



# Flexible Space

## Under Floor Air Conditioning

CAM-V  
PRODUCT DESCRIPTION

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## Table of Contents

<b>Section One: Product Description .....</b>	<b>2</b>
1.0 General .....	2
1.1 Cabinet .....	3
1.2 Filter Section .....	3
1.3 Water Coils and Valves .....	4
1.3.2 Electric Heater Coil .....	5
1.3.3 Direct Expansion (DX) Coil.....	5
1.4 Fan Section.....	5
1.5 Electric Board.....	6
1.6 Control System .....	6
1.7 Humidifier.....	7
1.8 Baseframe .....	7
1.9 Optional Modules .....	7
1.10 Packing .....	7
1.11 Product Quality and Safety.....	8
 <b>Section Two: Technical Data.....</b>	 <b>9</b>
2.0 Overall Dimensions and Unit Weight .....	9
2.1 Unit Weight (Indicative) .....	10
2.2 Opening in Raised Floor and Service Area .....	10
2.3 Noise Data .....	11
2.4 Electrical Data.....	12
2.5 Water Connections.....	15
2.6 Instrument Installation .....	17

## Section One: Product Description

### 1.0 General

The Conditioned Air Module CAM-V 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



The air returning from the rooms enters the CAM-V through its open top. 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 for discharge to the space by Terminal Units (TUx).

The CAM-V is available as standard in four sizes: CAM-V11, CAM-V22, CAM-V33 and CAM-V44. Cooling capacities vary from 6 to 40 kW and heating capacities from 7.5 to 50 kW. A single unit can cover the air conditioning needs of areas up to 300m<sup>2</sup>.

The CAM-V is particularly suitable for open plan offices and can be located within an enclosure or be 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 as no duct connections are required. Fresh air can be discharged into the inlet of the cabinet; it mixes with the return air and is conditioned by the CAM-V.

### **1.1 Cabinet**

The cabinet consists of a welded steel frame of 2mm thick 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. 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.

Filter sizes are as follows:

- CAM-V11: 1 filter (510 x 745 x 100mm)
- CAM-V22: 2 filters (510 x 598 x 100mm)
- CAM-V33: 2 filters (695 x 650 x 100mm)
- CAM-V44: 2 filters (695 x 650 x 100mm)

## 1.3 Water Coils and Valves

### 1.3.1 General

Each unit is fitted with a standard chilled water coil (five-row for V11, V22, V44 and four-row for V33). This can be used for both cooling and heating with chilled and hot water in two-pipe installations or cooling only in four-pipe installations. In the latter case the optional one-row coil must be added for heating. In the event that humidity control is required, then both cooling and electric heating coils are recommended to provide dehumidification and reheat function. Each coil is supplied with the relevant three-way valve and actuator.

- **CAM-V11:** The standard cooling coil is five rows, copper tubes with twelve aluminium plate fins per inch, with a face area of 0.46m<sup>2</sup> or both of the following additional coils will be available as optional:
  - a) One row additional heating coil: copper tubes with fourteen aluminium plate fins per inch with a surface area of 0.26m<sup>2</sup>
  - b) Aluminium electric heaters: 4.5 kW total capacity with three step automatic switching (1.5+3.0 kW)
- **CAM-V22:** The standard cooling coil is five rows, copper tubes with twelve aluminium plate fins per inch, with a face area of 0.77m<sup>2</sup>. One or both of the following additional coils will be available as optional:
  - a) One row additional heating coil: copper tubes with fourteen aluminium plate fins per inch with a face area of 0.44m<sup>2</sup>
  - b) Aluminium electric heaters: 5.85 kW total capacity with three steps automatic switching (1.95 + 3.9 kW) or 4.5 kW total capacity with two step automatic intervention (1.5 + 3.0 kW)

- **CAM-V33:** the standard cooling coil is four rows, copper tubes with fourteen aluminium plate fins per inch, with a face area of 1.26 m<sup>2</sup>. One or both of the following additional coils will be available as optional:
  - a) One row additional heating coil: copper tubes with twelve aluminium plate fins per inch with a surface area of 0.83m<sup>2</sup>
  - b) Aluminium electric heaters: 9kW total capacity with three step automatic intervention (3+6kW).
  
- **CAM-V44:** The standard cooling coil is five rows, copper tubes with fourteen aluminium plate fins per inch, with a face area of 1.26 m<sup>2</sup>. One or both of the following additional coils will be available as optional:
  - a) One row additional heating coil: copper tubes with twelve aluminium plate fins per inch with a surface area of 0.83m<sup>2</sup>
  - b) Aluminium electric heaters: 9kW total capacity with three step automatic intervention (3+6kW).

The CAM-V unit will be supplied with the following valves and actuators:

- Standard valve will be three way L&D type (CAM-V11 Kvs = 6,3; CAM-V22 Kvs = 10; CAM-V33 Kvs = 16; CAM-V44 Kvs = 16)
- HW valve for optional one row coil will be three way L&D type (CAM-C11 Kvs=4; CAM-V22 Kvs=4; CAM-V33 Kvs=6.3; CAM-V44 Kvs=6.3)

### 1.3.2 Electric Heater Coil

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

### 1.3.3 Direct Expansion (DX) Coil

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

## 1.4 Fan Section

The CAM-V is equipped with quiet, low speed centrifugal fan(s), each with integral variable speed independent electric motor with built-in thermal protection. The electric motors are IP10 protection and class F insulation. The fan speed is automatically controlled by the Flexface microprocessor controller (0-10V output) according to the air volume drawn by the

terminal units. 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. They are secured by toggle belts and anti vibration gaskets on V11 and V22 units, whilst the fans of V33 and V44 units are mounted on anti-vibration frames and secured by screws. Fan motors are fitted with automatically resettable temperature sensing devices. The CAM-V 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-V on the basis of the air volume drawn by the TUx (connected to the CAM-V) 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 multi-input board
- 1 x electrical heater card (where required)
- 1 x water thermostat (not for CAM-V 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/h 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 electric heater element. A warning light shows when the cylinder must be replaced. An automatic flush control system is standard.

### **1.8 Baseframe**

A simple frame is supplied for use with the CAM-V.

### **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-V are 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.

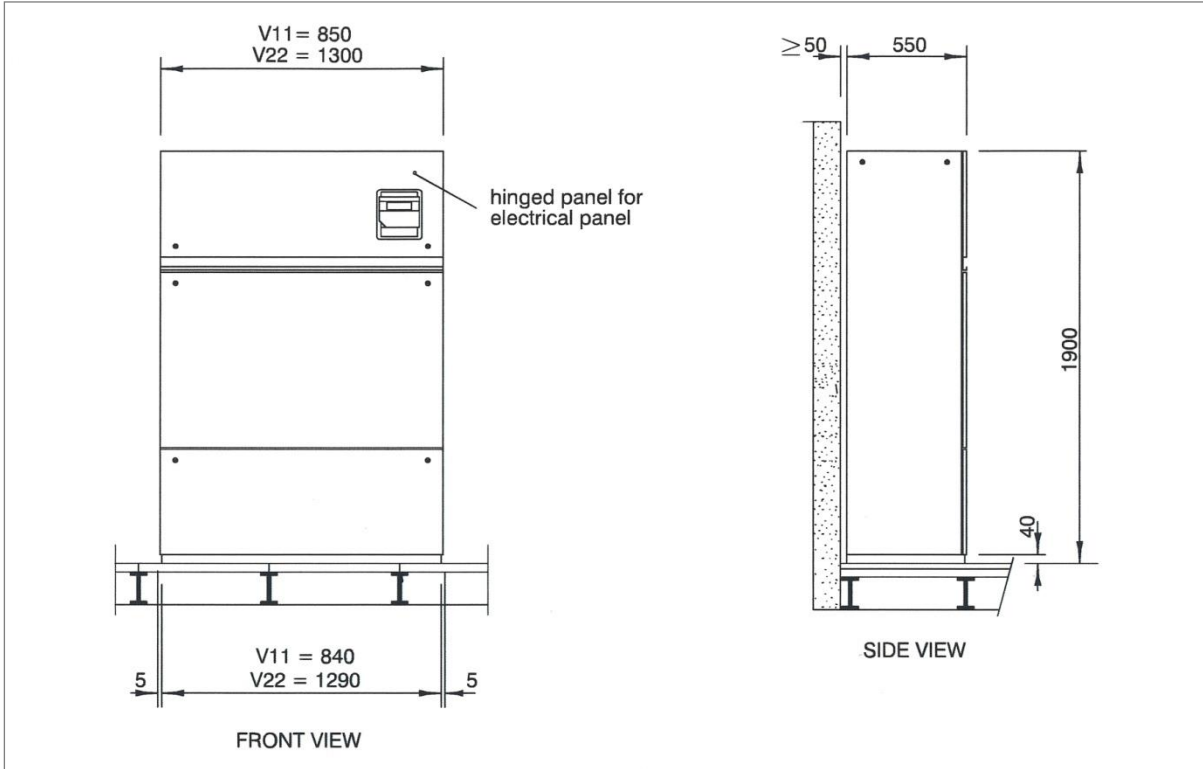
### **1.11 Product Quality and Safety**

The units of the CAM-V series are marked as compliant with the European directives concerning mechanical, electrical and electromagnetic safety (2006/42/EC, 2004/108/EC, 2006/95/EC). The unit is supplied complete with a test certificate and conformity declaration.

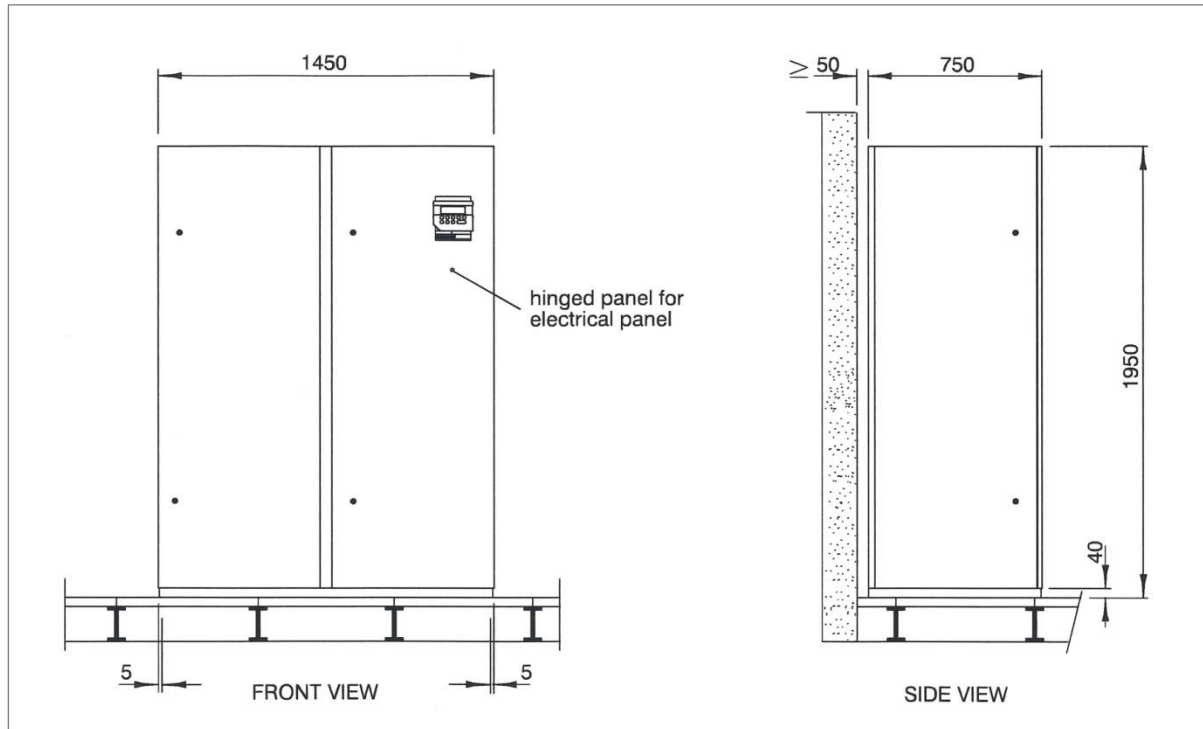
## Section Two: Technical Data

### 2.0 Overall Dimensions and Unit Weight

#### AET V11 – V22



#### AET V33 – V44

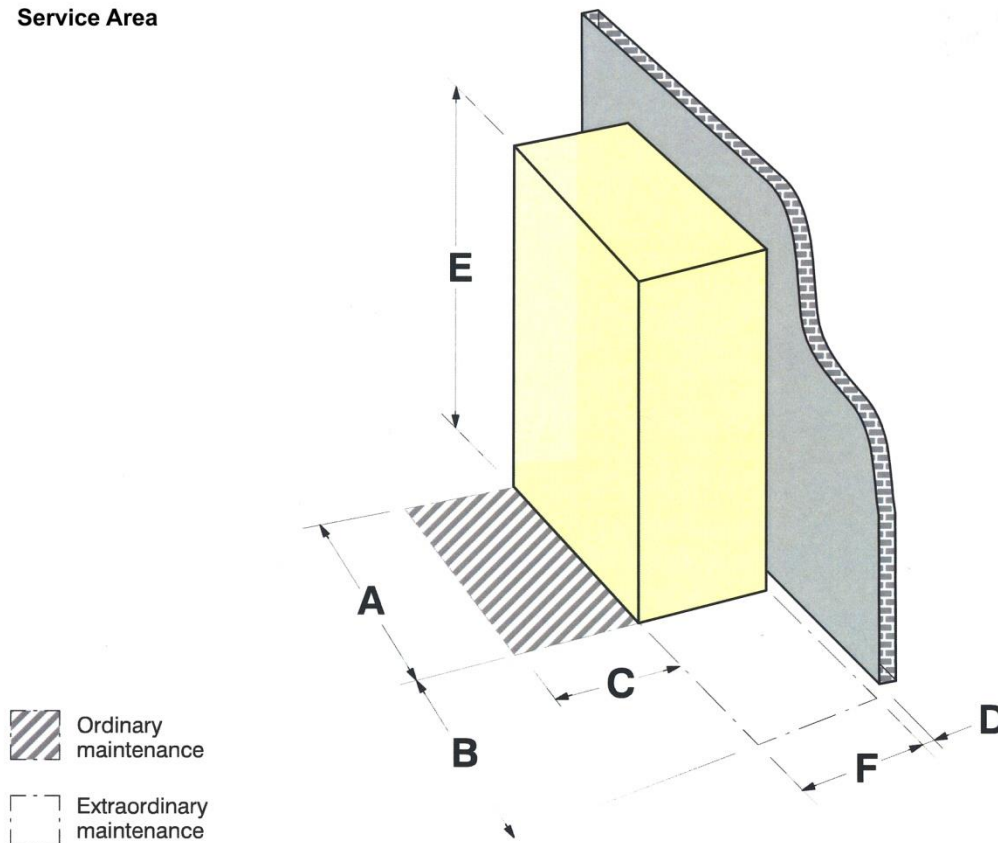


## 2.1 Unit Weight (Indicative)

Model	Maximum Weight
CAM-V11	217 kg
CAM-V22	312 kg
CAM-V33	389 kg
CAM-V44	412 kg

## 2.2 Opening in Raised Floor and Service Area

Service Area



	Model			
	V11	V22	V33	V44
A (mm)	850	1300	1450	
B (mm)	800	1200	1415	
C (mm)	800			
D (mm)	≥ 50			
E (mm)	1900		1950	
F with panels (mm)	550		750	
F without panels (mm)	-		-	

## 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-V 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.

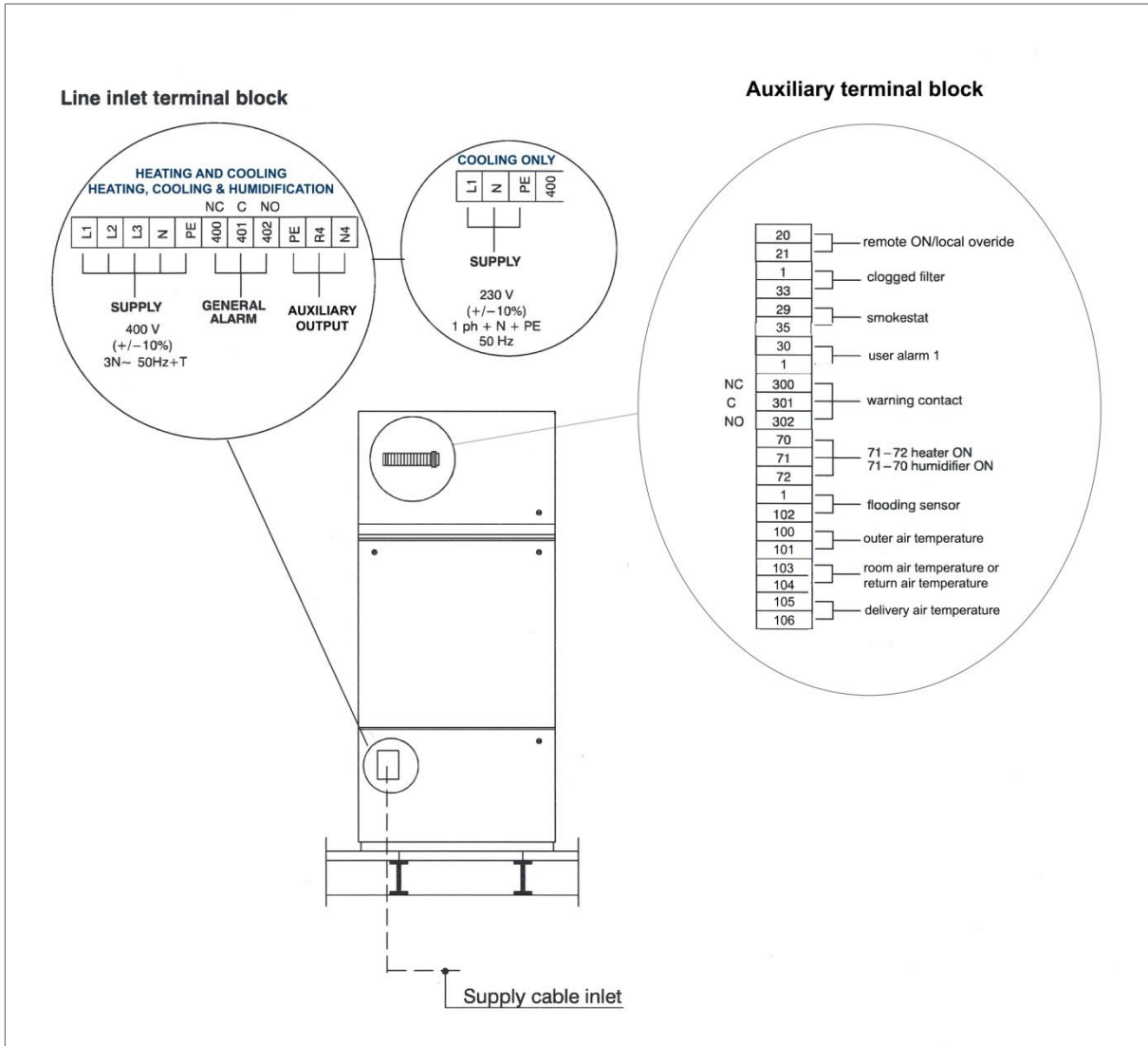
### CAM-V Sound Pressure Level dB(A)

<b>CAM V11</b>	Air flow (m3/h)	1120	1500	2000	2500	3000	3240
	SPL base version	33	34	39	43	45	46
<b>CAM V22</b>	Air flow (m3/h)	3000	3500	4000	4500	5000	5400
	SPL base version	37	39	42	45	47	48
<b>CAM V33</b>	Air flow (m3/h)	4000	5000	6000	7500	8500	9160
	SPL base version	38	41	46	51	53	55
<b>CAM V44</b>	Air flow (m3/h)	4000	5000	6000	7500	8500	8980
	SPL base version	38	41	46	51	53	55

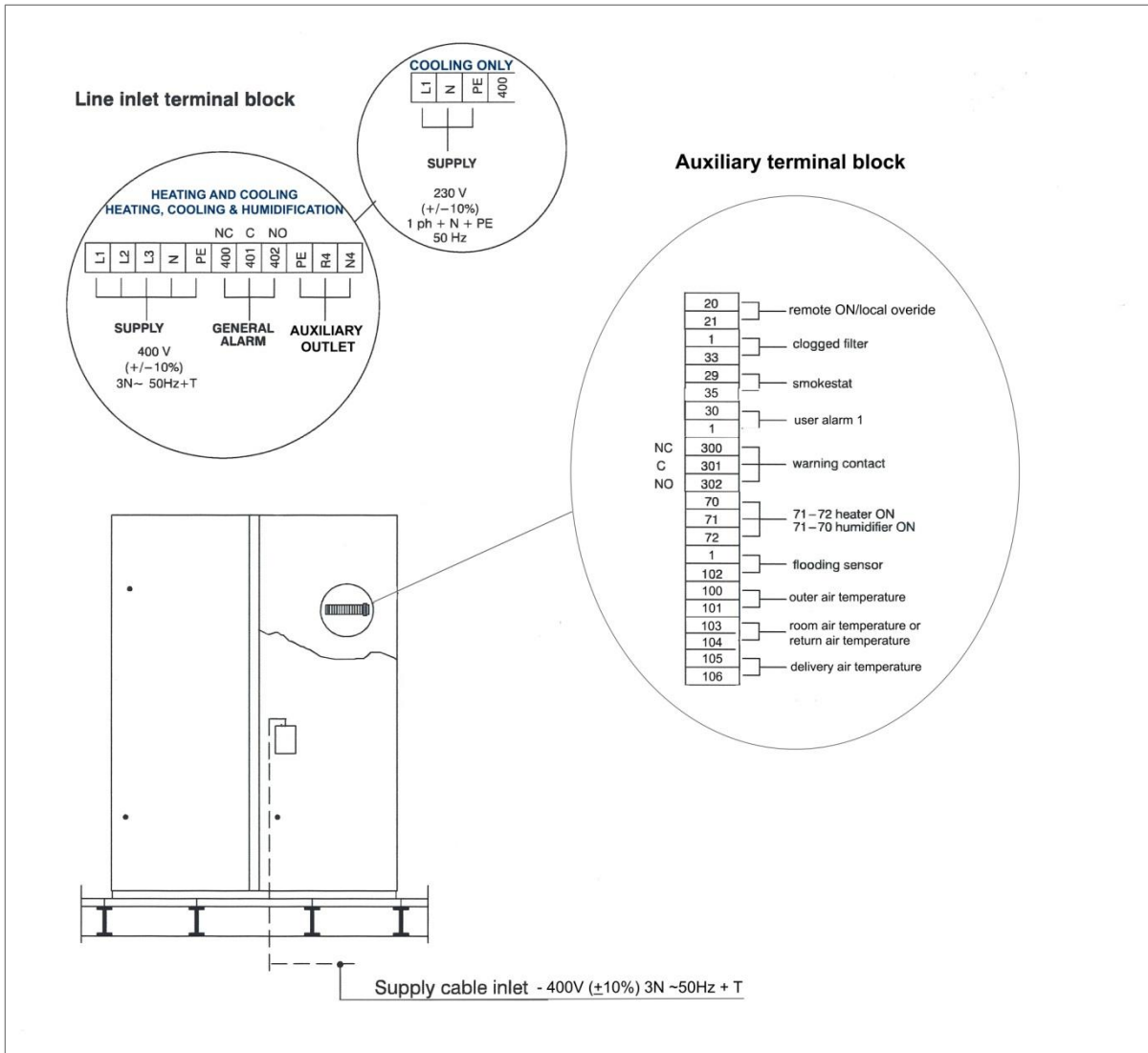
## 2.4 Electrical Data

### 2.4.1 Electrical Connections

#### CAM V11 – V22



**CAM V33 – V44**

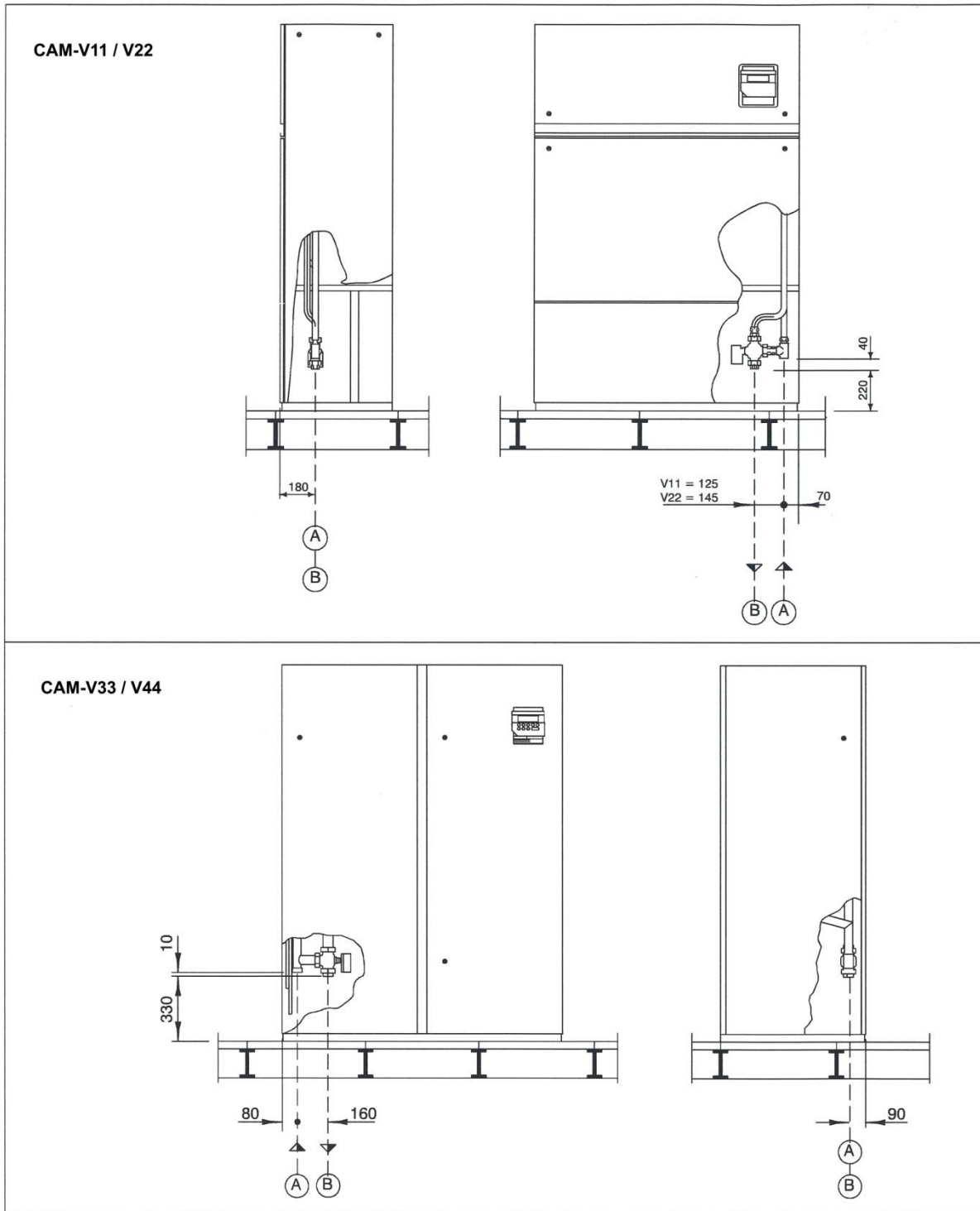


### 2.4.2 Power Consumption

Unit	Component	Electrical Supply	FLA (Full Load Ampere)	LOA (Locked Rotor Ampere)
CAM-V11	AC Fan	230V-1ph-50Hz	4.5	8.0
	EC Fan			
	Electric Heater (4500W)	400V-3ph-50Hz	7.2	-
	Humidifier	400V-3ph-50Hz	5	-
CAM-V22	AC Fan	230V-1ph-50Hz	9	16.0
	EC Fan			
	Electric Heater (7500W)	400V-3ph-50Hz	10	-
	Humidifier	400V-3ph-50Hz	5	-
CAM-V33	AC Fan	230V-1ph-50Hz	11.6	23.0
	EC Fan			
	Electric Heater (9000W)	400V-3ph-50Hz	13	-
	Humidifier	400V-3ph-50Hz	5	-
CAM-V44	AC Fan	230V-1ph-50Hz	11.6	23.0
	EC Fan			
	Electric Heater (9000W)	400V-3ph-50Hz	13	-
	Humidifier	400V-3ph-50Hz	5	-

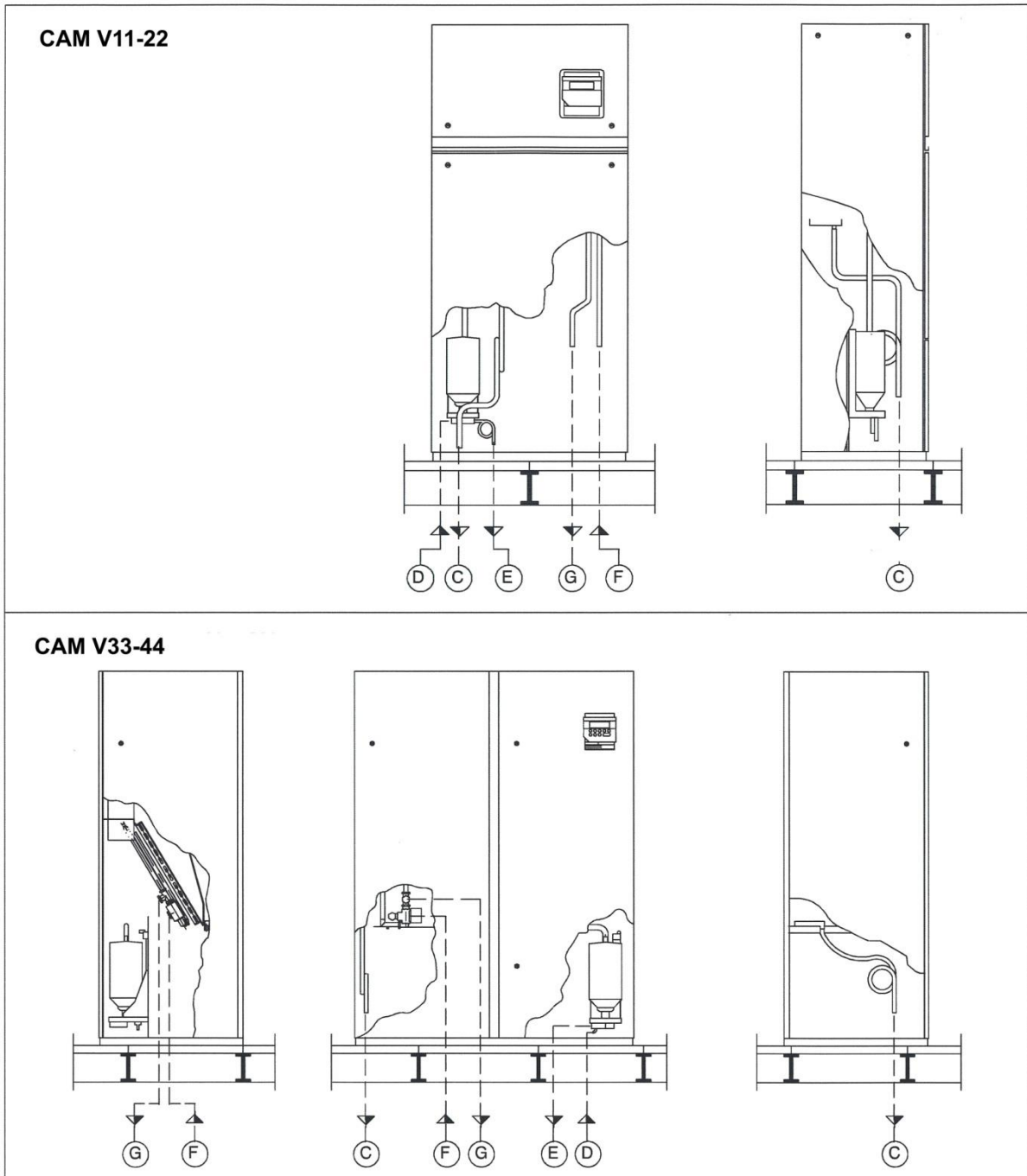


## 2.5 Water Connections



Pos.	Connections	Dimensions		
		CAM-V11	CAM-V22	CAM-V33/V44
A	Cooling water inlet	3/4" G female	1" G female	1 1/4" G female
B	Cooling water outlet	3/4" G female	1" G female	1 1/4" G female

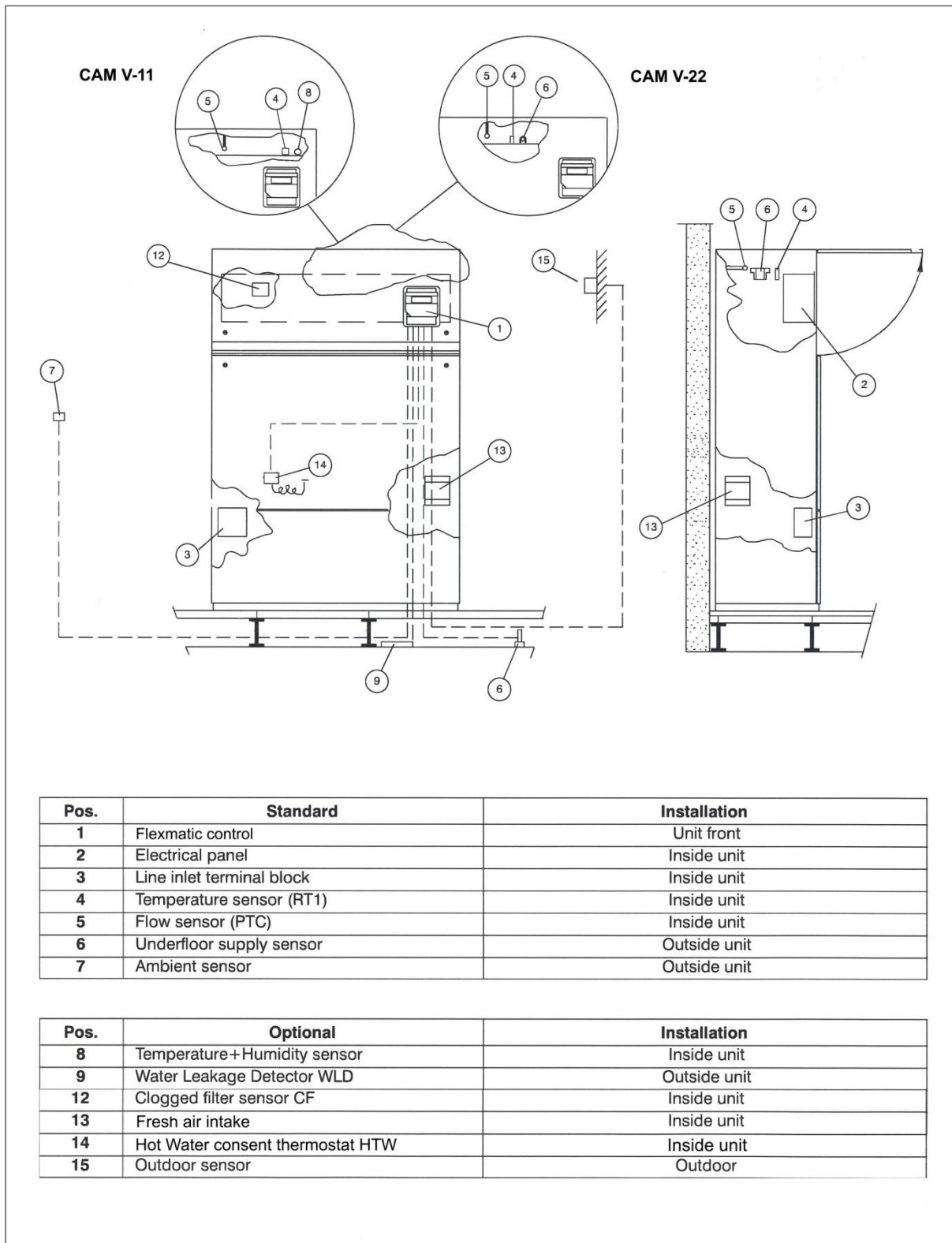
### 2.5.1 Auxiliary Water Connections



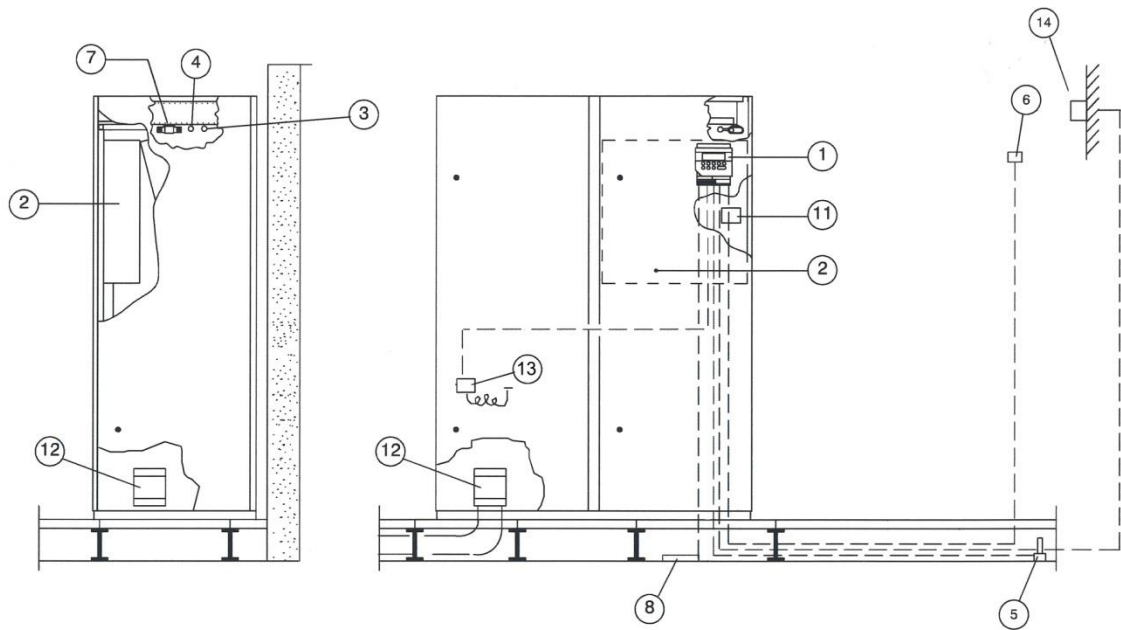
Pos.	Connections	Dimensions	
		CAM V11-V22	CAM V33-V44
C	Condenser drain	D 20 mm female	D 20 mm female
D	Humidair water supply (optional)	1/2" G male	1/2" G male
E	Humidair water drain (optional)	D 22 mm female	D 22 mm male
F	Hot water inlet (optional)	1/2" G female	3/4" G female
G	Hot water outlet (optional)	1/2" G female	3/4" G female

## 2.6 Instrument Installation

### CAM V11 – V22



**CAM V33 – V44**



Pos.	Optional	Installation
1	Flexmatic control	Unit front
2	Electrical panel	Inside unit
3	Temperature sensor (RT1)	Inside unit
4	Flow sensor (PTC)	Inside unit
5	Underfloor supply sensor	Outside unit
6	Ambient sensor	Outside unit

Pos.	Optional	Installation
7	Temperature + Humidity sensor	Inside unit
8	Water Leakage Detector WLD	Outside unit
11	Clogged filter sensor CF	Inside unit
12	Fresh air intake	Inside unit
13	Hot Water consent thermostat HTW	Inside unit
14	Outdoor sensor	Outdoor

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