



Flexible Space

Under Floor Air Conditioning

CAM-C
PRODUCT DESCRIPTION

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Section One: Product Description

1.0 General

The Conditioned Air Module or CAM-C filters and conditions the air distributed in the underfloor plenum for an office zone. It consists of the following main sections:

- Cabinet
- Filter section
- Coils and valves
- Fan section
- Electric board
- Control system
- Humidifier
- Baseframe



The air returning from the rooms enters the CAM-C from the underfloor void. It is then filtered and conditioned according to the temperature and humidity set-points selected on the electronic control panel. The conditioned air is then delivered to the underfloor plenum through a suitable baseframe for discharge to the space by Terminal Units (TUx).

The CAM-C is available as standard in three sizes: CAM-C15, CAM-C25 and CAM-C35. Nominal cooling capacities vary from 7 to 35 kW, and heating capacities from 7.5 to 50 kW. A single unit can cover the air conditioning needs of areas up to 300 m².

The CAM-C is particularly suitable for cellular and open space offices and has been designed to be enclosed in partitions or left free standing. It can be located in a variety of locations such as corridors, technical rooms or in normal working spaces. Installation is fast and easy because no duct connections are required. Fresh air can be discharged directly into the return air section of the under floor plenum for treatment by the CAM-C.

1.1 Cabinet

The cabinet consists of a robust frame made of welded 2mm sheet steel with front and side panels internally lined with 23mm thick thermal and acoustic insulation in self-extinguishing polyurethane foam (type HELIOCELL – 30/AU). The internal discharge plenum is lined with the same material.

The front panels ensure easy access to the electric board and the electronic control; for safety reasons, a special key lock prevents access by unauthorised people. When required, additional front and side panels can be supplied, increasing the acoustic insulation. The frame and panels are finished with an epoxy polyester powder coat of pearl grey colour (Ral 7035).

1.2 Filter Section

The filters in the front section of the unit provide continuous high efficiency filtration of the re-circulated air. This achieves the required degree of clean air in the office area. Disposable filters are made of deep pleated fabric, mounted in galvanised frames for easy replacement. Filters with G3 efficiency, are fitted as standard, F5 and F7 filters are available on request.

The filter section provides easy access to facilitate the inspection and replacement of filters. A clogged filter switch can be fitted on request and linked to the on-board control panel for alarm purposes.

Each CAM includes a number of disposable low velocity synthetic fibre filters:

- CAM-C15: 2 filters (1000 x 410 x 88 mm)
- CAM-C25: 3 filters (1000 x 410 x 88 mm)
- CAM-C35: 4 filters (1000 x 445 x 88 mm)

1.3 Water Coils and Valves

1.3.1 General

Each unit is fitted with a three-row cooling coil as standard. An additional single-row heating coil may be supplied as required for four-pipe configurations. The three-row coil may be used for cooling and heating in a two-pipe configuration. In the event that humidity control is required, then both cooling and heating coils are recommended to provide dehumidification and reheat function. Each coil is fitted with a three-port automatic valve actuator as standard. Two-port valves and actuator are available on request.

CAM-C15: the standard cooling coil is three rows, copper tubes with twelve aluminium plates per inch, with a face area of 0.8 m². One or both of the following additional coils will be available as optional:

- a) One row additional heating coil: copper tubes with eight aluminium plate fins per inch.
- b) Aluminium electric heaters: 4.5 kW total capacity, with three steps automatic intervention (1.5 + 3.0 kW)

CAM-C25: the standard cooling coil is three rows, copper tubes with twelve aluminium plate fins per inch, with a face area of 1.21 m². One or both of the following additional coils will be available as optional:

- a) One row additional heating coil: copper tubes with eight aluminium plate fins per inch.
- b) Aluminium electric heaters: 10.35 kW total capacity with three steps automatic intervention (3.45 + 6.90 kW) or 4.5 kW total capacity with two steps automatic intervention (1.5 + 3.0 kW)

CAM-C35: the standard cooling coil is three rows, copper tubes with twelve aluminium plate fins per inch, with a face area of 1.76 m². One or both of the following additional coils will be available as optional:

- a) One row additional heating coil: copper tubes with eight aluminium plate fins per inch.
- b) Aluminium electric heaters: 14.85 kW total capacity with three steps automatic intervention (4.95 + 9.90 kW) or 10.35 kW total capacity with three steps automatic intervention (3.45 + 6.90 kW).

1.3.2 Electric Heater Coil

Stepped electric heating coils are available in place of hot water coils in all units.

1.3.3 DX Coil and Electric Heating

Direct Expansion (DX) cooling coils may be provided in place of chilled water cooling coils.

1.4 Fan Section

The CAM-C is equipped with quiet, low speed centrifugal fans, each with integral variable speed independent electric motor with built-in thermal protection. Different fan speeds can be selected using the Flexmatic display which allows different voltage outputs. The fans are double inlet with statically and dynamically balanced impellers with lifetime lubricated bearings for quiet, vibration-free operation. They are available in AC or EC options, IP10 electric protection as standard. The fan section is downstream of the cooling coil, mounted on anti-vibration frames and secured by toggle belts to provide uniform air distribution with low pressure drop and low noise. The CAM-C is provided with an electronic flow sensor to check the operation of the unit.

1.5 Electric Board

The units are designed for 400 (+/- 10%) V/3ph+N+PE/50Hz for versions including electric heating, cooling and/or humidification and 230V (+/- 10%) V/1ph+N+PE/50 Hz for the cooling only version. The electric board is factory wired and complies with IEC standards. It is completely isolated from the air stream and accessible from the front panel, and protected by safety locks with a special key. Components include: main isolator, transformer, circuit breakers, fan motor contactor, humidifier, electric heater contactors and fresh air module (FA5/7) contacts. Free contacts for remote signalling are available.

1.6 Control System

A factory-wired electronic control system provides an automatic and continuous control of the supply air temperature and humidity to maintain the area at the required conditions. The Flexface controller plus Flexmatic display automatically control the airflow supplied by the CAM-C on the basis of the air volume drawn by the TUX (connected to the CAM-C) from the raised floor plenum.

Additional modules can be fitted for humidity control, outdoor compensation and connection with an external Building Management System (BMS). Electronic automatic control will be fitted into the unit consisting of:

- 1 x Flexface controller with two outputs for heating and cooling
- 1 x Flexmatic display (optional)
- 1 x zone room air temperature sensor

- 1 x supply air temperature sensor
- 1 x electrical heater card (where required)
- 1 x water thermostat (not for CAM-C units with the optional one-row heating coil)

In addition to the main internal control panel, an On/Off switch is located externally on the front face of the unit. The unit run time may be extended by pressing and holding a push button located on the front face of the unit. The run on time may be selected on the Flexmatic controller.

1.7 Humidifier

A sophisticated electronic steam humidifier is available as an option (5 kg/hr nominal steam humidifier with electronic control and humitemp sensor). The humidifier can use any type of hard or soft water, provided it is not distilled water. It produces clean, virtually particle-free and bacteria free steam instantaneously from a disposable plastic cylinder fitted with an electric heating element. A warning light shows when the cylinder must be replaced. An automatic flush control system is standard, and limits the salt concentration in the cylinder.

1.8 Baseframe

The baseframe can be of any height to match the adjacent raised access floor. There are two models of baseframe: TP (triangular plate) and RP (rectangular plate). Using TP and RP baseframes, six different baseframe configurations are available to adapt the CAM-C installation to any zone layout requirement. Air delivery and intake can be from the front, side or back of the unit according to the baseframe configuration. The baseframe is made of welded steel sheet and painted the same colour as the CAM-C frame. The baseframe can be ordered up to 300mm, 500mm or 800mm on the basis of the height of the finished floor. The baseframe has adjustable height supports fitted to obtain the correct height and to compensate for slab irregularities. See section 2.2 for further information on Baseframe configuration.

1.9 Optional Modules

These optional modules are available:

- Humidification (described above)
- Dehumidification function is already available if the humidification option is fitted.
A Humitemp sensor is provided with the additional HW and/or electric coil

- Setpoint compensation with the external temperature electronic compensator and outdoor air temperature sensor
- Connection to BMS via Flexgateway. (local or remote control) Modbus and Bacnet options.

1.10 Packing

The CAM-C is protected by polystyrene panels and corners, and wrapped with extensible film. Wooden crates or cases and hermetic bags can be supplied for the sea transport on request.

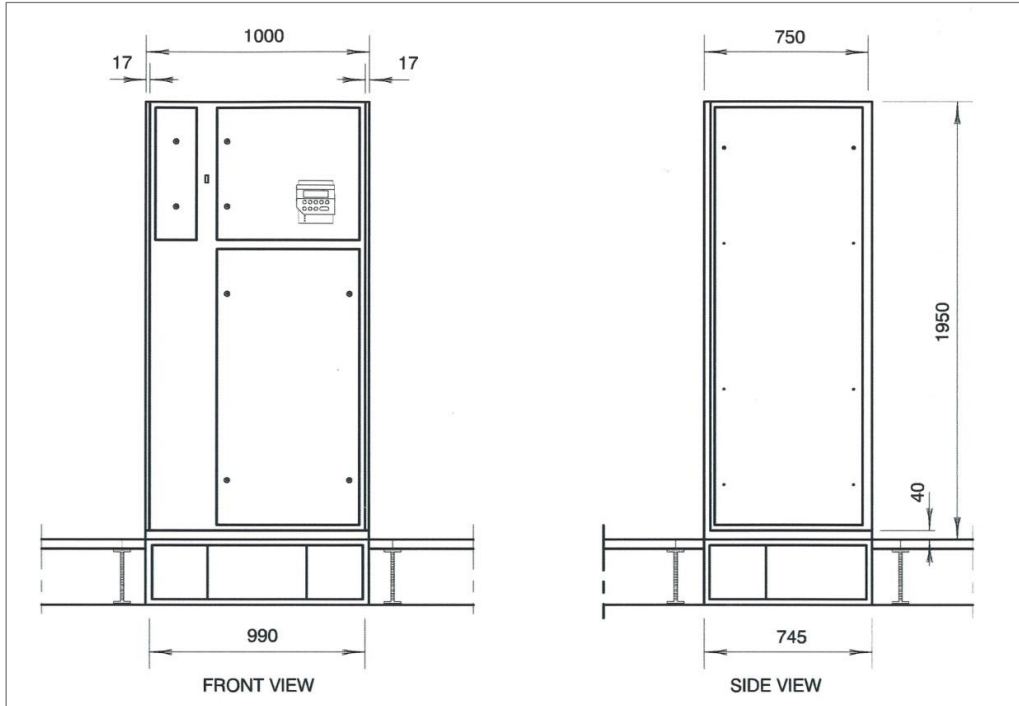
1.11 Product Quality and Safety

The units of the CAM-C series are marked as compliant with the European directives concerning mechanical, electrical and electromagnetic safety (98/37/CE, 89/336/CEE, 73/23/CEE. The unit is supplied complete with a test certificate and conformity declaration.

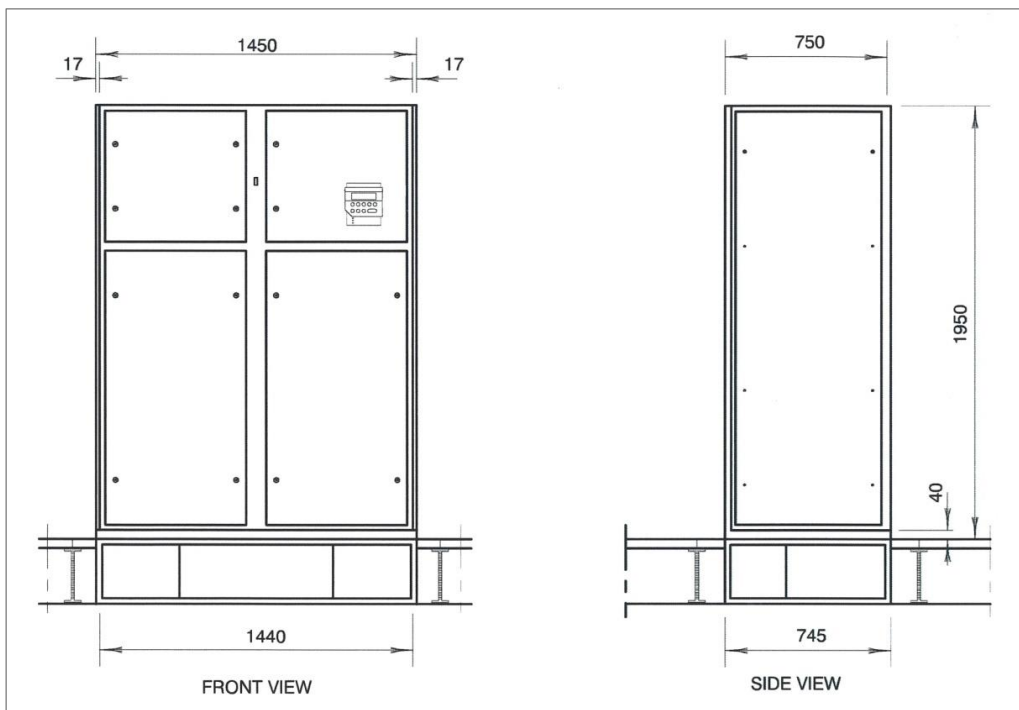
Section Two: Technical Data

2.0 Overall Dimensions and Unit Weights

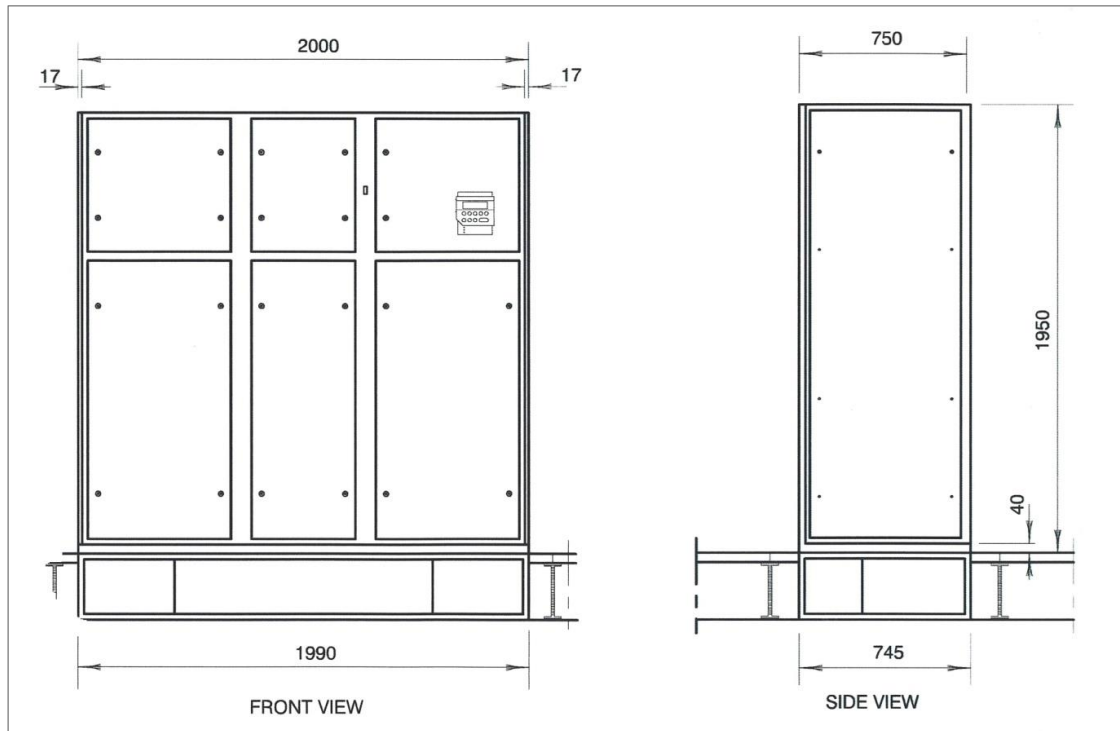
CAM-C15



CAM-C25



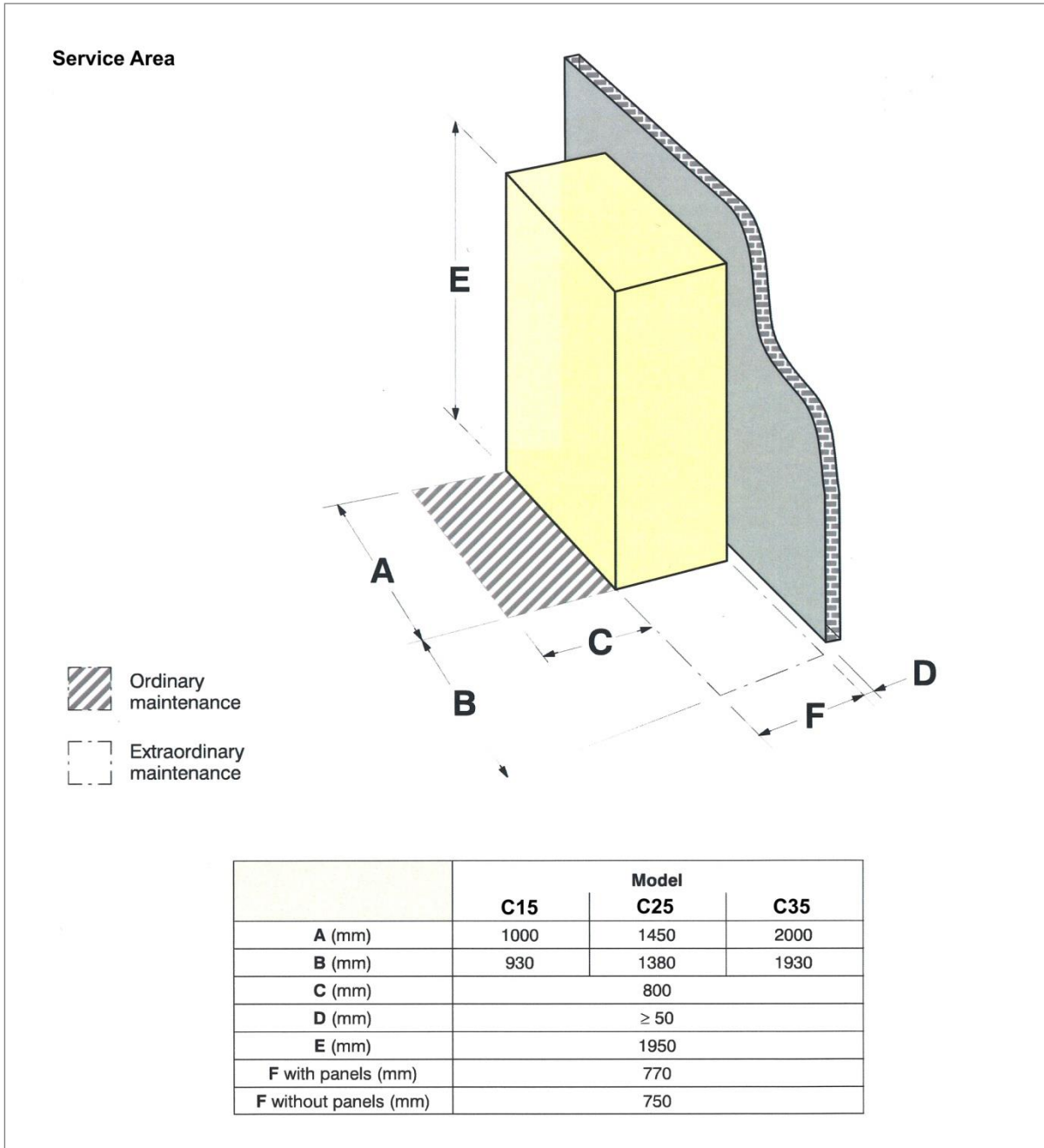
CAM-C35



CAM-C Unit Weight (Indicative)

Model	Maximum Weight
CAM-C15	282 Kg
CAM-C25	385 Kg
CAM-C35	500 Kg

2.1 Opening in the Raised Floor and Service Area



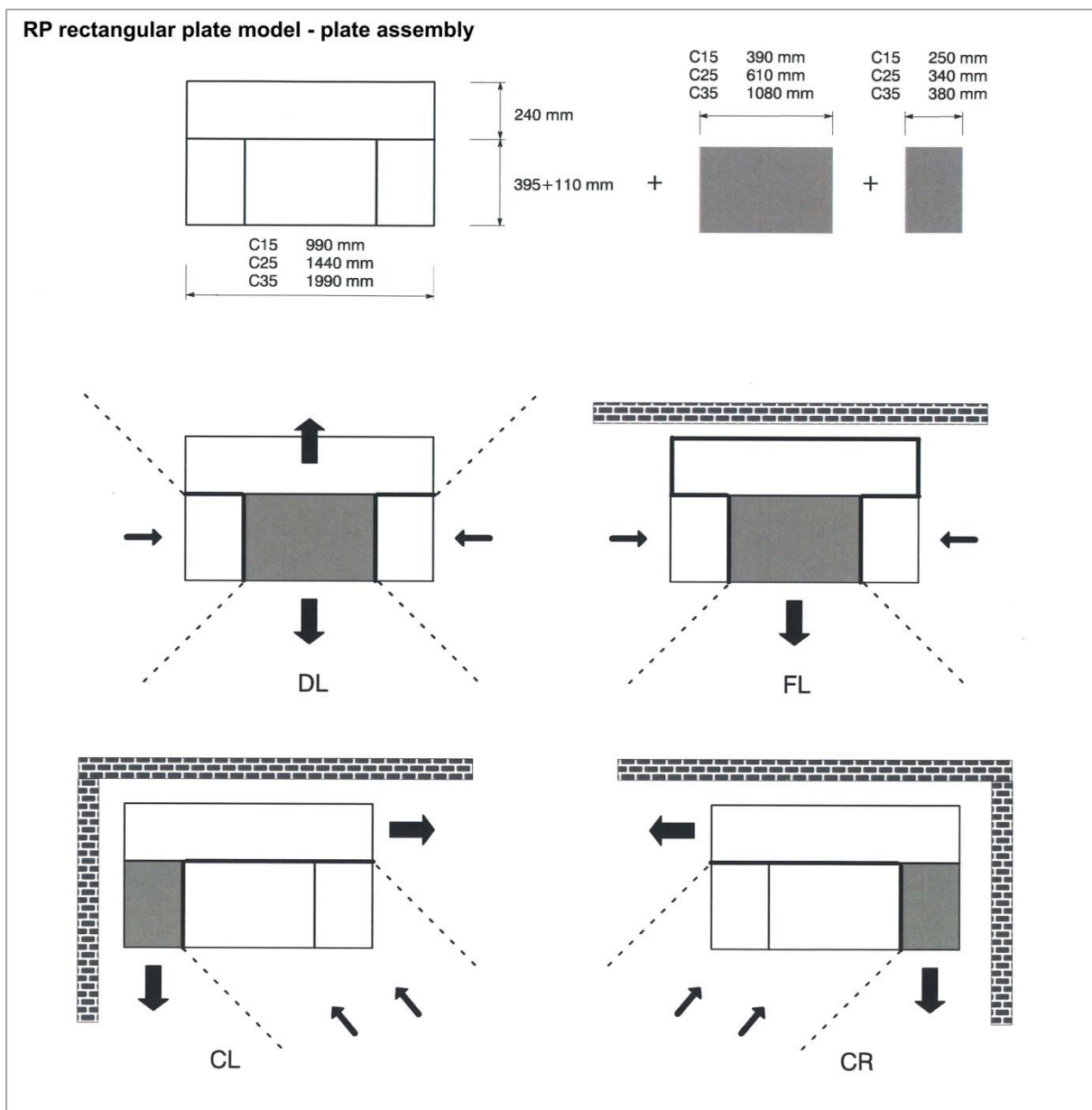
2.2 Baseframe Configuration

There are two types of baseframes:

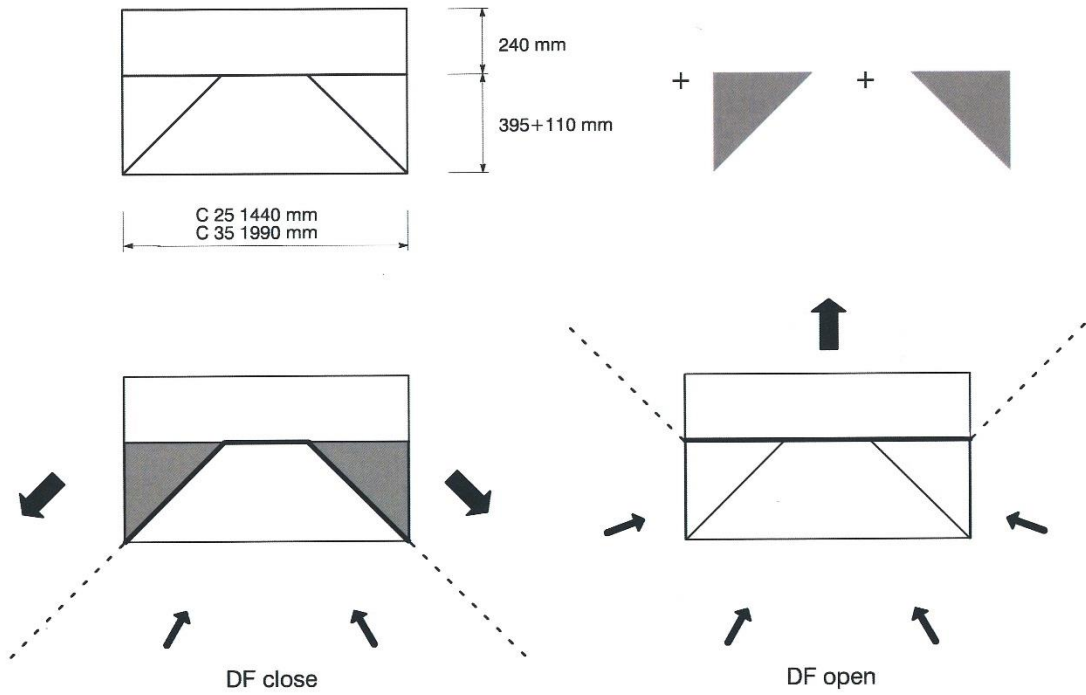
- TP model (triangular plate)
- RP model (rectangular plate)

Using TP and RP baseframes it is possible to obtain six different configurations:

DF open, DF close, CR, CL, FL and DL.



TP Triangular plate model - plate assembly



2.3 Noise Data

Test Conditions

All the measurements have been carried out under steady test conditions. The instrument used is a Bruel & Kjaer sound meter type 2203 equipped with an octave band filter type 1613 and condenser microphone type 4145 (according to IEC publications). The background noise level was at least 10 dB lower than the machine level at any frequency. The instrument was positioned 1.5 metres above the ground level in front of the machine at a distance of two metres.

Noise data are referred to the following conditions:

- Free field conditions
- CAM-C positioned close to the wall
- Fan(s) in operation at specified speed
- Clean filters
- Room ambient temperature 26°C, 50% R.H.

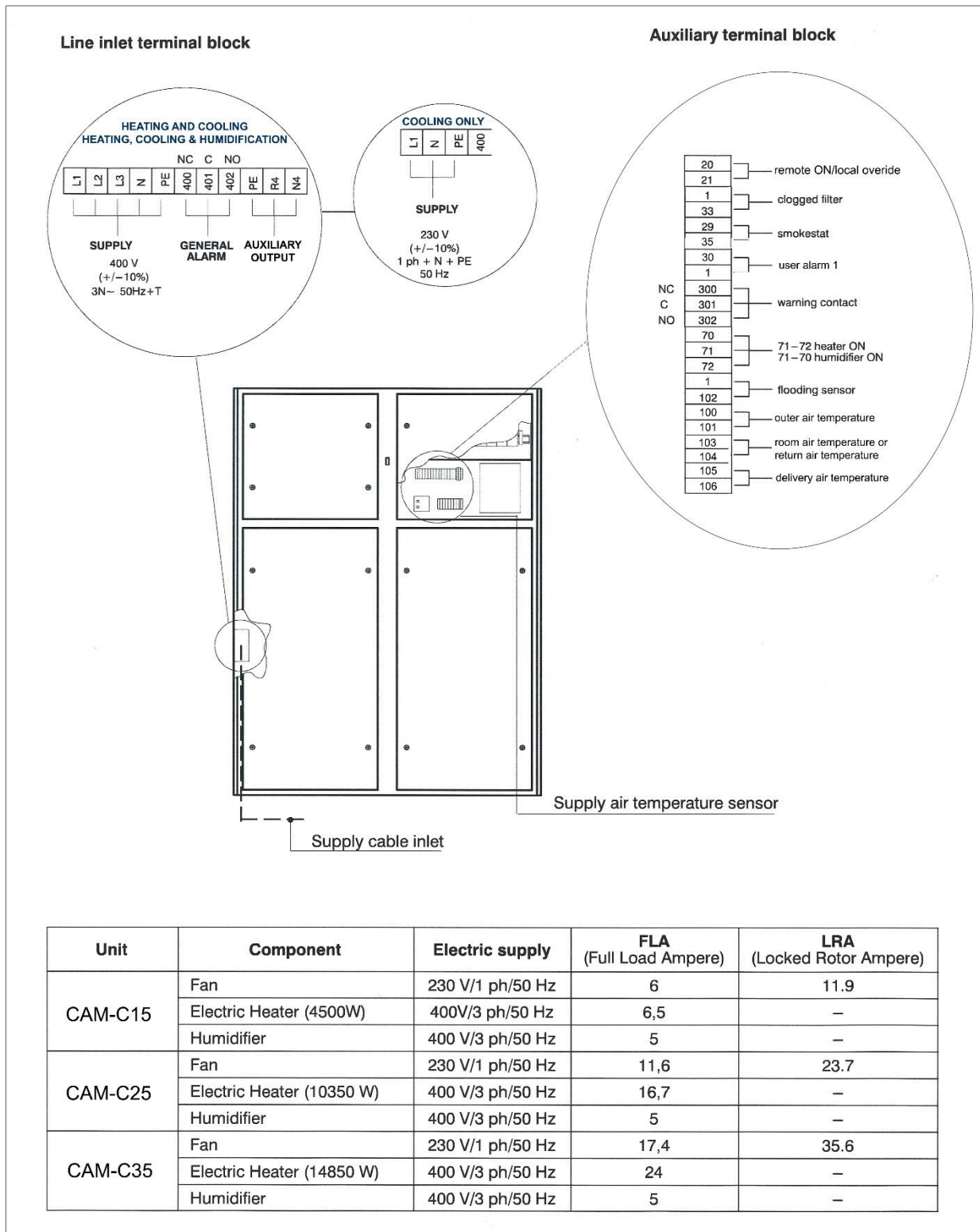
Sound pressure level is given according to ISO recommendation 1996 – 1971 (E) appendix Y.

Noise data are referred to free field conditions: the noise level in the room should be calculated in accordance with the actual site and installation conditions which will affect the final noise in the ambient.

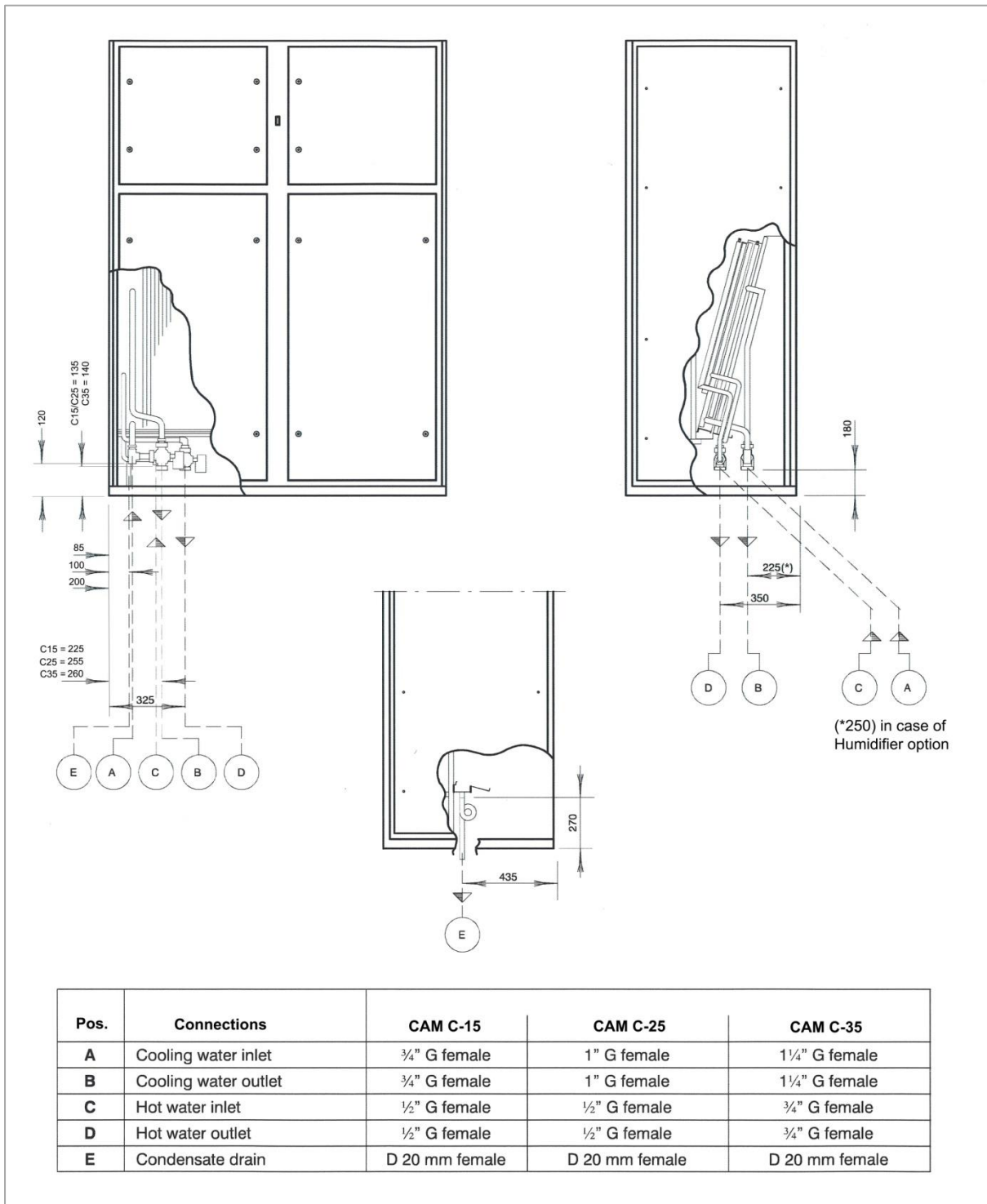
CAM-C Sound Pressure Level dB(A)

CAM-C15	Air flow (m3/h)	1500	2000	2500	3000	3500	4000		
	SPL base version	33	34	35	39	41	42		
	SPL add. panels	31	32	33	37	40	41		
CAM-C25	Air flow (m3/h)	3500	4000	4500	5000	5500	6000	6500	7000
	SPL base version	36	39	41	42	44	45	46	47
	SPL add. panels	35	38	40	41	42	43	44	45
CAM-C35	Air flow (m3/h)	6000	6500	7000	7500	8000	8500	9000	9500
	SPL base version	38	39	41	42	44	45	47	48
	SPL add. panels	37	38	40	41	43	44	45	46

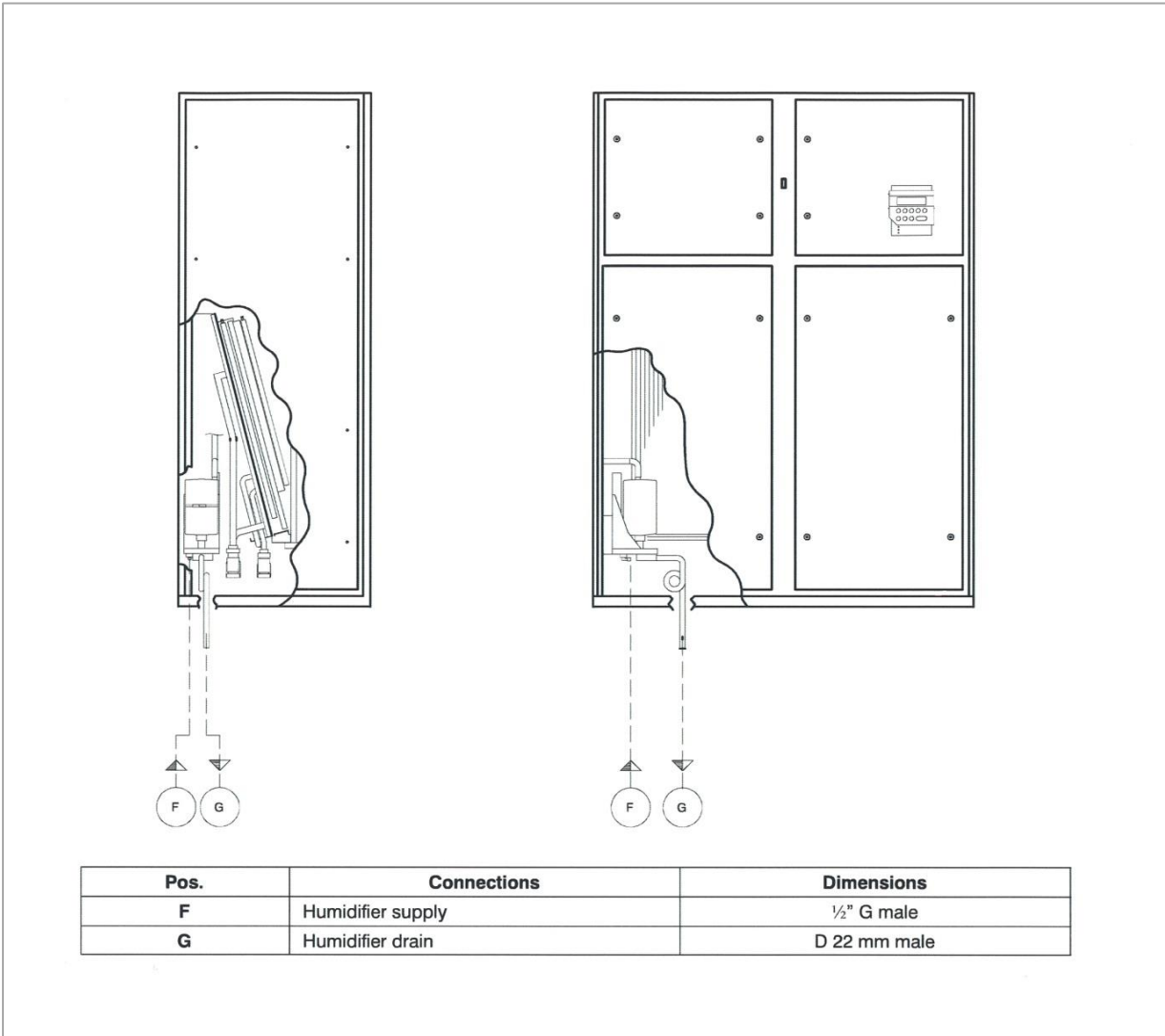
2.4 Electrical Data



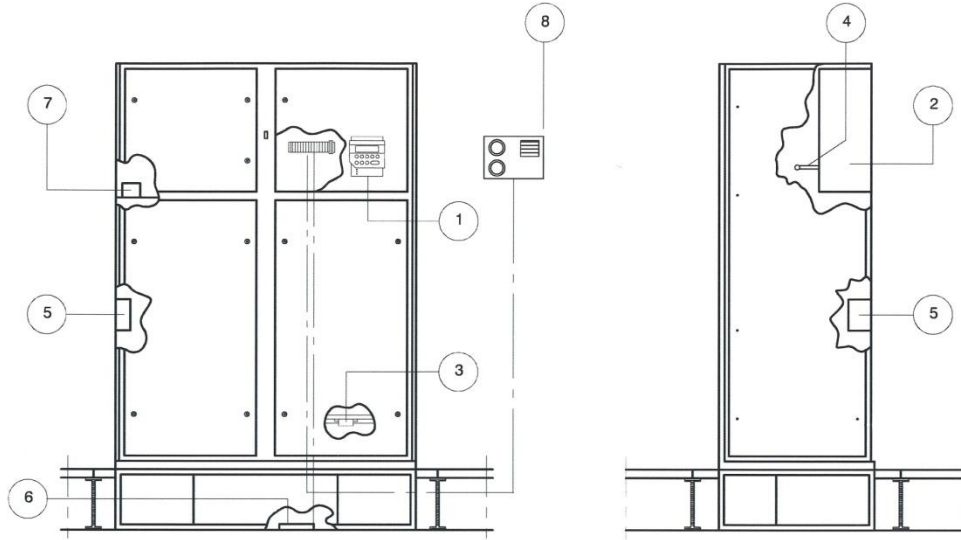
2.5 Water Connections



Water Connections – humidifier (optional)



2.6 Instrument Installation



Pos.	Standard	Installation
1	Flexmatic control	Unit front
2	Electrical Panel	Inside unit
3	Temperature + humidity sensor	Inside unit
4	Flow sensor	Inside unit
5	Terminal block supply and alarm	Inside unit

Pos.	Optional	Installation
6	Sensor for liquistat	Outside unit
7	Clogged filter sensor (CF)	Inside unit
8	Smokestat / fire sensor Alarm package	Outside unit

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