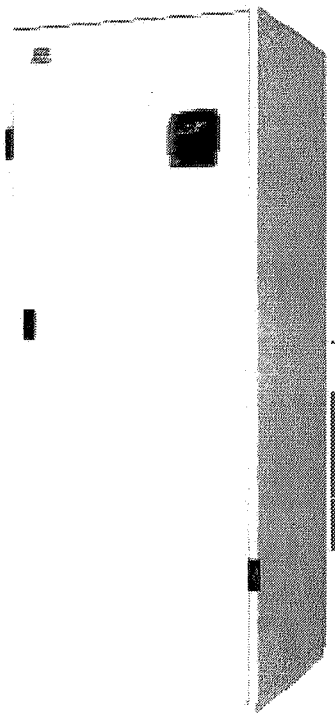
Liebert HIROSS

High Performance Air Conditioning



H I M O D Range S

HIGH PERFORMANCE AIR CONDITIONING

A/W/F/D/H
Versions

SERVICE MANUAL

English

Cod. 272762
Rev. 13.06.2003

Issued by T.D.Service

EMERSON
Network Power

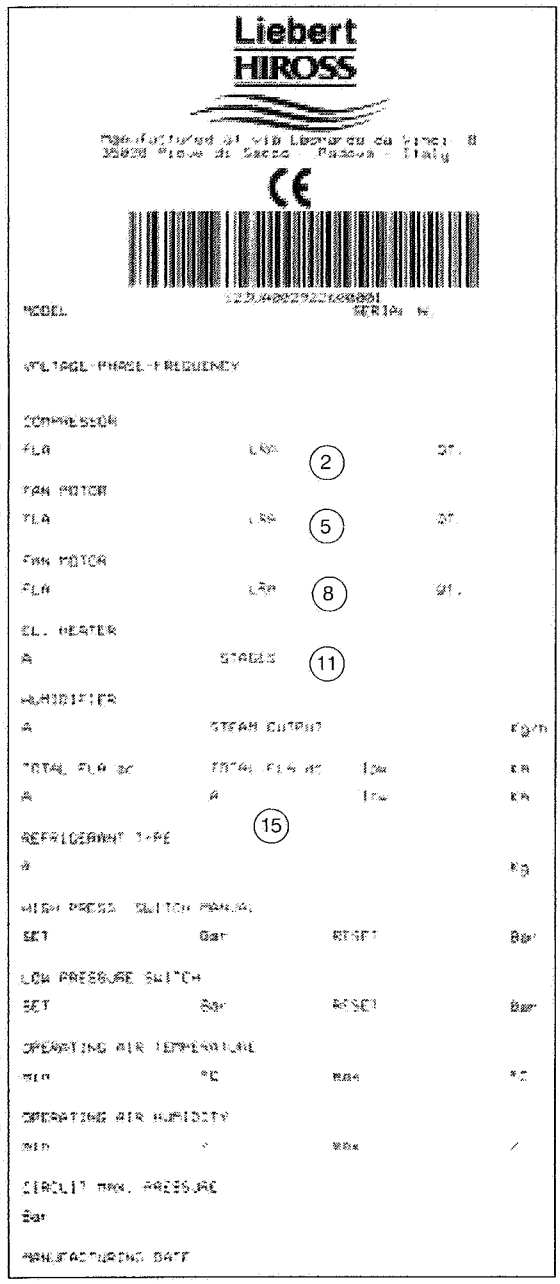
Liebert HIROSS
is a division of
Emerson

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.

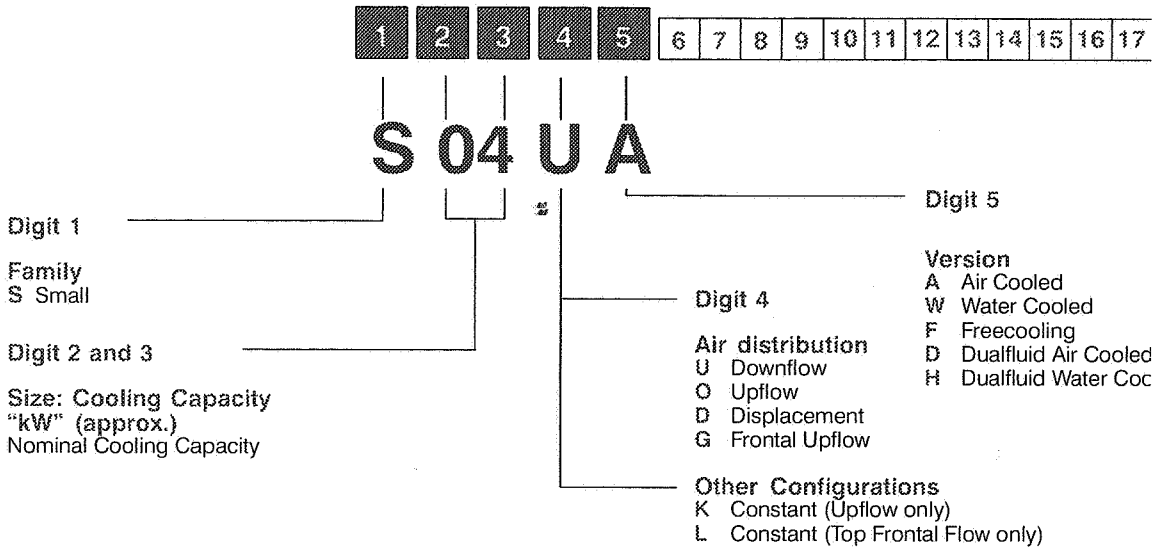


Attention: data relevant to the supplied unit are indicated on the inboard label (see below empty fax–simile).
Data in the manual are referred to standard conditions and can be modified without any advance notice.

POS.	DESCRIPTION
1	Compressor Full Load Ampere [A]
2	Compressor Locked Rotor Ampere [A]
3	Compressor quantity
4	Evaporator fan Full Load Ampere [A]
5	Evaporator fan Locked Rotor Ampere [A]
6	Evaporator fan quantity
7	Condenser fan Full Load Ampere [A]
8	Condenser fan Locked Rotor Ampere [A]
9	Condenser fan quantity
10	Electrical heating Ampere
11	Electrical heating steps
12	Humidifier Ampere
13	Steam production capacity
14	Max. unit AC Ampere
15	Max. unit DC Ampere
16	Rated peak withstand current
17	Rated short–time current
18	Refrigerant type
19	High pressure switch Stop
20	High pressure switch Restart
21	Low pressure switch Stop
22	Low pressure switch Restart
23	Min. room operation temperature
24	Max. room operation temperature
25	Min. room operation humidity
26	Max. room operation humidity
27	Max. refrigeration circuit pressure

Digit Nomenclature (DX unit)

The unit is fully defined by seventeen digits.



Digit 6 – Fan
0 Standard fan
1 EC fan

Digit 7 – Main Power Supply
0 400 V/3 Ph/50 Hz
1 230 V/3 Ph/50 Hz
2 230 V/1 Ph/50 Hz
3 230 V/1 Ph/60 Hz
4 230 V/3 Ph/60 Hz
5 380 V/3 Ph/60 Hz
6 460 V/3 Ph/60 Hz

Digit 8 – Electric Heating
0 None
1 3 Stage (1 Stage for S04..6)

Digit 9 – Humidification
0 None
V 4.5 or 9 kg/h

Digit 10 – Microprocessor Control
0 Microface with Temperature Control
1 Microface with Temperature and Humidity Control
6 Hiromatic Evolution with Temperature Control, Languages SET 1
7 Hiromatic Evolution with Temperature and Humidity Control, Languages SET 1
8 Hiromatic Evolution with Temperature Control, Languages SET 2
9 Hiromatic Evolution with Temperature and Humidity Control, Languages SET 2

(1) Languages SET 1: GB, F, I, D, E, P, NL, S
(2) Languages SET 2: GB, PL, CZ, H, RUS, TK
Note: For Constant with 7, 9 options available only

Digit 11 – Reheating System
0 None
G Hot gas coil
W Hot water coil

Digit 12 – Air Filter Efficiency
0 G4
1 F5
2 G4; with Clogged Filter Pressure Switch
3 F5; with Clogged Filter Pressure Switch

Digit 13 – Refrigerant
0 R407C
1 R22

Digit 14 – Free

Digit 15 – MCB for Remote Air Condenser
0 No MCB
1 MCB 6 A each condenser
2 MCB 10 A each condenser
3 MCB 16 A each condenser
4 MCB 25 A each condenser
5 MCB ... A each condenser

Digit 16 – Packing
P PLP and Pallet
C Cardboard and Wooden Crate
S Seaworthy

Digit 17 – Special Requirements
0 Standard LiebertHiross
X Special LiebertHiross

Index

Enclosures

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

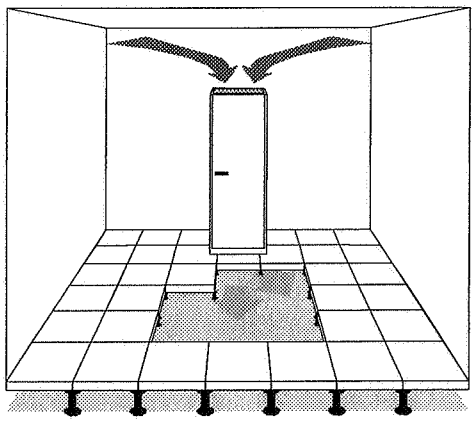
The units are designed to operate within working ranges (see Tab. a).
These limits are referred to new machines or to those that have been correctly installed and serviced.
The warranty clauses are no longer valid for any possible damage or malfunction that may occur during or due to operation outside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

Tab. a – Operating limits

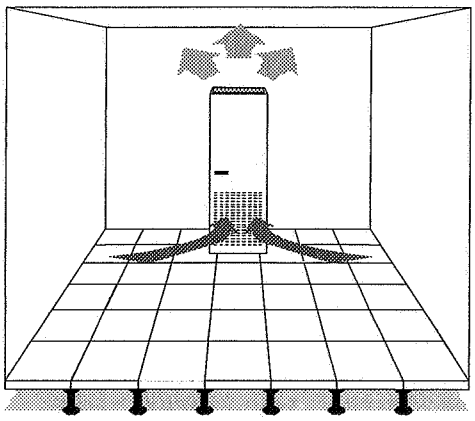
Room conditions	from:	18°C, 45% R.H.	Hot water heating coil	inlet water temperature	max. 85°C
	to:	27°C, 55% R.H		water pressure	max. 8.5 bar
Ambient conditions: lower limit (+)(*)		from 9°C ÷ –20°C with Variex on condenser	Chilled water coil (**)	inlet water temperature	min. 5°C
Voltage tolerances	standard	230V±10%/1/50 (S04–06) 400V ± 10%/3/50		water pressure	max. 16 bar
				differential press. at closed valve	max. 2.0 bar
Max unit to condenser distance (+)		50 m	Water to condenser (other information par. 5.4)		min. 5° C
Max condenser to unit geodetic height (+) (#)	from:	20 m	Storage conditions	from:	– 20°C
	to:	–3 m		to:	50°C

(*) Exceeding these limits will cause a compressor lock, reset to normal operation can only be carried out manually.
(#) If the condenser is installed below the room unit. If the condenser is installed above the unit at a height of over 6 m, a trap must be fitted every 6 m (see Tab. b).
(+) Only units with air–cooled condensers.
(**) Other information in para 5.3 and 9.4.1.

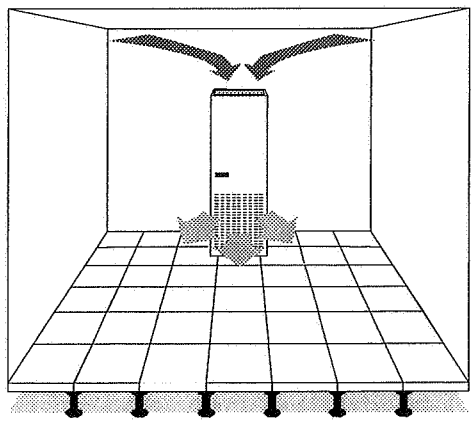
U / UNDER



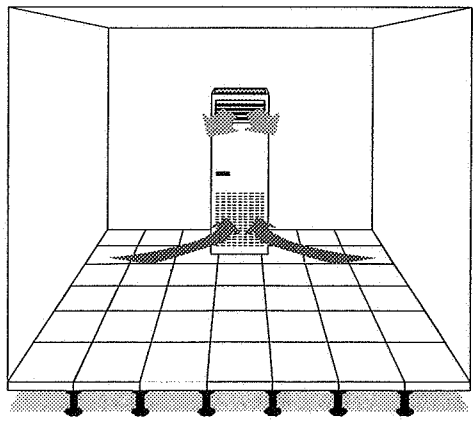
O / OVER



D / DISPLACEMENT



G / GRILLE



2 – Positioning

See overall dimensions and service area drawings in **Enclosures C**.

3 – Installation

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

See drawings in **Enclosures C**.

3.1 – 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.

4 – Refrigeration connections

4.1 – Refrigeration pipeline connections

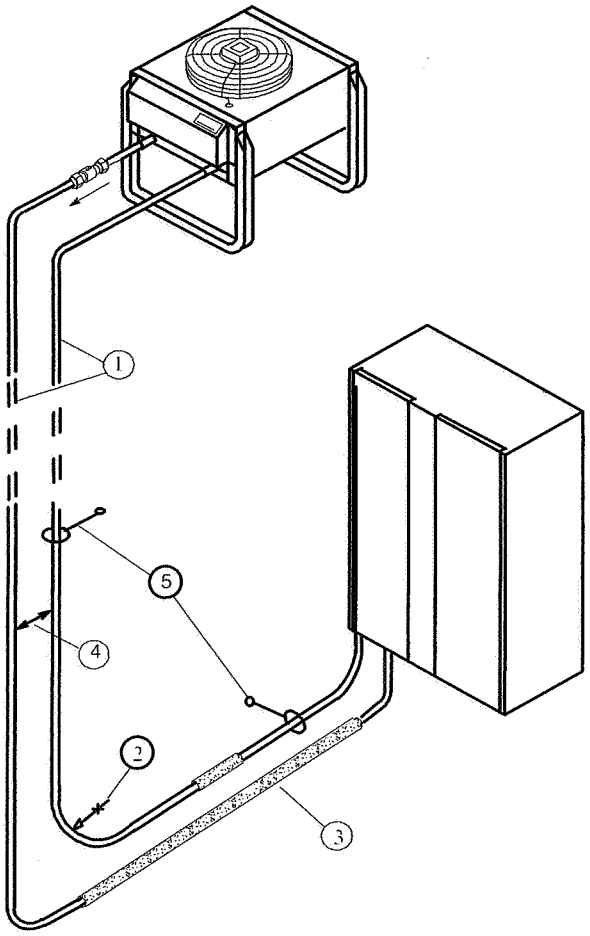
The air condensing units are delivered helium–pressurized at 3 bar.

> ***The discharge operation of the room unit pressurized with helium (at 3 bar) and the de–welding of the bottoms from the connections must be carried out as last operations, immediately followed by the connection and emptying of the whole system.***

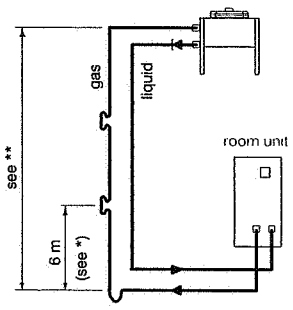
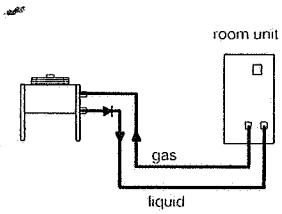
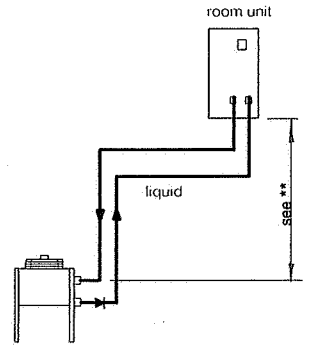
4.1.1 – General layout (Tab. b)

1) In soft or hard copper.
   The diameter required is stated in Tab. c.
   If the installer intends to use pipes of a larger diameter (e.g. for long winding runs) then consult HPAC Technical Sales Support.
   Use as short refrigeration pipelines as possible to minimize the total charge of refrigerant and the pressure drops. For long runs (over 50 equivalent m) contact HPAC Technical Sales Support.
   Lay the horizontal gas pipes with 1% downward gradient towards the refrigerant flow.
2) Reduce the number of bends, which must be of large radius, to a minimum.
3) Insulate the piping as specified in Tab. b. If the pipes are put next to electrical cables it is advised to insulate them to avoid induced currents and damage to cable insulation.
4) There must be a minimum separation of 20 mm between the gas and liquid pipelines.
   If this is not possible insulate both lines.
5) Support both horizontal and vertical pipes with vibration–damping clamps (which include rubber gaskets). Place these every 1.5 – 2 m.

Fig. a – Recommended pipe layout



Tab. b – Condenser positioning

CONDENSER POSITION			CONDENSER ABOVE CONDITIONER	CONDENSER AND CONDITIONER AT SAME LEVEL	CONDENSER BELOW CONDITIONER (not recommended)
INSULATION	gas	int.	necessary	necessary	necessary
		ext.	only for aesthetic reasons	only for aesthetic reasons	only for aesthetic reasons
	liq.	int.	absolutely not	not necessary	no (expose to cold underfloor air)
		ext.	only for aesthetic reasons	only if exposed to sun	only if exposed to sun
LAYOUT			 (*) Oil traps every 6 m of vertical piping		 (**) The maximum values have been defined in Chap. 3 Operating Range, condensing unit installation

4.1.2 – Pipe diameter

The diameters of the connecting pipes between the conditioner and the condensing unit listed in Tab. c must be respected, otherwise the guarantee becomes invalid.

Tab. c – Pipe diameters (room unit – remote condenser)

STANDARD PIPE DIAMETERS (Valid for equivalent lengths up to 50 m)				
MOD.	copper tube external diametre x thickness (mm) R407C		copper tube external diametre x thickness (mm) R22	
	Gas	Liquid	Gas	Liquid
S04	10 X 1	10 X 1	10 X 1	10 X 1
S05	10 X 1	10 X 1	10 X 1	10 X 1
S07	12 X 1	12 X 1	12 X 1	10 X 1
S10	12 X 1	12 X 1	12 X 1	12 X 1
S12	14 X 1	14 X 1	14 X 1	14 X 1
S13	14 X 1	14 X 1	16 X 1	16 X 1
S17	16 X 1	16 X 1	16 X 1	16 X 1
S20	18 X 1	16 X 1	22 X 1	18 X 1
S23	22 X 1	18 X 1	22 X 1	18 X 1

When the pipes are more than 50 m long, contact Technical Support Department

4.1.3 – Installing pipelines

THE FOLLOWING OPERATIONS MUST BE CARRIED OUT BY AN EXPERIENCED REFRIGERATION TECHNICIAN.

The discharge operation of the room unit pressurized with helium (at 3 bar) and the de–welding of the bottoms from the connections must be carried out as last operations, immediately followed by the connection and emptying of the whole system.

1) Lay the piping, taking note of the following:
   - Welding:
     - All joints must be braze–welded.
     - Avoid butt welds by using sleeves or enlarging one of the pipes using a pipe opener.
     - Use silver–based solders and the correct apparatus.
     - Guarantee a correct weld as a refrigerant leak, or a faulty weld which leads to a leak later on, can seriously damage the air conditioner.
   - Always use large–radius curves (bending radius at least equal to pipe diameter). Bend the pipes as follows:
     - soft copper: by hand or bending device.
     - hard copper: use preformed curves. Do not overheat the pipes when welding so as to minimize oxidation.
2) Connect the pipes to the condenser:
   - Condensers with butt–welded pipe connections: cut the pipe, enlarge it and weld it to the pipeline.
   - Condensers with threaded tap connections: flange the pipes and connect.

   RESPECT THE DIRECTION OF REFRIGERANT FLOW (SEE LABELS ON REFRIGERANT CONNECTIONS).
3) Wash out the pipelines as follows:
   a) Plug up the free ends of the pipes.
   b) Connect a helium cylinder, fitted with a reducer (max. pressure 10 bar), to the ¼" SAE Schrader valve of the condenser.
   c) Pressurize the pipes with helium or azoto.
   d) Unplug the pipes instantaneously.
   e) Repeat a) – d) several times.

THIS OPERATION IS ESPECIALLY IMPORTANT WHEN HARD COPPER PIPING IS USED.

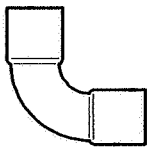
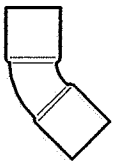
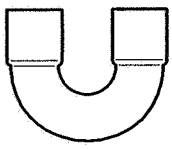
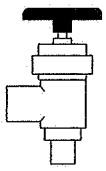
4) Open all the room unit shut–off valve.
5) Discharge the room unit pressurized with helium (at 3 bar) opening the charge valves so that all the branches of the circuit are discharged (e.g. on the receiver, on the low pressure side and on the compressor delivery).
6) De–weld the bottoms from the connections of the room unit.
7) Fix (weld) the pipes to the connections on the air conditioner.
8) **Connect the refrigerant safety valve to the outdoor with a Ø 16 copper pipe.**

Tab. d – Weight of refrigerant contained in piping during operation

EXTERNAL PIPE DIAMETER (mm)	gas (*)	liquid (+), at different condensing temperatures R407C (kg/m)			liquid (+), at different condensing temperatures R22 (kg/m)		
		35.0 °C	46.0 °C	57.0 °C	35.0 °C	46.0 °C	57.0 °C
10 x 1	0.0031	0.06	0.06	0.05	0.06	0.06	0.05
12 x 1	0.0049	0.09	0.09	0.08	0.09	0.09	0.08
14 x 1	0.0068	0.11	0.11	0.10	0.12	0.12	0.11
16 x 1	0.0085	0.17	0.16	0.15	0.18	0.17	0.16
18 x 1	0.012	0.23	0.22	0.20	0.24	0.23	0.21
22 x 1	0.019	0.34	0.32	0.31	0.36	0.34	0.33
28 x 1	0.033	0.58	0.55	0.52	0.61	0.58	0.55

(*) Due to the small weight influence (at 15.5 bar – discharge temp. 65°C), only 0.062 kg/l for R407C and R22 is considered.
(+) Liquid pressure and density varies according to condensing temperature (see refrigerant tables).

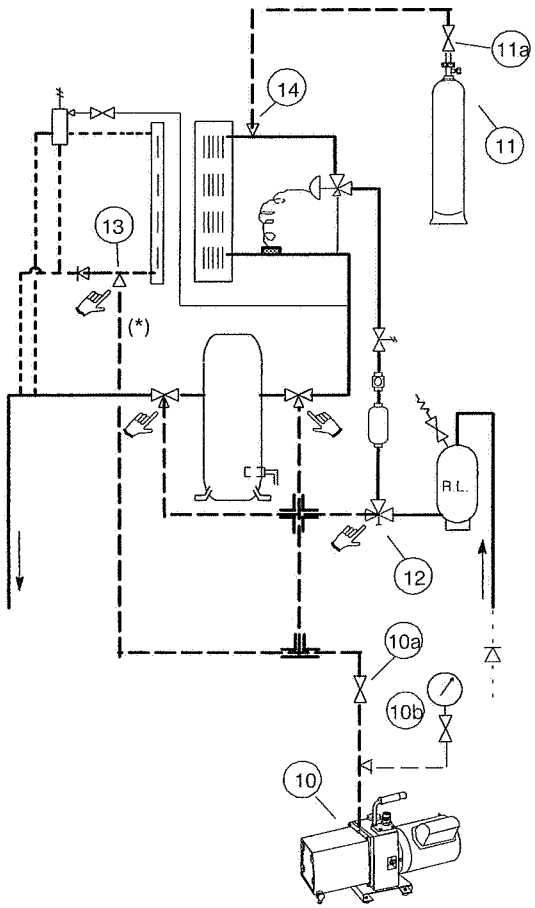
Tab. e – Equivalent lengths (m) of: curves, shut–off and non–return valves

Nominal diameter (mm)	 90°	 45°	 180°	 90°	
12	0.50	0.25	0.75	2.10	1.90
14	0.53	0.26	0.80	2.20	2.00
16	0.55	0.27	0.85	2.40	2.10
18	0.60	0.30	0.95	2.70	2.40
22	0.70	0.35	1.10	3.20	2.80
28	0.80	0.45	1.30	4.00	3.30

4.2 – Vacuum creation and refrigerant charge

> ***Check the refrigerant type to be used on the data plate of the air conditioner and on the refrigerating compressor.***

Fig. b – Pump and refrigerant charging cylinder connection for vacuum creation and refrigerant charge



(*) only with reheating coil (optional)

4.2.1 – R407C precharge

1) ***Open all cocks of the system including those used for pressurizing*** (ambient unit and condensing unit). By this operation all the components of the refrigerating circuit must be subject to vacuum.
2) Connect a proper, high efficiency vacuum pump (10) ***suitable for polyester oils*** to the couplings:
   - ***Compressor intake and delivery*** using, if available, the three–way Rotalock cocks, coupling 1/4" SAE (make sure that all three ways are open), otherwise the Schrader valves welded on the pipings.
   - ***Three–way Rotalock cock, coupling 1/4" SAE of the liquid receiver (12)*** (make sure that all three ways are open).
   - ***Schrader coupling (13)*** fit on the compressor or fan space, if the reheating coil option is available.
3) **Provide for a connection with refrigerant cylinder before making vacuum.**
4) Make the system vacuum up to 0.3 absolute mbar and after 3 hours check if 1.3 absolute mbar have not been exceeded. This condition warrants a humidity lower than 50 ppm inside the system.
   If the complete vacuum is not possible, this means that there are some leaks (to be removed according to the instructions in 6 below).

NEVER USE THE COMPRESSOR TO CREATE A VACUUM (THIS INVALIDATES ITS GUARANTEE).

5) Break the vacuum as follows:
   a) Close the pump cock (10) for the vacuum (10).
   b) Open the cock of the refrigerant cylinder (11a) until the system reaches a pressure value of about 3 bar.

   > ***The refrigerant must be introduced and charged by taking only liquid fluid from the cylinder.***

   c) At this point both the vacuum pump and the refrigerant cylinder can be disconnected as follows:
      c1) close the cylinder cock (11a)
      c2) close the way 1/4" SAE of the Rotalock cocks and of the connected Schrader valves.
6) Inspect all connections/joints using a leak detector. If a leak is found, empty the pipes and the condenser, seal the leak and repeat the instructions in 3) – 6).
7) Now the machine is ready for completing the charge and the start–up.
8) Charge the refrigerant (**ONLY LIQUID**) by means of the charge valve placed at the evaporator inlet.

4.2.2 – R22 precharge

1) ***Open all cocks of the system including those used for pressurizing*** (ambient unit and condensing unit). By this operation all the components of the refrigerating circuit must be subject to vacuum.
2) Connect a proper, high efficiency vacuum pump (10) to the couplings for:
   - ***compressor intake and delivery*** by using, if available, the three–way Rotalock cocks, coupling 1/4" SAE (make sure that all the three ways are open), otherwise the Schrader valves welded on the pipings.
   - ***Three–way Rotalock cock, coupling 1/4" SAE of the liquid receiver (12)*** (make sure that all three ways are open).
   - ***Schrader coupling (13)*** fit on the compressor or fan space, if the reheating coil option is available.
3) **Provide for a connection with refrigerant cylinder before making vacuum.**
4) Make the system vacuum up to a residual pressure of 0.7 absolute mbar, then go on for 30 minutes.
   The pressure must be measured by means of a vacuum pressure gauge (10 b) on the system side.
   If the complete vacuum is not possible, this means that there are some leaks (to be removed according to the instructions given in 6 below).

NEVER USE THE COMPRESSOR TO CREATE A VACUUM (THIS INVALIDATES ITS GUARANTEE).

5) Break the vacuum as follows:
   a) Close the cock (10a) of the vacuum pump (10).
   b) Open the cock (11a) of the refrigerant cylinder kept vertically **to load only gaseous refrigerant.**
   c) **Pre–charge is complete** when the pressure of the gaseous refrigerant contained in the lines, condenser and Liquid Receiver (L.R.) balances that of the cylinder.
   d) At this point both the vacuum pump and the refrigerant cylinder can be disconnected as follows:
      d1) close the cylinder cock (11a)
      d2) close the way 1/4" SAE of the Rotalock cocks and of the connected Schrader valves.
6) Inspect all connections/joints using a leak detector. If a leak is found empty the pipes and the condenser, seal the leak and repeat the instructions in 3) – 6).

4.2.3 – Refrigerant charge *(A and D)*

1) Start the unit as described in para. 7.1.
2) Manually start the compressor (ensure the unit is not in the dehumidification phase).
3) Guarantee a constant condensation temperature (preferably 42–45°C); if necessary, partially obstruct the condenser coil surface or limit its ventilating power to obtain these conditions.
4) Charge the unit until the bubbles in the sight glass have disappeared and the working conditions of the entire refrigeration circuit have become normal.
5) Verify that the superheat is 5–8 °C (to do this refer to para. 9.1).

4.3 – Refrigeration circuits

See drawings in **Enclosure E**.

5 – Water connections

5.1 – General warnings

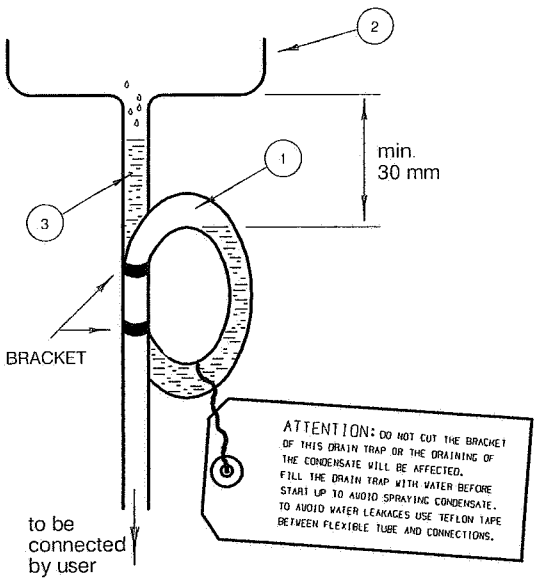
ENSURE THAT THE TUBING DOES NOT OBSTRUCT THE AIR FLOW*(Under only)*.

IF THE TUBING IS TO RUN OUTDOORS, ADD ETHYLENE GLYCOL TO THE CIRCUIT AS DESCRIBED IN PARA. 5.5.

5.2 – Auxiliary water connections

– **Condensate drain** (Fig. c):
- Use galvanized steel, PVC or flexible polythene tubing.
- Allow a 2% gradient towards the drain.
- 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. c – Condensate drain



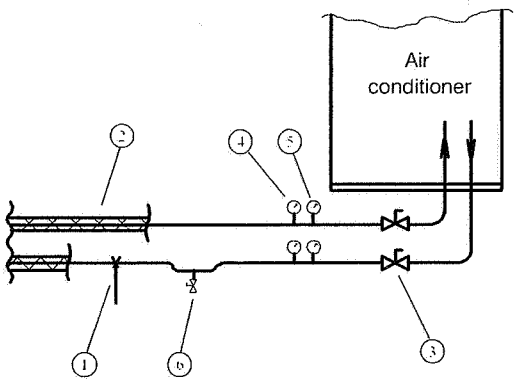
– **Humidifier** *(optional)*: See **Enclosure A**.

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

5.3 – Chilled water connections *(D and H only)* – (Fig. d)

- 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.
- Fill the circuit with water/glycol (see Fig. d).

Fig. d – Chilled water circuit



5.4 – Coooling water connections *(W, F and H only)*

The unit must receive cooling water as follows:

a) from an external cooling water source, in open circuit (para. 5.4.1 and Figures in Enclosures).
b) using a Dry cooler, in closed circuit (para. 5.4.2).

- Connect the piping as shown in **Enclosures D**.
- It is advisable to use hoses to be connected, with 3–piece joints, to the condenser water inlet and outlet couplings.
- IMPORTANT: fit a standard strainer on the inlet water piping.
- Place shut–off ball valves at the conditioner inlet and outlet to allow easy maintenance.
- It is advisable to install a water drain system at the lowest point in the circuit.
- Fully drain the piping before connecting it to the air conditioner.

5.4.1 – Extra notes for open circuit applications

- Use the unit with mains or well water.
  DO NOT USE WATER FROM AN EVAPORATIVE COOLING TOWER UNLESS THE FILLING WATER HARDNESS IS CONTROLLED.
- The water pressure must be 2 – 10 bar (if this is not so, contact the Technical Support Department).
- The required water flow at different temperatures is given in our catalogues or on request.
- If necessary (very low water temperature) insulate both pipes using Armaflex insulation.
- ***Calibrate the water pressostatic valve (WV) as described in CHAP. 9.***

5.4.2 – Extra notes for closed circuit applications

- The installation in Fig. e is indicative only; for individual installations follow the project diagram.
- ***Install a pump system*** calculated on the basis of the flow and total head of the system (see project data), ***and controlled by the compressor running*** (see label on the unit).
- Insulate both pipes using Armaflex insulation.
- VERY IMPORTANT: Add water and ethylene glycol to the circuit, **when the ambient temperature is below zero (referring also to para. 5.5). Do not exceed the nominal operating pressure of the circuit components.**
- Bleed air out of the circuit.

5.5 – Adding ethylene glycol

Tab. f – Ethylene glycol to be added to water

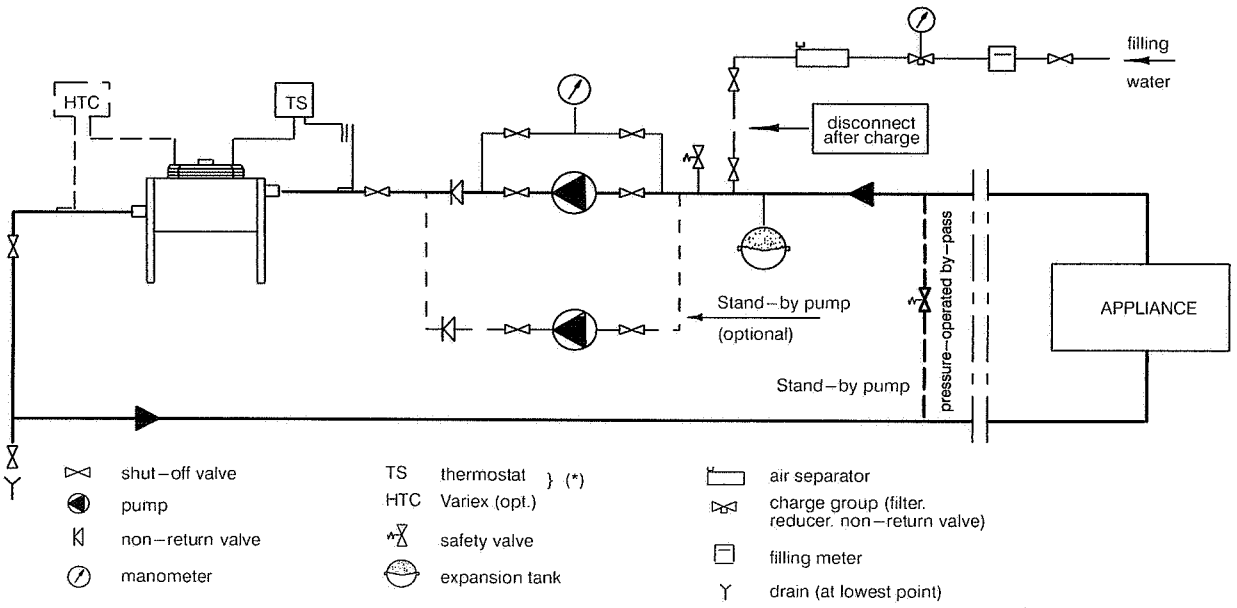
freezing temperature (°C)	0	−5	−11	−18	−27	−39
ethylene glycol to add to water (% in weight of total mixture)	0	10	20	30	40	50

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. e – Advised Dry cooler Installation



See hydraulic drawings in the Enclosures D.

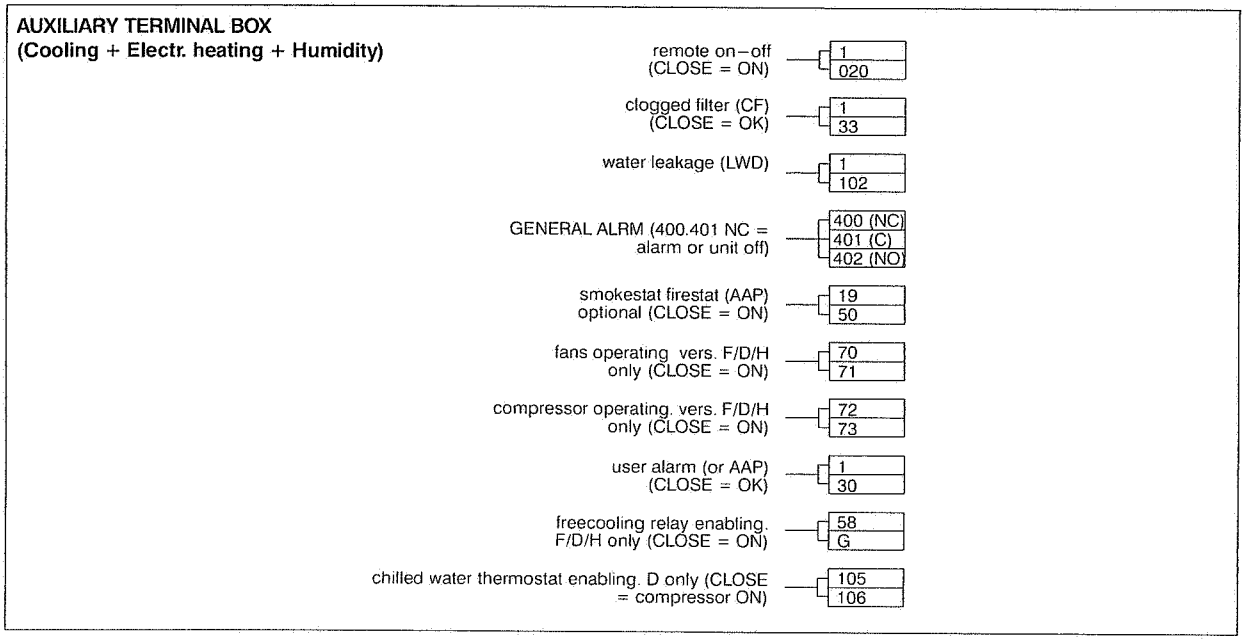
6 – Electrical connections

6.1 – 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:
   - Connect the cable to the Line inlet terminal board.
   - Use the cable size defined according to the air flow, 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 (Fig. f):
   - 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.

See electrical data in Enclosures B: Technical data tables.

Fig. f – Electrical connections



6.2 – Fan connections

The fan is electrically feeded by 1 or 2 autotransformers that are connected in order to obtain the nominal air flow and the Available External Static Pressure (AESP: 20 Pa for Under and 50 Pa for Over).
To change the factory connection proceed as follow:

– identify the unit's aeraulic graph in the Product Documentation;

– 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 and correct it, if necessary (see electrical diagram);

– choose the new output fan connections and connect the wires to the relevant blocks.

7 – Start–up

7.1 – **First start–up** (or after long standstill)

TO PREVENT COMPRESSOR DAMAGE THE CRANKCASE(S) MUST BE PREHEATED FOR AT LEAST 4 HOURS BEFORE CONDITIONER START–UP (FAILURE TO DO SO INVALIDATES THE GUARANTEE).

Start the air conditioner as follows:

1) Open all valves in the refrigeration circuit according to the instruction label attached to the valve.
2) *W, F and H only*: Open all valves in the water circuit according to the instruction label attached to the valve.
3) Ensure that the refrigerant charge is correct (see Chap. 4).
4) Using a leak detector, verify that there are no refrigerant leaks. If there are any, then repair the leak and recharge as described in Chap. 4.
5) At least 4 hours before start–up, close **QS** and **QF8** on the electrical panel.
   In the "*Microface*" control system factory setting the *stand alone* mode is standard. The *stand alone* mode gives the possibility of turning on the unit simply rotating the main switch on the electric panel. The **yellow** LED on

the *Microface* case will light after turning on the unit, because of the presence of electric power.
If the LED does not light up:
- check the electric panel power supply;
- check the protection devices (e.g.: thermal switches);
- check the fuses.

6) Verify the operation of the crankcase heater.
7) Check that there are no water leakages.
8) *D and H only*: Bleed all air out of the chilled water circuit using the bleed valve on the chilled water coil.
9) If an external condenser or Dry cooler is installed, start it by supplying power to it.
10) Close all MCBs on the electrical panel.
11) Check the supply voltage on all phases.
12) Check the supply voltage on all phases for the external condenser or Dry cooler, if fitted.
13) **ENSURE THAT THE COMPRESSOR HAS BEEN PREHEATED FOR AT LEAST 4 HOURS BEFORE STARTING THE UNIT.**
14) Start the unit by pressing **ON OFF** (see Fig. g).
15) Check the electrical absorption of all components (see Chap. 6).
16) Check the electrical absorption of the external condenser/Dry cooler, *if fitted.*
17) **IMPORTANT – If the compressor makes a loud and unusual noise IT IS NECESSARY TO INVERT the electrical connections of the phases supplying the corresponding scroll compressors, which accept only one direction of rotation.**
18) Ensure that the fans rotate in the correct direction (see arrow on fan).
19) Ensure that all control system settings are correct and that there are no alarms (see Control manual).
20) *W, F and H only*: Verify the water flow.
21) *W, F and H only*: For closed circuit units ensure that the water pump starts when the compressor starts.
22) Verify the Fresh Air Intake operation *(if fitted)*.
23) 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 the compressor operates when required.
    - *D and H only*: Ensure that chilled water valve operates when required.
    - Ensure that the fan operation controller on the external condenser/Dry cooler *(if fitted)* is calibrated correctly, and that it controls the fan operation.

7.2 – Starting and stopping

- ALWAYS ENSURE THAT EACH CRANKCASE HAS BEEN PREHEATED.
  FOR BRIEF STOPPAGES KEEP THE SUPPLY TO THE CRANKCASE HEATER.

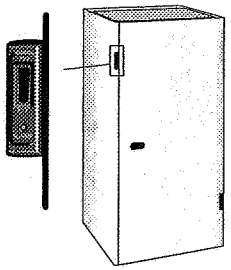
Turn on the unit operating on the ON/OFF switch placed on the left case of the unit (Fig. g). If the ON/OFF remote device is not installed, the green LED on the *Microface* case will light up together with the LED placed below the ON/OFF switch. The fan starts immediately (the fan always works when the 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.

7.3 – Automatic restart

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

If the power interruption is expected to be of several hours, to avoid an automatic cold restart of the compressor stop the unit before the black–out and, on the return of power, allow the compressor to preheat before restarting the unit.

Fig. g – On–Off switch



7.4 – Checking the refrigeration piping pressure drops

Himod S is equipped with connections to check the refrigeration piping pressure drops:

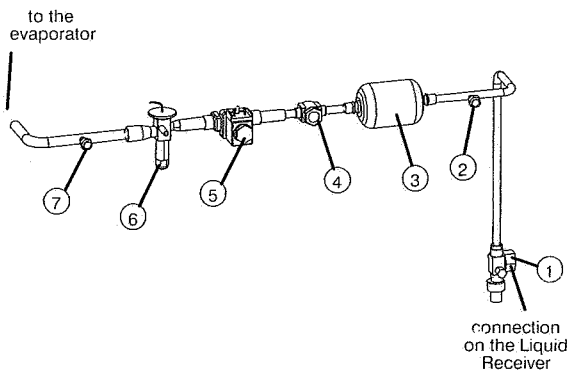
room unit → condenser → room unit

To carry out this operation it is necessary to use 2 calibrated manometers and connect them as follows:
M1, connected to the compressor delivery valve;
M2, connected to theSchrader valve (2) of Fig. h.
When the compressoris ruuning, check M1 and M2.

N.B.: Repeat this test , inverting the manometers : tocalculate the correct Δp consider the average value of the two readings.

Refrigeration pipeline Pressure drops (Δp bar), at 45°C (approx. R407C = R22):
- At the same geodetic level: Δp (bar) = M1–M2
- When condenser is above the room unit:
  Δp (bar) = M1–M2+geodetic difference (m x 1,1:10,2)
- When condenser is below the room unit:
  Δp (bar) = M1–M2–geodetic difference (m x 1,1:10,2)

Fig. h – Refrigerant line components



1	Liquid receiver valve
2	Filter dryer inlet Schrader valve
3	Filter dryer
4	Sight glass
5	Solenoid valve
6	Thermostatic expansion valve
7	Evaporator inlet Schrader valve

8 – 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.
- 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.
- 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**

  A and W only:
  The compressor is started and the cold refrigerant flows through the evaporator, thus cooling the air passing over it. For compressor operation see Control manual.

- **HEATING**
  This can take one of 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 an on–off (3–way) valve.
  - hot gas reheat (*optional* used during dehumidification): the hot refrigerant which exits the compressor flows through the hot gas coil, thus heating the air passing over it.

- **DEHUMIDIFICATION – *optional***

  A, W and F only:
  One of the compressors starts and either the air flow or the evaporator surface is reduced (depending on the model), thereby causing dehumidification (refer also to Control manual).

  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 Enclosure A).

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

9 – Calibrations

The air conditioner has already been factory–tested and calibrated, but it is very important to check, at start–up, the superheating of thermostatic valve (all versions) and the by–pass hot gas valve (F/D/H/KA/KW).

See Tab. 5 and Tab. 6 that show all valves.

- The air conditioner has already been factory.
- For calibrations of instruments installed on the external condensers/Dry coolers refer to the relevant manual.
- For control system calibrations refer to Control manual (to prevent erratic operations do not use temperature and rel. humidity set points/proportional bands which differ excessively from the Standard Settings).

9.1 – Setting the thermostatic expansion valve

THIS OPERATION MUST BE **PERFORMED BY AN EXPERI**ENCED REFRIGERATION TECHNICIAN.

The valve has already been factory–set and should be reset (only if necessary) as follows:

1) IMPORTANT: Ensure that the instructions in Chap. 4 have been carried out.
2) Allow the compressor to operate for 15 mins.
3) Measure the superheat as follows:
   a) Place a contact thermometer on the tube exiting the evaporator;
   b) Connect a manometer (by a tube of max. 30 cm) to the compressor suction valve.
   c) **The overheating is the difference between the refrig**erant saturation temperature corresponding to the **pressure read on the manometer and the real tem**perature read on the thermometer.
4) The superheat must be 5–8 K; if not, set the expansion valve as follows:
   a) Remove the protective cover;
   b) Turn the adjustment screw by 1/4 turn only;
   c) Wait 10 minutes.
   d) Measure the superheat and repeat the operation if necessary.

   N.B.: If the superheat is too low (compressor cool to the touch) the screw must be turned in a clockwise direction. If the superheat is too high (compressor hot to the touch) **the screw must be turned in a counterclockwise direc**tion.

9.2 – Adjustment of the hot gas injection valve as antifreeze mode (F–D–H)

THIS OPERATION MUST BE CARRIED OUT BY AN EXPERT REFRIGERATION TECHNICIAN.

9.2.1 – Features

This valve is installed int some special versions (see relevant **refrigeration circuits). It enables a partial control of the evap**orating pressure, so as to avoid evaporation temperatures lower **than zero degrees centigrade and thus any ice forma**tion (chilled water side), even with low temperatures of the return air. It injects hot gas exiting the compressor before the evaporator through the gas–liquid mixer, so as to keep the pressure **higher than the set value. See the refrigeraton dia**gram.

9.2.2 – Adjustment

The min. evaporating pressure is kept by calibrating the valve as follows.

- Drastically reduce the conditioner air delivery.
- Check by a precise pressure gauge the evaporating pressure and the relevant saturation temperature.
- Adjust the valve acting on the adjustment screw, so that **it intervenes when the evaporation temperature has de**creased to 2°C.
- Then **check the correct operation of the thermostatic ex**pansion valve.

9.3 – Adjustment of the hot gas injection valve as thermal load control mode (Constant)

THIS OPERATION MUST BE CARRIED OUT BY AN EXPERT REFRIGERATION TECHNICIAN.

9.3.1 – Features

This valve is installed in the Constant versions (see relevant refrigeration circuits). It enables a partial control of the evaporating pressure, so as to avoid evaporation temperatures lower than zero degrees centigrade and thus any ice formation (chilled water side), even with low temperatures of the return air. It injects hot gas exiting the compressor before the evaporator through the gas–liquid mixer, so as to keep the pressure higher than the set value. See the refrigeraton diagram.

9.3.2 – Adjustment

The min. evaporating pressure is kept by calibrating the valve as follows.

- Drastically reduce the conditioner air delivery.
- Check by a precise pressure gauge the evaporating pressure and the relevant saturation temperature.
- Adjust the valve acting on the adjustment screw, so that it intervenes when the evaporation temperature has decreased to 2° C.
- Then check the correct operation of the thermostatic expansion valve.

9.4 – Chilled water valve *(F, D and H only)*

The 2–way (F) or 3–way (D/H) valve controls the chilled water flow and operates as follows (Fig. i):

- 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.

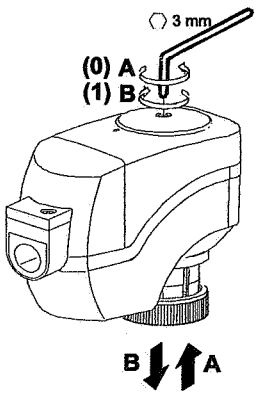
Note 1: In the unlikely event of control system failure, the valve can be manually controlled by means of a 3 mm allen key placed into the actuator slot.
NEVER PERFORM THIS OPERATION USING A SCREWDRIVER.

Note 2: When actuator stem is completely down, the valve is open and chilled water coil is supplied.

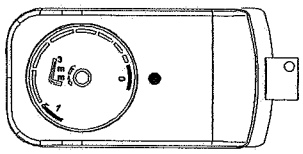
9.4.1 – Operating limits (see Tab. a – Chap. 1)

To avoid leakages through the closed way of the valve, the max. differential pressure allowable through the closed valve is 200 KPa (2 bar).
In any case, the max. differential pressure through the valve, must be lower than: 300 KPa for S17–20–23 F/H/D.

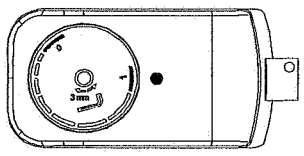
Fig. i – Position of the chilled water valve actuator (for 2 or 3–way valve)



Manual adjustment with 3 mm allen key



Position indicator on
0 = CLOSED valve
(3–way valve: by–pass open)



Position indicator on
1 = OPEN valve
(3–way valve: by–pass closed)

10 – 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.
COOLING WATER *(W, F and H only)*	• Verify the cooling water circulation. • Ensure that there are no water leaks. • Closed circuit only: Verify that the water pump is operating correctly and bleed any air out of the circuit.
REFRIGERATION CIRCUIT	• Check the evaporation pressures (to be done by a refrigeration technician). • Check the compressor current absorption, its head temperature and the presence of any unusual noise. • Ensure that there is no ice formation on the evaporator.
EXTERNAL CONDENSER/ Dry cooler *if fitted)*	See relevant manual.
CHILLED WATER CIRCUIT *(D and H only)*	• Ensure that there are no water leaks. In case of leaks, eliminate them. **N.B. At any sanitary water topping up the antifreeze percentage will reduce, thus increazing the freezing point temperature. It is necessary, in this case, to restore the correct mixture, adding the proper quantity of ethylene glycol.** • 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.**

10.1 – Refrigeration circuit

WHEN REPAIRING THE REFRIGERATION CIRCUIT COLLECT ALL REFRIGERANT IN A CONTAINER: DO NOT ALLOW IT TO ESCAPE.

- When **either removing (for repairs) or charging refrigerant** this must always be done on both the high and low pressure sides of the compressor simultaneously.
- The compressor copper plated steel connections should be welded with a silfos material containing a minimum of 5% silver.

10.1.1 – Refrigerant charge of the water–cooled units *(W, F and H)*

1) Start the unit as described in para. 7.1.
2) Manually start the compressor (ensure the unit is not in dehumidification).
3) Wait a few minutes to allow conditions to stabilize.
4) Check whether there are any bubbles visible in the sight glass. If there are any, this means there is a leak, which must be traced (using a leak detector) and repaired; then recharge the unit until no further bubbles are visible.
5) Using a **manometer, check that the evaporating temperature** is above 0°C.
6) Verify the water pressostatic valve (WV) setting (CHAP. 8).
7) Verify that the superheat is 5–8 °C (to do this refer to Chap. 8).

10.1.2 – Oil charge R407C

The oil to be used when topping up (only if there are any leaks) is Mobil EAL Arctic 22CC (see Tab. g).

Tab. g – Mobil Arctic EAL 22CC oil (for R407C only)

density (at 15 °C)	:	0.967 kg/l
flash point (C.O.C.)	:	245 °C
Pour point	:	<–54 °C
viscosity at 40 °C	:	23.6 cSt
viscosity at 100 °C	:	4.7 cSt
viscosity index (ASTM D2270)	:	130

These oils rapidly absorb the humidity present in the air when they are exposed to the atmosphere.
If the oil absorbs humidity, the ester molecules can break down, forming acidity.
We therefore recommend exposing the oil for as short a time as possible (a few minutes) and, in case of topping up, using exclusively the oil indicated on the refrigerating compressor.
Normally 1 or 2–liter cans are available for this purpose;

once they are opened, they must be completely used up. They must not be used after a long period, as they absorb humidity.
It is therefore obvious that the taps of the compressor must only be turned after the whole plant has been subjected to a vacuum and partial filling.

10.1.3 – Oil charge R22

The oil to be used when topping up (only if there are any leaks) is SUNISO 3GS.

Tab. h – Suniso 3GS oil (for R22 only)

density (at 15 °C)	:	0.91 kg/l
flash point (C.O.C.)	:	178°C
Pour point	:	–40 °C
viscosity at 40 °C	:	29.5 cSt
viscosity at 100 °C	:	4.32 cSt
coppoer corrosion (100 °C, 3 hr) ASTM D130	:	1
neutralization value	:	0.03 max.
dielectric strenght		> 30kV

10.1.4 – Oil topping–up of an installed circuit

If oil leakages occur, the topping–up operation is necessary. Please contact Technical Support Deparment if topping–up is necessary.

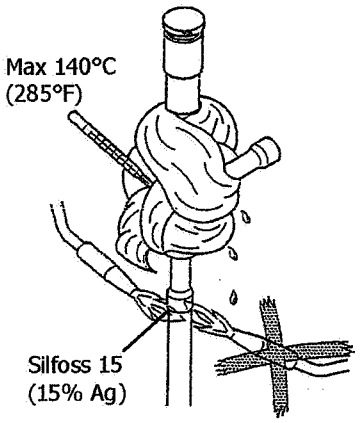
10.2 – Spare parts

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.

NOTES:

1) When a faulty compenent is replaced, follow the relevant manufacturer instructions.
2) When the spare parts must be welded, be carefully do not damage the internal parts (gaskets, seals, o–rings, etc.).
   See, as an example, Fig. j.

Fig. j – CPCE valve



10.3 – 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.
The refrigerating fluid and the lubricating oil in the circuit must be disposed of in conformity with the laws in force in your country.

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

HIMOD S MODEL	HUMIDAIR MODEL	MAIN POWER SUPPLIES (V ± 10%)	SETTING [kg/h] *	ABSORBED CURRENT [A]	POWER [kW]	MAX. CYLINDER WATER VOLUME [l]	MAX. SUPPLY WATER QUANTITY [l/min.]	MAX. DRAIN WATER QUANTITY [l/min.]
S04...06	HAK 21L	230V / 1ph / 50Hz	0.6...2.0	6.5	1.5	4.85	0.3	2.5
S07...12	HAK 53H	400V / 3ph / 50Hz	1.3...4.5	4.6	3.0	2.84	0.6	2.5
S07...12	HAK 53L	230V / 3ph / 50Hz	1.3...4.5	8.0	3.0	2.84	0.6	2.5
S13...29	HAK 93H	400V / 3ph / 50Hz	2.7...9.0	9.0	5.8	5.34	0.6	2.5
S13...29	HAK 93L	230V / 3ph / 50Hz	2.7...9.0	15.6	5.8	5.34	0.6	2.5

For humidifier current (FLA) and rated power, refer to electrical features in the 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 seeFig. 6 and Fig.7 Enclosures C

Fig. 1 – Supply water connection

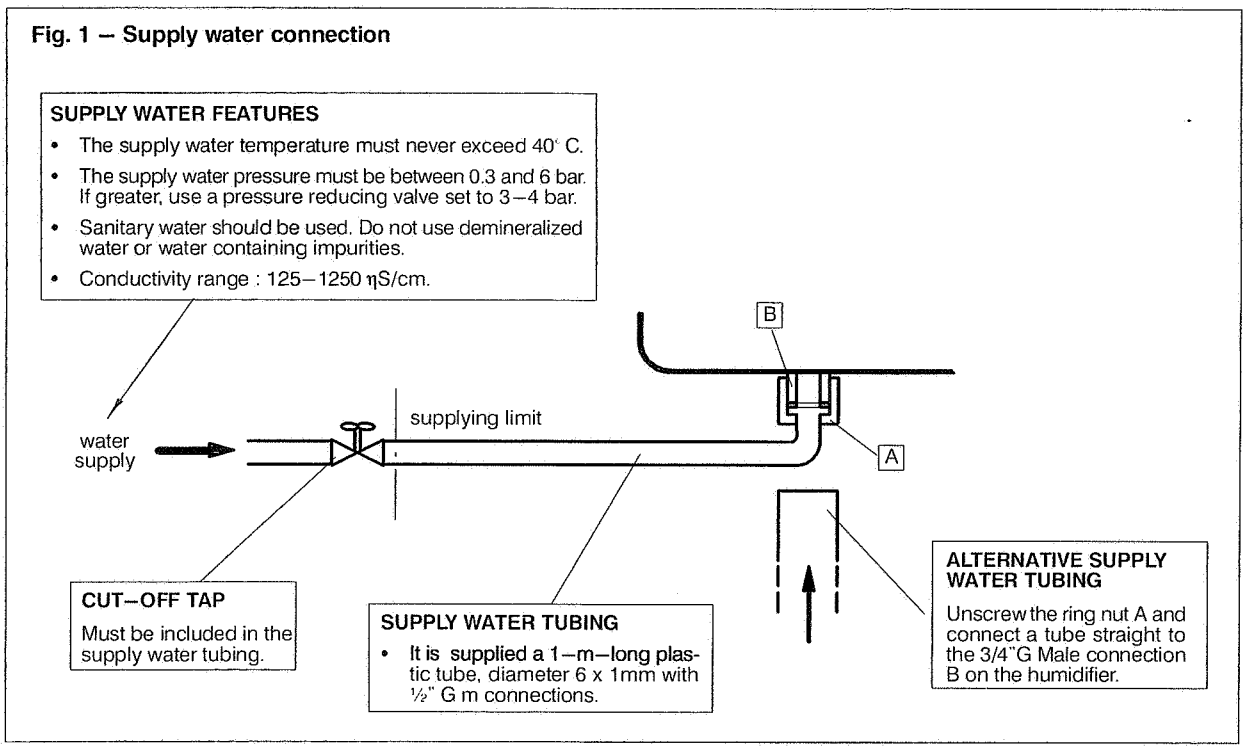
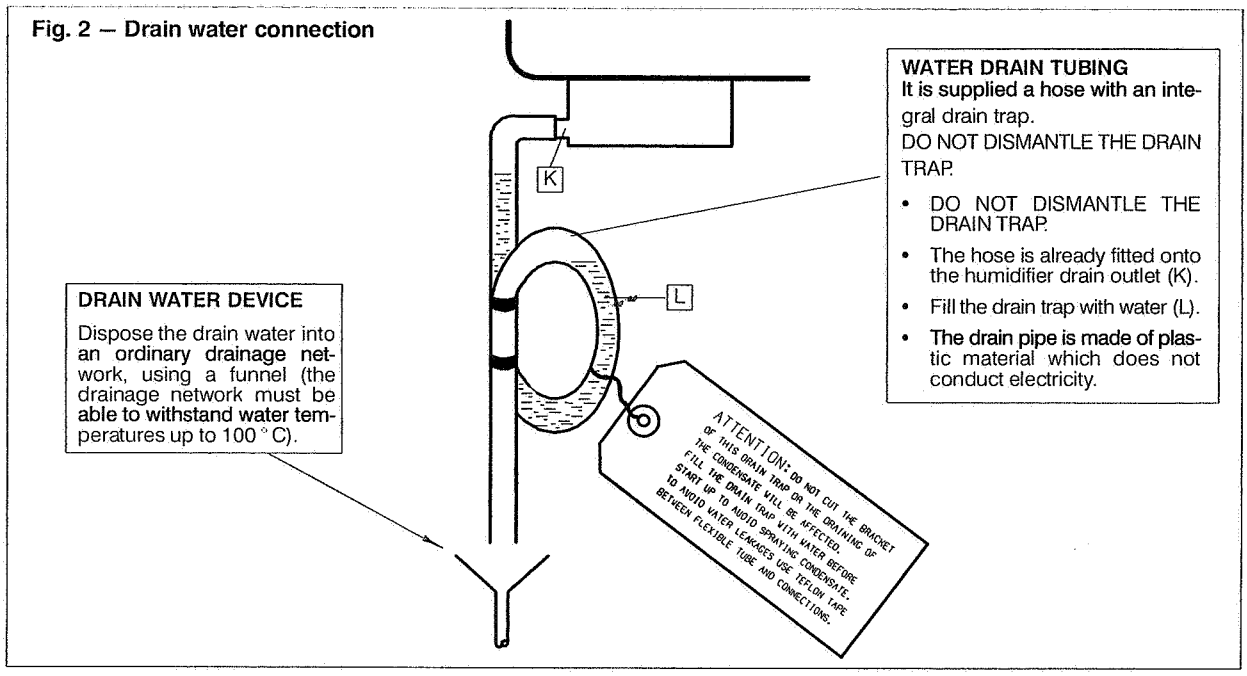


Fig. 2 – Drain water connection



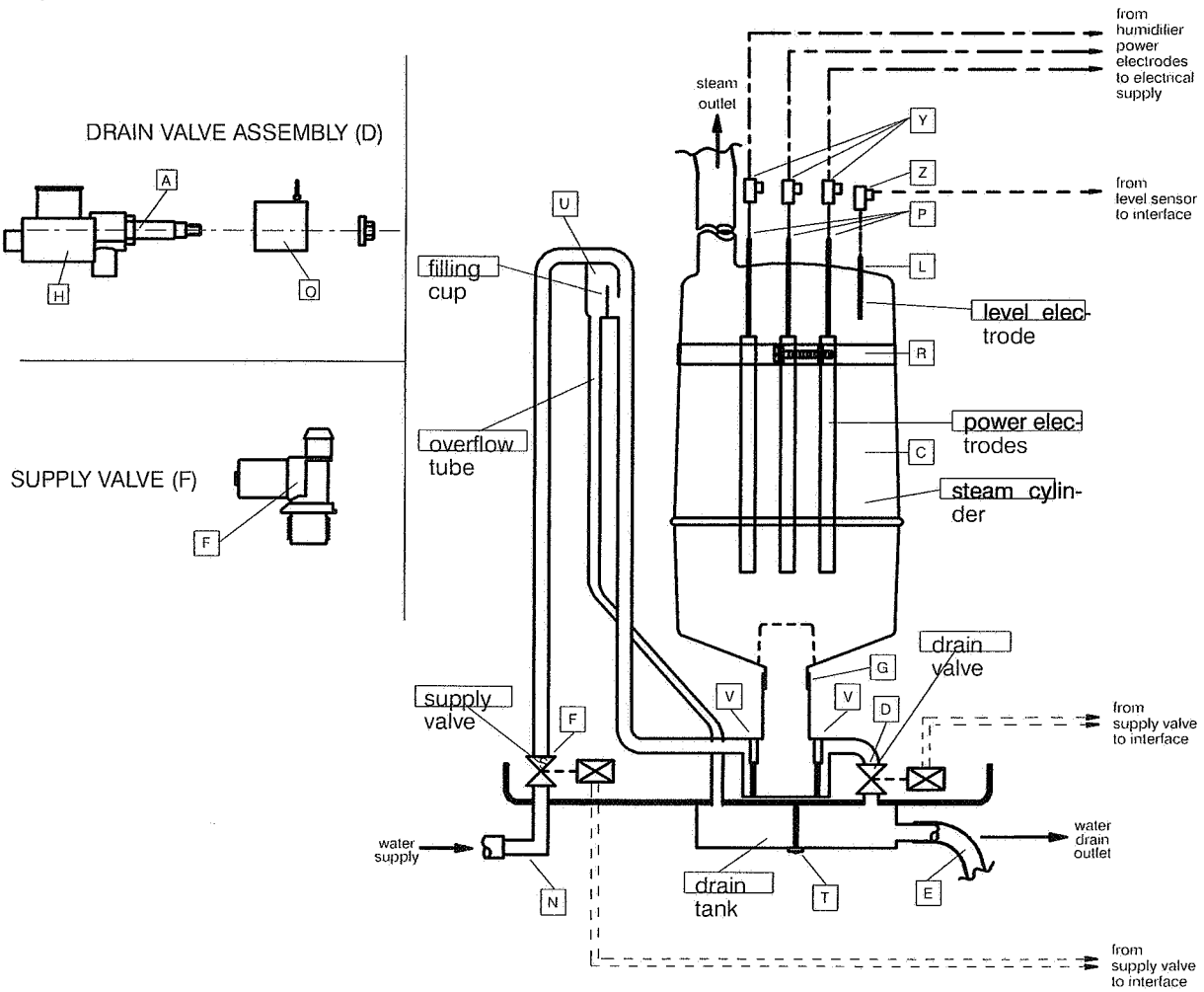
NOTES:

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 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 CONTROL Service menu several times (see Control 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 Control 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. App. A.5.1.
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. App. A.5.1.
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. App. A.5.1.
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 (D).
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 — Humidifier 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

Tab. 1 – Electrical data

Configuration	Model	Power supply	FLA (A)	LRA (A)	RESIDUAL–CURRENT CIRCUIT BREAKERS IΔn = 0.3A (400V)
(F): Cooling *Fan + compressor*	S04 A/W	1ph / 230V	10.7	36.3	16A
	S05 A/W		12.1	48.3	16A
	S07 A/W	3ph / 400V	8.2	44.9	16A
	S10 A/W		9.6	50.9	16A
	S12 A/W		12.6	54.9	16A
	S13 A/W		10.8	64.9	16A
	S17 A/W/F/ D/H		12.4	76.4	20A
	S20 A/W/F/ D/H		16.2	91.0	20A
	S23 A/W/F/ D/H		21.1	113.0	25A
(F+C): Cooling + Electrical heating *Fan + compressor + electrical heaters*	S04 A/W	1ph / 230V	19.2	44.8	25A
	S05 A/W		20.6	56.8	25A
	S07 A/W	3ph / 400V	14.7	51.4	20A
	S10 A/W		16.1	57.4	20A
	S12 A/W		19.1	61.4	25A
	S13 A/W		19.4	73.5	25A
	S17 A/W/F/ D/H		21.0	85.0	25A
	S20 A/W/F/ D/H		24.8	99.6	32A
	S23 A/W/F/ D/H		29.7	121.6	32A
(F+C+H): Cooling + Electrical heating + Humidification *Fan + compressor + electrical heaters + humidifier*	S04 A/W	1ph / 230V	25.7	51.3	32A
	S05 A/W		27.1	63.3	32.A
	S07 A/W	3ph / 400V	19.3	56.0	25A
	S10 A/W		20.7	62.0	25A
	S12 A/W		23.7	66.0	25A
	S13 A/W		28.4	82.5	32A
	S17 A/W/F/ D/H		30.0	94.0	32A
	S20 A/W/F/ D/H		33.8	108.6	40A
	S23 A/W/F/ D/H		38.7	131.6	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 of the user–installed switch 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.

Tab. 2 – Standard fan connections for HIMOD with autotransformer

Configuration	Model	Autotrasformer outlet voltage	
		Standard	Dehumidification
UNDER (U)	S04U A/W	140	120
	S05U A/W	160	140
	S07U A/W	170	130
	S10U A/W	200	170
	S12U A/W	215	185
	S13U A/W	260	220
	S17U A/W	290	260
	S20U A/W	220	190
	S23U A/W	290	260
OVER (O) CONSTANT (K) GRILLE (G) GRILLE–CONSTANT (L)	S04O A/W	140	120
	S05O A/W	160	140
	S07O A/W	170	130
	S10O A/W	200	170
	S12O A/W	215	185
	S13O A/W	260	220
	S17O A/W	290	260
	S20O A/W	220	190
	S23O A/W	290	260
UNDER (F/D/H)	S17U F/D/H	290	260
	S20U F/D/H	220	190
	S23U F/D/H	290	260
OVER (F/D/H)	S17O F/D/H	290	260
	S20O F/D/H	220	190
	S23O F/D/H	290	260
DISPLACEMENT (D)	S04D A/W	120	120
	S05D A/W	140	120
	S07D A/W	150	130
	S10D A/W	185	170
	S12D A/W	200	185
	S13D A/W	220	190
	S17D A/W	260	220
	S20D A/W	190	150
	S23D A/W	260	220

NOTES:

- To change the ESP (External Static Pressure) of the fan (20 Pa for Under and 50 Pa for Over) it is necessary to move the following wires:
  – R5–T5 e R4–T4 (dehumidification) on S13–17–20–23
  –160–120 (dehumidification) on S5–12.
- The motor fan for Himod S04–05–07–10–12 is single phase and no internal changes are requested.
- The motor fan for Himod S13–17–20–23 is 3–phase and is Y connected on all versions.
  – Do not connect it at $\leq$

Tab. 3 – Electrical data (standard component)

component	FAN (3ph – 400V: S13–S23) (1ph – 230V: S04–S05–S07–S12)				COMPRESSOR (3ph – 400V – 50Hz) (1ph – 230V: S04–S05)								
					STANDARD R407C				MOTOR	OPTIONAL R22			
Model	OA*	FLA	LRA	nominal power (kW)*	OA**	FLA	LRA	nominal power (kW)**	winding resistance (ohm)	OA**	FLA	LRA	nominal power (kW)**
S04 U/O	1.4	1.5	3.1	0.20	5.3	10.0	35.0	1.16	2.25		10.0	35.0	
S05 U/O	1.4	1.5	3.1	0.23	6.8	11.4	47.0	1.45	1.62		10.7	45.0	
S07 U/O	2.2	2.6	4.9	0.34	4.2	5.6	40.0	2.16	4.83		5.5	39.0	
S10 U/O	2.3	2.6	4.9	0.40	4.8	7.0	46.0	2.51	4.03		6.8	44.0	
S12 U/O	2.4	2.6	4.9	0.43	4.1	10.0	50.0	3.05	3.88		7.5	51.0	
S13 U/O	2.6	2.8	9.9	0.87	5.1	8.0	55.0	2.95	–		12.5	55.0	
S17 U/O	2.6	2.8	9.9	0.98	6.3	9.6	66.5	3.71	–		15.0	66.5	
S20 U/O	4.6	4.8	19.0	1.50	6.5	11.5	73.0	4.49	–		19.0	73.0	
S23 U/O	4.5	4.8	19.0	1.86	11.1	16.4	95.0	5.89	–		15.0	94.0	

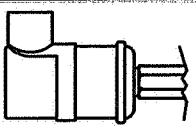
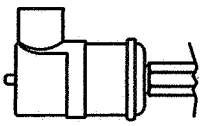
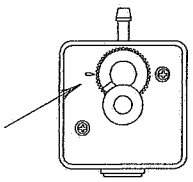
* At standard operating conditions ESP: 50 Pa for Over units and 20 Pa for Under units
Filters: class G4

** At nominal operating conditions: Condensing temperature 45•C – Room conditions 24•C / 50% RH

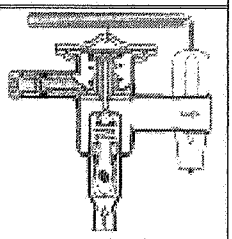
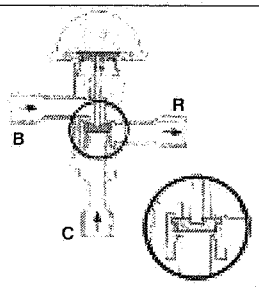
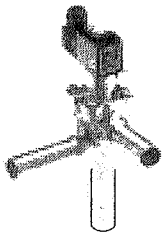
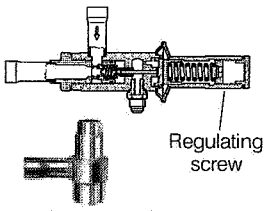
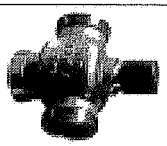
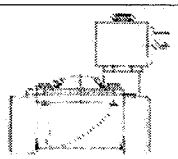
Tab. 4 – Electrical data (optional component)

Component	ELECTRICAL HEATING		HUMIDIFIER	
Model	FLA [A]	nominal power [kW]	FLA [A]	nominal power [kW]
(400V / 3Ph / 50Hz)				
S04–05 U/O	8.5	1.95	6.5	1.5
S07–10–12 U/O	6.5	4.50	4.6	3.0
S13–17–20–23 U/O	8.6	5.85	9.0	5.8

Tab. 5 – Calibrations of electrical components

Refrigeration Circuit Pos.	COMPONENT	SETTING	NOTES	Contact
16	**Low Pressure Switch (LP)**	STOP 2 barg START 2.8 barg DIFFER. (fixed) 0.8 bar (fixed setting – automatic reset)	 delayed automatic reset (see MICROFACE/ HIROMATIC manual)	Nolmally closed
3	**High Pressure Switch (HP)**	STOP 26 barg START 20 barg DIFFER. (fixed) 6.0 bar **(fixed setting – manual reset)**	 Reset	Nolmally closed
–	**Clogged filter differential pressure switch (CF)**	Filters G4 = 2mbar Filters G5 = 3 mbar	 Regulating ring	Nolmally closed

Tab. 6 – Adjustment / calibrations of refigerant circuit valves

Refrigerant Circuit Pos.	Component	Calibration & Operating	Application	Model	Drawing
10	**Thermostatic valve**	Overheating control 5 ÷ 8 K (see para. 9.1)	All versions	Danfoss mod. TUBE	
18	**Head pressure control valve**	Factory calibrated 13 ÷ 14 bar	Himod W/F/H	ALCO HP5 T4–225	
11	**Hot gas injection valve** Reheating mode	**ON–OFF action, controlled by Microface** (re–heating)	Himod A/W/F/D/H (no Himod Constant)	ALCO 3031RC12S7	
11	**Room thermal load control**	Modulating action, **controlled by Microface** 0 ÷ 10 VDC (see para. 9.3)	Himod K only (Constant)	Stäfa M3FB15LX	
21 + 22	**Hot gas injection** Antifreeze protecion in Freecooling unit	Modulating action **N.B. Calibrated at +2°C at machine start up**	Himod F/D/H	Danfoss CPCE + LG	
	Hot gas injection Evaporating pressure control		Himod KA/KW		
19	**2–way chilled water valve**	Modulating action (servomotor: see para. 9.4)	Himod F	Landis VVP 459	
	3–way chilled water valve	Modulating action (servomotor: see para. 9.4)	Himod D–H	Landis VXP 459	
25	**Solenoid valve**	ON–OFF action (coupled to valve 19)	Himod F	Parker 133 CN	

Tab. 7 – R407C refrigerant and oil charge for A–D

MODEL	R407C REFRIGERANT CHARGE						Mobil EAL Arctic 22CC OIL CHARGE (liters)			
	Base charge (+) CDT + COND (kg)		Refrigerant lines std. De (mm)		Pipe charge (kg/m) for distances D (*)		oil within compressor		charge to be added for every 10 m over 30 m between CDT and COND	charge to be added for every 10 m over 30 m between CDT and COND (**)
	without hot gas	with hot gas	Gas	Liquid	without hot gas	with hot gas	crankcase	Max topping up	without hot gas	with hot gas
S04 A–D			10	10	0.063	0.120	0.74	0.70	0.05	0.10
S05 A–D			10	10	0.063	0.120	1.00	0.95	0.05	0.10
S07 A–D			12	12	0.095	0.180	1.10	1.05	0.05	0.10
S10 A–D			12	12	0.095	0.180	1.10	1.05	0.10	0.20
S12 A–D			14	14	0.117	0.220	1.40	1.35	0.10	0.20
S13 A–D			14	14	0.117	0.220	2.10	2.05	0.10	0.20
S17 A–D			16	16	0.178	0.340	2.20	2.15	0.15	0.30
S20 A–D			18	16	0.181	0.400	2.20	2.15	0.15	0.30
S23 A–D			22	18	0.250	0.570	2.50	2.40	0.20	0.40

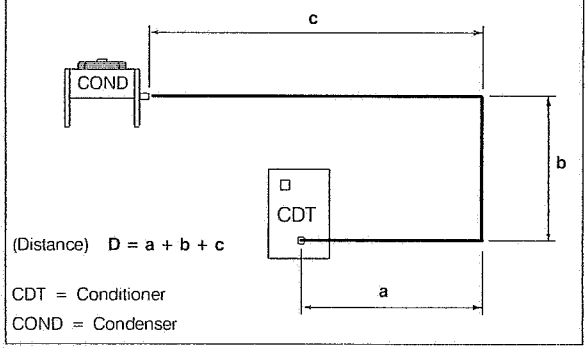
(*) For distance D see Fig. J.
(**) Topping up is requested for short pipeline too, due to the extra–charge of refrigerant.l
(+) Unit coupled with standard condenser
N.B.: The air conditioner is supplied pressurized with helium at 3 bar.

Tab. 8 – R22 refrigerant and oil charge for A–D

MODEL	R22 REFRIGERANT CHARGE						SUNISO 3GS OIL CHARGE (liters)			
	Base charge (+) CDT + COND (kg)		Refrigerant lines std. De (mm)		Pipe charge (kg/m) for distances D (*)		oil within compressor		charge to be added for every 10 m over 30 m between CDT and COND	charge to be added for every 10 m over 30 m between CDT and COND (**)
	without hot gas	with hot gas	Gas	Liquid	without hot gas	with hot gas	crankcase	Max topping up	without hot gas	with hot gas
S04 A–D			10	10	0.063	0.120	0.74	0.70	0.05	0.10
S05 A–D			10	10	0.063	0.120	1.00	0.95	0.05	0.10
S07 A–D			12	10	0.064	0.150	1.10	1.05	0.05	0.10
S10 A–D			12	12	0.095	0.180	1.10	1.05	0.10	0.20
S12 A–D			14	14	0.127	0.240	1.40	1.35	0.10	0.20
S13 A–D			16	16	0.188	0.360	2.10	2.05	0.15	0.30
S17 A–D			16	16	0.250	0.360	2.20	2.15	0.20	0.40
S20 A–D			22	18	0.260	0.600	2.20	2.15	0.20	0.40
S23 A–D			22	18	0.260	0.600	2.50	2.40	0.20	0.40

(*) For distance **D** see Fig. 1.
(**) Topping up is requested for short pipeline too, due to the extra–charge of refrigerant.l
(+) Unit coupled with standard condenser
N.B.: The air conditioner is supplied pressurized with helium at 3 bar.

Fig. 1 – Pipeline air conditioner – condenser



Tab. 9 – Refrigerant and oil charge W–F–H

MODEL	R407C REFRIGERANT CHARGE		R22 REFRIGERANT CHARGE		OIL CHARGE	
	without hot gas	with hot gas	without hot gas	with hot gas	EAL ARCTIC 22CC	SUNISO 3GS
S04 W–F–H					0.74	0.74
S05 W–F–H					1.00	1.00
S07 W–F–H					1.10	1.10
S10 W–F–H					1.10	1.10
S12 W–F–H					1.40	1.40
S13 W–F–H					2.10	2.10
S17 W–F–H					2.20	2.20
S20 W–F–H					2.20	2.20
S23 W–F–H					2.50	2.50

N.B.: The air conditioner is supplied complete with refrigerant and oil.

Installation drawings

Fig. 1. **Overall dimensions Service Area**

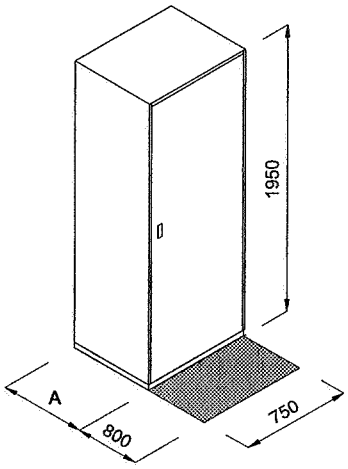


Fig. 2. **Overall dimensions: Conditioner with Plenum**

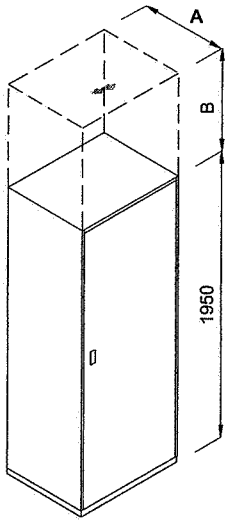
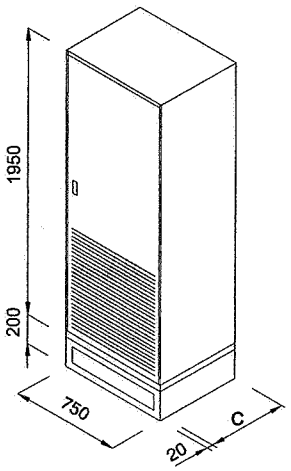


Fig. 3. **Overall dimensions: Conditioner with Base Module**

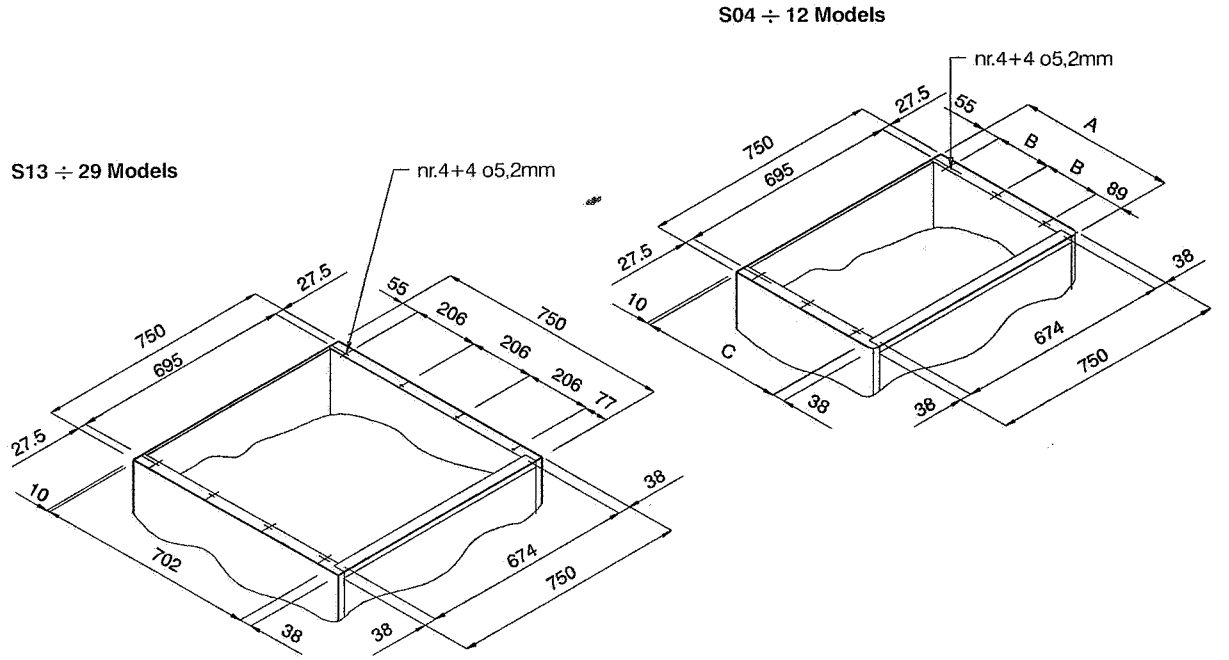


Models	A (mm)	C (mm)
S04–05–06	400	380
S07–08–10–11–12	500	480
S13–15–17–18–20–23–29	750	730

B: AVAILABLE PLENUM HEIGHTS (mm)			
Plenum simple	Plenum for silencing cartridges	Plenum for high efficiency filters	Plenum with frontal airflow (OVER only)
500 – 600 – 700 – 800 – 900 – 1000 – 1100 – 1200	600 – 900 – 1200	500 – 600 – 700 – 800 – 900	600

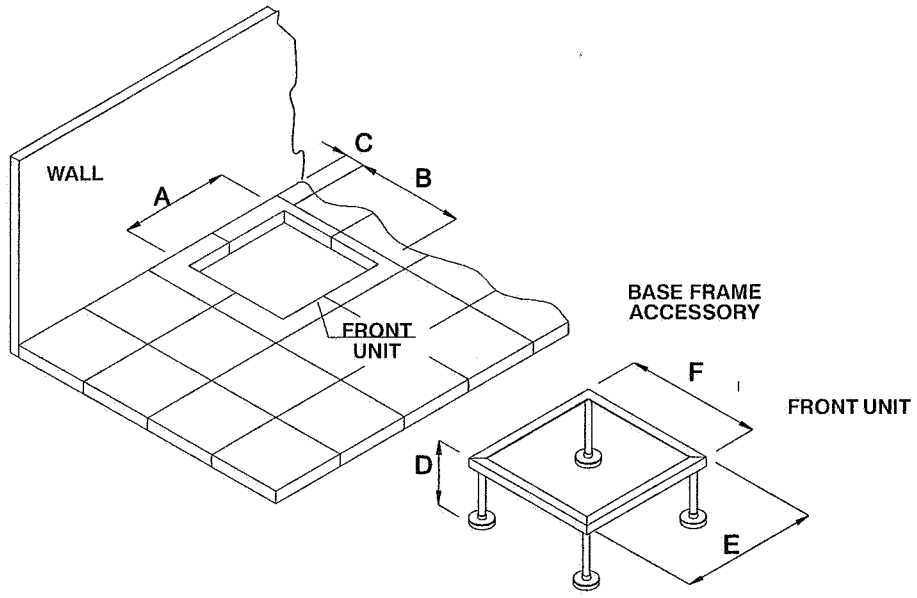
MODELS	WEIGHTS (Kg) Versions							
	A	W	F	D	H	K / A	K / W	C
S04	160	165	–	–	–	–	–	–
S05	170	175	–	–	–	–	–	–
S06	–	–	–	–	–	–	–	135
S07	195	200	–	–	–	200	205	–
S08	–	–	–	–	–	–	–	150
S10	210	215	–	–	–	215	220	–
S11	–	–	–	–	–	–	–	165
S12	215	222	–	–	–	222	229	–
S13	240	247	–	–	–	247	254	–
S15	–	–	–	–	–	–	–	190
S17	250	260	290	280	290	260	270	–
S18	–	–	–	–	–	–	–	210
S20	260	270	310	300	310	270	280	–
S23	270	280	320	310	320	280	290	–
S29	–	–	–	–	–	–	–	230

Fig. 4. Air inlet and outlet – hole for plenum connection



Models	A mm	B mm	C mm
S04 ÷ 06	400	128	352
S07 ÷ 12	500	178	452

Fig. 5. Hole in raised floor



MODELS	Dimensions (mm) A without base frame	A with base frame	B without base frame	B with base frame	C without base frame	C with base frame	D	E	F
S04–05–06	690	750	320	390	50	10	≤ 300 ≤ 500 ≤ 800	740	380
S07–08–10–11–12			420	490					480
S13–15–17–18–20–23–29			670	740					730

Fig. 6. Extension hood

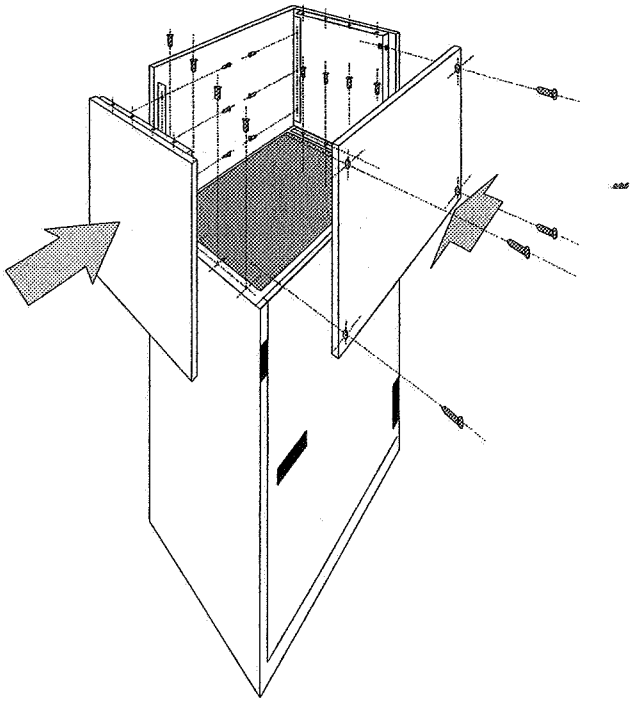


Fig. 7. Base module

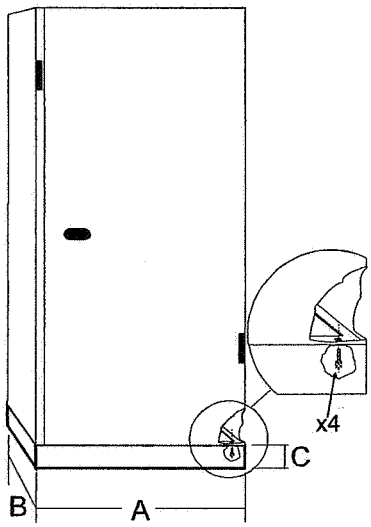


Fig. 8. Base frame

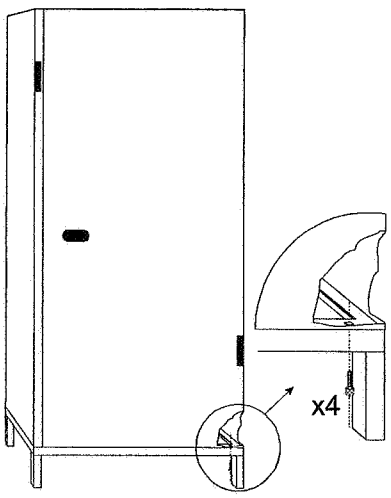


Fig. 9. High efficiency filters

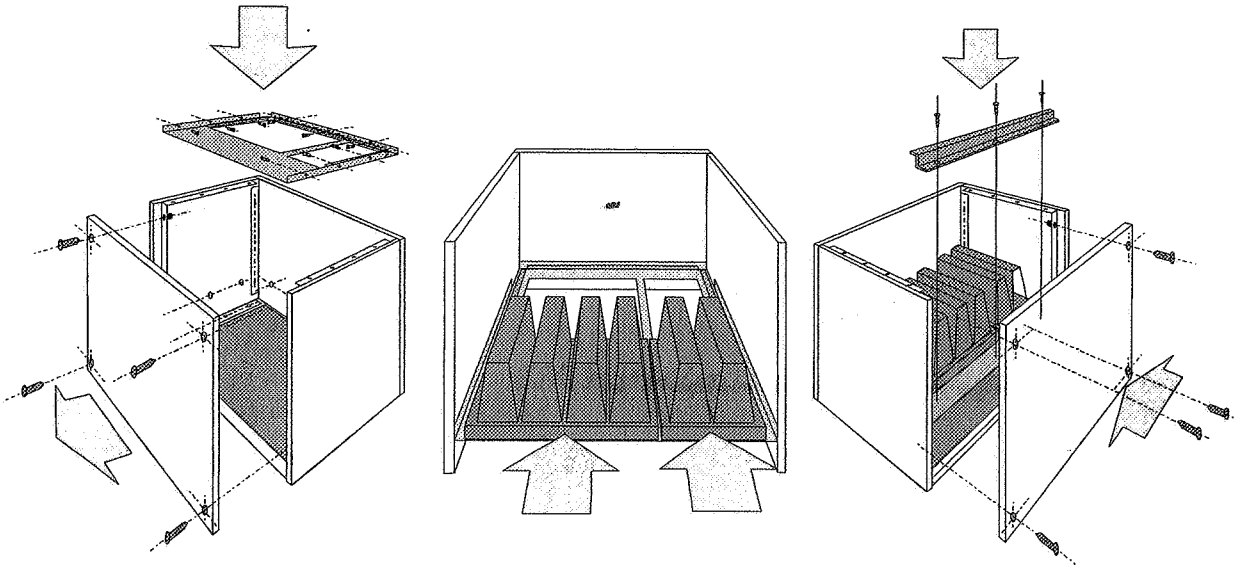
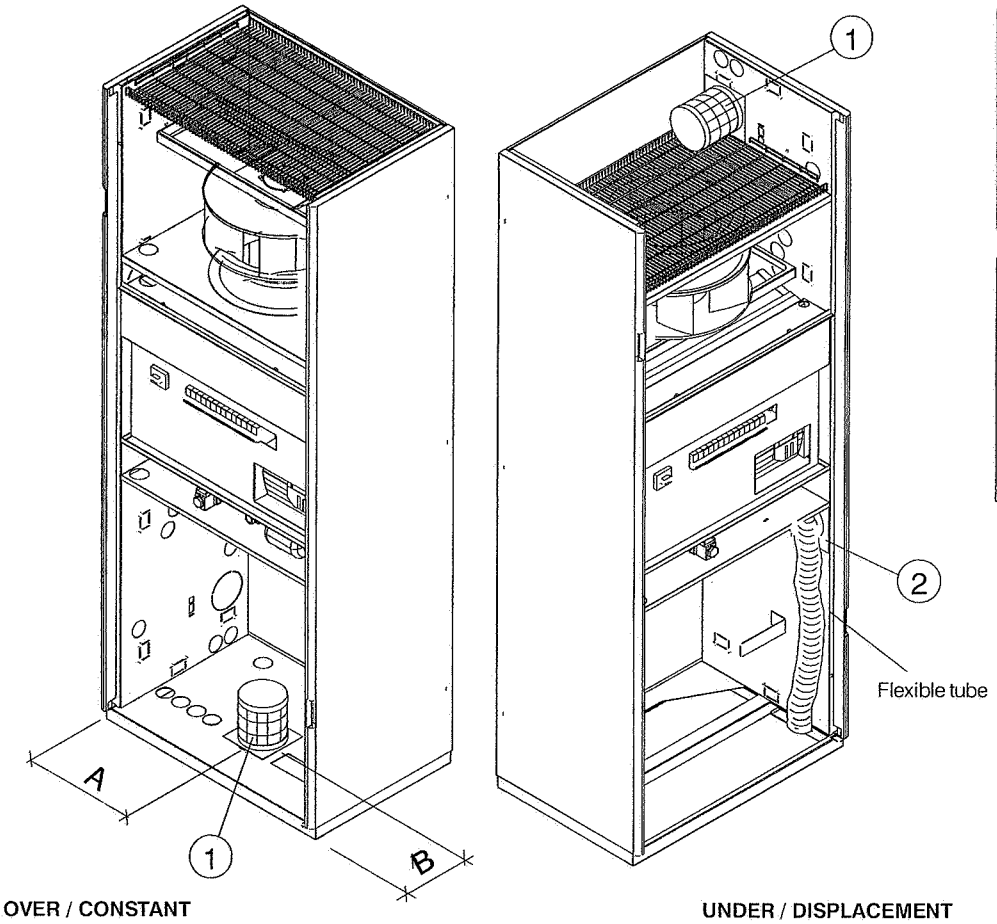
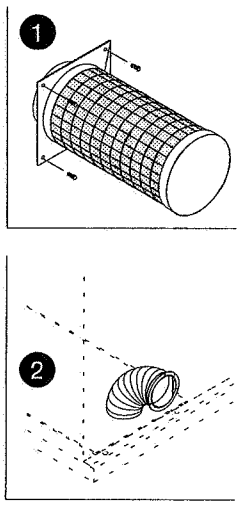


Fig. 10. New air module



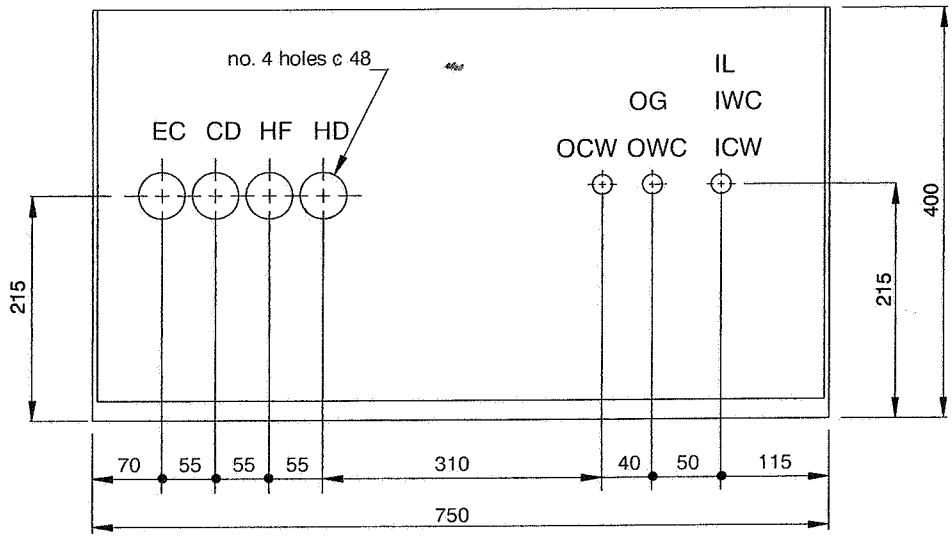


OVER / CONSTANT

UNDER / DISPLACEMENT

MODELS	Dimensions (mm)	
	A	B
S04–05–06	185	310
S07–08–10–11–12	375	190
S13–15–17–18–20–23–29	155	450

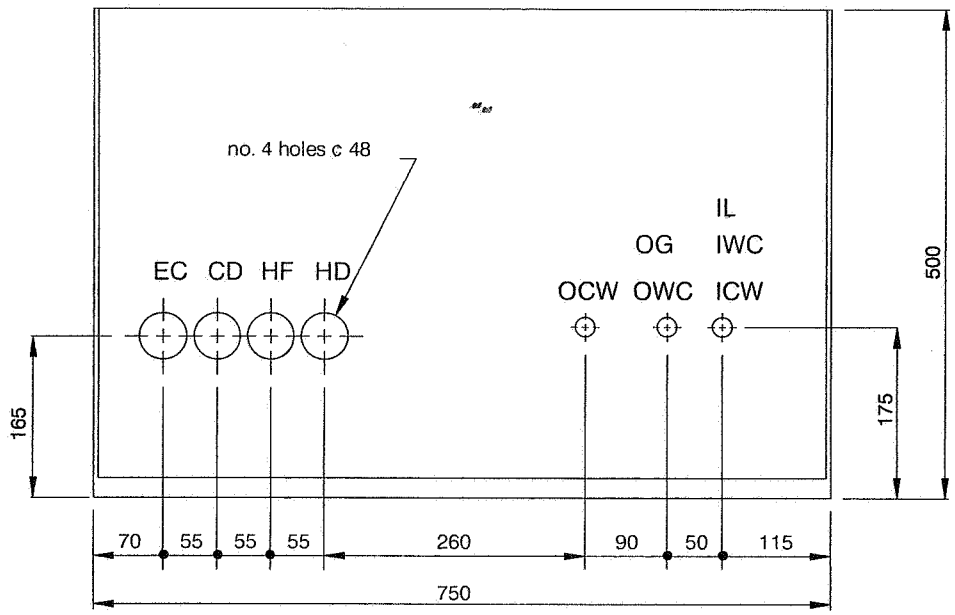
Fig. 11. Refrigerant, water and electrical connections Himod S 04 ÷ 06 – Plant view



FRONT UNIT

Unit Connection		Version A	Version W	Version C
IL	Liquid line inlet	OD 12 mm		
OG	Gas line outlet	OD 12 mm		
ICW	Chilled water inlet			3/4" GAS–F
OCW	Chilled water outlet			3/4" GAS–F
IWC	Water to condenser inlet		1/2" GAS–F	
OWC	Water from condenser outlet		1/2" GAS–F	
IHW	Hot water inlet (opt.)	OD 16 mm		
OHW	Hot water outlet (opt.)	OD 16 mm		
CD	Condensate drain	ID 20 mm		
HF	Humidifier feed (opt.)	1/2" GAS–M		
HD	Humidifier drain (opt.)	ID 22 mm		
EC	Electrical power supply	Hole ¢ 48 mm		

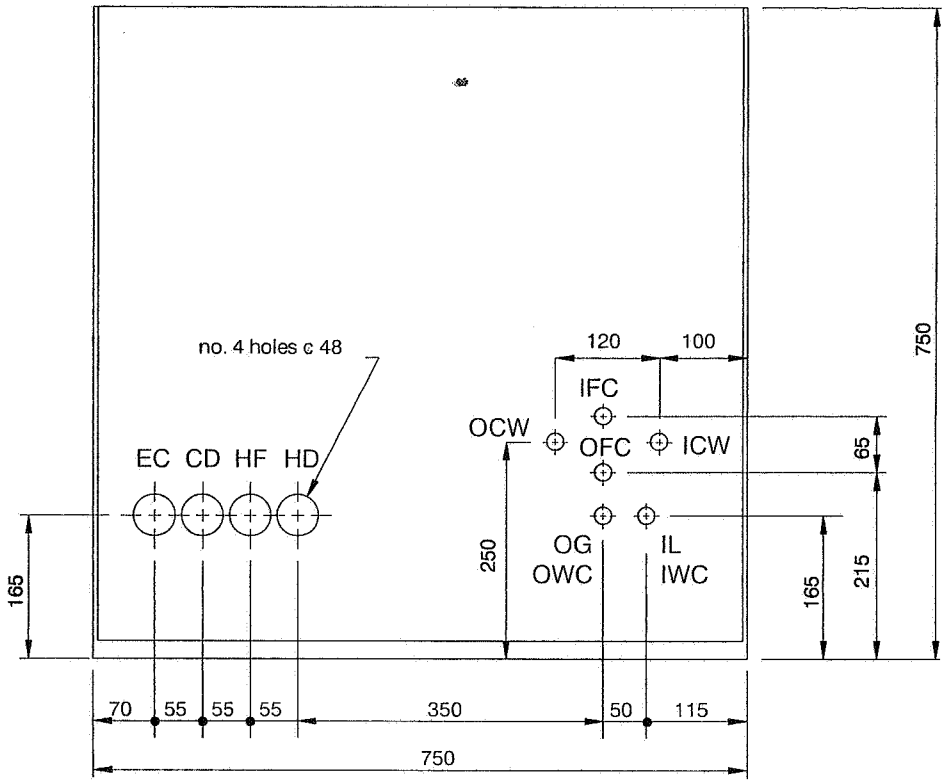
Fig. 12. Refrigerant, water and electrical connections Himod S 07 ÷ 12 – Plant view



FRONT UNIT

Unit Connection		Version		
		A	W	C
IL	Liquid line inlet	OD 12 mm		
OG	Gas line outlet	OD 16 mm		
ICW	Chilled water inlet			3/4" GAS–F
OCW	Chilled water outlet			3/4" GAS–F
IWC	Water to condenser inlet		1/2" GAS–F	
OWC	Water from condenser outlet		1/2" GAS–F	
IHW	Hot water inlet (opt.)	OD 16 mm		
OHW	Hot water outlet (opt.)	OD 16 mm		
CD	Condensate drain	ID 20 mm		
HF	Humidifier feed (opt.)	1/2" GAS–M		
HD	Humidifier drain (opt.)	ID 22 mm		
EC	Electrical power supply	Hole ¢ 48 mm		

Fig. 13. Refrigerant, water and electrical connections Himod S 13 ÷ 29

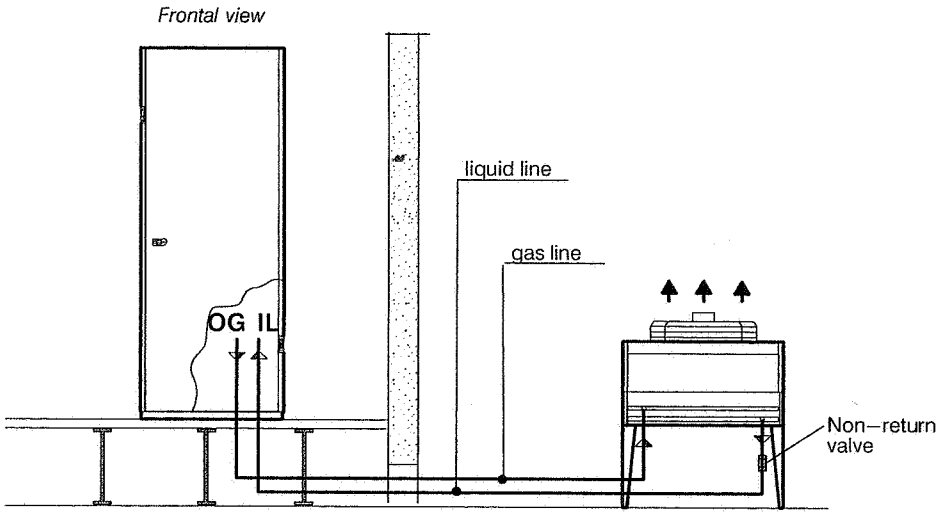


FRONT UNIT

Unit Connection		Version					
		A	W	D	H	F	C
IL	Refrigerant liquid line inlet	OD 16 mm		OD 16 mm			
OG	Refrigerant gas line outlet	OD 18 mm		OD 18 mm			
ICW	Chilled water inlet						1" GAS–F
OCW	Chilled water outlet						1" GAS–F
IWC	Water to condenser inlet		3/4" GAS–F		3/4" GAS–F	1" GAS–F	
OWC	Water from condenser outlet		3/4" GAS–F		3/4" GAS–F	1" GAS–F	
IHW	Hot water inlet (opt.)	OD 18 mm					
OHW	Hot water outlet (opt.)	OD 18 mm					
IFC	Water inlet to Freecooling coil			1" GAS–F	1" GAS–F		
OFC	Water outlet to Dry–Cooler			1" GAS–F	1" GAS–F		
CD	Condensate drain	ID 20 mm					
HF	Humidifier feed (opt.)	1/2" GAS–M					
HD	Humidifier drain (opt.)	ID 22 mm					
EC	Electrical power supply	Hole c 48 mm					

Fig. 14. Refrigeration connections

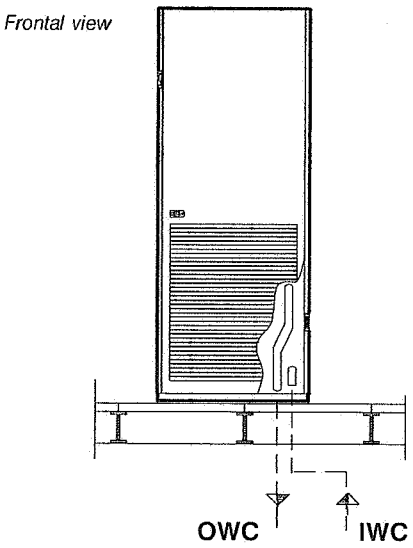
Himod S – A



OG	Refrigerant pipe outlet
IL	Refrigerant pipe inlet

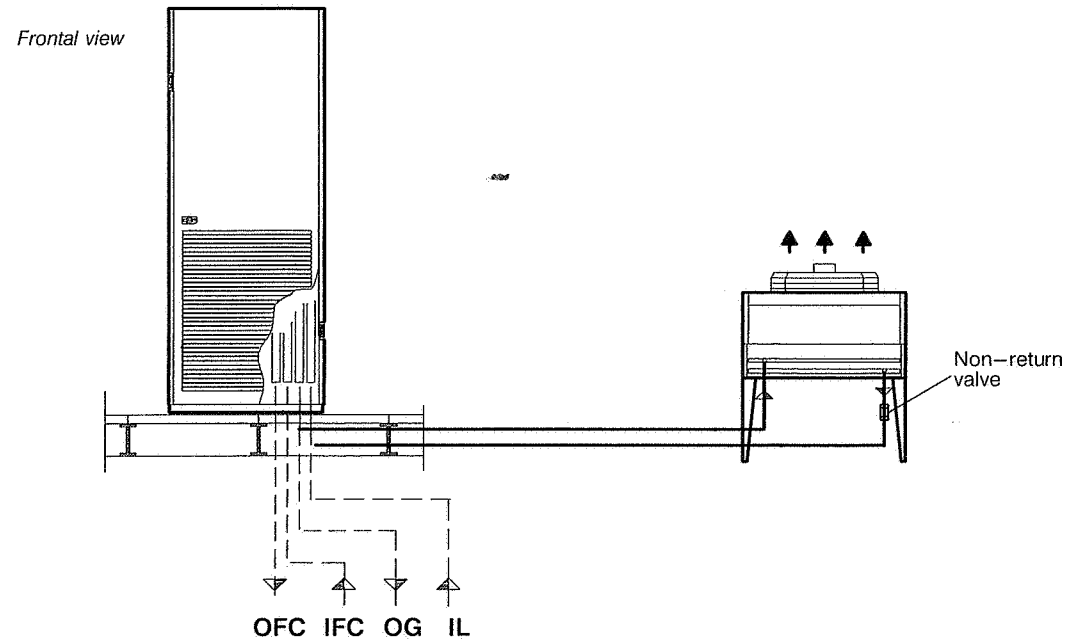
Notes: *recommended diameters see Table in Chap. 4.*

Fig. 15. Water connections Himod S – W / F



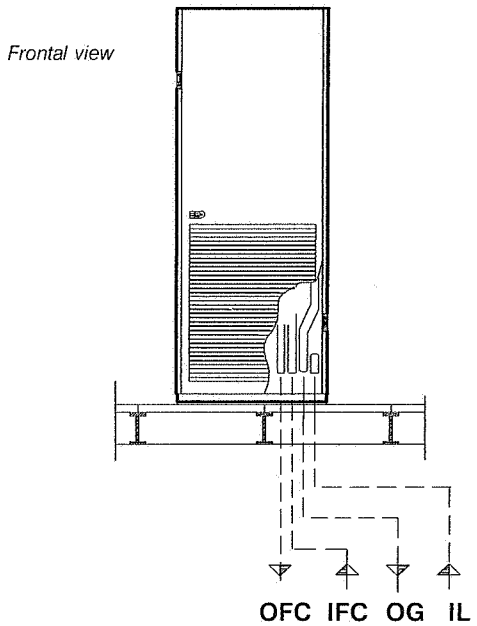
IWC	Water to condenser inlet
OWC	Water from condenser outlet

Fig. 16. Chilled water and refrigerant connections Himod S – D



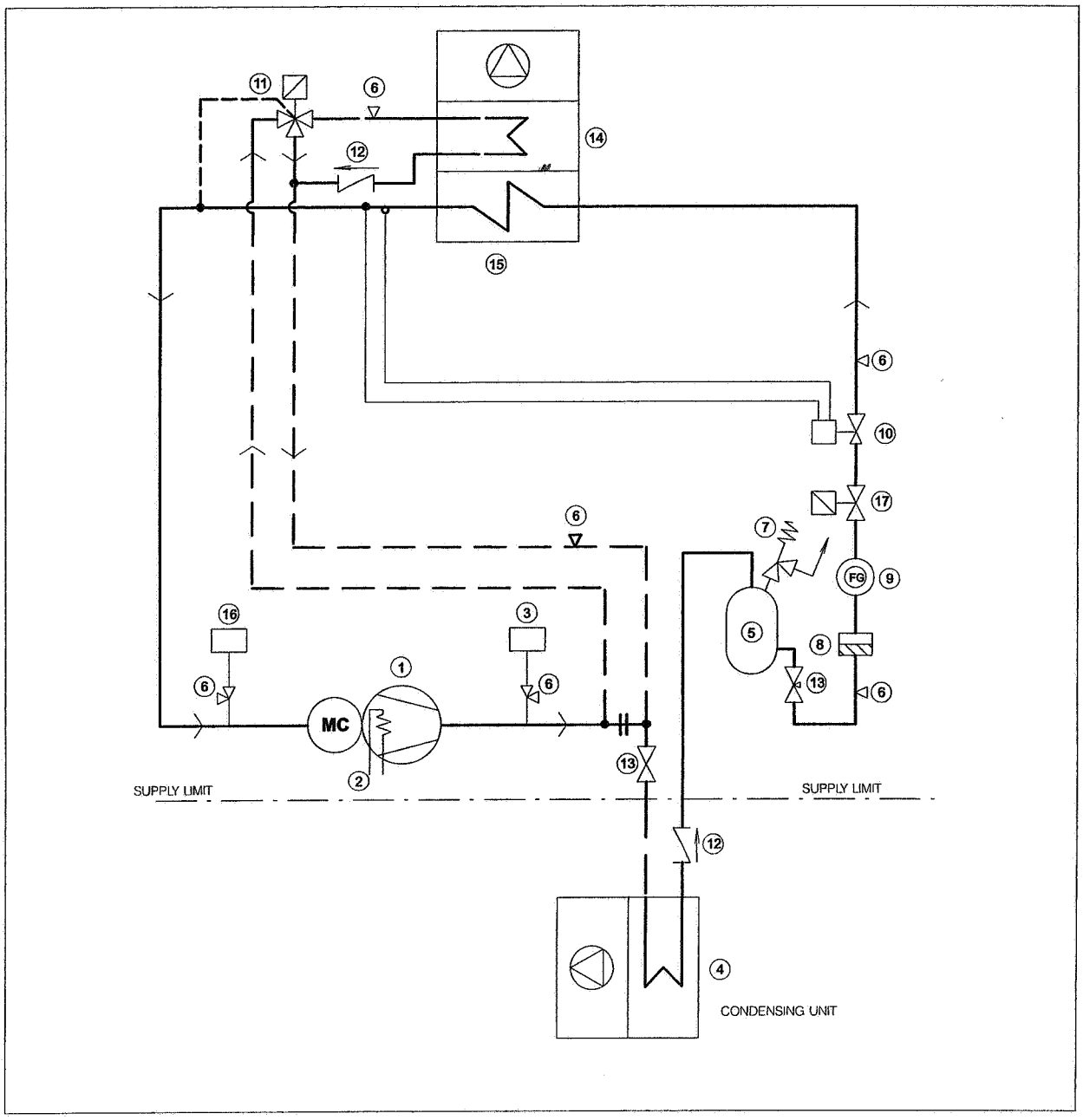
IL	Refrigerant liquid line inlet
OG	Refrigerant gas line outlet
IFC	Water inlet to Freecooling coil
OFC	Water outlet to Dry–Cooler

Fig. 17. Chilled water and refrigerant connections Himod S – H



IL	Refrigerant liquid line inlet
OG	Refrigerant gas line outlet
IFC	Water inlet to Freecooling coil
OFC	Water outlet to Dry–Cooler

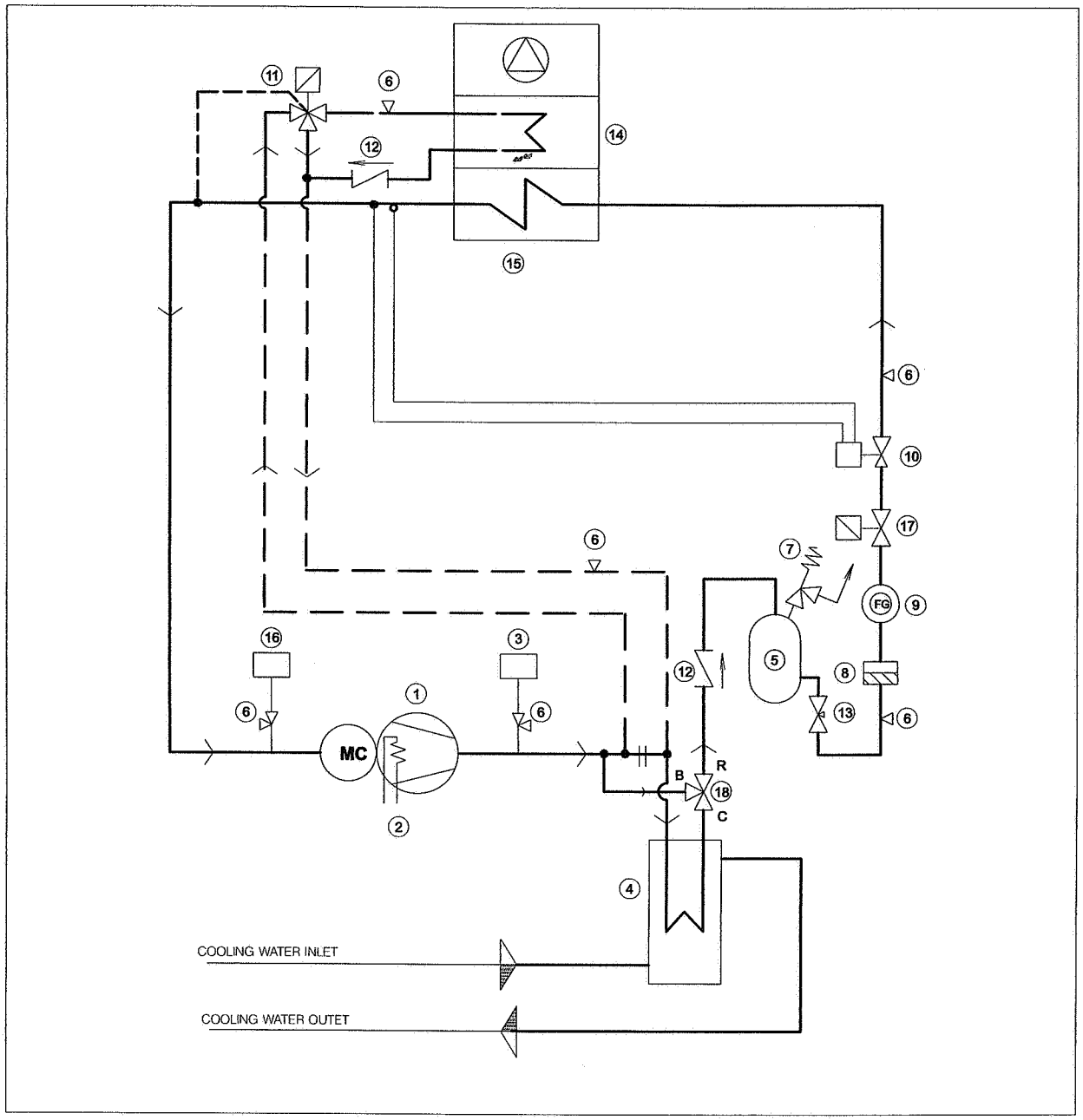
Fig. 1. Himod S xxA Under/Over



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass

POS.	DESCRIPTION
10	Thermostatic expansion valve
11	Hot gas solenoid valve ON–OFF (optional)
12	Check valve
13	Shut–off valve
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve

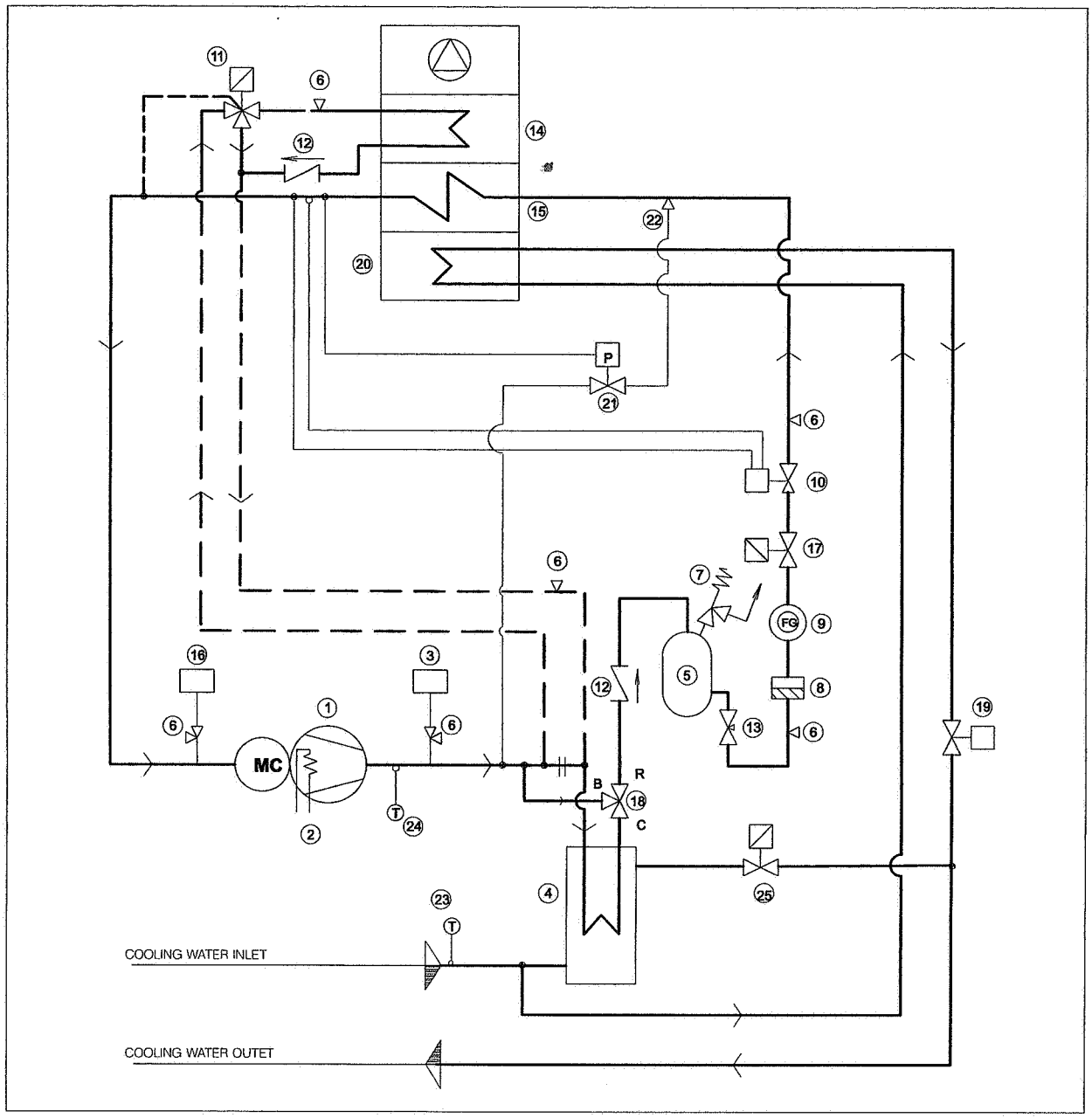
Fig. 2. Himod S xxW Under/Over



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass

POS.	DESCRIPTION
10	Thermostatic expansion valve
11	Hot gas solenoid valve ON–OFF (optional)
12	Check valve
13	Shut–off valve
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve

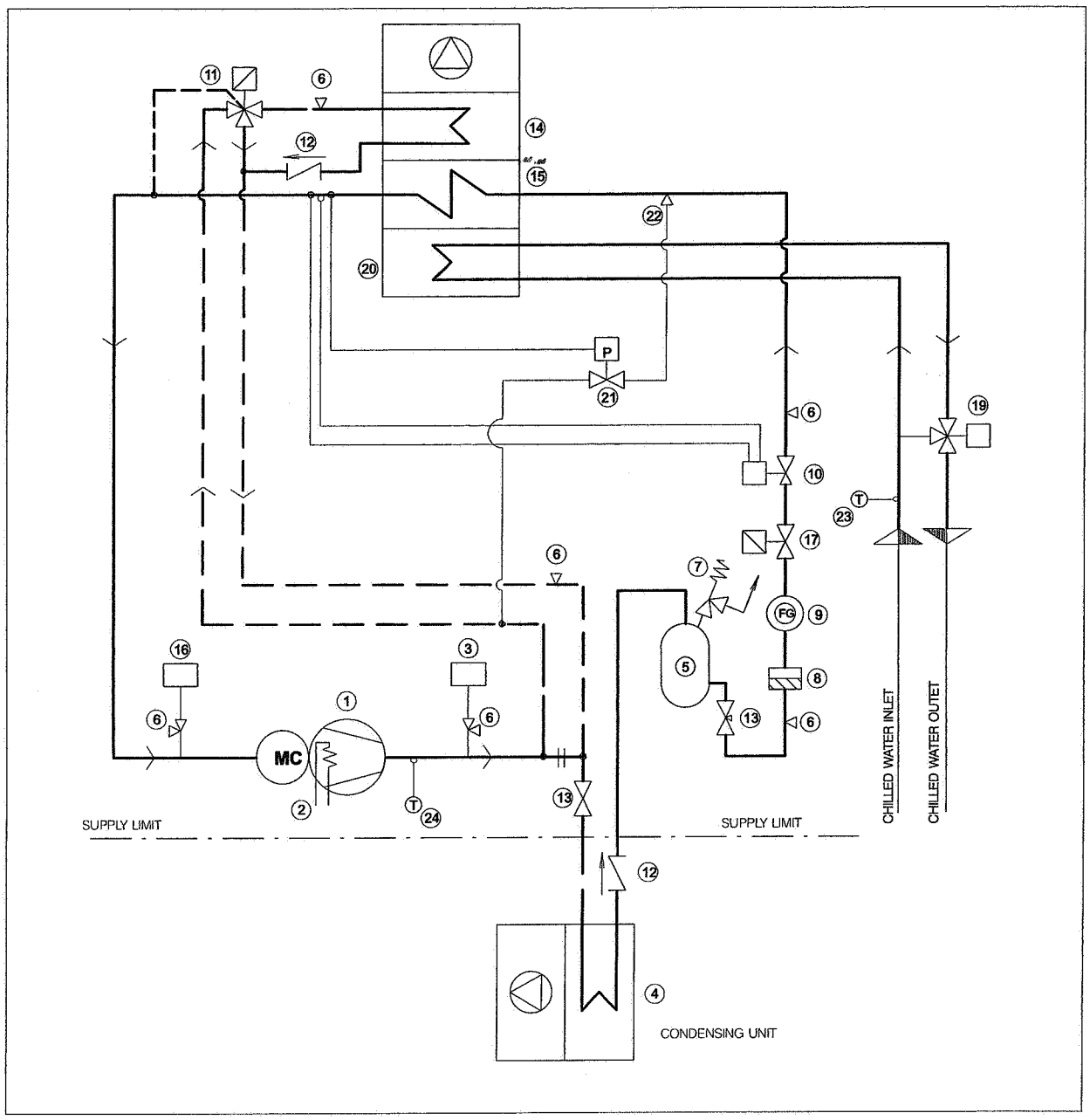
Fig. 3. Himod S xx F Under/Over



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas solenoid valve ON–OFF (optional)
12	Check valve

POS.	DESCRIPTION
13	Shut–off valve
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Chilled water 2–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat
25	Solenoid water valve

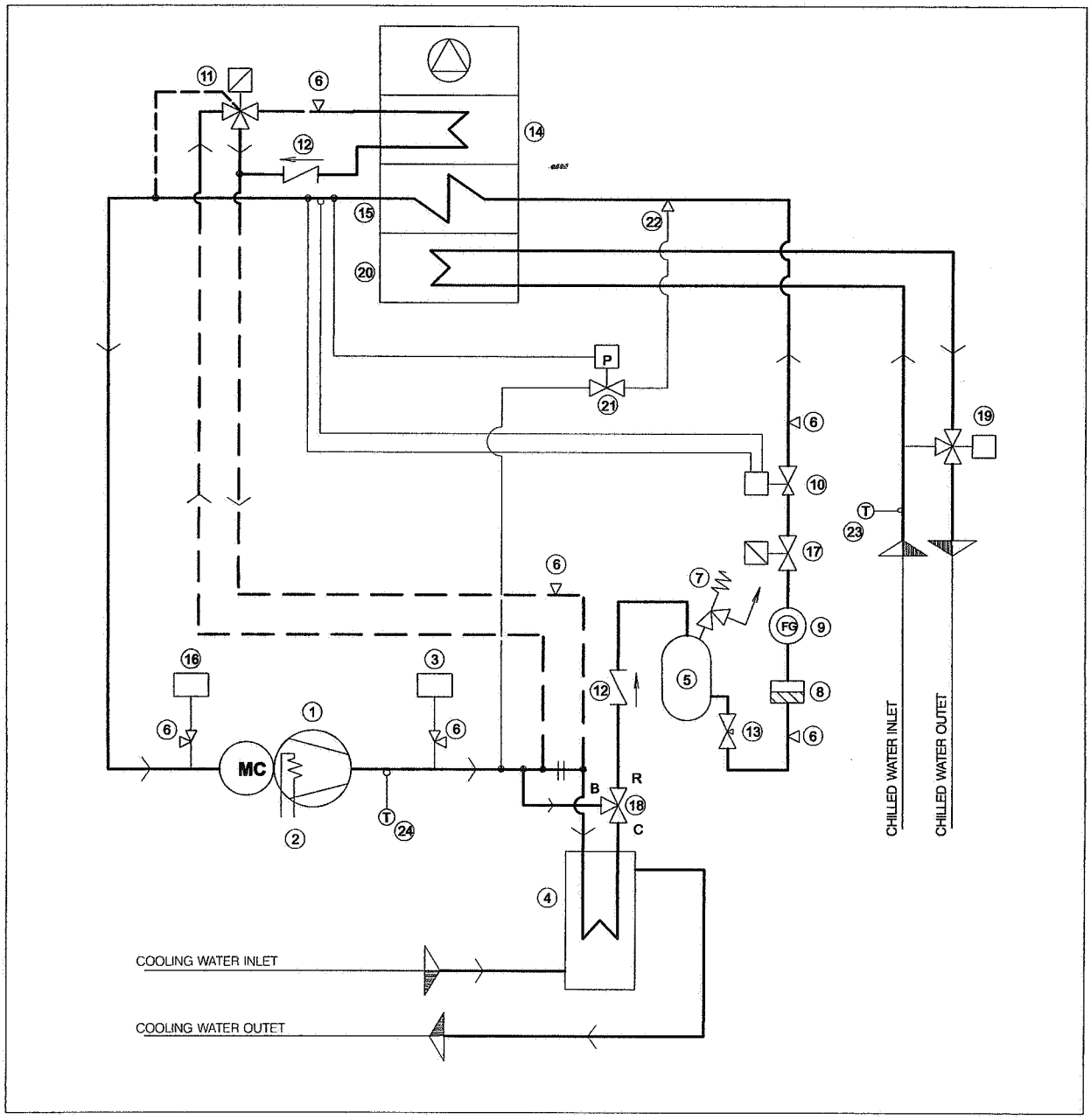
Fig. 4. Himod S xx D Under/Over



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas solenoid valve ON–OFF (optional)
12	Check valve

POS.	DESCRIPTION
13	Shut–off valve
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	–
19	Chilled water 3–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat

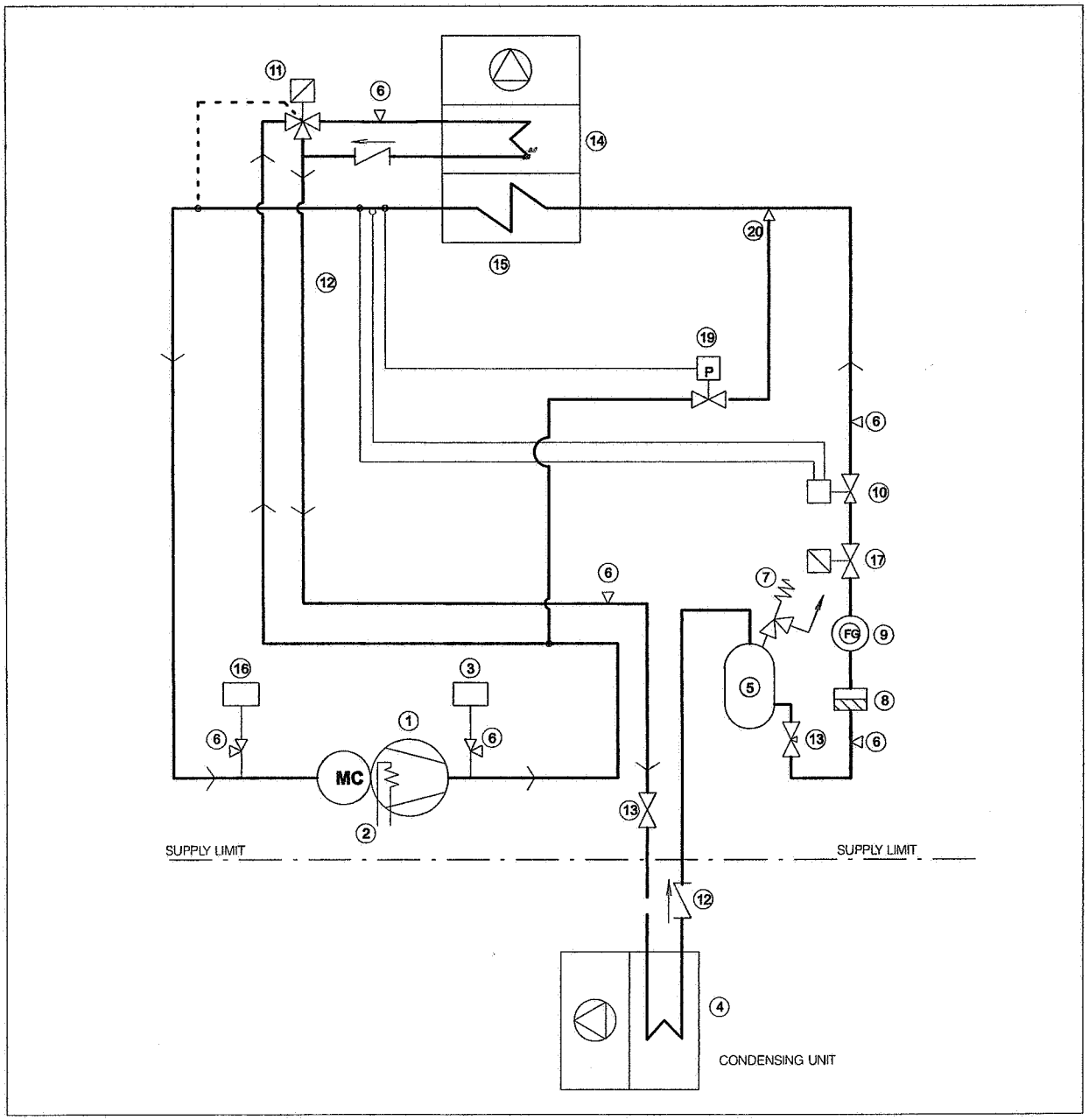
Fig. 5. Himod S xx H Under/Over



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas solenoid valve ON–OFF (optional)
12	Check valve

POS.	DESCRIPTION
13	Shut–off valve
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Chilled water 3–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat

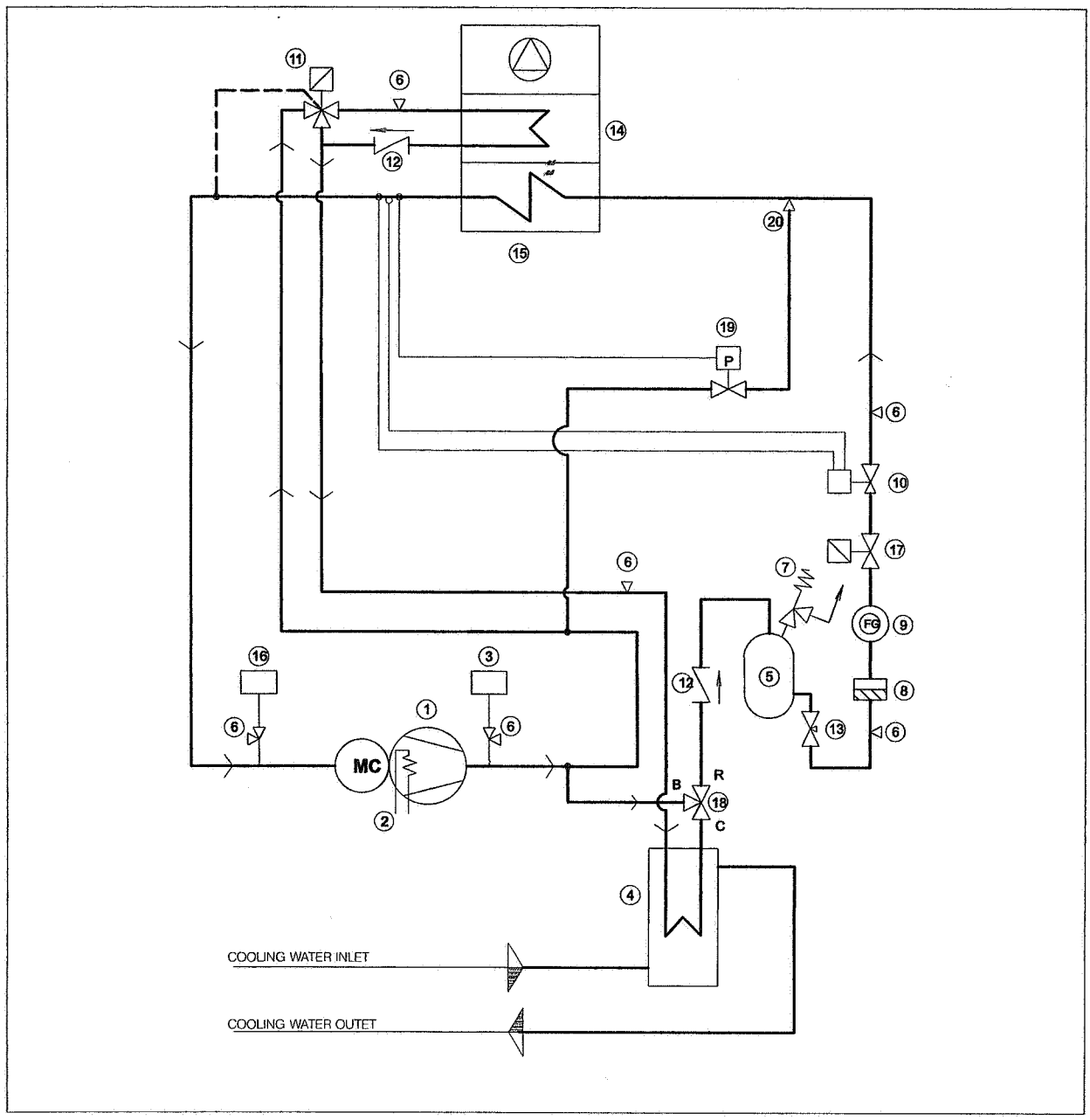
Fig. 6. Himod S xx KA Under/Over



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

POS.	DESCRIPTION
11	3–way hot gas modulating valve
12	Check valve
13	Shut–off valve
14	Reheating coil
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	–
19	Hot gas injection valve (ev. control)
20	Hot gas injector

Fig. 7. Himod S xx KW Under/Over

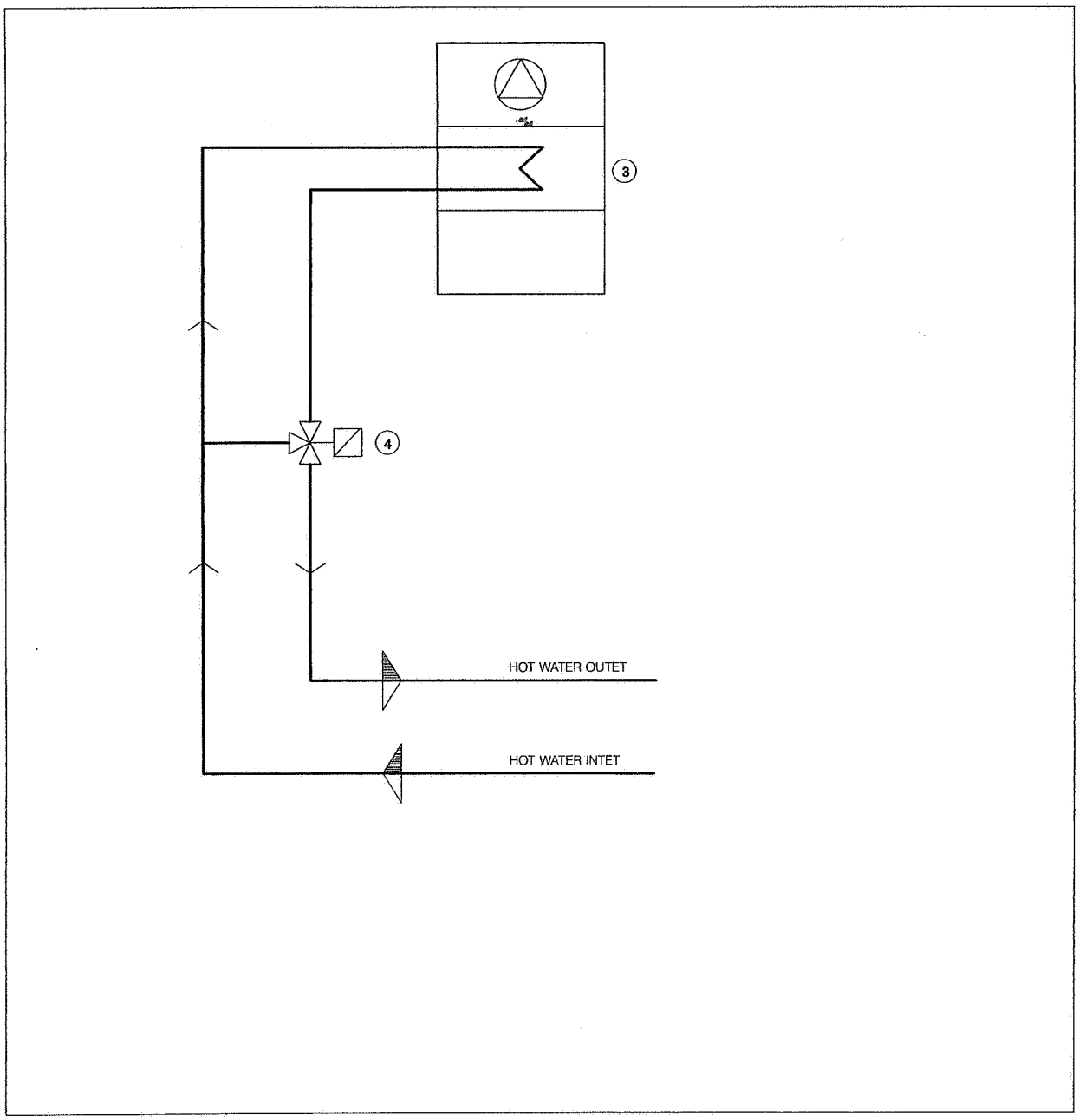


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

POS.	DESCRIPTION
11	3–way hot gas modulating valve
12	Check valve
13	Shut–off valve
14	Reheating coil
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Hot gas injection valve
20	Hot gas injector

Hot water reheating coil – optional

Fig. 8. Himod S



POS.	Optional components
3	Hot water coil
4	Hot water 3–wai valve

Il Fabbricante dichiara che questo prodotto è conforme alle direttive Europee:
The Manufacturer hereby declares that this product conforms to the European Union directives:
Der Hersteller erklärt hiermit, dass dieses Produkt den Anforderungen der Europäischen Richtlinien gerecht wird:
Le Fabricant déclare que ce produit est conforme aux directives Européennes:
El Fabricante declara que este producto es conforme a las directivas Europeas:
O Fabricante declara que este produto está em conformidade com as directivas Europeias:
Tillverkare försäkrar härmed att denna produkt överensstämmer med Europeiska Uniones direktiv:
De Fabrikant verklaart dat dit produkt conform de Europese richtlijnen is:
Vaimistaja vakuuttaa täten, että tämä tuote täyättää seuraavien EU-direktiivien vaatimukset:
Produsent erklærer herved at dette produktet er i samsvar med EU-direktiver:
Fabrikant erklærer herved, at dette produkt opfylder kravene i EU direktiverne:
Ο Κατασκευαστής δηλώνει ότι το παρόν προΪόν είναι κατασκευασμένο αύμφωνα με τις οδηγίες της Ε.Ε.:

98/37/CE; 89/336/CEE; 73/23/CEE; 97/23/EC

Liebert
HIROSS

Zona Industriale Tognana
Via Leonardo da Vinci, 8
35028 Piove di Sacco (PD)
ITALY

Tel. +39 049 9719111
Telefax +39 049 5841257
Internet : www.liebert-hiross.com

EMERSON
Network Power

Liebert HIROSS
is a division of
EMERSON

Issued by T.D. Service
Printed in Italy by Liebert HIROSS S.p.A.