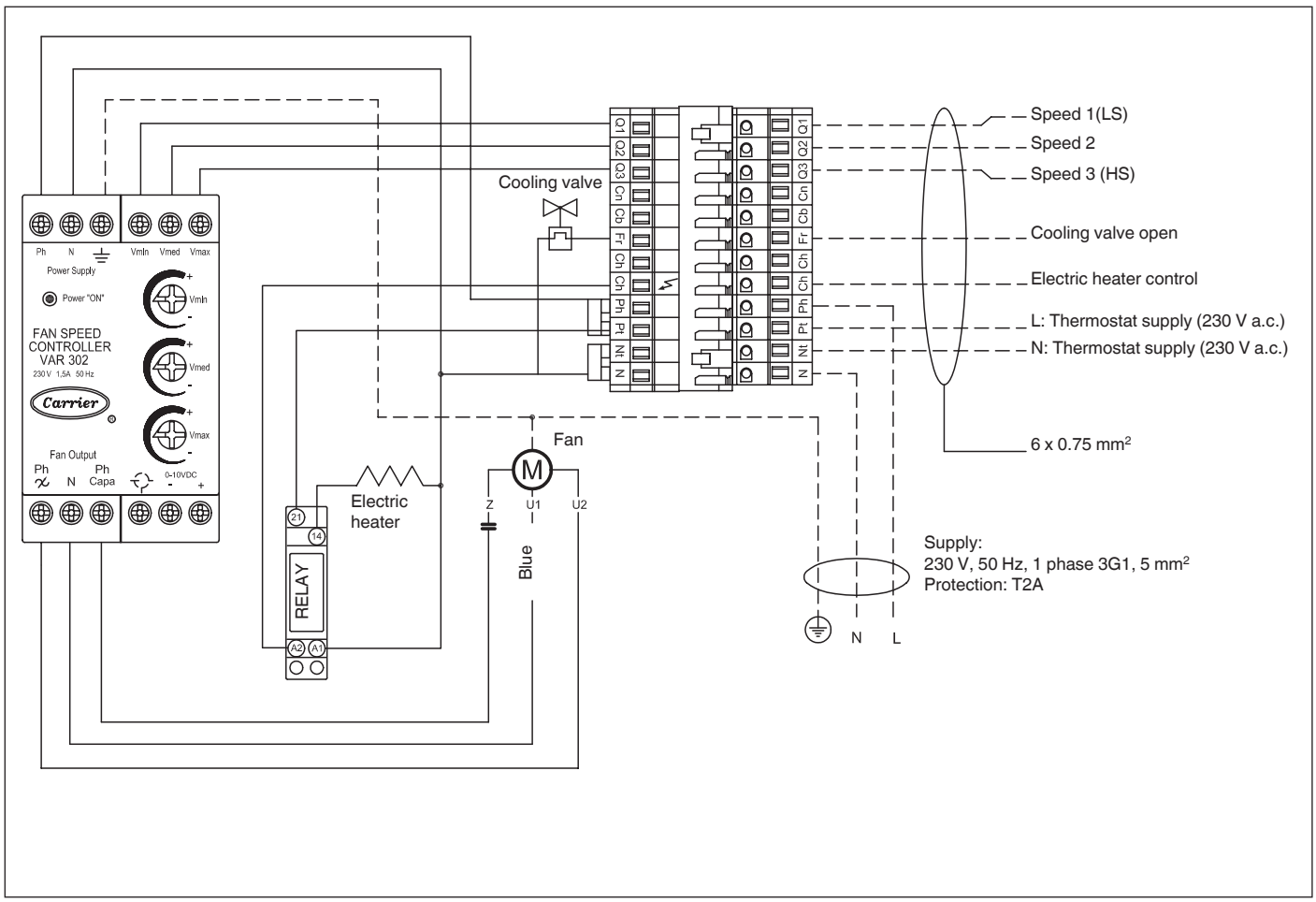
14.6.2 - 5-row coil with heating/cooling changeover (2-pipe change-over)



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



14.6.4 - 5-row cooling coil and PTC electric heater



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