Liebert HIROSS

High Performance Air Conditioning

Himod

C Version

Service Manual

English

cod. 272631 – rev. 15.01.2003

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

The Service Manual **HIMOD** can also be surfed on the Web at the address: **www.HIROSS.IT/pde/TDS/Himod**
This document is password–protected. Ask for the password to your Dealer/Area Manager.

1 – Preliminary operations

1.1 – Inspection

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

1.2 – 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.

1.3 – 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The warranty clauses are no longer valid for any possible damage or malfunction that may occur during or due to operation outside the application values.

1.4 – Identification

The air conditioner can be identified according to the following nomenclature:

27 U C

Model

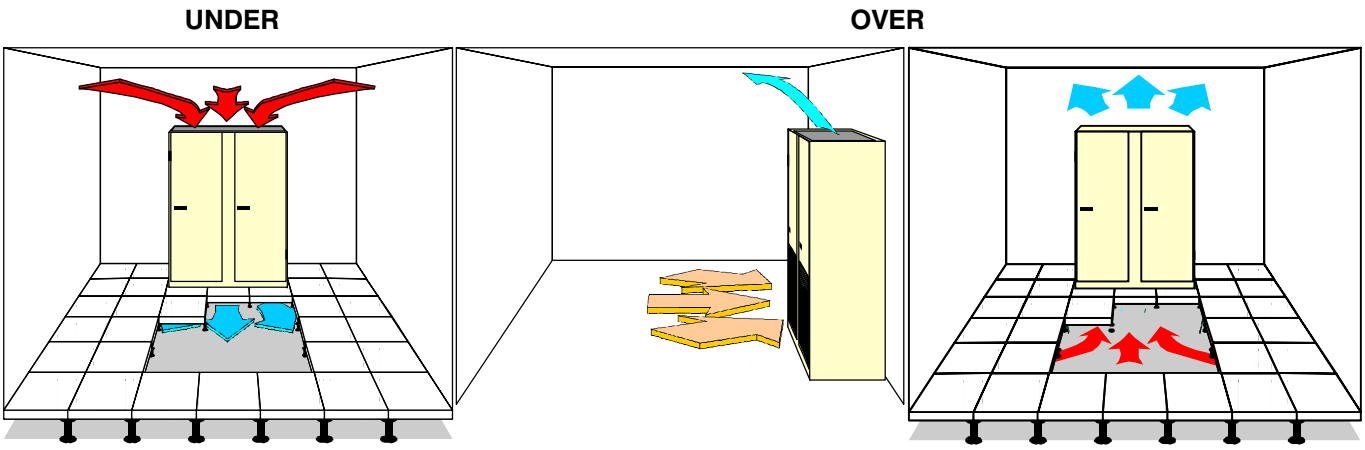
Air distribution:
U* = *Under (downflow)
O* = *Over (upflow)

Cooling circuit:
A = air–cooled
W = water–cooled
C* = *chilled water
F = Freecooler
D = Dualfluid (air–cooled)
H = Dualfluid (water–cooled)

To view the Service Manual HIMOD version A/W/F/D/H, refer to the Manual code 272157

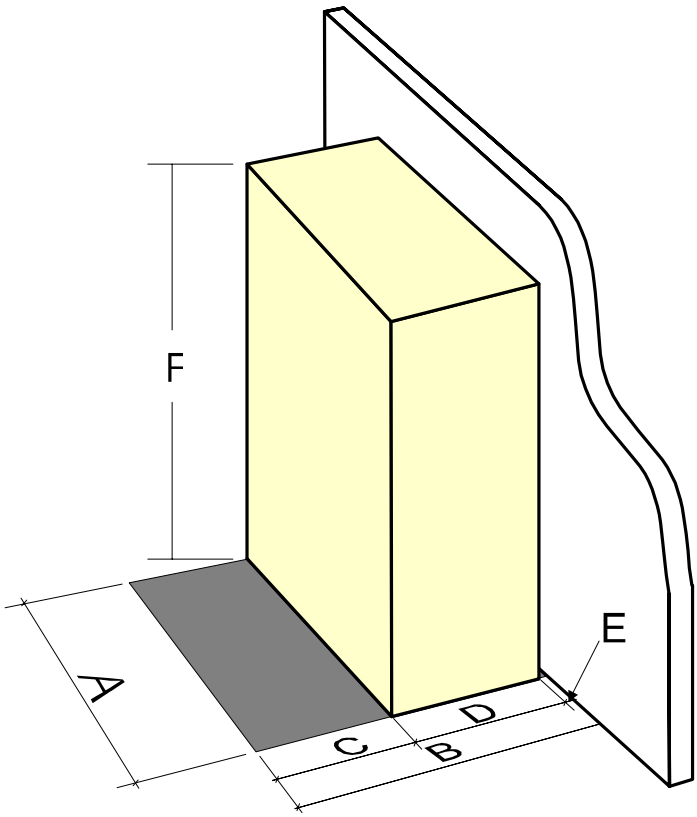
Tab. 1 – Operating limits

Room conditions	from:	18°C, 45% R.H.	Hot water heating coil	inlet water temperature	max. 85°C
	to:	27°C, 55% R.H		water pressure	max. 8.5 bar
			Chilled water coil	inlet water temperature	min. 5°C
Voltage tolerances	standard	400V± 10%/3/50		water pressure	max. 16 bar
	optional	208 ÷ 230V ± 10%/3/60 380V ± 10%/3/60 460V ± 10%/3/60	Storage conditions	from:	– 20°C
				to:	50°C



2 – Positioning

2.1 – Clearance areas and main dimensions



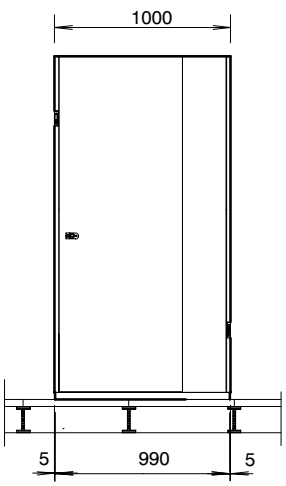
	MODEL			
	27–45 O/UC	**55–65–80–85 O/UC**	**90–10 UC**	**12–14 UC**
A [mm]	1000	1750	2050	2550
B [mm]	1740	1740	1740	1740
C [mm]	800	800	800	800
D [mm]	890	890	890	890
E [mm]	50	50	50	50
F [mm]	1950	1950	1950	1950

MODEL	WEIGHT (kg) – standard unit
27 UC	290
45 UC	340
55 UC	495
65 UC	555
80 UC	590
85 UC	610
90 UC	660
10 UC	670
12 UC	830
14 UC	840
27 OC	290
45 OC	340
55 OC	495
65 OC	555
80 OC	590
85 OC	610

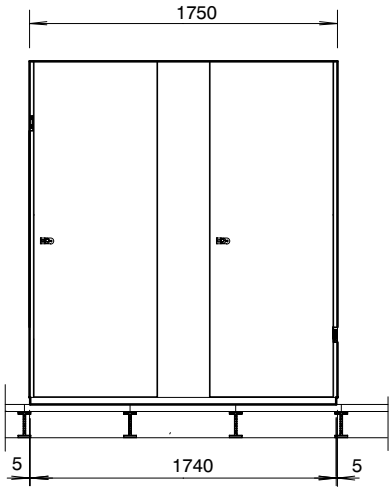
2.2 – Overall dimensions

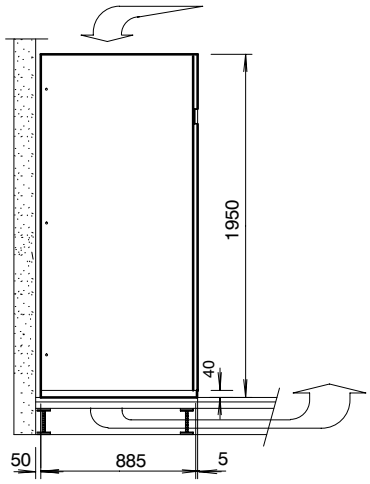
Under Version

27–45 UC

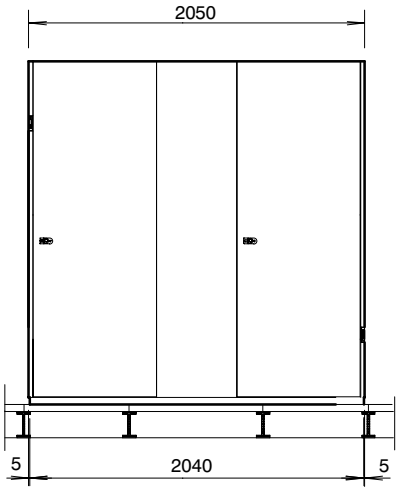


55–65–80–85 UC

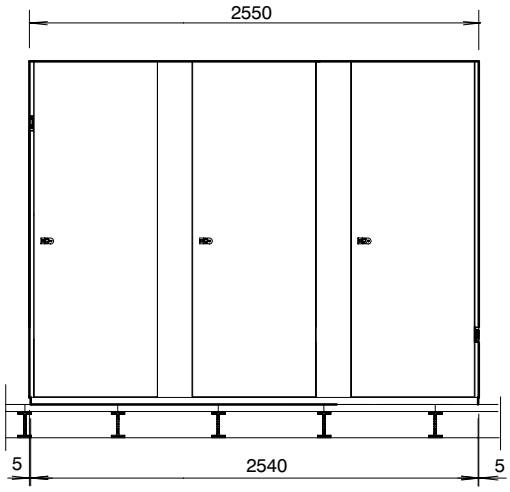


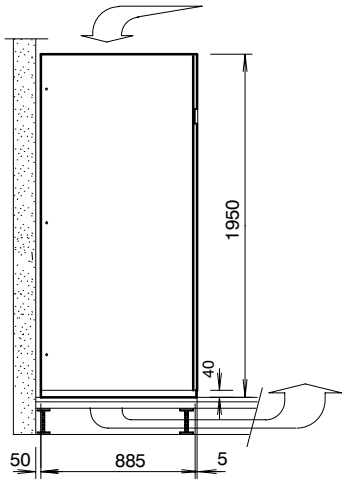


90–10 UC



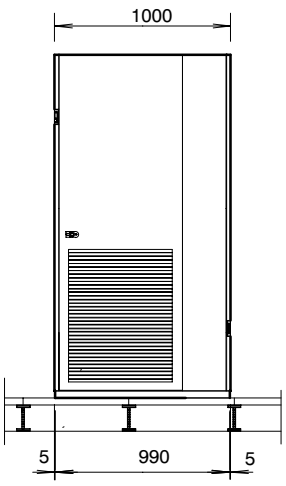
12–14 UC



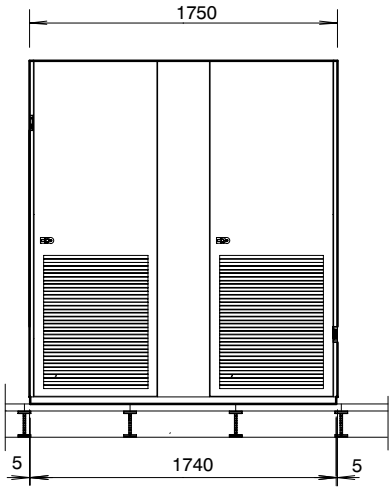


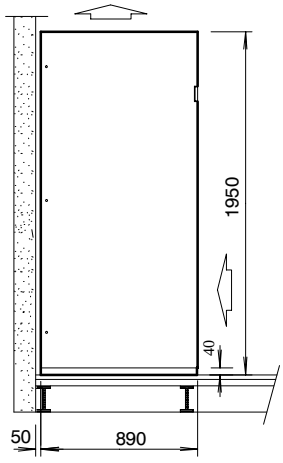
Over Version

27–45 OC



55–65–80–85 OC

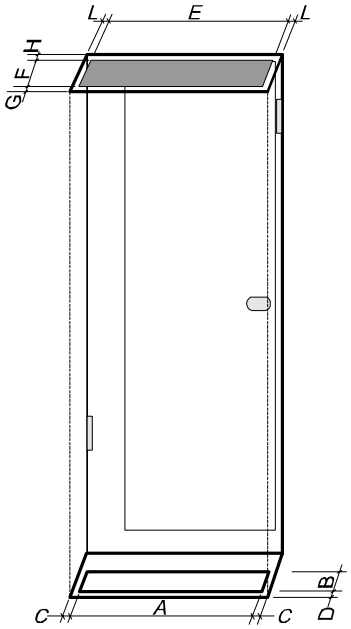




3 – Installation

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

3.1 – Air inlet and outlet



Look–through rear view

	A	B	C	D
27–45 C – under	910	778	40	52
55–65–80–85 C – under	1580	778	80	52

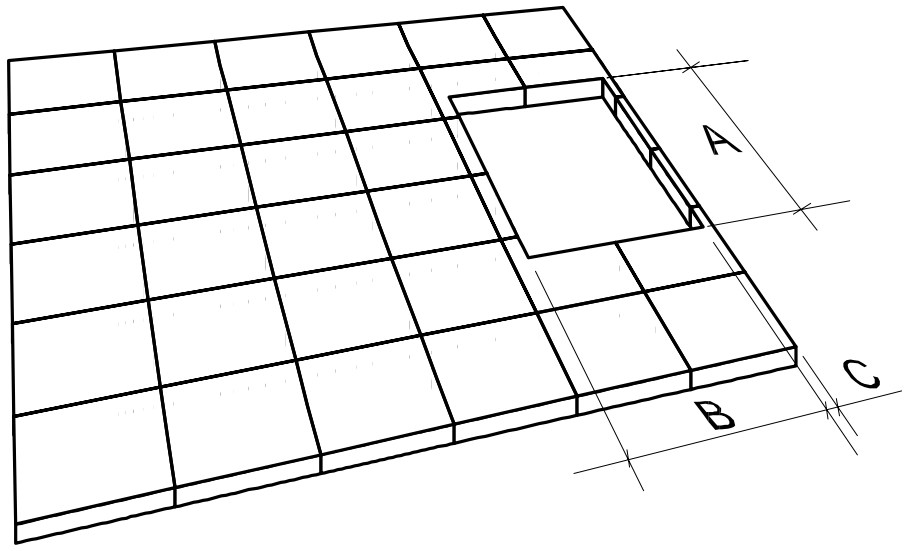
	E	F	G	H	L
27–45 C – under	910	804	43	43	45
55–65–80–85 C – under	1660	804	43	43	45

	A	B	C	D
90–10 C – under	1960	297	40	483
12–14 C – under	2460	297	40	483

	E	F	G	H	L
90–10 C – under	1960	799	43	46	45
12–14 C – under	2460	799	43	46	45

ATTENTION: About the upflow (over) units, the extraordinary removal of the fan (560 mm blade diameter) is permitted only from the top of the unit.
Please keep it on mind during the possible ducting design and manufacturing.

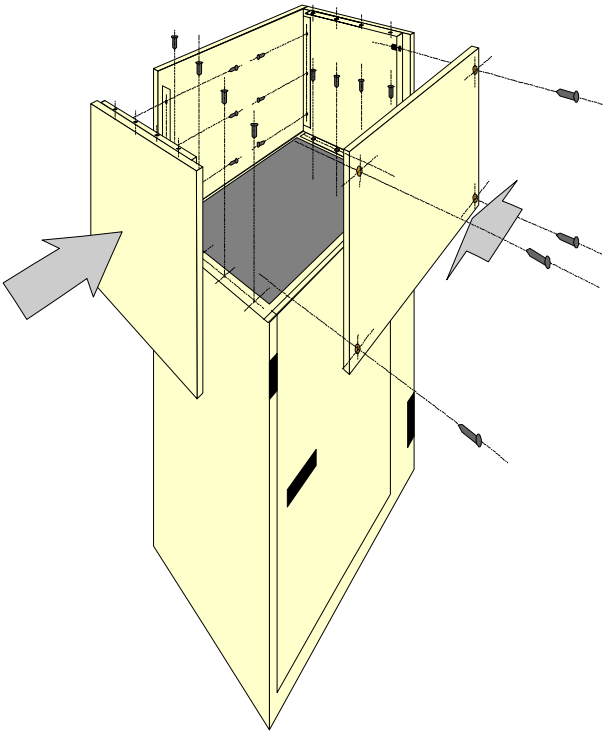
3.2 – Hole in raised floor

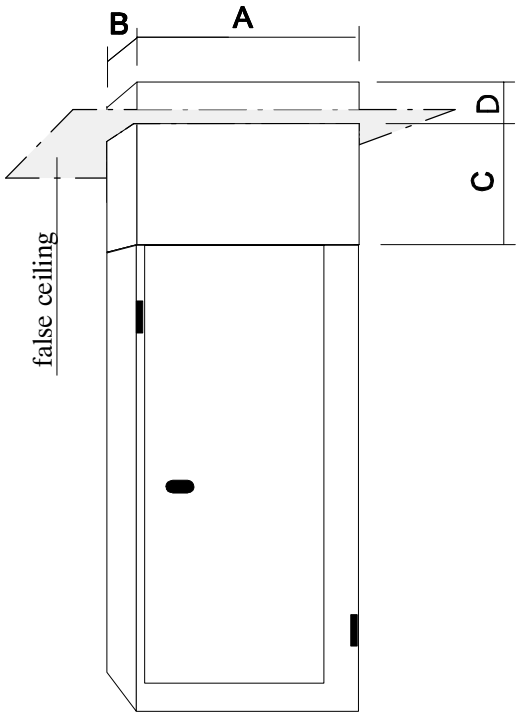


	27–45 C		55–65–80–85 C	
	without base frame	with base frame	without base frame	with base frame
A [mm]	900	1000	1650	1750
B [mm]	810	885	810	885
C [mm]	93	48	93	48

	90–10 UC		12–14 UC	
	without base frame	with base frame	without base frame	with base frame
A [mm]	1970	2050	2470	2550
B [mm]	810	885	810	885
C [mm]	93	48	93	48

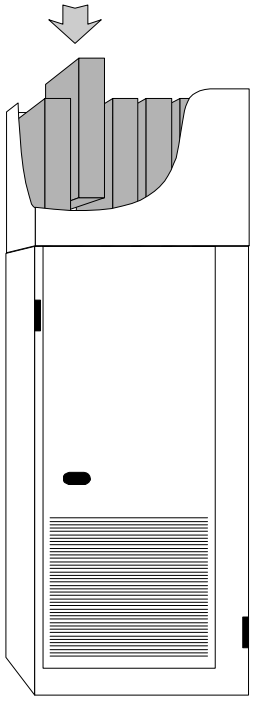
3.3 – Extension hood



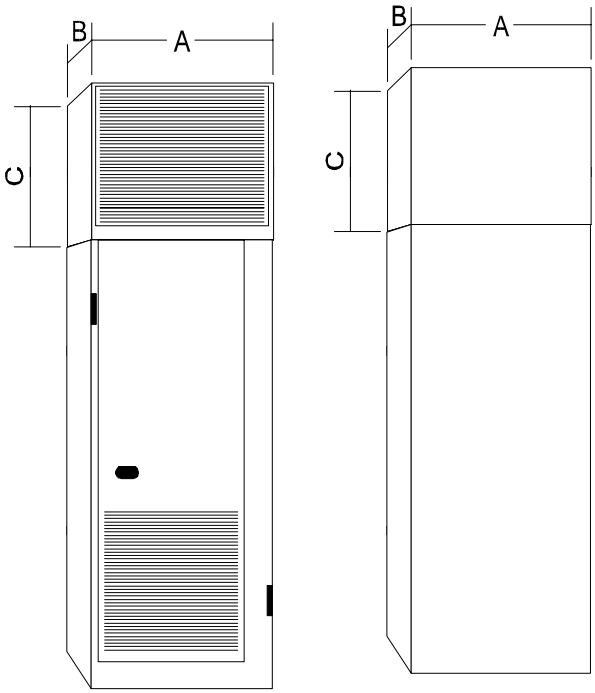


	A	B	C	D
27–45 C	1000	890	500 / 1200	30
55–65–80–85 C	1750	890	500 / 1200	30
90–10 UC	2050	890	500 / 1200	30
12–14 UC	2550	890	500 / 1200	30

3.4 – Extension hood with sound reduction cartridges (Over unit)



3.5 – Horizontal discharge hood (Over unit)

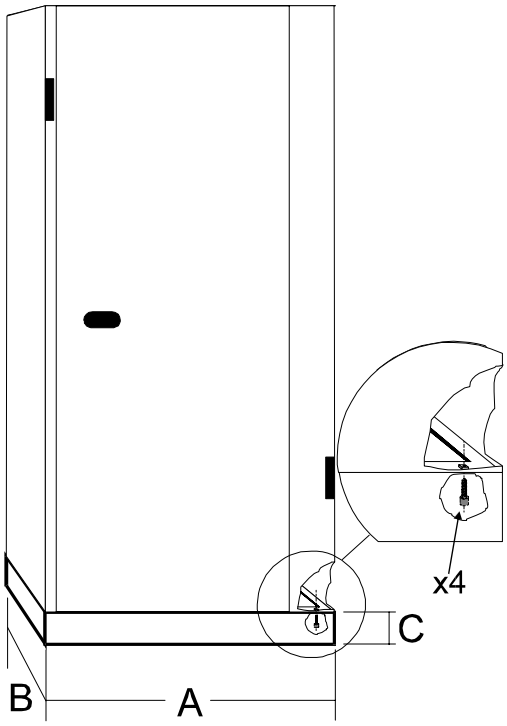


front back

	A	B	C
27–45 C	1000	890	600/900
55–65–80–85 C	1750	890	600/900

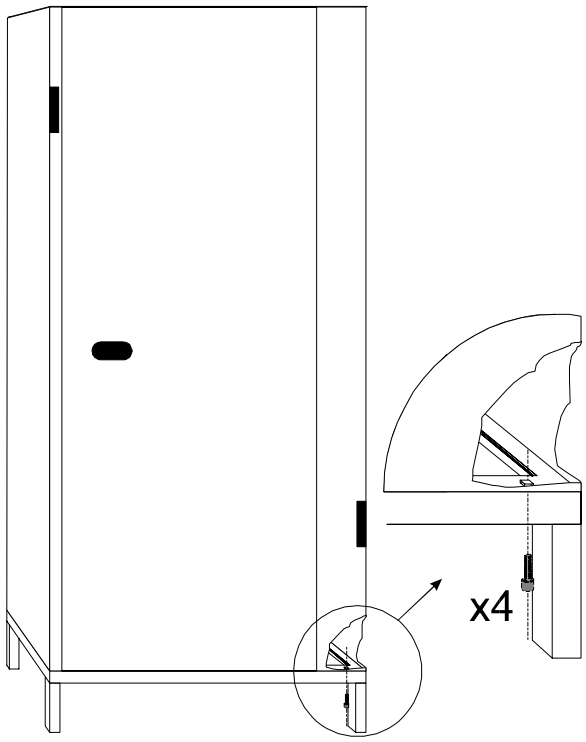
3.6 – Base module

If there is no raised floor below the unit it must be placed on a base module to allow access to the external connections.
The conditioner is connected to the base module by 4 screws.

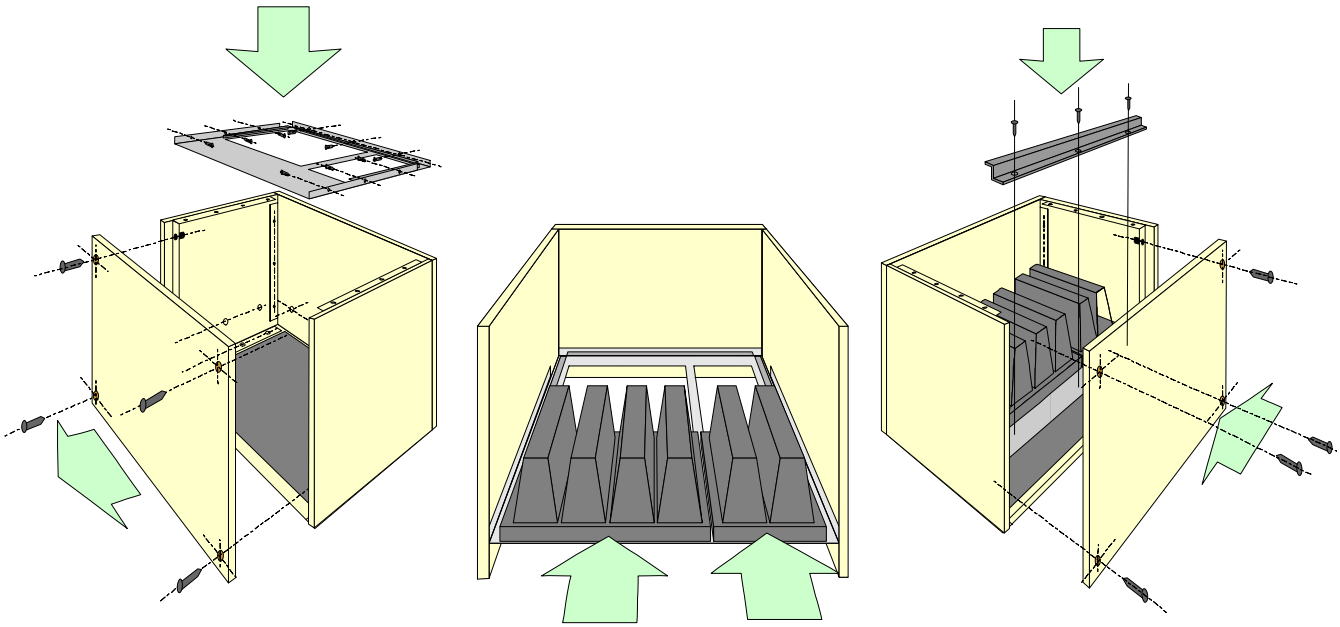


	A	B	C
27–45 C	990	885	200
55–65–80–85 C	1740	885	200
90–10 UC	2040	885	200
12–14 UC	2540	885	200

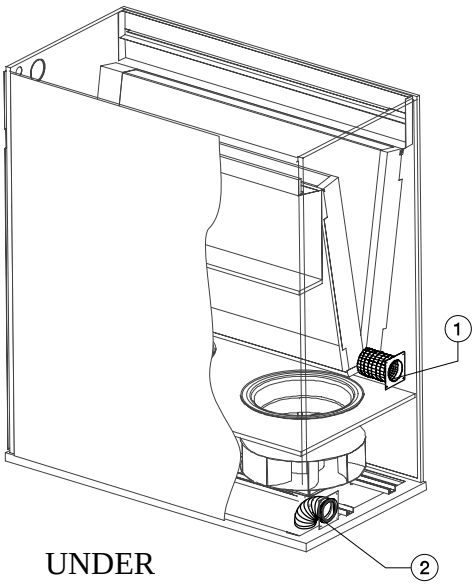
3.7 – Base frame



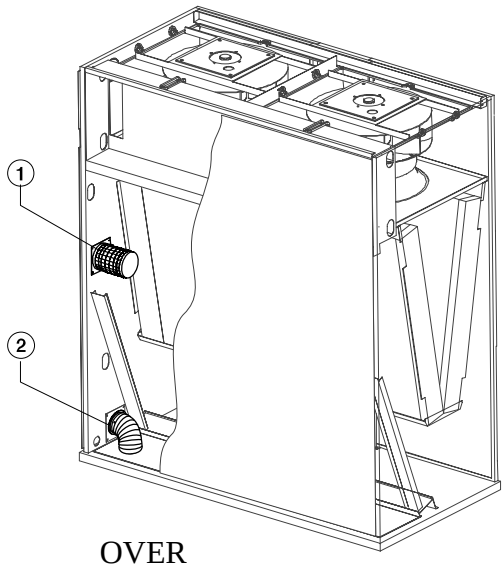
3.8 – High efficiency filters



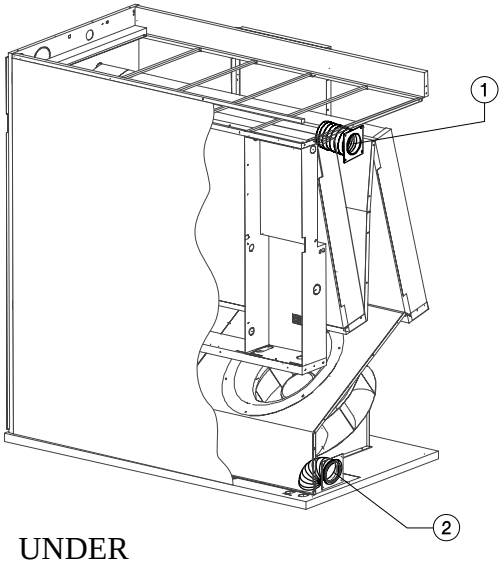
3.9 – New Air module



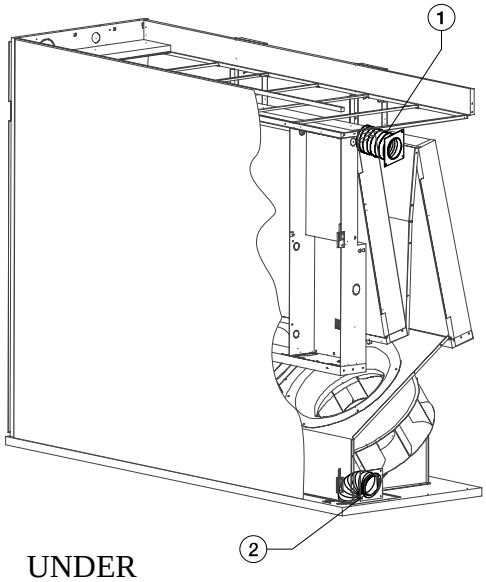
UNDER
(C version)



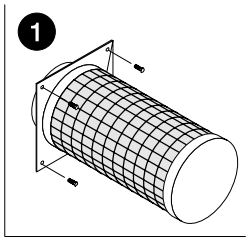
OVER
(C version)

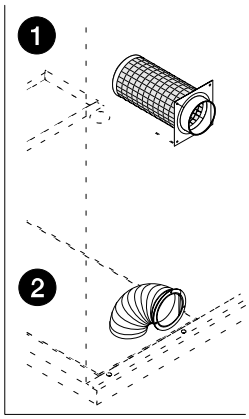


UNDER
(Mod. 90–10 – C version)



UNDER
(Mod. 12–14 – C version)





4 – Water connections

4.1 – General warnings

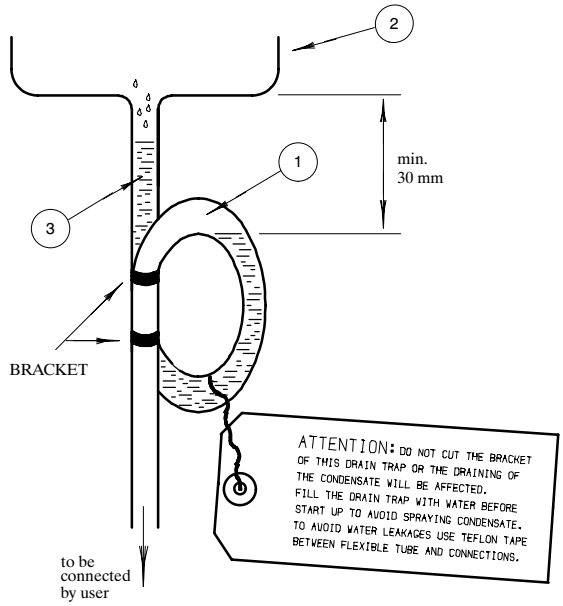
ENSURE THAT THE TUBING DOES NOT OBSTRUCT THE AIR FLOW*(Under only)*.

IF THE TUBING IS TO RUN OUTDOORS, ADD ETHYLENE GLYCOL TO THE CIRCUIT AS DESCRIBED IN PARA. 4.4.

4.2 – Auxiliary water connections

– **Condensate drain** (Fig. 1)**:**
- Use galvanized steel, PVC or flexible polythene tubing.
- Allow a 2% gradient towards the drain outlet.
- There must be a drain trap (1) placed at least 30 mm below the drain tray (2).
- Fill the drain trap with water (3).

Fig. 1 – Condensate drain



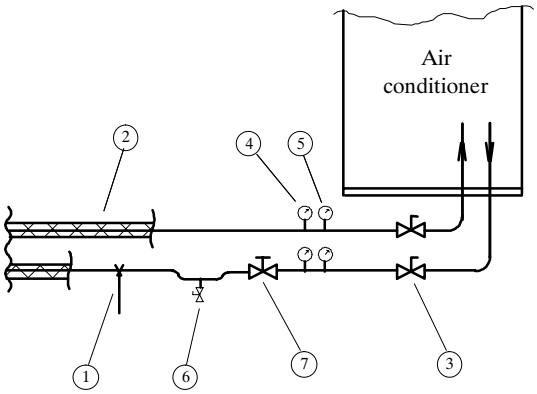
– **Humidifier** *(optional)*: See App. A.

– **Hot water** *(optional)*:
- Use copper or steel (Mannesmann) tubing.
- Insulate both tubes using Armaflex insulation.

4.3 – Chilled water connections

- Use copper or steel (Mannesmann) tubing.
- Place the tubing on supporting saddles (1).
- Insulate both tubes using Armaflex insulation (2).
- Place shut–off ball valves (3) at the conditioner inlet and outlet to allow easy maintenance.
- It is useful to install a thermometer (4) and a manometer (5) at the conditioner inlet and outlet.
- Install a water drain tap (6) at the lowest point in the circuit.
- Place a control valve (7) in the outlet water tubing.
- Fill the circuit with water/glycol (see below), up to a maximum pressure of 7 bar.

Fig. 2 – Chilled water circuit



4.4 – Adding ethylene glycol

Tab. 2 – Ethylene glycol to be added to water

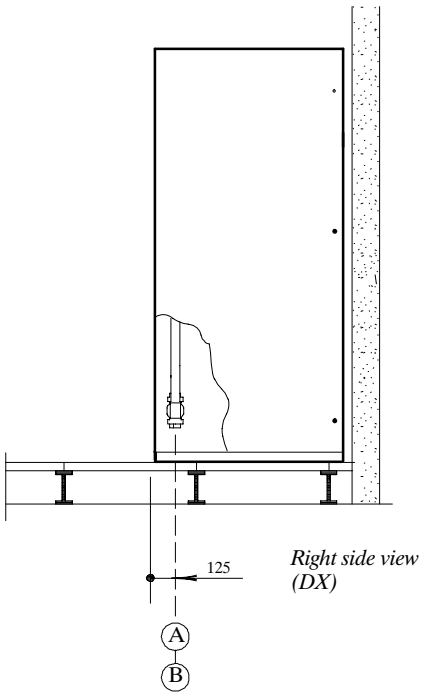
freezing temperature (°C)	0	–5	–11	–18	–27	–39
ethylene glycol to add to water (% in weight of total mixture)	0	10	20	30	40	50

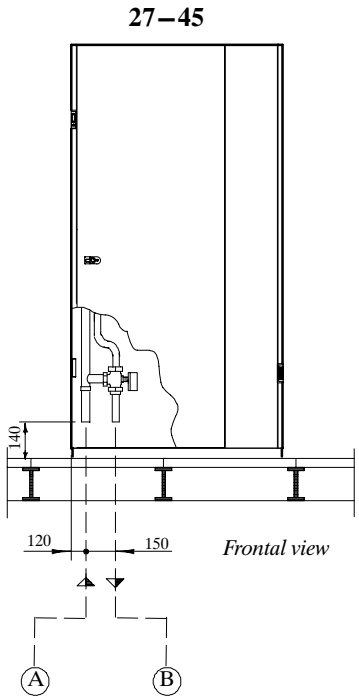
N.B. Values are for Shell antifreeze 402. For different brands check manufacturer's data.

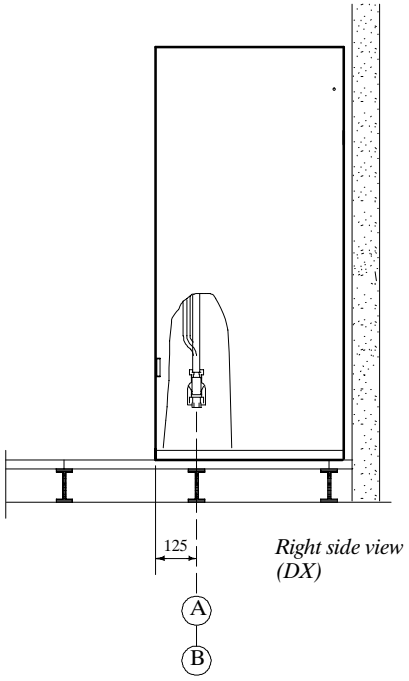
NOTES:
- To avoid stratification run the circulation pump for at least 30 min. after adding any glycol.
- After adding water to the water circuit, **disconnect the unit from the sanitary water piping system;** in this way the water mixed with glycol won't return into the same piping system.
- After any topping–up of water check the glycol concentration and add any glycol if necessary.
- The hydraulic features of the system vary by adding glycol. Therefore check the head and the flow rate of the pump to be used.

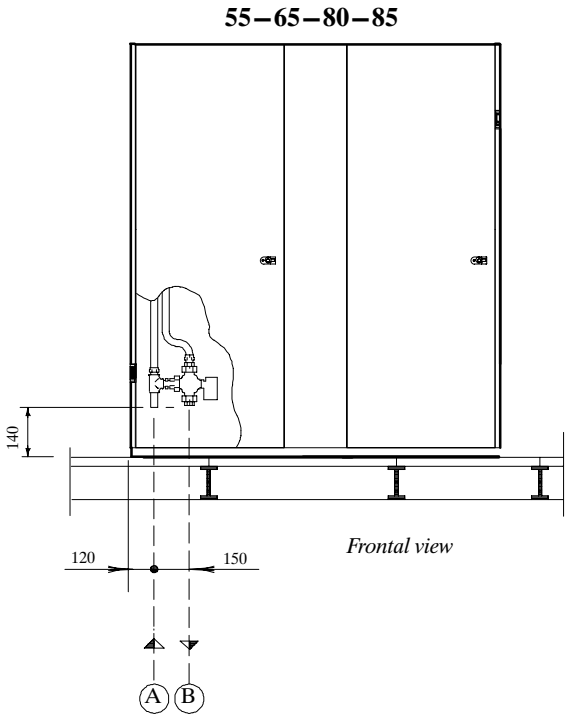
Fig. 3 – Chilled water connections

Himod C
under





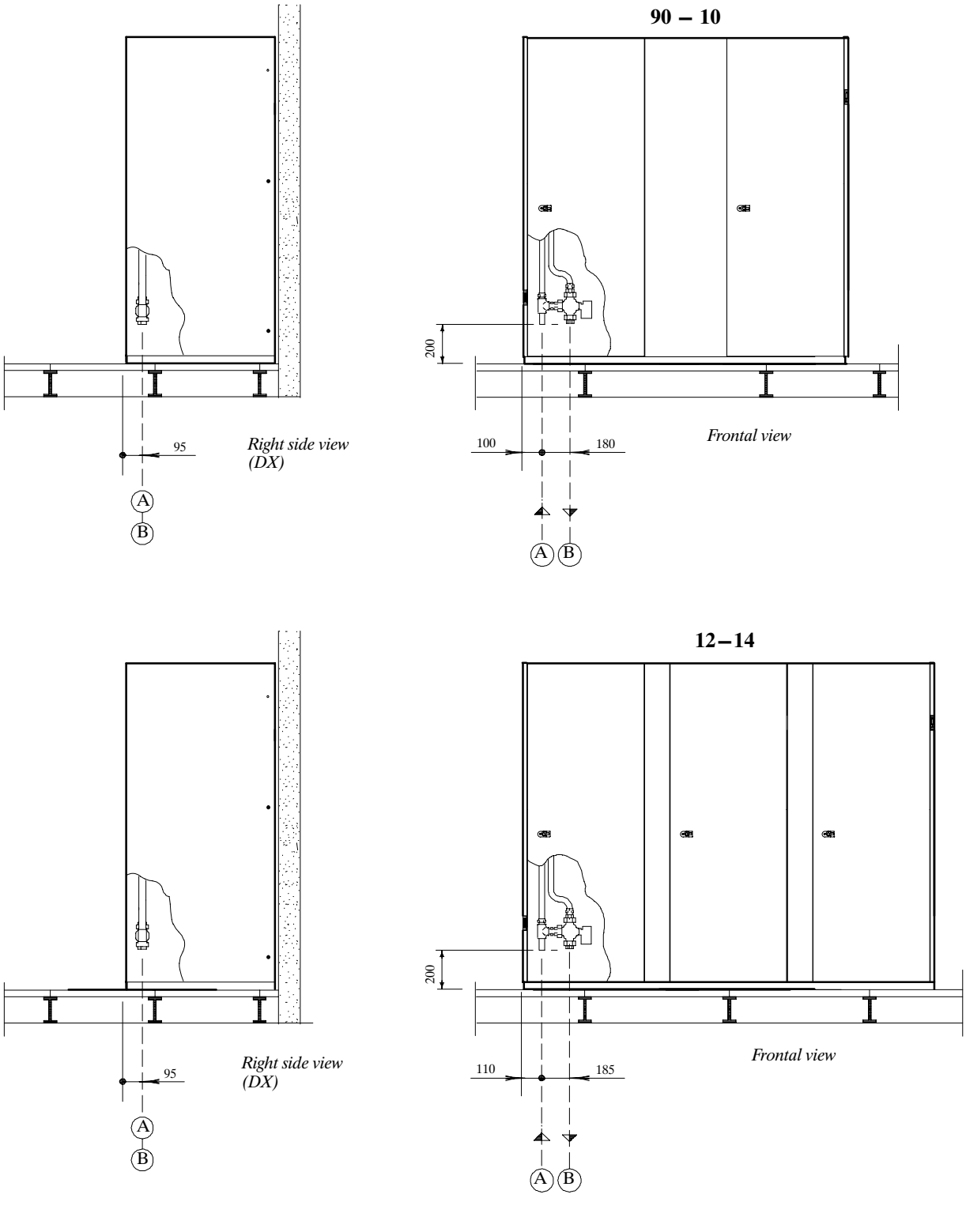




POS.	CONNECTION	DIMENSION		
		27C	45–55C	65–80–85C
A	Chilled water inlet	1 " female	1 ¼" female	1 ½" female
B	Chilled water outlet	1 " female	1 ¼" female	1 ½" female

Fig. 4 – Chilled water connections

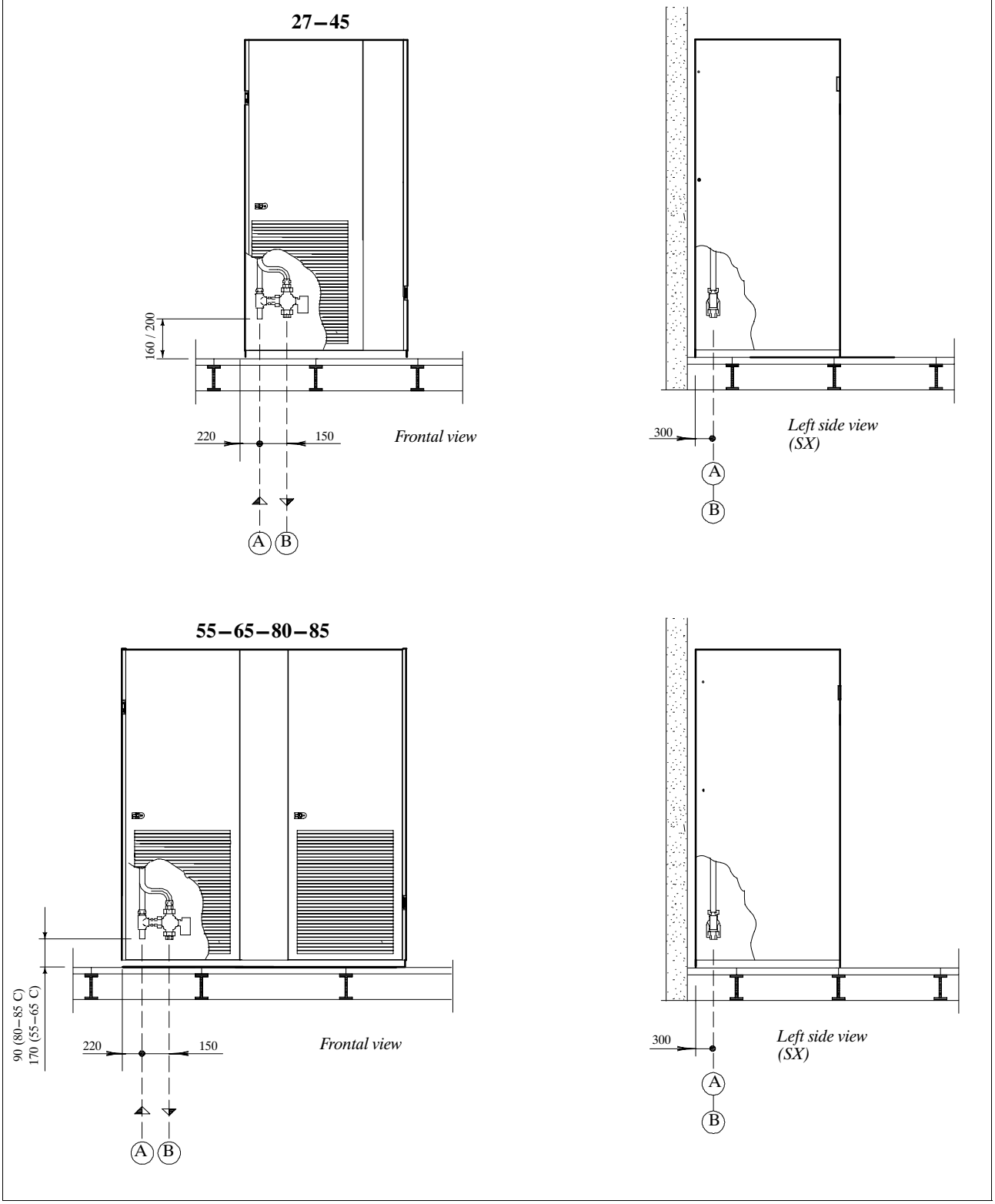
Himod C
under



POS.	CONNECTION	DIMENSION	
		90–10 C	12–14 C
A	Chilled water inlet	2 ” male	2 ½” male
B	Chilled water outlet	2 ” male	2 ½” male

Fig. 5 – Chilled water connections

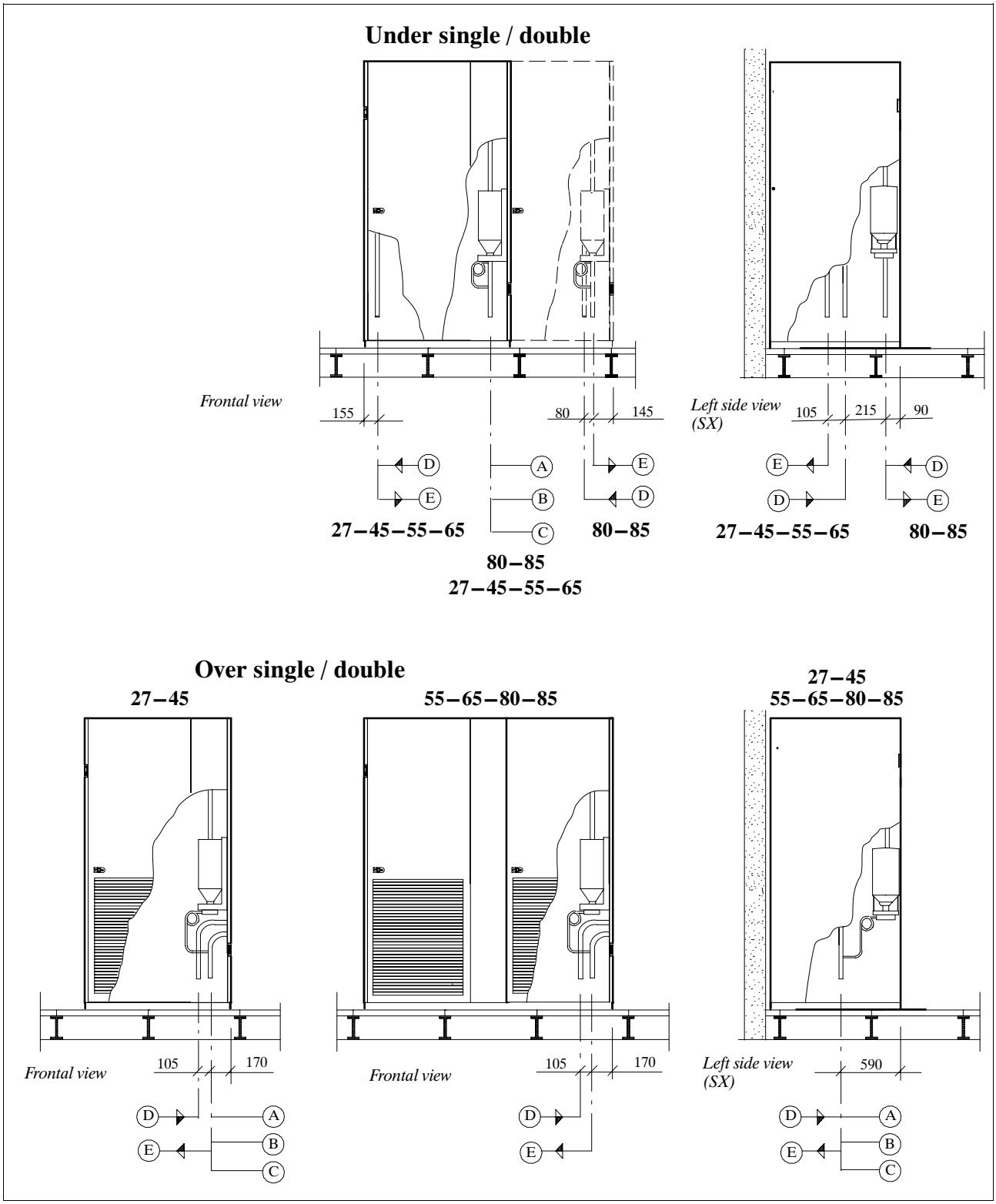
Himod C
over



POS.	CONNECTION	DIMENSION		
		27C	45–55C	65–80–85C
A	Chilled water inlet	1 " female	1 ¼" female	1 ½" female
B	Chilled water outlet	1 " female	1 ¼" female	1 ½" female

Fig. 6 – Auxiliary water connections

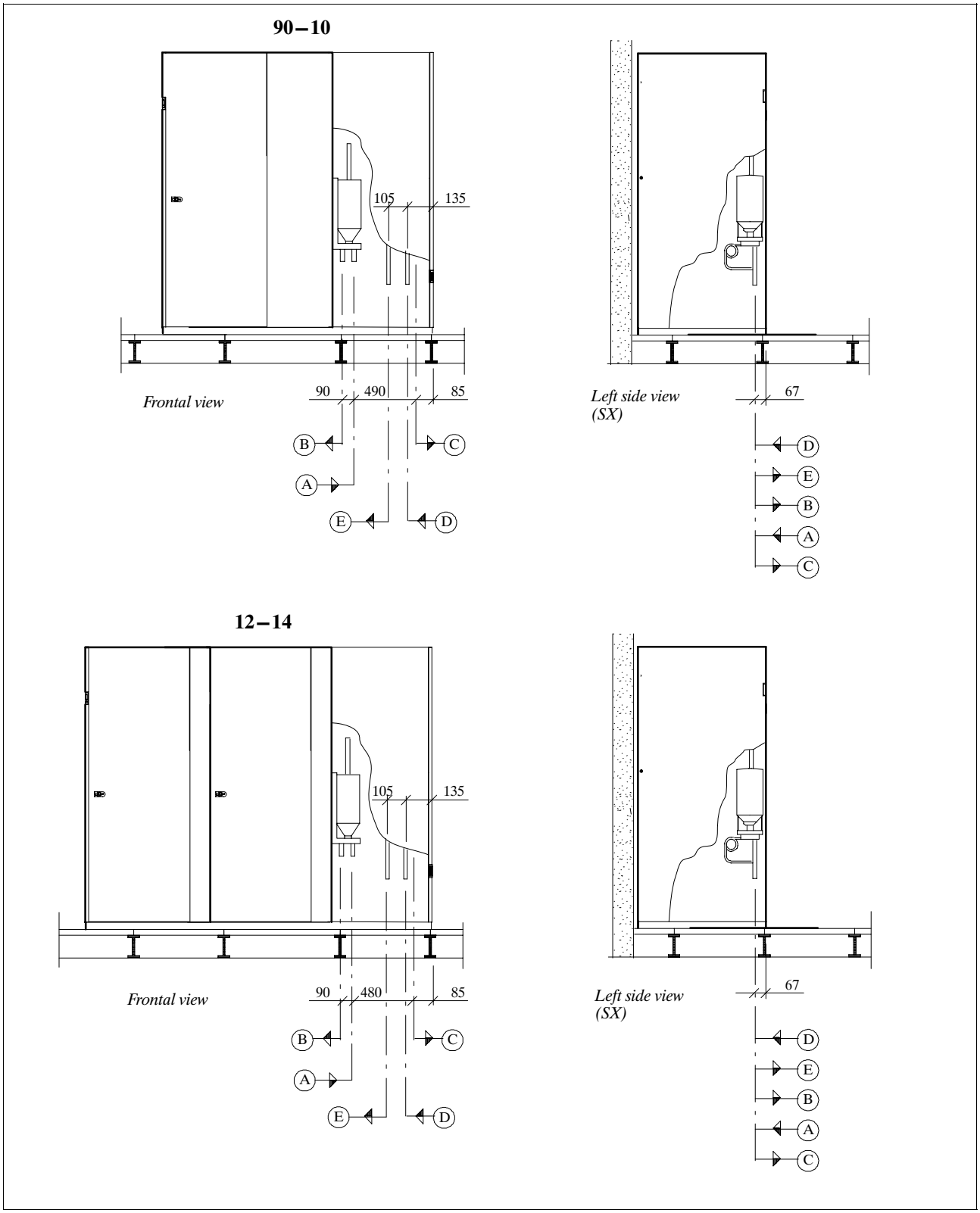
Himod C
under/over



POS.	CONNECTION	DIMENSION
A	HUMIDAIR water supply (optional)	½" G male
B	HUMIDAIR water drain (optional)	ø 22 mm female
C	Condensate drain	ø 20 mm female
D/E (small)	Hot water inlet/outlet (optional)	ø 18 x 1 mm
D/E (big)	Hot water inlet/outlet (optional)	ø 22 x 1 mm

Fig. 7 – Auxiliary water connections

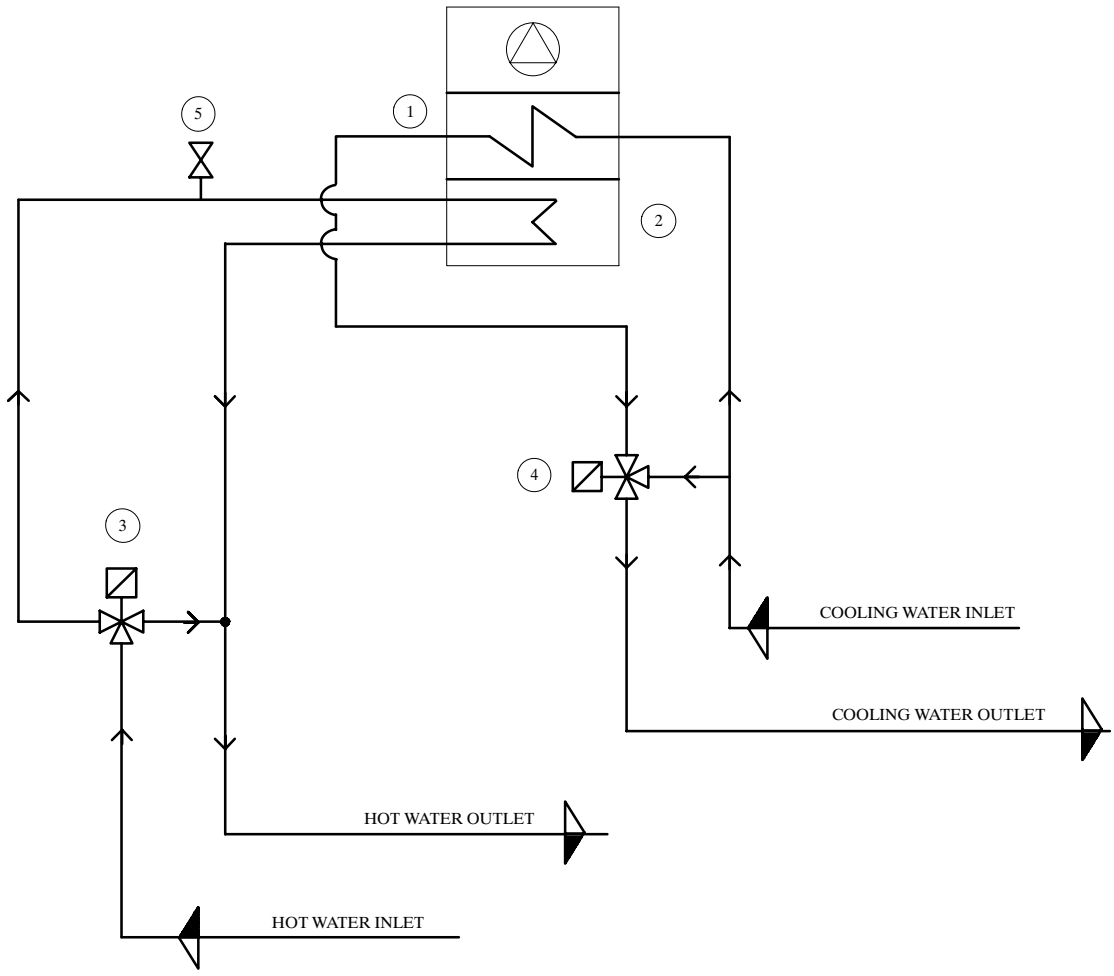
Himod C
under



POS.	CONNECTION	DIMENSION
A	HUMIDAIR water supply (optional)	½" G male
B	HUMIDAIR water drain (optional)	ø 22 mm female
C	Condensate drain	ø 20 mm female
D/E	Hot water inlet/outlet (optional)	ø 22 x 1 mm

Fig. 8 – Water circuit

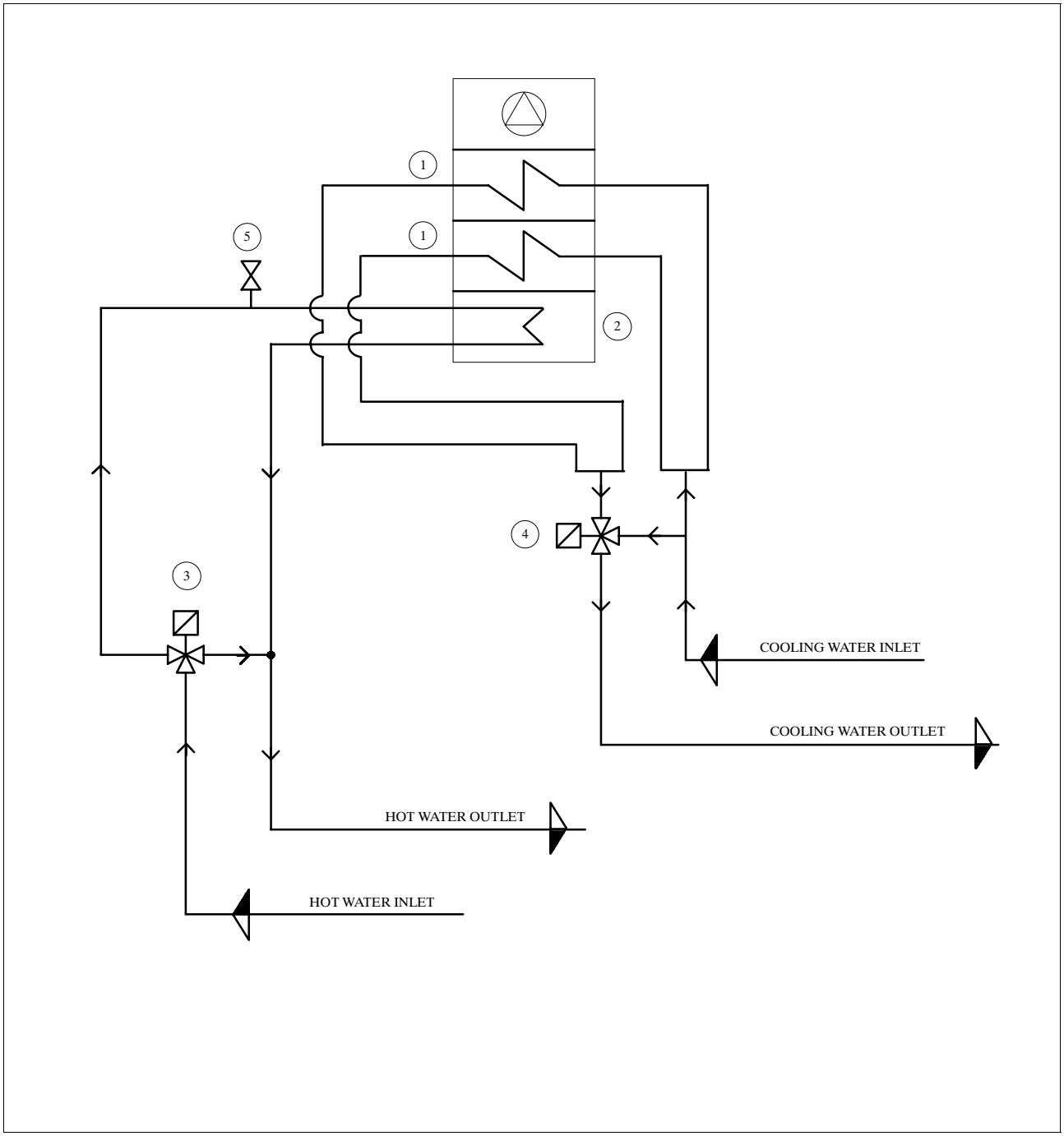
Himod C
27–55–65



POS.	DESCRIPTION
1	Chilled water coil
2	Reheating coil (optional)
3	ON–OFF 3–way valve (optional)
4	Chilled water 3–way valve
5	Air purge valve

Fig. 9 – Water circuit

Himod C
45–80–85–90–10–12–14



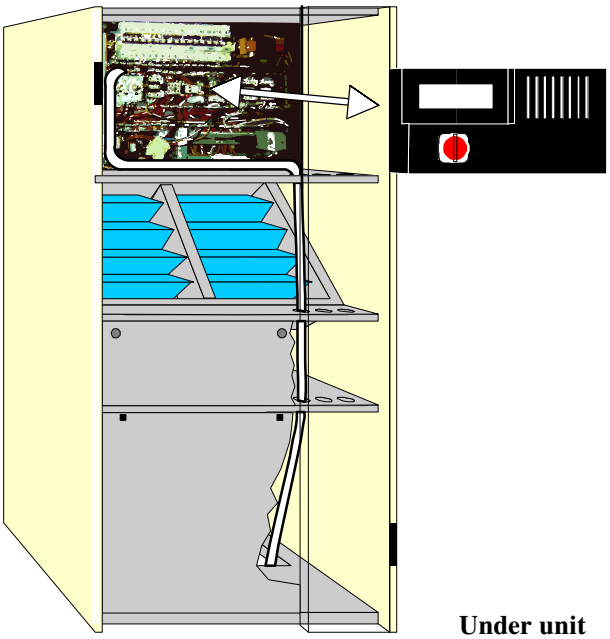
POS.	DESCRIPTION
1	Chilled water coil
2	Reheating coil (optional)
3	ON–OFF 3–way valve (optional)
4	Chilled water 3–way valve
5	Air purge valve

5 – Electrical connections

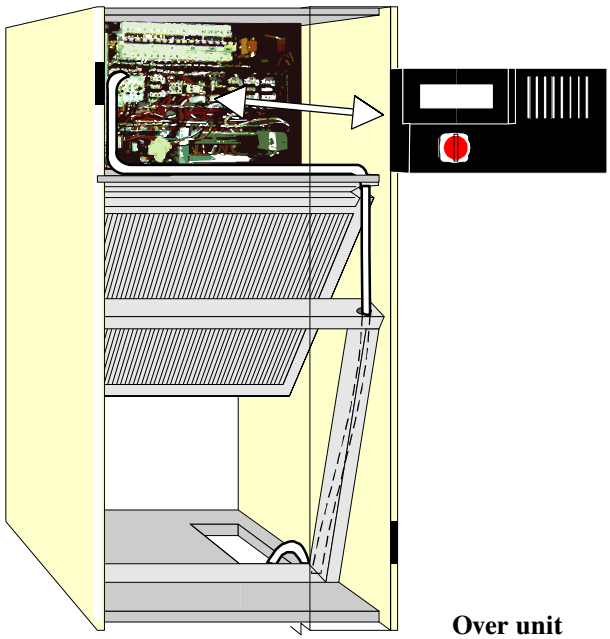
5.1 – Electrical connections

1) Before proceeding with the electrical connections, ensure that:
   - all electrical components are undamaged;
   - all terminal screws are tight;
   - the supply voltage and frequency are as indicated on the unit.
2) Power supply cable connections (see Fig. 10):
   - Connect the cable to the Line inlet terminal board.
   - Use the cable size defined according to the flow (see Fig. 11), the supply voltage and the installation type.
   - Protect the supply using a back–up fuse.
   - Do not fit the supply cable in the raceways inside the machine electric board.
   - Use multipolar cables with sheath (CEI20–22) only.
3) Wiring connections:
   - Connections for remote on–off and hot water consent must be done by the installer.
   - The General Alarm terminals allow remote alarm signalling.
4) In case of short circuit, check the sticking of the involved remote control switch and possibly replace it.

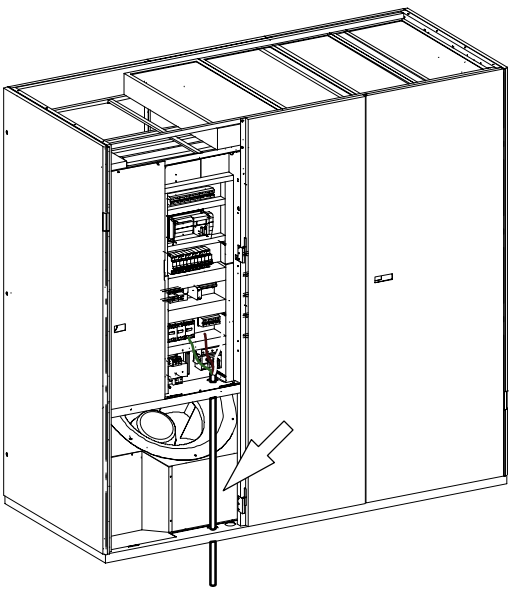
Fig. 10 – Supply cable passage



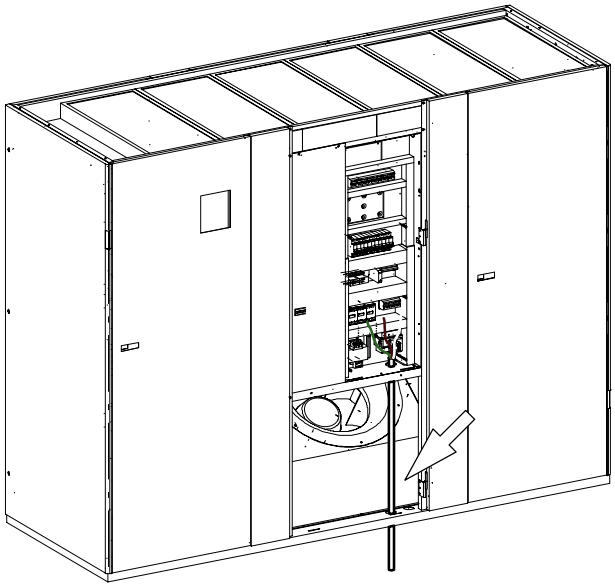
Under unit



Over unit

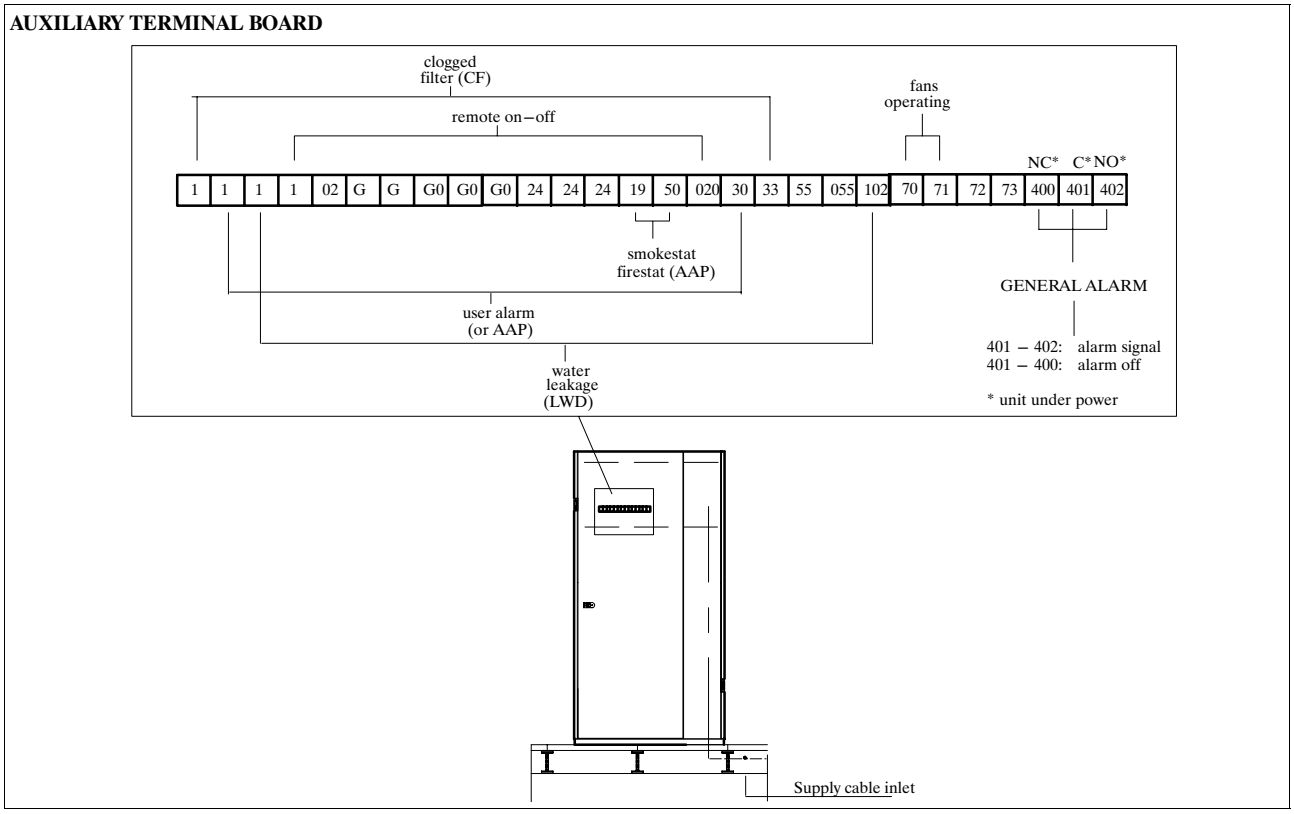


Under unit
(Mod. 90–10 C version)



Under unit
(Mod. 12–14 C version)

Fig. 11 – Electrical connections



Tab. 3 – Electrical data

50 Hz

CONFIGURATION	MODELS	FLA (A)	LRA (A)	RESIDUAL–CURRENT CIRCUIT BREAKERS I∆n = 0.3A (400V)
3ph / 400V				
(F): Cooling *Fan(s)*	**27 – 45 C**	4,8	16,0	10A
	55 – 65 – 80 – 85 C	9,7	32,0	16A
	90 – 10 U C	17,3	35,6	16A
	12 – 14 U C	17,3	53,4	25A
(F+C): Cooling + Electrical heating *Fan(s) + heating*	**27 – 45 C**	13,3	16,0	16A
	55 – 65 – 80 – 85 C	26,7	32,0	32A
	90 – 10 U C	34,3	35,6	50A
	12 – 14 U C	34,3	53,4	50A
(F+C+H): Cooling + Electrical heating + Humidity *Fan(s) + heating, + humidification*	**27 – 45 C**	22,3	22,3	32A
	55 – 65 – 80 – 85 C	35,7	35,7	50A
	90 – 10 U C	47,3	47,3	63A
	12 – 14 U C	47,3	47,3	63A

60 Hz

CONFIGURATION	MODELS	FLA (A)	LRA (A)	RESIDUAL−CURRENT CIRCUIT BREAKERS I△n = 0.3A (400V)
3ph / 208−230V				
(F): Cooling *Fan(s)*	**27 – 45 C**	8,9	35,4	16A
	55 – 65 – 80 – 85 C	17,8	70,8	25A
(F+C): Cooling + Electrical heating *Fan(s) + heating*	**27 – 45 C**	24,3	35,4	32A
	55 – 65 – 80 – 85 C	48,6	70,8	50A
(F+C+H): Cooling + Electrical heating + Humidity *Fan(s) + heating + humidification*	**27 – 45 C**	33,3	33,3	63A
	55 – 65 – 80 – 85 C	57,6	57,6	80A
3ph / 380V				
(F): Cooling *Fan(s)*	**27 – 45 C**	4,9	20,4	10A
	55 – 65 – 80 – 85 C	9,7	40,8	16A
(F+C): Cooling + Electrical heating *Fan(s) + heating*	**27 – 45 C**	13,8	20,4	16A
	55 – 65 – 80 – 85 C	27,5	40,8	32A
(F+C+H): Cooling + Electrical heating + Humidity *Fan(s) + heating + humidification*	**27 – 45 C**	22,8	22,8	40A
	55 – 65 – 80 – 85 C	36,5	36,5	50A
3ph / 460V				
(F): Cooling *Fan(s)*	**27 – 45 C**	4,0	16,0	10A
	55 – 65 – 80 – 85 C	8,0	32,0	10A
(F+C): Cooling + Electrical heating *Fan(s) + heating*	**27 – 45 C**	11,4	16,0	16A
	55 – 65 – 80 – 85 C	22,7	32,0	25A
(F+C+H): Cooling + Electrical heating +Humidity *Fan(s) + heating + humidification*	**27 – 45 C**	20,4	20,4	32A
	55 – 65 – 80 – 85 C	31,7	31,7	40A

NOTES:

- The cables have to be sized in compliance with local standards and according to the type and characteristics (e.g. Amperes) of installation.
- The specific power the user−installed switch allows must be lower than 300,000 A^2 x s.
- Prescriptions on the differential relay required to the user:
  - for special places (healthcare facilities, etc...) comply with the local regulations;
  - For ordinary places, a low sensitivity is suggested (300 mA) coordinated with the value of the ground heater (IEC 364): Ra v 50/Ia (Art. 413.1.4.1, CEI 64−8);
  - In case of frequent over−voltages with mains impulse, it is advisable to install a selective differential and to evaluate the need for adopting other devices.
  - (Models 90−10−12−14 U C only) The value of current (Full Load Ampere) is calculated considering electric heaters running at a capacity of 17,55 kW, configuration F+C and F+C+H.

5.2 – Fan connections

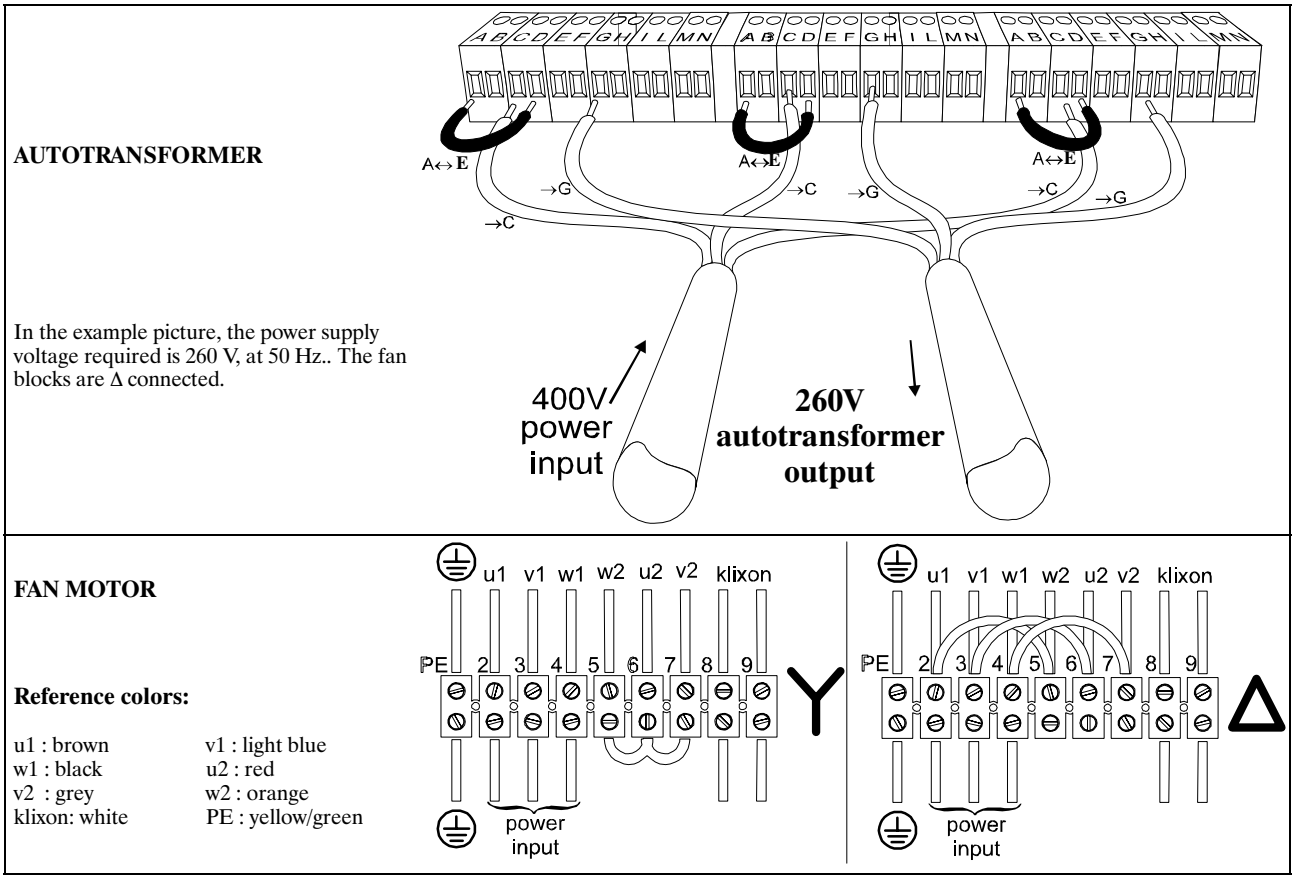
The fan is electrically feeded by an autotransformer that is connected by the constructor in order to obtain the nominal air flow and the Available External Static Pressure (AESP).
To change the factory connection proceed as follow:

– identify the unit's graph;
– choose the curve's point where both the air flow and the static pressure are the most suitable for the installation;
– check the factory fan blocks connection (Δ or Y) and correct if necessary (see Fig. 12);
– find the output connectors and the bridges corresponding to the graph values (see para. 5.3;
– connect the bridges and the output connectors;
– connect the 400V supply cables to the "C" terminals.

> After a wiring modification, execute a loadless test on the autotransformer. Check the voltage of each wire, in order not to damage the transformer (always refer to the **output voltage** column values).

N.B. A FAN SPEED VARIATION CHANGES THE WORKING CONDITION OF THE UNIT.

Fig. 12 – Example of electrical connection to the autotransformer



Tab. 4 – Autotransformer output connections

50 Hz

autotrasformer outlet voltage (1)	output STD		graph value	
	output connectors	bridge	Δ fan connection	Y fan connection
185	**E**	A ↔ H	**185**	–
200	**E**	A ↔ G	**200**	–
215	**E**	A ↔ F	**215**	–
230	**A**	–	**230**	–
245	**F**	A ↔ E	**245**	–
260	**G**	A ↔ E	**260**	–
275	**H**	A ↔ E	**275**	**160** (156)
280	**E**	B ↔ G	**280**	**160** (162)
295	**E**	B ↔ F	**295**	**170** (167)
310	**B**	–	**310**	**180** (179)
325	**F**	B ↔ E	**325**	**180** (185)
340	**G**	B ↔ E	**340**	**200** (196)
355	**H**	B ↔ E	**355**	**200** (202)
370	**E**	C ↔ G	**370**	**210** (214)
385	**E**	C ↔ F	**385**	**220** (219)
400	**C**	–	**400**	**230** (231)

60 Hz

autotrasformer outlet voltage (1)	output STD		graph value	
	output connectors	bridge	Δ fan connection	Y fan connection
190	**E**	B ↔ G	**190**	–
208	**A**	–	**208**	–
210	**E**	B ↔ F	**210**	–
230	**B**	–	**230**	–
250	**F**	B ↔ E	**250**	–
270	**G**	B ↔ E	**270**	**160** (156)
290	**H**	B ↔ E	**290**	**170** (167)
320	**E**	C ↔ H	**320**	**180** (179)
340	**E**	C ↔ G	**340**	**200** (196)
360	**E**	C ↔ F	**360**	**210** (214)
380	**C**	–	**380**	**220** (219)
400	**F**	C ↔ E	**400**	**230** (231)
420	**G**	C ↔ E	**420**	–
440	**H**	C ↔ E	**440**	–
460	**D**	–	**460**	–

(1) Δ connection: fan inlet voltage = autotrasformer outlet voltage
Y connection: fan inlet voltage = autotrasformer outlet voltage multiplied by 0.577

Tab. 5 – Standard fan connections for HIMOD with autotransformer

50 Hz

Model	Standard			
	autotrasformer outlet voltage (1)	connections	output connectors	bridge
25/27U C	215	Δ	E	A ↔ F
35/45U C	215	Δ	E	A ↔ F
50/55U C	230	Δ	A	–
60/65U C	230	Δ	A	–
70/80U C	230	Δ	A	–
75/85U C	230	Δ	A	–
90U C	260	Δ	G	A ↔ E
10U C	280	Δ	E	B ↔ G
12U C	260	Δ	G	A ↔ E
14U C	325	Δ	F	B ↔ E
25/27O C	230	Δ	A	–
35/45O C	230	Δ	A	–
50/55O C	230	Δ	A	–
60/65O C	230	Δ	A	–
70/80O C	230	Δ	A	–
75/85O C	230	Δ	A	–

60 Hz

Model	Standard			
	autotrasformer outlet voltage (1)	connections	output connectors	bridge
27U C	250	Δ	F	B ↔ E
45U C	250	Δ	F	B ↔ E
55U C	260	Δ	G	A ↔ E
65U C	260	Δ	G	A ↔ E
80U C	280	Δ	E	B ↔ G
85U C	280	Δ	E	B ↔ G
27O C	270	Δ	G	B ↔ E
45O C	270	Δ	G	B ↔ E
55O C	260	Δ	G	A ↔ E
65O C	260	Δ	G	A ↔ E
80O C	280	Δ	E	B ↔ G
85O C	280	Δ	E	B ↔ G

(1) Δ connection: fan inlet voltage = autotrasformer outlet voltage
Y connection: fan inlet voltage = autotrasformer outlet voltage multiplied by 0.577

Tab. 6 – Electrical data

50 Hz

component / Model	FAN (3ph – 160 → 400V) OA (A)	FLA (A)	LRA (A)	absorbed power (kW)
27U C	4.3	4.4	16	1.4
45U C	4.3	4.4	16	1.4
55U C	2 x 4.3	2 x 4.4	2 x 16	2 x 1.5
65U C	2 x 4.3	2 x 4.4	2 x 16	2 x 1.5
80U C	2 x 4.3	2 x 4.4	2 x 16	2 x 1.5
85U C	2 x 4.3	2 x 4.4	2 x 16	2 x 1.5
90U C	2 x 5.8	2 x 6.0	2 x 17.8	2 x 2.4
10U C	2 x 5.9	2 x 6.0	2 x 17.8	2 x 2.6
12U C	3 x 5.9	3 x 6.0	3 x 17.8	3 x 2.5
14U C	3 x 5.9	3 x 6.0	3 x 17.8	3 x 3.1
27O C	4.3	4.4	16	1.5
45O C	4.3	4.4	16	1.5
55O C	2 x 4.3	2 x 4.4	2 x 16	2 x 1.5
65O C	2 x 4.3	2 x 4.4	2 x 16	2 x 1.5
80O C	2 x 4.4	2 x 4.4	2 x 16	2 x 1.6
85O C	2 x 4.4	2 x 4.4	2 x 16	2 x 1.6

60 Hz

component / Model	FAN (3ph – 160 → 460V) OA (A)	FLA (A)	LRA (A)	absorbed power (kW)
27U C	3.4	3.5	16	1.1
45U C	3.4	3.5	16	1.2
55U C	2 x 3.3	2 x 3.5	2 x 16	2 x 1.2
65U C	2 x 3.4	2 x 3.5	2 x 16	2 x 1.2
80U C	2 x 3.2	2 x 3.5	2 x 16	2 x 1.2
85U C	2 x 3.3	2 x 3.5	2 x 16	2 x 1.2
27O C	3.3	3.5	16	1.2
45O C	3.3	3.5	16	1.2
55O C	2 x 3.3	2 x 3.5	2 x 16	2 x 1.2
65O C	2 x 3.3	2 x 3.5	2 x 16	2 x 1.2
80O C	2 x 3.3	2 x 3.5	2 x 16	2 x 1.3
85O C	2 x 3.3	2 x 3.5	2 x 16	2 x 1.3

1. The fan "OA" value and the absorbed power are refered to standard air flow; Under unit with underflow air discharge and 20 Pa available external static pressure; Over unit with ducted air discharge and 50 Pa available external static pressure.

NOTE: the indicated fan currents are measured on their terminal boards; to calculate the current absorption of the fans to the machine supply terminals multiply the indicated values by the selected transforming ratio (see Tab. 4).

Tab. 7 – Optional electrical data

50 Hz

Component	ELECTRICAL HEATING		HUMIDIFIER	
Model	FLA (A)	rated power [kW]	FLA (A)	rated power [kW]
(400V / 3Ph / 50Hz)				
27–45 U/O C	8.5	5.85	9.0	5.8
55–65–80–85 U/O C	17.0	11.70		
90–10–12–14 U C	17.0	11.70	13.0	9.0
	25.4	17.55		

60 Hz

Component	ELECTRICAL HEATING		HUMIDIFIER	
Model	FLA (A)	rated power [kW]	FLA (A)	rated power [kW]
(208–230V / 3Ph / 60Hz)				
27–45 U/O C	15.4	5.85	15.0	5.8
55–65–80–85 U/O C	30.8	11.70		
(380V / 3Ph / 60Hz)				
27–45 U/O C	8.9	5.85	9.0	5.8
55–65–80–85 U/O C	17.8	11.70		
(460V / 3Ph / 60Hz)				
27–45 U/O C	7.4	5.85	8.0	5.8
55–65–80–85 U/O C	14.7	11.70		

5.3 – Aeraulic features

The aeraulic features, namely the values of the useful static pressure while the voltage changes (graphs), can be surfed on the Web at the following address:

www.HIROSS.IT/pde/TDS/Aeraulic_features

This document is password–protected. Ask for the password to your Dealer/Area Manager.

6 – Start–up

6.1 – **First start–up** (or after long stand-still)

Start the air conditioner as follows:

1) Open all valves in the water circuit according to the instruction label attached to the valve.
2) Check that there are no water leakages.
3) Bleed all air out of the chilled water circuit using the bleed valve on the chilled water coil.
4) Close all MCBs on the electrical panel.
5) Check the supply voltage on all phases.
6) Start the unit by pressing **ON OFF** (see Fig. 13).
7) Check the electrical absorption of all components (see Chap. 5).
8) Ensure that the fans rotate in the correct direction (see arrow on fan).
9) Ensure that all control system settings are correct and that there are no alarms (see Control manual).
10) Verify the water flow.
11) Verify the Fresh Air Intake operation *(if fitted)*.
12) Once the system is operating under load, check the various components, as follows:
    - Verify that the fans are operating properly.
    - Ensure that the temperature and relative humidity are being controlled, and that the humidifier *(optional)* and heating steps *(optional)* operate when required.
    - Ensure that chilled water valve operates when required.

6.2 – Starting and stopping

Turn on the unit operating on the ON/OFF switch placed on the left case of the unit (Fig. 13). If the ON/OFF remote device is not installed, the green LED on the *Microface* case will light up together with the LED placed below the ON/OFF switch. The fan starts immediately (the fan always works when the unit is ON); after 2 minutes the regulation is activated, so the cooling (compressor), heating (electric heaters), humidifying and dehumidifying devices can start.

Adjust the set–point as indicated in **Control manual.**

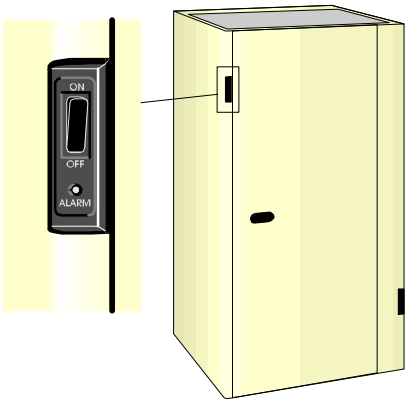
Stop the unit putting the ON/OFF switch in OFF.

- The main switch **QS** should only be switched off if the unit is stopped for a long period of time.

6.3 – Automatic restart

If desired, the unit will automatically restart on the return of power after a supply interruption (see Control manual).

Fig. 13 – On–Off switch



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 TEMPERATURE sensor or HUMITEMP (temperature + rel. humidity) sensor (check type installed), verifies the state of the inlet 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 (see also Control manual):
  - **COOLING**
    Chilled water flows through the chilled water coil, thus cooling the air passing over it. The chilled water flow is controlled by a timed modulating (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 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 an on–off (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 (see LOW LIMIT intervention in Control manual).
  - **HUMIDIFICATION – *optional***
    The humidifier creates steam, which is distributed into the air stream via the steam distribution pipe (see also App. A).
- Filtered new air is injected into the air stream via the Fresh Air Intake.
- The treated air passes through the fans, which operate continuously, and is then dispersed out of the unit.
- *Under unit only:* the air passes from the underfloor void into the room via air distribution outlets.

N.B.: Manual control can be performed using the control system (see Control manual).

7.1 – Chilled water valve

The 3–way valve controls the chilled water flow. It operates as follows (Fig. 14):

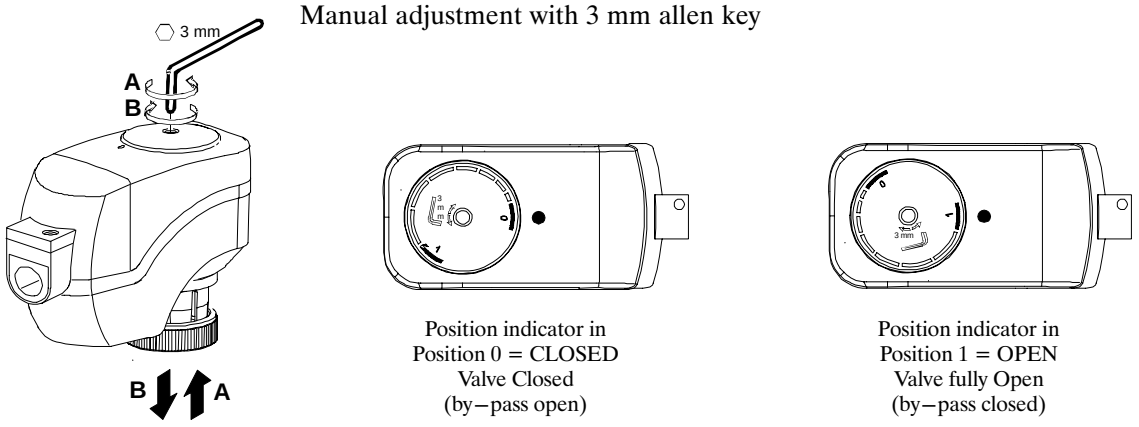
- When the valve is fully open (i.e. max. chilled water flow) the actuator slot is set to '1'.
- When the valve is closed (i.e. no chilled water flow) the actuator slot is set to '0'.

The valve running time is set to the value specified in the Control Manual.

Note 1: In the unlikely event of control system failure, the valve can be manually controlled by means of a 3 mm allen key placed into the actuator slot.
NEVER PERFORM THIS OPERATION USING A SCREWDRIVER.

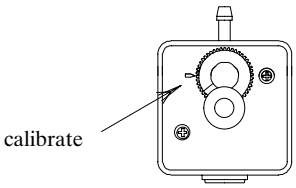
Note 2: For models 90–10–12–14 UC the chilled water valve is not foreseen for the manual operation.
When actuator stem is completely down the valve is closed (by–pass 100%), when actuator stem is completely up the valve is open (by–pass 0%) and all water flows into the coil.

Fig. 14 – Position of the chilled water valve actuator



8 – Calibrations

- The air conditioner has already been factory–tested and calibrated as shown below.

COMPONENT	SETTING	NOTES
Fan differential pressure switch	0.8 mbar	
Clogged filter differential pressure switch (CF)	Filters G4 = 2 mbar	

9 – Maintenance / Spare Parts

AS THE HIROMATIC/MICROFACE FEATURES AUTOMATIC RESTART (AFTER A SUPPLY INTERRUPTION) IT IS ADVISED TO EITHER DISABILITATE AUTORESTART OR TO OPEN SWITCH QS WHEN PERFORMING ANY MAINTENANCE.

- On a daily basis check the HIROMATIC/MICROFACE readings for temperature and, if shown, rel. humidity.
- The Maintenance Programme below should be carried out by a qualified technician, preferably working under a maintenance contract.

Maintenance schedule – Monthly check

FANS	Check that the fan motor rotates freely without any abnormal noise, and ensure that the bearings are not running hot. Also check the current absorption.
AIR FILTERS	Verify the state of the filters; if necessary clean or replace them. In very dusty ambients perform this check more frequently.
NEW AIR FILTER *(if fitted)*	Verify the state of the filter; if necessary clean or replace it.
CONTROL SYSTEM	Verify the operation of LEDs, display and alarms.
HUMIDIFIER *(if fitted)*	See App. A.
ELECTRICAL CIRCUIT	• Check the electrical supply on all phases. • Ensure that all electrical connections are tight.
CHILLED WATER CIRCUIT	• Ensure that there are no water leaks. • Bleed any air out of the chilled water circuit using the bleed valve situated on the top right of the chilled water coil. • Verify the correct chilled water flow. • Check the inlet – outlet fluid temperature and pressure using the thermometers and manometers, if fitted.

9.1 – Spare parts

It is recommended the use of original spare parts.
When placing an order refer to "Component List" enclosed with the machine and quote the unit model no. and serial no.

9.2 – Dismantling the unit

The machine has been designed and built to ensure continuous operation.

The working life of some of the main components, such as the fan and the compressor, depends on the maintenance that they receive.
If the unit has to be dismantled, this operation must be done by skilled refrigeration technicians.

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. 8 – 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 93H	141103	2.7 – 9.0	380 ÷ 460 V trifase 50–60 Hz	5.34	0.6	2.5
HAK 93L	141104	2.7 – 9.0	208 ÷ 230 V trifase 50–60 Hz	5.34	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. 6 and Fig.7.

Fig. 1 – Supply water connection

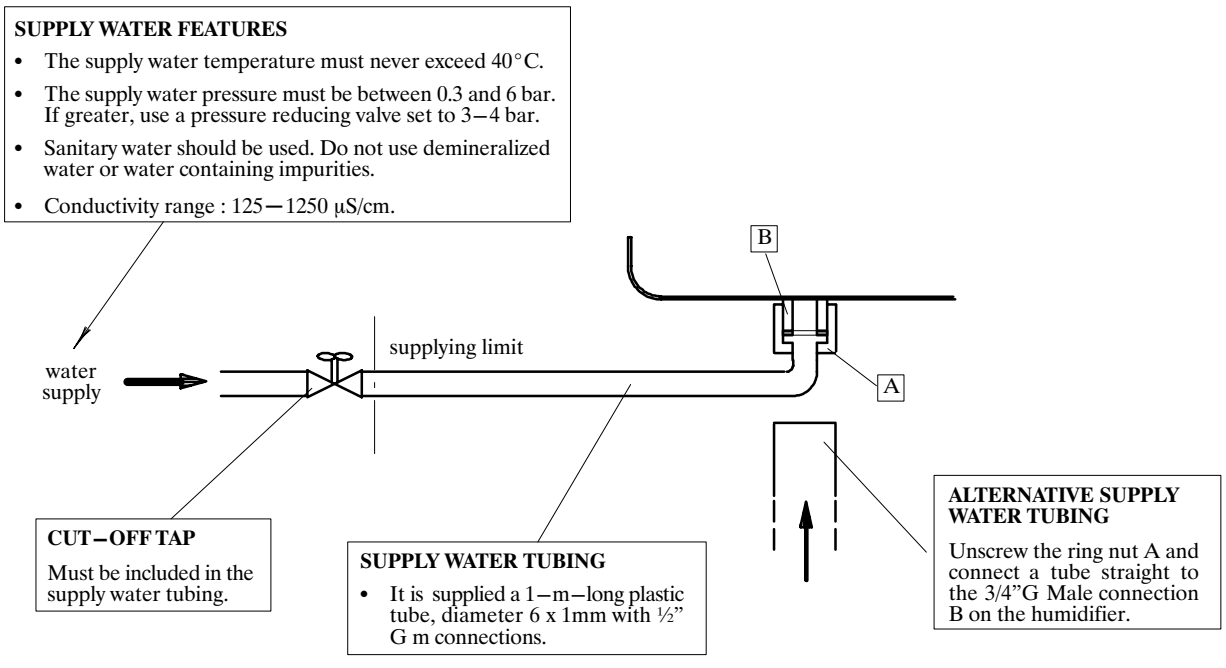
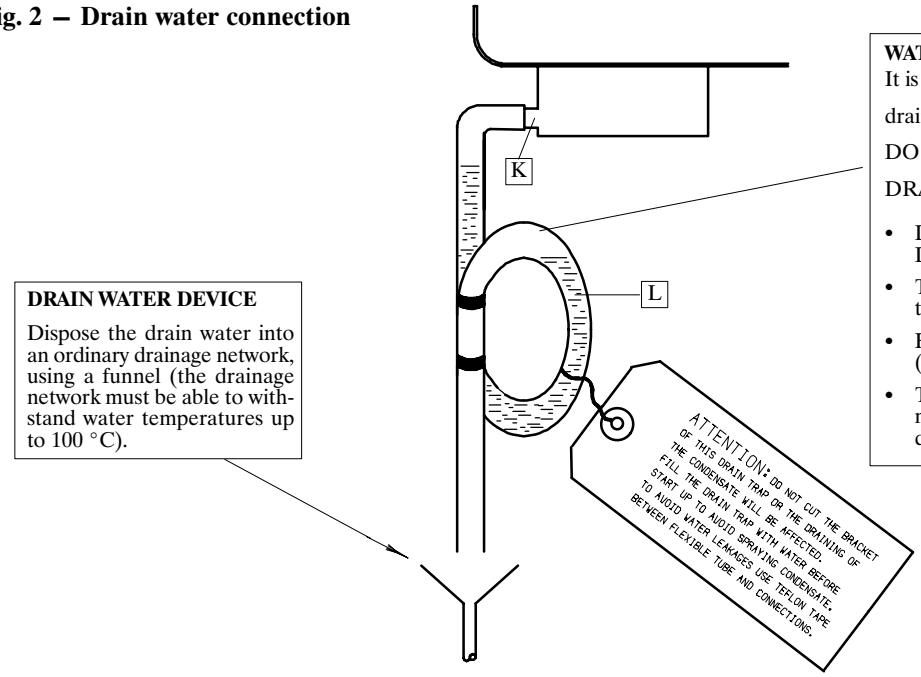


Fig. 2 – Drain water connection



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).

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.

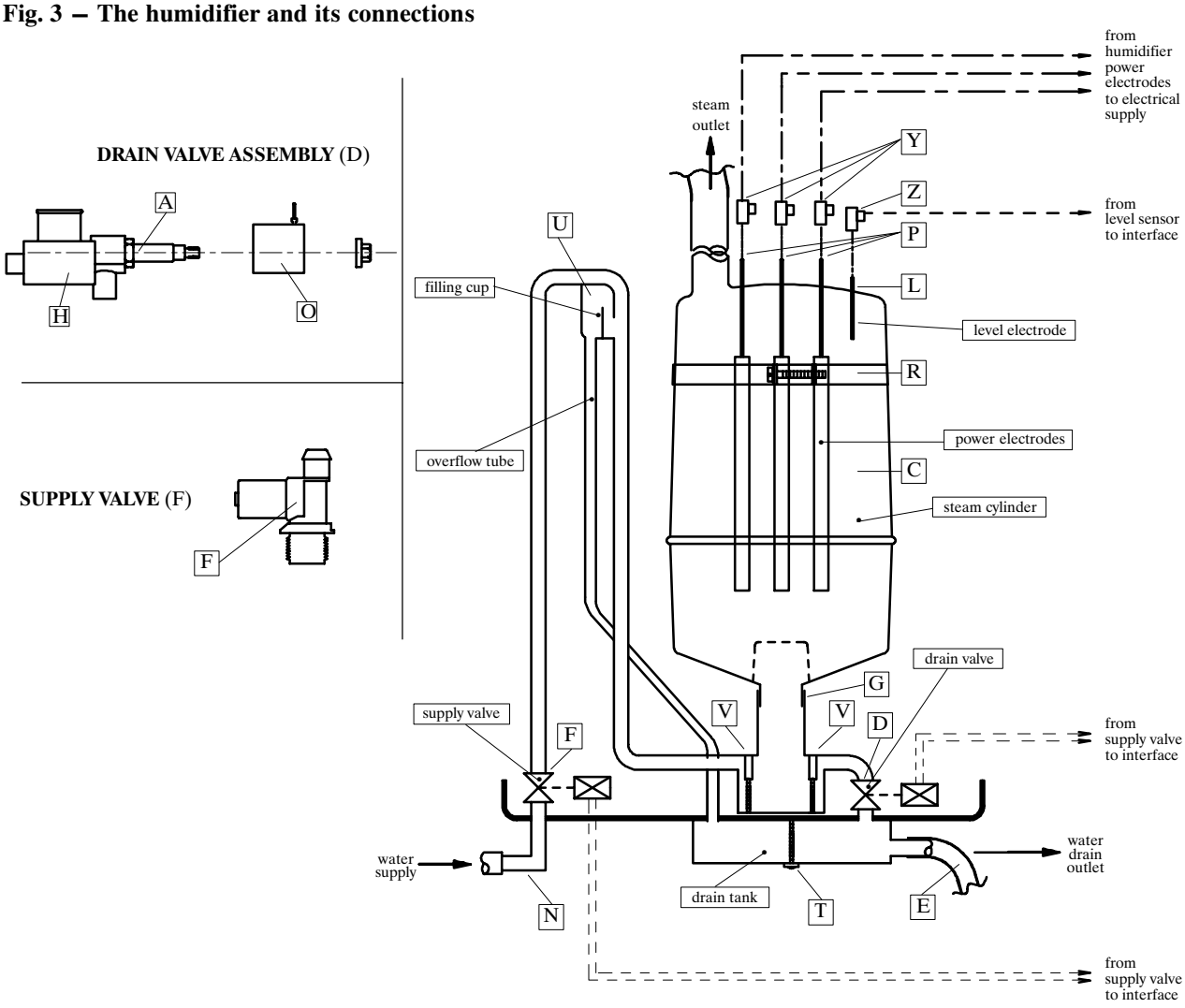
NOTES:

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

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