Liebert HIROSS

Flexible Space System

CAM & HIVAR

SERVICE MANUAL

English

Cod. 272758

Rev. 10.06.2003

Issued by T.D.Service

EMERSON Network Power

Liebert HIROSS is a division of Emerson

Caution

We recommend that:

- the manual is retained for the entire service life of the machine;
- the user reads the manually carefully before carrying out any operations on the machine;
- the control is used exclusively for the purpose for which it is intended; incorrect use of the control shall release the manufacturer from any liability.

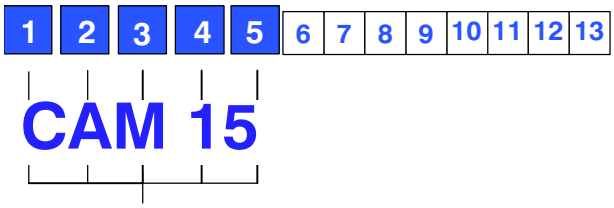
This manual has been prepared to enable the end–user to carry out only the operations that can be made with the panels closed. Any operations that require the opening of doors or equipment panels must be carried out only by qualified personnel.
Each machine is equipped with an Electric Insulating device which allows the operator to work in conditions of safety. This device must always be used to eliminate risks during maintenance (electric shocks, scalds, automatic restarting, moving parts and remote control).
The panel key supplied with the unit must be kept by the person responsible for maintenance.
For identification of the unit (model and serial no.) in case of the necessity for assistance or spare parts, locate the identification label on the outside of the unit.

Index

1 — Model Configuration Description

Digit Nomenclature

The unit is fully defined by thirteen digits.



Basic Module
CAM 15
CAM 25
CAM 35

Digits 1, 2, 3, 4, 5 — Basic Unit

Chilled water air conditioner inclusive of:

- electrical panel
- centrifugal direct driven fan(s)
- internally insulated panels
- 3 rows chilled water coil with 3—way modulating valve
- G3 filter

Digit 6 — Additional Panel

0 None
1 Included

Digit 7 — Hot Water Coil

0 None
W With 3—way modulating valve (Only with Macroface)

Digit 8 — Electrical Heating

0 None
1 Electrical heating 4.50 kW/380 V (CAM 15—25)
2 Electrical heating 10.35 kW/380 V (CAM 25—35)
3 Electrical heating 14.85 kW/380 V (CAM 35)

Digit 9 — Humidity Control System

0 None
V Humidair 5 kg/h with Humitemp sensor
Z Only dehumidification with Humitemp sensor (with Macroface)

Note: *The dehumidification is available only with additional hot water coil or Electric Heating.*

Digit 10 — Automatic Control

A With Microface
B With Microface + display
C With Microface + Hiromatic Evolution

Digit 11 — Air Filter Efficiency

A G3
B F5
C F7

Note: *If F5 filters are ordered than G3 filters are reccomended for start up only. (See accessories).*

Digit 12 — Packing

P Polystirene corners and plastic film
C Cardboard and Wooden Crate
S Seaworthy

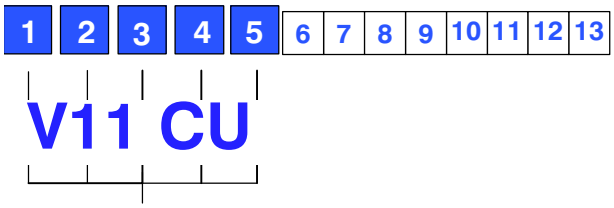
Digit 13 — Special Requirements

0 None
X As specified

Note: *The base frame must be considered as an integral part of the CAM unit. It must be chosen according to the under floor air distribution pattern. Please refer to separate section "base frame for CAM".*

Digit Nomenclature

The unit is fully defined by thirteen digits.



Basic Module
V11 CU
V22 CU
V33 CU
V44 CU

Digits 1, 2, 3, 4, 5 — Basic Unit

Chilled water air conditioner inclusive of:

- electrical panel
- centrifugal direct driven fan(s)
- internally insulated panels
- chilled water coil with 3—way modulating valve
- G3 filter

Digit 6 — Not Applicable

Digit 7 — Hot Water Coil

0 None
W With 3—way modulating valve (Only with Macroface)

Digit 8 — Electrical Heating

0 None
1 Electrical heating 4.50 kW/380 V
2 Electrical heating (V22: 5.85 kW; V33—44: 9 kW)

Digit 9 — Humidity Control System

0 None
V Humidair 5 kg/h with Humitemp sensor
Z Only dehumidification with Humitemp sensor

Note: *The dehumidification is available only with additional hot water coil or Electric Heating.*

Digit 10 — Automatic Control

A With Microface
B With Microface + display
C With Microface + Hiromatic Evolution

Digit 11 — Air Filter Efficiency

0 G3
1 F4
2 F5
3 = G3 with Clogged Filter Pressure Switch
4 = F4 with Clogged Filter Pressure Switch
5 = F5 with Clogged Filter Pressure Switch

Digit 12 — Packing

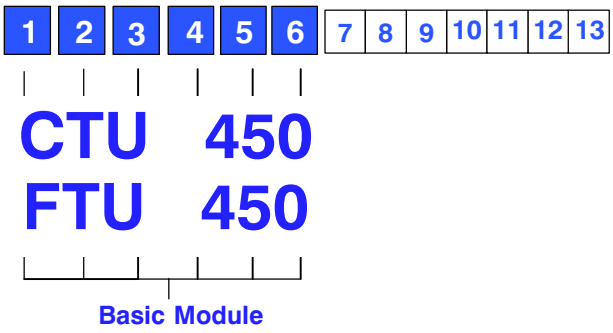
P Polystirene corners and plastic film
C Cardboard and Wooden Crate
S Seaworthy

Digit 13 — Special Requirements

0 None
X As specified

Digit Nomenclature

The unit is fully defined by thirteen digits.



Digits 1, 2, 3, 4, 5, 6 — Basic Unit

CTU450 TERMINAL UNIT, vertical console inclusive of:

- two centrifugal fans,
- motorized damper,
- multifunctional electronic control,
- grillles,
- 4.6 m power connection cable with plug and 1,5 m RG45 type round data connection cable

FTU450 TERMINAL UNIT, for floor recessed installation inclusive of :

- two centrifugal fans,
- motorized damper,
- multifunctional electronic control,
- air discharge and intake floor grilles,
- 4.6 m power connection cable with plug and 1,5 m RG45 type round data connection cable.

NOTE: *Under floor minimum height for FTU450 = 220 mm*

Digit 7, 8 —Electrical Heating

00 None
10 Electrical heating 220V / 1ph / 50Hz — 250 W
20 Electrical heating 220V / 1ph / 50Hz — 500 W

NOTE: *1000 W electrical heating is available upon request.*

Digit 9 — Automatic Control

2 Liebert—Hiross multifunctional control, with two temperature sensors (room and supply air) and display + onboard Bus card.

Digit 10 — Special Requirements

0 None

Digit 11 — Packing

0 Standard

Digit 12 — Suction and Discharge Grilles (FTU)

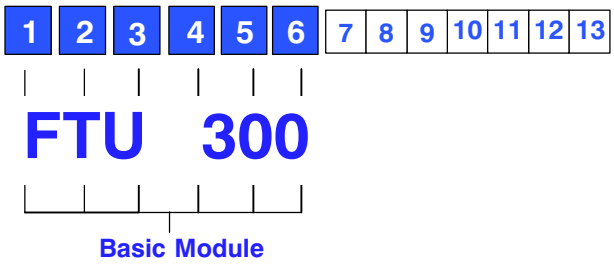
0 Standard (new patented adjusting heigh screw)
X Special

Digit 13 — Power Supply

0 Standard European plug Shuko (5 m)
1 Standard British plug (5 m)
2 None (w/o plug and cable)

Digit Nomenclature

The unit is fully defined by thirteen digits.



Digits 1, 2, 3, 4, 5, 6 — Basic Unit

FTU300 TERMINAL UNIT, for floor recessed installation inclusive of :

- frame
- two centrifugal fans,
- motorized damper,
- multifunctional electronic control,
- one grille for air suction and discharge,
- 4.6 m power connection cable with plug and 1,5 m RG45 type round data connection cable.

Digit 7 — Under floor casing

1 H = 150 mm

Digit 8 — Electrical Heating

0 None
2 Electrical heating 230V / 1ph / 50Hz — 300 W

Digit 9 — Automatic Control

0 Electronic control with 2 sensors, on/off switch, fan speed switch, set—point switch, bus—card for network connection.

Digit 10 — Suction and Discharge Grille

0 Anodized aluminium grille with access hatch

Digit 11 — Packing

0 Standard

Digit 12 — Special Requirements

0 None
X As specified

Digit 13 — Power Supply

0 Standard European plug Shuko (5 m)
1 Standard British plug (5 m)
2 None (w/o plug and cable)

2 — Preliminary operations

2.1 — Inspection

On receiving the equipment immediately check its condition; report any damage to the transport company at once.

2.2 — Handling

- Always keep the unit vertically upright and do not leave it out in the open.
- If possible transport the unit using a fork lift truck; otherwise use a crane with belts or cables, avoiding pressing on the top edges of the packing.

2.3 — Operating limits

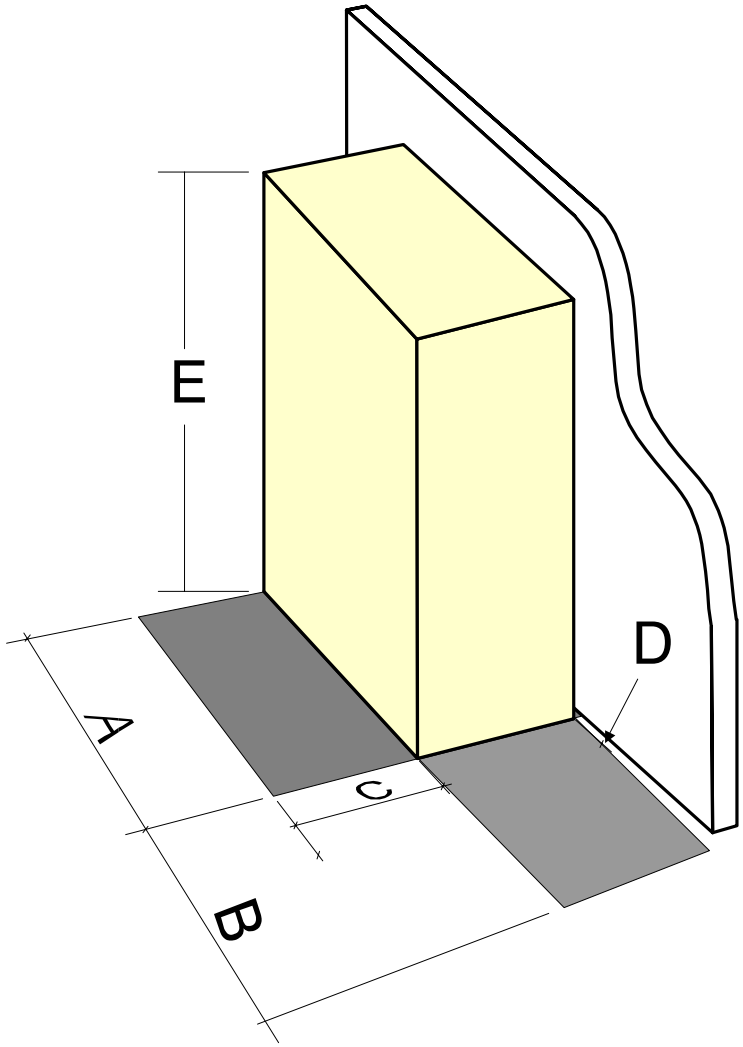
The units are designed to operate within working ranges (see Tab. 1).
These limits are referred to new machines or to those that have been correctly installed and serviced.
The warranty clauses are no longer valid for any possible damage or malfunction that may occur during or due to operation outside the application values.

Tab. 1 — Operating limits

Room conditions	from:	18°C, 45% R.H.	Chilled water coil	inlet water temperature	min. 5°C
	to:	27°C, 55% R.H		water pressure	max. 16 bar
Voltage tolerances		400V± 10%/3/50	Storage conditions	from:	– 20°C
Hot water heating coil	inlet water temperature	max. 85°C		to:	50°C
	water pressure	max. 8.5 bar			

3 — Positioning

Fig. 1 — Clearance areas and main dimensions

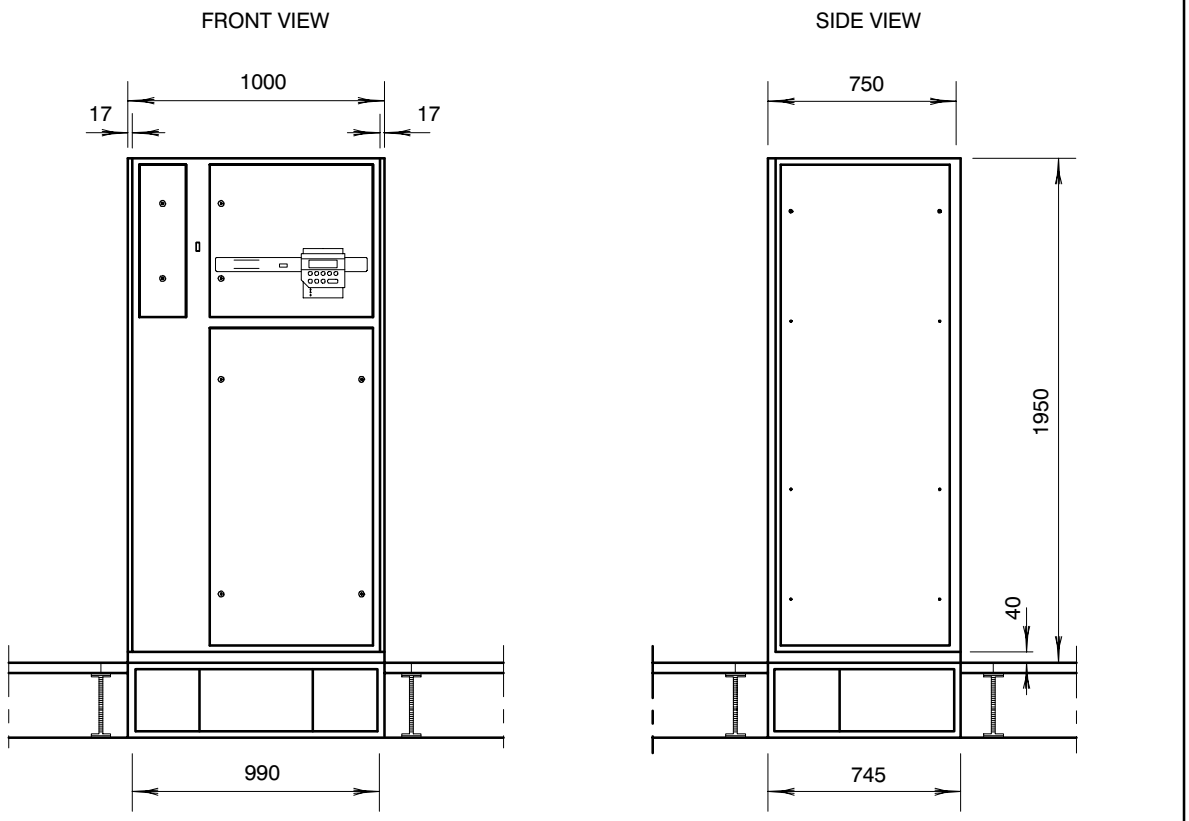


	MODEL						
	CAM 15	**CAM25**	**CAM35**	**V11**	**V22**	**V33**	**V44**
A [mm]	1000	1450	2000	850	1300	1450	1450
B [mm]	930	1380	1930	800	1200	1415	1415
C [mm]	800	800	800	800	800	800	800
D [mm]	100	100	100	100	100	100	100
E [mm]	1950	1950	1950	1900	1900	1950	1950

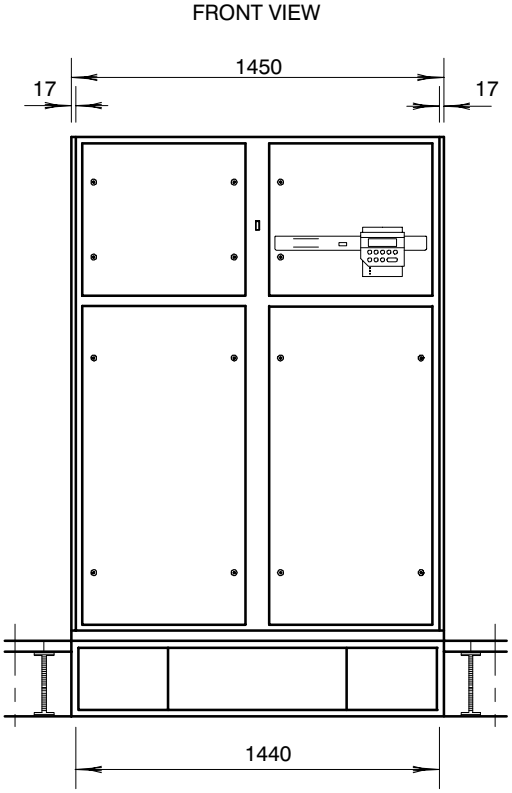
MODEL	**WEIGHT (kg) — standard unit**
CAM15	282
CAM25	385
CAM35	500
V11	204
V22	282
V33	360
V44	378
FTU 450	24 + 6.6 (grilles)
FTU 300	16.5 + 2.5 (grille)
CTU 450	24.5
FAM 700	

Fig. 2 — Overall dimensions

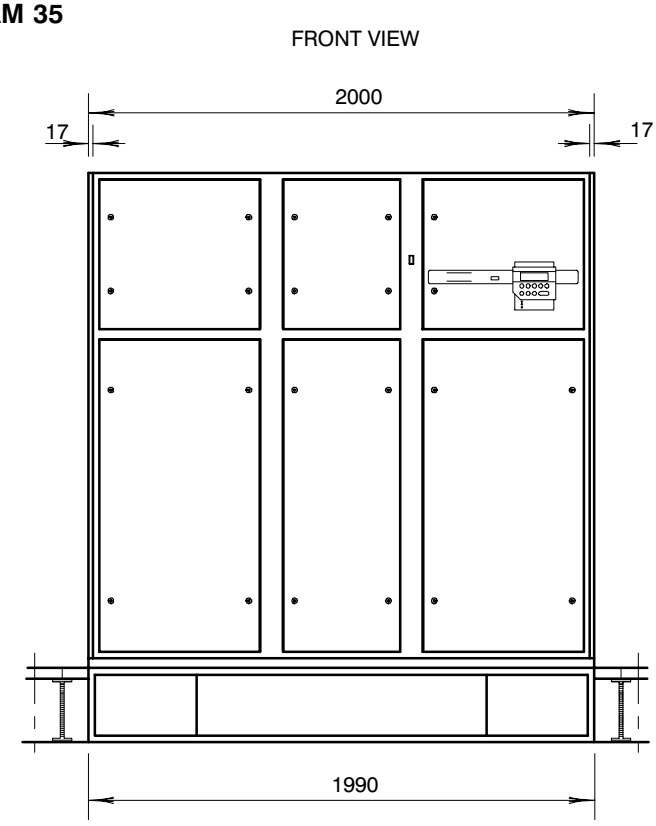
CAM 15



CAM 25

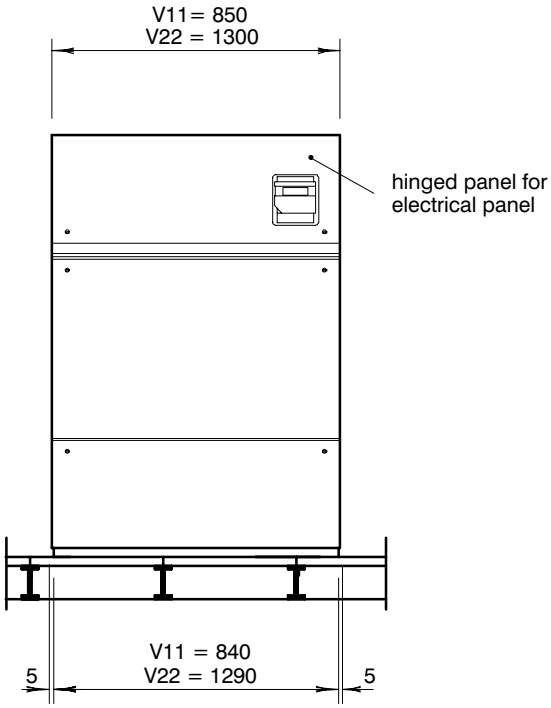


CAM 35

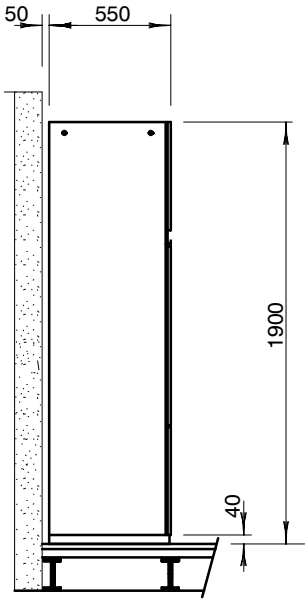


HIVAR V11–22CU

FRONT VIEW

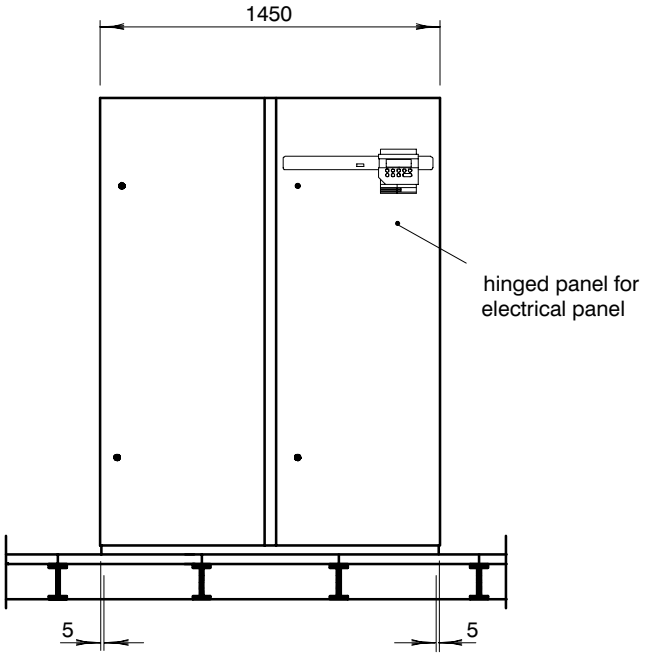


SIDE VIEW

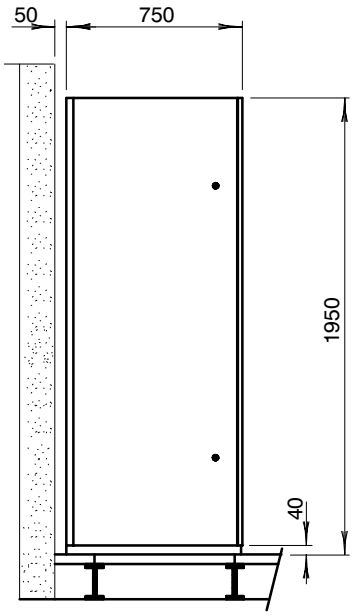


HIVAR V33–44CU

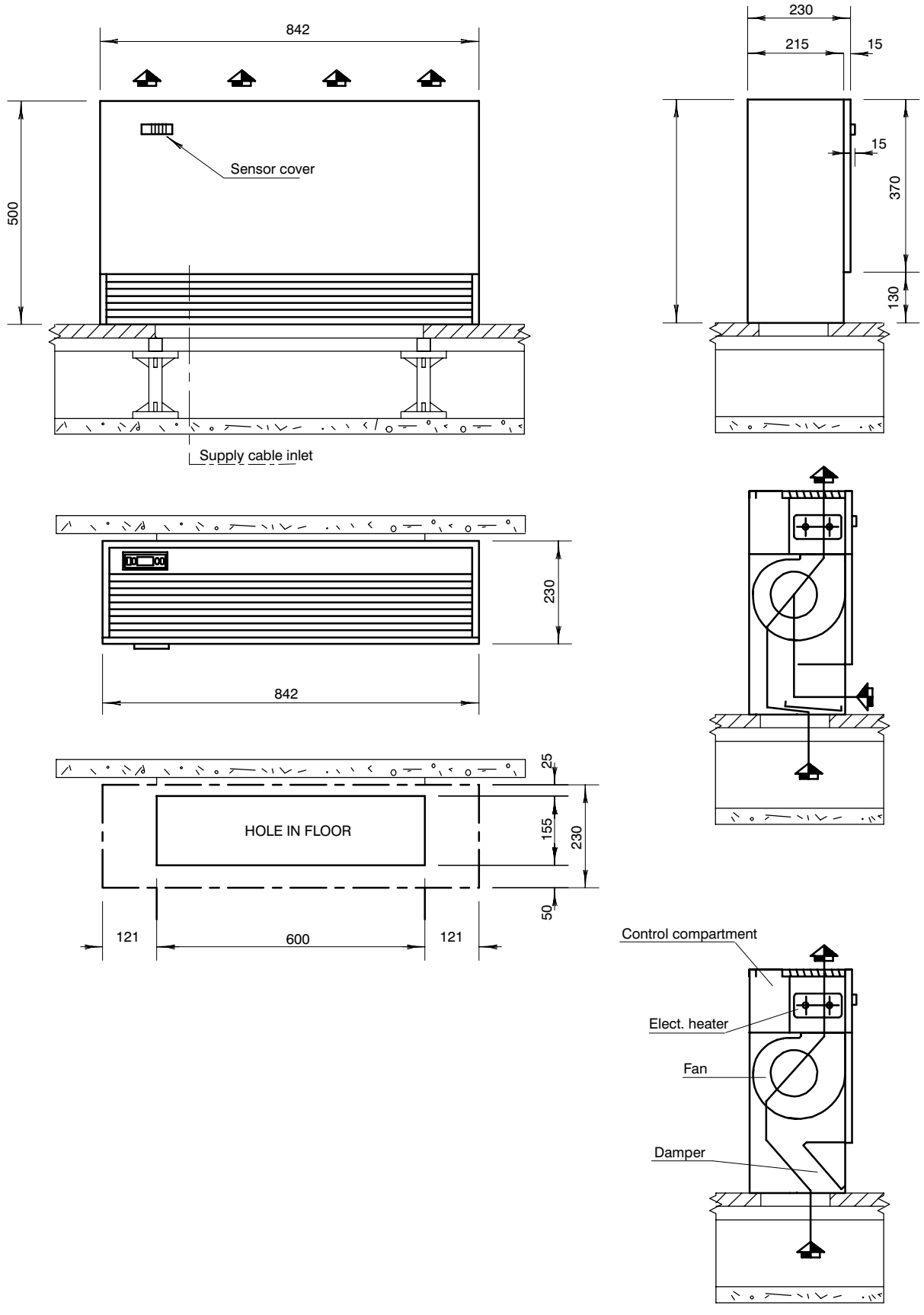
FRONT VIEW



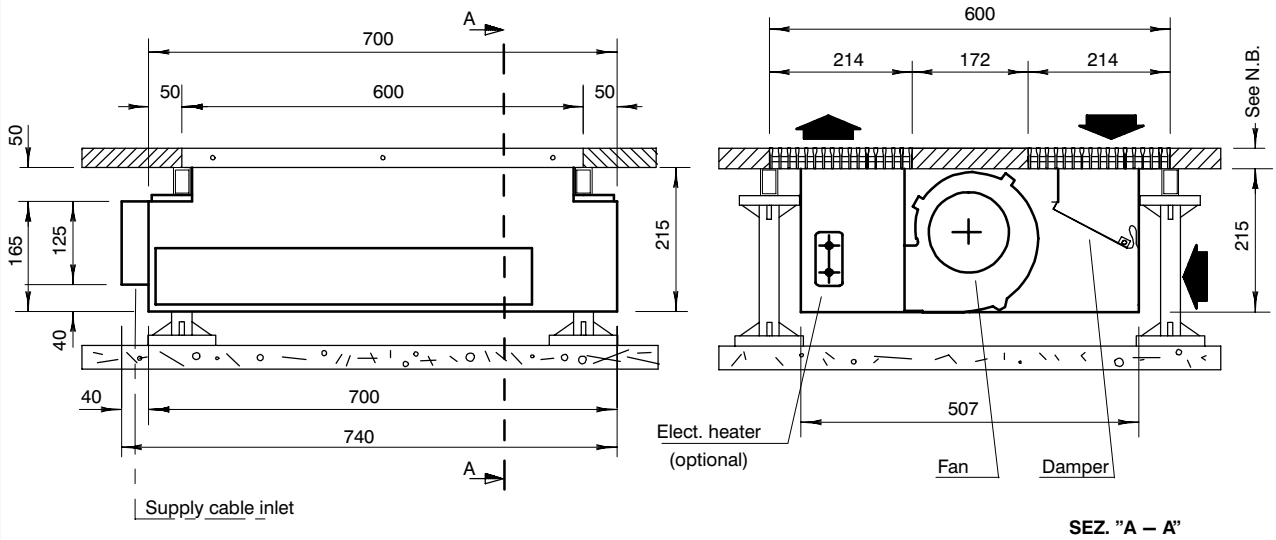
SIDE VIEW



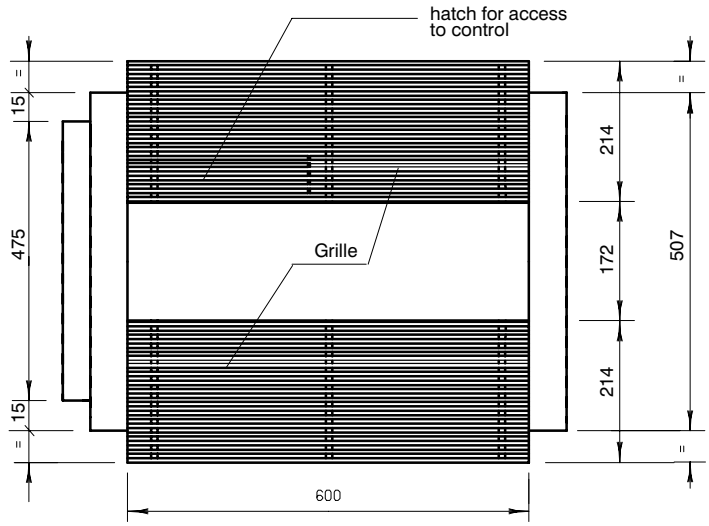
Overal dimensions and hole in floor – CTU 450



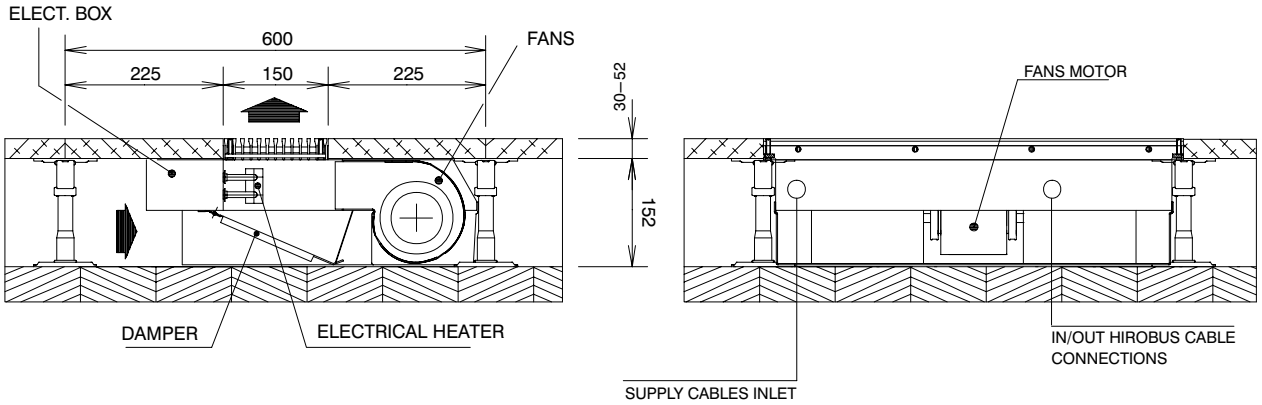
Overal dimensions — FTU 450

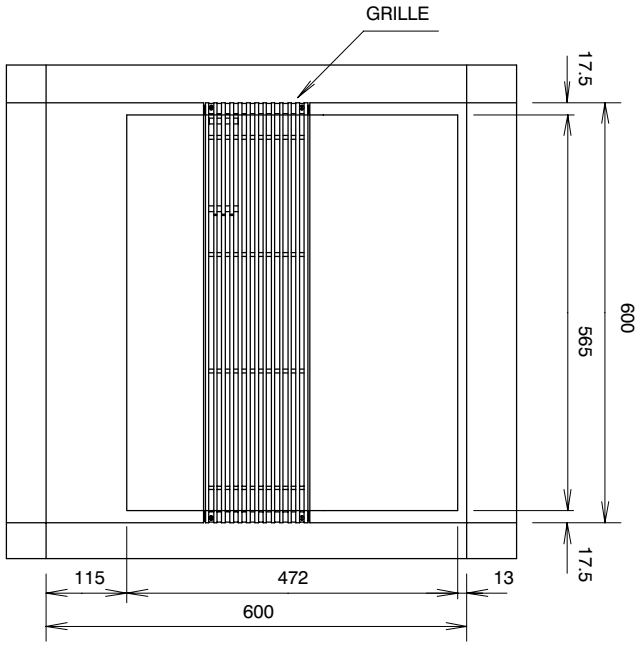


SEZ. "A — A"

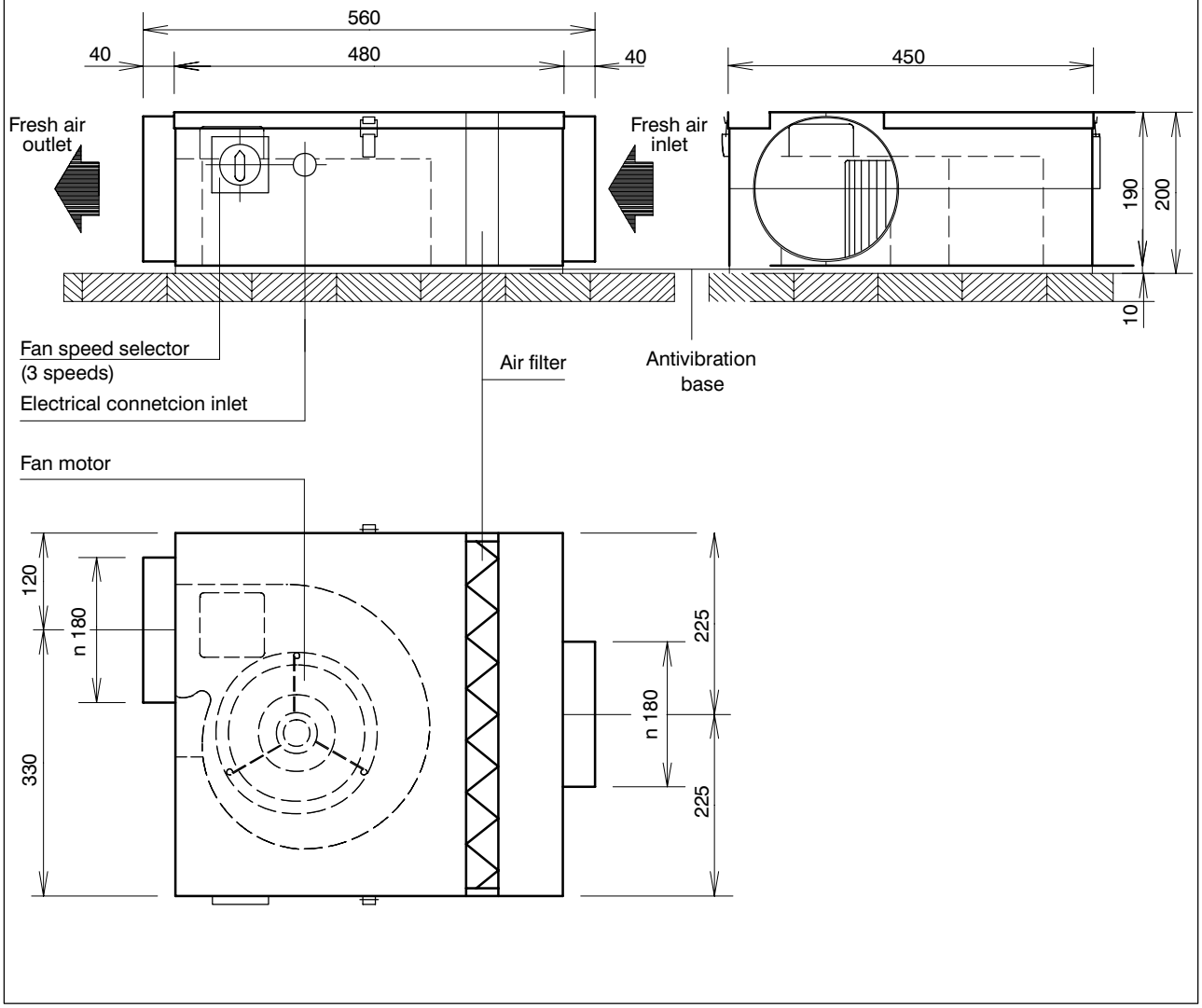


Overal dimensions — FTU 300





Overal dimensions – FAM 700



4 — Installation

ATTENTION: The conditioner must never be installed out of doors.

4.1 — Installation of CAM's baseframe

- Ensure that the Baseframe to be installed is as for that specified for the project.
- Apply the sealing gasket to the frame's top edge.
- Note the reference labels.,
- Position the frame as specified in the project drawing.

WHEN POSITIONING THE BASEFRAME RESPECT THE SERVICE AREA SHOWN IN THE INSTALLATION DRAWINGS AND "FRESH AIR" DRAWINGS. THE BASEFRAME'S SUPPLY AND RETURN PASSAGES MUST BE FREE OF ALL OBSTRUCTIONS (WALLS, TUBES, DUCTS, ETC.) WHICH CAN EFFECT THE FREE AIR FLOW.

4.2 — CAM positioning

- Arrange the baseframe according to the selected configuration.
- Place the CAM on top of the Baseframe (ensure that the Baseframe's front is positioned correctly).
- Fix the CAM to the Baseframe using 4 screws (screwed into the bottom of the CAM).

ATTENTION
ALLOW A SERVICE AREA AROUND THE UNIT, WITH DIMENSIONS AS QUOTED IN THE INSTALLATION DRAWINGS.

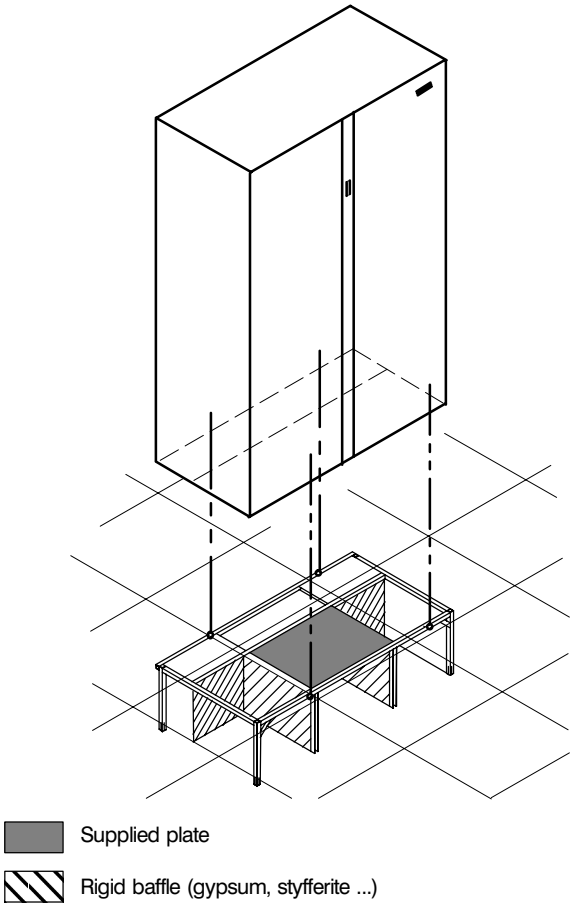
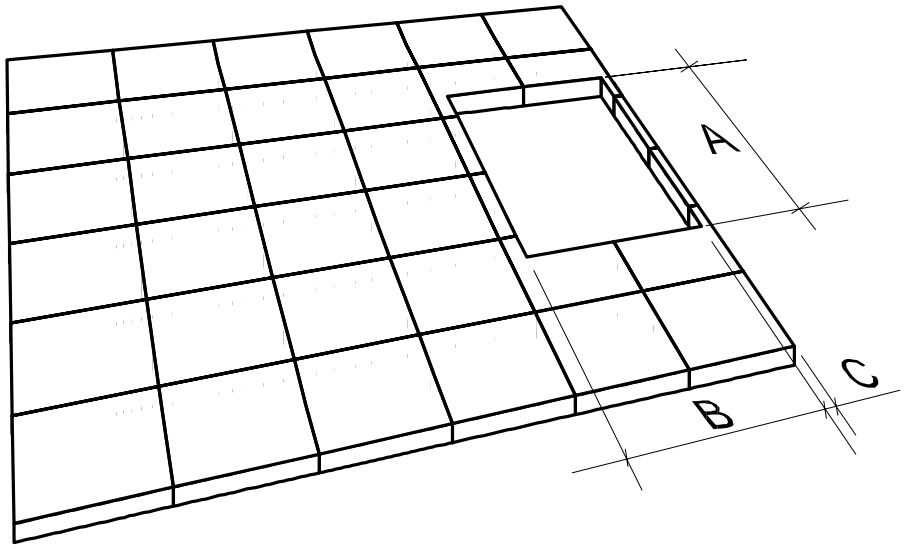


Fig. 3 — Hole in raised floor



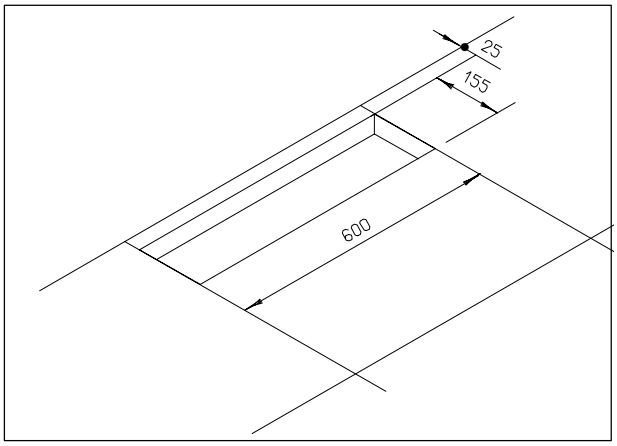
	CAM 15	CAM 25	CAM 35
A [mm]	995	1445	1995
B [mm]	750	750	750
C [mm]	100	100	100

The dimensions of the hole are foreseen for the Baseframe complete with perimetral insulation gasket.

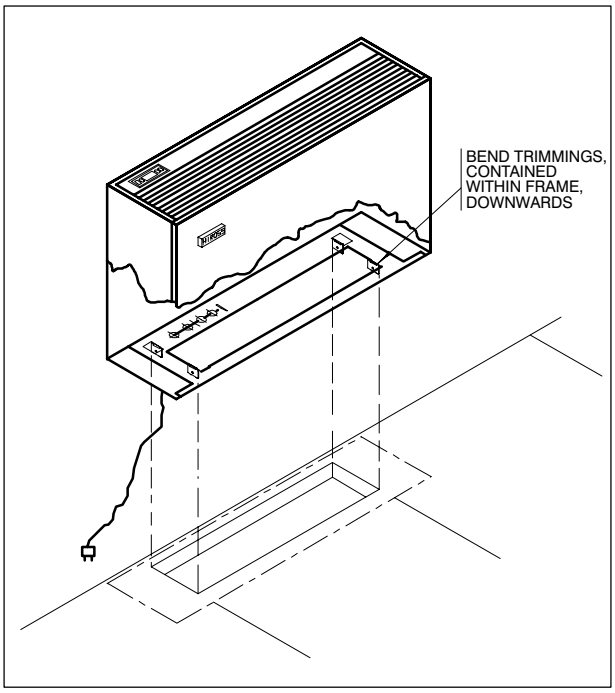
	V 11	V 22	V 33	V 44
A [mm]	845	1295	1445	1445
B [mm]	550	550	750	750
C [mm]	100	100	100	100

4.3 – CTU positioning

- Position the CTUs exactly as for the project drawing and install them according to the procedure which follows.
- Make a hole in the floor as for the drawing.



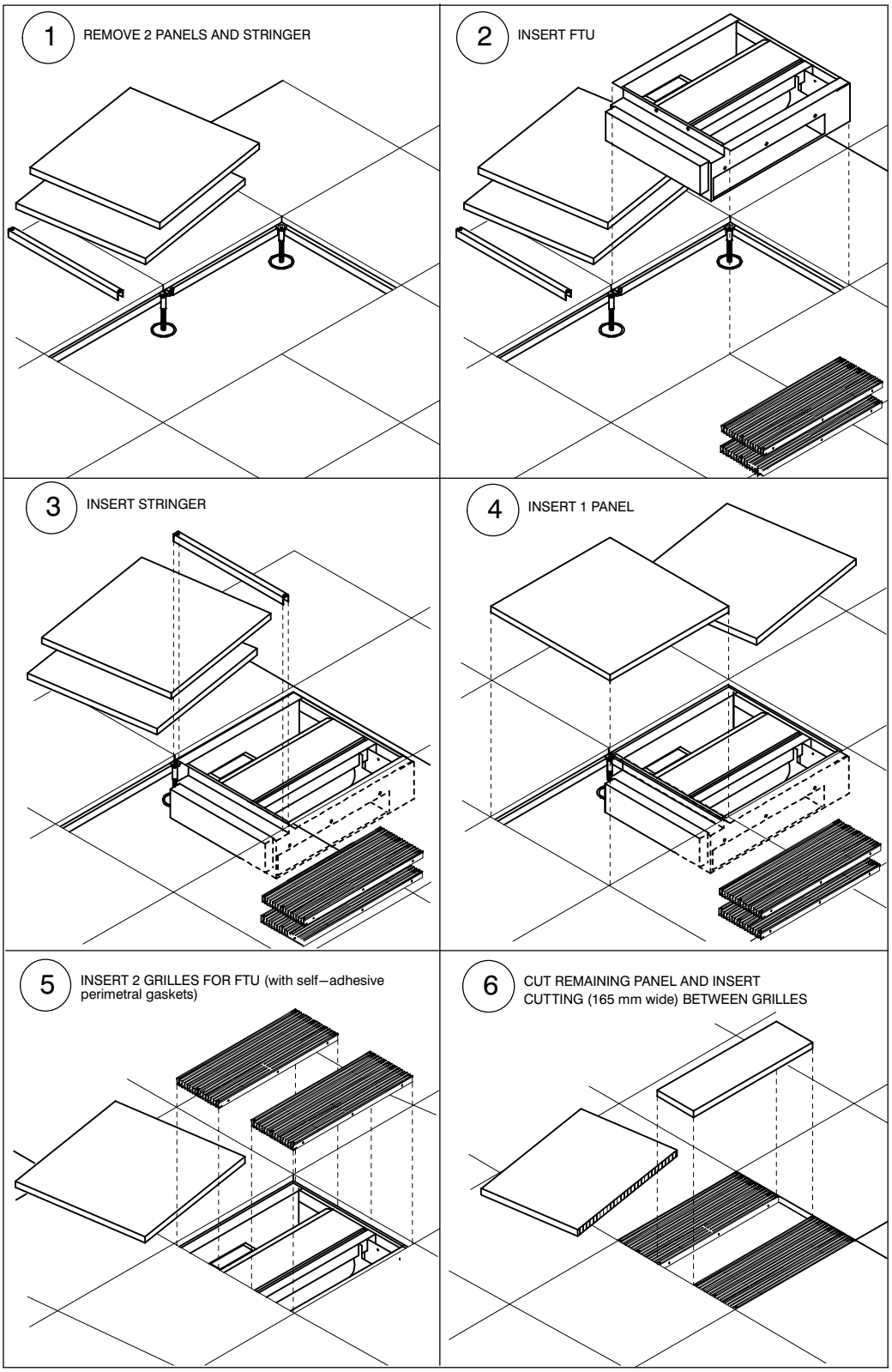
- Carefully cut the piece of panel between the CTU and the wall, seeing as this must guarantee a good airtightness. For irregular wall profiles use a sealing gasket.
- Insert the CTU as for the drawing below and bend the trimmings to hold the CTU in place.



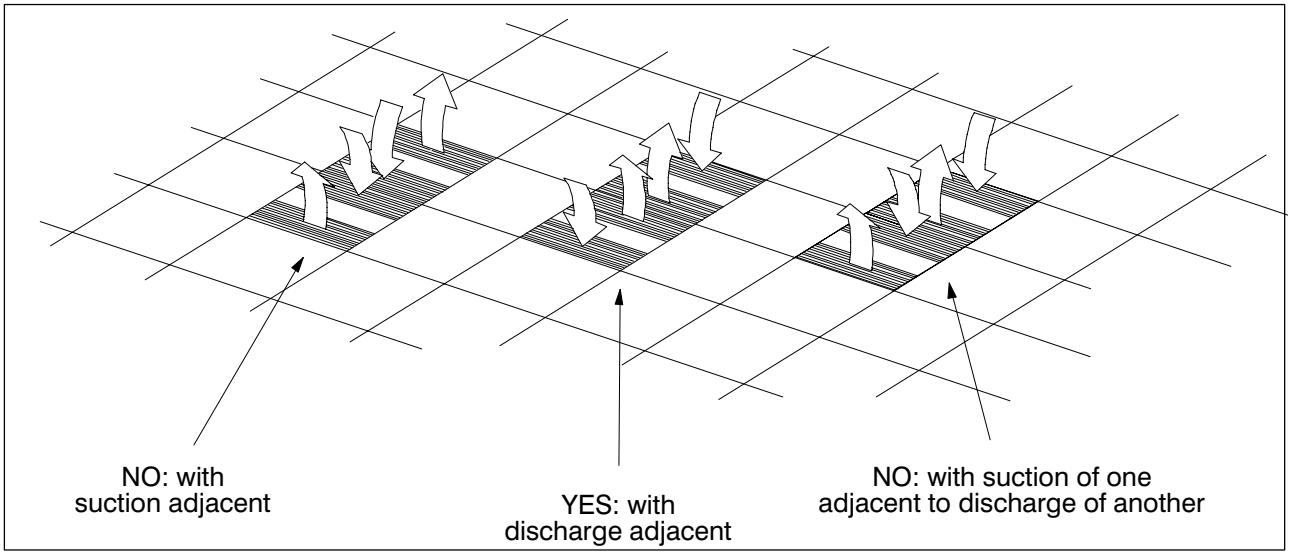
- Extract the cable from below the CTU and connect it to an underfloor electrical socket (230V ± 10%).

4.4 – FTU positioning

- Position the FTUs exactly as for the project drawing.
- Extract the cable from below the FTU and connect it to an underfloor socket (230V ± 10%).



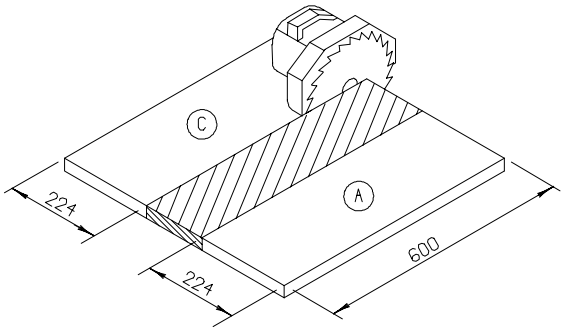
- If FTUs are to be positioned close together install them as below.



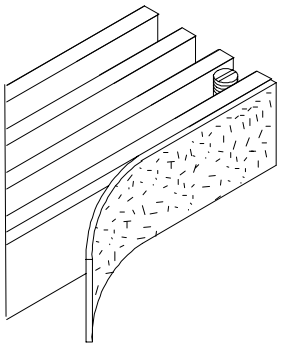
4.5 — Grille positioning

4.5.1 — Installing a grille

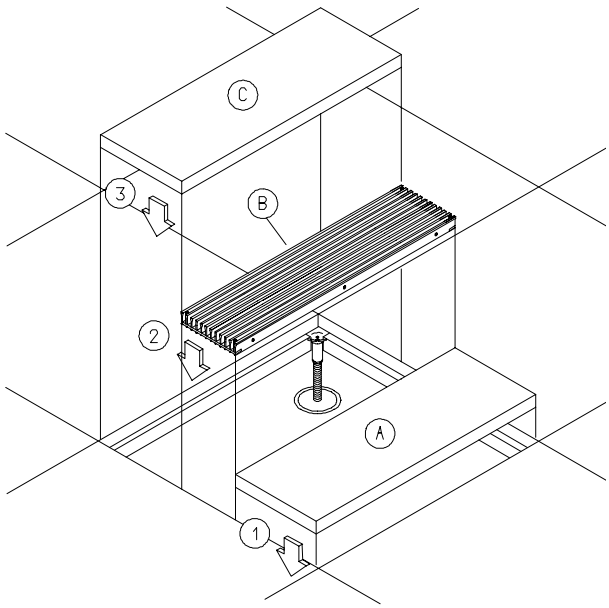
- Position the grilles exactly as for the project drawing.
- Remove an entire panel from the raised floor, in correspondence to where the grille is to be placed.
- Cut the panel as below.



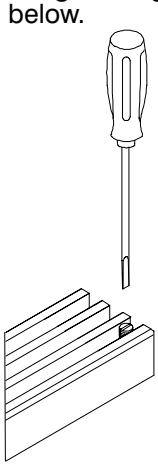
- It is advised to apply a sealing gasket along the two longest edges of the grille, as below.



- Insert the grille (B) and panel cuttings (A, C) as shown in the picture.

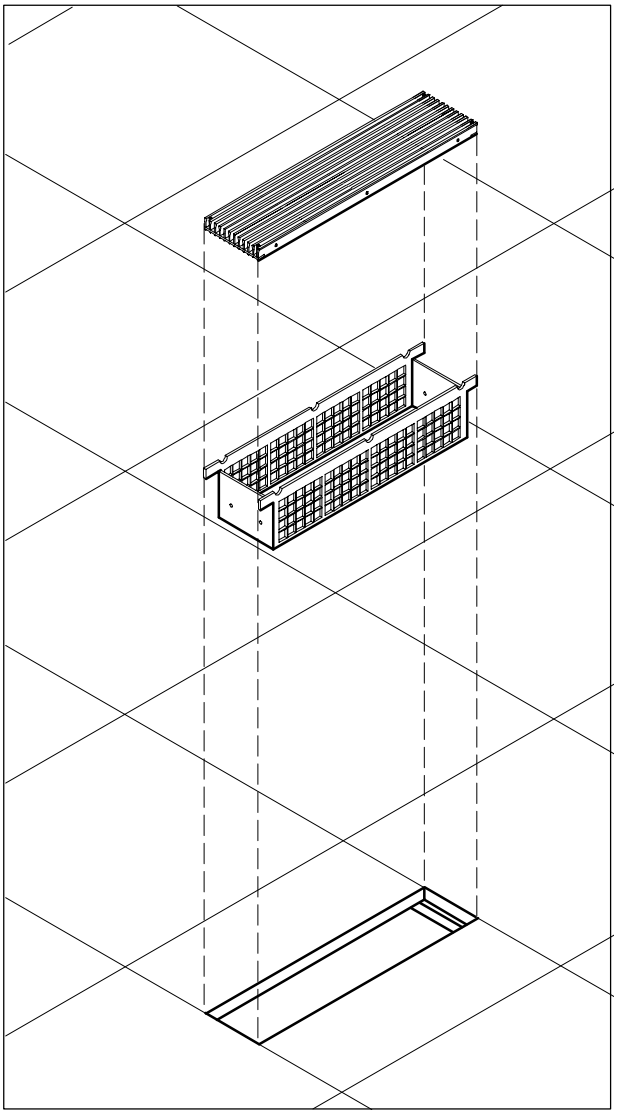


- Regulate the grille height using the 4 screws on the grille itself, as below.



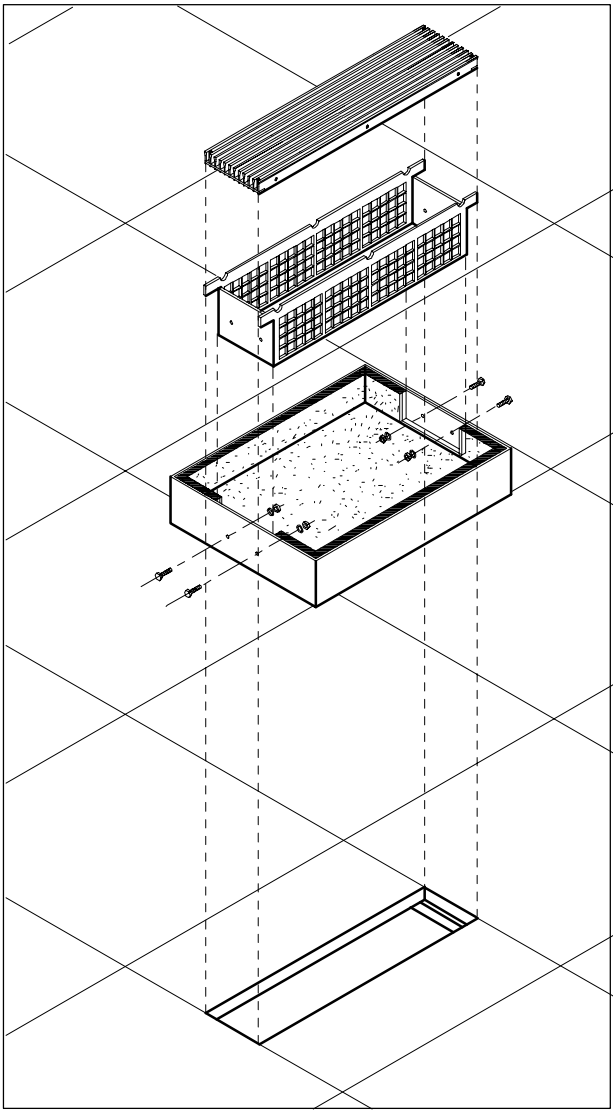
4.5.2 – Installing grille + collecting tray

Insert the collecting tray under the grille, as below.



4.5.3 – Installing grille + collecting tray +sound attenuator

Screw the attenuator to the tray and then position these under the grille, as below.
Take care: it is no possible to install the Sound Attenuator without collecting tray.



5 – Water connections

Connect the CAM/HIVAR's cooling coil(s) with flexible insulated piping.
Respect the arrows on the inlet/ outlet and the diameters shown in the installation drawings.

Connect the humidifier drain (if fitted) to the building's drain network, adding a drain trap to prevent the return of odours into the room.

Connect the humidifier supply (if fitted) to the sanitary water circuit.

The condensate drain tube must be in zinc steel, PVC or reticular polythene.

The bleed valves, positioned in the fan section, must be used when filling the circuit and for subsequent periodic bleeding.

5.1 – Pressurizing system, bleeding incondensables

After filling the water circuit, open the valves positioned near the CAM/HIVAR. Bleed all incondensables using the bleed valves.

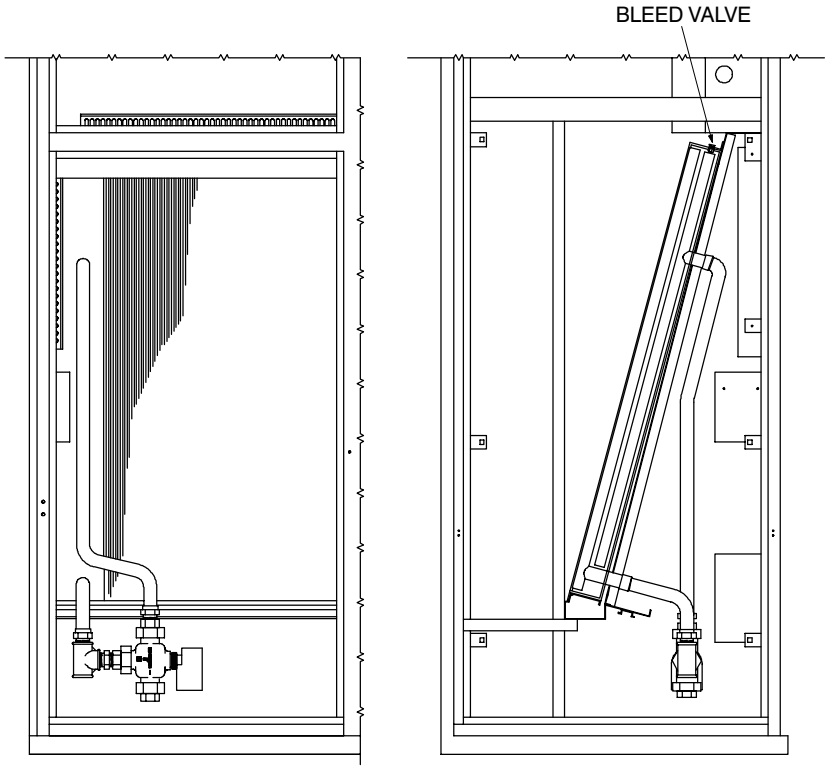
Check that there are no leakages in the circuit, the joints or thermometer/manometer wells.

All coils have already been factory tested according EN norms.

The Unit will be pressurized for at least 24 hours, the pressure will be continuously monitored by means of a manometer.

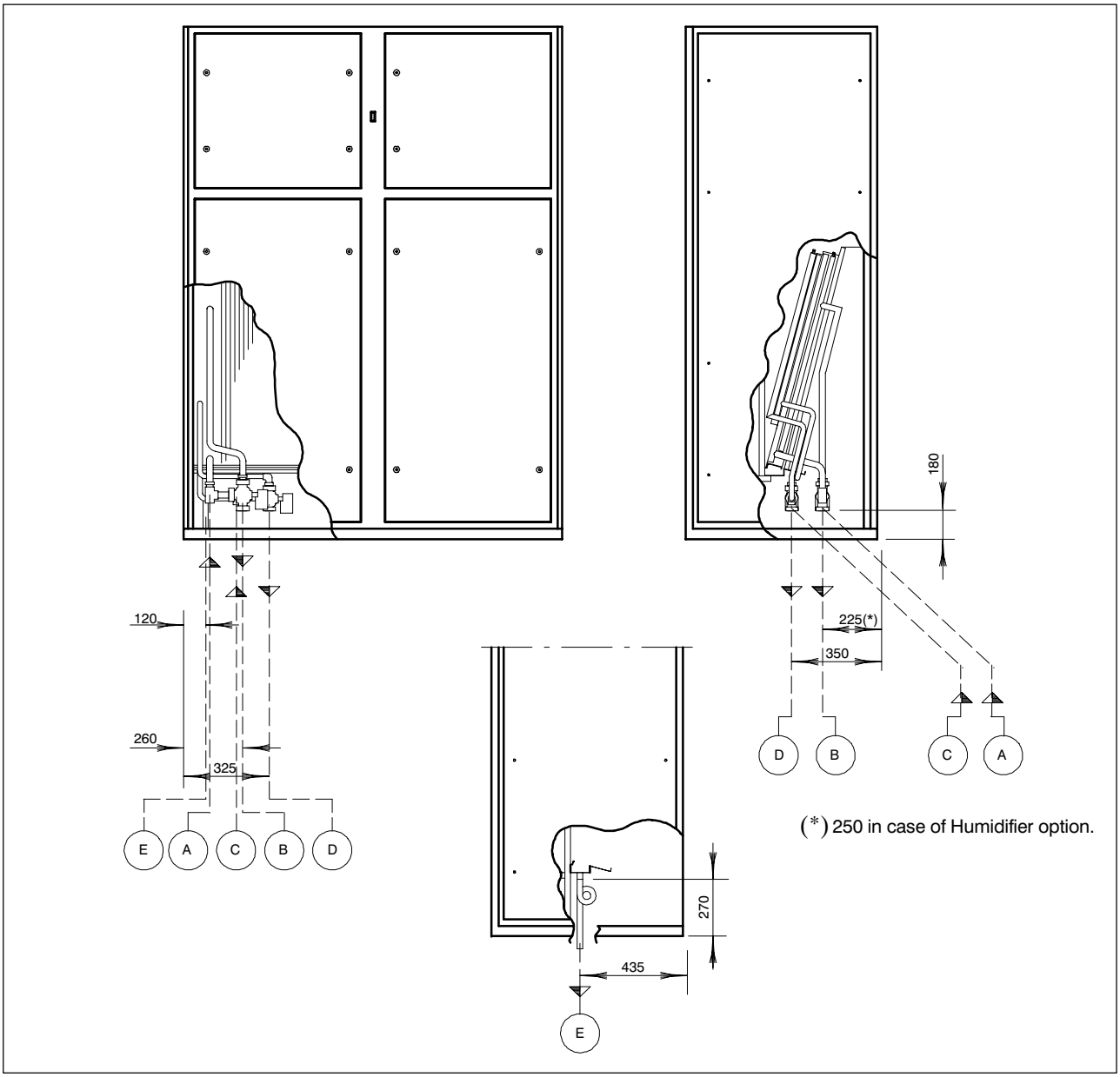
The pressure must not exceed 10 bar.

3–WAY VALVE



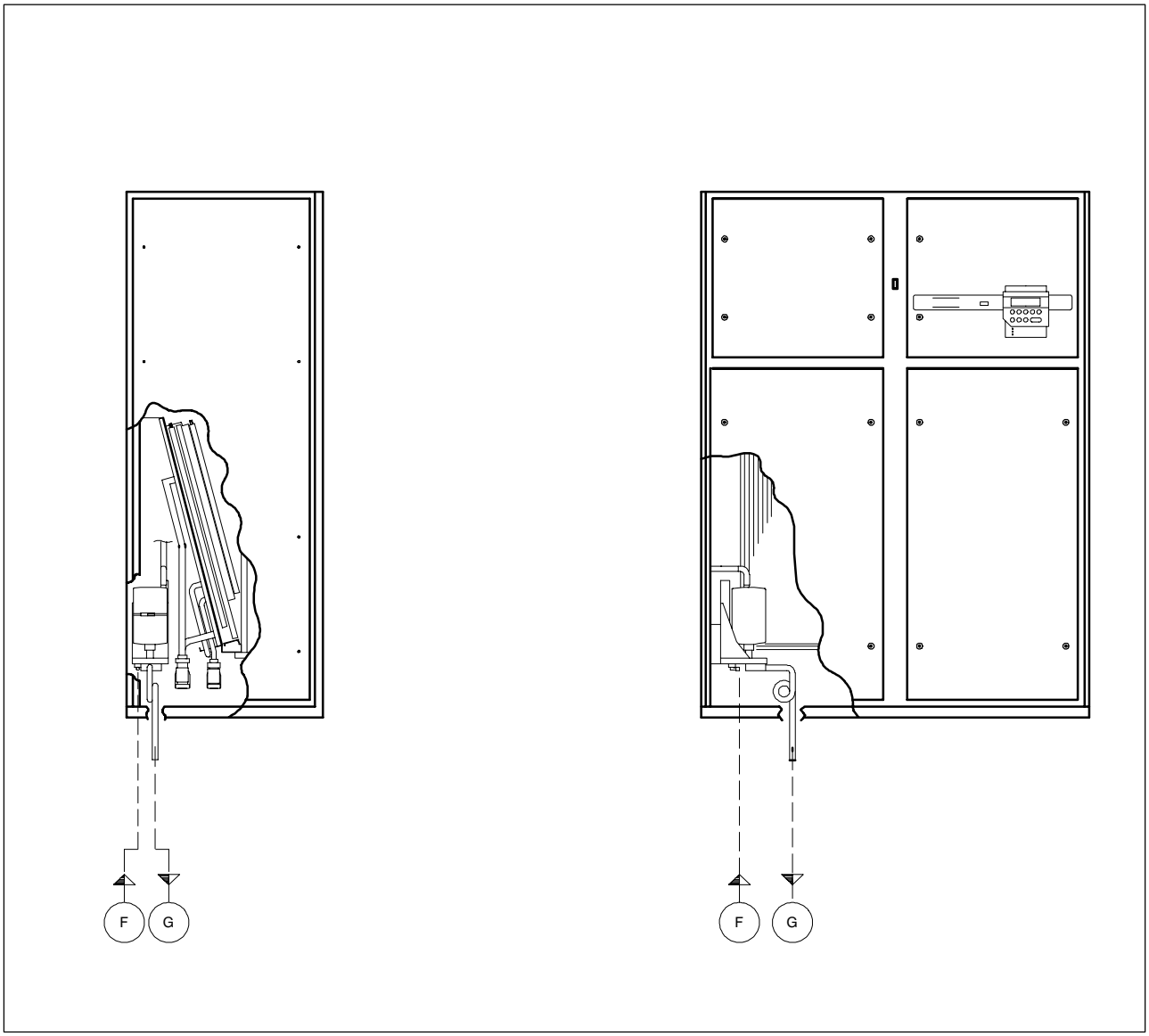
Model	WATER CAPACITY coil + circuit (l)
CAM 15	9.9
CAM 25	14.8
CAM 35	21.3
V 11	9.6
V 22	15.8
V 33	22.6
V 44	28.3

Fig. 4 – Water connections CAM



POS.	CONNECTIONS	DIMENSIONS		
		CAM15	CAM25	CAM35
A	Cooling water inlet	¾"G female	1"G female	1¼"G female
B	Cooling water outlet	¾"G female	1"G female	1¼"G female
C	Hot water inlet	½"G female	½"G female	¾"G female
D	Hot water outlet	½"G female	½"G female	¾"G female
E	Condensate drain	D 20 mm female	D 20 mm female	D 20 mm female

Fig. 5 – Humidifier water connections CAM

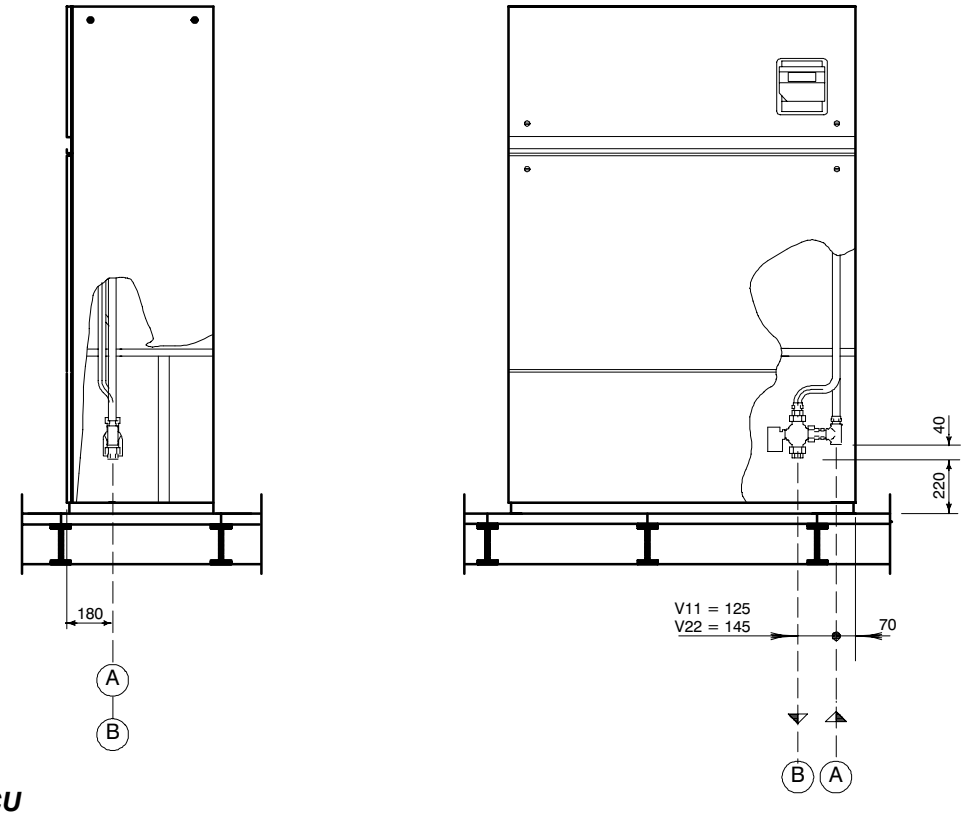


POS.	CONNECTIONS	DIMENSIONS
F	Humidifier supply	½"G male
G	Humidifier drain	D 22 mm male

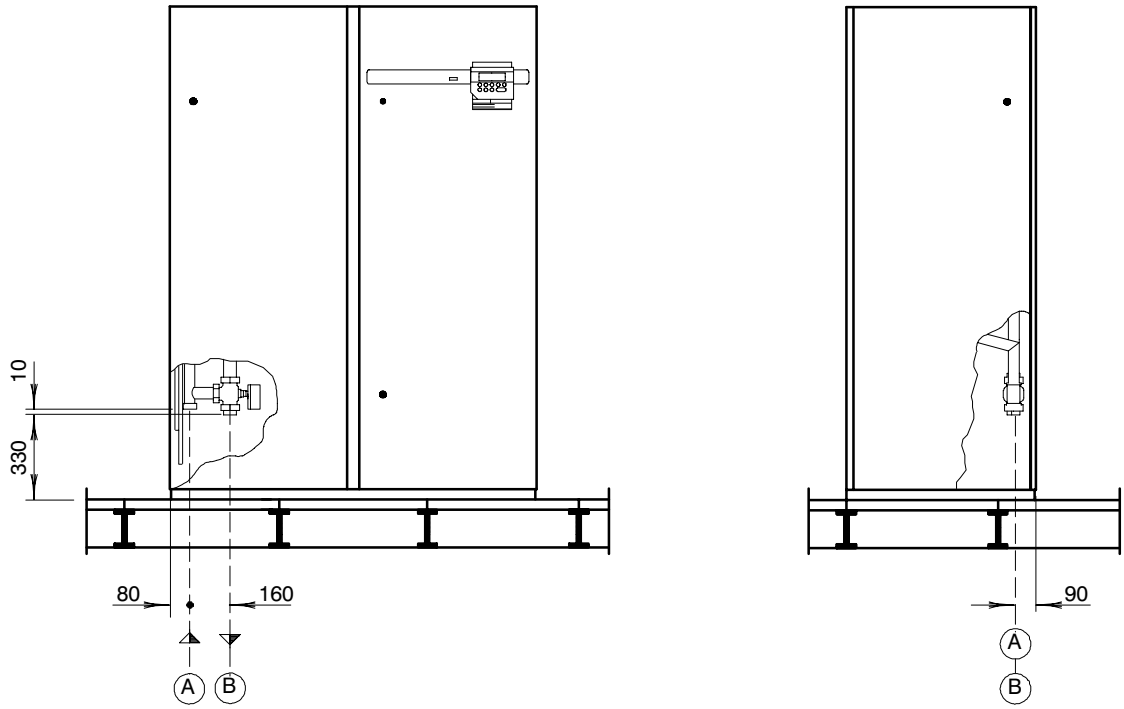
Fig. 6 – Water connections

HIVAR

HIVAR V11–22CU



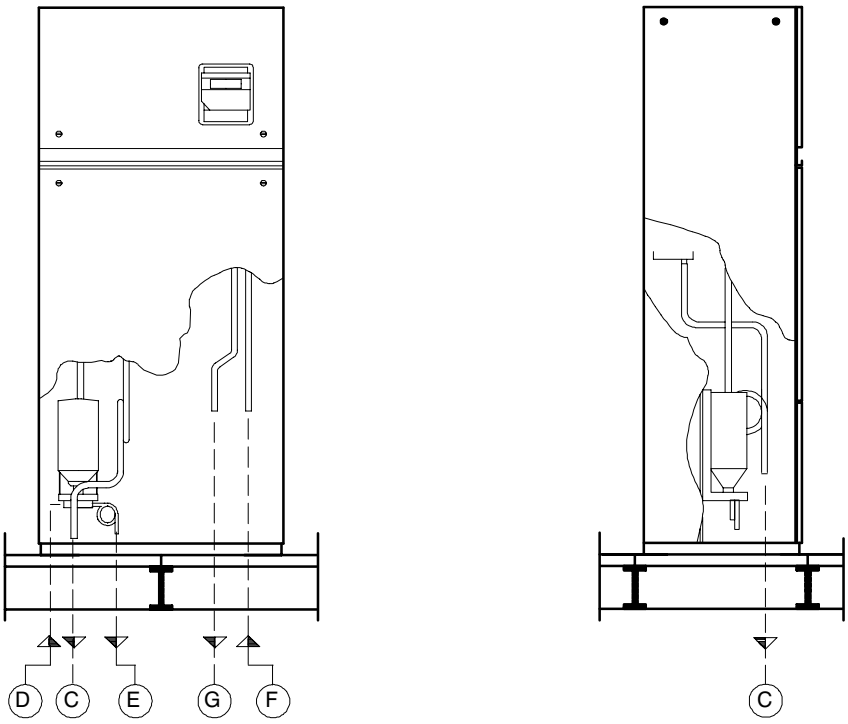
HIVAR V33–44CU



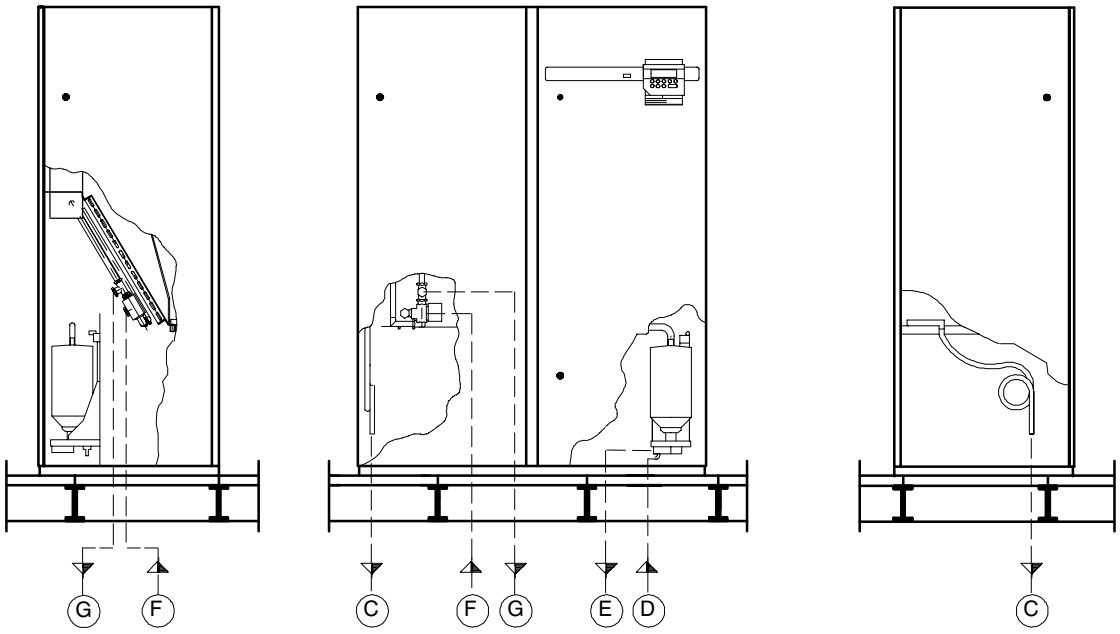
POS.	CONNECTIONS	DIMENSIONS		
		V11CU	V22CU	V33–44CU
A	Cooling water inlet	¾"G female	1"G female	1¼"G female
B	Cooling water outlet	¾"G female	1"G female	1¼"G female

Fig. 7 – Auxiliary water connections HIVAR

HIVAR V11–22CU



HIVAR V33–44CU



POS.	CONNECTIONS	DIMENSIONS	
		V11–22CU	V33–44CU
C	Condensate drain	D 20 mm female	D 20 mm female
D	HUMIDAIR water supply (optional)	½"G male	½"G male
E	HUMIDAIR water drain (optional)	D 22 mm female	D 22 mm female
F	Hot water inlet (optional)	½"G female	¾"G female
G	Hot water outlet (optional)	½"G female	¾"G female

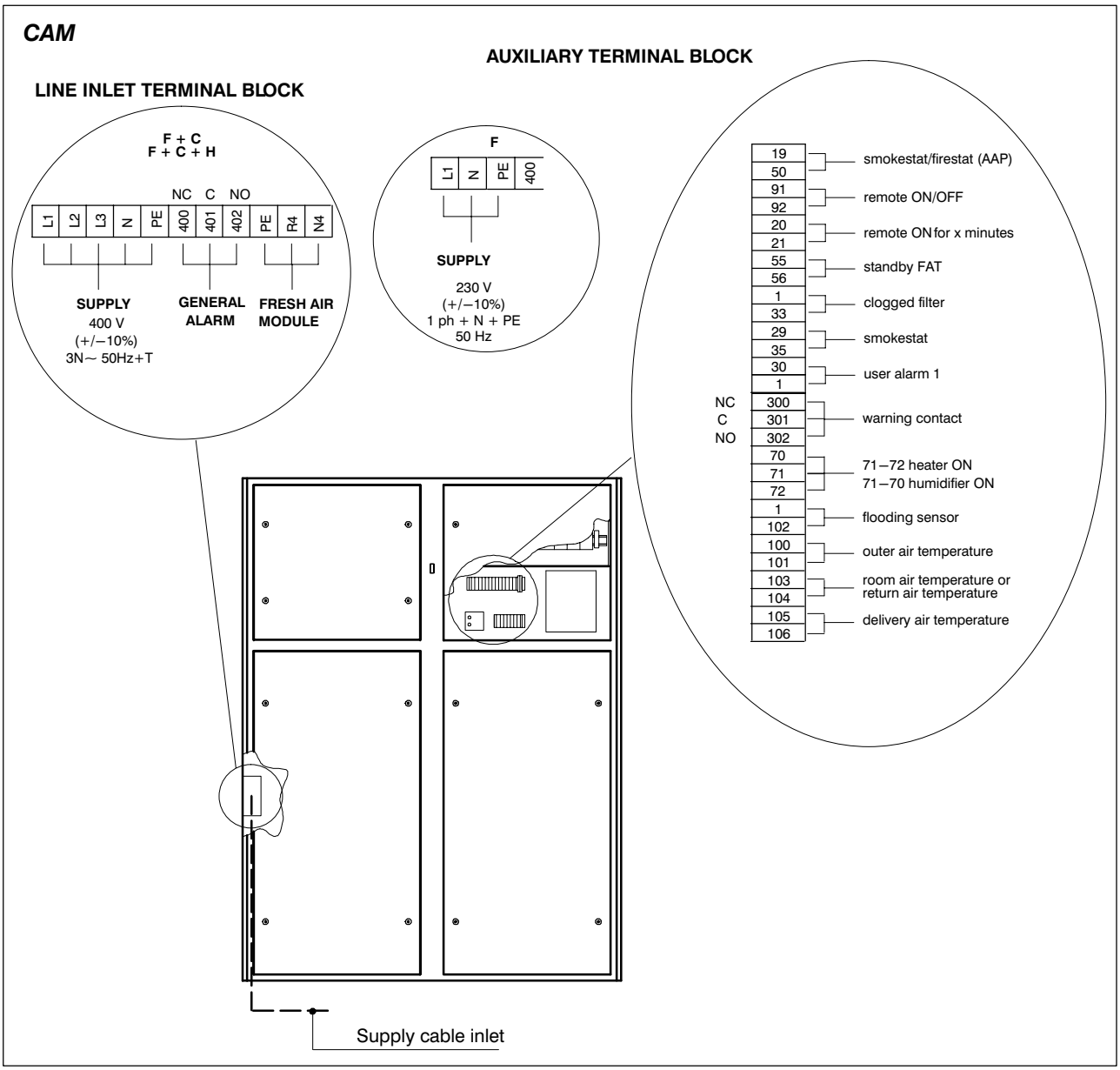
6 – Electrical and sensor connections

6.1 – Electrical connections

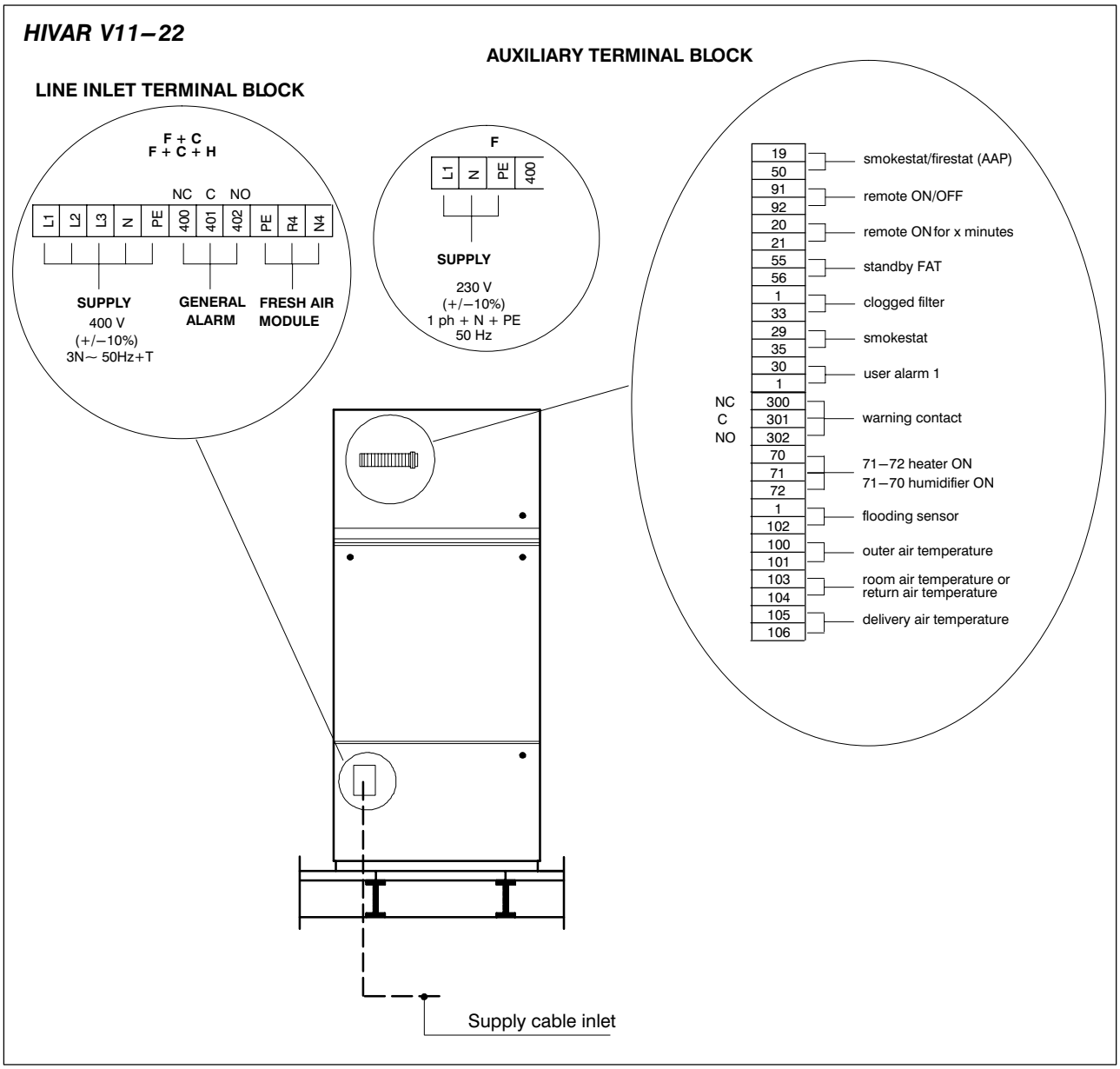
Bring the cable up through the protection duct, situated to the left of the air filters, and bring it out again in the electrical compartment.

Connect the power supply cable to the general switch ('3' in drawing).

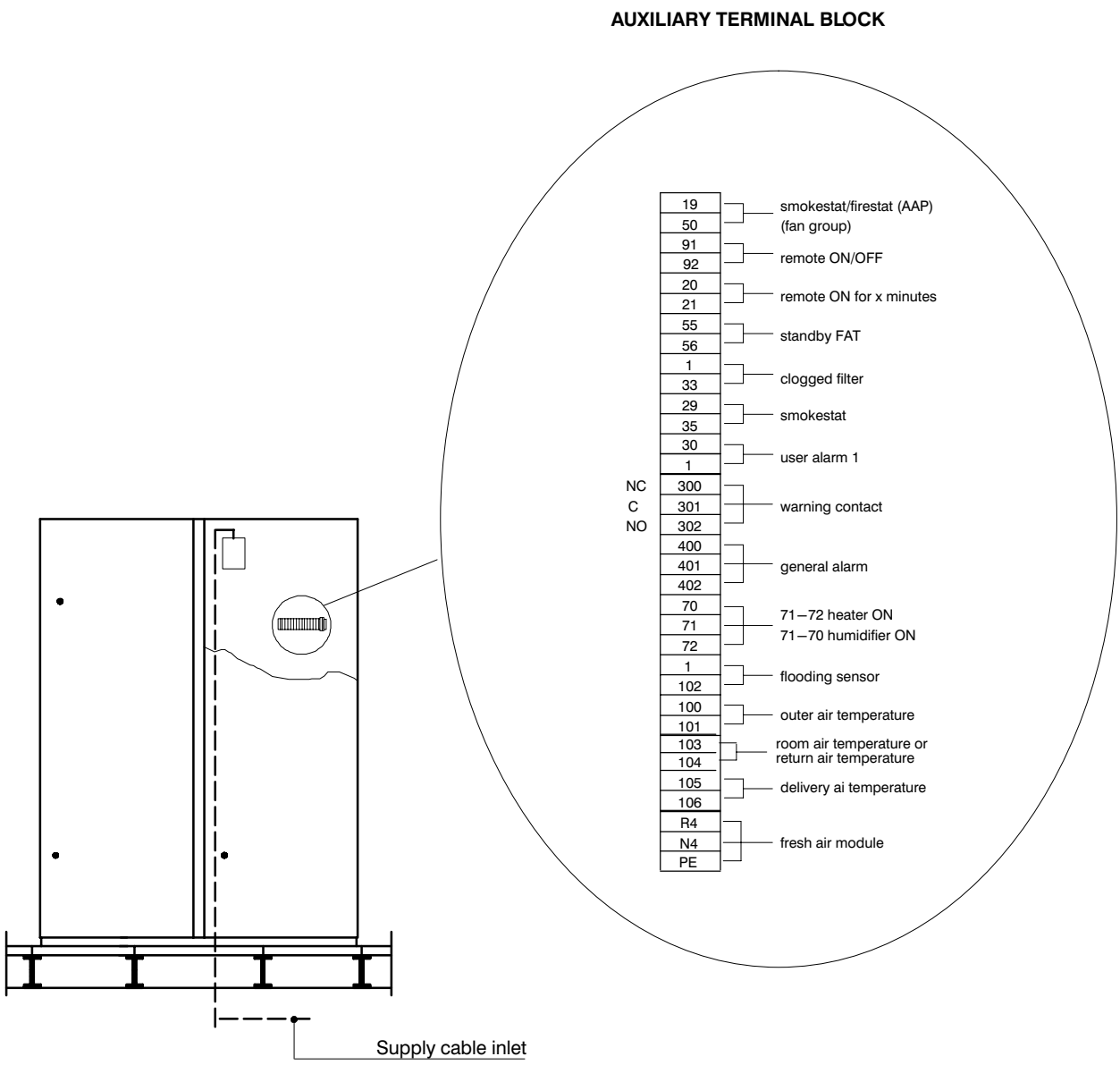
For cable sizing see the table at the end of the manual.



UNIT	Component	Electrical supply	FLA (Full Load Ampere)	LOA (Locked Rotor Ampere)
CAM 15	Fan	230 V/1 ph/50 Hz	6.0	11.9
	Electric Heater (4500 W)	400 V/3 ph/50 Hz	6.5	–
	Humidifier	400 V/3 ph/50 Hz	5.0	–
CAM 25	Fans	230 V/1 ph/50 Hz	11.6	23.7
	Electric Heater (10350 W)	400 V/3 ph/50 Hz	16.7	–
	Humidifier	400 V/3 ph/50 Hz	5.0	–
CAM 35	Fans	230 V/1 ph/50 Hz	15.8	35.6
	Electric Heater (14800 W)	400 V/3 ph/50 Hz	24.0	–
	Humidifier	400 V/3 ph/50 Hz	5.0	–


HIVAR V11–22
AUXILIARY TERMINAL BLOCK
LINE INLET TERMINAL BLOCK
F + C
F + C + H
NC C NO
L1 L2 L3 N PE 400 401 402 PE R4 N4
SUPPLY
400 V
(+/–10%)
3N~ 50Hz+T
GENERAL ALARM
FRESH AIR MODULE
F
L1 N PE 400
SUPPLY
230 V
(+/–10%)
1 ph + N + PE
50 Hz
19 smokestat/firestat (AAP)
50
91 remote ON/OFF
92
20 remote ON for x minutes
21
55 standby FAT
56
1 clogged filter
33
29 smokestat
35
30 user alarm 1
1
NC 300
C 301 warning contact
NO 302
70
71 71–72 heater ON
71–70 humidifier ON
72
1 flooding sensor
102
100 outer air temperature
101
103 room air temperature or return air temperature
104
105 delivery air temperature
106
Supply cable inlet

HIVAR V33–44



UNIT	Component	Electrical supply	FLA (Full Load Ampere)	LOA (Locked Rotor Ampere)
V11CU	Fan	230 V/1 ph/50 Hz	4.5	8.0
	Electric Heater (4500 W)	400 V/3 ph/50 Hz	7.2	–
	Humidifier	400 V/3 ph/50 Hz	5.0	–
V22CU	Fans	230 V/1 ph/50 Hz	9.0	16.0
	Electric Heater (7500 W)	400 V/3 ph/50 Hz	10.0	–
	Humidifier	400 V/3 ph/50 Hz	5.0	–
V33CU	Fans	230 V/1 ph/50 Hz	11.6	23.0
	Electric Heater (9000 W)	400 V/3 ph/50 Hz	13.0	–
	Humidifier	400 V/3 ph/50 Hz	5.0	–
V44CU	Fans	230 V/1 ph/50 Hz	11.6	23.0
	Electric Heater (9000 W)	400 V/3 ph/50 Hz	13.0	–
	Humidifier	400 V/3 ph/50 Hz	5.0	–

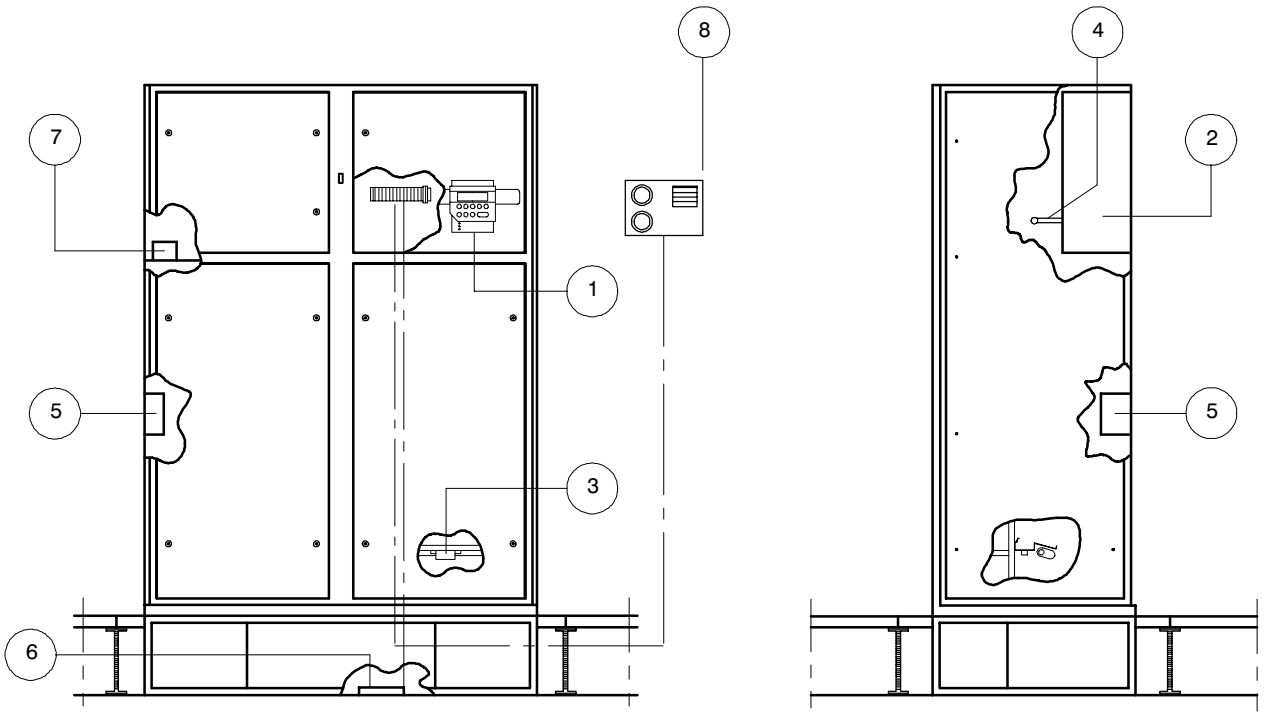
6.2 — Sensor connections

The air supply sensor is not connected to the terminal block. Take enough wire to be able to place the sensor within the supply void, about 2–3 m from the CAM/Hivar.

The ambient sensor must be placed where designated in the project drawing, which should be placed in an ambient which best represents the temperature of the CAM/Hivar's zone.

The external compensation sensor (if present) must be placed in a zone where it is not exposed to the sun (eg. north).
Its 2 wires are connected to terminals B1 and M on the compensator ('2' in drawing).
To do this undo the screws on the front of the regulator so as to gain access to the terminal block's base.

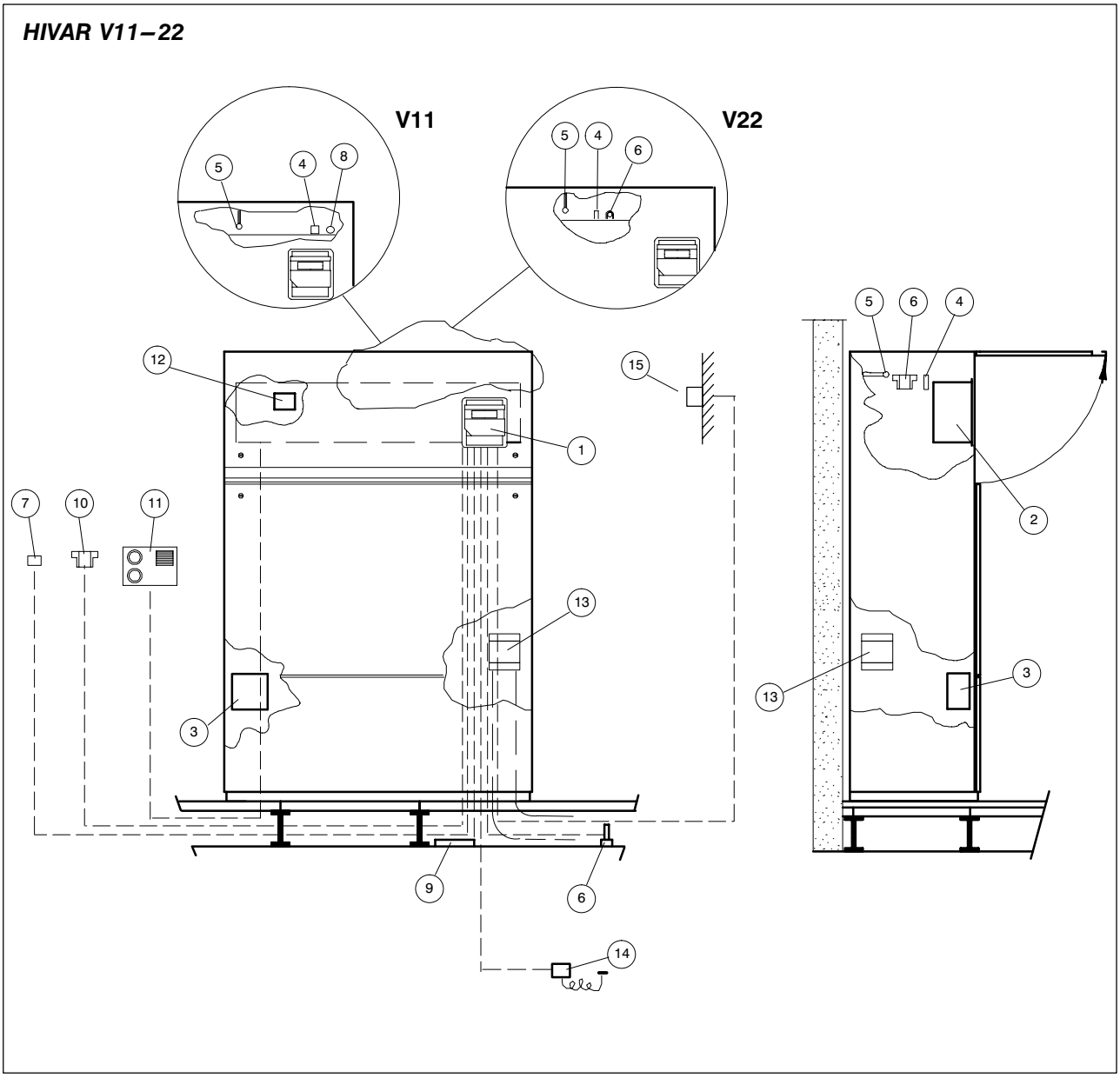
CAM



POS.	STANDARD	INSTALLATION
1	Hiromatic 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/firestat Alarm Package	Outside unit

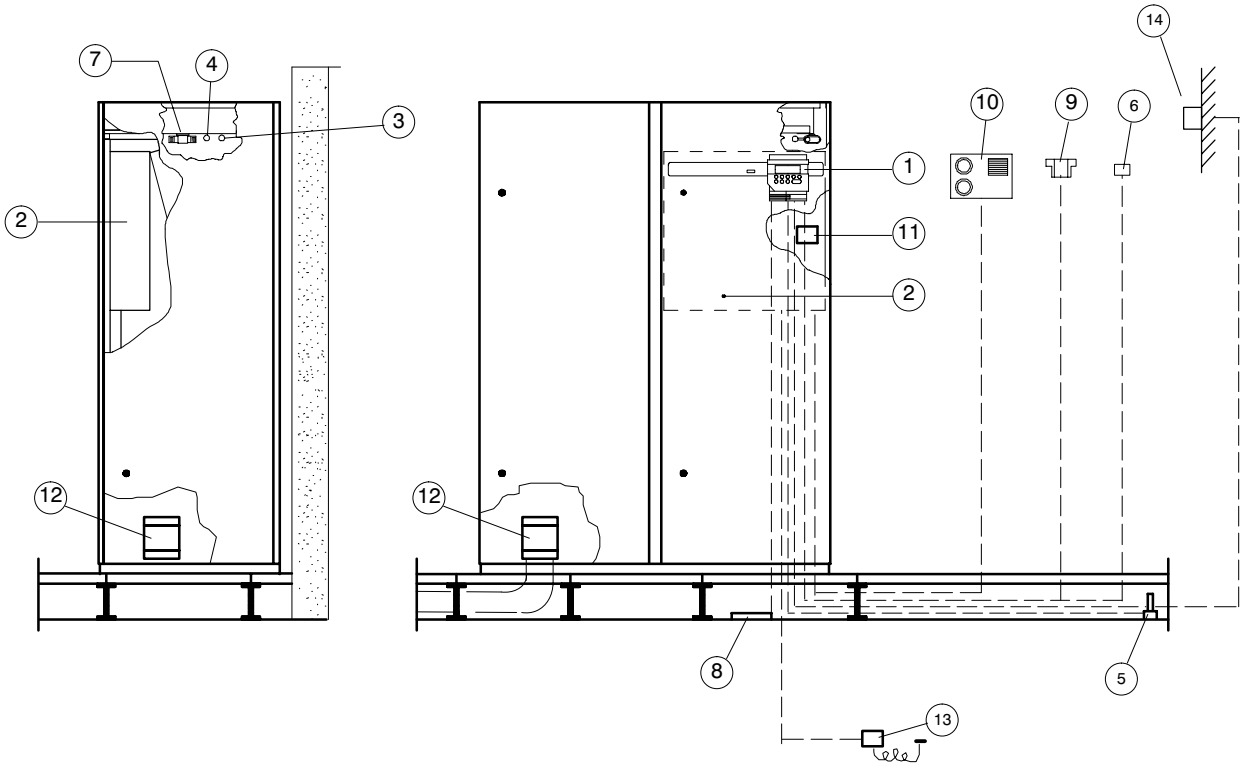
HIVAR V11–22



POS.	STANDARD	INSTALLATION
1	Hiromatic Control	Unit front
2	Electrical panel	Inside unit
3	Line inlet terminal block	Inside unit
4	Temperature sensor (RT1)	Inside unit
5	Flow sensor (PTC)	Inside unit
6	Underfloor supply sensor	Outside unit
7	Ambient sensor	Outside unit

POS.	OPTIONAL	INSTALLATION
8	Temperature + humidity sensor	Inside unit
9	Water Leakage Detector (WLD)	Outside unit
10	El. Environ. Alarm Package (EEAP)	Outside unit
11	Antifire Alarm Package (AAP)	Outside unit
12	Clogged filter sensor (CF)	Inside unit
13	New Air Intake	Inside unit
14	Hot water consent thermostat (HWT)	Outside unit
15	Outdoor sensor	Outdoor

HIVAR V33–44



POS.	STANDARD	INSTALLATION
1	Hiromatic 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
9	El. Environ. Alarm Package (EEAP)	Outside unit
10	Antifire Alarm Package (AAP)	Outside unit
11	Clogged filter sensor (CF)	Inside unit
12	New Air Intake	Inside unit
13	Hot water consent thermostat (HWT)	Outside unit
14	Outdoor sensor	Outdoor

Tab. 2 – Technical and operational characteristics

Component	Supply (STD)	Max current per phase FLA (A)			Fans	Filters	Filter STD efficiency
		Fans	Humidifier	El. Heat	no/speed	no/dimens. (mm)	
CAM15	400V/3Ph+N+E/50Hz	6.70 1400W	6.00 3400W	7.3 4500W	1 adjustable	2/(1000 x 410 x 88)	EU3
CAM25		11.50 2300W	6.00 3400W	7.3 4500W 16.7 10350W	2 adjustable	3/(1000 x 410 x 88)	
CAM35		15.80 3300W	6.00 3400W	16.7 10350W 24.0 14850W	3 adjustable	4/(1000 x 445 x 88)	
HIVAR V11CV		4.50 600W	6.00 3400W	7.3 4500W	1 adjustable	1/(510 x 745 x 100))	EU3
HIVAR V22CV		8.70 1100W	6.00 3400W	10.0 5850W	2 adjustable	2/(510 x 598 x 100)	
HIVAR V33CV		12.0 2700W	6.00 3400W	12.9 9000W	2 adjustable	3/(695 x 650 x 100)	
HIVAR V44CV		12.0 2600W	6.00 3400W	12.9 9000W	2 adjustable	3/(695 x 650 x 100)	
CTU 450	230V/1Ph+E/50Hz	0.25 56W	//	1.2 250W 2.3 500W	1 adjustable	//	//
FTU 450		0.25 58W	//	1.2 250W 2.3 500W	1 adjustable	//	//
FTU 300		0.25 45W	//	1.2 2.3 300W	1 adjustable	//	//
FAM 700		1.30 147W	//	//	1 2 speed	1/(210 x 200 x 35)	EU3

7 – Operation

Unit operation is completely automatic. The below sequence explains how the unit operates :

- The air, sucked in by the fan(s), enters the unit.
- The air is immediately filtered.
- The ZONE TEMPERATURE sensor or HUMITEMP (temperature + rel. humidity) sensor (check type installed), verifies the state of the return air, and relays this information to the control system.
- The control system compares the relayed information to the set point and proportional band values programmed into its memory: it then commands the air conditioner to treat the air as follows:
  - **COOLING**
    Chilled water flows through the chilled water coil, thus cooling the air passing over it. The chilled water flow is controlled by a 3–way valve, which regulates the flow rate in order to obtain the exact amount of cooling required.
  - **HEATING**
    This can take one of two three forms:
  - electrical heating *(optional)*: the heating elements heat the air passing over them. There are 3 heating steps.
  - hot water heating *(optional)*: if hot water is available, this flows through the hot water coil, thus heating the air passing over it. The hot water flow is controlled by 3–way valve.
  - **DEHUMIDIFICATION – *optional***
    Maximum chilled water flow is requested through the coil, whose temperature drops below the dew point of the air, thus dehumidifying it.
    If necessary, heating is used to reheat the air.
    N.B.: If, during dehumidification, the ambient temperature drops below a specified level, dehumidification will be stopped if necessary.
  - **HUMIDIFICATION – *optional***
    The humidifier creates steam, which is distributed into the air stream via the steam distribution pipe.
- Filtered new air is injected into the air stream via the Fresh Air Intake (FAM 700).
- The treated air passes through the fans, which operate continuously, and is then the air passes from the underfloor void into the room via FTUs.

App. A — HUMIDAIR humidifier

App. A.1 — Preface

The HUMIDAIR represents the best humidifier technology available, guaranteeing the steam as clean as possible together with simple maintenance.
In order to obtain optimum performance from the HUMIDAIR it is advisable to read this manual carefully.

Tab. 1 — Humidair specifications

HUMIDAIR KIT		steam production (variable)	humidifier power supply voltage	max. cylinder water volume	max. supply water quantity	max. drain water quantity
model	code	kg/h (*)	V/ph/Hz	(l)	(l/min.)	(l/min.)
HAK 53H	**141101**	**1.3 — 4.5**	400 V 3 ph 50—60 Hz	**2.84**	**0.6**	**2.5**

For humidifier current (FLA) and rated power refer to electrical features in air conditioner manual.

(*) Unit is factory—set to produce 70% of the maximum value (see Microface manual).

App. A.2 — Installation

The humidifier is supplied already mounted within the air conditioner. The only necessary operations are the connections for the supply water (Fig. 1) and drain water (Fig. 2); for the positions of the supply/ drain connections within the unit see Fig. 5.

Fig. 1 — Supply water connection

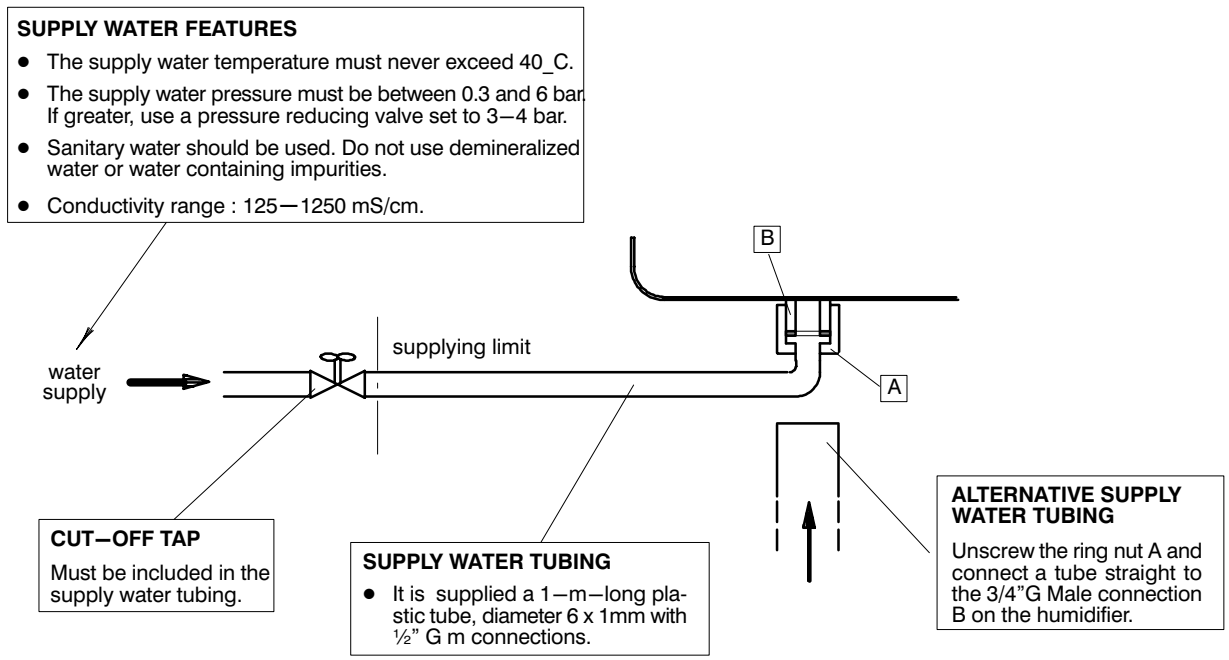
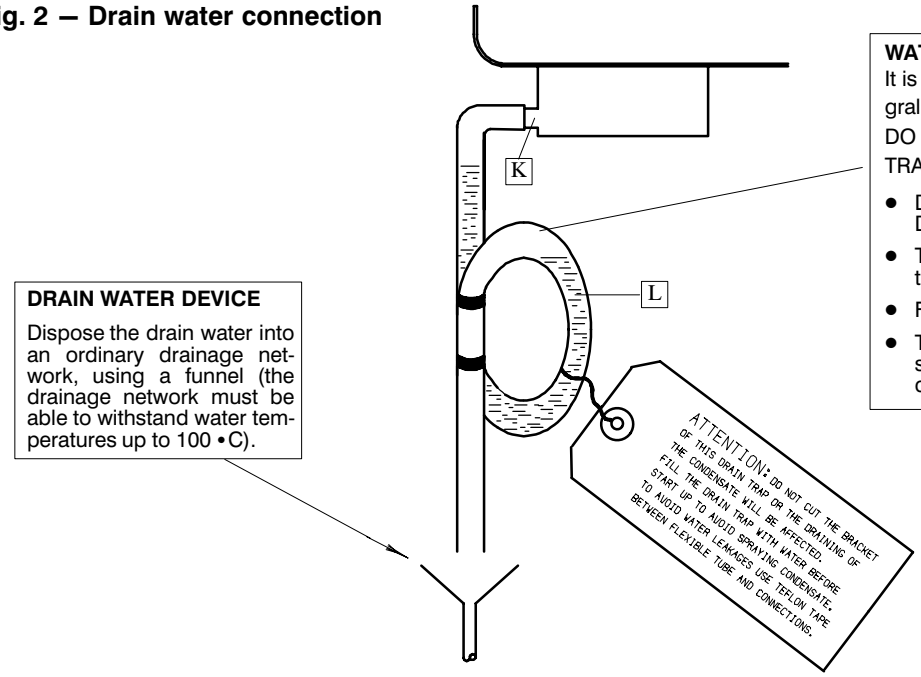


Fig. 2 — Drain water connection



WATER DRAIN TUBING

It is supplied a hose with an integral drain trap.

DO NOT DISMANTLE THE DRAIN TRAP.

- DO NOT DISMANTLE THE DRAIN TRAP.
- The hose is already fitted onto the humidifier drain outlet (K).
- Fill the drain trap with water (L).
- The drain pipe is made of plastic material which does not conduct electricity.

DRAIN WATER DEVICE

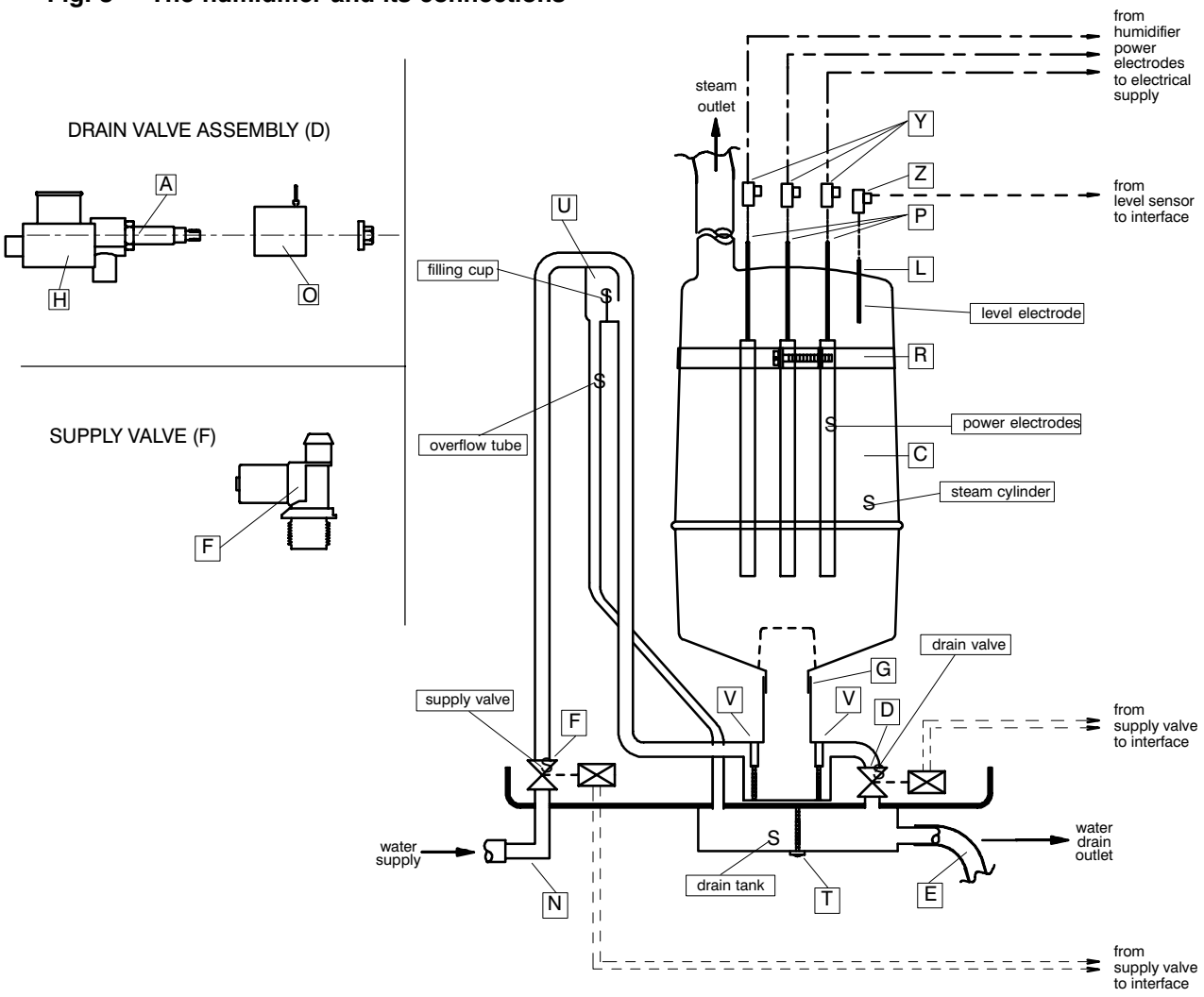
Dispose the drain water into an ordinary drainage network, using a funnel (the drainage network must be able to withstand water temperatures up to 100 •C).

NOTES:
1) Allow a 2% gradient towards the drain outlet.
2) Avoid back pressures in the drain piping.

App. A.3 — Humidair components

The components of the HUMIDAIR humidifiers are shown below.

Fig. 3 — The humidifier and its connections



App. A.4 — Start—up and operation

App. A.4.1— Start—up

Before using the humidifier, check the following:

- Supply and drain connections.
- That the cut—off tap is open.
- All wiring.
- Earthing.
- Steam hose connection between steam cylinder and distributor.

To start the humidifier simply switch on the air conditioner, which will in turn automatically start and stop the humidifier as required. The (adjustable) parameters which determine humidifier operation have already been factory—preset (see HIROMATIC manual).

App. A.4.2— Operation

Water, provided it contains even a small quantity of salts in solution, is a conductor of electricity. Therefore, if the steam cylinder is filled with water and a potential difference is applied between the production electrodes, the water behaves like an ordinary electrical resistance and becomes hot, thus creating steam.
The steam production rate can be controlled by varying the water level in the cylinder; the higher the water level, the deeper the electrodes are immersed into it and the greater the steam production.

Note 1

In case of low water conductivity the cylinder 93H (9.0 kg/h) or 53H (4.5kg/h) can be substituted with the cylinder 93L or 53L without changing the power supply.
Please remember to set the right cylinder type into the Control system.
The steam production will remain unchanged.

Note 2

When starting with an empty cylinder, the water conductivity is **normally** insufficient for the HUMIDIFIER STEAM OUTPUT to be reached immediately.
Therefore the humidifier produces as much steam as possible to fill the cylinder completely. Any evaporation water is immediately refilled.
The drain valve is kept shut and therefore, as the steam does not contain any salts, the conductivity of the water within the cylinder slowly increases until the HUMIDIFIER STEAM OUTPUT is obtained.
The length of the start—up period depends upon the water conductivity. For very conductive water it may occur that the HUMIDIFIER STEAM OUTPUT is obtained immediately.

App. A.5 — Maintenance

App. A.5.1— Removing the steam cylinder

To remove the steam cylinder, proceed as follows (see Fig. 3):

1) Open the General Switch relative to the humidifier.
2) Drain all the water from the cylinder by activating "**HUM. DRAIN**" in the HIROMATIC Service menu several times (see Microface manual).
3) Disconnect the steam hose (S) (made of non—conductive rubber).
4) Disconnect the power electrode wires (P) and level sensor wire (L).
5) Undo the clip (R).
6) Pull the cylinder (C) out of its gland at the bottom (G).

App. A.5.2— Replacing the steam cylinder

When the steam cylinder is approaching the stage where it needs to be replaced, warning **A25** is generated (see HIROMATIC manual) to advise the user that the cylinder must be replaced. To replace the cylinder, proceed as follows (see Fig. 3):

1) Carry out the instructions in para. **Removing the steam cylinder**.
2) Using the new cylinder, carry out 4)—6) of para. 5.1 in reverse order.
3) Connect the steam hose (S); the clip on the hose needs to be tightened only slightly.
4) Manually switch the humidifier on for 2—3 minutes (in the HIROMATIC Service menu). Then switch it off.
5) Drain the water as for 2) in para. **Removing the steam cylinder**.
6) If the air conditioner features a HIROMATIC with Graphic display, reset the humidifier working hours (window no. 1 of **PARAMETER MENU**) to zero.
7) Close the General Switch relative to the humidifier.

App. A.5.3— Annual maintenance

Annually (e.g. before any close—down period) carry out the following service on the humidifier (see Fig. 3):

1) Carry out the instructions in para. **Removing the steam cylinder**.
2) Disconnect the supply (F) and drain (D) valve wires.
3) Unscrew and remove the drain tank (T).
4) Unscrew the drain valve assembly screws (V).
5) Remove the drain valve assembly.
6) Unscrew and remove the drain valve solenoid (O).
7) Unscrew and remove the drain valve armature (A).
8) Clean all parts of the drain valve using a commercially available descaling agent (to remove any incrustations).
9) Detach the hose from the supply valve.
10) Remove the supply valve connection (N).
11) Unscrew the supply valve (F) and remove it.
12) Clean the supply valve using a jet of water.
13) Replace any hose which has become hard and brittle.
14) Thoroughly flush the drain line (E).
15) Reassemble the humidifier by carrying out the above instructions in reverse order.

ATTENTION

Always empty the cylinder completely before any close—down period.

App. A.6 – Spare part list

It is recommended the use of original spare parts. When placing an order quote the part code, as well as the air conditioner model no. and serial no.

POSITION (see Fig. 3)	CODE	DESCRIPTION	INSTALLED QUANTITY					Notes
			21L	53H	53L	93H	93L	
C	141070	Steam cylinder 140	1					(*)
	141071	Steam cylinder 263		1				(*)
	141072	Steam cylinder 243			1			(*)
	141073	Steam cylinder 363				1		(*)
	141074	Steam cylinder 343					1	(*)
T	141200	Drain tank	1	1	1	1	1	
U	141201	Filling cup	1	1	1	1	1	
N	141300	Supply valve connection	1	1	1	1	1	
K	2400006	Rubber gasket for drain tank	1	1	1	1	1	
B	240007	Rubber gasket for supply valve connection	1	1	1	1	1	
F	183209	Complete supply valve	1					
	183204	Complete supply valve		1	1	1	1	
A	183205	Drain valve armature	1	1	1	1	1	
H	183206	Drain valve housing	1	1	1	1	1	
O	254001	Drain valve solenoid	1	1	1	1	1	(+)
X	254393	Connector for level electrode	1	1	1	1	1	
Y	254394	Connector for production electrode	2	3	3	3	3	
	275905	Isolator for level sensor	1	1	1	1	1	
Z	271099	Base	1	1	1	1	1	

(+) = Spare part recommended
(*) = Consumable material

App. B — Installation Guide: CAM Baseframe

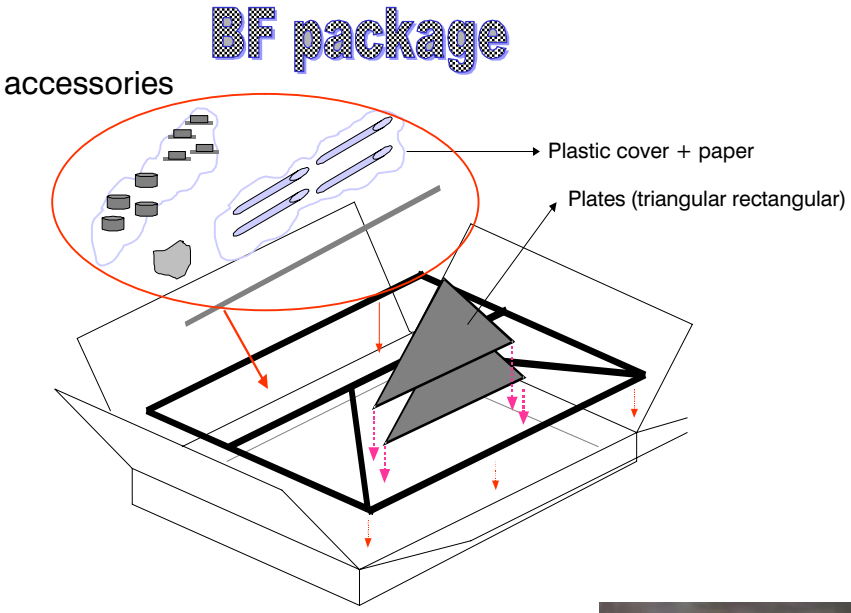
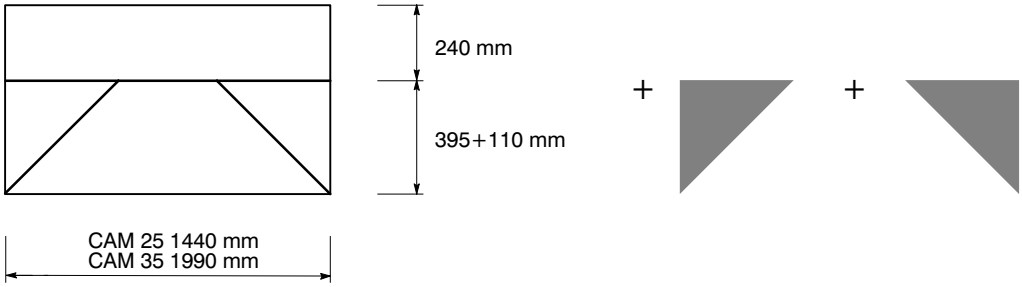


Fig. 1 — TP triangular plate model



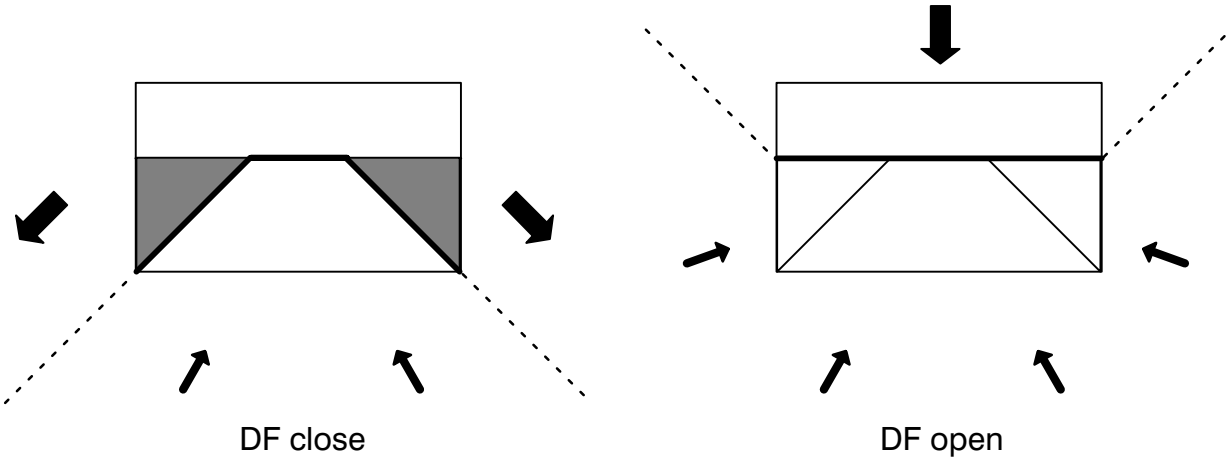
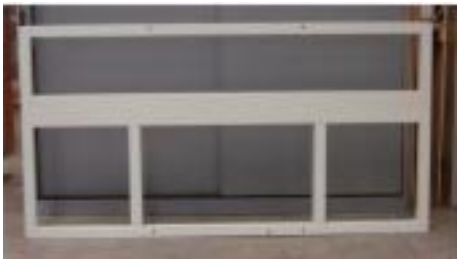
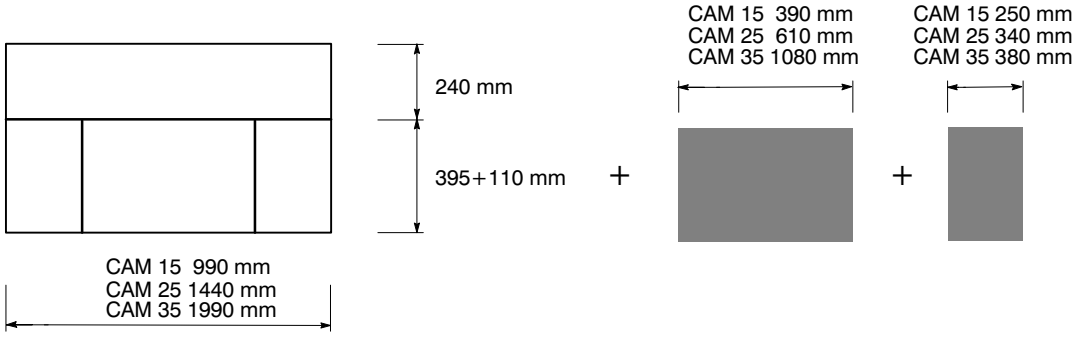
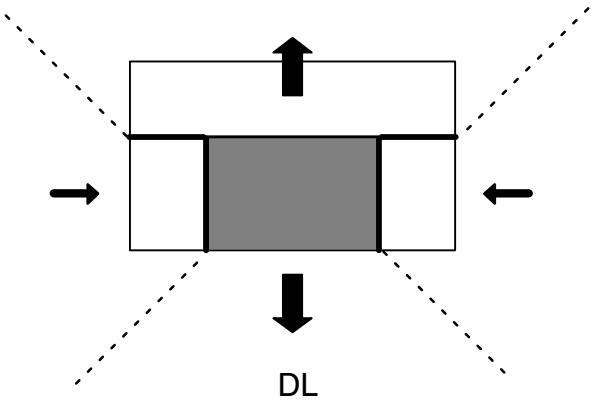
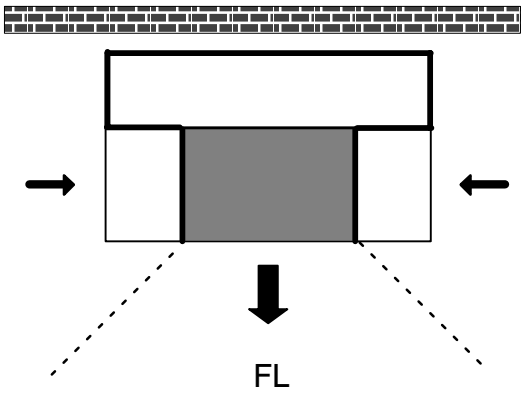


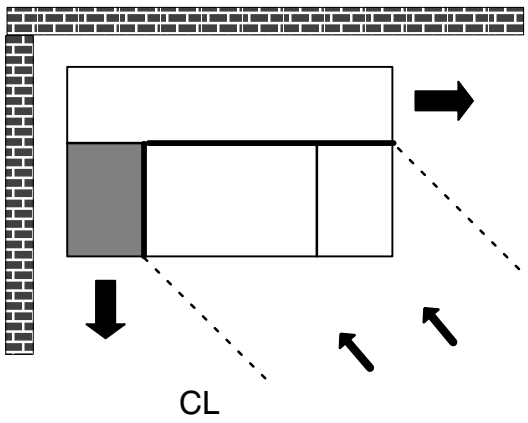
Fig. 2 — TP rectangular plate model

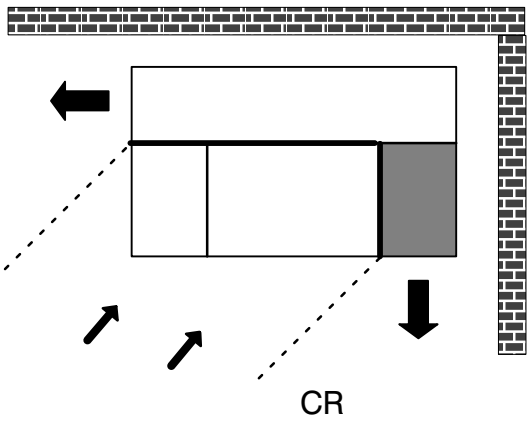












A

- Cut the bars at right height
- Fix the pedestals

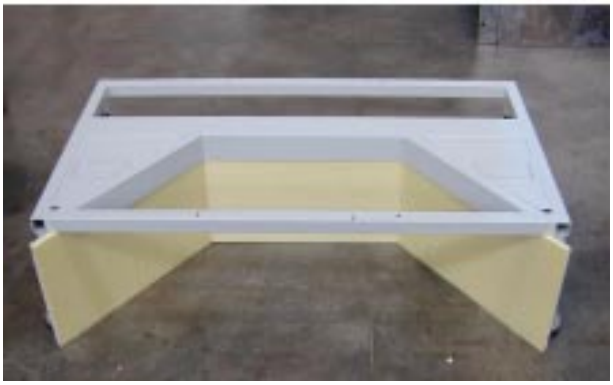
B

- Fix the plates (only if you need, please refer to TP and RP possible configuration)

C

- Fix the baffle (the underfloor partitioning is **not supplied**, you can use Gypsum board or an other uninflammable rigid material)

D



- Complete the baffle

E

- Eliminate all gaps using sylicone

F

- Put the gasket

G

- Open the hole for piping and after the connection close all gaps.

App. C – FAN Speed regulator

The **RGV** series bears **CE** marking as required by directive **EEC 89/336** and its subsequent modification **EEC 92/31** on electromagnetic compatibility.

Since all these products are not used as “stand–alone” appliances but incorporated into other plants or machines, the standards’ compatibility test was carried out under typical operating conditions. The essential requirements of the directive are satisfied by conformity to “generic standards” for heavy industry.

EN 50081–2 emission standard, **EN 50082–2** immunity standard, and in particular:

EN 55011 class B for radiated disturbances

EN 55011 class A for conducted disturbances

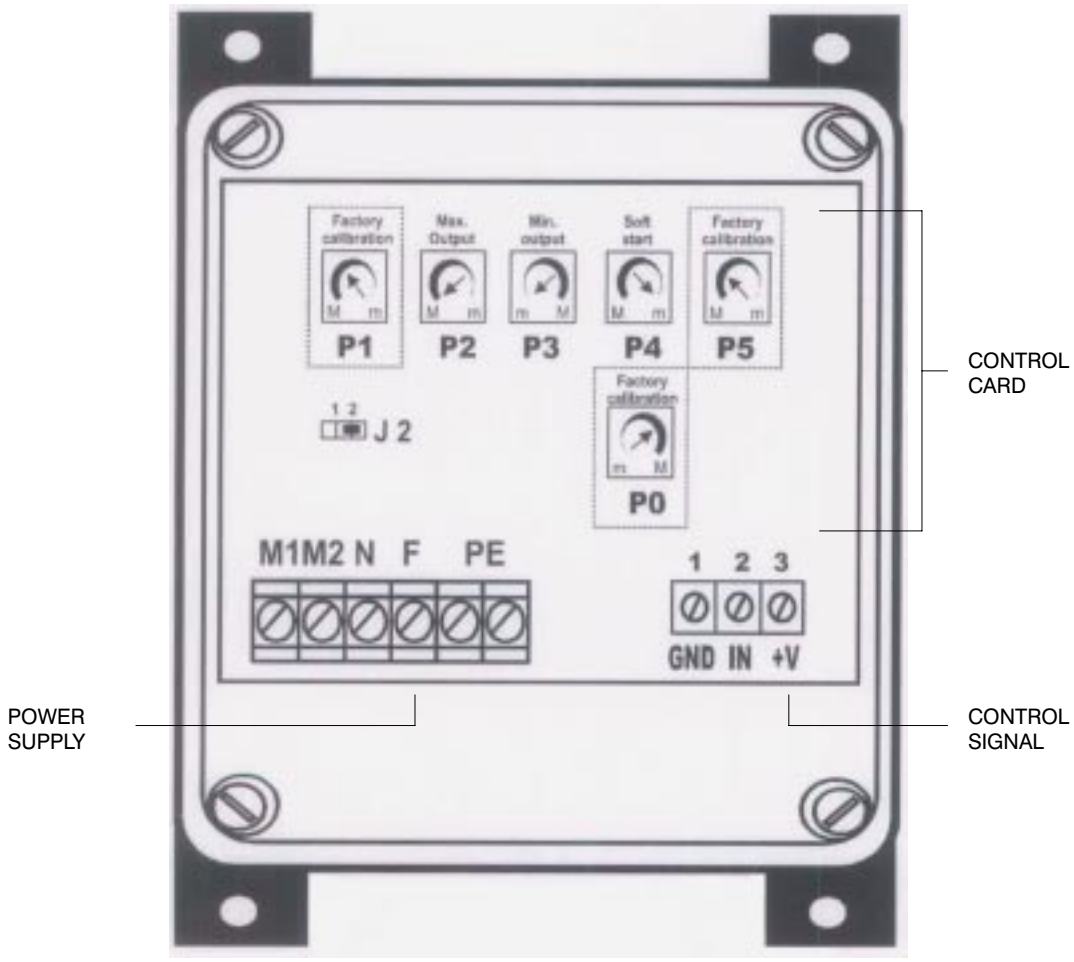
ENV 50140 (IEC 801–3) for susceptibility (on the power supply)

ENV 50141 for conducted susceptibility on power lines

IEC 801–4 for fast transistors (bursts / high frequency disturbance)

IEC 801–2 for electrostatic discharge (ESD)

The test and checks for conformity have been carried out according to the procedures described in the product’s technical documentation. The system used was formed by an RGV voltage regulator, a control cable and relative controls, a power supply cable, a monitor cable and a fan.



App. C.1 — Description

The RGV series single−phase cutting regulators comprise one electronic card mounted inside a technopolymer case (IP55 at 120°C).
There are 2 sections: Control card (upper side) and Power card (lower side).

Power card contains the following connection components:

POWER SUPPLY terminal boards:

- Input supply: **F,N**
- Output: **M1, M2**
- Earth / PE connection

CONTROL SIGNAL terminal boards:

- 1,2,3 for connection of the control analogue input signals

Control card contains the following regulation and signaling components:

TRIMMERS:

- marked "**Pn**" ; used to set working parameters

JUMPERS:

- marked "**Jn**" ; used to change preset operational modes

Tab. 1 — REGULATION

Trimmers				
P1 Factory calibration	Adjustable from	100%	to	30%
P2 MAX. OUTPUT	Adjustable from	P1	to	30%
P3 MIN. OUTPUT	Adjustable from	P5	to	70%
P4 SOFT START	Adjustable from	10"	to	60"
P5 Factory calibration	Adjustable from	0%	to	70%
Jumpers				
J2 = ON1	"**0 Vdc"** input corresponds to the **"0 Vac"** control value to the fan			
J2 = ON2	"0 Vdc" input corresponds to the "P5 – MIN Vac OUTPUT" (factory setting)			

WARNING: check the position of jumper J2 during commissioning procedure

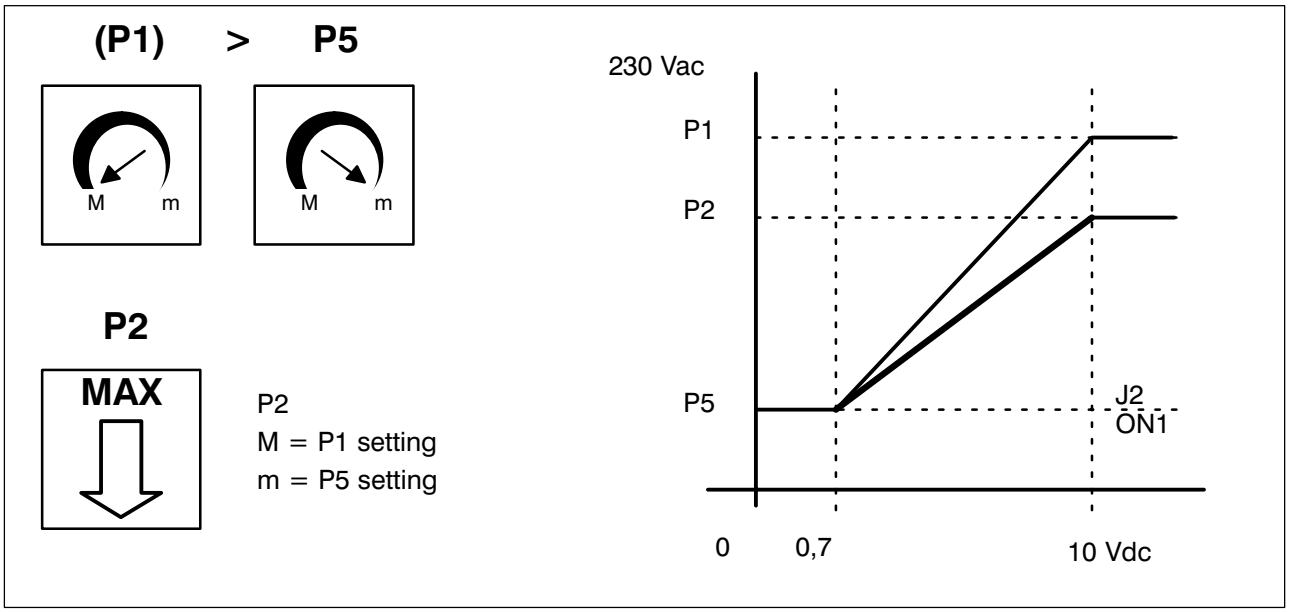
App. C.2 — Control trimmer

WARNING: Before starting the regulator calibration phase, check the position of the trimmers. The position of the trimmers marked with a spot of red paint (supplier calibrated trimmers) must not be altered.

The work parameters regulation can be divided into TWO PHASES:

1) definition of regulator work limits: the value of P1 and P5 are defined by the supplier
2) definition of regulator work field: the values of P2 and P3 are preliminary set by the factory and could be modified during the commissioning, if needed.

Fig. 1 — MAX OUTPUT regulation (P2 trimmer)



Limits the maximum operating voltage (from **P1** to **P5** factory setting).

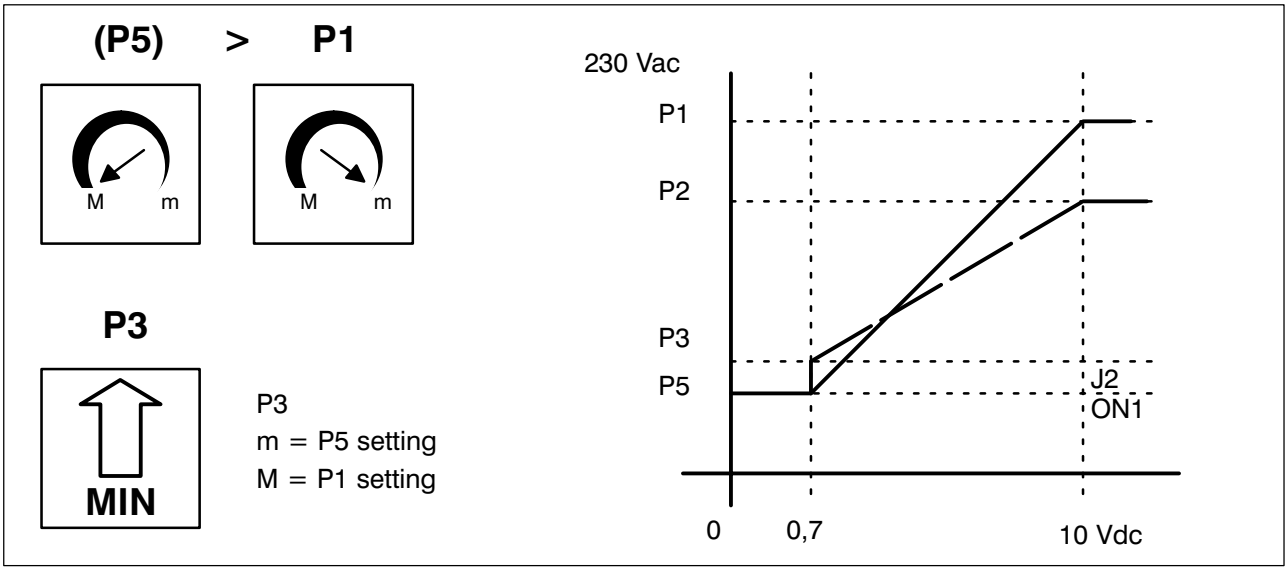
It is useful for limiting the maximum capacity or noise of the fan when turning at max. speed.

It is set in the factory to the max. value "M" which corresponds to the max voltage supplied to the fan and equal to 100% of the control value.

To regulate the **MAX.OUTPUT** voltage correctly, proceed as follows:

1) close in control signal terminal block, **IN** with **+V**
2) turn the **P2** trimmer starting from position **"M"** as far as the desired MAX voltage value.

Fig. 2 – MIN OUTPUT regulation (P3 trimmer)



Regulation of trimmer **P3** supplies the fan with a constant minimum voltage when the automatic control is not working or the control input is disconnected (only **J2= ON2**).

Rotate **P3** clockwise starting from position **"m"** until the desired minimum voltage is reached.

App. C.3 – SOFT–START regulation (P4 trimmer)

P4

Soft start

m= 10"

M= 60"

P4 trimmer adjusts the speed with which the fan speed varies ("slow start" and "slow stop"); it practically "slows" or "speeds up" the system depending on the change of the automatic control signal.

In the "M" position (trimmer completely turned anti–clockwise), the variation speed is slowed to the maximum (system slow to speed).

In the "m" position (minimum), speed variation is almost instantaneous .

The cutting regulators is provided with a minimum Soft–Start time equal to 10 seconds to avoid possible hunting that might be caused by an excessively slow system.

WARNING

The position of trimmers marked with a spot of red paint (supplier calibration) must not be altered

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