

**H I M O D S & M**

HIGH PERFORMANCE AIR CONDITIONING

A/W/F/D/H  
Versions

## SERVICE MANUAL

**English**

Cod. 272762  
Rev. 31.08.2004

Issued by T.D.Service





# 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 closed panels. 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.



Manufactured at via Leonardo da Vinci, 8  
35028 Piove di Sacco - Padova - Italy

523UA002922600001  
MODEL SERIAL N.

VOLTAGE-PHASE-FREQUENCY

COMPRESSOR				
1 FLA	LRA	2	QT.	3
FAN MOTOR				
4 FLA	LRA	5	QT.	6
FAN MOTOR				
7 FLA	LRA	8	QT.	9
EL. HEATER				
10 A	STAGES	11		
HUMIDIFIER				
12 A	STEAM OUTPUT		Kg/h	13
TOTAL FLA ac	TOTAL FLA dc	Ipk	KA	14
A	A	Icw	KA	15
REFRIGERANT TYPE				16
18 R			Kg	17
HIGH PRESS. SWITCH-MANUAL				
19 SET	Bar	RESET	Bar	20
LOW PRESSURE SWITCH				
21 SET	Bar	RESET	Bar	22
OPERATING AIR TEMPERATURE				
23 min	°C	max	°C	24
OPERATING AIR HUMIDITY				
25 min	%	max	%	26
CIRCUIT MAX. PRESSURE				
27 Bar				
MANUFACTURING DATE				

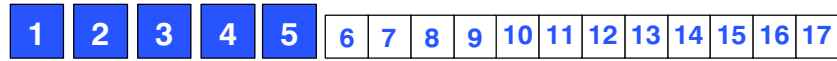


**Attention:** data relevant to the supplied unit are indicated on the inboard label (see below empty fax-simile). Data in the manual are referred to standard conditions and can be modified without any advance notice.

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 1

#### Family

- S Small
- M Medium

### Digit 2 and 3

#### Size: Cooling Capacity "kW" (approx.)

Nominal Cooling Capacity

### Digit 5

#### Version

- A Air Cooled
- W Water Cooled
- F Freecooling
- D Dualfluid Air Cooled
- H Dualfluid Water Cooled

### Digit 4

#### Air distribution

- U Downflow
- O Upflow
- D Displacement
- G Frontal Upflow

#### Other Configurations

- K Constant (Upflow only)
- L Constant (Top Frontal Flow only)

### 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

### Digit 8 – Electric heating

- 0 None
- 1 Electric heating

### Digit 9 – Humidification

- 0 None
- V Electrode humidifier

### 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 – On board MCB, for Remote Air Condenser

- 0 No MCB
- 1 MCB 6 A single circuit condenser
- 2 MCB 10 A single circuit 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

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# Enclosures

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# 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.
- Transport the unit using a fork lift truck with front–shoulders at least 1.5 m high, to avoid upsetting danger.

Fig. a – Unit handling



## 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

### For all units

Room air conditions	from:	18°C, 45% R.H.
	to:	27°C, 55% R.H.
Hot water circuit	inlet water temperature	max. 85°C
	water pressure	max. 8.5 bar
Storage conditions	from:	– 20°C
	to:	50°C
Power supply tolerances		V ± 10% Hz ± 2

### For A and D units

Outdoor temperature: lower limit		
Exceeding of winter lower limits will temporarily cause a compressor stop.		
down to +10 °C	from +9 °C to –20 °C	below –21 °C
standard unit	VARIEX required	Consult HPAC Technical Sales Support
Outdoor temperature: higher limit		
This limit is determined by coupled condenser model. Exceeding of this limit (or a lack of maintenance), will caused a compressor stop by HP safety thermostat. Reset to normal operation can only be carried out manually.		

Relative position room unit vs. remote condenser		
From unit to condenser max distance	up to 30 m equivalent length	from 30 to 50 m equivalent length
From unit to condenser max geodetic height (1) (2)	from 20 m to –3 m	from 30 m to –8 m
Requirements		
Pipe diameter	see Tab. c	see Tab. c
Oil traps on vertical line of gas refrigerant	every 6 m, max	every 6 m, max
Extra oil charge	see Tab. 7	see Tab. 7
Variex installation	suggested	mandatory
Condenser	design	oversized +15%
Hot gas reheat	allowed	NOT allowed
Additional non return valve on delivery line, at 2 m from compressor	not necessary	mandatory

### For W, F and H units

Water or mixture temperature to condenser, lower limit (other information par. 5.4)	min. 5°C
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### For F, D and H units

Chilled water circuit		
inlet water temperature	min. 5°C	
water pressure	max. 16 bar	
Max. differential pressures on the modulating valve (2 or 3 ways)		
– Max. differential pressure through the closed valve: $\Delta p_{cv}$		
– Max. differential pressure across the valve for modulating service: $\Delta p_{ms}$		
Models	$\Delta p_{cv}$ (kPa)	$\Delta p_{ms}$ (kPa)
S17xF/D/H	200	300
S20xF/D/H	200	300
S23xF/D/H	200	300
M25xF/D/H	200	300
M31xF/D/H	150	150
M34xF/D/H	150	150
M35xF/D/H	150	150
M41xF/D/H	150	150
M42xF/D/H	150	150
M47xF/D/H	150	150
M50xF/D/H	150	150
M58xF/D/H	150	150

(1) Positive difference in height: condenser above conditioner

(2) Negative difference in height: condenser below conditioner

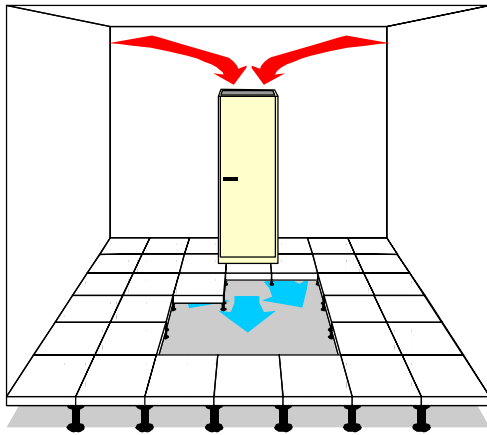
Other information in para 5.3.

## 1.4 – Noise level limits

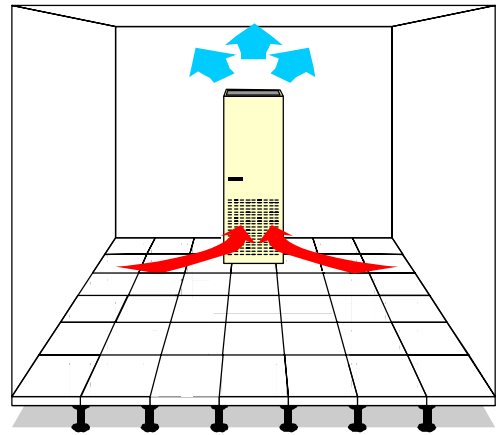
The sound pressure level in free field at 1.5 m height and 2 m in front of the air conditioner, with compressor and fan in operations, is less than 70 dBA for all models.

The units are available in the four configurations shown below.

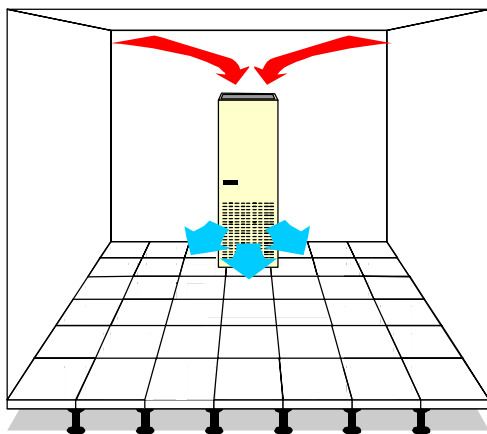
**U / UNDER**  
Downflow



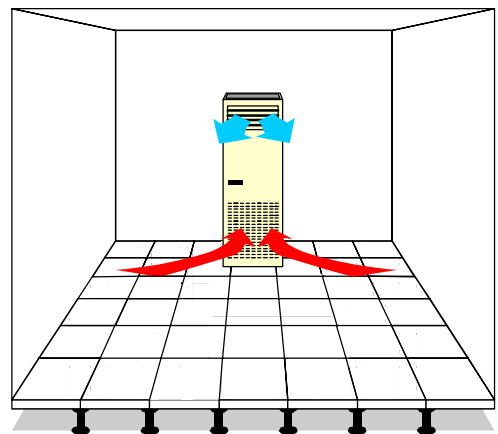
**O, K / OVER**  
Upflow with front air return



**D / DISPLACEMENT**  
Frontal air discharge at floor level



**G, L / GRILLE**  
Frontal upflow with front air return



S04–05 models



## 2 – Positioning

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



**Note for ducted Over conditioner and with electrical heaters in the case of plenum or duct not supplied by us.**

To avoid overheating of insulation material of a plenum or a duct, in the case of a ventilation fault, before the safety thermostat intervention, it is mandatory to locate the insulation material at a distance higher than 30 cm from the top of the of the air conditioner.

## 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 (A and D)

*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

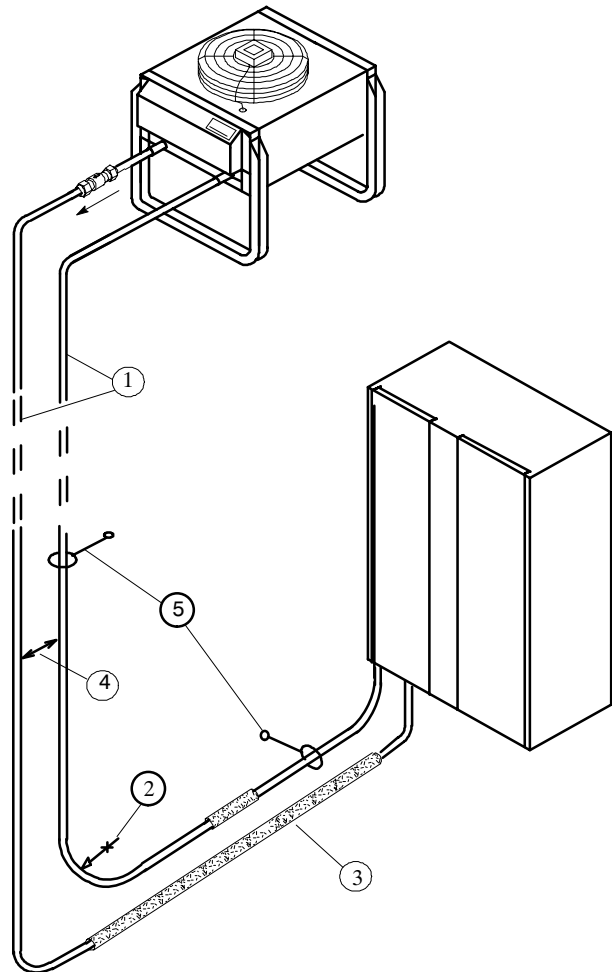
Sales Support.

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.

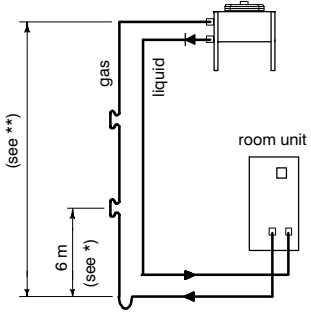
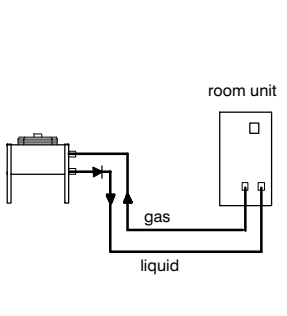
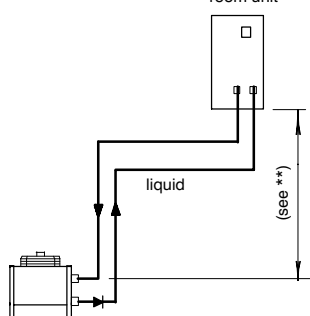
Lay the horizontal gas pipes with 1% downward gradient towards the refrigerant flow.

- 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 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. b – 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	
		ext.	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		 <p>(*) Oil traps every 6 m of vertical piping</p>			
(**) see Chap. 1, Tab. a.					

**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
	S04–05	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
M25–29–31	22 X 1	18 X 1	22 X 1	18 X 1
M34	16 X 1	16 X 1	16 X 1	16 X 1
M35	22 X 1	18 X 1	28 X 1	22 X 1
M41–47	28 X 1	22 X 1	28 X 1	22 X 1
M42	18 X 1	16 X 1	22 X 1	18 X 1
M50–58	22 X 1	18 X 1	22 X 1	18 X 1
M66	22 X 1	18 X 1	28 X 1	22 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 or nitrogen cylinder, fitted with a reducer (max. pressure 10 bar), to the 1/4" SAE Schrader valve of the condenser.
  - c) Pressurize the pipes with helium or nitrogen.
  - 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  $\varnothing$  16 copper pipe.**

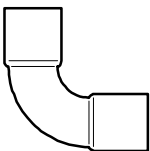
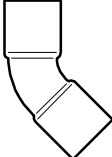
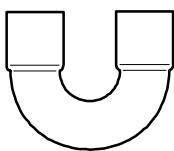
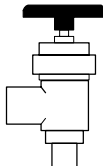

**Tab. d – Weight of refrigerant contained in piping during operation**

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
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**

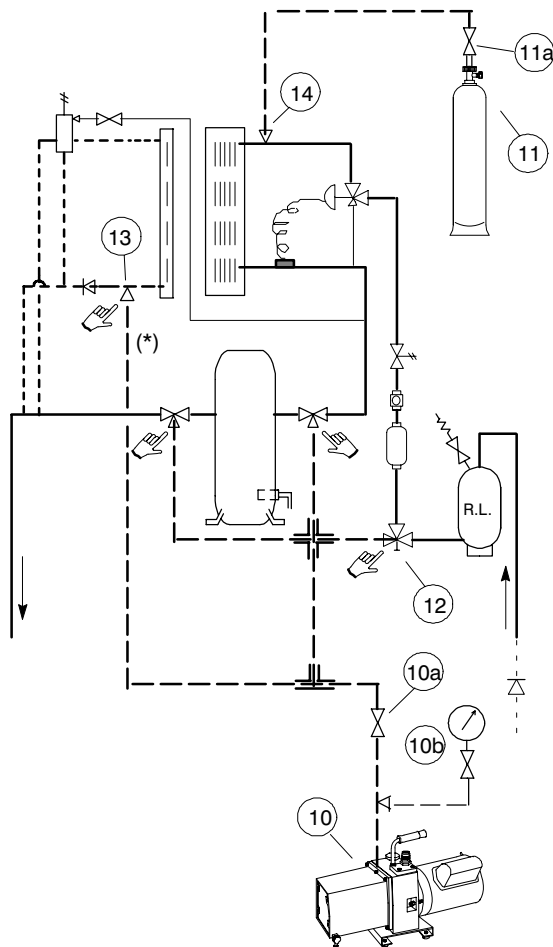
Nominal diameter (mm)					
	90°	45°	180°	90°	
12	0.50	0.25	0.75	2.10	1.90
14	0.53	0.26	0.80	2.20	2.00
16	0.55	0.27	0.85	2.40	2.10
18	0.60	0.30	0.95	2.70	2.40
22	0.70	0.35	1.10	3.20	2.80
28	0.80	0.45	1.30	4.00	3.30

#### 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. c – Pump and refrigerant charging cylinder connection for vacuum creation and refrigerant charge**



(\*) only with reheating coil (optional)

##### 4.2.1 – R407C precharge (A and D)

- 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 (A and D)

- 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 K (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).

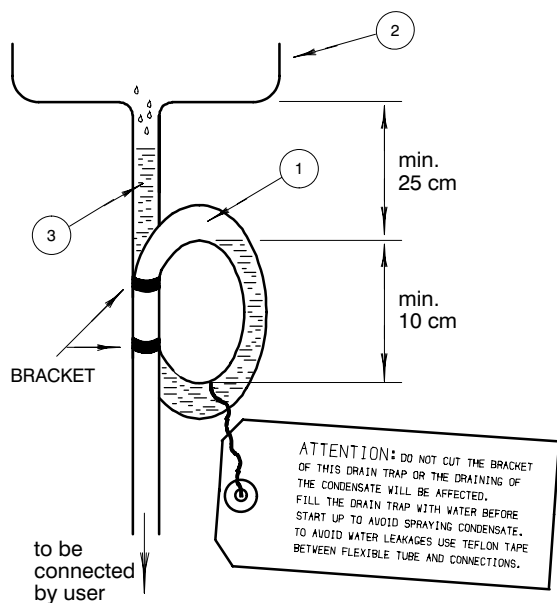
IF THE TUBING IS TO RUN OUTDOORS, ADD ETHYLENE GLYCOL TO THE CIRCUIT AS DESCRIBED IN PARA. 5.5.

#### 5.2 – Water connections

##### – Condensate drain (Fig. d):

- 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 25 cm below the drain tray (2). In the units S13 ÷ S23 and Mxx the drain trap must be placed under the unit, in the false floor.
- Fill the drain trap with water (3).

**Fig. d – Condensate drain**



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

– **Hot water (optional):**

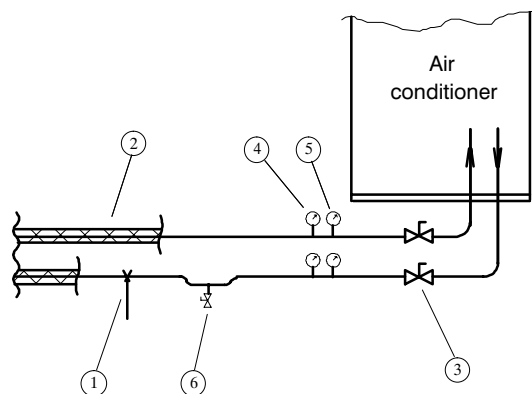
- Use copper or steel (Mannesmann) tubing.
- Insulate both tubes using Armaflex insulation.

#### 5.3 – Chilled water connections

(D and H only) – (Fig. e)

- 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. e).

**Fig. e – Chilled water circuit**



#### 5.4 – Cooling 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 – 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.

##### 5.4.2 – Notes for closed circuit applications

- The installation in Fig. f 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.

**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.

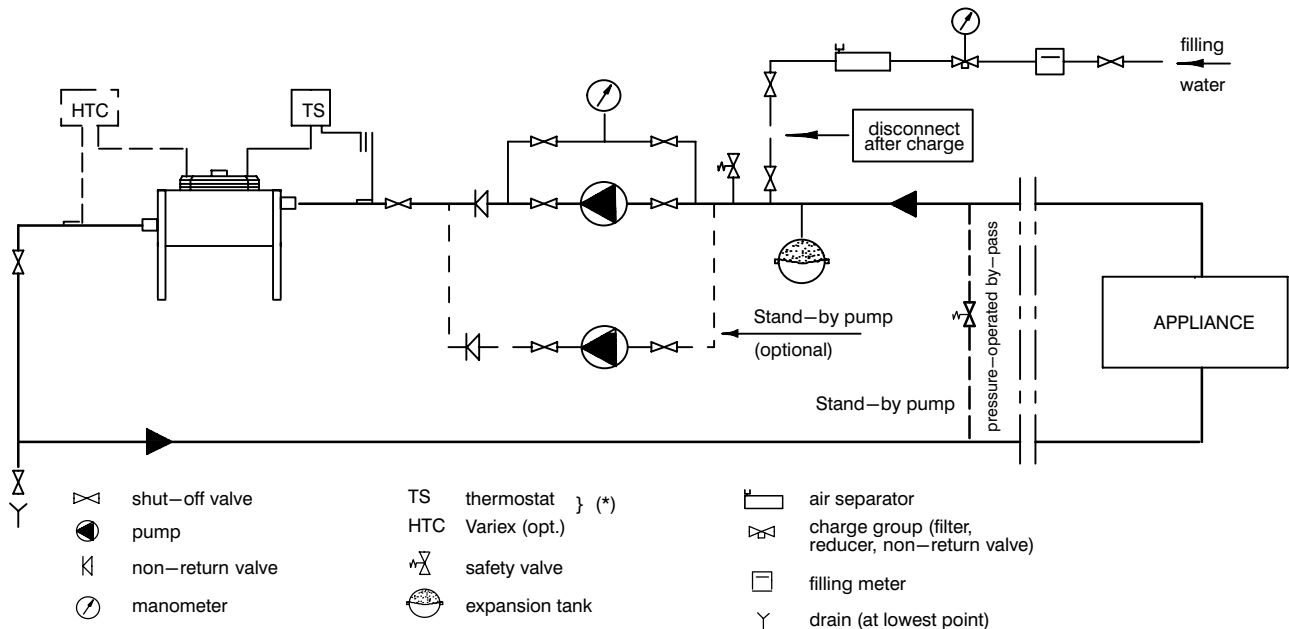
**5.5 – Adding ethylene glycol**

**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.

**Fig. f – Advised Dry cooler Installation**



See hydraulic drawings in the Enclosures D.

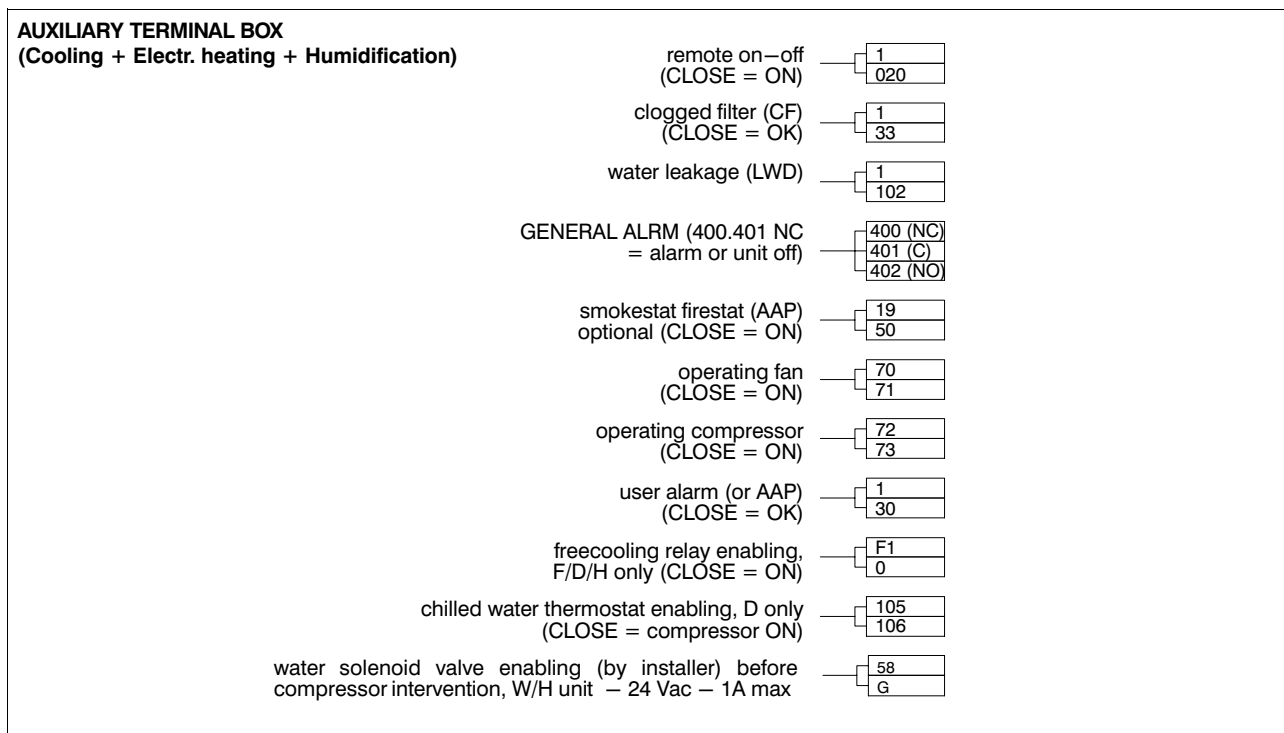
# 6 – Electrical connections

## 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 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.
- 3) Wiring connections (Fig. g):
  - Use multipolar cables with sheath (CEI20–22) only.
  - Connections for remote on–off and hot water consent must be done by the installer.
  - According with compressor running, two terminals for the opening of a water solenoid valve are available, by installer (W/H units).
  - The General Alarm terminals allow remote alarm signalling.
- 4) In case of short circuit, check the sticking of the involved switch and possibly replace it.

**See electrical data in Enclosures B: Technical data tables.**

**Fig. g – 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 External Static Pressure (ESP: 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.

## 6.3 – Protection degree IP2x check

After whole of the connections and installation works, comprising ceiling elements (plenum, ducting) and floor elements (base frame), check and verify the protection degree

IP2x (protection against finger access, std. CEI 64–8) at the boundary of the air conditioner.

## 6.4 – Protective features of EC fan (optional)

The EC fan has been provided with the following protective features:

- Over temperature of electronics
- Over temperature of motor
- Locked rotor protection
- Short circuit at the motor output

With any of these failures, the motor stops (electronically – no potential separation), the status relay is released. NO automatic restart. To reset the alarm, power supply has to be switched off for min. 20s once motor is at standstill.

- Mains under–voltage detection: if mains voltage falls below 3ph/290Vac (typical value) for 5s minimum, motor will be swithed off (only by electronics, no potential separation), status relay is released.

**If mains voltage returns to correct values, the motor will restart automatically.**

- Phase failure recognition:  
if one phase fails for 5s minimum, motor will be switched off (only by electronics, no potential separation), status relay is released.  
**If all 3 phases return to correct values, the motor will restart automatically within 10–40s.**

The power supply for an external speed setting potentiometer is short-circuit protected.

Motor is overload-protected via motor current limitation.

**Warning!** Leakage current of the motor is 7 mA roughly.

## 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:

- Open all valves in the refrigeration circuit according to the instruction label attached to the valve.
- W, F and H only:* Open all valves in the water circuit according to the instruction label attached to the valve.
- Ensure that the refrigerant charge is correct (see Chap. 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.
- 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.
- Verify the operation of the crankcase heater.
- Check that there are no water leakages.
- D and H only:* Bleed all air out of the chilled water circuit using the bleed valve on the chilled water coil.
- If an external condenser or Dry cooler is installed, start it by supplying power to it.
- Close all MCBs on the electrical panel.
- Check the supply voltage on all phases.
- Check the supply voltage on all phases for the external condenser or Dry cooler, if fitted.
- ENSURE THAT THE COMPRESSOR HAS BEEN PREHEATED FOR AT LEAST 4 HOURS BEFORE STARTING THE UNIT.**
- Start the unit by pressing **ON OFF** (see Fig. h).
- Check the electrical absorption of all components (see Chap. 6).
- Check the electrical absorption of the external condenser/Dry cooler, *if fitted*.
- 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 compressor, which accepts only one direction of rotation.**

- Ensure that the fans rotate in the correct direction (see arrow on fan).
- Ensure that all control system settings are correct and that there are no alarms (see Control manual).
- W, F and H only:* Verify the water flow.
- W, F and H only:* For closed circuit units ensure that the water pump starts when the compressor starts.
- Verify the Fresh Air Intake operation (*if fitted*).
- 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. h). 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**.

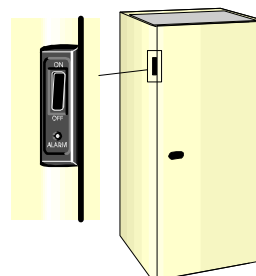
**Stop the unit putting the ON/OFF switch in OFF.**

### 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. h – 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 the Schrader valve (2) of Fig. 1.

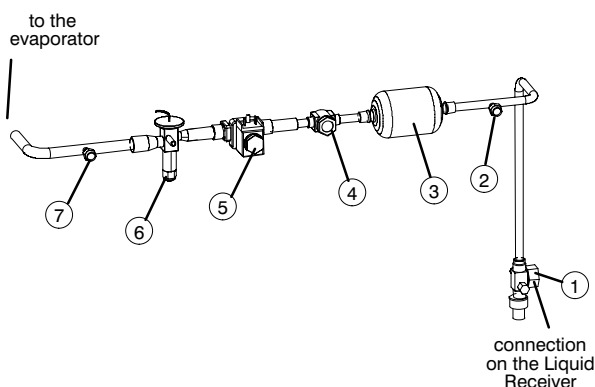
When the compressor is running, check M1 and M2.

**N.B.:** Repeat this test, inverting the manometers: to calculate the correct  $\Delta p$  consider the average value of the two readings.

**Refrigeration pipeline Pressure drops** ( $\Delta p$  bar), at 45° C (approx. R407C = R22):

- At the same geodetic level:  $\Delta p$  (bar) = M1 – M2
- When condenser is above the room unit:  
 $\Delta p$  (bar) = M1 – M2 + geodetic difference (m x 1,1; 10,2)
- When condenser is below the room unit:  
 $\Delta p$  (bar) = M1 – M2 – geodetic difference (m x 1,1; 10,2)

Fig. 1 – 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 (optional).
- 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

*Direct expansion mode (DX)*

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 two three forms:

- electrical heating (*optional*): the heating elements heat the air passing over them. There are 3 heating steps.
- hot water heating (*optional*): if hot water is available, this flows through the hot water coil, thus heating the air passing over it. The hot water flow is controlled by 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

*DX mode*

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).

*In freecooling mode: see 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 & Regulation (at start–up)

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 NO TAG and NO TAG (Enclosed B) 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 EXPERIENCED REFRIGERATION TECHNICIAN.

The valve has been factory preset and, if necessary, should be reset 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 refrigerant saturation temperature corresponding to the pressure read on the manometer and the real temperature 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 direction.

## 9.2 – Adjustment of the hot gas injection valve as antifreeze mode and partial control of the capacity (F, D, H and Constant)

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

### 9.2.1 – Features

This valve is installed in some special 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 refrigeration diagram.

### 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 decreased to 2 °C.
- Then check the correct operation of the thermostatic expansion valve.

## 9.3 – 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. j):

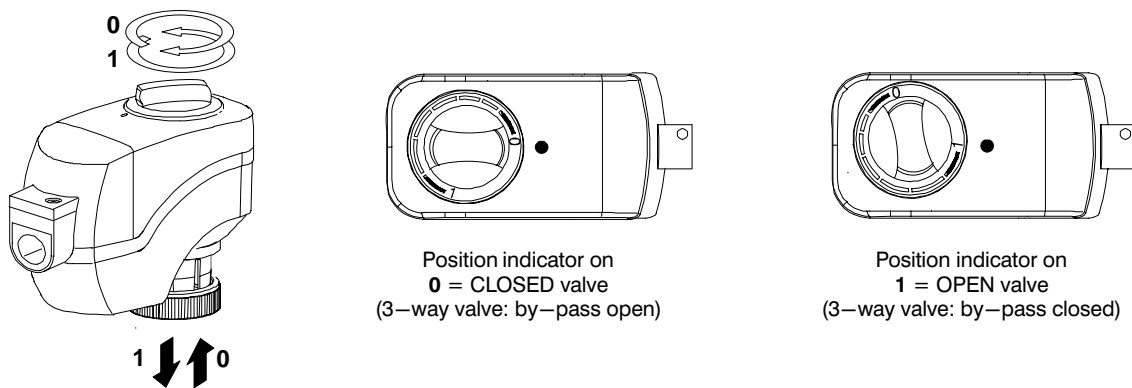
- When the valve is fully open (i.e. max. chilled water flow) the actuator slot is set to '1'.
- When the valve is closed (i.e. no chilled water flow) the actuator slot is set to '0'.

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 the rotary knob. It can be used to drive the actuator into any position between 0 and 1.

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

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



## 9.4 – Water condenser flow control valve (F only)

Solenoid 2–way – Fig.K shown – valve, controls the plate condenser water–flow. This valve is equipped with a hand driven opening system, and a closing–speed control. Opening hand drive can be used when a main control failure occurs, and is made by a cylindrical headed screw (screw 1) which has two position:

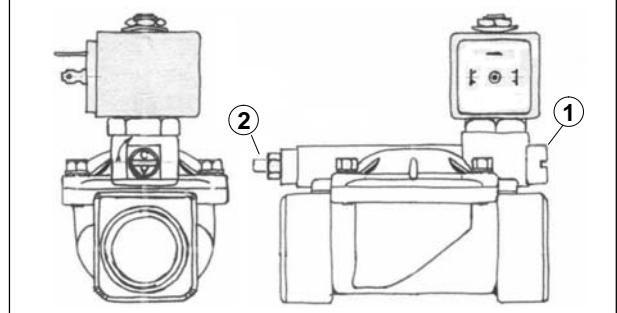
**Closed** – (valve closed) if letter "C" is turned upside;

**Open** – (valve open) if letter "A" is turned upside.

When from the "Closed" position the screw is turned to the "Open" position (no matter if in clockwise or counterclockwise direction) the valve is completely opened. In order to close the valve again it's necessary to turn again the screw to the "Closed" position. When the hand drive is in "Closed" position the valve can open if the coil is energized. Is then possible to modify the closing times turning a setting screw (screw 2); the adjustment possibilities range from fully open

position with maximum closing speed to fully closed position with valve always open.

Fig. k – Regulation of water condenser flow control valve



### 9.5 – Water leakage sensor (Liquistat)

Due to high flooding alarm device sensitivity, to the end to avoid undesirable alarm signal because of few sporadic wa-

ter drops, place the sensors at a minimum distance of 50 cm from the unit base perimeter.  
This solution assures alarm intervention for real flooding risk only.

## 10 – Maintenance/Spare Parts



AS THE HIROMATIC/MICROFACE FEATURES AUTOMATIC RESTART (AFTER A SUPPLY INTERRUPTION) EITHER DISABILTATE AUTO-RESTART OR OPEN QS SWITCH 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

<b>FANS</b>	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.
<b>AIR FILTERS</b>	Verify the state of the filters; if necessary clean or replace them. In very dusty ambients perform this check more frequently.
<b>NEW AIR FILTER</b> <i>(if fitted)</i>	Verify the state of the filter; if necessary clean or replace it.
<b>CONTROL SYSTEM</b>	Verify the operation of LEDs, display and alarms.
<b>HUMIDIFIER</b> <i>(if fitted)</i>	See A.
<b>ELECTRICAL CIRCUIT</b>	<ul style="list-style-type: none"> <li>• Check the electrical supply on all phases.</li> <li>• Ensure that all electrical connections are tight.</li> </ul>
<b>COOLING WATER</b> <i>(W, F and H only)</i>	<ul style="list-style-type: none"> <li>• Verify the cooling water circulation.</li> <li>• Ensure that there are no water leaks.</li> <li>• Closed circuit only: Verify that the water pump is operating correctly and bleed any air out of the circuit.</li> </ul>
<b>REFRIGERATION CIRCUIT</b>	<ul style="list-style-type: none"> <li>• Check the evaporation pressures (to be done by a refrigeration technician).</li> <li>• Check the compressor current absorption, its head temperature and the presence of any unusual noise.</li> <li>• Ensure that there is no ice formation on the evaporator.</li> </ul>
<b>EXTERNAL CONDENSER/ Dry cooler</b> <i>if fitted)</i>	See relevant Manual.
<b>CHILLED WATER CIRCUIT</b> <i>(D and H only)</i>	<ul style="list-style-type: none"> <li>• Ensure that there are no water leaks. In case of leaks, eliminate them. <b>N.B.</b> At any sanitary water topping up the antifreeze percentage will reduce, thus increasing the freezing point temperature. It is necessary, in this case, to restore the correct mixture, adding the proper quantity of ethylene glycol.</li> <li>• Bleed any air out of the chilled water circuit using the bleed valve situated on the top right of the chilled water coil.</li> <li>• Verify the correct chilled water flow.</li> <li>• Check the inlet – outlet fluid temperature and pressure using the thermometers and manometers, if fitted.</li> </ul>

### 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 K (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	: 4,35 cSt
copper corrosion (100 °C, 3 hr) ASTM D130	: 1
neutralization value	: 0,03 máx.
dielectric strength	: > 30kV

### 10.1.4 – Oil topping—up of an installed circuit

If oil leakages occur, the topping—up operation is necessary. (Contact the local Service before intervention).

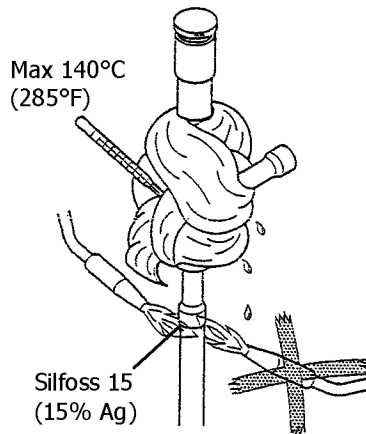
### 10.2 – Spare parts

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 component 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. I.

**Fig. I – 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

## A.1 – Preface

The HUMIDAIR represents the best humidifier technology available, guaranteeing the steam as clean as possible to-

gether with simple maintenance.

In order to obtain optimum performance from the HUMID-AIR it is advisable to read this manual carefully.

**Tab. a – Humidair specifications**

HIMOD 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.]
S04–05	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...23 M25–29	HAK 93H	400V / 3ph / 50Hz	2.7...9.0	9.0	5.8	5.34	0.6	2.5
S13...23 M25–29	HAK 93L	400V / 3ph / 50Hz	2.7...9.0	15.6	5.8	5.34	0.6	2.5
M31...66	HAK 93H	400V / 3ph / 50Hz	3.9...13.0	13.0	9.0	5.34	0.6	2.5
M31...66	HAK 93L	230V / 3ph / 50Hz	3.9...13.0	22.5	9.0	5.34	0.6	2.5

**Tab. b – Humidair specifications for Displacement unit**

HIMOD 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.]
S04–05 D	HAK 21L	230V / 1ph / 50Hz	0.6...2.0	6.5	1.5	4.85	0.3	2.5
S07...12 D	HAK 53H	400V / 3ph / 50Hz	1.3...2.0	2.0	1.3	2.84	0.6	2.5
S07...12 D	HAK 53L	230V / 3ph / 50Hz	1.3...2.0	3.6	1.3	2.84	0.6	2.5
S13...23 D M25–29 D	HAK 93H	400V / 3ph / 50Hz	2.7...4.5	4.6	3.0	5.34	0.6	2.5
S13...23 D M25–29 D	HAK 93L	230V / 3ph / 50Hz	2.7...4.5	8.0	3.0	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 about 70% of the maximum value (see Microface manual).

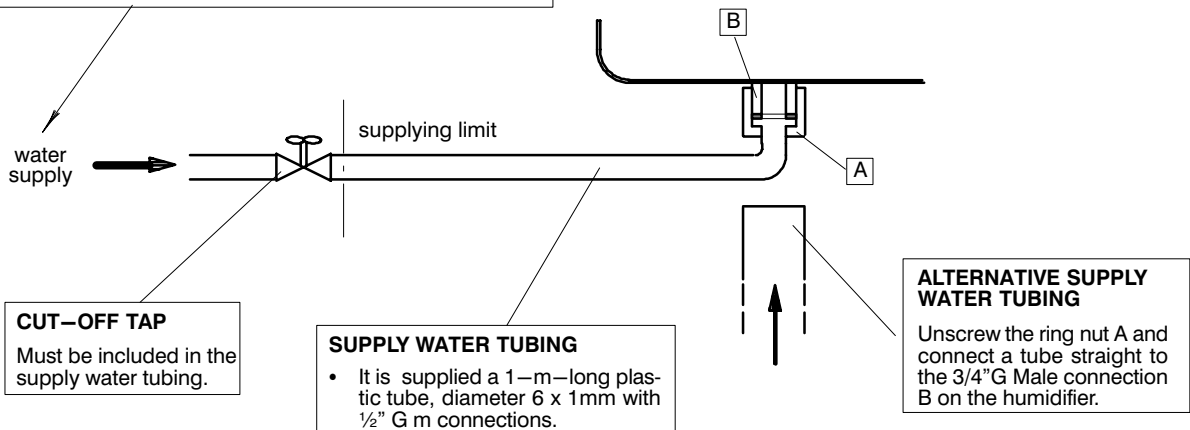
## A.2 – Installation

The humidifier is supplied already mounted within the air conditioner. The only necessary operations are the connections for the supply water (Fig. a) and drain water (Fig. b).

**Fig. a – Supply water connection**

### SUPPLY WATER FEATURES

- The supply water temperature must never exceed 40°C.
- The supply water pressure must be between 0.3 and 6 bar. If greater, use a pressure reducing valve set to 3–4 bar.
- Sanitary water should be used. Do not use demineralized water or water containing impurities.
- Conductivity range : 125–1250 ηS/cm.



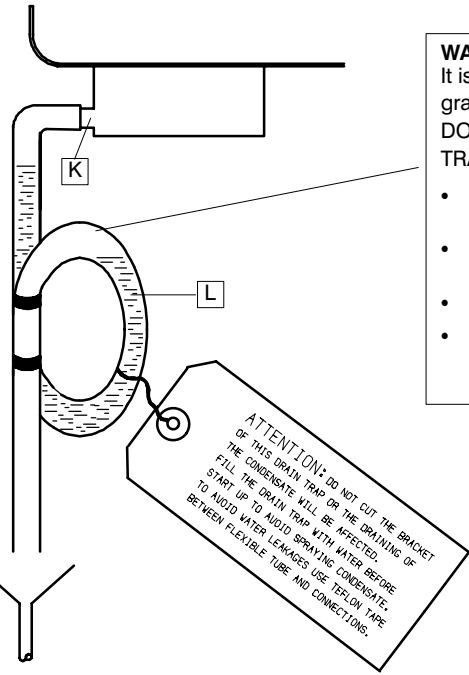
**Fig. b – Drain water connection**

**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.



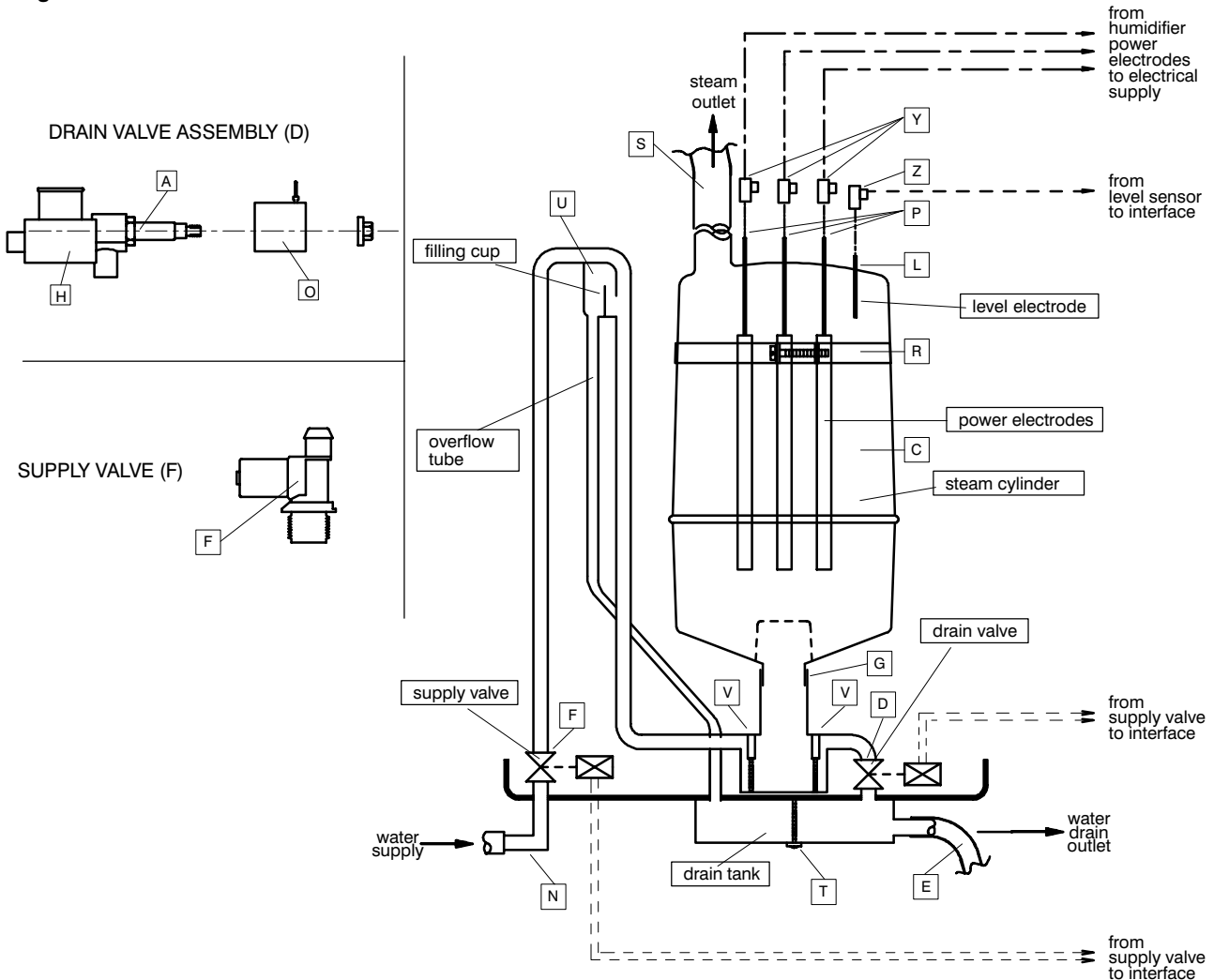
**NOTES:**

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

**A.3 – Humidair components**

The components of the HUMIDAIR humidifiers are shown below.

**Fig. c – The humidifier and its connections**



## A.4 – Start–up and operation

### 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).

### 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.

## A.5 – Maintenance

### A.5.1 – Removing the steam cylinder

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

- 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).

### 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. c):

- 1) Carry out the instructions in para. 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. 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.

### A.5.3 – Annual maintenance

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

- 1) Carry out the instructions in para. 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.

## 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. c)	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



## Technical data table

**Tab. 1 – Electrical data**

Configuration	Model	Power supply	FLA [A]	LRA [A]	RESIDUAL-CURRENT CIRCUIT BREAKERS $I_{\Delta n} = 0.3A (400V)$
<b>Cooling</b> <i>Fan + compressor</i>	S04xA/W	1ph / 230V	11.5	36.5	20A
	S05xA/W		12.9	48.5	20A
	S07xA/W		8.2	42.6	16A
	S10xA/W	3ph / 400V	9.6	48.6	16A
	S12xA/W		12.6	52.6	16A
	S13xA/W		12.8	52.8	20A
	S17xA/W/F/D/H		15.2	68.3	20A
	S20xA/W/F/D/H		16.9	78.8	20A
	S23xA/W/F/D/H		21.2	99.8	25A
	M25xA/W/F/D/H		19.8	98.8	25A
	M29xA/W		23.3	120.8	25A
	M31xA/W/F/D/H		24.5	122.0	32A
	M34xA/W/F/D/H		25.2	75.1	32A
	M35xA/W/F/D/H		27.2	133.0	32A
	M41xA/W/F/D/H		35.6	168.6	40A
	M42xA/W/F/D/H		31.2	90.9	40A
	M47xA/W/F/D/H		39.6	207.6	50A
	M50xA/W/F/D/H		39.6	118.6	50A
M58xA/W/F/D/H	43.4	156.5	50A		
M66xA/W	48.4	164.0	63A		
<b>Cooling + Electrical heating</b> <i>Fan + compressor + electrical heaters</i>	S04xA/W	1ph / 230V	18.0	43.0	25A
	S05xA/W		19.4	55.0	25A
	S07xA/W		14.7	49.1	20A
	S10xA/W	3ph / 400V	16.1	55.1	20A
	S12xA/W		19.1	59.1	25A
	S13xA/W		21.4	61.4	25A
	S17xA/W/F/D/H		23.8	76.9	25A
	S20xA/W/F/D/H		25.5	87.4	32A
	S23xA/W/F/D/H		29.8	108.4	32A
	M25xA/W/F/D/H		30.8	109.8	40A
	M29xA/W		34.3	131.8	40A
	M31xA/W/F/D/H		46.5	144.0	50A
	M34xA/W/F/D/H		47.2	97.1	50A
	M35xA/W/F/D/H		49.2	155.0	63A
	M41xA/W/F/D/H		57.6	190.6	80A
	M42xA/W/F/D/H		53.2	112.9	63A
	M47xA/W/F/D/H		61.6	229.6	80A
	M50xA/W/F/D/H		61.6	140.6	80A
M58xA/W/F/D/H	65.4	178.5	80A		
M66xA/W	70.4	186.0	100A		
<b>Cooling + Electrical heating + Humidification</b> <i>Fan + compressor + electrical heaters + humidifier</i>	S04xA/W	1ph / 230V	24.5	49.5	32A
	S05xA/W		25.9	61.5	32A
	S07xA/W		19.3	53.7	25A
	S10xA/W	3ph / 400V	20.7	59.7	25A
	S12xA/W		23.7	63.7	25A
	S13xA/W		30.4	70.4	32A
	S17xA/W/F/D/H		32.8	85.9	32A
	S20xA/W/F/D/H		34.5	96.4	40A
	S23xA/W/F/D/H		38.8	117.4	40A
	M25xA/W/F/D/H		39.8	118.8	50A
	M29xA/W		43.3	140.8	50A
	M31xA/W/F/D/H		59.5	157.0	80A
	M34xA/W/F/D/H		60.2	110.1	80A
	M35xA/W/F/D/H		62.2	168.0	80A
	M41xA/W/F/D/H		70.6	203.6	100A
	M42xA/W/F/D/H		66.2	125.9	80A
	M47xA/W/F/D/H		74.6	242.6	100A
	M50xA/W/F/D/H		74.6	153.6	100A
M58xA/W/F/D/H	78.4	191.5	100A		
M66xA/W	83.4	199.0	100A		

**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<sup>2</sup> 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):  $R_a \leq 50/I_a$  (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.

## Technical data table

**Tab. 2 – Standard fan connections for HIMOD with autotransformer**

Configuration	Model	Autotrasformer outlet voltage	
		Standard	Dehumidification Under / Over, K, G, L
<b>UNDER (U)</b> <b>OVER (O)</b> <b>CONSTANT (K, L)</b> <b>GRILLE (G)</b>	S04xA/W	140	120
	S05xA/W	160	140
	S07xA/W	170	130 / 150
	S10xA/W	200	170 / 185
	S12xA/W	215	185 / 200
	S13xA/W	260	220
	S17xA/W	290	260
	S20xA/W	220	190
	S23xA/W	290	260
	M25xA/W	220	190
	M29xA/W	290	160
	M31xA/W	220	190
	M34xA/W	260	220
	M35xA/W	260	220
	M41xA/W	220	190
	M42xA/W	220	190
	M47xA/W	260	220
	M50xA/W	260	220
	M58xA/W	290	260
M66xA/W	330	290	
<b>UNDER (F/D/H)</b> <b>OVER (F/D/H)</b>	S17xF/D/H	290	260
	S20xF/D/H	220	190
	S23xF/D/H	290	260
	M25xF/D/H	290	260
	M31xF/D/H	260	220
	M34xF/D/H	290	260
	M35xF/D/H	290	260
	M41xF/D/H	260	220
	M42xF/D/H	260	220
	M47xF/D/H	290	260
	M50xF/D/H	290	260
M58xF/D/H	330	290	
<b>DISPLACEMENT (D)</b>	S04DxA/W	120	120
	S05DxA/W	140	120
	S07DxA/W	150	130
	S10DxA/W	185	170
	S12DxA/W	200	185
	S13DxA/W	220	190
	S17DxA/W	260	220
	S20DxA/W	190	150
	S23DxA/W	260	220
	M25DxA/W	190	190
	M29DxA/W	260	260

**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  $\Delta$ .

## Technical data table

**Tab. 2b – EC optional fan connections**

Model	UNDER (U)		OVER (O)		DISPLACEMENT (D)		CONSTANT (K)	
	Std Vdc	Dehumidification Vdc	Std Vdc	Dehumidification Vdc	Std Vdc	Dehumidification Vdc	Std Vdc	Dehumidification Vdc
S13xA/W	6.5	5.5	6.5	5.5	6.5	5.5	6.5	5.5
S17xA/W	6.9	5.9	6.9	5.9	6.6	5.6	6.9	5.9
S20xA/W	7.3	6.3	7.3	6.3	7.0	6.0	7.3	6.3
S23xA/W	8.8	7.8	8.8	7.8	8.5	7.5	8.8	7.8
S17xF/D/H	7.0	6.0	7.0	6.0				
S20xF/D/H	7.5	6.5	7.5	6.5				
S23xF/D/H	9.0	8.0	9.0	8.0				
M25xA/W	8.0	7.0	8.0	7.0	7.0	6.0	7.5	6.5
M29xA/W	8.5	7.5	8.5	7.5	8.0	7.0		
M31xA/W	6.0	5.0	6.0	5.0				
M34xA/W	6.5	5.5	6.5	5.5				
M35xA/W	6.5	5.5	6.5	5.5				
M41xA/W	7.5	6.5	7.5	6.5				
M42xA/W	7.5	6.5	7.5	6.5				
M47xA/W	8.5	7.5	8.5	7.5				
M50xA/W	8.5	7.5	8.5	7.5				
M58xA/W	9.0	8.0	9.0	8.0				
M66xA/W	9.5	8.5	9.5	8.5				
M25xF/D/H	8.5	7.5	8.5	7.5				
M31xF/D/H	6.5	5.5	6.5	5.5				
M34xF/D/H	7.0	6.0	7.0	6.0				
M35xF/D/H	7.0	6.0	7.0	6.0				
M41xF/D/H	8.0	7.0	8.0	7.0				
M42xF/D/H	8.0	7.0	8.0	7.0				
M47xF/D/H	9.0	8.0	9.0	8.0				
M50xF/D/H	9.0	8.0	9.0	8.0				
M58xF/D/H	9.5	8.5	9.5	8.5				

**NOTE:**

The EC fan settings can be modified acting on the control display (see Microface manual)

## Technical data table

**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)**
S04xU/O	1.4	1.5	3.1	0.20	5.3	10.0	35.0	1.16	2.25	5.1	10.0	35.0	1.12
S05xU/O	1.4	1.5	3.1	0.23	6.8	11.4	47.0	1.45	1.62	6.6	11.4	47.0	1.40
S07xU/O	2.2	2.6	4.9	0.34	4.2	5.6	40.0	2.16	4.83	4.0	5.6	40.0	2.07
S10xU/O	2.3	2.6	4.9	0.40	4.8	7.0	46.0	2.51	4.03	4.6	7.0	46.0	2.42
S12xU/O	2.4	2.6	4.9	0.43	5.8	10.0	50.0	3.05	3.88	5.8	10.0	50.0	3.06
S13xU/O	2.6	2.8	9.9	0.87	5.7	10.0	50.0	2.97	3.88	5.7	10.0	50.0	3.00
S17xU/O	2.6	2.8	9.9	0.98	7.5	12.4	65.5	3.82	2.75	7.4	12.4	65.5	3.71
S20xU/O	4.6	4.8	19.0	1.50	7.9	12.1	74.0	4.38	2.27	7.8	12.1	74.0	4.32
S23xU/O	4.5	4.8	19.0	1.86	11.1	15.9	95.0	5.89	1.80	10.7	15.9	95.0	5.67
M25xU/O	4.7	4.8	19.0	1.52	11.1	15.9	95.0	5.89	1.80	11.1	15.9	95.0	5.7
M29xU/O	4.6	4.8	19.0	1.90	13.2	20.0	123.0	6.96	1.04	13.2	20.0	123.0	6.5
M31xU/O	5.7	6.0	23.0	1.99	13.1	20.0	123.0	6.94	1.04	13.1	20.0	123.0	6.5
M35xU/O	5.7	6.0	23.0	2.38	15.1	22.0	127.0	7.96	1.02	15.1	22.0	127.0	7.5
M41xU/O	2x4.7	2x4.8	2x19.0	2x1.51	17.6	27.0	167.0	10.00	0.83	17.6	27.0	167.0	9.3
M47xU/O	2x4.6	2x4.8	2x19.0	2x1.74	20.8	32.0	198.0	12.10	0.72	20.8	32.0	198.0	11.6
M34xU/O	5.7	6.0	23.0	2.38	2x7.5	2x12.4	2x65.5	2x3.82	2.75	2x7.5	2x12.4	2x65.5	2x3.7
M42xU/O	2x4.7	2x4.8	2x19.0	2x1.51	2x7.9	2x12.1	2x74.0	2x4.39	2.27	2x7.9	2x12.1	2x74.0	2x4.3
M50xU/O	2x4.6	2x4.8	2x19.0	2x1.74	2x11.1	2x15.9	2x95.0	2x5.90	1.80	2x11.1	2x15.9	2x95.0	2x5.7
M58xU/O	2x4.5	2x4.8	2x19.0	2x1.89	2x13.2	2x20.0	2x123.0	2x6.96	1.04	2x13.2	2x20.0	2x123.0	2x6.5
M66xU/O	2x4.5	2x4.8	2x19.0	2x2.09	2x15.1	2x22.0	2x127.0	2x7.98	1.02	2x15.1	2x22.0	2x127.0	2x7.5

(\*) 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

## Technical data table

**Tab. 4 – Electrical data (optional component)**

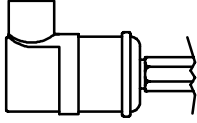
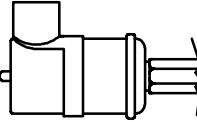
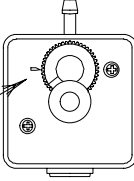
Component Model	ELECTRICAL HEATING		HUMIDIFIER	
	FLA [A]	Nominal power [kW]	FLA [A]	Nominal power [kW]
<b>(230V / 1Ph / 50Hz)</b>				
S04–05U/O	6.5	1.5	6.5	1.5
<b>(400V / 3Ph / 50Hz)</b>				
S07–10–12U/O	6.5	4.50	4.6	3.0
S13–17–20–23 U/O	8.6	5.85	9.0	5.8
M25–29U/O	11.0	7.5	9.0	5.8
M31 ÷ 66U/O	22.0	15.0	13.0	9.0

Component Model	EC OPTIONAL FAN (400V / 3Ph / 50Hz)			
	OA* [A]	FLA [A]	LRA [A]	Nominal power* (kW)
S13UA	1.00	4.0	0.1	0.62
S17UA	1.17	4.0	0.1	0.72
S20UA	1.55	4.0	0.1	0.96
S23UA	2.39	4.0	0.1	1.48
M25UA	1.77	4.0	0.1	1.08
M29UA	2.32	4.0	0.1	1.44
M31UA	2 x 0.73	2 x 4.0	2 x 0.1	2 x 0.45
M34UA	2 x 1.04	2 x 4.0	2 x 0.1	2 x 0.65
M35UA	2 x 1.04	2 x 4.0	2 x 0.1	2 x 0.65
M41UA	2 x 1.58	2 x 4.0	2 x 0.1	2 x 0.98
M42UA	2 x 1.59	2 x 4.0	2 x 0.1	2 x 0.99
M47UA	2 x 2.25	2 x 4.0	2 x 0.1	2 x 1.40
M50UA	2 x 2.25	2 x 4.0	2 x 0.1	2 x 1.40
M58UA	2 x 2.47	2 x 4.0	2 x 0.1	2 x 1.52
M66UA	2 x 3.13	2 x 4.0	2 x 0.1	2 x 1.94

(\*) At standard operating conditions ESP: 20 Pa for Under units MxxUA – Filters: class G4

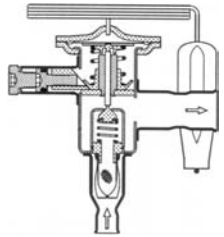
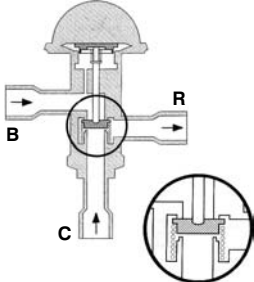


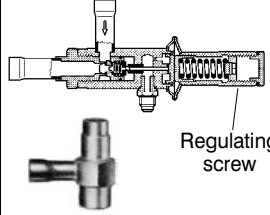


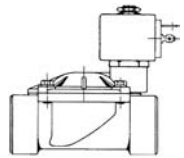
## Technical data table

**Tab. 5 – Calibrations of electrical components**

Refrigeration Circuit Item no.	COMPONENT	SETTING	NOTES	Contact
16	<b>Low Pressure Switch (LP)</b>	STOP            2 barg START           2.8 barg DIFFER. (fixed) 0.8 bar  (fixed setting – automatic re- set)	  Delayed automatic reset (see MICROFACE/ HIROMATIC manual)	Normally closed
3	<b>High Pressure Switch (HP)</b>	STOP            26 barg START           20 barg DIFFER. (fixed) 6.0 bar  (fixed setting – manual re- set)	 Reset	Normally closed
–	<b>Clogged filter differential pressure switch (CF)</b>	Filters G4 = 2mbar Filters G5 = 3 mbar	 Setting ring	Normally closed

## Technical data table

**Tab. 6 – Adjustments and calibrations of valves (see Enclosed E – Refrigeration circuits)**

Refrigerant Circuit Pos.	Component	Calibration & Operating	Application	Model	Drawing
10	<b>Thermostatic valve</b>	Overheating control 5 ÷ 8 K (see para. 9.1)	All versions	Danfoss mod. TUBE mod. TCBE mod. TDEZ	
18	<b>Head pressure control valve</b>	Factory calibrated 13 ÷ 14 bar	Himod W/F/H	ALCO HP5 T4–225 HP8 T5–225	
11	<b>Hot gas injection 3 way valve</b> Reheating mode	ON–OFF action, controlled by Microface (re–heating)	Himod A/W/F/D/H (no Himod Constant)	ALCO 3031RC12S7	
11	<b>Hot gas injection 3 way valve</b> Room thermal load control	Modulating action, controlled by Microface 0 ÷ 10 VDC (see para. 9.3)	Himod K only (Constant)	Siemens M3FB15LX	
21 + 22	<b>Hot gas injection</b> Antifreeze protection in Freecooling unit	Modulating action <b>N.B. Calibrated at +2°C at machine start up</b>	Himod F/D/H	Danfoss CPCE + LG	
	<b>Hot gas injection</b> Evaporating pressure control		Himod KA/KW		
19	<b>2–way chilled water valve</b>	Modulating action (servomotor: see para. 9.4)	Himod F	Siemens VXP 459	
	<b>3–way chilled water valve</b>	Modulating action (servomotor: see para. 9.4)	Himod D–H	Siemens VXP 459	
25	<b>Solenoid valve</b>	ON–OFF action (coupled to valve 19)	Himod F	Parker PM 133 CN	

## Technical data table

**Tab. 7 – R407C/R22 refrigerant and oil charge for air cooled models (A–D type)**

MODEL	BASE REFRIGERANT CHARGE <sup>(2)</sup> [kg]		BASE OIL CHARGE <sup>(1)</sup> (liters) oil within compressor	
	without hot gas	with hot gas	initial oil charge	Max topping up
S04xA	2.2	2.5	0.74	0.62
S05xA	2.2	2.5	1.12	1.01
S07xA	2.2	2.5	1.24	1.12
S10xA	2.2	2.5	1.24	1.12
S12xA	2.2	2.5	1.36	1.24
S13xA	2.9	5.7	1.36	1.24
S17xA	2.9	5.7	1.95	1.83
S17xD	2.9	4.2	1.95	1.83
S20xA	3.2	6.0	1.77	1.66
S20xD	3.2	4.5	1.77	1.66
S23xA	3.5	6.3	2.51	2.40
S23xD	3.2	4.5	2.51	2.40
M25xA–D	5.0	6.4	2.51	2.40
M29xA	5.5	6.9	4.14	4.05
M31xA–D	5.8	8.6	4.14	4.05
M35xA–D	6.2	9.0	4.14	4.05
M41xA–D	6.7	9.5	4.14	4.05
M47xA–D	7.1	9.9	4.14	4.05
M34xA–D	3.7	6.5	1.95	1.83
M42xA–D	4.4	7.2	1.77	1.66
M50xA–D	5.0	7.8	2.51	2.40
M58xA–D	5.5	8.3	4.14	4.05
M66xA	6.0	8.8	4.14	4.05

**Tab. 7a – Refrigerant and oil pipe charge**

Pipe diameter [mm]	Refrigerant pipe charge [kg/m] for distances D <sup>(3)</sup>		Oil pipe charge [l]	
	without hot gas	with hot gas	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 <sup>(4)</sup>
Liquid				
10	0.070	0.140	0.05	0.10
12	0.101	0.202	0.08	0.16
14	0.137	0.274	0.12	0.24
16	0.178	0.356	0.15	0.30
18	0.227	0.454	0.19	0.38
22	0.339	0.678	0.25	0.50

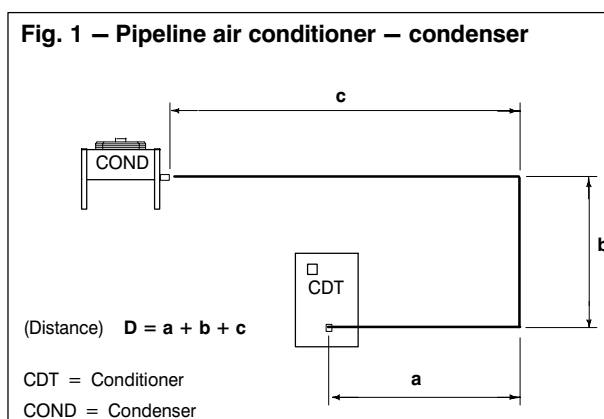
(1) The recommended oil for units with R407C refrigerant is MOBIL EAL ARCTIC 22 CC. For units with R22 refrigerant **pay attention to compressor label**: if requested mineral oil this will be SUNISO 3 GS, if requested ester oil this will be MOBIL EAL ARCTIC 22 CC.

(2) Unit coupled with remote condenser suggested for ambient temperature up to 35°C. The final charge must be precisely defined in field.

(3) For distance D see Fig. 1.

(4) Topping up is requested for short pipeline too, due to the extra-charge of refrigerant.

**N.B.:** The air conditioner is supplied pressurized with helium at 3 bar.





## Technical data table

**Tab. 8 – Refrigerant and oil charge for water cooled models (W–F–H type)**

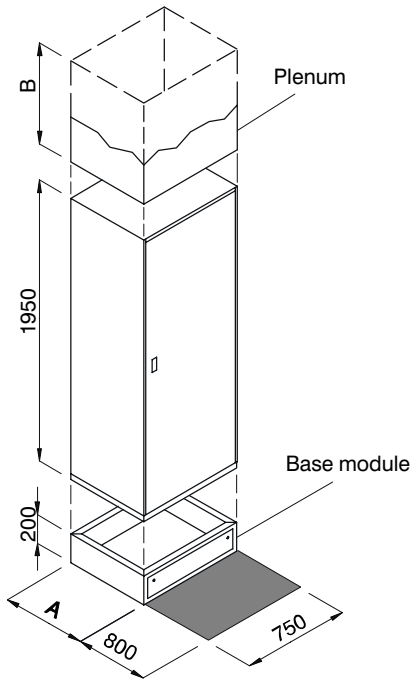
MODEL	R407C/R22 REFRIGERANT CHARGE [kg]		OIL CHARGE (1) (liters)
	without hot gas	with hot gas	
S04xW	2.5	2.8	0.74
S05xW	2.5	2.8	1.12
S07xW	2.7	3.0	1.24
S10xW	2.7	3.0	1.24
S12xW	2.7	3.0	1.36
S13xW	3.8	5.1	1.36
S17xW	3.8	5.1	1.95
S17xF–H	3.8	5.1	1.95
S20xW	4.1	5.4	1.77
S20xF–H	4.1	5.4	1.77
S23xW	4.4	5.7	2.51
S23xF–H	4.1	5.4	2.51
M25xW–F–H	6.3	7.8	2.51
M29xW	7.4	8.8	4.14
M31xW–F–H	7.7	10.5	4.14
M35xW–F–H	8.4	11.2	4.14
M41xW–F–H	9.6	12.4	4.14
M47xW–F–H	10.4	13.2	4.14
M34xW–F–H	4.7	7.5	1.95
M42xW–F–H	5.4	8.2	1.77
M50xW–F–H	6.3	9.1	2.51
M58xW–F–H	7.4	10.2	4.14
M66xW	8.2	11.0	4.14

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

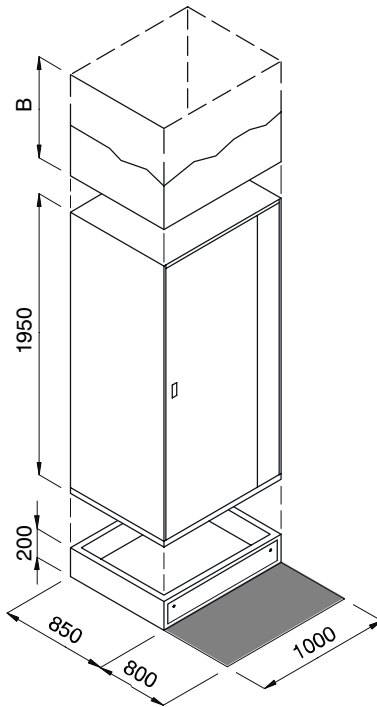
(1) The recommended oil for units with R407C refrigerant is MOBIL EAL ARCTIC 22 CC. For units with R22 refrigerant **pay attention to compressor label**: if requested mineral oil this will be SUNISO 3 GS, if requested ester oil this will be MOBIL EAL ARCTIC 22 CC.

# Installation drawings

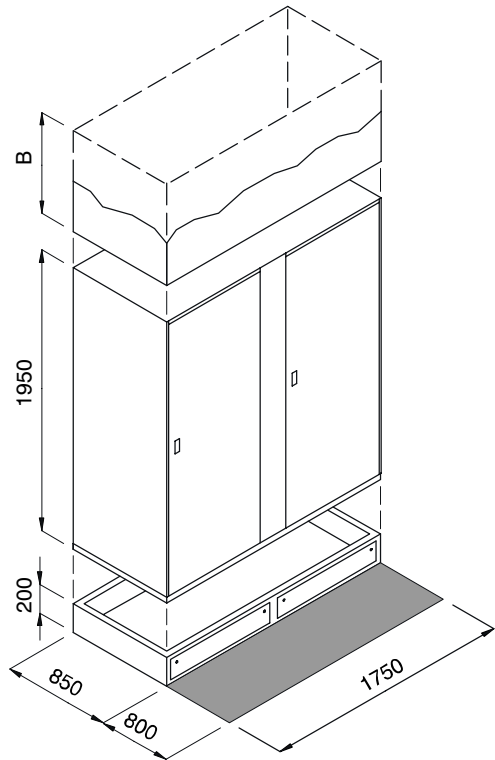
**Fig. 1. Overall dimensions Service Area S models**



**Fig. 2. Overall dimensions Service Area M25–29**



**Fig. 3. Overall dimensions Service Area M31...66**

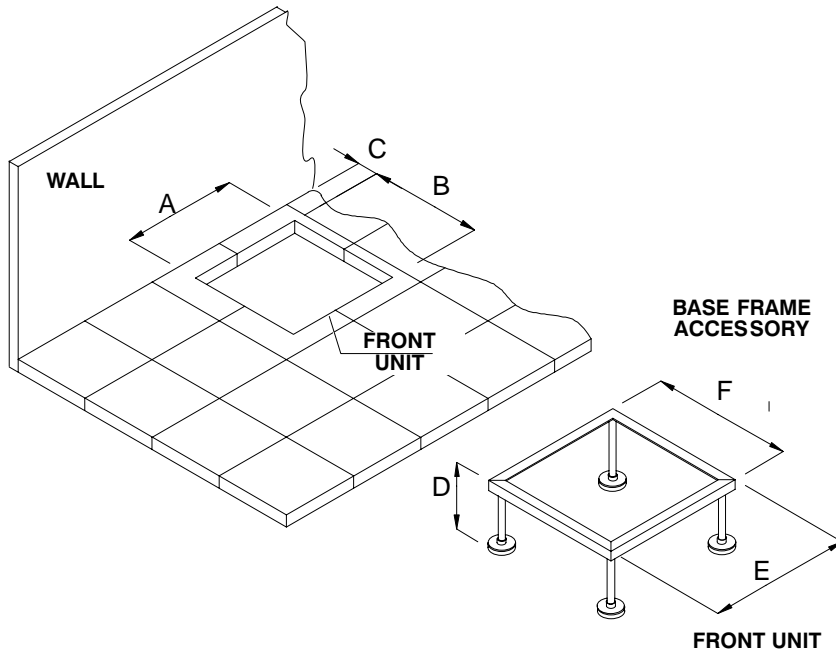


Models	A (mm)	AVAILABLE PLENUM HEIGHTS: B (mm)			
		Simple plenum	Plenum for silencing cartridges	Plenum for high efficiency filters	Plenum with frontal airflow (OVER only)
S04–05	400	500–600–700– 800 – 900–1000–100–1200	600–900–1200	500–600–700– 800–900	600
S07–10–12	500				
S13–17–20–23	750				
M25–29	850				
M31–34–35–41 42–47–50–58–66	850				

MODELS	WEIGHTS (kg)						
	Versions						
	A	W	F	D	H	K / A	K / W
S04	160	165					
S05	170	175					
S07	195	200				200	205
S10	210	215				215	220
S12	215	222				222	229
S13	240	247				247	254
S17	250	260	290	280	290	260	270
S20	260	270	310	300	310	270	280
S23	270	280	320	310	320	280	290
M25	415	425	510	500	510	425	435
M29	420	430					
M31	565	575	715	705	715		
M34	580	590	725	715	725		
M35	570	580	720	710	720		
M41	585	600	730	715	730		
M42	585	600	745	730	745		
M47	605	620	740	725	740		
M50	620	635	755	740	755		
M58	625	650	770	745	770		
M66	645	670					

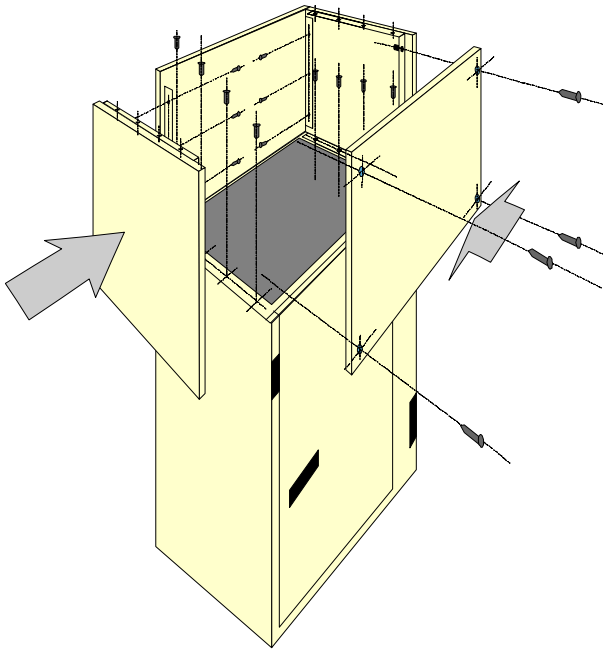


**Fig. 5. Hole in raised floor**

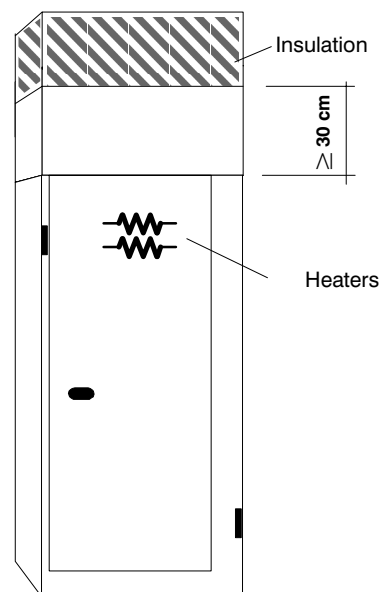


MODELS	Dimensions (mm)								
	A		B		C		D	E	F
	without base frame	with base frame	without base frame	with base frame	without base frame	with base frame			
S04-05	690	750	320	390	50	10	≤ 300 ≤ 500 ≤ 800	740	380
S07-10-12			420	490					480
S13-17-20-23			670	740					730
M25-29	930	1000	770	840				990	830
M31...66	1680	1750						1740	

**Fig. 6. Extension hood**



**Fig. 7. Over conditioner with electrical heaters.**  
Upflow ducted conditioner equipped with electrical heaters, connected to air duct not supplied by Liebert Hiross. **Pay attention to the position of insulating material!**



**Note:** See Chap. 2

Fig. 8. Base module

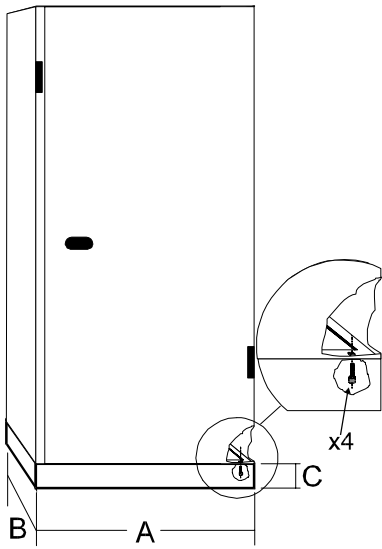


Fig. 9. Base frame

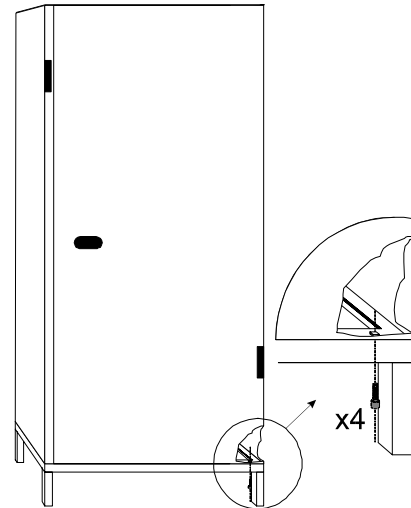
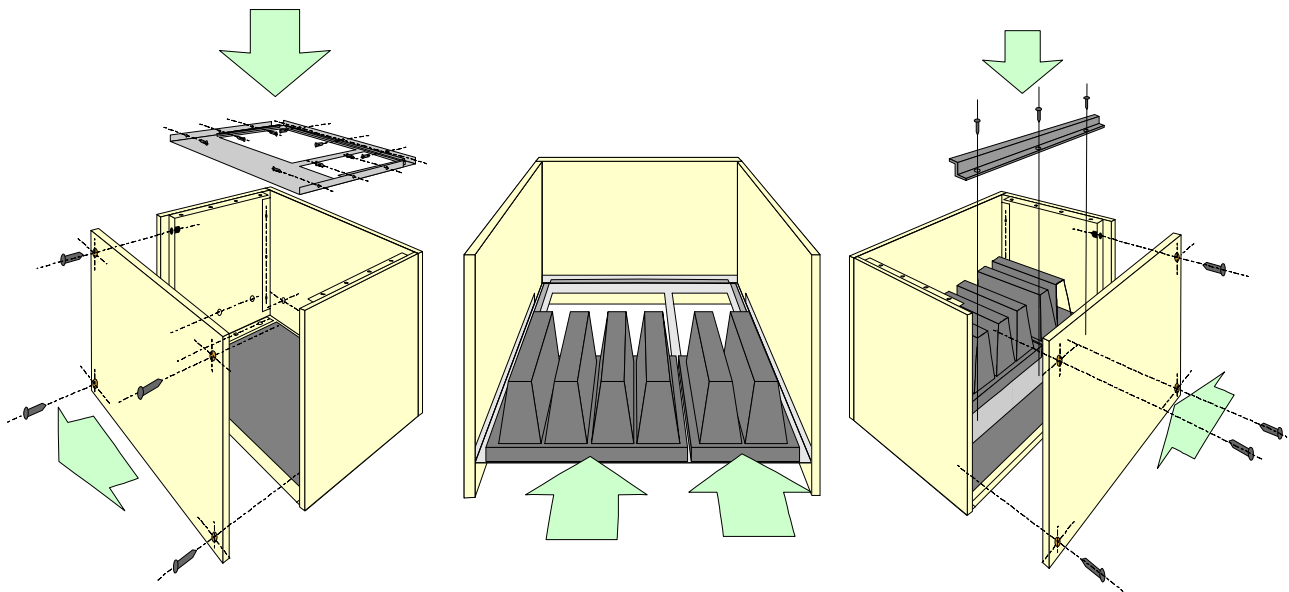
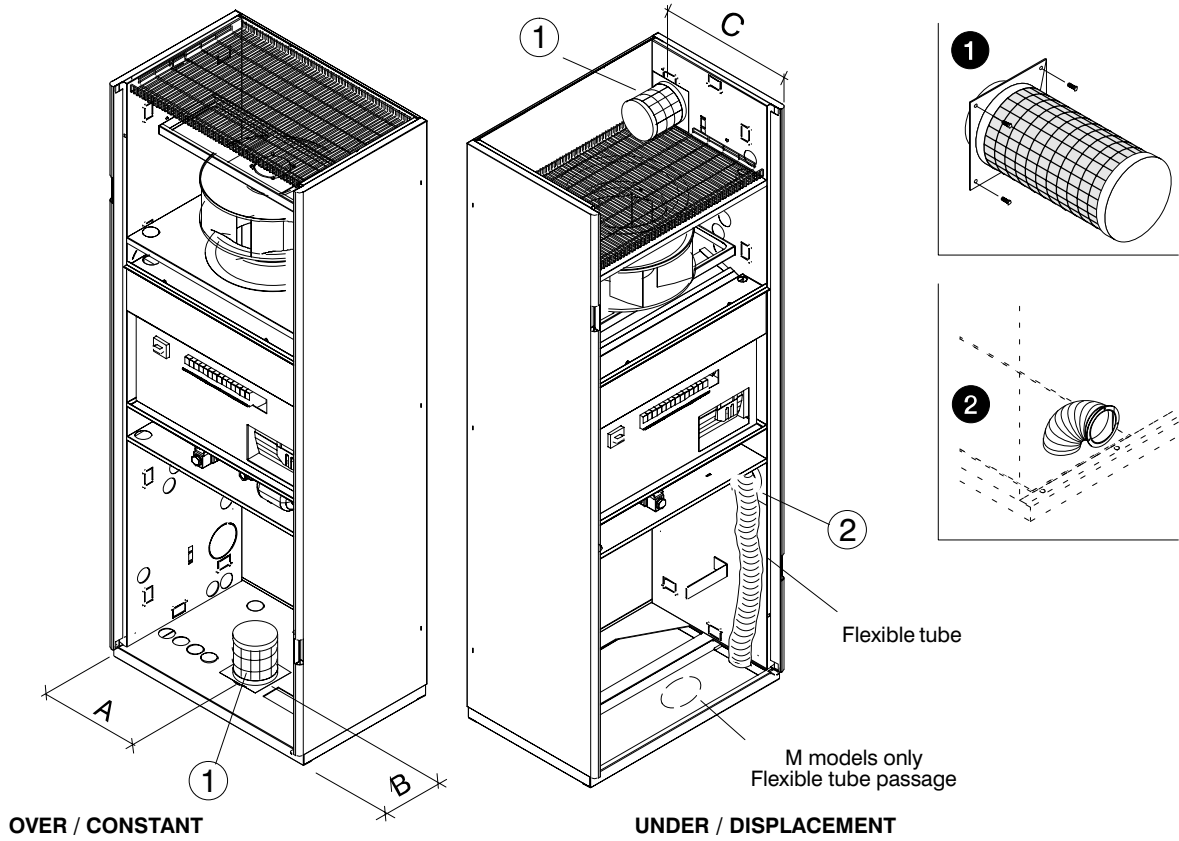


Fig. 10. High efficiency filters



# Installation drawings

Fig. 11. New air module



MODELS	Dimensions (mm)		
	A	B	C
S04-05	185	310	320
S07-10-12	375	190	420
S13-17-20-23	155	450	660
M25-29	650	565	145
M31...66	225	565	145

Fig. 12. Bleed valve position

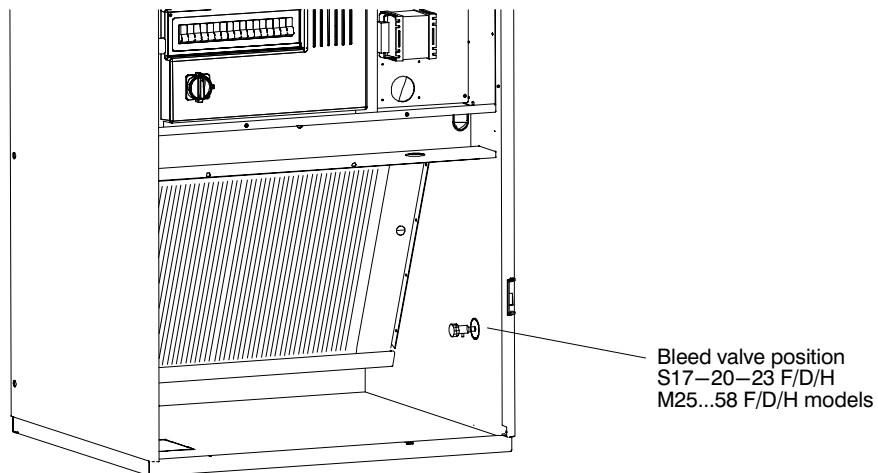
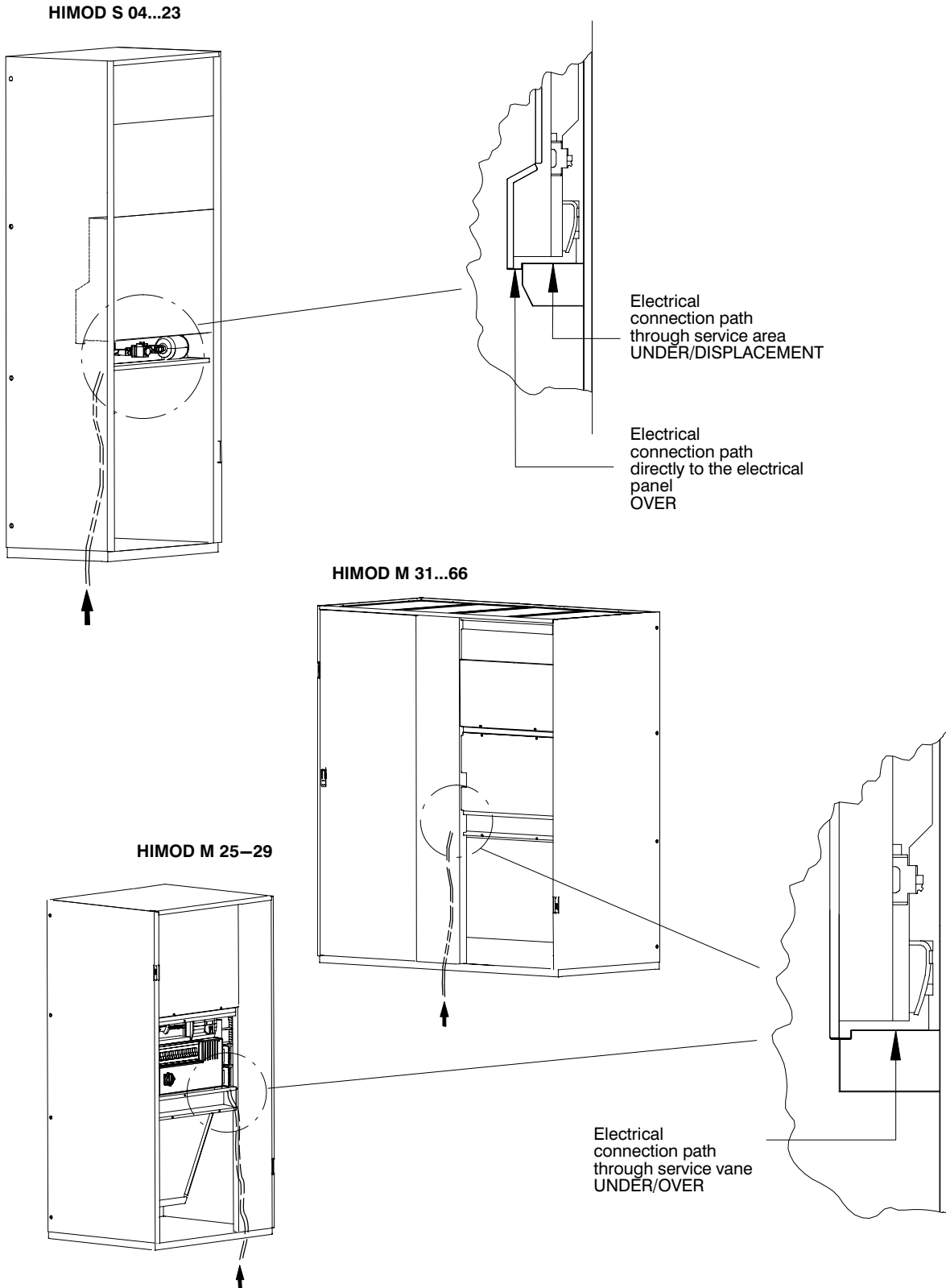
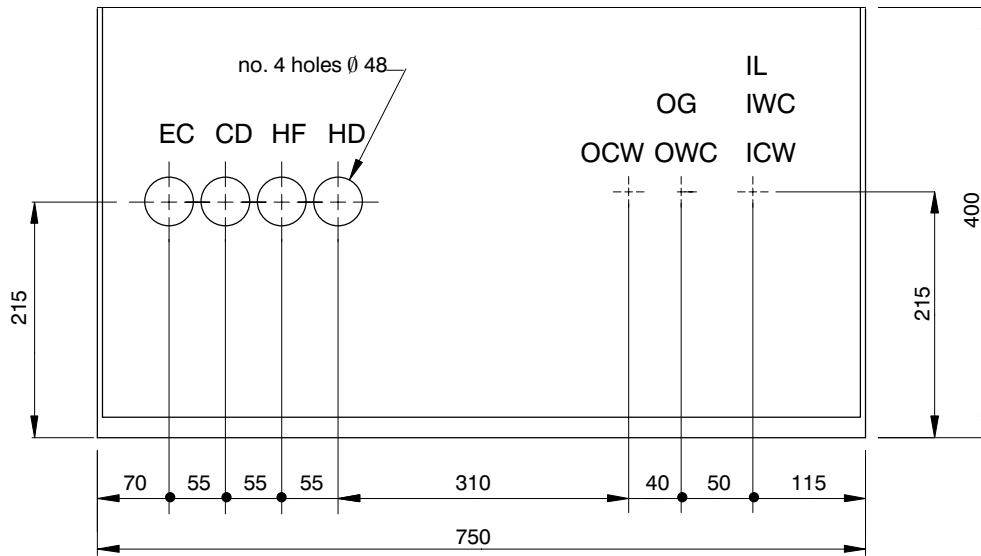


Fig. 13. Supply cable path



## Refrigerant and hydraulic connections

Fig. 14. Refrigerant, water and electrical connections Himod S 04 ÷ 05 – Plant view



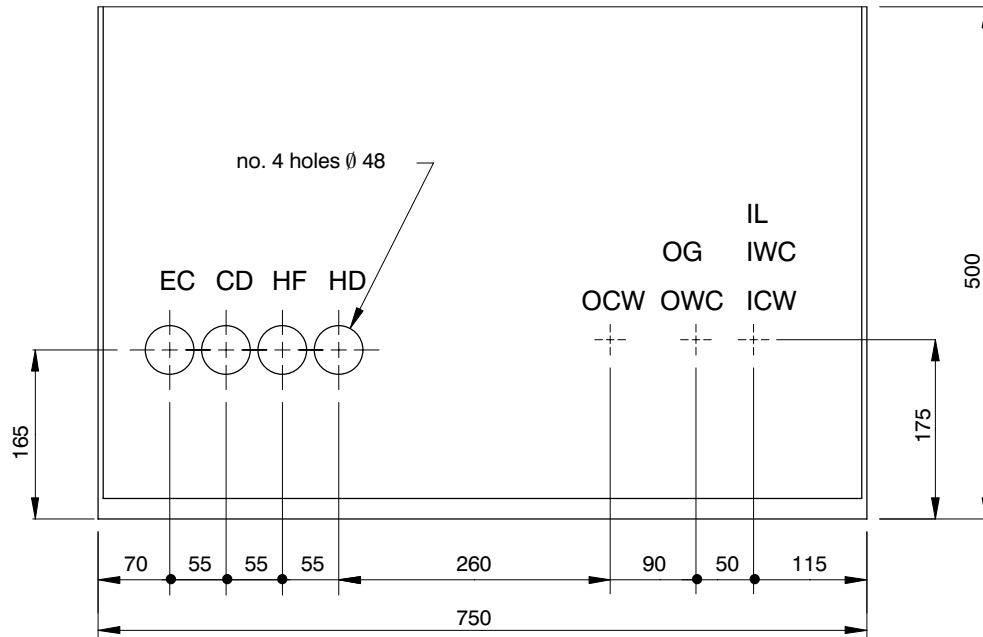
Unit Connection		Version		
		A	W	C
IL	Refrigerant liquid line inlet *	OD 12 mm		
OG	Refrigerant gas line outlet *	OD 12 mm		
ICW	Chilled water inlet			3/4" GAS-F
OCW	Chilled water outlet			3/4" GAS-F
IWC	Water to condenser inlet		1/2" GAS-F	
OWC	Water from condenser outlet		1/2" GAS-F	
IHW	Hot water 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 Ø 48 mm	

\* Connection size only. The dimension of the connecting pipe depends on unit model and refrigerant, see Tab. c on para. 4.1.2.



## Refrigerant and hydraulic connections

Fig. 15. Refrigerant, water and electrical connections Himod S 07 ÷ 12 – Plant view



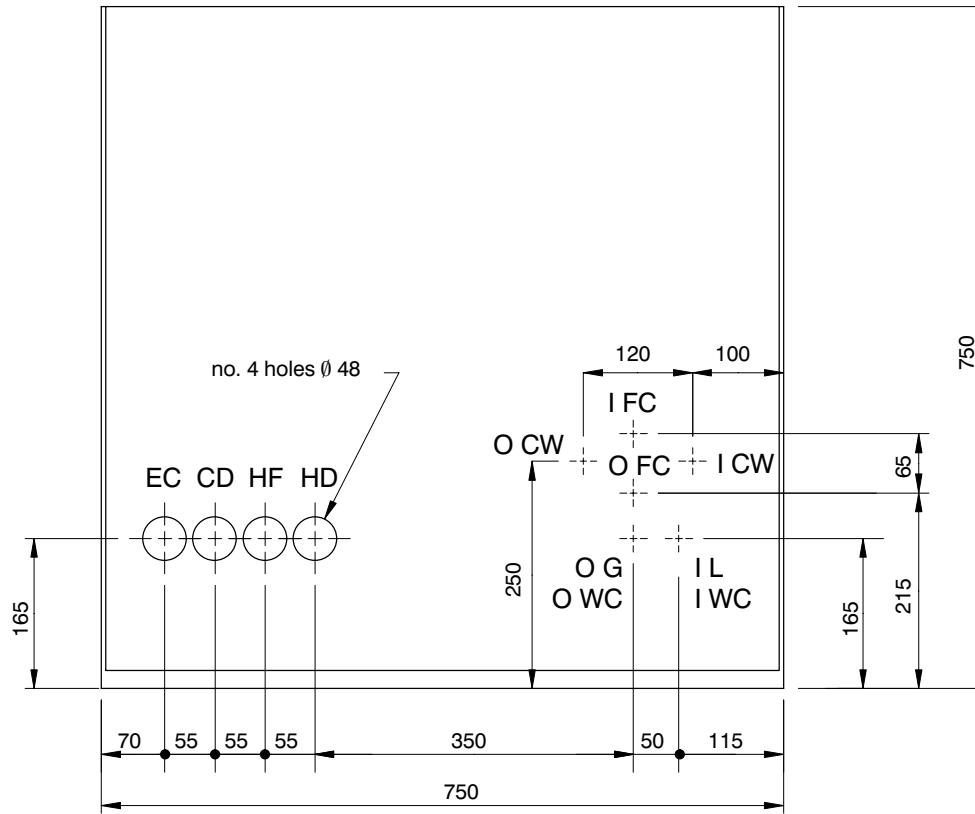
UNIT FRONT

Unit Connection		Version		
		A	W	C
IL	Refrigerant liquid line inlet *	OD 12 mm		
OG	Refrigerant 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 $\varnothing$ 48 mm	

\* Connection size only. The dimension of the connecting pipe depends on unit model and refrigerant, see Tab. c on para. 4.1.2.

## Refrigerant and hydraulic connections

Fig. 16. Refrigerant, water and electrical connections Himod S 13 ÷ 23



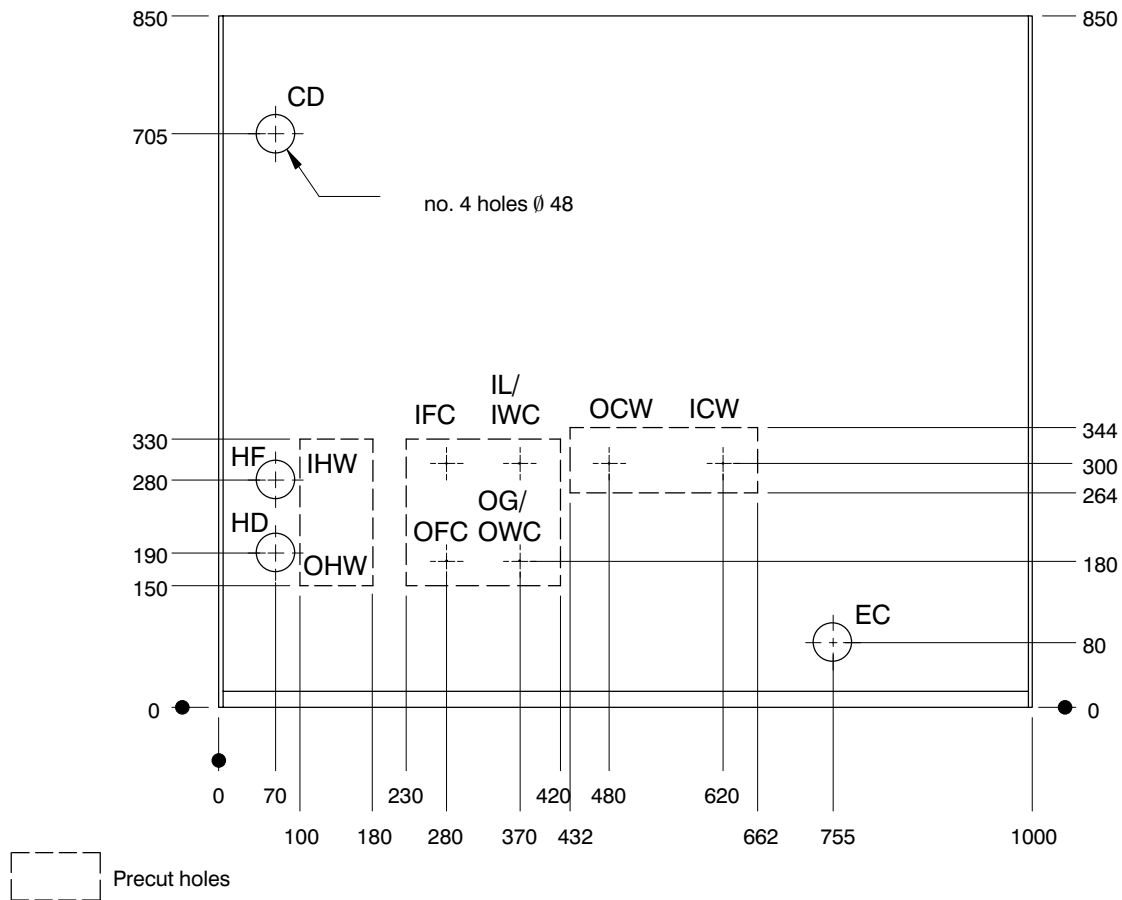
UNIT FRONT

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		
OWC	Water from condenser outlet		3/4" GAS-F		3/4" GAS-F		
IHW	Hot water inlet (opt.)	OD 18 mm					
OHW	Hot water outlet (opt.)	OD 18 mm					
IFC	Water inlet to Freecooling/Dualfluid coil			1" GAS-F	1" GAS-F	1" GAS-F	
OFC	Water outlet from Freecooling/Dualfluid coil			1" GAS-F	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 Ø 48 mm					

\* Connection size only. The dimension of the connecting pipe depends on unit model and refrigerant, see Tab. c on para. 4.1.2.

## Refrigerant and hydraulic connections

**Fig. 17. Refrigerant, water and electrical connections Himod M 25–29**



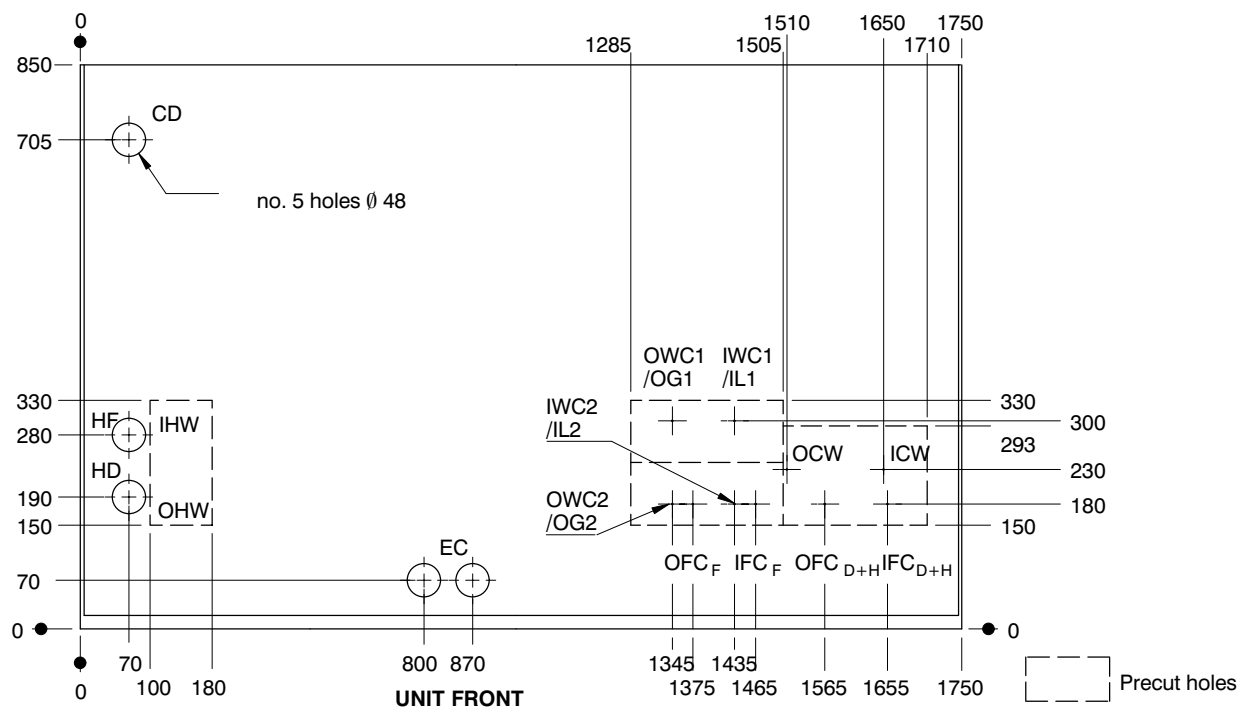
**UNIT FRONT**

Unit Connection		Version					
		A	W	D	H	F	C
<b>IL</b>	Refrigerant liquid line inlet *	OD 16 mm		OD 16 mm			
<b>OG</b>	Refrigerant gas line outlet *	OD 18 mm		OD 18 mm			
<b>ICW</b>	Chilled water inlet						1.1/4" GAS-F
<b>OCW</b>	Chilled water outlet						1.1/4" GAS-F
<b>IWC</b>	Water to condenser inlet		1" GAS-F		1" GAS-F		
<b>OWC</b>	Water from condenser outlet		1" GAS-F		1" GAS-F		
<b>IHW</b>	Hot water inlet (opt.)	OD 18 mm					
<b>OHW</b>	Hot water outlet (opt.)	OD 18 mm					
<b>IFC</b>	Water inlet to Freecooling and Dualfluid coil			1" GAS-F	1" GAS-F	1.1/4" GAS-F	
<b>OFC</b>	Water outlet from Freecooling and Dualfluid coil			1" GAS-F	1" GAS-F	1.1/4" GAS-F	
<b>CD</b>	Condensate drain	ID 20 mm					
<b>HF</b>	Humidifier feed (opt.)	1/2" GAS-M					
<b>HD</b>	Humidifier drain (opt.)	ID 22 mm					
<b>EC</b>	Electrical power supply	Hole Ø 48 mm					

\* **Connection size only. The dimension of the connecting pipe depends on unit model and refrigerant, see Tab. c on para. 4.1.2.**

## Refrigerant and hydraulic connections

**Fig. 18. Refrigerant, water and electrical connections Himod M 34...66**

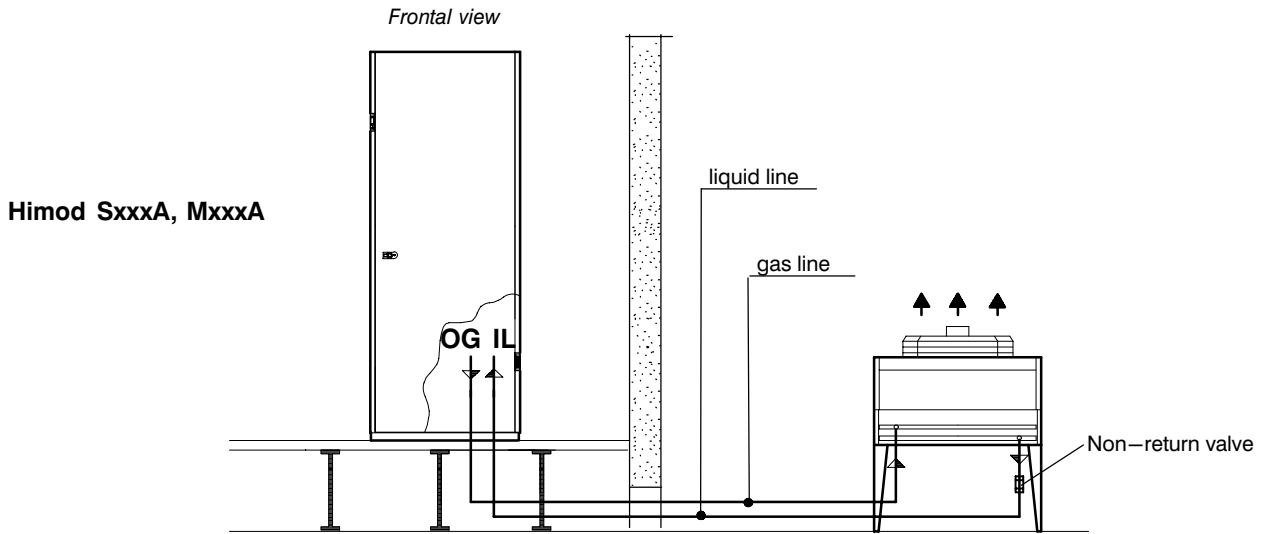


Models	Unit Connection	Version					
		A	W	D	H	F	C
M31-34-35-42-50-58-66	IL1	Refrigerant liquid line inlet 1*					
M41-47	IL1						
M34-42-50-58-66	IL2	Refrigerant liquid line inlet 2*					
M31-34-35-42-50-58-66	OG1						
M41-47	OG1	Refrigerant gas line outlet 1*					
M34-42-50-58-66	OG2						
M44-55	ICW	Chilled water inlet					
M66-77	ICW						
M44-55	OCW	Chilled water outlet					
M66-77	OCW						
M31-35-41-47-50-58-66	IWC1	Water to condenser 1 inlet					
M34-42	IWC1						
M34-42	IWC2	Water to condenser 2 inlet					
M50-58-66	IWC2						
M31-35-41-47-50-58-66	OWC1	Water from condenser 1 outlet					
M34-42	OWC1						
M34-42	OWC2	Water from condenser 2 outlet					
M50-58-66	OWC2						
Mxx	IHW	Hot water inlet (opt.)					
Mxx	OHW						
M31-34-35	IFC (F)	Water inlet to Freecooling					
M41-42-47-50-58	IFC (F)						
M31-34-35	OFC (F)	Water outlet from Freecooling					
M41-42-47-50-58	OFC (F)						
M31-34-35	IFC (D+C)	Water inlet to Dualfluid					
M41-42-47-50-58	IFC (D+C)						
M31-34-35	OFC (D+C)	Water outlet from Dualfluid					
M41-42-47-50-58	OFC (D+C)						
Mxx	CD	Condensate drain					
Mxx	HF	Humidifier feed (opt.)					
Mxx	HD	Humidifier drain (opt.)					
Mxx	EC	Electrical power supply					

\* Connection size only. The dimension of the connecting pipe depends on unit model and refrigerant, see Tab. c on para. 4.1.2.

# Refrigerant and hydraulic connections

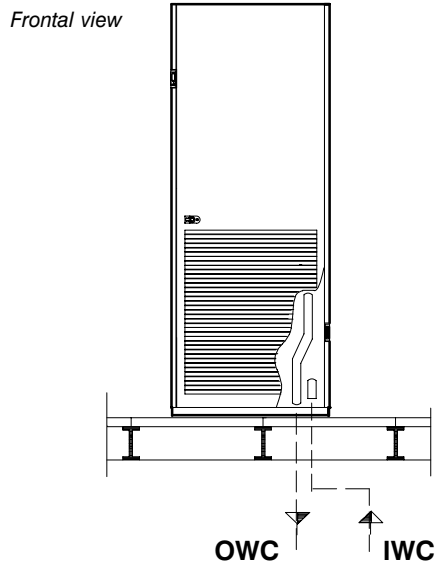
**Fig. 19. Refrigeration connections**



IL	Refrigerant pipe inlet
OG	Refrigerant pipe outlet

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

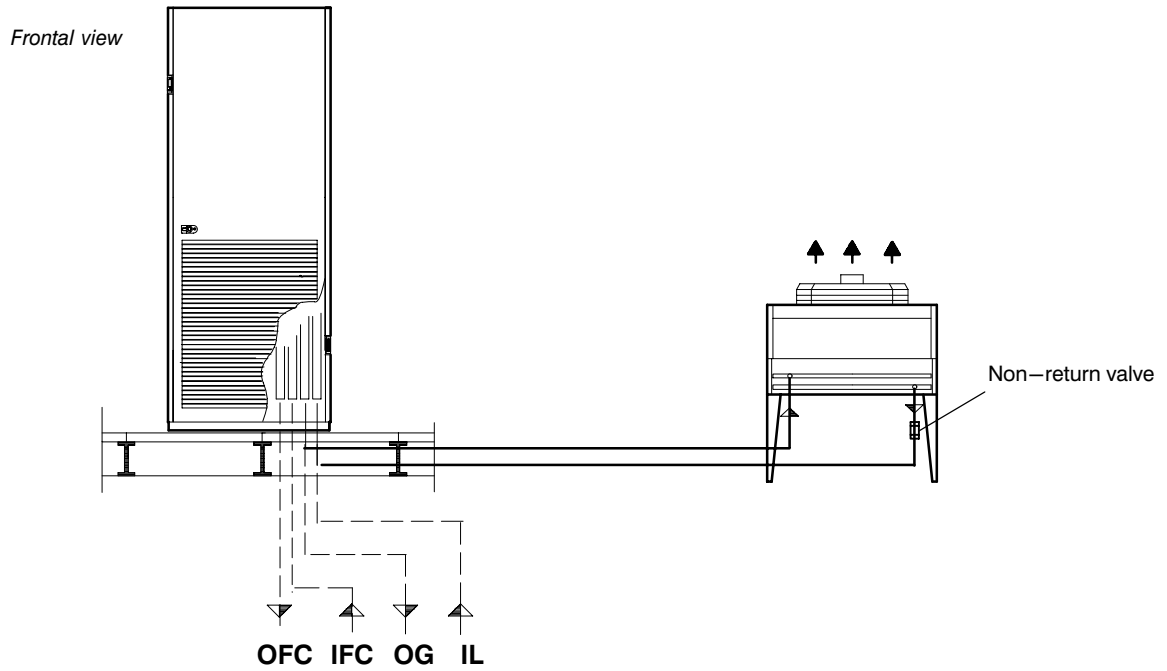
**Fig. 20. Water connections Himod SxxxF/H, MxxxF/H**



IWC	Water to condenser inlet
OWC	Water from condenser outlet

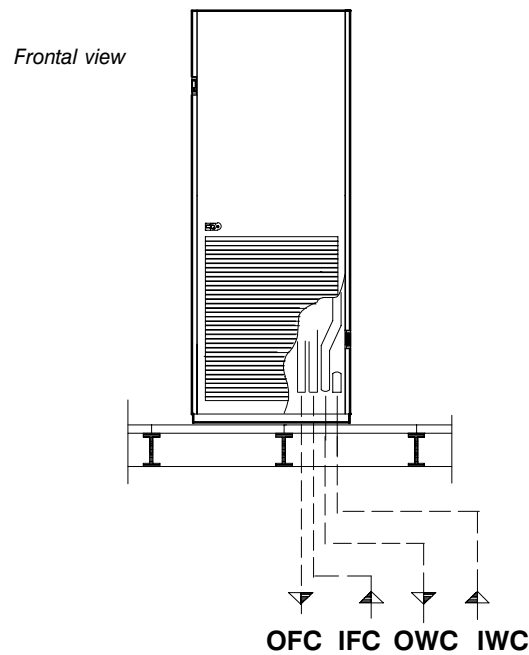
## Refrigerant and hydraulic connections

**Fig. 21. Chilled water and refrigerant connections Himod SxxxD, MxxxD**



<b>IL</b>	Refrigerant liquid line inlet
<b>OG</b>	Refrigerant gas line outlet
<b>IFC</b>	Water inlet to Freecooling coil
<b>OFC</b>	Water outlet to Dry-Cooler

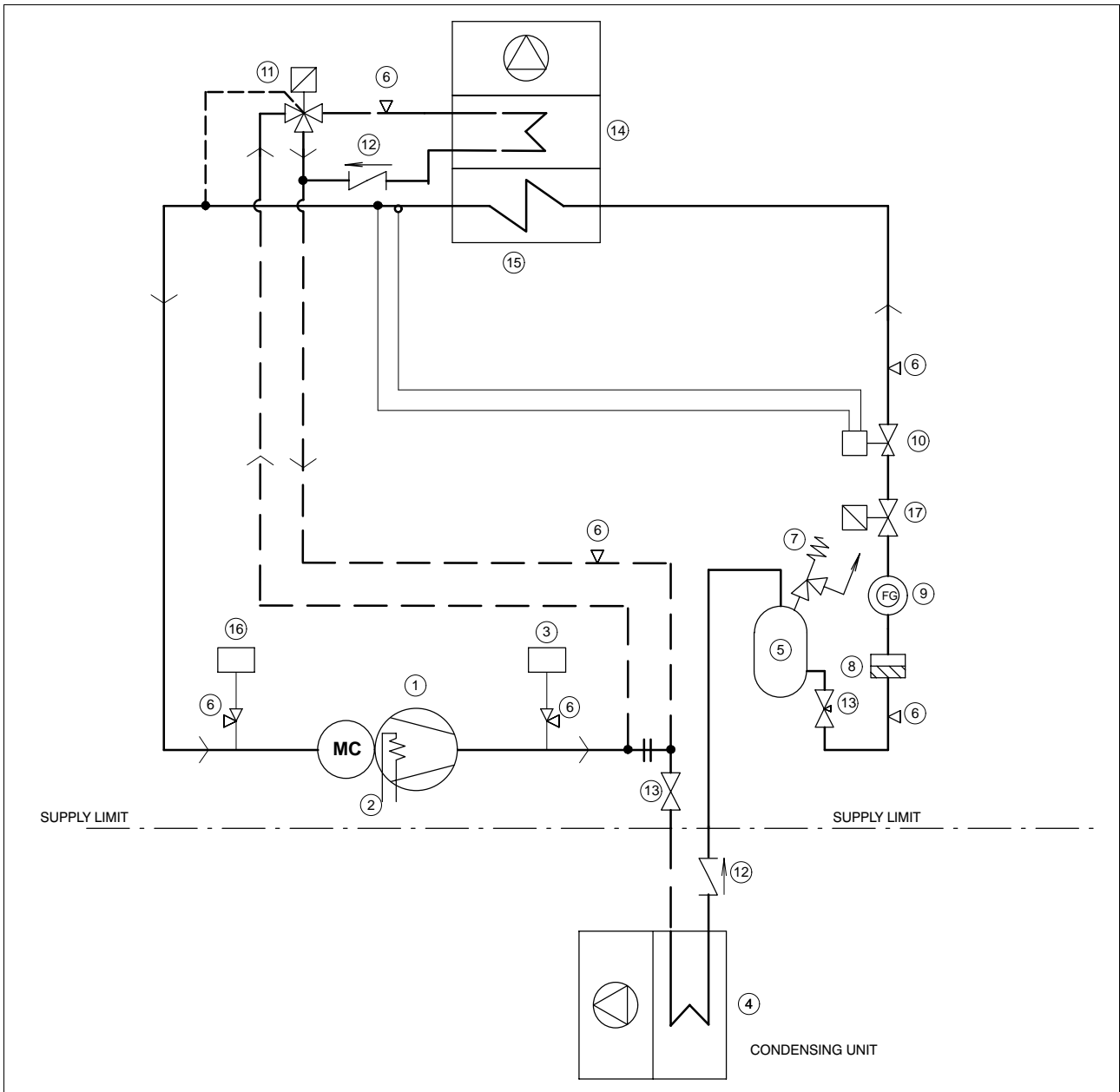
**Fig. 22. Chilled water and refrigerant connections Himod SxxxH, MxxxH**



<b>IWC</b>	Water to condenser inlet
<b>OWC</b>	Water from condenser outlet
<b>IFC</b>	Water inlet to Freecooling coil
<b>OFC</b>	Water outlet to Dry-Cooler

# Refrigeration circuits

Fig. 1. Himod SxxU/OA, M25-47U/OA

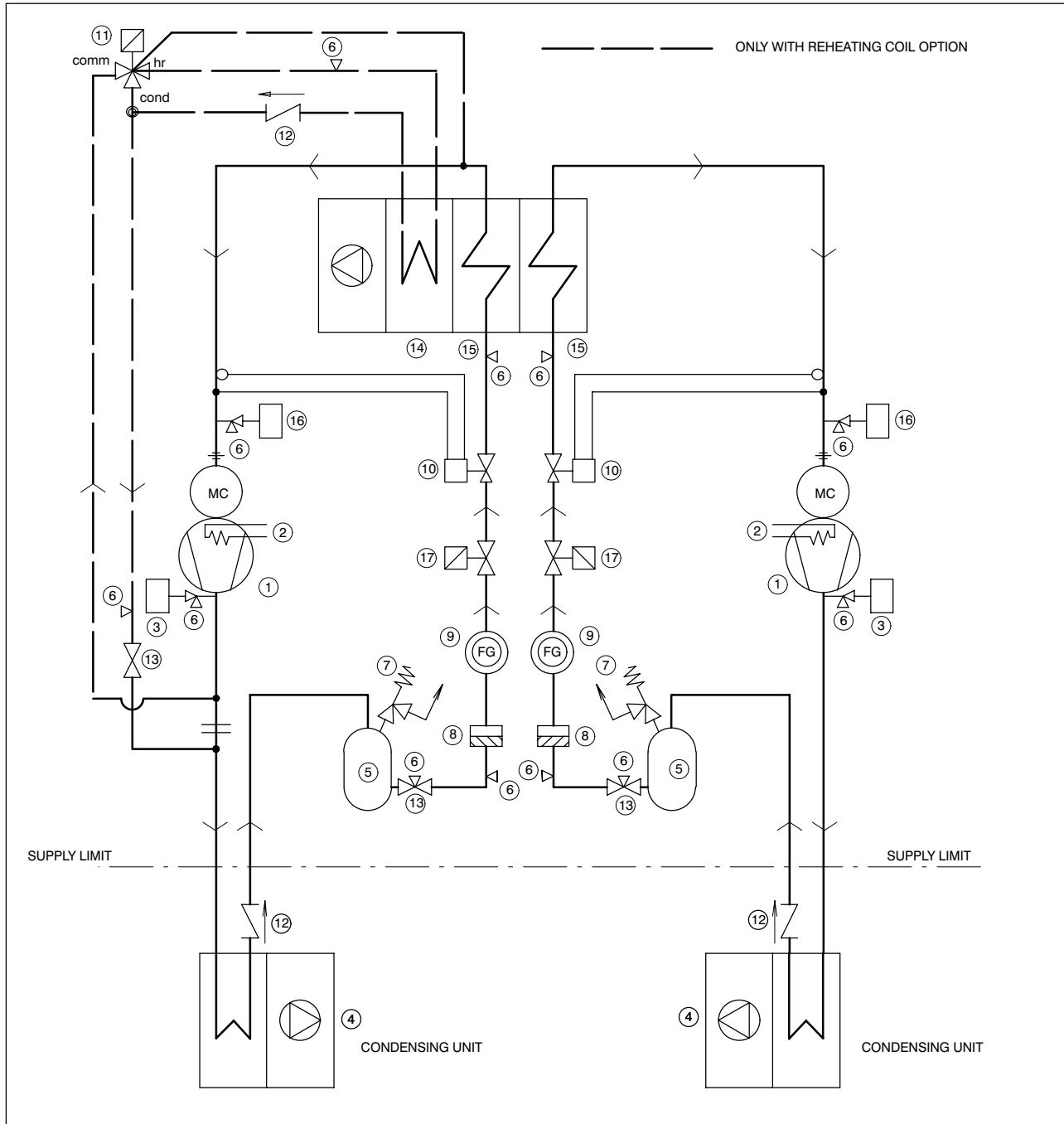


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass

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

## Refrigeration circuits

**Fig. 2. Himod M34–66U/OA**



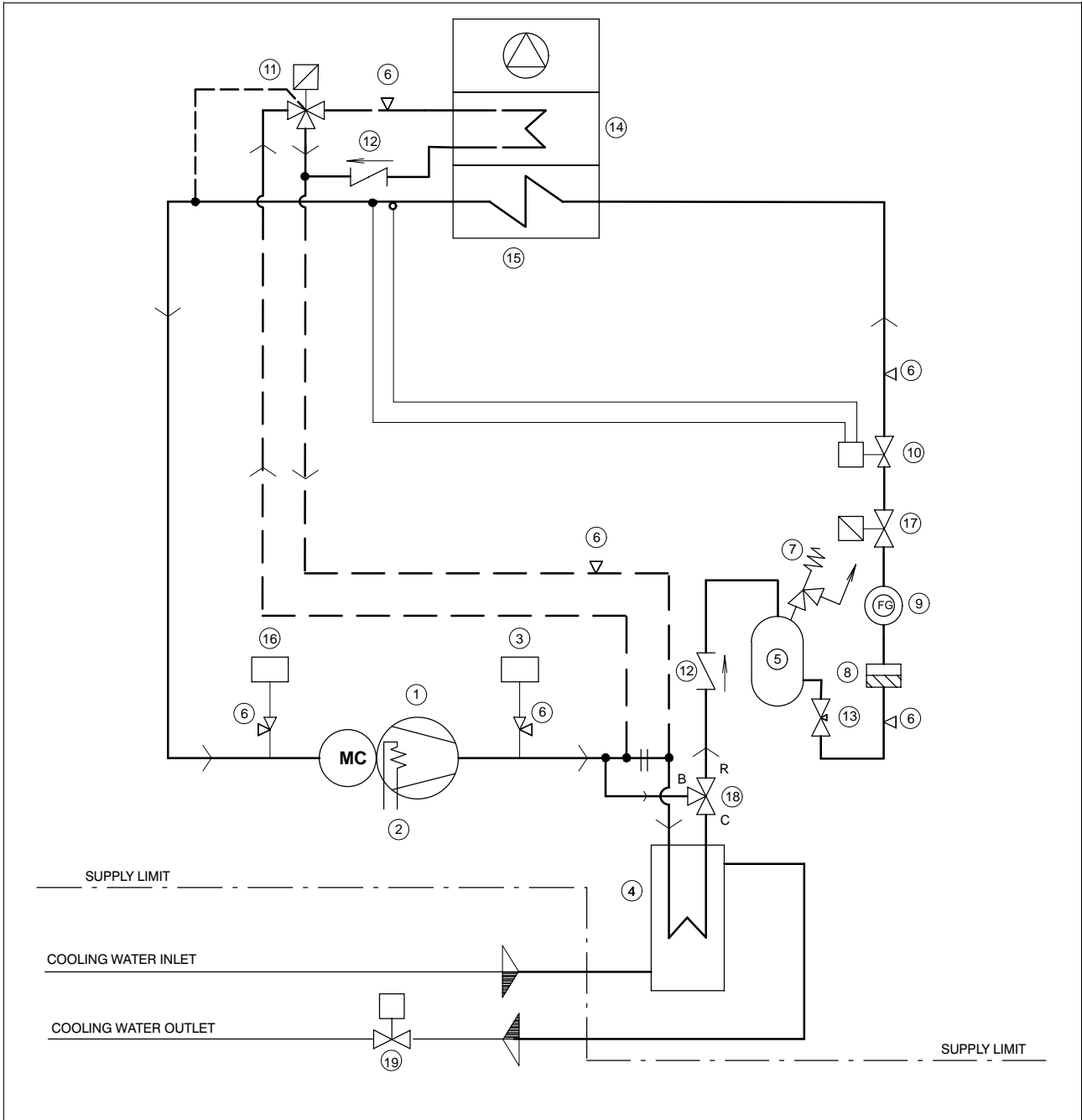
POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass

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



# Refrigeration circuits

**Fig. 3. Himod SxxU/OW**

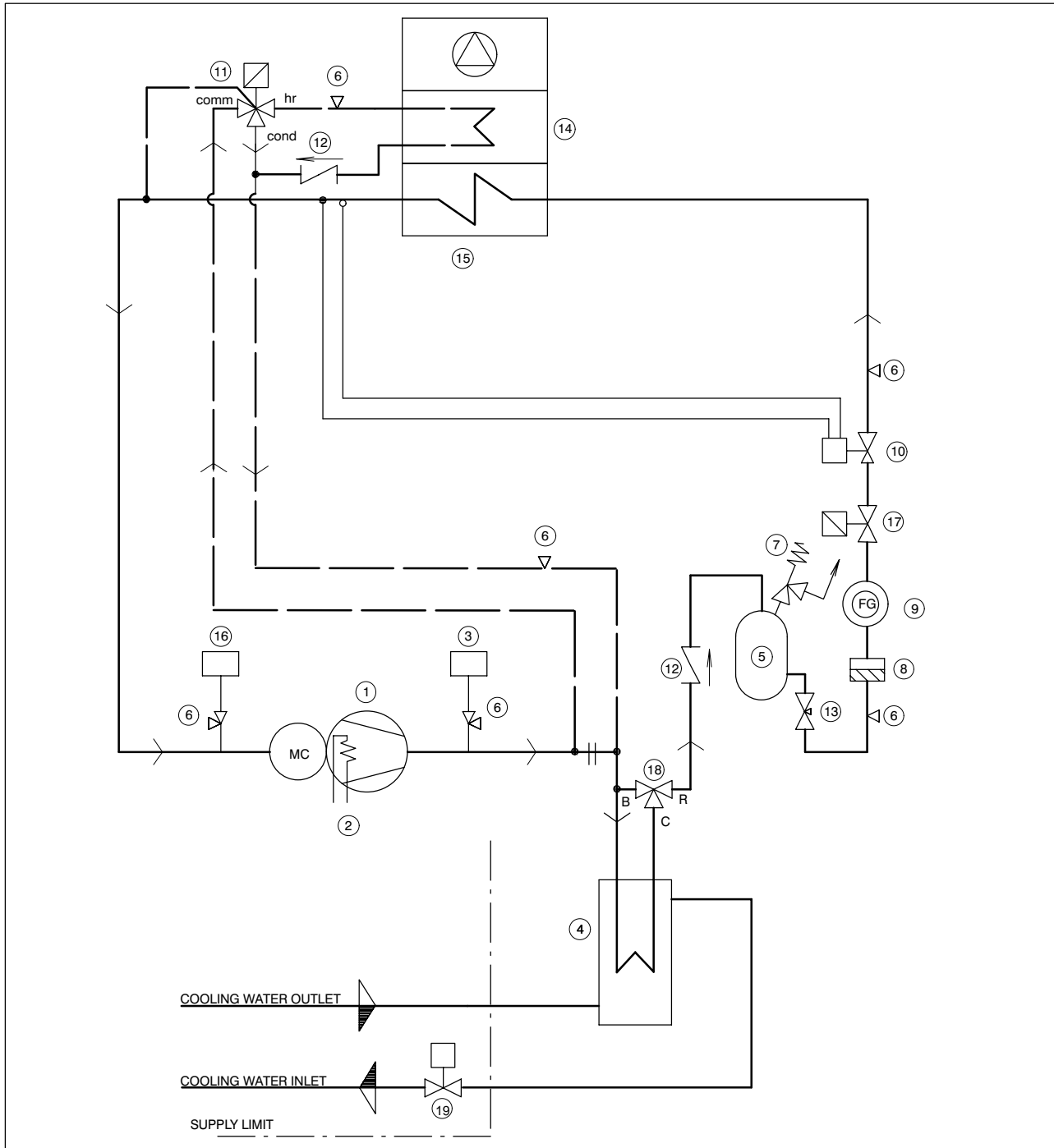


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

POS.	DESCRIPTION
11	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
19	Water solenoid valve (by the customer)

## Refrigeration circuits

**Fig. 4. Himod M25–47U/OW**

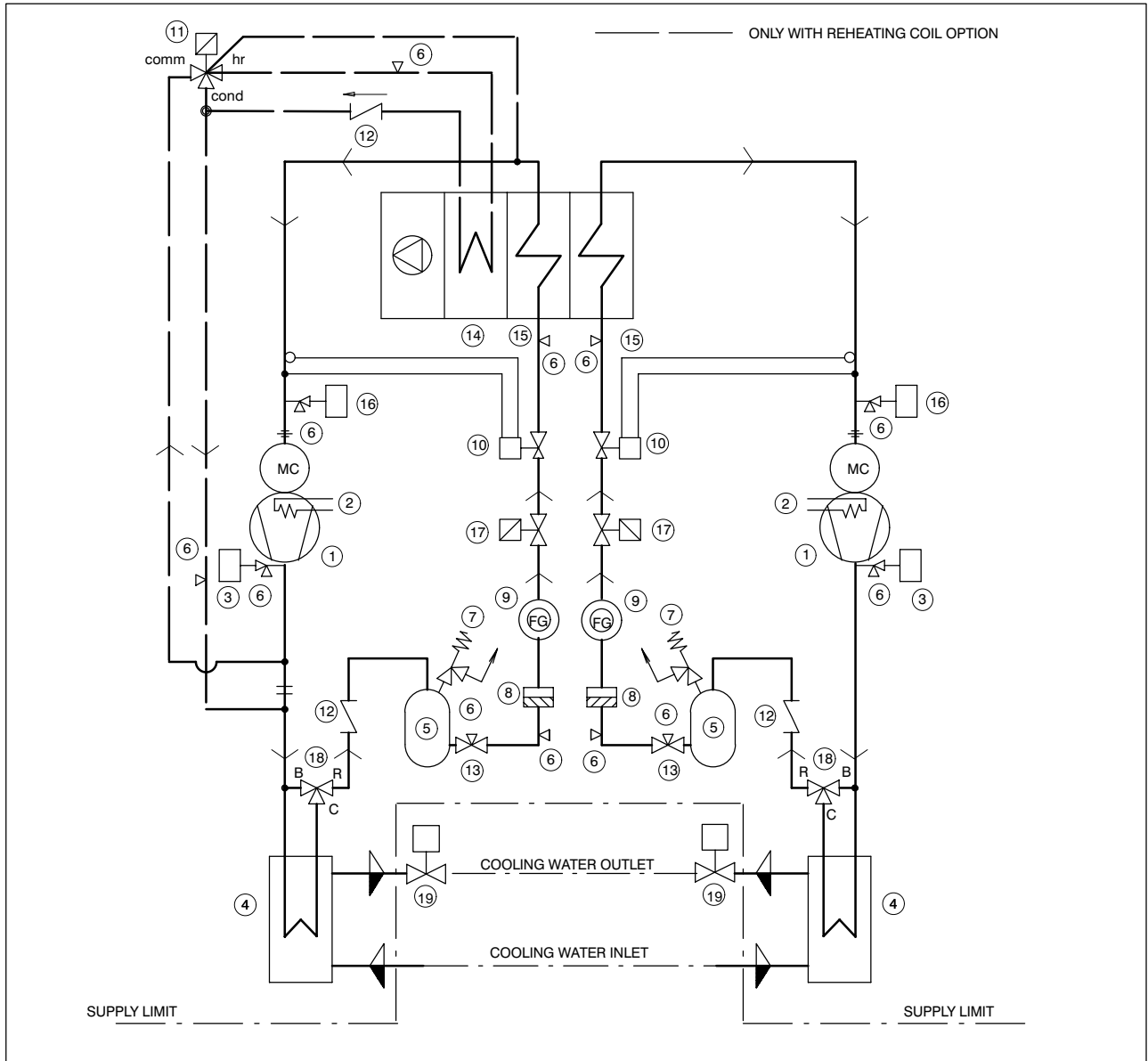


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

POS.	DESCRIPTION
11	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
19	Water solenoid valve (by the customer)

# Refrigeration circuits

**Fig. 5. Himod M34–66U/OW**



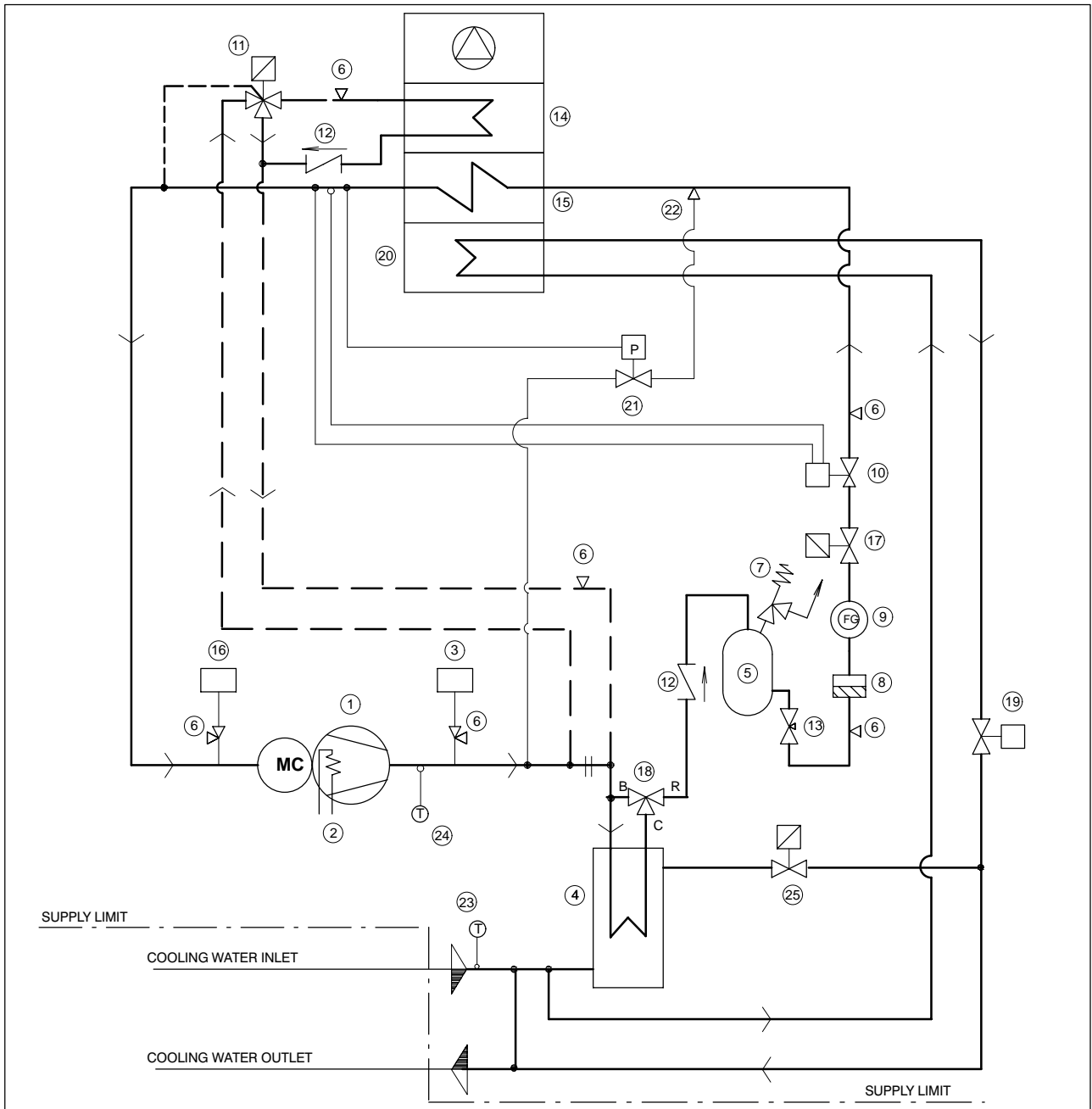
POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

POS.	DESCRIPTION
11	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
19	Water solenoid valve (by the customer)



# Refrigeration circuits

Fig. 7. Himod M25–47U/OF

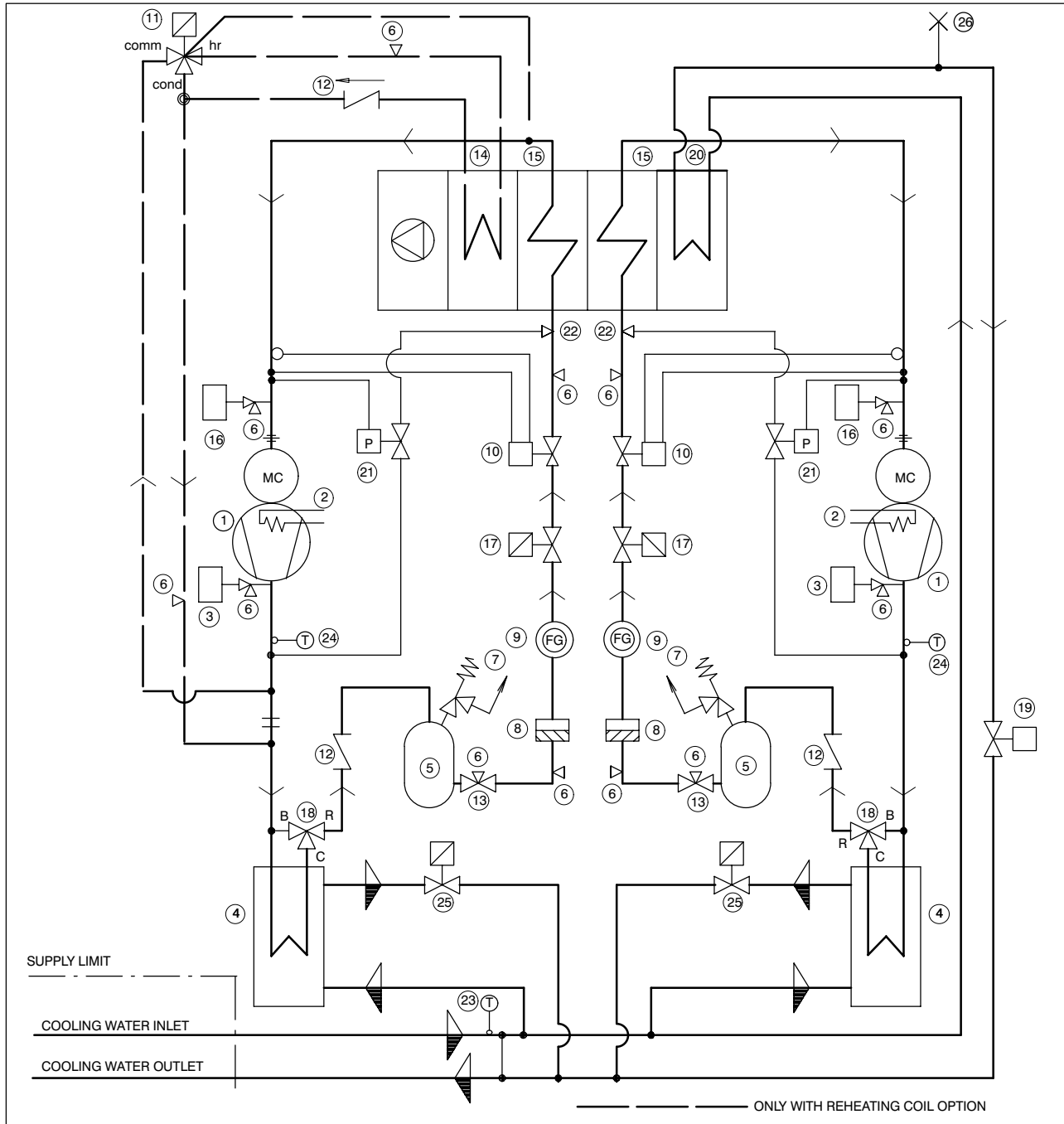


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas solenoid valve ON–OFF (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
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

## Refrigeration circuits

**Fig. 8. Himod M34–58U/OF**

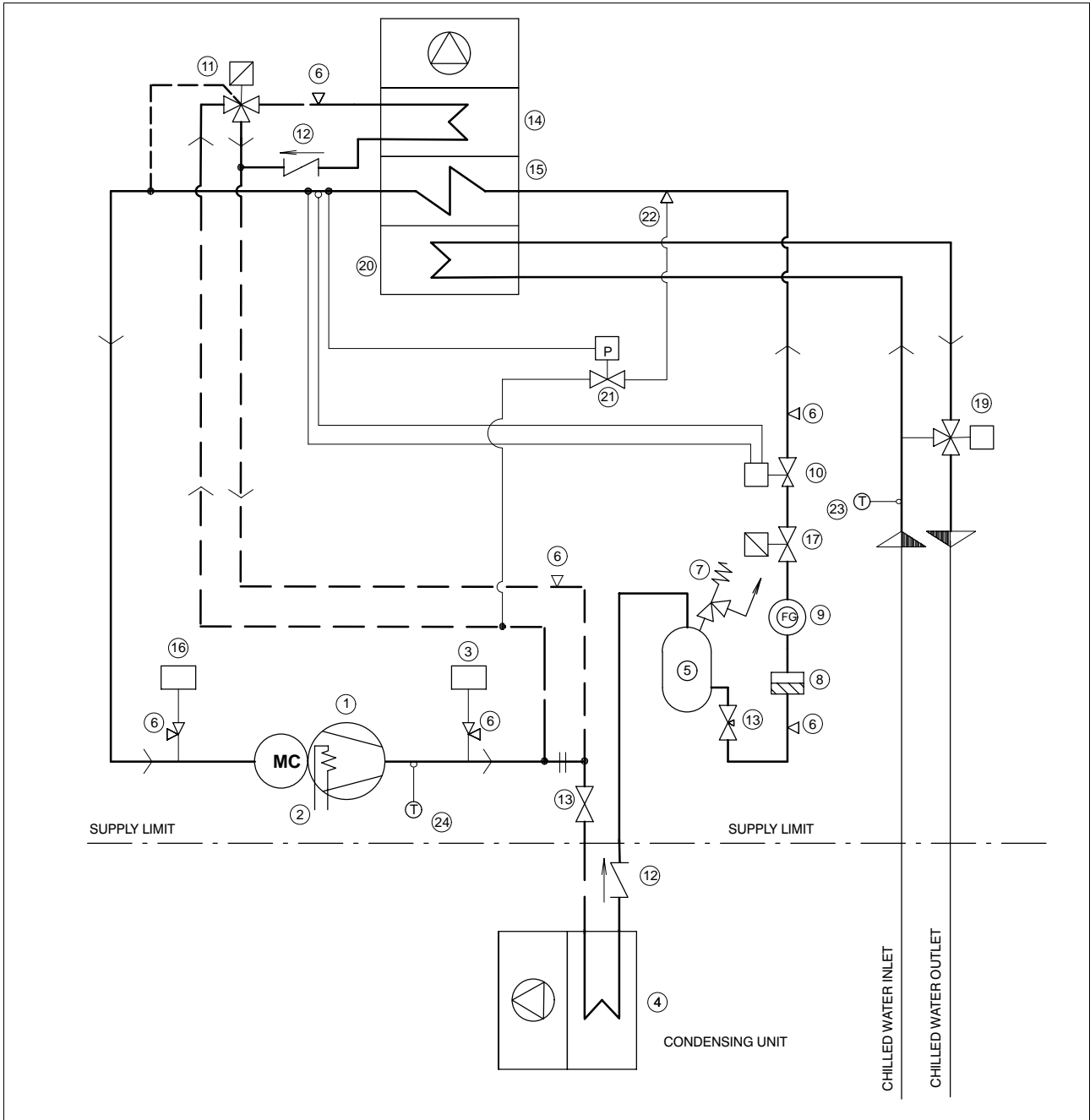


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas solenoid valve ON–OFF (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
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
26	Manual bleed valve

# Refrigeration circuits

**Fig. 9. Himod SxxU/OD, M25–47U/OD**

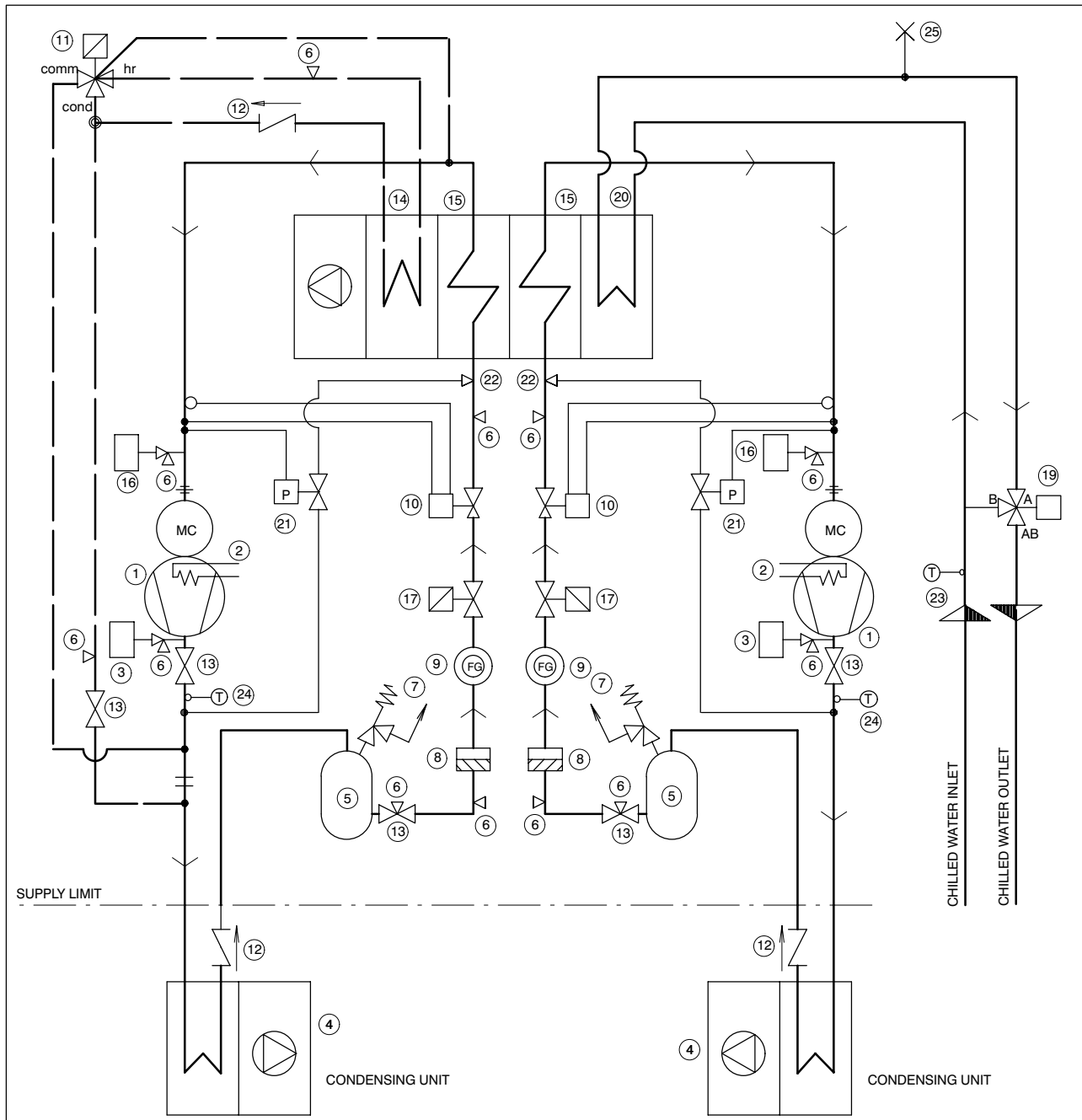


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas solenoid valve ON–OFF (optional)
12	Check valve

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)
23	Inlet water thermostat
24	Safety thermostat
25	Solenoid water valve

## Refrigeration circuits

**Fig. 10. Himod M34–58U/OD**



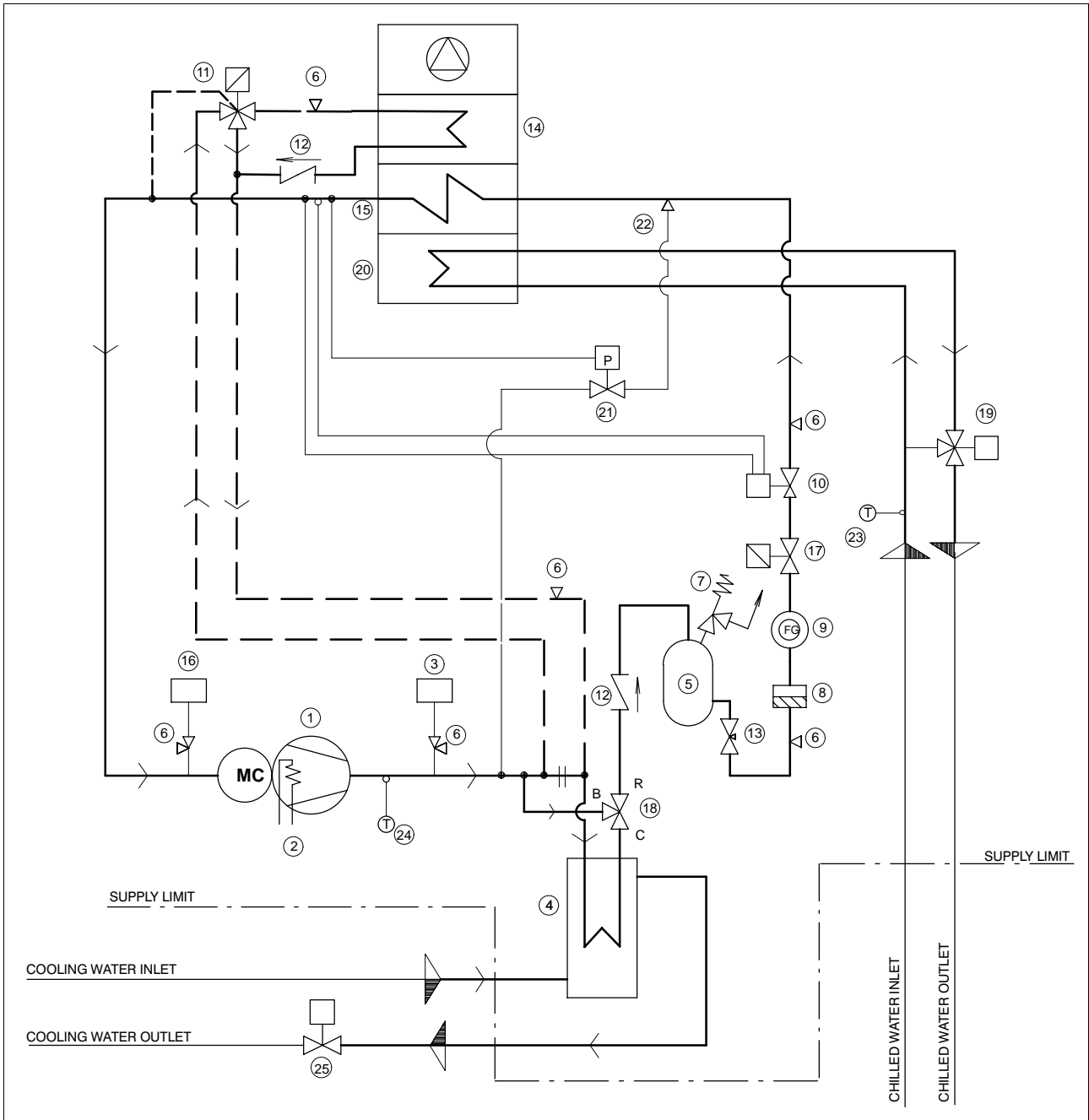
POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas solenoid valve ON–OFF (optional)
12	Check valve

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



# Refrigeration circuits

Fig. 11. Himod SxxU/OH

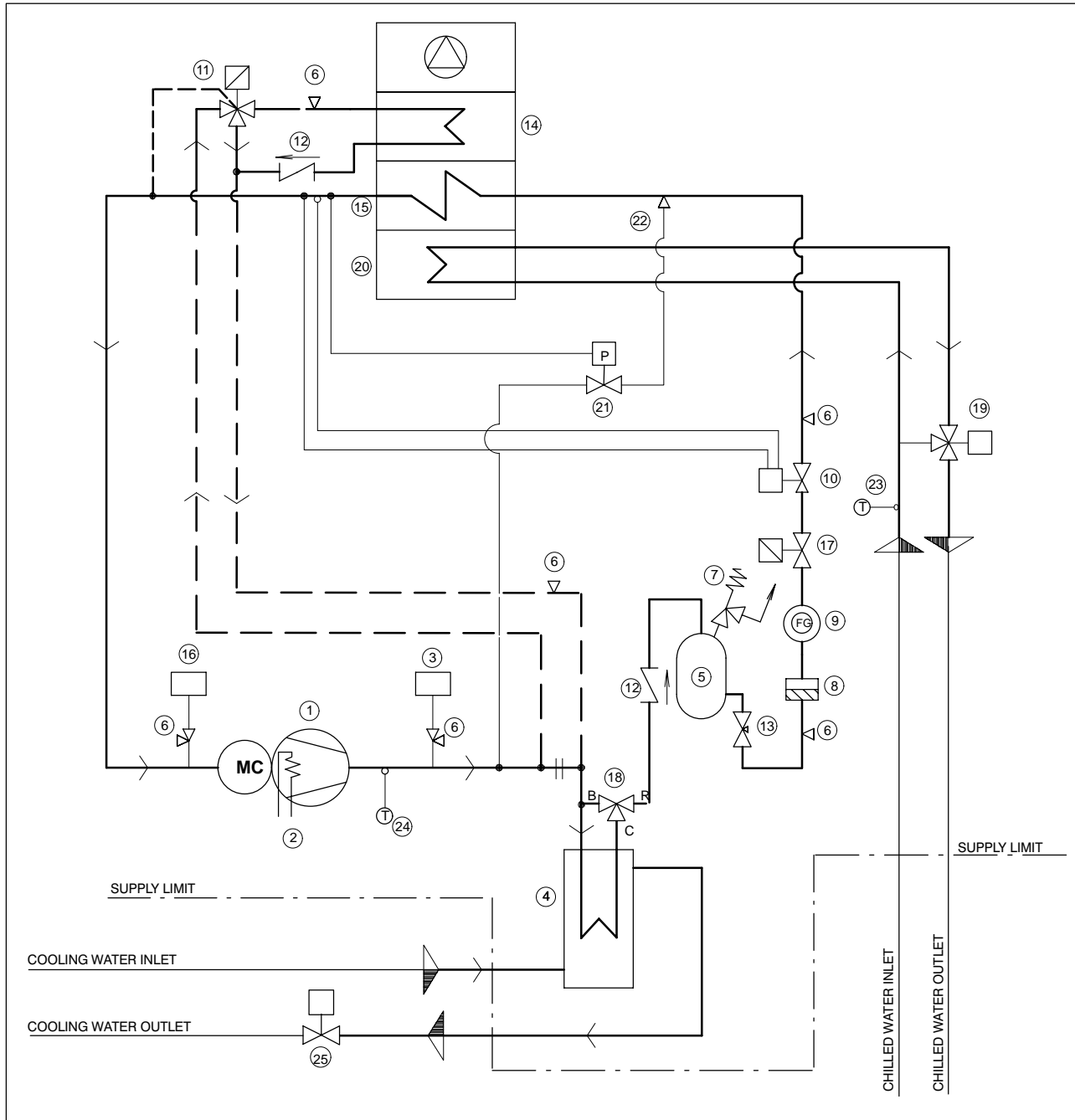


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas solenoid valve ON-OFF (optional)
12	Check valve
13	Shut-off valve

POS.	DESCRIPTION
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
25	Water solenoid valve (by the customer)

## Refrigeration circuits

**Fig. 12. Himod M25–47U/OH**

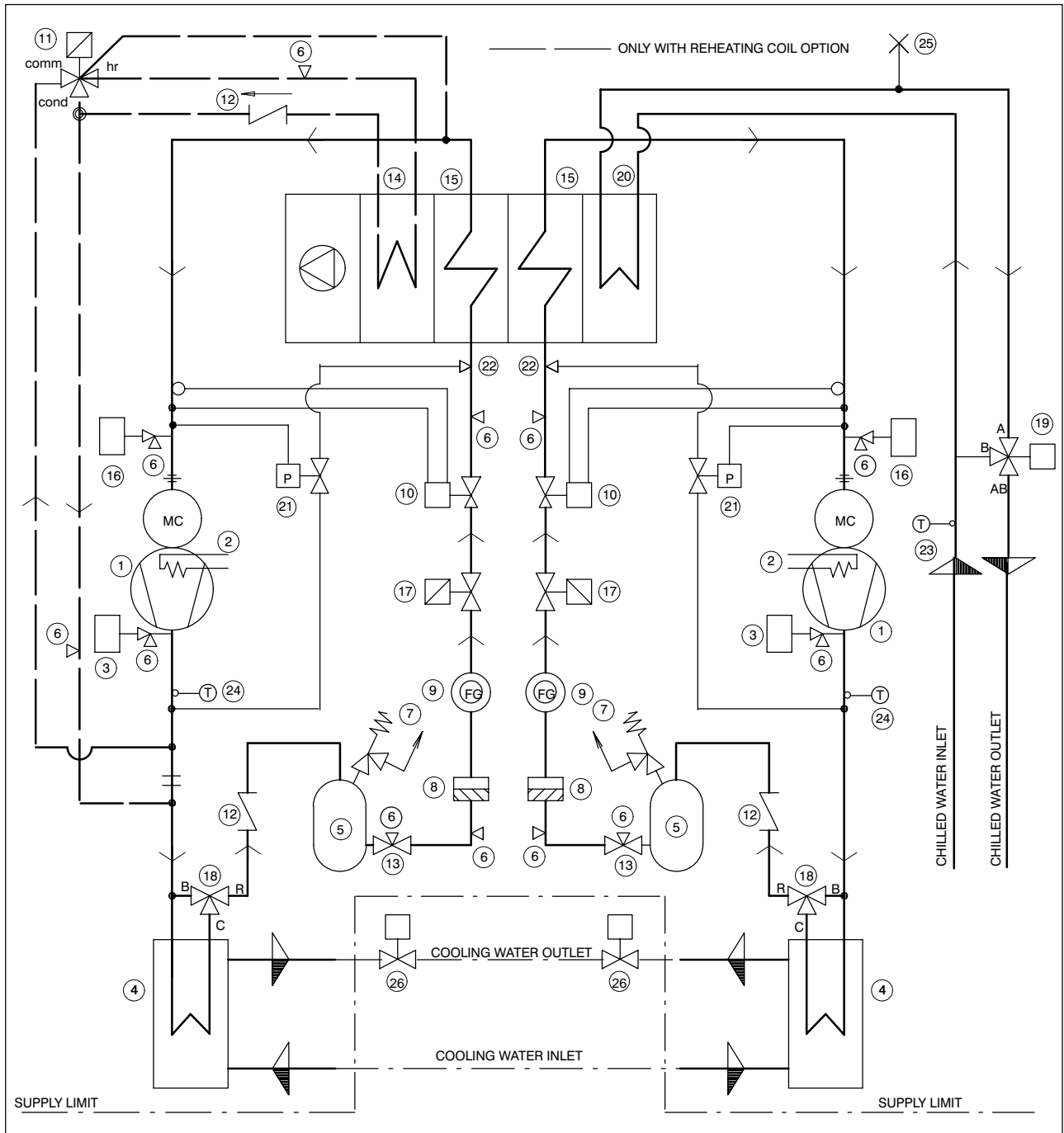


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas solenoid valve ON–OFF (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
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
25	Water solenoid valve (by the customer)

# Refrigeration circuits

**Fig. 13. Himod M34–58U/OH**

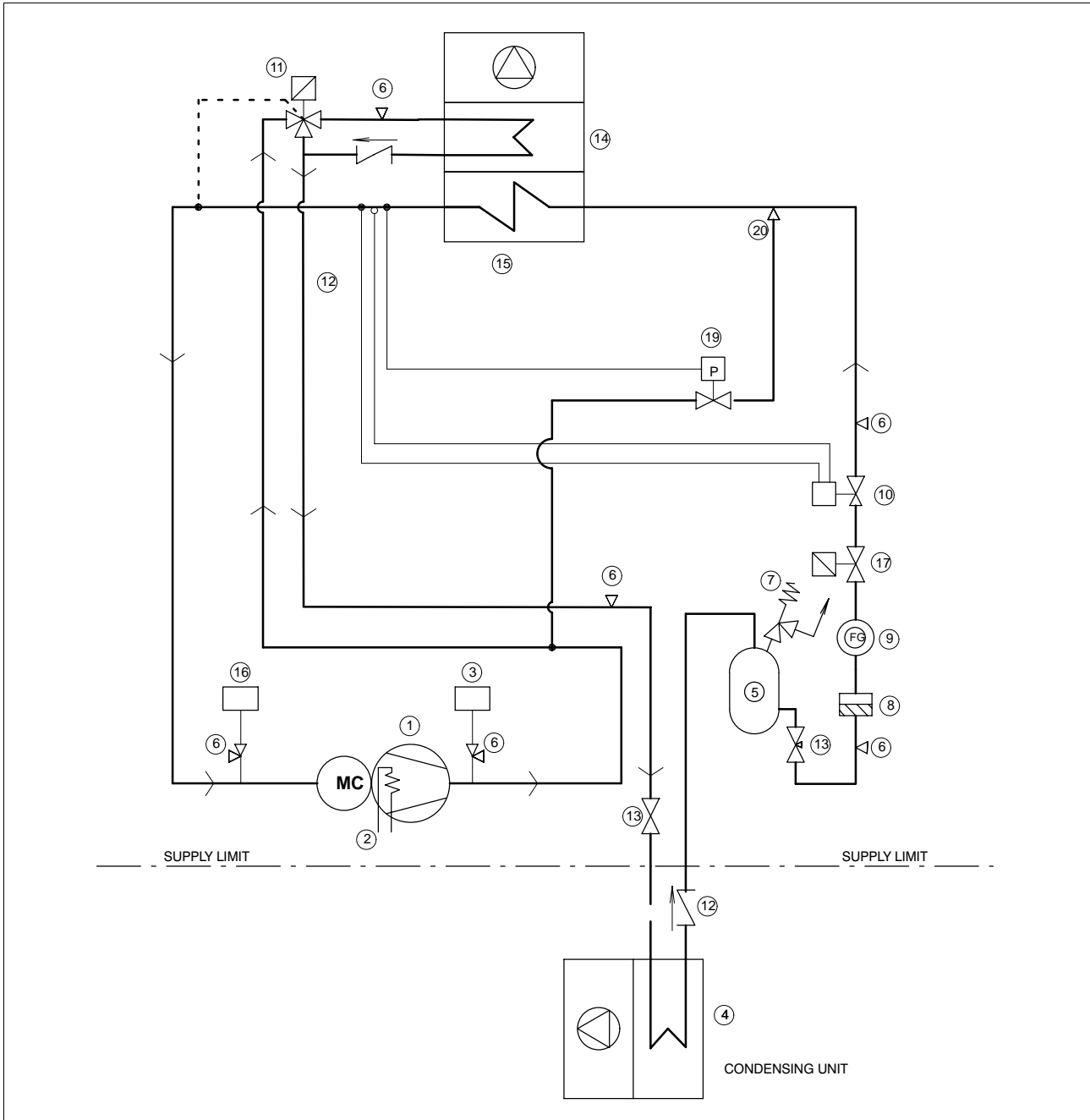


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas solenoid valve ON–OFF (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
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
25	Manual bleed valve
26	Water solenoid valve (by the customer)

## Refrigeration circuits

**Fig. 14. Himod SxxKA, M25KA**

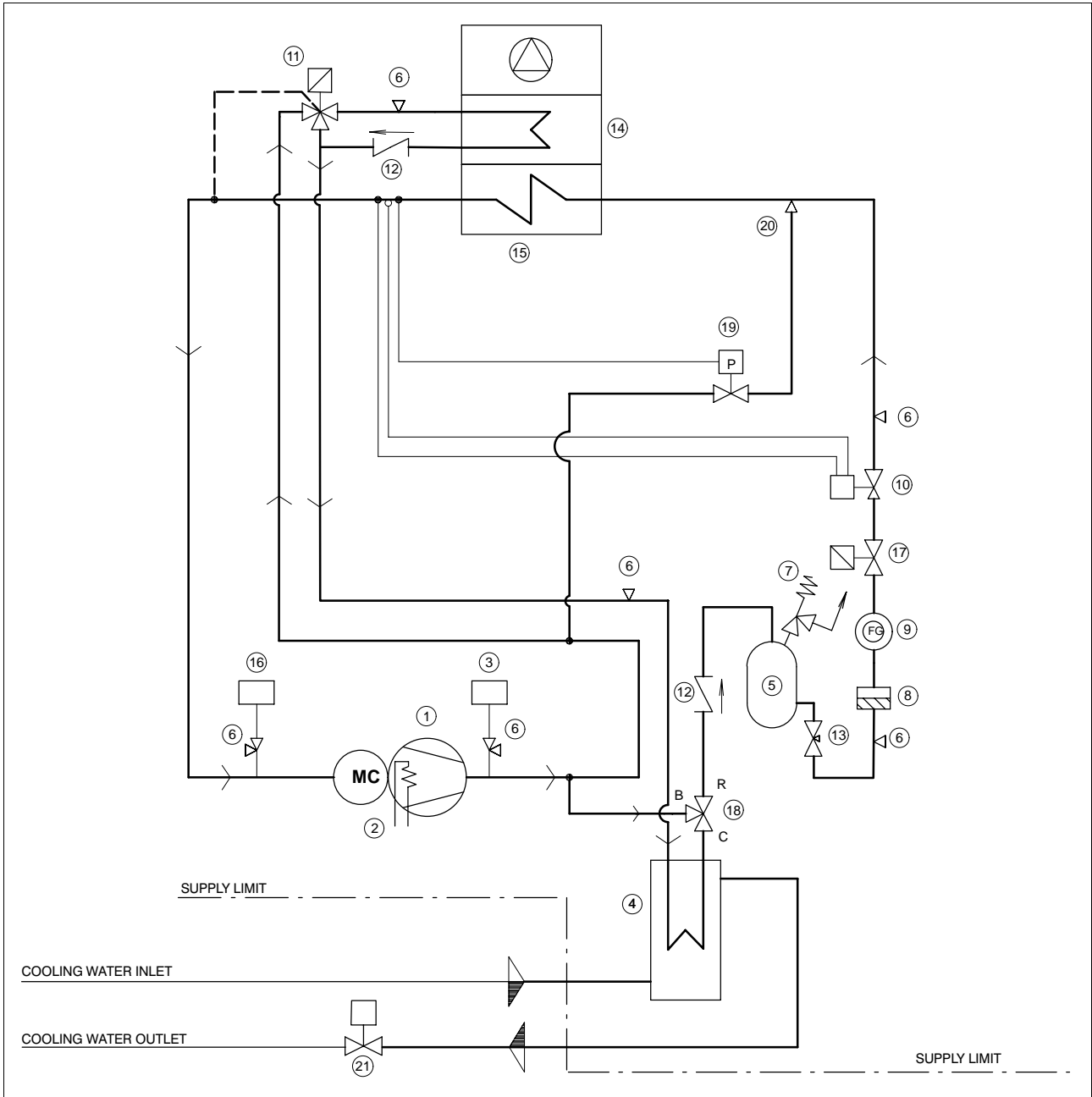


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

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 (antifreeze)
20	Hot gas injector

# Refrigeration circuits

Fig. 15. Himod SxxKW

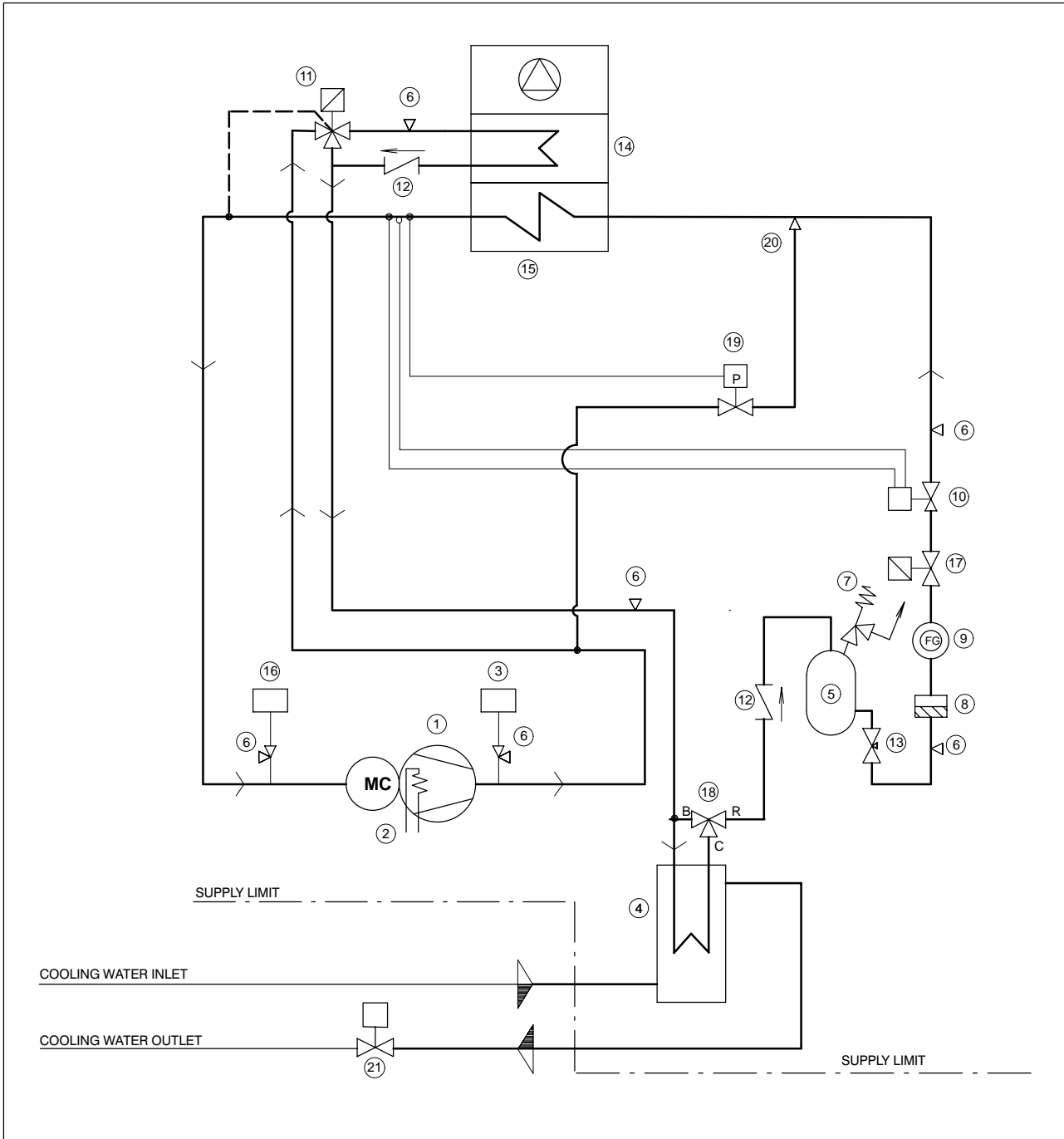


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

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 (antifreeze)
21	Water solenoid valve (by the customer)

## Refrigeration circuits

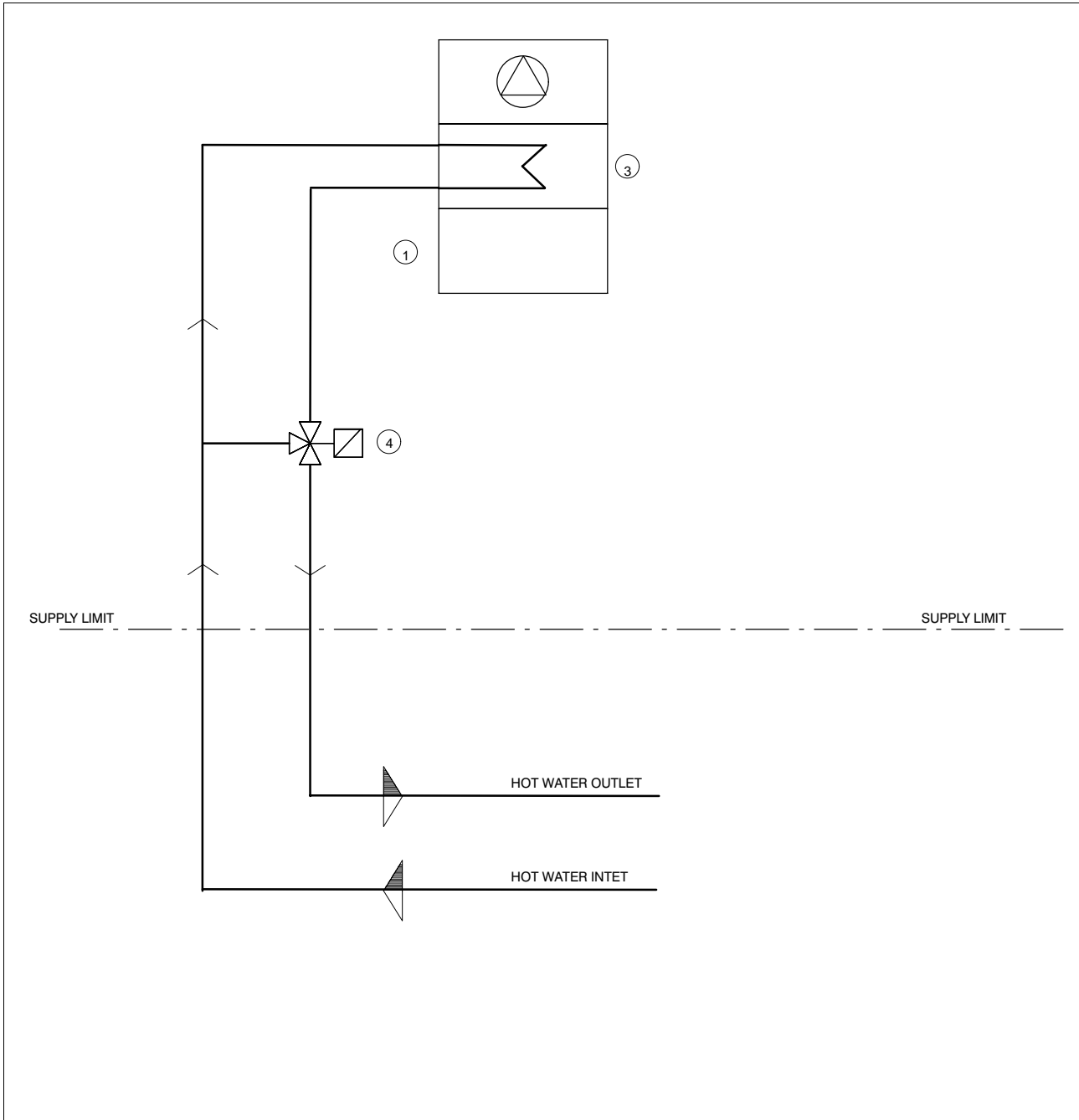
**Fig. 16. Himod M25KW**



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 (antifreeze)
21	Water solenoid valve (by the customer)

Hot water reheating coil – optional



POS.	Optional components
3	Hot water coil
4	Hot water 3-way valve





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**Liebert  
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