Operation Maintenance

AMICO

SDA/W SUA/W
Direct expansion models
0151-0251-0331-0351-0501-0601

SDC/SUC
Chilled water models
0200-0250-0300-0400-0600

R407C 6/22 kW

UNIFLAIR™

Release : 2.4
Date : May 2008
Language :English

EN

Release : 2.4 **Date**: May 2008

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IMPORTANT: the description regarding the Control System and the Operating Logic of the unit are described in the Control System Instruction Manual.

GENERAL CHARACTERISTICS

DOCUMENTATION ENCLOSED WITH THE UNIT

Every unit is supplied complete with the following documentation:

- Installation manual;
- Operation and maintenance manual;
- Microprocessor Control Instruction manual;
- Electrical diagram;
- Spare parts list
- CE declaration with list of European directives and norms to which the unit conforms
- Guarantee conditions.

UNIT DESCRIPTION AND INTENDED USE OF THE UNIT

Direct expansion precision air conditioning AMICO units (SDA-SDW, SUA-SUW) or chilled water AMICO units (SDC, SUC) are designed for high-technology applications such as computer rooms, telephone exchanges, control rooms, laboratories and clean rooms.
Air-cooled direct-expansion units must be connected to UNIFLAIR 'CAL'-series condensers.

AMICO units are fully assembled and tested in the factory and are built for applications where safety and reliability cannot be compromised.

ACTIVE SAFETY
UNIFLAIR control systems provide monitoring and prevention functions via:

- function status indication
- continuous reading and display of the temperature measured by the sensors.
- indication of fault and alarm situations
- automatic stopping of unit components in the event of risk;
- (for Direct expansion units) compressor management to reduce the start-up frequency of each compressor and to avoid compressors being started at the same time.

PASSIVE SAFETY
The essential functions of UNIFLAIR air conditioning units are protected against faults and potentially dangerous conditions the control systems which includes:

- (for Direct expansion units) high and low-pressure pressostats to protect the refrigerant circuit (HP with manual re-set);
- low airflow differential pressostat
- safety thermostat on units with electric heater
- (for Directy expansion units) compressor electric motor protection.

PERSONAL SAFETY
The design and wiring of UNIFLAIR air conditioning units conform to 2006/95/EEC electrical norms. The electrical panels, are equipped with an auxiliary 24V circuit and include individual short circuit protection using automatic circui

DATA PLATE

The units identification plate is located in the electrical panel compartment and gives the following information:

- Model and unit serial number;
- Voltage, number of phases and frequency of the power supply;
- Power absorbed by the unit and the individual components;
- Current absorbed by the unit and by the single components: OA (Operating current), FLA (Full load current) and LRA (Locked rotor current);
- (for Direct expansion models) Settings of the pressure switches of the refrigerant circuit (high and low pressure) and safety valve;
- (for Direct expansion models) Refrigerant type used and charging of refrigerant circuit.

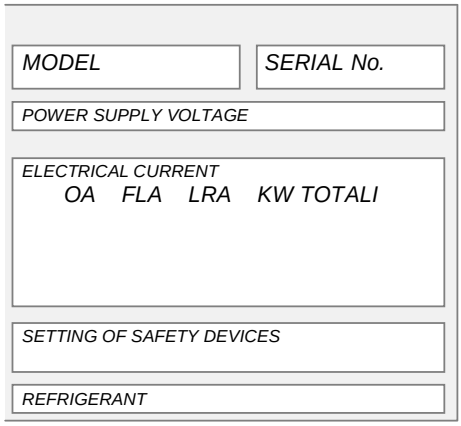


Fig. 1.

START-UP AND COMMISSIONING

EVACUATION OF REFRIGERANT LINES AND REFRIGERANT CHARGING

(Air-cooled models)

Water-cooled units (SDW, SUW) are supplied charged with refrigerant R407C or R22.
Air-cooled units (SDA, SUA) contain a holding charge of dry nitrogen (N_2) to prevent the presence of humidity within the refrigerant circuits. Evacuation and refrigerant charging is the responsibility of the installer who must read carefully the information enclosed in this paragraph.

	R22	R407C
1.	Open any taps located within the machine or system in order to ensure that all of the components will be evacuated;	
2.	Connect a high efficiency vacuum pump to the Schrader connections or to the ¼" SAE connections positioned on the intake and delivery side of the compressors;	
3.	Arrange a connection with a coolant bottle onto the loading connections.	
4.	**Create the vacuum** within the lines whilst maintaining **for a long time** the pressure below 100 Pa absolute (0.7 mm Hg) in order to evacuate the air as well as any trace of humidity.	**Create the vacuum** within the lines whilst maintaining **for a long time** the pressure below 10 Pa absolute (0.07 mm Hg) in order to evacuate the air as well as any trace of humidity.
5.	It is preferable that the vacuum be reached slowly and maintained for a long period of time rather than periods that are too brief. Await a "build-up period" of 100 seconds and check that the pressure has not exceeded 200 Pa absolute.	
6.	Generally, in the case of suspicion of strong hydration of the circuit or extremely extensive system, it will be necessary to proceed to the "breaking" of the vacuum with anhydrous nitrogen and then repeat the evacuation procedure as described.	
7.	Break the vacuum by performing a **preload** from the R22 coolant bottle.	Break the vacuum by performing a **preload in liquid phase** from the R407C coolant bottle.
8.	After having started the compressor, **slowly complete the loading phase** until the pressure within the lines has been stabilised and the gaseous bubbles have disappeared from the flow window;	
9.	The loading process must be controlled in design environmental conditions and with a delivery pressure of approximately 18 bar (equivalent to a saturated temperature of 48°C); in the case of units with on-off condensation controls, avoid switching-on and switching-off the condenser fan, which may partially obstruct the intake surface. *It is wise to check that the sub-cooling of the liquid at the entry of the thermostatic valve is between 3 and 5°C below the condensation temperature read on the scale of the pressure gauge and that the overheating of the vapour at the exit of the evaporator is equal to approximately 5-8°C.*	The loading process must be controlled in design environmental conditions and with a delivery pressure of approximately 18 bar (equivalent to a dew temperature of 48°C and bubble temperature of 43°C); in the case of units with on-off condensation controls, avoid switching-on and switching-off the condenser fan, which may partially obstruct the intake surface. *It is wise to check that the sub-cooling of the liquid at the entry of the thermostatic valve is between 3 and 5°C below the condensation temperature read on the scale of the pressure gauge and that the overheating of the vapour at the exit of the evaporator is equal to approximately 5-8°C.*

Refrigerant	Recommended Oil type (*)		
R22 (Mineral oil)	Suniso 3 GS	Texaco WF 32	Fuchs KM
R407C (POE)	Mobil EAL Arctic 22 CC	ICI EMKARATE RL 32S	

(*) recommended on COPELAND compressors.

In the case where it is necessary create the vacuum on a circuit already loaded with coolant, the first operation to perform is the removal of the coolant from the circuit by means of an appropriate device with a dry compressor which can recover the fluid.

THERMOSTATIC VALVE REGULATION

The expansion valve is regulated by using the regulation screws shown in the diagram below. The regulation of the valve has been pre-set in the factory on SDW and SUW models

- Check that liquid supercooling at the condenser output is around 3°C - 5°C;
- Check that thermostatic valve superheating is around 5°C - 8°C;
- Check that the sensor bulb of the valve is correctly positioned, fixed and insulated.

If superheating is higher than the consented level, increase the valve opening; if it is lower, reduce the opening.

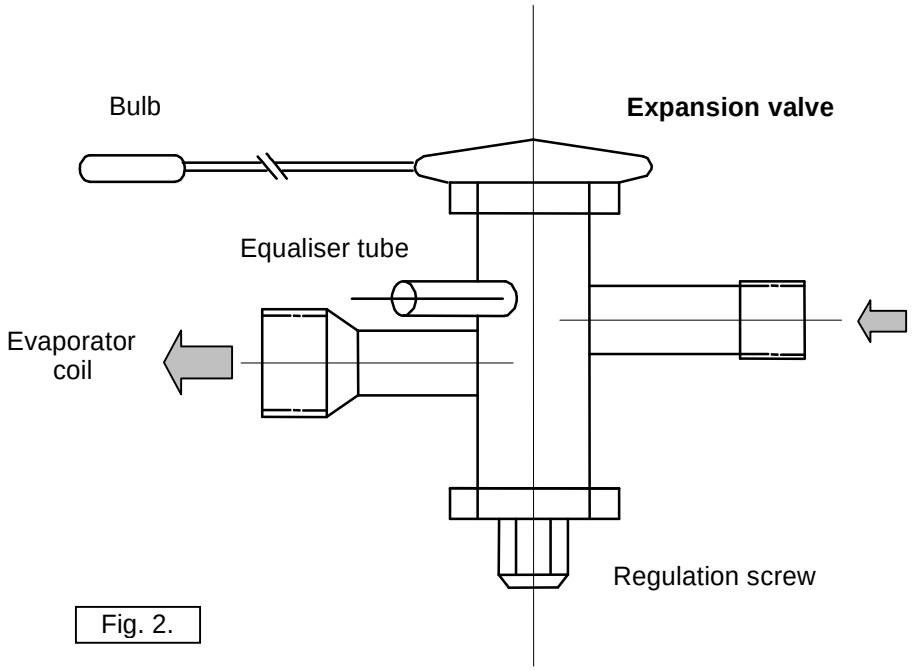


Fig. 2.

The table below shows the approximate changes in superheating resulting from one full turn of the expansion valve regulation screw.

Model AMICO	Valve		Pressure change per turn [bar]	Evaporation Temperature		
				-10°C	0	+10°C
				Change in superheating from one turn [Kelvin]		
0151…0601	TX3	R22	0.25	2.0	1.5	1.2
0151…0601	TX3	R407C	0.25	2.0	1.5	1.2

THERMOSTATIC ELECTRONIC REGULATION : see control manual Mp40

START-UP PROCEDURE

Power up the air-conditioner's control board: close the switch on the machine, set the auxiliary circuits' automatic circuit breaker, supply power and make sure the yellow light on the board or control keypad lights.
Arm all the automatic switches on the electrical panel.

Wait at least 12 hours after having turned on the power supply in order to heat up the oil in the compressors sufficiently (in units with optional crankcase heaters).

Refrigerant liquid may collect in the compressor crankcase during long periods of unit shut-down. At the start of the compressor this may cause foaming of the oil, leading to possible damage due to poor lubrication. It is therefore recommended to leave the power supply on for all but the longest of shut-downs.

Open all shut-off valves on the refrigerant circuits (air-cooled models).
Open all shut-off valves on the refrigerant circuit (on chilled-water models).
Check that power is on to the remote air-cooled condensers.
Check the water flow direction (on water-cooled models.).
Check that the condensation water shut-off valves are open (water-cooled models).
Check that the cooling water circulating pump is working and power is on to the external radiators (water-cooled models).

AT LEAST 12 HOURS AFTER TURNING ON THE POWER SUPPLY:

Start the unit by pressing enter button on the user terminal; after a short delay the fan will start and the symbol on the control panel will appear.

If there is an Alarm signaling also from the red flashing ALARM Key consult the Microprocessor Control instruction manual.

FUNCTION AND REGULATION

WATER-COOLED UNITS

OPEN WATER CIRCUIT

If the cooling water temperature is not controlled and may go below 25°C, a pressostatic valve must be fitted for each condenser; in this case the supply pressure must not go above 200 kPa (2 bar).
IMPORTANT: do not use water cooled by an evaporative tower since the condensers would quickly become blocked with scale.

CLOSED WATER CIRCUIT

The condensers are supplied with water in a closed circuit cooled by external dry-coolers ; check that the diameter of the piping and the performance of the pump are sufficient. An inadequate water flow reduces the performance of the air conditioning unit.
The cooling water temperature must be controlled so that it does not go below 25°C as per fig. 3.
The microprocessor control system can perform this function by; measuring the water temperature with optional sensor A and modulating the valve of the servomotor B or by controlling the fans C of the external dry-coolers.

If the temperature of the cooling water is not controlled, a constant water flow condensation pressure regulation system must be used (available as an option) on each cooling circuit.
IMPORTANT: the cooling water must contain a percentage of ethylene glycol (of the passive, non-corrosive type) in proportion to the likely minimum outdoor temperature.

Percentage of glycol by weight	10%	20%	30%	40%	50%
Freezing temperature	-4°C	-10°C	-17°C	-25°C	-37°C

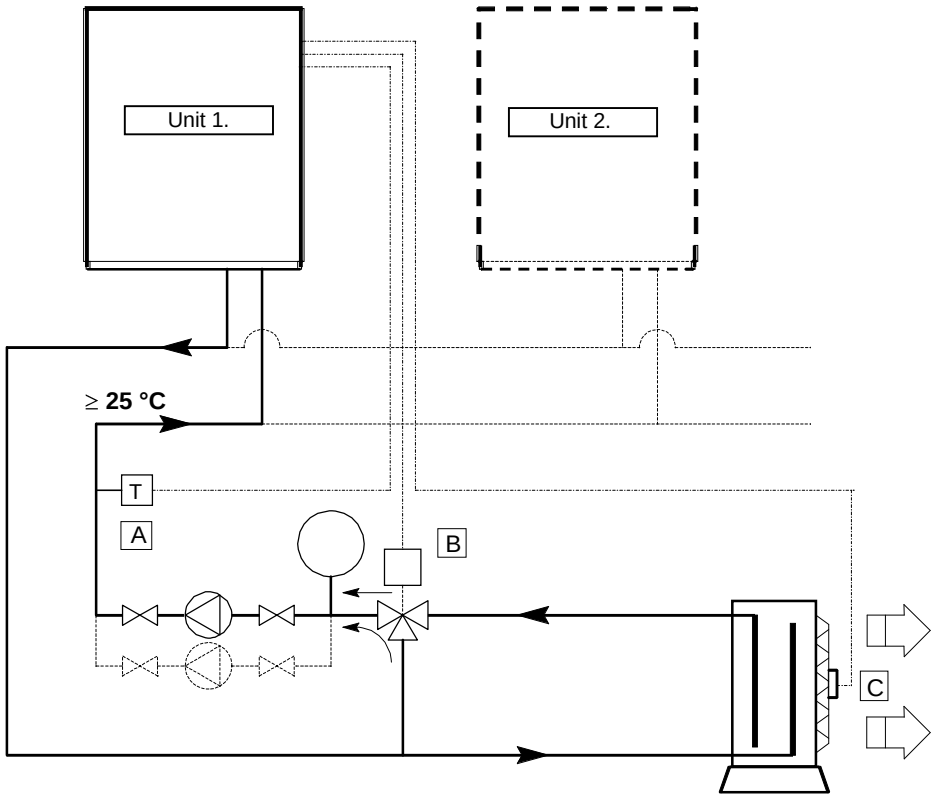


Fig. 3.

MEASUREMENT AND ALARM DEVICES

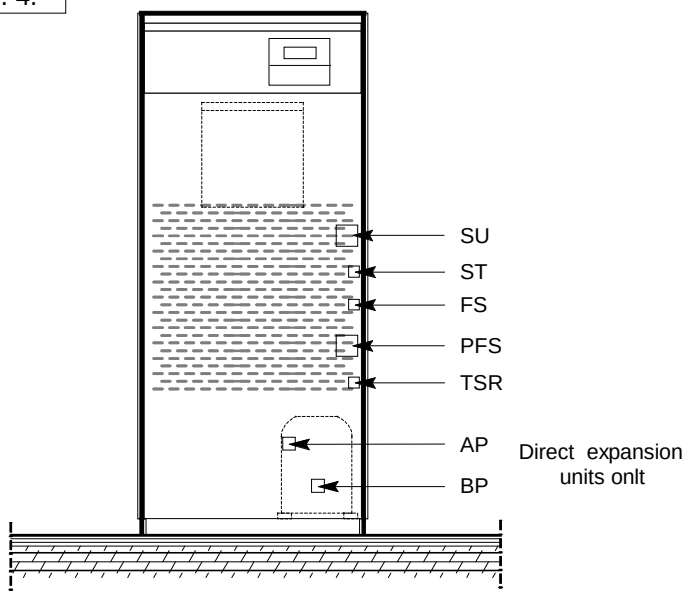
The unit is equipped with the following devices (see fig. 4.):
- **ST Temperature sensor;**
- **STU Room temperature and humidity sensor** (in units with humidity control);
- **FS Air flow sensor** (differential pressure switch);
- **PFS dirty filter sensor** (differential pressure switch);
- **High pressure switch AP** - with manual reset push-button ;
- **Low pressure switch BP** - with automatic re-set;
- **Electric heater safety thermostat TSR**; the re-set button is in the coil housing;

The following optional devices can be connected to the microprocessor control:
- **Under floor water detector** consisting of:

a) **SAS device** inserted in the appropriate socket of the electrical panel;
b) **RAS sensor** (or sensors, connected in parallel) installed at the points to be monitored;

- **High/low room temperature sensor**: to be installed close to the unit;
- **Room temperature and humidity sensor**: to be installed close to the room unit;
- **Fire and smoke sensors** to be installed in the room or under the raised floor, in a low air-speed zone.

Fig. 4.



Some versions might have the following probes:
- **External air temperature** read-only sensor to be installed outdoors, in the shade;
- **Closed circuit water temperature** sensor (for reading and control of water and glycol supply temperature) to be inserted in a measuring point on the water supply pipe to the unit;
- **Hot water temperature** sensor (for reading and control of hot water re-heating) to be inserted in a measuring point on the hot water supply pipe to the unit;
- **Air delivery temperature** sensor for monitoring and regulation of the room unit cooling capacity as a function of the air delivery temperature, to be installed near the fan output.

SLM DELIVERY TEMPERATURE LIMIT SENSOR

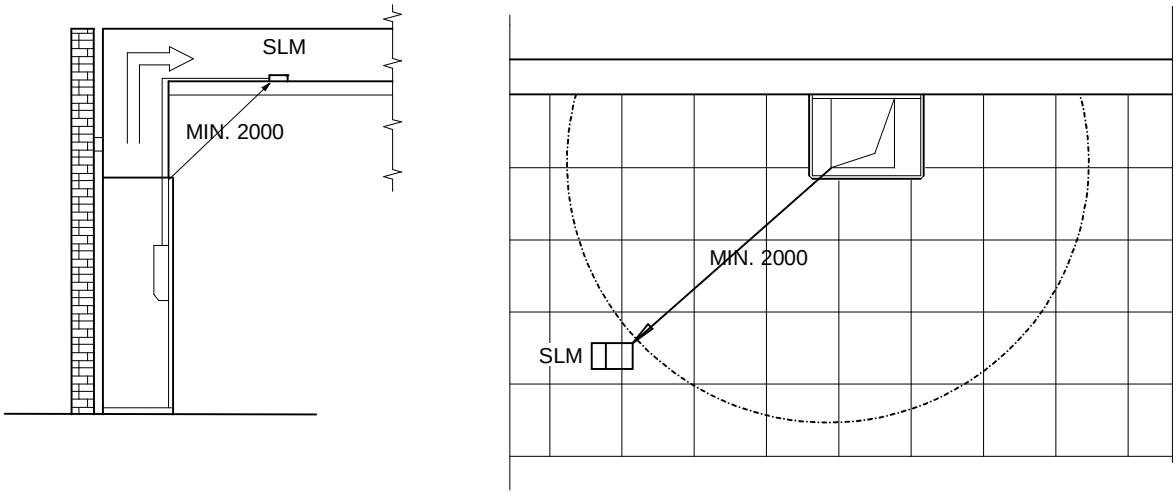


Fig. 5.

REMOTE AIR-COOLED CONDENSER

(regulation of condensation pressure)

Unit condensation pressure must be between:
- minimum 40°C (for correct thermostatic valve function and to avoid freezing of the coil in partial operation);
- maximum 63°C.

in order to control the condensation pressure, remote UNIFLAIR condensers belonging to the CAL series matched with AMICO air conditioners can be fitted with:
- pressostat **PV** which measures condensation pressure and activates the fan of the air-cooled condenser;
- regulator **RV** which modulates the speed of the fan as a function of condensation pressure.

The table below shows the settings of the two systems:

	Description	Intervention	Differential	Reset
PV	Fan Pressostat	18 bar (closing)	4 bar	14 bar
RV	Speed Regulator	20 bar (max. speed)	4 bar	16 bar (min. speed)

When setting the pressostat or the regulator, check the condensation pressure with a manometer connected to the pressure connector of the gas output valve.

SETTING THE PRESSOSTATIC VALVE

(Optional - water cooled models only)

The pressostatic valve controls the water flow to prevent that the condensate pressure falls too low and reduces water consumption.

Set the pressostatic valve with the regulation knob (clockwise to increase the pressure) until the pressure is stable at the recommended value of 17 bar (equivalent to a saturation temperature of around 45°C in the case of R22). Check the pressure with a manometer fitted on the pressure connector of the output valve.

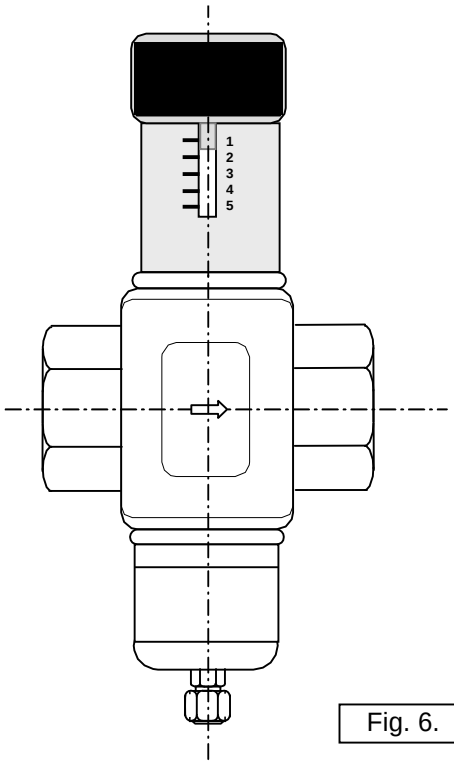


Fig. 6.

SETTING THE REGULATION AND SAFETY DEVICES

After having started the unit, set the following set points :
- **Room temperature:** (cooling and heating set points); see Microprocessor Control Manual;
- **Room relative humidity:** (humidity and dehumidification set point) (C and D versions):see Microprocessor Control Manual;
- **Fan speed:** see section on Fan Speed Regulation;
- **Dirty filter differential pressure switch :** see paragraph 'SETTING THE DIRTY FILTER SENSOR'.

IMPORTANT: The setting of the safety devices are set in the factory, as shown in the table below, and must not be modified.

Check that safety devices are set at the values shown in the table below.

SETTING VALUES

Rif	Description	Intervention	Differential	Re-set
DIRECT EXPANSION MODELS				
AP	HP Pressure switch	27.5 bar (opening)	-	Re-set manual
BP	LP Pressure switch	2.0 bar (opening)	1.5 bar	3.5 bar
T and H VERSIONS				
TSR	Safety Thermostat (optional)	320 °C (opening)	-	Manual reset
WATER-COOLED MODELS				
VP	Pressostatic Valve	15 bar	-	-

MAXIMUM AND MINIMUM WATER TEMPERATURES

Max. and minimum water tempertures for chilled water circuits and for hot water reheat circuits are: 5°C ÷ 90°C. The max. amount of ethylene glycol accepted equal to 50%.

FAN SPEED REGULATION

Fan speed rotation can be adjusted according to environmental factors (a low speed corresponds to low noise levels and reduced unit capacity and vice versa). The fans speed is set between the maximum speed (mains voltage) and a minimum speed , the regulation has been pre-set in the factory.

Models with regulator 4 A

S**0151 S**0251 S**0200 nominal voltage 192V (155V in dehumidification)
S**0300 nominal voltage 200V (170V in dehumidification)
S**0331 S**0250 nominal voltage 205V (180V in dehumidification)

Models with regulator 8 A

S**0351 S**0400 nominal voltage 192V (155V in dehumidification)
S**0501 S**0601 S**0600 nominal voltage 198V (165V in dehumidification)

N.B.: minimum speed is set automatically in units with humidity control during the dehumidification cycle.

With electronic thermostatic valve see control manual Mp40

SETTING THE AIRFLOW SENSOR

The **FS** differential pressostat should intervene if the fan is not working (if the unit has **one** fan only) or if one of the fans is not running (in the case of multiple fans).
Since the difference in pressure between the fan intake and delivery depends on the airflow, it is necessary to set the pressostat after installation, making sure that the contact closes when the fan is in normal operation.

To set the pressostat:
- simulate a fan fault (stop the fan, or one of the fans if multiple); check that the pressostat intervenes;
- if the pressostat does not intervene, gradually lower the setting until it does.

The FS differential pressostat can be set on a scale from 0.5 to 5.0 mbar (from 50 to 500 Pa).

SETTING THE DIRTY FILTER SENSOR

The PFS pressostat must be set as a function of the pressure drop; this depends not only on how dirty the filter is but also on the airflow and therefore on the setting of the fan speed regulator. The setting must be adjusted when the filter is clean:
- set the fan speed regulator at the desired value (see Fan Speed Regulation);
- set the pressostat intervention at 1.5 mbar;
- gradually cover the surface of the air filter and check that the pressostat intervenes when the filter is about 50-60% covered;
- if the pressostat does not intervene, gradually lower its setting; if it cuts in too soon, increase the setting.

TEMPERATURE AND HUMIDITY SENSOR

The number and type of humidity sensors fitted on the units may vary according to the model :
- cooling only (**C**);
- cooling + electric re-heat (**T**);
- cooling + humidity control (humidification + dehumidification) (**D**);
- cooling + electric re-heat + humidity control (**H**).

The figure shows a horizontal temperature and humidity sensor, that must be connected as shown in the electric diagram.

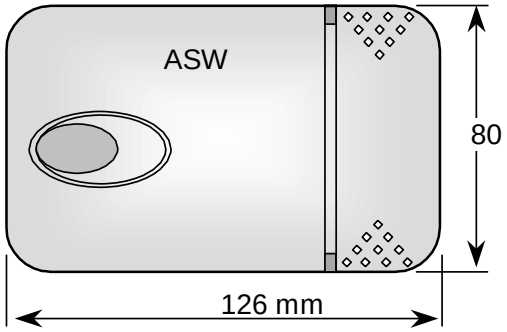


Fig. 8.

VALVE AND SERVOMOTOR

IMPORTANT: Disconnect the power supply before working on the servomotor.

With 24V AC power supply the servomotor moves in accordance with the control signal that varies between 0 and 10V DC. The servomotor automatically stops:

- at the end of its travel;
- in the position corresponding to the control signal;
- in the position in which it is situated whenever power is disconnected.

OPERATION OF SERVOMOTOR SSC619 (with Mp40 Microprocessor Control) AND SSC819 (with mP30 Microprocessor control) *(*)*

The degree of opening of the valve can be checked by looking at the indicator on top of the motor (see detail **A** in the diagram).

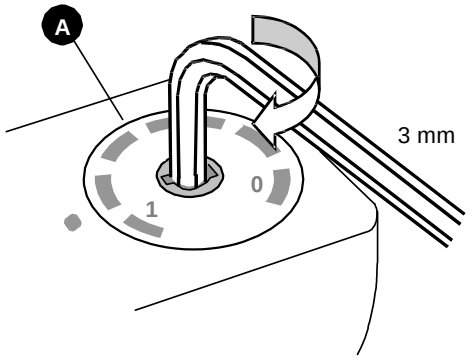
(*) except for units with mP30 version T-H, with hot water valve.

MANUAL EMERGENCY FUNCTION

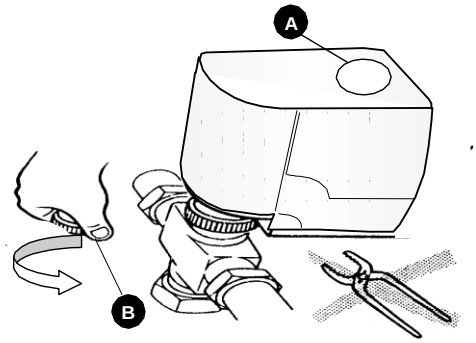
If there is a malfunction in the servomotor or in the control system, the valve can be moved manually by turning the control knob positioned next to the servomotor.

If necessary:

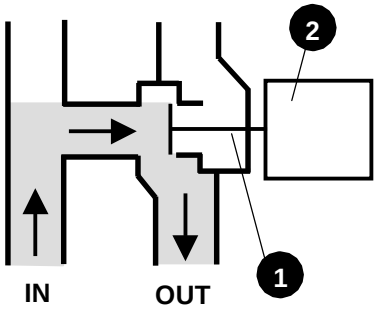
- Turn the knob clockwise to open the valve, and anti-clockwise to close it;



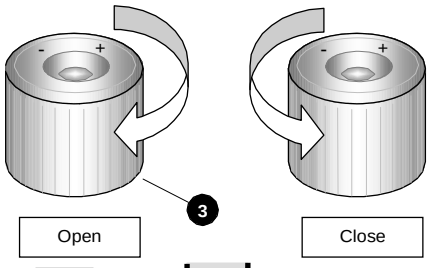
- If necessary remove the servomotor from the valve by unscrewing the locking nut (B); the servomotor is unscrewed manually, no tools are needed;



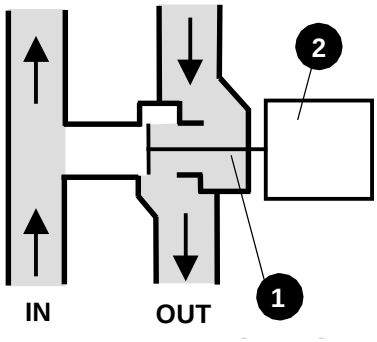
- After having removed the servomotor (**2**) the valve stem (**1**) will be raised completely, excluding the coil from the water flow; in three-way valves the water flow will be completely by-passed;



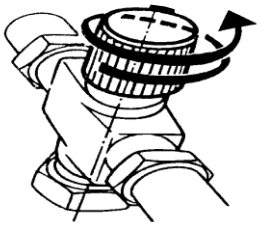
- Install the manual control knob on the valve (**3**); turn the knob clockwise to lower the valve stem (valve open), anti-clockwise to raise the valve stem (valve closed);



- With 3-way valves turn completely the knob and the by-pass will be completely obstructed. The hot water coil will then be supplied 100% by the water flow.



- In order to replace the servomotor: turn the manual control knob anti-clockwise and position the servomotor, then turn it clockwise with the locking nut.



TECHNICAL DATA

GENERAL CHARACTERISTICS

These characteristics refer to standard units and may be different on special or modified versions.

		S*.A-W				SD*	SU*	SD*	SU*
		0151	0251	0331	0351	0501	0501	0601	0601
STANDARD FANS	NUMBER	1	1	1	2	**2**	**3**	**2**	**3**
	NUMBER OF POLES	6	6	6	6	6	6	6	6
HIGH POWER FANS	NUMBER	1	1	1	2	**3**	**3**	**3**	**3**
	NUMBER OF POLES	4	4	4	4	4	4	4	4
COMPRESSOR	NOMINAL POWER (ARI standard) - kW	1.8	2.5	2.9	3.7	4.5	4.5	5.2	5.2
RESIST. ELETTRICHE STANDARD (T-H vers.)	TOTAL POWER kW	2	2	2	3	6	6	6	6
	NUMBER OF ELEMENTS	1	1	1	1	2	2	2	2
HUMIDIFIER	MAX CAPACITY kg/h	1,5	1,5	1,5	1,5	3	3	3	3
	NOMINAL POWER kW	1.5	1.5	1.5	1.5	2.2	2.2	2.2	2.2
HOT WATER VALVE (optional)		1/2”	½”	1/2”	1/2”	3/4”	3/4”	3/4”	3/4”
FUSE F1		5x20 250V 4A - 'F'							
FUSE F3 (WITH OPT. CONDENSATE DRAIN PUMP)		5x20 250V 1A - 'T'							

		S*C				SDC	SUC
		0200	0250	0300	0400	0600	0600
STANDARD FANS	NUMBER	1			2	**2**	**3**
	NUMBER OF POLES	6			6	**4**	**6**
HIGH POWER FANS	NUMBER	1			2	**3**	**3**
	NUMBERO OF POLES	4			4	**4**	**4**
STANDARD ELECTRICAL RE-HEAT (T - H versions)	TOTAL POWER - kW	2		3		6	6
	NUMBER OF ELEMENTS	1		1		2	2
HUMIDIFIER	MAX CAPACITY - kg/h	1,5				3	3
	NOMINAL POWER - kW	1.5				2.3	2.3
CHILLED WATER VALVE		1/2”	3/4”			1”	1”
HOT WATER VALVE (optional)		1/2”				3/4”	3/4”
FUSE F1		5x20 250V 4A - 'F'					
FUSE F3 (WITH OPT. CONDENSATE DRAIN PUMP)		5x20 250V 1A - 'T'					

NOMINAL AIRFLOW

m^3/h (1)	0151	0251	0331	0351	0501	0601
SD*	1580	1580	1940	3020	4970	4970
SU*	1580	1580	1940	3020	4720	4720

(1) *data refers to static delivery pressure of 10 Pa.*

ELECTRICAL DATA

COMPONENTS

		FANS			COMPRESSOR				HEATERS		HUMIDIFIER	
MODEL	VOLTAGE	No.	kW	OA	kW	OA	FLA	LRA	kW	OA	kW	OA
SD* 0151 SU* 0151	230/1 (*)	1	0.25	1.3 (s)	1.8	8.7 (s)	10.0 (s)	55 (s)	2.0	8.7 (s)	1.5	6.3 (s)
SD* 0251 SU* 0251	230/1 (*)	1	0.25	1.3 (s)	2.5	12.1 (s)	15.0 (s)	86 (s)	2.0	8.7 (s)	1.5	6.3 (s)
SD* 0331 SU* 0331	400/3+N	1	0.25	1.3 (s)	2.9	5.0 (t)	5.7 (t)	44 (t)	2.0	8.7 (s)	1.5	6.3 (s)
SD* 0351 SU* 0351	400/3+N	2	0.25	1.3 (s)	3.6	6.2 (t)	6.8 (t)	51 (t)	3.0	13.0 (s)	1.5	6.3 (s)
SU* 0501	400/3+N	3	0.25	1.3 (s)	4.5	7.7 (t)	8.5 (t)	60 (t)	6.0	13 0 (s)	2.2	9.5 (s)
SD* 0501	400/3+N	2	0.57	2.9 (s)	4.5	7.7 (t)	8.5 (t)	60 (t)	6.0	13.0 (s)	2.2	9.5 (s)
SU* 0601	400/3+N	3	0.25	1.3 (s)	5.2	9.3 (t)	10.6 (t)	70 (t)	6.0	13.0 (s)	2.2	9.5 (s)
SD* 0601	400/3+N	2	0.57	2.9 (s)	5.2	9.3 (t)	10.6 (t)	70 (t)	6.0	13.0 (s)	2.2	9.5 (s)

KEY
kW: nominal power;
OA: current absorbed nominal conditions;
FLA: current absorbed maximum conditions
LRA: start-up current.

NOTES
(s): monophase current
(t): triphase current.

(*) for 0151-0251 models , the standard current supplied is monophase 230V/1/50Hz; triphase current is supplied on request 400V/3+N/50Hz.

CURRENT ABSORPTION OF COMPLETE UNIT

		C VERSION		T VERSION *(*)*		D VERSION		H VERSION *(*)*	
MODEL	VOLTAGE	kW	OA	kW	OA	Kw	OA	kW	OA
S*.A-W 0151	230/1	2.1	10.0	2.3	10.0	3.6	16.3	4.1	18.7
S*.A-W 0251	230/1	2.8	13.4	2.8	13.4	4.3	19.7	4.8	22.1
S*.A-W 0331	400/3+N	3.2	6.3	3.2	8.7	4.7	11.3	5.2	13.7
S*.A-W 0351	400/3+N	4.1	8.8	4.1	13.0	5.6	12.5	7.1	19.2
SU.A-W 0501	400/3+N	5.3	11.6	6.8	12.6	7.5	17.2	11.3	20.3
SD.A-W 0501	400/3+N	5.6	12.9	7.1	13.9	7.8	17.2	11.6	21.6
SU.A-W 0601	400/3+N	6.0	13.2	6.8	13.2	8.2	18.8	12.0	21.9
SD.A-W 0601	400/3+N	6.3	14.5	7.1	14.5	8.5	18.8	12.3	23.2

NOTE **:** Maximum current absorption of the most heavily loaded phase in operational conditions;

KEY **VERSION C**: cooling only
VERSION T: cooling + electric re-heat
VERSION D: cooling + humidity control (humidification and dehumidification)
VERSION H: cooling + electric re-heat + humidity control.

(*) data referred to units with standard electric resistances.

IMPORTANT: Units with high capacity electrical resistances all have triphase voltage: 400V/3+N/50Hz.

		FANS			HEATERS		HUMIDIFIER	
MODEL	VOLTAGE	No.	kW	OA	kW	OA	kW	OA
S*C 0200	230/1	1	0.25	1.3 (s)	2.0	8.7 (s)	1.5	6.3 (s)
S*C 0250	230/1	1	0.25	1.3 (s)	2.0	8.7 (s)	1.5	6.3 (s)
S*C 0300	230/1	1	0.25	1.3 (s)	3.0	13.0 (s)	1.5	6.3 (s)
S*C 0400	230/1	2	0.25	1.3 (s)	3.0	13 0 (s)	2.2	9.5 (s)
S*C 0600	230/1	2	0.57	2.9 (s)			2.2	9.5 (s)
	400/3+N				6.0	13.0 (t)		

KEY
kW: nominal power;
OA: current absorption in nominal conditions;

NOTES
(s): monophase current
(t): triphase current.

		C VERSION *(*)*		T VERSION		D VERSION		H VERSION *(*)*	
MODEL	VOLTAGE	kW	OA	kW	OA	KW	OA	kW	OA
S*C 0200	230/1	0.3	1.3	2.3	10.0	1.8	7.6	3.8	16.3
S*C 0250	230/1	0.3	1.3	2.3	10.0	1.8	7.6	3.8	16.3
S*C 0300	230/1	0.3	1.3	3.3	14.3	1.8	7.6	4.8	20.6
S*C 0400	230/1	0.5	2.6	3.5	15.6	2.0	8.9	5.0	21.9
SUC 0600	230/1	0.8	3.9	--	--	3.0	13.4	--	--
	400/3+N	--	--	6.8	12.6	--	--	9.0	22.1
SDC 0600	230/1	1.2	5.2	--	--	3.3	14.7	--	--
	400/3+N	--	--	7.1	13.9	--	--	9.3	23.4

NOTE **:** Maximum current absorbed during heavily loaded phases under operating conditions;

KEY **VERSION C**: cooling only
VERSION T: cooling + electric re-heat
VERSION D: cooling + humidity control (humidification and dehumidification)
VERSION H: cooling + electric re-heat + humidity control.

(*) data referred to units with standard electric resistances.
IMPORTANT: Units with high capacity electrical resistances all have triphase voltage: 400V/3+N/50Hz.

MAINTENANCE

PREVENTIVE MAINTENANCE

The following maintenance operations should be done regularly.

WEEKLY:
- check that room conditions on the control panel display are normal;
- (for Direct expansion units) check the refrigerant charge and the sight flow glass (the presence of a few bubbles is normal);
- check normal room temperature and noise levels of compressor and fans;
- check the air filters; clean or change the filters when the dirty filter alarm comes on;
- check that the power supply voltage is within design limits.

MONTHLY:
- check normal condensation and evaporation pressures;
- check the cylinder and the feed and drain valves of the humidifier: replace the cylinder when the specific alarm comes on (see microprocessor instruction manual);
- check the flow of condensate to the drain;
- check remote condensers or external radiators: remove all foreign objects (leaves, seeds, dust, etc.) uses an air compressor or water;
- check the correct functioning of the chilled water valve (on SDC-SUC models).
- check correct pressostatic valve operation (option for water-cooled models).

YEARLY:
- check that electrical terminals are tight and in good condition;
- check that the concentration of ethylene glycol and passivating inhibitor complies with the supplier's instructions (water-cooled models).

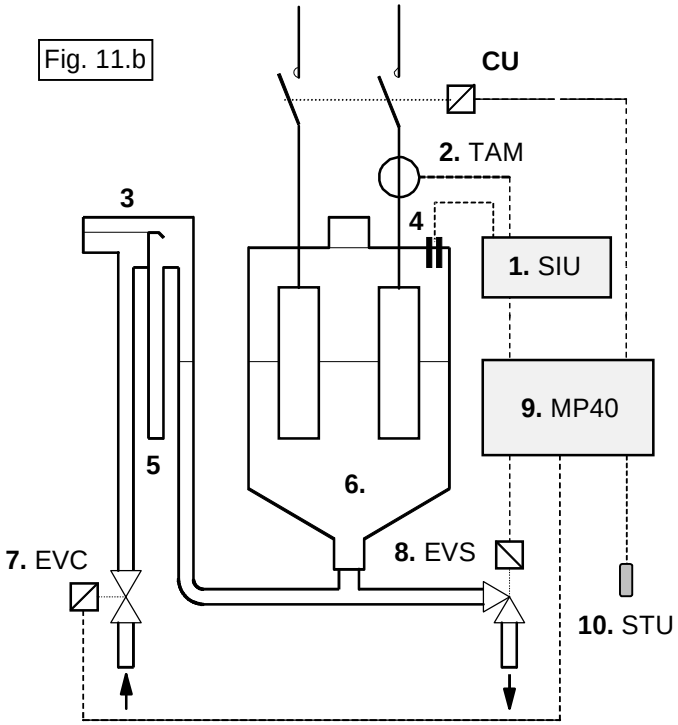
HUMIDIFIER

SYSTEMS COMPONENTS

On request, D and H versions can be fitted with an immersed-electrode humidifier. The steam production group consists of the following components.

1. Humidifier interface board: **SIU**;
   (at internal of the electrical panel) .
2. Current transformer **TAM** for measuring the current flowing between the electrodes in the boiler cylinder;
3. Water supply filling tray;
4. High water level detector electrodes in the boiler cylinder;
5. Overflow pipe;
6. Boiler cylinder;
7. Feed water solenoid valve: **EVC**;
8. Boiler cylinder drain solenoid valve: **EVS**.
9. Control board: **MP40**;
10. Temperature and humidity probe: **STU**;

Fig. 11.b



OPERATING PRIINCIPLE OF THE HUMIDIFIER

In the electrode boiler humidifier, the current flowing between the electrodes in the water in the cylinder generates the heat necessary to boil the water (see fig. 11.).

The rate of current flow, and therefore of steam production measured by the transformer (**2.**), is controlled by controlling both the water level and the concentration of salts in the cylinder (**6.**) by means of the fill (**7.**) and drain (**8.**) solenoid valve.

On a call for humidification, the CU humidifier contact (see electrical diagram) is closed, providing power to the immersed electrodes. When the current falls below the value required as a result of a fall in the water level, the feed water solenoid valve (**7.**) is opened.

The drain solenoid valve (**8.**) is opened at intervals depending upon the characteristics of the feed water supply, in order to mantain the optimum concentration of dissolved salts in the water in the cylinder (**6.**).

The only maintenance required is periodic inspection and cleaning of the steam boiler components. This should be carried out at least once a year, preferably before summer holiday shutdown.

BOILER CYLINDER

Scale deposits must be cleaned periodically from the electrodes and particles of scale must be removed from the filter at the base of the cylinder.

To dismantle the cylinder:

- drain all the water from the cylinder (see the section on Manual Controls in the microprocessor control instruction manual);

- cut the power supply by opening the main isolator on the electrical panel;
- disconnect the steam distributor hose from the top of the cylinder;
- disconnect the power connections to the electrodes by unscrewing the terminal connectors and pull off the connectors of the high level electrodes;
- unclip the cylinder fixing strap ;
- pull the cylinder vertically upwards out of its seat.

The boiler cylinder can be re-used many times after cleaning of the electrodes. However it will eventually require replacement when the electrode meshes are too worn to make further cleaning worth while.
The standard spare part comprises only the cylinder itself .

FILL AND DRAIN CONNECTIONS

Periodic inspections of the fill and drain connections are also advisable in order to guarantee trouble-free operation of the humidifier.
Proceed as follows:
- drain all the water from the cylinder using the MANUAL CONTROL on the microprocessor control;
- cut the power supply by opening the main isolator on the electrical panel;
- disconnect the feed line at the ¾ " connection to the inlet solenoid valve connection;
- extract, clean and replace the filter located inside the solenoid valve connection;
- remove the drain solenoid valve assembly (shown in fig. 13.), clean out the water pathways and remove any particles of scale from the drain syphon.

Fig. 13

PROBLEM SOLVING

Problem solving is made easier by the control panel display, if there is an alarm, consult the Control panel instruction manual. If necessary, call the nearest service **centre describing the nature of the fault displayed on the control.**

PROBLEM	POSSIBLE CAUSE	CHECK / REMEDY
NO POWER (the yellow power line light on the mother board or on the terminal is unlit)	A) No power to the unit electrical panel	Check that power is on and the unit main switch on the electrical panel is closed.
	B) No power to the auxiliary circuit	1) Check that the IM automatic circuit breaker on the AUX circuit is set.
		2) Check the auxiliary circuit 24V fuse.
THE UNIT DOES NOT WORK	A)The control panel does not start the unit.	Check that the control panel connectors are correctly located in their sockets; see control panel instruction manual.
	B) Check the control panel for alarms	See the control panel instruction manual

TEMPERATURE CONTROL

PROBLEM	POSSIBLE CAUSE	CHECK / REMEDY
ROOM TEMPERATURE TOO HIGH (high room temperature alarm)	A) The parameter settings on the control panel are not correct	Check the room temperature setting; see control panel instruction manual.
	B) Lack or zero air flow.	See ”Lack Of Air Flow”.
	C) The compressor does not work when called by the control panel.	See ”The Compressor Does Not Work”.
	D) Insufficient compressor output	See ”Compressor High Output Pressure”, ”Compressor Low Intake Pressure”.
	E) The control system does not work properly	See the control panel instruction manual; check that the control panel and sensors work properly.
	F) Heat load higher than expected.	Check: fresh air conditions and volume, external air infiltration and latent load, particularly with dehumidification.
	G) The 3-way valve is not working	Check the electrical connections of the servomotor valve (see paragr. SERVOMOTOR VALVE)
	H) Insufficient chilled water flow.	Check the chilled water supply; check that the shut-off valves are open.
	I) Chilled water temperature too high	Check the chilled water function.

TEMPERATURE CONTROL

PROBLEM	POSSIBLE CAUSE	CHECK / REMEDY
ROOM TEMPERATURE TOO LOW (Low room temperature alarm)	A) The parameter settings on the control panel are not correct.	Check the room temperature setting; see the control panel instruction manual
	B) Insufficient power supply to the electric heaters or the heaters are not working.	1) Check electric heater operation
		2) Check electric heater power supply
		3) If there is a heater alarm, remove the cause and re-set the safety thermostat
	C) The hot gas coil (if fitted) is not working during dehumidification with re-heat.	1) Check the hot gas three-way valve function
		2) Check the compressor serving the re-heat: see "The Compressor Doesn't Work"
	D) The hot water coil is not working properly.	1) Check the flow of hot water
		2) Check the function of the regulation valve (see Valve and Servomotor).
	E) The control system is not working properly.	See control panel instruction manual; check that control panel and/or sensors work properly.
	F) Thermal leakage higher than expected	Check thermal leakage and entry of external air.
	G) The 3-way valve of the chilled water circuit is blocked open.	Check the functioning of the 3-way valve (see paragr. VALVE AND SERVOMOTOR)

HUMIDITY CONTROL

PROBLEM	POSSIBLE CAUSE	CHECK / REMEDY
ROOM HUMIDITY TOO HIGH (High room humidity alarm)	A) The parameter settings on the control panel are not correct.	Check room humidity settings; see the control panel instruction manual.
	B) Latent load higher than expected	Check: latent load, fresh air conditions and volume, external air infiltration
	C) The compressor does not function during dehumidification.	See "The Compressor Doesn't Work"
	D) Dehumidification valve does not close.	Check the function of the dehumidification circuit solenoid valve.
	E) The control system is not working.	See control panel instruction manual; check that control panel and sensors work properly.
	F) Chilled water not sufficiently cold for the dehumidification function	Lower the chilled water temperature until condensate is present on the surface of the coil.
ROOM HUMIDITY TOO LOW (Low room humidity alarm)	A) The parameter settings on the control panel are not correct.	Check the room temperature setting; see also the control panel instruction manual.
	B) Latent load lower than expected.	Check: quantity of the latent load, fresh air conditions and volume, external air infiltration
	C) The humidifier is not working.	1) Check water supply pressure
		2) Check function of manual control system and steam production group (see microprocessor control manual).
	D) The control system is not working.	See control panel instruction manual; check that control panel and/or sensors work properly.

VENTILATION

PROBLEM	POSSIBLE CAUSE	CHECK/REMEDY
LACK OF AIRFLOW	A) No power to the fans	Check power supply to the fan motors
	B) The filters are dirty	Shake dust out of the cartridge and clean with a vacuum cleaner. Change filter if blocked. Check correct setting of the dirty filter pressostat.
	C) The fans are rotating in the wrong direction	Swap two power supply phases and check correct rotation direction. (See electrical diagrams, RSF phase sequence relay).
	D) The airflow is obstructed	Read the section on Air Distribution
	E) Intervention of fan thermal protection.	Check the resistance of the fan windings. Re-set then measure voltage and current.
	F) The fan speed control is incorrectly set	See Fan Speed Regulation and Setting the Fan Speed Regulator
	G) The pressure drop on the air distribution system (ducts, suspended ceiling, raised floor, etc.) is to high.	1) Check the dimensions and characteristics of the air distribution system
		2) Increase the fan rotation speed (See Fan Speed Regulation)
		3) If the unit has standard 6-pole fans, substitute high-power 4-pole fans.
	H) The control system signals an alarm even though the airflow is correct; the microprocessor control and/or the airflow sensor is not working;	See the microprocessor control manual.

REFRIGERANT CIRCUIT

PROBLEM	POSSIBLE CAUSE	CHECK/REMEDY
HIGH COMPRESSOR OUTPUT PRESSURE	A) Non-condensable air or gas in the circuit, with bubbles in the flow sight glass; supercooling of the liquid is high.	Evacuate the refrigerant circuit and re-charge
	B) Airflow is insufficient or air in the remote condenser is too warm.	1) Check fan operation and rotation direction in the remote heat exchanger. (See condenser/radiator instruction manual).
		2) Remove any obstructions from the remote condenser with compressed air or water.
		3) Check pressure drop if air output is ducted
		4) Check for obstructions to unit airflow and for recirculation of air;
		5) Check that the temperature of the cooling air is within the projected limits
	C) Water flow to remote condenser insufficient or too warm.	1) Check condensation water flow, pressure and temperature;
		2) Check pressostatic valve setting and function.
	D) Too much refrigerant in the circuit; condenser partially flooded. Refrigerant supercooling too high at condenser output	Remove some refrigerant from the circuit.
	E) High-pressure valves partially closed	Check the opening of the valves.

REFRIGERANT CIRCUIT

PROBLEM	POSSIBLE CAUSE	CHECK/REMEDY
HIGH PRESSURE PRESSOSTAT INTERVENES	A) The condensation pressure control system is not functioning efficiently. (air-cooled models).	1) Check condenser fan and fuses; re-set or replace the faulty fans;
		2) Check setting and function of the condenser fan pressostat and the speed regulator
	B) The HP pressostat is incorrectly set.	Re-set the pressostat to the value shown on the unit data plate.
	C) System output pressure is too high.	See High Compressor Output Pressure
LOW COMPRESSOR OUTPUT PRESSURE	A) The condensation pressure control system is not working (see microprocessor control instruction manual).	1) Check the function and setting of the condenser fan pressostat and speed regulator
	B) Water flow to the condenser is too high or too cold.	1) Check the temperature of the water supply to the condenser
		2) Check the setting and function of the pressostatic valve (if fitted)
		3) Install a pressostatic regulation valve to control the water flow as a function of condensation pressure.
	C) Intake pressure too low	See Low Compressor Intake Pressure.
HIGH COMPRESSOR INTAKE PRESSURE	A) Thermal load higher than expected	Check: room thermal load especially during dehumidification; the flow and conditions of external air; external air leaks
	B) System output pressure is too high	See High Compressor Output Pressure
	C) Too much refrigerant in the circuit	Remove some refrigerant from the circuit.
	D) Liquid refrigerant return to compressor intake	Check correct thermostatic valve superheating (around 8-10°C); Check that the valve sensor bulb is correctly positioned, fixed and insulated
LOW COMPRESSOR INTAKE PRESSURE (possible freezing of the coil)	A) Room temperature too low	See "Room temperature too low"
	B) Low or zero airflow	See "Lack of airflow"
	C) Liquid receiver output valve not fully open	Check the opening of the valve
	D) Refrigerant filter blocked	Check the refrigerant filter
	E) Thermostatic valve incorrectly set or defective	Check correct thermostatic valve superheating (around 8-10°C); Check that the valve sensor bulb is correctly positioned, fixed and insulated.
	F) Insufficient refrigerant charge	Check for leaks and re-charge the unit until supercooling at the condenser output is 3-5°C.

REFRIGERANT CIRCUIT

PROBLEM	POSSIBLE CAUSE	CHECK/REMEDY
COMPRESSOR INTAKE LP PRESSOSTAT INTERVENES (low compressor intake pressure)	A) Thermostatic valve incorrectly set or defective	Check that superheating of the thermostatic valve is correct (around 8-10°C).
	B) The filter dryer cartridge is dirty	Check whether the cartridge needs to be changed; temperature difference before and after the cartridge should be less than 2°C.
	C) The low pressure pressostat is incorrectly set.	Re-set low pressure pressostat.
	D) System output pressure is too low	See “Low compressor output pressure”.

COMPRESSORS

PROBLEM	POSSIBLE CAUSE	CHECK/REMEDY
THE COMPRESSOR DOESN’T WORK	A) Short circuit protection has intervened	Re-set the automatic switch and check the cause of the short circuit. Before starting the compressor check the resistance and continuity of the compressor winding.
	B) Intervention of compressor’s internal protection	See Compressor Internal Protection has Intervened
	C) The contactor is not working	Check the contacts and the contactor coil.
COMPRESSOR INTERNAL PROTECTION INTERVENES	A) A phase is missing	Check the resistance of the compressor winding. After re-setting, measure the voltage and current of the three phases.
	B) The motor is overloaded	Check that unit is operating within normal limits
	C) Power supply voltage too high or too low	Check that the difference between the three power supply phases is less than 2%. With monophase units, voltage must be within -10% and +6% of the nominal value.
	D) The rotor is blocked	Replace the compressor
THE COMPRESSOR IS NOISY	A) The compressor is damaged	Call an authorised service centre to replace the compressor.
	B) Liquid return to the compressor	Check expansion valve function and superheating.

ELECTRIC RE-HEAT

PROBLEM	POSSIBLE CAUSE	CHECK / REMEDY
ELECTRIC HEATER SAFETY THERMOSTAT INTERVENES	A) Insufficient airflow	See Low Airflow
	B) Thermostat connection wire is interrupted	Check the continuity of the connection between the safety thermostat and the control system
	C) The safety thermostat is faulty	Change the thermostat.

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