PURIFICATION SOLUTIONS

Refrigerated air dryers

NRC 0250÷2000 UL

OPERATING AND MAINTENANCE MANUAL

Our contact details:
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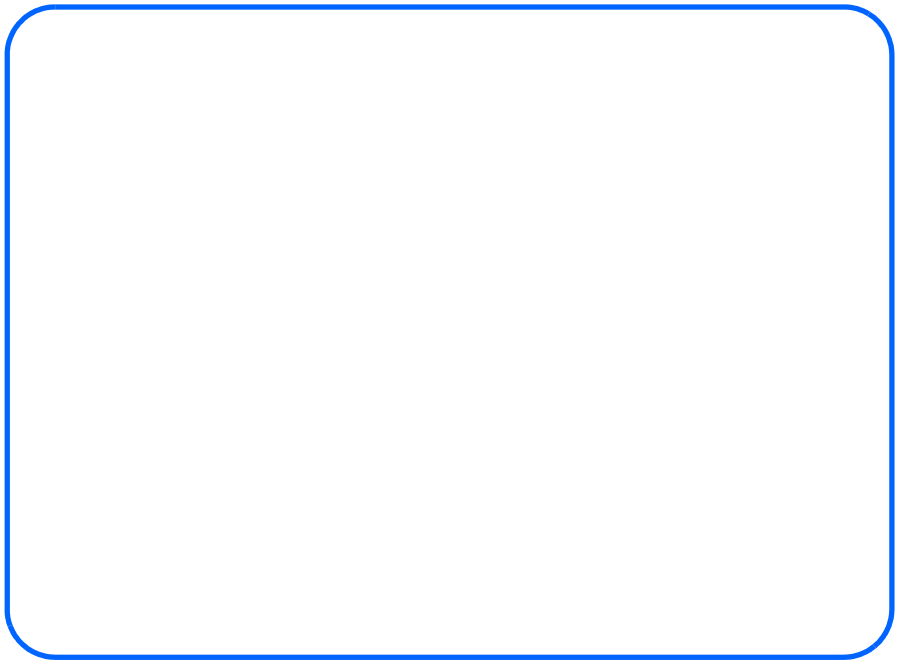
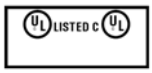


CONTENTS

English

CHAPTER 1

GENERAL INFORMATIONS

The units described in this manual are called “dryers”.
They are designed to dry a “compressed gas” flow.
These dryers are equipped with a refrigeration circuit for cooling the compressed air to the temperature called “pressure dew point”.
In most applications the gas to be dried is the “compressed air” and this is why this term will be used even if the gas to be dried is different.
Furthermore, the term “pressure” will be used to indicate the relative pressure.
The electrical panel has been designed following UL508A standard rule (Industrial Control Panels), homologated with UL file number E249753 and marked 

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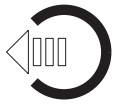
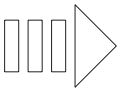
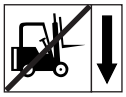
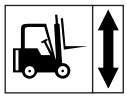
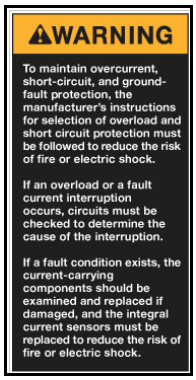
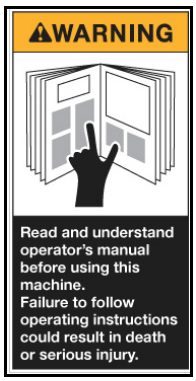
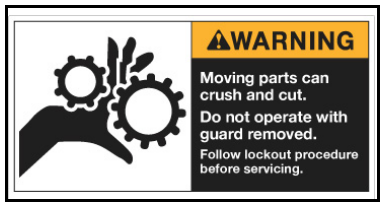
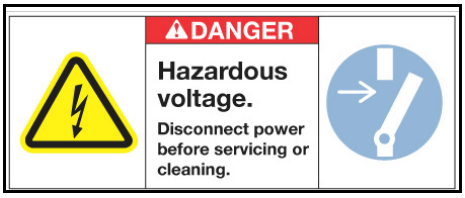
The following general symbols are shown on the stickers on the unit as well as on the dimensional drawings and refrigeration circuits in this manual.
Their meaning is the following:

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	Unit air inlet		Unit air outlet
	Cooling water inlet (for water-cooled units)		Cooling water outlet (for water-cooled units)
	Condensate drain		Flow of cooling air (air-cooled models)
	Direction of fan rotation (air-cooled units)		Direction of flow of refrigerant gas
	Prohibition of using inserting lift truck forks to handle the unit in the point where the symbol appears		Indication of the axis to refer to in unit lifting operations

English

The following warning symbols are shown on the stickers on the unit.
If requested, the same stickers are available also in French.
Their meaning is the following:

WARNING SYMBOL	DESCRIPTION	WARNING SYMBOL	DESCRIPTION
	To maintain overcurrent, short-circuit, and ground-fault protection, the manufacturer's instructions for selection of overload and short circuit protection must be followed to reduce the risk of fire or electric shock. If an overload or a fault current interruption occurs, circuits must be checked to determine the cause of the interruption. If a fault condition exists, the current-carrying components should be examined and replaced if damaged, and the integral current sensors must be replaced to reduce the risk of fire or electric shock.		Hazardous voltage. All doors must be closed before energizing the panel.
	Read and understand operator's manual before using this machine. Failure to follow operating instructions could result in death or serious injury.		Moving parts can crush and cut. Do not operate with guard removed. Follow lockout procedure before servicing.
		Hazardous voltage. Disconnect power before servicing or cleaning.	

ATTENTION

This manual gives the user, the installer and the maintenance technician all the technical information required to install, commission and operate the dryer and carry out the routine maintenance operations to ensure maximum service life.
Use only original spare parts when carrying out routine maintenance or repairs.
For all INFORMATION or requests for SPARE PARTS concerning the dryer please contact your distributor or the nearest service centre, providing the SERIAL NUMBER and TYPE of the unit shown on the data plate as well as on the first page of this manual.

CHAPTER 2

SUMMARY OF POSSIBLE CONFIGURATIONS

The configuration of the unit to which this manual is attached was established in the quotation.
The Table 1 helps users to understand some of the descriptions contained in this manual (see Chapter 5, Chapter 9, Chapter 10 and Chapter 11), wherever it is necessary to precisely establish the characteristics that differentiate a determined dryer from another.
The Table 1 shows all the possible configurations for each model and must therefore be interpreted using both the quotation data and the drawings attached to this manual.

Characteristic	MODELS									
	DE 0250	DE 0325	DE 0425	DE 0520	DE 0600	DE 0700-0800	DE 1000	DE 1220	DE 1600	DE 2000
Power supply single phase at 60Hz	•	•								
Power supply three-phase at 60Hz	•	•	•	•	•	•	•	•	•	•
Electr. board. units at 60Hz: tDry	•	•	•	•	•	•	•	•	•	•
Timing condensate discharge system	•	•	•	•	•	•	•	•	•	•
Intelligent condensate discharge system CDE1610	•	•								
Intelligent condensate discharge system CDE2050			•	•	•	•	•	•	•	•
Thermostat									•	•
HP pressure switch with automatic reset	•	•	•	•	•	•	•	•	•	•
LP pressure switch		•	•	•	•	•	•	•	•	•
PV pressure switch		•	•	•	•	•	•	•	•	•
Condensation with air	•	•	•	•	•	•	•	•	•	•
Condensation with water	•(2)	•(2)	•(2)	•(2)	•(2)	•(2)	•(2)	•(2)	•(2)	•(2)

Table 1 UNIT CONFIGURATIONS

(2) special layout

CHAPTER 3

SAFETY

ATTENTION

This unit has been designed to be safe when used for the purpose for which it was intended provided it is installed, started up and serviced in accordance with the instructions contained in this manual.
The unit contains electrical components operating at mains voltage as well as moving parts, such as fans. It must therefore be disconnected from the mains supply network before being opened.
All maintenance operations which require the unit to be opened may only be carried out by expert or sufficiently trained people with a perfect knowledge of the necessary precautions and directed by a qualified supervisor, wherever possible.

3.1 General

The user should make sure that all the personnel connected with operating and servicing the dryer and auxiliary equipment have read and understood all the warnings, cautions, prohibitions and notes indicated both in this manual and on the unit.

If the user makes use of operating procedures, instruments or methods of working which are not specifically recommended, he must ensure that the dryer and auxiliary equipment will not be damaged or made unsafe and that there are no risks to people or property.
Any improper use of the machine will relieve the manufacturer from any liability for possible personal injury or property damage.
Arbitrary modifications made to the unit will automatically invalidate all forms of guarantee provided by the manufacturer.

3.2 General precautions

3.2.1 Compressed gases to be dried

Compressed gases to be dried should be compatible with the materials used to build the unit (carbon steel, cast iron, copper and its alloys) and may be air, nitrogen, argon and helium, for example.

ATTENTION

In any case they must not cause corrosion dangerous for the pressure vessels and fire in event of leakage.

3.2.2 Precautions when using compressed air

If using compressed air for cleaning purposes, make sure safety regulations are followed and appropriate clothing and eye protection is worn.
Never direct compressed air towards your skin or other people.
Never use compressed air to remove dirt from clothing.
Before releasing compressed air through a hose make sure that the free end is held securely so that it cannot whip and cause injury.

3.2.3 Lifting and transport precautions

Make sure that all chains, hooks, shackles and slings are in good condition and are of the correct capacity: they must be tested and approved according to local safety regulations.
Cables, chains or ropes must never be applied directly to eyebolts.
Arrange the lifting cables so that there are no sharp bends.
Use a spreader bar to avoid side loads on hooks and eyebolts.
While a load is being lifted, keep clear of the area beneath and around it.
Keep lifting acceleration and speed within safe limits and never leave a load hanging on a hoist for longer than is necessary.
The units must be moved in accordance with the attached diagrams (please consult the final part of this manual).
The manufacturer does not supply bars, belts and lifting hooks with the unit.

ATTENTION

The weights of the units are shown on their data plates and on the top side of the packaging.

3.2.4 Precautions during installation and operation

For connections to the mains power supply, please see Chapter 6 “Installation“. and the wiring diagrams.
Check the direction of rotation of electric motors (three-phase fans) when starting up the unit for the first time and after any work on the electrical connections or switch gear.
All piping must be painted or clearly marked in accordance with local safety regulations.
Never remove or tamper with the safety devices, guards or insulation material fitted to the unit or auxiliary equipment.
The unit and auxiliary equipment must be earthen and protected by fuses against short-circuits and overloading.
When mains power is switched on, lethal voltages are present in the electrical circuits and the greatest of care must be taken whenever it is necessary to do any work on the electrical system.
Do not open any electrical panels while voltage is applied unless this is necessary for measurements, tests or adjustments.
This job should only be carried out by a qualified electrician equipped with the proper tools and wearing appropriate personal protection equipment against electrical hazards.

3.2.5 Maintenance and repair precautions

When disposing of parts and waste material of any kind take care not to pollute drains or water-course.
Do not burn any waste which could cause air pollution.
Protect the environment by using approved storage methods.
If replacement parts are needed always use original spares.
Keep a written record of all maintenance and repair work carried out on the unit and auxiliary equipment.
The frequency and the nature of the work required over a certain period may give rise to adverse operating conditions which should be corrected.
Use only refrigerant gas specified on the data plate of the unit.
Make sure that all operating and maintenance instructions are strictly followed and that the complete unit, with all accessories and safety devices, is kept in good working order.
Regularly check the accuracy of pressure and temperature gauges.
Replace them when acceptable tolerances are exceeded.
Keep the machine clean at all times.
During maintenance and repair work, protect components and exposed openings by covering them with clean cloths.
Precautions must be taken when carrying out welding or other repair operations which generate heat, flames or sparks.
Always protect nearby components with non-flammable material.
Never carry out welding or other repair operations which generate heat close to a component containing oil.
Before carrying out these operations the systems must first be thoroughly purged and cleaned, preferably by steam cleaning.
Never weld or otherwise modify a pressure vessel.
To prevent increases in working temperatures and pressures, inspect and clean the heat transfer surfaces (e.g. condenser cooler fins) at regular intervals.
Prepare a suitable cleaning schedule for each unit.
Do not damage safety valves and other pressure relief devices.
Do not clog these components with paint, oil or accumulated dirt.
Never use a light source such as a naked flame to inspect the inside of the unit.
Before dismantling any part of the unit ensure that all heavy movable parts are secured, and that power supply has been disconnected.
After completing a repair, make sure no tools, loose parts or rags are left inside the machine.
Check the direction of rotation of electric motors (three-phase fans) when starting up the unit for the first time and after any work on the electrical connections or switch gear.
Put back all guards after carrying out repair or maintenance work.
Do not use flammable liquid to clean components while the unit is working.
If non-flammable chlorinated hydrocarbon fluids are used for cleaning, safety precautions must be taken against the release of toxic vapors.

Before removing any panels or dismantling any part of the unit, carry out the following operations:

- Disconnect the power cable of the unit from the mains electricity supply.
- Lock the main switch, if present, in the “OFF” position with a padlock.
- Attach a warning label to the main switch (if present) reading: “WORK IN PROGRESS - DO NOT SWITCH ON”.
- Do not switch on the mains electricity supply or attempt to start the unit if a warning label is attached.

Coloured tracers can be used in service-maintenance operations.
Inspect all refrigerant circuit joints including connectors, flanges, and more generally all critical points (open joints) in order to prevent possible leakage of refrigerant gas.

3.3 Refrigerant gases

Only R134a is used as refrigerant in these dryers.
The manufacturer's instructions and local safety regulations should always be observed when handling and storing refrigerant gas cylinders.

3.3.1 R134a safety card

PHYSICAL AND CHEMICAL PROPERTIES	
Name:	R134a (1,1,1,2 - tetrafluoroethane)
Colour:	Colourless
Odour:	Similar to ether
Boiling point:	-26.5°C / -15.7°F at atmospheric pressure
Flammability:	Non-flammable
Relative density:	1.21 kg/l (0.0437lbs/in) at 25°C / 77°F
Water solubility:	0.15% in weight at 25 °C / 77°F and atmospheric pressure
STABILITY AND REACTIVITY	
Stability:	No reactivity if used in compliance with the instructions
Substances to be avoided:	Alkaline metals, alkaline-earth metals, granulated metal salts, Al, Zn, Be, etc. in powder form
Dangerous decomposed products:	Halogens acids, carbonyl halide traces

	TOXICOLOGICAL INFORMATION
Acute toxicity:	ALC/inhalation/4 hours/ on rat = 567 ml/l
Local effects:	Concentrations higher than 1000 ppm v/v may cause narcotic effects. Inhalation of a high concentration of decomposing products may cause respiratory problems (pulmonary oedema)
Long-term toxicity:	No carcinogenic, teratogenic or mutagenic effects shown during tests on animals
Specific effects:	A rapid evaporation of the liquid may cause ice
	ECOLOGICAL INFORMATION
Potential global heating HGWP (R11=1):	0.28
Potential ozone impoverishment ODP (R11=1):	0
Disposal considerations:	Can be re-used after reprocessing
	HAZARD INDICATIONS
Main hazards:	Asphyxia
Specific hazards:	Unknown
	FIRST-AID PRECAUTIONS
Inhalation:	Take the patient outdoors. If necessary give oxygen or artificial respiration. Never give adrenaline or similar substances
Contact with eyes:	Rinse the eye thoroughly with water for at least 15 minutes. Seek medical attention
Contact with skin:	Wash immediately with water. Remove contaminated clothing
	FIRE PRECAUTIONS
Means of extinction:	Any one
Specific hazards:	Pressure increase
Specific methods:	Cool the containers by spraying water
	PRECAUTIONS IN CASE OF ACCIDENTAL LEAKAGE
Individual precautions:	Evacuate personnel to safety areas. Proper ventilation is required. Use personal protection equipment
Environmental precautions:	Evaporate
Cleaning methods:	Evaporate
	HANDLING AND STORAGE
Handling:	Technical precautions: only use in ventilated areas.Safety recommendations: leakage test. Do not carry out pressure tests using an air/R134A mixture. When mixed with air it can become a combustible at a higher than atmospheric pressure when the volume ratio is higher than 60%
Storage:	Technical precautions/storage method: close carefully and keep in a fresh, dry and well ventilated place
	INDIVIDUAL EXPOSURE/PERSONAL PROTECTION
Control parameters:	1000 ppm v/v or ml/m3 as the weighted average over 8 hours
Respiratory protection:	For rescue operations and when carrying out maintenance work on vessels suitable for R134A use an independent breathing apparatus. Vapors are heavier than the air, and they therefore could cause suffocation by reducing the oxygen available for breathing
Protection for eyes:	Safety goggles
Protection for hands:	Rubber gloves
Hygiene protection:	Do not smoke

CHAPTER 4

TECHNICAL DATA

4.1 Data plate and meaning of abbreviations

The main technical data of the dryer are indicated on the data plate:

MODEL and CODE	The model number and the code identify the size of the unit and the type of construction.
MANUAL	Code number of this manual.
SERIAL NUMBER	Serial or construction number of the unit.
YEAR OR CONSTRUCTION	Year in which final testing of the unit took place.
VOLTAGE/PHASE/FREQUENCY	Power supply characteristics.
SHORT CIRCUIT CURRENT	Short circuit current
HIGHER MOTOR FLA	Max. absorbed current.
MAX. CONSUMPTION (I max)	Sum of FLA values of all loads.
INSTALLED POWER (P max)	Sum of max. powers of all loads.
PROTECTION DEGREE	As defined by UL508A and EN60529.
WIRING DIAGRAM	Number of wiring diagram.
REFRIGERANT	Type of refrigerant in the unit.
QUANTITY OF REFRIGERANT	Quantity of refrigerant contained in the unit.
MAX. COOLING PRESSURE	Rated pressure of refrigeration circuit.
MAX. COOLING TEMPERATURE	Rated temperature of refrigeration circuit.
USER CIRCUIT FLUID	Fluid cooled by the unit.
MAX. WORKING PRESSURE	Maximum rated pressure of user circuit.
MAX. TEMPERATURE	Rated temperature of user circuit; this should not be confused with the maximum working temperature which is defined in the quotation.
SOUND PRESSURE LEVEL	Free field sound pressure level in hemispherical irradiation conditions (open field) at a distance of 1m (39.37in) from the unit, condenser side, and 1.6m (63.0in) from the ground.
AMBIENT TEMPERATURE	Min. and max. temperature of cooling air.
WEIGHT	Approximate weight of the unit before packing.
CONDENSER COOLING FLUID	Fluid used by the unit to cool the condenser (this data is not present if the unit condenser is air cooled).
MAX. COOLING PRESSURE	Maximum rated pressure of the condenser cooling circuit (this data is not present if the unit condenser is air cooled).
MAX. TEMPERATURE	Max. rated temperature of the condenser cooling circuit (this data is not present if the unit condenser is air cooled).

The following abbreviations are present on the data plate and wiring diagram:

FLA max. current of electrical loads;
PMAX max. power of electrical loads;
ILR current with rotor stopped;

4.2 Performances

ATTENTION

The performance of the dryer (dew-point, electrical power consumption, pressure drops, etc.) mainly depends on the flow rate and pressure of the compressed gas to be dried and on the temperature of the fluid used to cool the condenser (ambient temperature or water inlet temperature depending on whether the dryer is air or water cooled).
These data are specified in the quotation and must be referred to when checking dryer performance.

4.2.1 Sound Level Measurements

The noise emission values measured are below 70 dB(A).

CHAPTER 5

DESCRIPTION

5.1 Operating principle

A refrigeration circuit reduces the temperature of a patented “thermal mass” through which the humid compressed air to be dried is passed.
As the air is cooled its water vapor condenses and is then separated and drained.
The temperature of the thermal mass is controlled by an electronic board which stops the compressor when it reaches the fixed set point.

5.2 Air and refrigerant circuits

(See attached refrigerant drawings)

5.2.1 Compressed air circuit

The warm, wet compressed air enters the dryer and passes through the air-to-air heat exchanger section of the thermal mass.
Here it is pre-cooled by the cold, dry compressed air leaving the air-to-refrigerant heat exchanger section or the evaporator of the thermal mass.
The pre-cooled air then enters the evaporator section of the thermal mass where it is cooled (in most applications to a temperature of approximately 3°C / 37.4°F) exchanging heat with the evaporator refrigerant fluid and the silica thermal mass.
The heat is exchanged by conduction through the aluminium fins connecting the copper tubes, inside which the compressed air flows, to the copper tubes, inside which the refrigerant fluid evaporates.
The aluminium fins also exchange heat with the silica thermal mass keeping it at a temperature of approximately 0°C (32 °F).
At this stage, the compressed air is in a saturated state and entrains the condensed moisture produced during cooling.
It then passes into the high efficiency condensate separator (demister type with stainless steel mesh) where the entrained moisture is precipitated out of the air and collects at the bottom of the separator.
A timed or capacitive condensate drain (depending on the unit configuration, see Table 1) opens at intervals to force the condensate from the dryer with compressed air.
The cold, dry air leaving the separator then flows for a second time through the air-to-air heat exchanger section of the thermal mass where it is reheated while pre-cooling the warm wet air entering the dryer.
Not only does this air-to-air heat exchanger reduce the energy consumption required to dry a given quantity of compressed air, but it also prevents condensation from forming on the dryer outlet.

5.2.2 Refrigeration circuit

The compressed refrigerant gas flows to the condenser.
Here the cooling action causes the refrigerant gas to condense to a liquid.
The refrigerant condenser may be air or water cooled (see Table 1).

- **Air-cooled condenser:**
  The condenser is a finned coil heat exchanger cooled by a flow of air provided by an electrically driven fan.
  The condenser is generously sized in order to be partially used as a liquid receiver.
- **Water-cooled condenser:**
  This condenser is a tube-in-tube heat exchanger (copper tubes inside a carbon steel outer tube) in which the water flows inside the exchanger tubes.
  The cooling water enters the rear of the dryer and flows through a pressure regulating valve before entering the condenser.
  The pressure regulating valve controls the cooling water flow to ensure that condensing pressure does not fall below a pre-set value.

After the condenser, the liquid refrigerant then passes through a filter-dryer to a capillary tube which reduces its pressure in order to lower its boiling point.
The refrigerant then enters the evaporator tubes in the thermal mass and cools both the thermal mass and the compressed air.
The refrigerant leaving the evaporator is now a cold vapor and returns to the compressor to repeat the cycle.
Since the heat of the compressed air available to evaporate the refrigerant varies considerably due to fluctuations in the air flow rate and inlet temperature, the dryer features an electronic system which controls the temperature of the thermal mass temperature, thereby achieving 3 important objectives:

- to ensure that the dew-point under pressure is maintained at a constant value of approximately +3°C (+37.4°F);
- to prevent the compressed air temperature from falling below 0°C (32°F), a temperature at which the condensed moisture could start to freeze;
- to ensure that all the refrigerant leaving the evaporator is in the form of a vapor so that no liquid refrigerant returns to the compressor.

When there is little or no load, the temperature in the thermal mass tends to fall.
At 0°C (32°F), the electronic board switches off the refrigerant compressor.
The compressed air that continues to flow in the evaporator is cooled by the cold energy stored in the silica.
When the temperature of the latter eventually starts to increase, the refrigerant compressor is automatically switched back on to cool it down again.
This system has the advantage of reducing the average energy consumption of the dryer roughly in proportion to the demand.

CHAPTER 6

INSTALLATION

DANGER

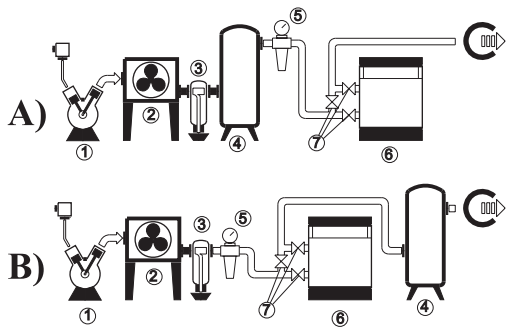
Before installing or operating these dryers, make sure that all personnel have read and understood Chapter 3 "Safety" of this manual.

6.1 Location

1. Install the dryer in a well ventilated area where the ambient air is clean and free from flammable gas or solvents.
2. Take care when installing the dryer in areas subject to low ambient temperatures. Take steps to prevent any discharged condensate from freezing in the drainage system.
   The minimum operating ambient temperature of the dryer is shown on the data table applied on the unit.
3. The dryer may be placed on any sufficiently strong and level surface.
   Allow the clearances shown in the installation drawings around the unit for servicing access and to ensure an unrestricted flow of cool air through the refrigeration condenser.
   Position the dryer so that cooling air cannot recirculate in the ventilation inlet grilles.
   Make sure that the dryer is not subject to warm air flows from the air compressor, after-coolers or other pieces of equipment.
4. The position of the dryer in the compressed air system depends on the way the air is used (see installation diagram).

A Install the dryer downstream from the receiver when the air compressor operates intermittently and the maximum total air usage does not exceed that of the compressor (this is the most frequent case).

B Install the dryer upline from the receiver when the receiver is designed to cater for large fluctuations in air usage which can mean much higher instantaneous air flows than the maximum output of the compressor.



1. air compressor
2. after-cooler
3. condensate separator
4. compressed air receiver
5. pre-filter
6. dryer
7. by-pass

6.2 Piping

(see installation diagram)

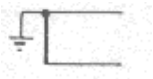
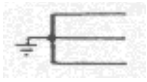
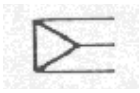
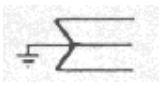
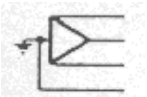
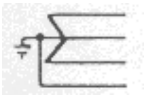
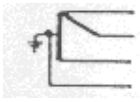
1. Air inlet and outlet connections are clearly marked (see Chapter 1 "General informations"). The piping and connections must be correctly sized and suitable for the working pressure of the application. Remember to remove the protective caps from the connections. Make sure to use the NPT adaptor fittings for the dryers that require them. Ensure that no debris or other material enters the connections during installation procedures. Any foreign material that enters the connections can result in clogging of the filter or jamming of the condensate drain valve.
2. All piping must be properly supported. **Flexible connections are recommended in order to prevent pipe stress or the transmission of vibrations.**
3. Connect the condensate drain pipe to a suitable point. The dryer discharge must not be connected to those from any other compressed air equipment; ideally it should discharge into a open funnel. Condensate drainage must never be piped into a common sewer drain as it may contain oil. Oil/water separators should be used to collect discharged oil. Make sure that the drainage system complies with local regulations.
4. A pre-filter should be installed upline from the dryer together with a coalescence oil separator filter, if required.
   Install on-off valves on the compressed air inlet and outlet in order to isolate the dryer if necessary.
   Fit a suitably sized safety valve upline from these valves.
5. A bypass line with on-off valves should be installed in order to allow servicing to be carried out without interfering with the compressed air supply.
6. Piping or other parts with a temperature in excess of 60°C (140°F) and which may be touched by personnel must be guarded or insulated.
7. To enable compressed air to be released from the dryer, before maintenance work is carried out, for example, a small relief valve should be fitted to the air piping between the dryer and one of the two on-off valves.

6.3 Electrical connections

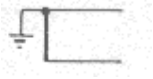
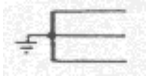
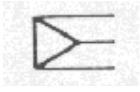
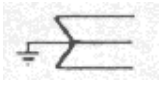
The machine must be connected to the mains power supply in accordance with the laws and regulations in force in the country of installation, after verifying the wiring diagram annexed to the unit.

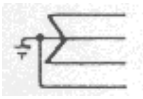
Voltage, frequency and the number of phases must comply with the values indicated on the machine data plate.

Main distribution systems in United States:

System	Nominal Voltage	Utilization Voltage	
	120	115	110
	240/120	230/115	220/110
	600 480 240	575 460 230	550 440 220
	480	460	440
	480/277 208/120	460/266 200/115	440/254 190/110
	240/120	230/115	220/110
	240/120	230/115	220/110

Main distribution systems in Canada:

System	Nominal Voltage	Utilization Voltage	
	240 480 600	230 460 575	220 440 550
	240/120	230/115	220/110
	600 480 240	575 460 230	550 440 220
	600 480 240	575 460 230	550 440 220

System	Nominal Voltage	Utilization Voltage	
	600/347 480/277 416*/240 208/120	575/332 460/266 400*/230 200/115	550/318 440/254 380*/220 190/110

For mains power input:

1. To access the components of the electrical panel it is necessary to remove the unit's front panel and the screws fixing the control board.
   The control board has been especially studied to be opened to 90° (see figure of chapter 12.2.1).
2. Connect the machine (⏚ terminal in the electrical panel) to the earth system of the building;
3. Provide protection against direct contact of at least NEMA Type 1 upline from the power cable;
4. Fit a device protecting the power cable from overcurrent (short-circuit) (see indication in the electrical diagram) upline from the power cable.
   For this purpose, all protection devices must be homologated ("listed").
5. Use conductors which can carry the maximum current required at the maximum ambient operating temperature, according to the type of installation chosen (see indication in the electrical diagram). Use only UL marked copper cables, in conformity with NEC (NATIONAL ELECTRICAL CODE) and CEC (CANADIAN ELECTRICAL CODE).
6. After the connection to the circuit breaker/switch (as indicated in the wiring diagram), the unit's power cable must exit the unit by the appropriate hole positioned on the back panel and identified by a label with the indication of the power supply.

English

CHAPTER 7

START UP

ATTENTION

Before starting up or operating these dryers be sure that all personnel have read and understood the Chapter 3 "Safety" of this manual.

1. Check that the dryer on-off valves are closed and that the by-pass valve is open.
2. If the unit is equipped with a "capacitive" condensate drain (see Table 1), check that it is correctly installed (see Table 1).
3. Air-cooled condenser models (see Table 1):
   - Check that the ambient temperature is within the range indicated on the data plate of the unit.
4. Water-cooled condenser models (see Table 1):
   - Open the dryer water inlet valve.
   - Open the dryer water outlet valve.
   - Check that the available head pressure at the dryer (difference between the cooling water inlet and outlet pressures) is at least 1 to 1.5 bar (14.5-21.75 psi).
5. Check that the main switch on the dryer panel is in the "O" position.
6. Power the dryer by means of the line protection device.
7. Turn the main switch of the dryer to the "I" position.
8. When the unit is powered, one of the LED's on the electronic board lights up (see Chapter 8 "tDRY Electronic controller").
9. After switching on the electronic board (see chapter 8.6 "Unit start-up and shutdown") and the pre-set delay, the refrigerant compressor starts working for several minutes.
10. Air-cooled condenser models (see Table 1):
    - In models without a fan pressure switch (see Table 1), he fan starts immediately together with the compressor.
    - In models with a fan pressure switch (see Table 1), the fan starts when the refrigerant fluid condensing pressure reaches the tripping value and stops when the pressure returns to the reset value (see Chapter 9 "Safety pressure switches");
    - In the three-phase models (see Table 1), make sure the fan rotates in the right direction,
    - The cooling air must enter the dryer through the grille next to the condenser.
      If necessary, invert two phases to reverse the direction of rotation.
11. Water-cooled condenser models (see Table 1):
    - Check that the cooling water temperature is within the range indicated on the data plate of the unit.
    - Calibrate the water pressure valve as described in Chapter 11 "Water pressure valve".
12. Check that the compressor stops when the thermal mass reaches the set temperature.
13. Slowly open the dryer inlet valve to pressurise it.
14. Slowly open the dryer outlet valve.
15. Close the dryer by-pass valve.
16. Check that the compressed air inlet temperature is at or below the temperature for which the dryer was selected.
    With the compressed air flowing, the dew-point temperature should lie between 0°C (32°F) and 4°C (39°F);
    Brief excursions outside this range may occur when there are big fluctuations in air flow without compromising the operation of the dryer.
17. Press the condensate drain manual test button and check that the condensate drain solenoid valve opens.
18. If the unit is fitted with a timed condensate drain (see Table 1), check that the solenoid valve opens again after the pre-set delay.
19. If the unit is fitted with an "capacitive" condensate drain (see Table 1), make sure it works properly.

The dryer is now ready for normal operation (see Chapter 12 "General operating and maintenance regulation").

CHAPTER 8

tDRY ELECTRONIC CONTROLLER

8.1 User Interface

8.1.1 Display

The device display is divided into three zones:

Left zone
Indicator icons (see 8.1.3).

Upper right zone
Normally displays the temperature read by probe Pb1 (see paragraph 8.17).
The parameter CF26 enables selection of the value to be displayed.

Use button ⌃ or ⌄ to scroll through the values of the other probes present, the names of which are shown on the lower right area of the display.

Lower right zone
Normally displays the temperature read by probe Pb3.
The parameter CF27 enables selection of the value to be displayed.

Use button ⌃ or ⌄ to scroll through the names of the probes present.

8.1.2 Control indicator-probe association

The message displayed on the lower section when scrolling through values using the button ⌃ or ⌄ is shown in the table below. The values shown depend on the specifications of the system. Refer to the cooling circuit diagram and specifications in the offer.

Probe description	Name
Probe absent	--
Air inlet NTC temperature	In
Air outlet NTC temperature	OUt
Evaporator outlet NTC temperature	DP
Evaporator 1 outlet NTC temperature	DP1
Evaporator 2 outlet NTC temperature	DP2
Condensation control NTC temperature	Cdt
Evaporation pressure 4-20mA input	LP
Condensation pressure 4-20mA input	HP

8.1.3 Display icons

ICON	MEANING	ICON	MEANING
°C	On with temperature expressed in degrees Celsius	°F	On with temperature expressed in degrees Fahrenheit
	Not used	bar	On with pressure expressed in bar
PSI	On with pressure expressed in PSI		On: Unit powered Off: Unit off
	On with condensate drain output active		Not used
1	Compressor 1 in operation	2	Compressor 2 in operation
	Not used		Ventilation active
	Not used		Not used

ICON	MEANING	ICON	MEANING
LP	Low pressure alarm	HP	High pressure alarm
⚠	General alarm	HT	High temperature alarm
menu	Indicates access to function menu	Flow!	Condensate drain alarm

8.1.4 Button functions

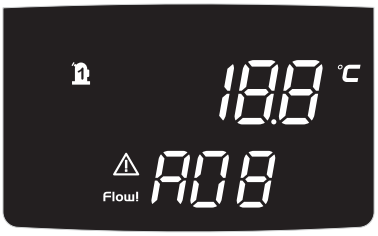
BUTTONS	MEANING
∧	Selects the temperature range displayed in the upper zone. During programming, scrolls through parameter codes or increments the relative value.
∨	During programming, scrolls through parameter codes or decreases the relative value.
SET	Enables the display of the parameter selected from parameter CF28. During programming, selects a parameter or confirms a value.
menu	Enables access to function menu.
⏻	In stand-by status, if pressed for more than 2 seconds, enables the user to turn the unit on or off.
	If pressed, enables a test of condensate drain operation; on release the condensate drain is switched off.
SET + ∨	Used to enter programming mode.
SET + ∧	Used to exit programming mode.

8.1.5 Display leds

The indicator leds (see image) are illustrated below:

LED	LED STATUS	USED TO INDICATE
	Led n°1 and n°2	Flashing: read-only parameter.
	Led n°3	Steady: Parameter for display and modification in Pr1. Flashing: Read-only parameter in Pr1. Off: Parameter not displayed in Pr1.
	Led n°4	Steady: Parameter for display and modification in Pr2. Flashing: Read-only parameter in Pr2. Off: Parameter not displayed in Pr2.

8.2 Display during an alarm



With hypothetical normal conditions, in other words with no alarms, as soon as the device detects an alarm condition, the lower section of the display flashes the alarm code on screen, alternating with the temperature value The relative alarm icon, if present, also starts flashing.

8.2.1 Alarm icons

LP	Low pressure alarm	HP	High pressure alarm
⚠	General alarm	HT	High temperature alarm
Flow!	Condensate drain alarm		

8.3 Programming parameters

To facilitate searches for parameters, the menu is divided into families, inside which the parameters can be displayed according to the level password entered.

FAMILY	TYPE
ALL	All parameters
St	Set point parameters
CF	Unit configuration parameters
CO	Compressor parameters
FA	Fan parameters
Sc	Condensate drain parameters
AL	Alarm parameters
Ar	Antifreeze heater parameters

8.4 Programming via the keypad

The parameters of the electronic controller grouped into families and divided into two levels named:

1. USER (**Pr1**);
2. SERVICE (**Pr2**).

The USER level (password protected) enables access to the user parameters, and the SERVICE level (password protected) enables access to the factory set parameters for unit configuration, accessible only by assistance personnel.
The various parameters are grouped into different menus. The **ALL** menu displays all parameters without grouping.

8.4.1 Access to "Pr1" parameters (USER level) or "Pr2" parameters (SERVICE level)

To enter the menu for parameters "**Pr1**" or "**Pr2**":

1. Press and hold buttons SET + ▽ for a few seconds ;
2. The display shows the label **PAS** and the text "**Pr1**" in the lower section; press and hold △ to display "**Pr2**";
3. Press SET ;
4. Enter the password using buttons ▽ △ ;
5. Press SET ;
6. When the text **ALL** appears at the top of the display, this means that access has been successful;
7. Repeat the operation if the text **ALL** does not appear on display.

The parameters menu is grouped into families or Labels. The user can scroll within the menu through the various Labels using the buttons ▽ △ and select which parameter groups to display and/or modify. The label **ALL** enables the user to inhibit the display of parameters by family and the option to scroll through all parameters.
Modifications to parameters depend on the access mode.

8.4.2 How to modify a parameter's value

1. Follow the same procedure illustrated in paragraph 8.4.1 "Access to "Pr1" parameters (USER level) or "Pr2" parameters (SERVICE level)" from point 1. to point 7.
2. Select the required parameter;
3. Press SET to enable modifications to the value;
4. Modify the value using button ▽ or △ ;
5. Press SET to memorize the new value and move to the next parameter code;

6. Output: press SET + ^, when a parameter is displayed, or wait for 15 seconds without pressing any buttons

NOTE

The new set value is also memorized when the system exits programming mode after the timeout and without pressing buttons SET + ^.

ATTENTION

*The configuration parameters in the family **CF** can only be modified when the unit is in stand by.*

8.4.3 Moving a parameter between levels

To move a parameter from level **Pr2** to level **Pr1**:

1. Access the parameter programming mode (**Pr2**);
2. If led n°3 (see 8.1.5) is off, this means that the parameter can only be viewed on the SERVICE level.
3. Select the required parameter;
4. Press and hold the button SET, and at the same time briefly press v;
   led 1 illuminates to enable display of the parameter also in programming mode **Pr1** (see8.1.5);

To move a parameter from level **Pr1** to level **Pr2**:

1. Access programming mode on the SERVICE level;
2. Select the required parameter;
3. Press and hold button SET, and at the same time briefly press v;
   led 2 illuminates to enable display of the parameter only in programming mode **Pr2** (see 8.1.5);

8.5 Password modification

To modify the Pr1 password, the user must be aware of the current version: 3.
To modify the Pr2 password, the user must be aware of the current version: 32.

1. Enter programming mode **Pr1** or **Pr2**.
2. Select a parameter family.
3. Scroll through the parameters using button v or ^ and press SET when the parameter "**Pr1**" or "**Pr2**" is displayed; the value then starts to flash.
4. Enter the NEW PASSWORD using buttons v or ^ and then press SET to confirm the new value.
5. The upper display flashes for a few seconds and then displays the next parameter.
6. To exit, press SET + ^.

8.6 Unit start-up and shutdown

With the unit OFF (stand-by) briefly press ⏻ to switch the unit on or off. When the unit is ON, led ❄ illuminates.

Press ⏻ again to return the unit to stand-by and led ❄ turns off .

Also in stand-by mode, the controller enables:

1. Display of values detected;
2. Management of alarms with display and notification.

DANGER

When the unit is in stand-by it remains powered. In the event of maintenance, disconnect the unit from the electrical mains.

ATTENTION

Before disconnecting the power supply, set the unit to stand-by.
This avoids inadvertent re-start of the unit with the start-up procedure inhibited (see also paragraph 8.11).

8.7 Function menu

To access the function menu, briefly press menu. The relative icon illuminates to confirm access.

The system exits the menu automatically after 15 seconds or manually by pressing button menu.

Access to the function menu enables:

1. Reset of a compressor thermal cut-out alarm;
2. Programming of a device with pre-programmed memory stick (Download);
3. Memorization of parameters of the device onto a programming key (Upload);

4. Display of the alarm history;
5. Deletion of alarm history;
6. Display of compressor operating hours;
7. Reset of compressor operating hours;
8. Display of the number of compressor start-ups;
9. Reset of the number of compressor start-ups;
10. Energy saving.

8.7.1 Displaying and resetting an alarm

Enter the function menu by pressing menu:

1. Use button ∧ or ∨ to select the function **ALrM**;
2. Press SET; the lower display shows the alarm code;
3. If the alarm can be reset, the upper section of the display shows the label **rSt**, and if not resettable the text **NO** is displayed.
4. Use button ∧ or ∨ to scroll through the alarms present;
5. Press SET on the label **rSt** to reset the alarm and move to the next;
6. To exit, press menu or wait for the timeout to expire (15 seconds).

8.7.2 Resetting a compressor thermal cut-out alarm

The function COtr enables reset of a compressor thermal cut-out alarm.
The function COtr displays all active compressor thermal cut-out alarms with MANUAL reset.
CO1r = reset of compressor thermal cut-out no. 1
CO2r = reset of compressor thermal cut-out no. 2
The labels CO1r - CO2r - COUr are present according to the digital inputs configured as compressor thermal cut-out alarms.
The label COUr refers to the activation of a single thermal cut-out digital input for the two compressors.

NOTE
The function COtr is present in the function menu only if the number of compressor thermal cut-out alarms per hour is reached as set in Par.AL09, after which alarm reset changes from automatic to MANUAL

RESETTING AN ALARM WITH MANUAL RESET

1. Enter the function menu by pressing menu;
2. Use button ∧ or ∨ to select the function **COtr**;
3. Press SET; the lower display shows the label that identifies the ES compressor thermal cut-out alarm. **CO1r**; the upper display shows the label **rSt** is the alarm is resettable or the label **NO** if not. Use button ∧ or ∨ to scroll through all the active alarm labels in ascending order;
4. If the label **rSt** is displayed, press SET, and the lower display shows the label **ArSt** and the upper display shows **PAS**;
5. Use button ∧ or ∨ to select the label **ArSt** on the lower section of the display and **PAS** on the upper section of the display;
6. Press SET: the text **PAS** remains on the lower section of the display while on the upper section, **0** flashes on display;
7. Use button ∧ or ∨ to enter the password to enable deletion;
8. If the password is correct, the label **ArSt** flashes for 5 seconds to confirm deletion.
9. To exit the function **COtr** and return to normal display, press menu or wait for the timeout to expire (15 seconds).

8.7.3 Programming an device with a pre-programmed key (Download)

1. Disconnect the unit from the power supply via the main switch;
2. Insert the key;
3. Re-power the unit via the main switch;

The data are downloaded from the key to the electronic controller automatically.
During this phase, controls are blocked and the lower display shows the flashing message **dOL** .
At the end, the upper section of the display shows one of the following messages:
End if programming has been completed successfully (after 15 seconds the electronic controller is ready for operation);
Err if programming has failed.

ATTENTION

*In the event of an error, repeat the operation; if the message **Err** re-appears, this may indicate damage to the electronic controller.*

8.7.4 Memorizing parameters of the device onto a programming key (Upload)

With the device switched on:

1. Power up the unit via the main switch;
2. Insert the key;
3. Enter the function menu by pressing menu (see paragraph 8.7 “Function menu”);
4. Use button ∧ or ∧ to select the function **UPL** shown on the upper section of the display;
5. Press SET to start downloading the data from the device to the key.

During this phase, the lower section of the display shows the flashing message **UPL**.
At the end, the upper section of the display shows one of the following messages:
End if programming is successful;
Err if programming has failed.

ATTENTION

*In the event of an error, repeat the operation; if the message **Err** re-appears, this may indicate damage to the electronic controller.*

To exit the function **UPL** press menu or wait for 15 seconds.

8.7.5 Displaying the alarm history

1. Enter the function menu by pressing menu;
2. Use button ∧ or ∨ to select the function **ALOG**;
3. Press SET; the upper section of the display shows the alarm code label, while the lower section shows a progressive number;
4. Use button ∧ or ∨, to scroll through all alarms stored in the history;
5. To exit the function **ALOG** and return to normal display, press menu or wait for the timeout to expire (15 seconds).

NOTE

The memory has a capacity to store up to 100 alarms, and any alarm detected over this number will automatically cancel the oldest alarm in the memory.
The alarms are displayed in progressive order from the oldest to the most recent.

8.7.6 Deleting the alarm history

The control enables the user to reset the alarm log (label **ArSt**) within the function **ALOG**, but this operation is password protected. SERVICE level operation

1. Enter the function menu by pressing menu;
2. Use button ∧ or ∨ to select the function **ALOG**;
3. Press SET;
4. Use button ∧ or ∨ to select the label **ArSt** on the lower section of the display and **PAS** on the upper section of the display;
5. Press SET: the text **PAS** remains on the lower section of the display while on the upper section, **0** flashes on display;
6. Use button ∧ or ∨ to enter the password to enable deletion;
7. If the password is correct, the label **ArSt** flashes for 5 seconds to confirm deletion.

On completion of reset, the electronic controller returns to the normal display.

8.7.7 Displaying the compressor operating hours

The Hour function enables the display of the number of compressor operating hours.
The Labels identifying individual compressors within the Hour function are:
CO1H operating hours of compressor n° 1
CO2H operating hours of compressor n° 2
The labels identifying the compressors are shown in the function menu only if the relative outputs are configured during the programming phase.

1. Enter the function menu
2. Use button ▲ or ▼ to select the Hour function
3. Press SET and the label of the single unit is shown on the lower section of the display, while the upper section shows the operating hours. The icon ◷ illuminates.
4. Use button ▲ or ▼ to display all configured units
5. To return to the normal display, press menu or wait for the timeout to expire .

8.7.8 Resetting compressor operating hours

Enter the function menu:

1. In the function Hour use button ▲ or ▼ to select the label CO1H or CO2H;
2. Press SET for 3sec on selection of label CO1H or CO2H and the upper section of the display shows the operating hours flashing (reset in progress) then 0 to confirm reset and moves to the next value;
3. To exit the reset function and return to normal display, press menu or wait for the timeout to expire.

8.7.9 Displaying the number of compressor start-ups

The number of start-ups of an individual compressor can be displayed by means of the FUNCTION COSn.
The Labels C1S and C2S identify the individual compressors within the COSn function :
C1S n° compressor 1 starts . C2S n° compressor 2 starts
The labels identifying the compressors are shown in the function menu only if the relative outputs are configured during the programming phase.

Enter the function menu:

1. Use button ▲ or ▼ to select the function COSn
2. Press SET and the label of the single unit C1S is shown on the lower section of the display, while the upper section shows the number of start-ups.
3. Use button ▲ or ▼ to display all configured compressors

To return to the normal display, press menu or wait for the timeout to expire .

8.7.10 Resetting the number of compressor start-ups

Enter the function menu:

1. In the function COSn use button ▲ or ▼ to select the label C1S or C2S;
2. Press SET for 3sec on selection of the unit C1S or C2S; the upper section of the display shows the number of start-ups flashing (reset in progress) then 0 to confirm reset and moves to the next value;
3. To exit the reset function and return to normal display, press menu or wait for the timeout to expire.

8.7.11 Energy saving

After enabling parameter CF29 enter the function menu:

1. In the function ES use button ▲ or ▼ to select the label OFF or ON in the lower display section;
2. Press the button to confirm;
3. To exit the function and return to normal display, press menu or wait for the timeout to expire.

8.8 Other functions via the keypad

8.8.1 Displaying the set-point

Briefly press SET, and the upper section of the display shows the current set point.

ATTENTION

This parameter can only be displayed if set as CF39=1;
If CF39=0 the value ST01 can only be displayed or modified in parameter programming (see paragraph 8.3).

8.8.2 Editing the set-point

1. Press button SET for at least 3 seconds;
2. The set point value flashes on display;
3. Use button ⌃ or ⌄ to modify the value.

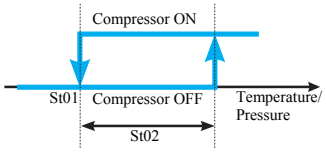
To memorize the new set point, press SET or wait for 15 seconds to exit programming mode.

8.8.3 Temperature management

The tDRY board enables the control of air temperature inside the system, activating/deactivating one/two compressors and managing various alarms in the event of anomalous temperature readings.
In more detail, the controller implements two types of temperature control according to the set parameters.

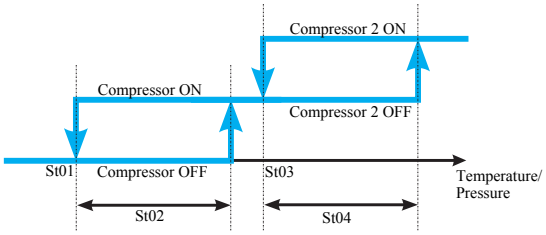
8.8.3.1 Operation with one compressor

Parameter CF01=0÷3 and a single compressor configured.
Temperature control is on the single probe selected via parameter CF01, and when the temperature/pressure reading reaches St01 the compressor is shut down, and only restarts when the value reached is equal to St01+St02.
Compressor start-up or shutdown operations must only be performed when the condition requiring temperature control persists for at least the time set in St14.



8.8.3.2 Operation with two compressors

Parameter CF01=0÷3 and two compressors configured.
Temperature control is on the single probe selected via parameter CF01, and when the temperature/pressure reading reaches St01 the compressor is shut down, and only restarts when the value reached is equal to St01+St02.
The second compressor operates in the same way as the first, while only the reference parameters differ, and are respectively: St03 and St03+St04.
Compressor start-up or shutdown operations must only be performed when the condition requiring temperature control persists for at least the time set in St14.



The compressor immediate shutdown parameter St13 acts when there are two compressors in operation, and shuts down one compressor only.

8.9 Operating logic

There are two types of unit:

- with one thermal mass unit, DE0250÷0700-0800, and therefore with one temperature control probe;
- with two thermal mass units, DE1000÷2000, and therefore with two temperature control probes.

Models DE1600 and DE2000 have more than two thermal mass units (4 and 5 respectively), but are the same as units with two thermal mass units in terms of operating logic.

8.9.1 Units with one thermal mass unit

The compressor is activated according to the temperature values sent by probe Pb1 inserted in the thermal mass unit.
These values are compared with the set point values (**ST01**) and differential values (**ST02**), set on the electronic controller. The differential may only be modified by specialist personnel.

8.9.2 Units with two thermal mass units

The compressor is activated according to the temperature values read by probe Pb1 inserted in the first thermal mass unit and by probe Pb2 inserted in the second thermal mass unit.
These values are compared with the set point values (**ST01**) and differential values (**ST02**), set on the electronic controller. The differential (**ST02**) may only be modified by specialist personnel.
It is sufficient that one of the two probes Pb1 or Pb2 reads a value below the set point **ST01** for the compressor to be shut down.
Vice versa, the compressor only restarts if both probes Pb1 and Pb2 read a value above the set point **ST01+ST02**

8.9.3 Units with more than two thermal mass units

The compressor is activated according to the temperature values read by probe Pb1 inserted in the first thermal mass unit and by probe Pb2 inserted in the second thermal mass unit, as in the case of units with two thermal mass units.
The temperature of the other thermal mass units is controlled by the safety thermostats, which prevent temperatures from falling below 32°F / 0°C, thereby avoiding freezing of the condensate that forms inside the piping. The parameters set on the thermostats are shown in the enclosed document.

8.9.4 Energy saving

The energy saving function is active if one of the digital inputs is configured as energy saving and is ACTIVE.
The energy saving function via digital input inhibits the same function in the function menu enabled via parameter CF29.

8.9.4.1 Displaying the current set point

When button SET is pressed for the first time, the lower display shows the SEtP, and the upper display shows the set value. When the energy saving function is enabled, and button SET is pressed a second time, the lower display shows label SEtr (real set point), and the upper display shows the real value with which the unit is operating.

8.9.4.2 Energy saving mode

During the Energy Saving cycle, the set point is increased by the value entered in St05/St07 so that the operating set point becomes set point St01+St05 on units with one compressor, and set point St03+St07 on units with two compressors. The reference differential for temperature control with energy saving mode active is obtained from the parameters St06 and St08.

8.10 Condensate drain management

The electronic controller enables the selection of 2 different modes to control the condensate drain relay (Relay n°4):

1. timed;
2. permanently energised.

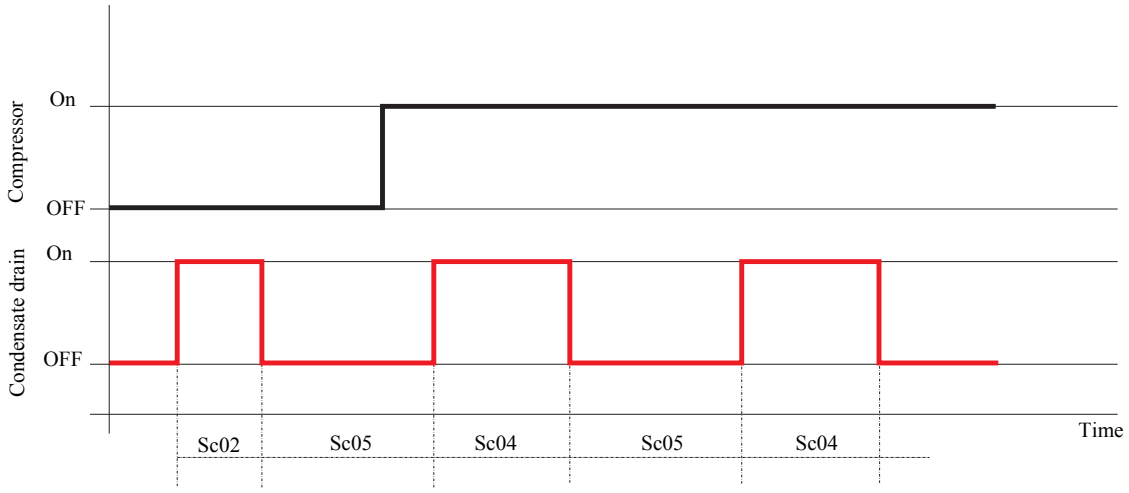
The mode is established according to the unit design specifications, modifying the setting in parameter **Sc01**.
In both operating modes, led is also lit during energisation of the condensate drain relay.
The condensate drain relay continues to operate according to settings also in the event of an alarm.

8.10.1 Timed management

ATTENTION

This setting is required if only the condensate drain solenoid valve is installed on the unit (timed drain).

To manage the condensate drain relay according to a timed logic, the parameter Sc01 must be configured as **Sc01=1**.
The relay is energised sequentially with ON and OFF intervals settable respectively via parameters **Sc02**, **Sc03**, **Sc04** and **Sc05**.
When the unit is started up, the condensate drain relay ON time is reset to value entered with parameter **Sc04** and on subsequent start-up the cycle always resumes operation with the valve set to ON.
The following figure shows the timed operating logic for the condensate drain relay.



During unit operation, the condensate drain relay can be tested manually (see paragraph 8.10.3 “Condensate drain operation test”).
Manual activation does not modify settings of the ON and OFF time intervals.
Different condensate drain ON and OFF times can be set when the unit is OFF (stand-by) by means of parameters SC06, SC07 and SC08.

8.10.2 Permanently energised management

ATTENTION

This setting is required when the unit is equipped with a capacitive condensate drain.

To manage the condensate drain relay according to a permanently energised logic, the Sc01 parameter must be configured as **Sc01= 0**.

When the unit is powered, the relay remains permanently energised and the indicator led remains lit.

This enables constant power to the capacitive condensate drain installed on the unit.

8.10.3 Condensate drain operation test

When the unit is powered, if button is pressed for 2 seconds, the condensate drain relay is energised and the icon illuminates to indicate the valve operating status.

This operation is only possible with timed management of the condensate drain relay, and is used to verify correct operation.

8.11 Power failure

On return of power:

1. The device sets to the status as present before the power failure;
2. All timed functions are cancelled and reset.

8.12 System air temperature control

The electronic controller enables control of the air temperature within the system and management of any alarms if anomalous temperatures are detected.

More specifically, for systems with a single thermal mass unit (DE0250÷0700-0800) the controller manages the air inlet temperature on the system (probe Pb2), the temperature of the thermal mass unit (probe Pb1) and the air outlet temperature on the system (probe Pb3).

For systems with two thermal mass units (DE1000÷2000), the controller displays the air inlet temperature on the system (probe Pb3) and the temperature of the two thermal mass units (probes Pb1 and Pb2).

The system displays a warning message ("pre-alarm" status) when the temperatures read by the probes exceed the normal value range.

If the "pre-alarm" condition occurs too frequently or if the probe readings exceed the set limits, the controller sets to alarm conditions ("alarm" status).

For more details of the various alarm and pre-alarm conditions refer to paragraph 8.16 “Alarm codes” and 8.15 “Description of parameters” .

8.13 Digital inputs/outputs

8.13.1 Displaying digital input/output polarity in programming mode

Configuration parameters

The parameters that concern digital inputs, digital outputs (relays), proportional outputs configured as ON/OFF outputs and analogue inputs configured as digital inputs, are displayed differently from the other configuration parameters.

As well as the configuration of digital inputs and outputs, the SAME parameter enables settings of the polarity.

EXAMPLE OF DISPLAY IN PROGRAMMING MODE:

The lower display shows the label of parameter (CF06) for configuration of digital input ID1. The upper display shows the label "c" or "o" in front of the configuration number.	
Label 7 of digital input ID1 configured as condensate drain label "o" active with contact OPEN. Label 7 of digital input ID1 configured as condensate drain label "c" active with contact CLOSED.	

8.13.2 Changing polarity of digital inputs/outputs

Enter programming mode:

1. Select a parameter of the digital inputs/outputs, and the upper display shows the letter "o" in front of the configuration number. The lower display shows the label with parameter code.
2. Press button SET and letter "o" and configuration number flash on display; use button ∧ or ∨ to select polarity (o / c) according to requirements and then press SET to confirm the new value / polarity.

3. The upper display flashes for a few seconds and the next parameter is then displayed.
4. To exit programming mode, press SET + ^ or wait for the time out interval to expire without pressing any button.

8.14 Analogue/digital output/input configuration

8.14.1 Configuration of analogue inputs Pb1 - Pb2 - Pb4

Parameters	
CF02= Configuration PB1 CF03= Configuration PB2 CF05= Configuration PB4	0 = Probe absent; 1 = Air inlet NTC temperature; 2 = Air outlet NTC temperature; 3 = Evaporator outlet NTC temperature; 4 = Evaporator 1 outlet NTC temperature; 5 = Evaporator 2 outlet NTC temperature; 6 = Condenser control NTC temperature.

English

After configuration n° 6 the display changes from o1 to c12, to enable configuration of an analogue input with the same characteristics as a digital input.

8.14.2 Configuration of analogue input Pb3

Parameters	
CF04= Configuration PB3	0 = Probe absent; 1 = Air inlet NTC temperature; 2 = Air outlet NTC temperature; 3 = Evaporator outlet NTC temperature; 4 = Evaporator 1 outlet NTC temperature; 5 = Evaporator 2 outlet NTC temperature; 6 = Condenser control NTC temperature; 7 = Evaporator pressure 4÷20mA input; 8 = Condensation pressure 4÷20mA input.

After configuration n° 8 the display changes from o1 to c12, to enable configuration of an analogue input with the same characteristics as a digital input.

8.14.3 Configuration of digital inputs Id1 - Id5

Parameters	
CF06 = Configuration ID1 CF07 = Configuration ID2 CF08= Configuration ID3 CF09 = Configuration ID4 CF10 = Configuration ID5	0 = Disabled; 1 = Compressor 1 thermal cut-out; 2 = Compressor 2 thermal cut-out; 3 = Compressor thermal cut-outs (one input per 2 compressors); 4 = Compressor delivery temperature alarm; 5 = Low pressure switch alarm; 6 = High pressure switch alarm; 7 = Condensate drain alarm; 8 = Condensation fan thermal cut-out; 9 = Remote On/off control; 10 = General utility alarm; 11 = Energy saving.

8.14.4 Configuration of digital inputs RL1- RL5

Parameters	
CF11 = Configuration RL1 CF12 = Configuration RL2 CF13= Configuration RL3 CF14 = Configuration RL4 CF15 = Configuration RL5	0 = Disabled; 1 = Compressor 1; 2 = Compressor 2; 3 = Condensate drain; 4 = Step 1 fan; 5 = Step 2 fan; 6 = General alarm; 7 = Anti-freeze heater.

8.14.5 Configuration of 12Vdc output

Parameters	
CF16 = 12Vdc output configuration	0 = Disabled; 1 = Compressor 1; 2 = Compressor 2; 3 = Condensate drain; 4 = Step 1 fan; 5 = Step 2 fan; 6 = General alarm; 7 = Anti-freeze heater.

8.15 Description of parameters

Parameter	Level	Description	Min	Max	U.M.	Resolution	Value
Temperature control parameters							
St01	**Pr2**	Step 1 operating **set point**	St09	St10	°C °F bar PSI	Dec Int Dec Int	1.5°C 35°F
St02	**Pr2**	Step 1 **differential**	0,0 0 0,0 0	80,0 144 5,0 72	°C °F bar PSI	Dec Int Dec Int	1.5°C 3°F
St03	**Pr2**	Step 2 operating **set point**	St11	St12	°C °F bar PSI	Dec Int Dec Int	4°C 39°F
St04	**Pr2**	Step 2 **differential**	0,0 0 0,0 0	80,0 144 5,0 72	°C °F bar PSI	Dec Int Dec Int	1.5°C 3°F
St05	**Pr1**	Energy saving set point increment with reference to parameter **St01**	0,0 0 0,0 0	30,0 54 10,0 145	°C °F bar PSI	Dec Int Dec Int	0
St06	**Pr1**	Energy saving differential with reference to parameter **St01**	0,0 0 0,0 0	80,0 144 5,0 72	°C °F bar PSI	Dec Int Dec Int	0
St07	**Pr1**	Energy saving set point increment with reference to parameter **St03**	0,0 0 0,0 0	30,0 54 10,0 145	°C °F bar PSI	Dec Int Dec Int	0

Parameter	Level	Description	Min	Max	U.M.	Resolution	Value
St08	**Pr1**	Energy saving differential with reference to parameter **St03**	0,0 0 0,0 0	80,0 144 5,0 72	°C °F bar PSI	Dec Int Dec Int	0
St09	**Pr2**	Enables entry of the **minimum set point** for step 1	-50,0 -58 0,0 0	St01	°C °F bar PSI	Dec Int Dec Int	1°C 34°F
St10	**Pr2**	Enables entry of the **maximum set point** for step 1	St01	110,0 230 50,0 725	°C °F bar PSI	Dec Int Dec Int	3°C 38°F
St11	**Pr2**	Enables entry of the **minimum set point** for step 2	-50,0 -58 0,0 0	St03	°C °F bar PSI	Dec Int Dec Int	1°C 34°F
St12	**Pr2**	Enables entry of the **maximum set point** for step 2	St03	110,0 230 50,0 725	°C °F bar PSI	Dec Int Dec Int	5°C 41°F
St13	**Pr2**	Immediate compressor shutdown set point	-50,0 -58 0,0 0	110,0 230 50,0 725	°C °F bar PSI	Dec Int Dec Int	-1°C 30°F
St14	**Pr2**	Delay for acceptance of actions on compressor	0	250	Sec.	Int	0
Pr1	**Pr1**	Password	0	999			3
Pr2	**Pr2**	Password	0	999			32
Configuration parameters							
CF01	**Pr2**	Control probe: 0 = Control on probe **Pb1**; 1 = Control on probe **Pb2**; 2 = Control on probe **Pb3**; 3 = Control on probe **Pb4**; 4 = Control on "**combined**" probe.	0	4			0 (DE0250÷0800) 4 (DE1000÷2000)
CF02	**Pr2**	**Pb1** Configuration: 8.14.1 “Configuration of analogue inputs Pb1 - Pb2 - Pb4”	0 O1	6 c11			3 (DE0250÷0800) 4 (DE1000÷2000)
CF03	**Pr2**	**Pb2** Configuration: 8.14.1 “Configuration of analogue inputs Pb1 - Pb2 - Pb4”	0 O1	6 c11			1 (DE0250÷0800) 5 (DE1000÷2000)
CF04	**Pr2**	**Pb3** Configuration: 8.14.2 “Configuration of analogue input Pb3”	0 o1	8 c11			2 (DE0250÷0800) 1 (DE1000÷2000)
CF05	**Pr2**	**Pb4** Configuration: 8.14.1 “Configuration of analogue inputs Pb1 - Pb2 - Pb4”	0 o1	6 c11			0
CF06	**Pr2**	**ID1** Configuration: 8.14.3 “Configuration of digital inputs Id1 - Id5”	0 - o1	c11			o10
CF07	**Pr2**	**ID2** Configuration: 8.14.3 “Configuration of digital inputs Id1 - Id5”	0 - o1	c11			o7

English

Parameter	Level	Description	Min	Max	U.M.	Resolution	Value
CF08	**Pr2**	**ID3** Configuration: 8.14.3 “Configuration of digital inputs Id1 - Id5”	0 - o1	c11			06
CF09	**Pr2**	**ID4** Configuration: 8.14.3 “Configuration of digital inputs Id1 - Id5”	0 - o1	c11			o5
CF10	**Pr2**	**ID5** Configuration: 8.14.3 “Configuration of digital inputs Id1 - Id5”	0 - o1	c11			o9
CF11	**Pr2**	**RL1** Configuration: 8.14.3 “Configuration of digital inputs Id1 - Id5”	0 - o1	c7			c1
CF12	**Pr2**	**RL2** Configuration: 8.14.3 “Configuration of digital inputs Id1 - Id5”	0 - o1	c7			0
CF13	**Pr2**	**RL3** Configuration: 8.14.3 “Configuration of digital inputs Id1 - Id5”	0 - o1	c7			0
CF14	**Pr2**	**RL4** Configuration: 8.14.4 “Configuration of digital inputs RL1- RL5”	0 - o1	c7			c3
CF15	**Pr2**	**RL5** Configuration: 8.14.4 “Configuration of digital inputs RL1- RL5”	0 - o1	c7			o6
CF16	**Pr2**	**RL6** Configuration: 8.14.5 “Configuration of 12Vdc output”	0 - o1	c7			0
CF17	**Pr2**	Pressure value at 4mA	0,0 0	50,0 725	Bar PSI	Dec Int	0.0 0
CF18	**Pr2**	Pressure value at 20mA	0,0 0	50,0 725	Bar PSI	Dec Int	30.0 435
CF19	**Pr2**	**Pb1** Offset	-12,0 -21	12,0 21	°C °F	Dec Int	0 0
CF20	**Pr2**	**Pb2** Offset	-12,0 -21	12,0 21	°C °F	Dec Int	0 0
CF21	**Pr2**	**Pb3** Offset	-12,0 -21 -21,0 -174	12,0 21 21,0 120	°C °F bar PSI	Dec Int Dec Int	0 0 0 0
CF22	**Pr2**	**Pb4** Offset	-12,0 -21	12,0 21	°C °F	Dec Int	0 0
CF24	**Pr2**	Selection of °C or °F: 0 = °C / bar 1 = °F / psi	0	1			1
CF25	**Pr2**	Selection of mains frequency operation: 0 = 50 Hz 1 = 60Hz 2 = DC power supply	0	2			1
CF26	**Pr1**	Upper display contents default: 0 = no display 1 = Pb1 2 = Pb2 3 = Pb3 4 = Pb4	0	4			1
CF27	**Pr1**	Lower display contents default: 0 = no display 1 = Pb1 2 = Pb2 3 = Pb3 4 = Pb4	0	4			3
CF28	**Pr2**	Set point display: 0 = set point not visible from button 1 = visible from button St01 2 = visible from button St03	0	2			0

Parameter	Level	Description	Min	Max	U.M.	Resolution	Value
CF29	**Pr1**	Energy saving mode enabled via function menu: Energy saving disabled Energy saving enabled	0	1			0
CF30	**Pr1**	Serial address	1	247			1
Pr1	**Pr1**	Password	0	999			3
Pr2	**Pr2**	Password	0	999			32
Compressor parameters							
CO01	**Pr2**	Min. compressor activation time	0	600	Sec.	Int	60
CO02	**Pr2**	Min. compressor shutdown time	0	600	Sec.	Int	120
CO03	**Pr2**	Time between two consecutive start-ups on same compressor	0	600	Sec.	Int	240
CO04	**Pr2**	Activation delay between two compressors	0	600	Sec.	Int	3
CO05	**Pr2**	Shutdown delay between two compressors	0	600	Sec.	Int	3
CO06	**Pr2**	Compressor start-up delay from power ON	0	600	Sec.	Int	10
CO07	**Pr2**	Compressor rotation enable: 0 = rotation disabled 1 = rotation enabled	0	1			0
CO08	**Pr2**	Compressor 1 hour counter set point (0 function disabled)	0	9999	Hr		0
CO09	**Pr2**	Compressor 2 hour counter set point (0 function disabled)	0	9999	Hr		0
Pr1	**Pr1**	Password	0	999			3
Pr2	**Pr2**	Password	0	999			32
Fan parameters							
FA01	**Pr2**	Fan output 0= None 1= Present	0	1			0
FA02	**Pr2**	Fan settings 0= On when compressor ON 1= ON / OFF control 2= 2-step control 3= Speed proportional regulator	0	3			0
FA03	**Pr2**	Fan operating mode 0= Dependent on compressor 1= Independent from compressor	0	1			0
FA04	**Pr2**	Fan start-up time to reach max. speed after ON	0	250	Sec		0
FA05	**Pr2**	Fan time lag	0	20	µs	250µs	0
FA06	**Pr2**	Pre-ventilation before compressor ON	0	250	Sec		0
FA07	**Pr2**	Min. fan speed	0	100	%		30
FA08	**Pr2**	Max. fan speed	0	100	%		100
FA09	**Pr2**	Fan speed minimum temperature/pressure set point	-50,0 -58 0,0 0	110 230 50,0 725	°C °F Bar PSI	Dec Int Dec Int	0
FA10	**Pr2**	Fan speed maximum temperature/pressure set point (step 1)	-50,0 -58 0,0 0	110 230 50,0 725	°C °F Bar PSI	Dec Int Dec Int	0

English

Parameter	Level	Description	Min	Max	U.M.	Resolution	Value
FA11	**Pr2**	Fan speed maximum temperature/pressure set point (step 2)	-50,0 -58 0,0 0	110 230 50,0 725	°C °F Bar PSI	Dec Int Dec Int	0
FA12	**Pr2**	Fan proportional band	0,0 0 0,0 0	25,0 45 50,0 725	°C °F Bar PSI	Dec Int Dec Int	0
FA13	**Pr2**	CUT-OFF Differential	0,0 0 0,0 0	25,0 45 50,0 725	°C °F Bar PSI	Dec Int Dec Int	0
FA14	**Pr2**	CUT-OFF Over ride	0,0 0 0,0 0	25,0 45 50,0 725	°C °F Bar PSI	Dec Int Dec Int	0
FA15	**Pr2**	CUT-OFF delay time	0	250	Sec		0
FA16	**Pr2**	Night function speed	0	100	%		30
Pr1	**Pr1**	Password	0	999			3
Pr2	**Pr2**	Password	0	999			32
Condensate drain parameters							
Sc01	**Pr1**	Condensate drain valve operation: 0 = Always on 1 = Timed operation	0	1			0 (with cap. cond. drain) 1 (with timed cond. drain)
Sc02	**Pr1**	Condensate drain ON time with one compressor off (if parameter **Sc01**=1)	1	180	Sec	Int	2
Sc03	**Pr1**	Condensate drain ON time with two compressors off (if parameter **Sc01**=1 and two compressors are configured)	1	180	Sec	Int	2
Sc04	**Pr1**	Condensate drain ON time with compressors on (if parameter **Sc01**=1)	1	180	Sec	Int	Default=5 2 (DE0600÷DE0800) 7 (DE1600, DE2000)
Sc05	**Pr1**	Condensate drain valve OFF operating time (if parameter **Sc01**=1)	1	600	Sec	Int	Default = 120; 60 (DE0600÷DE0800, DE1200)
Sc06	**Pr1**	Condensate drain ON time (if parameter **Sc08**=2 and unit is OFF)	1	60	Min	Int	1
Sc07	**Pr1**	Condensate drain valve OFF operating time (if parameter **Sc08**=2 and unit is OFF)	1	120	Min	Int	30
Sc08	**Pr1**	Condensate drain: 0 = Always active 1 = Active only when unit is ON 2 = Active when unit is OFF at time intervals **Sc06** and **Sc07**	0	2			0
Pr1	**Pr1**	Password	0	999			3
Pr2	**Pr2**	Password	0	999			32

Parameter	Level	Description	Min	Max	U.M.	Resolution	Value
Alarm parameters							
AL01	**Pr2**	Low pressure switch delay	0	250	Sec	Int	120
AL02	**Pr1**	Enables entry of the maximum number of low pressure alarm trips to be considered within one hour. When this threshold is exceeded, the system switches from automatic reset to manual reset.	0	16			0
AL03	**Pr2**	Low pressure alarm with compressor OFF: 0 = Not active with compressor off 1 = Active with compressor off	0	1			0
AL04	**Pr2**	Delay of low pressure alarm analogue input	0	250	Sec	Int	120
AL05	**Pr2**	Set point of low pressure alarm analogue input	0,0 0	50,0 725	Bar PSI	Dec Int	1.5 22
AL06	**Pr2**	Low temperature/pressure differential	0,0 0	50,0 725	Bar PSI	Dec Int	1.0 15
AL07	**Pr2**	Number of maximum low pressure alarm trips per hour from analogue input	0	16			3
AL08	**Pr2**	Delay of compressor 1-2 thermal cut-out alarm on start-up	5	250	Sec	Int	10
AL09	**Pr2**	Number of maximum thermal cut-out trips per hour on compressor delivery	0	16			3
AL10	**Pr2**	Password for reset of alarm history and compressor thermal cut-out alarms (see procedures 8.4.3 “Function menu”)	0	999			4
AL11	**Pr2**	Compressor thermal cut-out alarm operation 0 = shuts down single compressor 1 = shuts down circuit	0	1			0
AL12	**Pr2**	Condensation high temperature/pressure alarm set point	-50,0 -58 0,0 0	110 230 50,0 725	°C °F Bar PSI	Dec Int Dec Int	110 230 -- --
AL13	**Pr2**	Condensation high temperature/pressure differential	0,0 0 0,0 0	25,0 45 50,0 725	°C °F Bar PSI	Dec Int Dec Int	20 36 -- --
AL14	**Pr2**	High DW alarm delay on compressor start-up	0	250	Min	Int	10
AL15	**Pr1**	**Air inlet** probe low temperature pre-alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	-15 5
AL16	**Pr1**	**Air inlet** probe low temperature pre-alarm differential	0,0 0	25,0 45	°C °F	Dec Int	5 9
AL17	**Pr1**	Number of maximum **air inlet** probe low temperature pre-alarm trips per hour	0	16			10
AL18	**Pr1**	**Air outlet** probe low temperature pre-alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	-15 5
AL19	**Pr1**	**Air outlet** probe low temperature pre-alarm differential	0,0 0	25,0 45	°C °F	Dec Int	5 9
AL20	**Pr1**	Number of maximum **air outlet** probe low temperature pre-alarm trips per hour	0	16			10
AL21	**Pr1**	**Evaporator outlet** probe low temperature pre-alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	-3 27
AL22	**Pr1**	**Evaporator outlet** probe low temperature pre-alarm differential	0,0 0	25,0 45	°C °F	Dec Int	3 5
AL23	**Pr1**	Number of maximum **evaporator outlet** probe low temperature pre-alarm trips per hour	0	16			10

English

Parameter	Level	Description	Min	Max	U.M.	Resolution	Value
AL24	**Pr1**	**Evaporator 1 outlet** probe low temperature pre-alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	-3 27
AL25	**Pr1**	**Evaporator 1 outlet** probe low temperature pre-alarm differential	0,0 0	25,0 45	°C °F	Dec Int	3 5
AL26	**Pr1**	Number of maximum **evaporator 1 outlet** probe low temperature pre-alarm trips per hour	0	16			10
AL27	**Pr1**	**Evaporator 2 outlet** probe low temperature pre-alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	-3 27
AL28	**Pr1**	**Evaporator 2 outlet** probe low temperature pre-alarm differential	0,0 0	25,0 45	°C °F	Dec Int	3 5
AL29	**Pr1**	Number of maximum **evaporator 2 outlet** probe low temperature pre-alarm trips per hour	0	16			10
AL30	**Pr1**	**Air inlet** probe low temperature alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	-20 -4
AL31	**Pr1**	**Air inlet** probe low temperature alarm differential	0,0 0	25,0 45	°C °F	Dec Int	5 9
AL32	**Pr1**	**Air outlet** probe low temperature alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	-20 -4
AL33	**Pr1**	**Air outlet** probe low temperature alarm differential	0,0 0	25,0 45	°C °F	Dec Int	5 9
AL34	**Pr1**	**Evaporator outlet** probe low temperature alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	-5 23
AL35	**Pr1**	**Evaporator outlet** probe low temperature alarm differential	0,0 0	25,0 45	°C °F	Dec Int	5 9
AL36	**Pr1**	**Evaporator 1** outlet probe low temperature alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	-5 23
AL37	**Pr1**	**Evaporator 1 outlet** probe low temperature alarm differential	0,0 0	25,0 45	°C °F	Dec Int	5 9
AL38	**Pr1**	**Evaporator 2 outlet** probe low temperature alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	-5 23
AL39	**Pr1**	**Evaporator 2 outlet** probe low temperature alarm differential	0,0 0	25,0 45	°C °F	Dec Int	5 9
AL40	**Pr1**	**Air inlet** probe high temperature alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	70 158
AL41	**Pr1**	**Air inlet** probe high temperature alarm differential	0,0 0	25,0 45	°C °F	Dec Int	5 9
AL42	**Pr1**	**Air outlet** probe high temperature alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	70 158
AL43	**Pr1**	**Air outlet** probe high temperature alarm differential	0,0 0	25,0 45	°C °F	Dec Int	5 9
AL44	**Pr2**	**Evaporator outlet** probe high temperature alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	20 68
AL45	**Pr2**	**Evaporator outlet** probe high temperature alarm differential	0,0 0	25,0 45	°C °F	Dec Int	5 9
AL46	**Pr2**	**Evaporator 1 outlet** probe high temperature alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	20 68
AL47	**Pr2**	**Evaporator 1 outlet** probe high temperature alarm differential	0,0 0	25,0 45	°C °F	Dec Int	5 9
AL48	**Pr2**	**Evaporator 2 outlet** probe high temperature alarm set point	-50,0 -58	110,0 230	°C °F	Dec Int	20 68
AL49	**Pr2**	**Evaporator 2 outlet** probe high temperature alarm differential	0,0 0	25,0 45	°C °F	Dec Int	5 9

Parameter	Level	Description	Min	Max	U.M.	Resolution	Value
AL50	**Pr1**	Number of maximum **air inlet** probe low temperature alarm trips per hour	0	16			5
AL51	**Pr1**	Number of maximum **air outlet** probe low temperature alarm trips per hour	0	16			5
AL52	**Pr1**	Number of maximum **evaporator outlet** probe low temperature alarm trips per hour	0	16			5
AL53	**Pr1**	Number of maximum **evaporator 1 outlet** probe low temperature alarm trips per hour	0	16			5
AL54	**Pr1**	Number of maximum **evaporator 2 outlet** probe low temperature alarm trips per hour	0	16			5
AL55	**Pr1**	Alarm management controls available to client: 0 = Shuts down cooling circuit only 1 = Shuts down entire circuit including condensate drain	0	1			0
AL56	**Pr1**	Number of maximum alarm trips per hour available to client	0	16			5
AL57	**Pr2**	Enables alarm relay open collector output at off or stand-by: 0 = Alarm output enabled 1 = Alarm output disabled	0	1			0
Pr1	**Pr1**	Password	0	999			3
Pr2	**Pr2**	Password	0	999			32
Anti-freeze heater parameters							
Ar01	**Pr2**	Anti-freeze heater minimum set point	-50,0 -58	Ar03	°C °F	Dec Int	-5 23
Ar02	**Pr2**	Anti-freeze heater maximum set point	Ar03	110,0 230	°C °F	Dec Int	5 41
Ar03	**Pr2**	Anti-freeze heater set point	Ar01	Ar02	°C °F	Dec Int	0 32
Ar04	**Pr2**	Anti-freeze heater differential	0,0 0	25,0 45	°C °F	Dec Int	5 9
Ar05	**Pr2**	Anti-freeze heater settings: 0= Always off with unit OFF 1= Always enabled	0	1			0
Ar06	**Pr2**	Anti-freeze heater temperature control: 0 = Regulates on PB1 1 = Regulates on PB2 2 = Regulates on PB3 3 = Regulates on PB4	0	3			3
Pr1	**Pr1**	Password	0	999			3
Pr2	**Pr2**	Password	0	999			32

8.16 Alarm codes

Code on display	Meaning	Cause	Icon	Action	Reset
P1	Alarm from probe **Pb1**	Probe configured but faulty or value out of range	⚠	Activates alarm relay output Compressor shutdown	Automatic If value returns within specified range
P2	Alarm from probe **Pb2**	Probe configured but faulty or value out of range	⚠	Activates alarm relay output Compressor shutdown	Automatic If value returns within specified range

Code on display	Meaning	Cause	Icon	Action	Reset
P3	Alarm from probe **Pb3**	Probe configured but faulty or value out of range	⚠	Activates alarm relay output Compressor shutdown	Automatic If value returns within specified range
P4	Alarm from probe **Pb4**	Probe configured but faulty or value out of range	⚠	Activates alarm relay output Compressor shutdown	Automatic If value returns within specified range
A01	High pressure switch alarm	Activation of high pressure switch digital input	HP	Activates alarm relay output Compressor shutdown	Manual When the pressure value has returned within the normal range, the manual reset procedure can be performed.
A02	Low pressure switch alarm	Activation of low pressure switch digital input	LP	Activates alarm relay output Compressor shutdown	Automatic Becomes manual reset after AL02 trips per hour. Manual When the pressure value has returned within the normal range, the manual reset procedure can be performed
A03	High pressure transducer alarm	AL12 threshold exceeded	HP	Activates alarm relay output Compressor shutdown	Manual When the pressure value has returned within the normal range, the manual reset procedure can be performed
A04	Low pressure transducer alarm	AL05 threshold exceeded	LP	Activates alarm relay output Compressor shutdown	Automatic Becomes manual reset after AL07 trips per hour. Manual When the pressure value has returned within the normal range, the manual reset procedure can be performed
A05	Condensate drain alarm	Condensate drain digital input activation	Flow!	Activates alarm relay output Compressor shutdown	Automatic Automatic reset on return to normal values
A06	Compressor 1 thermal cut-out alarm	Compressor delivery thermal cut-out digital input activation	⚠	Activates alarm relay output If AL11 = 0: Compressor 1 shutdown; If AL11 = 1: shutdown of all compressors	Automatic Becomes manual reset after AL09 trips per hour Manual To reset the alarm, enter the function menu.
A07	Compressor 2 thermal cut-out alarm	Compressor delivery thermal cut-out digital input activation	⚠	Activates alarm relay output If AL11= 0: Compressor 2 shutdown; If AL11= 1: Shutdown of all compressors	Automatic Becomes manual reset after AL09 number of trips per hour. Manual To reset the alarm, enter the function menu.
A08	Compressor thermal cut-out alarm	Compressor delivery thermal cut-out digital input activation	⚠	Activates alarm relay output Shutdown of all compressors	Automatic Becomes manual reset after AL09 number of trips per hour Manual To reset the alarm, enter the function menu.

Code on display	Meaning	Cause	Icon	Action	Reset
A09	Compressor delivery high temperature alarm	Compressor delivery thermal cut-out digital input activation	⚠	Activates alarm relay output Shutdown of all enabled compressors	Manual When the input returns to normal status the manual reset procedure can be performed.
A10	Alarm available to client	Relative digital input activation	⚠	Activates alarm relay output and Compressor shutdown + as described for parameter AL55	Automatic Becomes manual reset after AL56 number of trips per hour. Manual To reset the alarm, enter the function menu.
A11	**Air inlet probe** low temperature pre-alarm	Activation when air inlet reading analogue input detects a temperature below AL15. Deactivation when air inlet reading analogue input detects a temperature above AL15 + AL16.	⚠	Activates alarm relay output. Message only if number of trips within one hour is below AL17, Otherwise shuts down compressor. Condensate drain continues to operate	Automatic Becomes manual reset after AL17 number of trips per hour. Manual Manual reset possible on elimination of emergency
A12	**Air outlet probe** low temperature pre-alarm	Activation when air outlet reading analogue input detects a temperature below AL18. Deactivation when air outlet reading analogue input detects a temperature above AL18 + AL19.	⚠	Activates alarm relay output. Message only if number of trips within one hour is below AL20, otherwise shuts down compressor Condensate drain continues to operate	Automatic Becomes manual reset after AL20 number of trips per hour. Manual Manual reset possible on elimination of emergency
A13	**Evaporator air outlet probe** low temperature pre-alarm	Activation when air outlet reading analogue input detects a temperature below AL21. Deactivation when air outlet reading analogue input detects a temperature above AL21 + AL22.	⚠	Activates alarm relay output. Message only if number of trips within one hour is below AL23, otherwise shuts down compressor Condensate drain continues to operate	Automatic Becomes manual reset after AL23 number of trips per hour. Manual Manual reset possible on elimination of emergency
A14	**Evaporator 1 air outlet probe** low temperature pre-alarm	Activation when evaporator 1 air outlet reading analogue input detects a temperature below AL24. Deactivation when evaporator 1air outlet reading analogue input detects a temperature above AL24 + AL25.	⚠	Activates alarm relay output. Message only if number of trips within one hour is below AL26, otherwise shuts down compressor Condensate drain continues to operate	Automatic Becomes manual reset after AL26 number of trips per hour. Manual Manual reset possible on elimination of emergency
A15	**Evaporator 2 air outlet probe** low temperature pre-alarm	Activation when evaporator 2 air outlet reading analogue input detects a temperature below AL27. Deactivation when evaporator 2air outlet reading analogue input detects a temperature above AL27 + AL28.	⚠	Activates alarm relay output. Message only if number of trips within one hour is below AL29, otherwise shuts down compressor Condensate drain continues to operate	Automatic Becomes manual reset after AL29 number of trips per hour. Manual Manual reset possible on elimination of emergency

English

Code on display	Meaning	Cause	Icon	Action	Reset
A16	**Air inlet probe** low temperature alarm	Activation when air inlet reading analogue input detects a temperature below AL30. Deactivation when air inlet reading analogue input detects a temperature above AL30 + AL31.	⚠	Activates alarm relay output Compressor shutdown	Automatic Becomes manual reset after AL50 number of trips per hour. Manual Manual reset possible on elimination of emergency
A17	**Air outlet probe** low temperature alarm	Activation when air outlet reading analogue input detects a temperature below AL32. Deactivation when air outlet reading analogue output detects a temperature above AL32 + AL33.	⚠	Activates alarm relay output Compressor shutdown	Automatic Becomes manual reset after AL51 number of trips per hour. Manual Manual reset possible on elimination of emergency
A18	**Evaporator air outlet probe** low temperature alarm	Activation when evaporator air outlet reading analogue input detects a temperature below AL34. Deactivation when evaporator air outlet reading analogue input detects a temperature above AL34 + AL35.	⚠	Activates alarm relay output Compressor shutdown	Automatic Becomes manual reset after AL52 number of trips per hour Manual Manual reset possible on elimination of emergency
A19	**Evaporator 1 air outlet probe** low temperature alarm	Activation when evaporator 1 air outlet reading analogue input detects a temperature below AL36. Deactivation when evaporator 1 air outlet reading analogue input detects a temperature above AL36 + AL37.	⚠	Activates alarm relay output Compressor shutdown	Automatic Becomes manual reset after AL53 number of trips per hour Manual Manual reset possible on elimination of emergency
A20	**Evaporator 2 air outlet probe** low temperature alarm	Activation when evaporator 2 air outlet reading analogue input detects a temperature below AL38. Deactivation when evaporator 2air outlet reading analogue input detects a temperature above AL38 + AL39.	⚠	Activates alarm relay output Compressor shutdown	Automatic Becomes manual reset after AL54 number of trips per hour Manual Manual reset possible on elimination of emergency
A21	**Air inlet probe** high temperature alarm	Activation when air inlet reading analogue input detects a temperature above AL40. Deactivation when air inlet reading analogue input detects a temperature below AL40 + AL41.	⚠ + HT	Activates alarm relay output Message only	Automatic Automatic reset on return to normal values

Code on display	Meaning	Cause	Icon	Action	Reset
A22	**Air outlet probe** high temperature alarm	Activation when air outlet reading analogue input detects a temperature above AL42. Deactivation when air outlet reading analogue output detects a temperature below AL42 + AL41.	⚠ + HT	Activates alarm relay output Message only	Automatic Automatic reset on return to normal values
A23	**Evaporator air outlet probe** high temperature alarm	Activation when evaporator air outlet reading analogue input detects a temperature above AL44. Deactivation when evaporator air outlet reading analogue input detects a temperature above AL44 + AL45.	⚠ + HT	Activates alarm relay output Message only	Automatic Automatic reset on return to normal values
A24	**Evaporator 1 air outlet probe** high temperature alarm	Activation when evaporator 1 air outlet reading analogue input detects a temperature above AL46. Deactivation when evaporator air outlet reading analogue input detects a temperature below AL46 -AL47.	⚠ + HT	Activates alarm relay output Message only	Automatic Automatic reset on return to normal values
A25	**Evaporator 2 air outlet probe** high temperature alarm	Activation when evaporator 2 air outlet reading analogue input detects a temperature above AL48. Deactivation when evaporator air outlet reading analogue input detects a temperature below AL48 -AL49.	⚠ + HT	Activates alarm relay output Message only	Automatic Automatic reset on return to normal values
C1Mn	Compressor 1 maintenance warning	Compressor operating hours > CO08	⚠	Activates alarm relay output Message only	Manual
ACF1	Configuration alarm	Two digital inputs with same configuration	⚠	Activates alarm relay output Compressor shutdown	Automatic With correct reprogramming
ACF2	Configuration alarm	Condensation control enabled but analogue inputs or outputs missing for control of fans or FA11 < FA10	⚠	Activates alarm relay output Compressor shutdown	Automatic With correct reprogramming
ACF3	Configuration alarm	Parameter CF26 = 3 with CF04 set as pressure transducer.	⚠	Activates alarm relay output Compressor shutdown	Automatic With correct reprogramming
ACF4	Configuration alarm	Parameter CF4 = Ar06 set as pressure transducer with Ar06 = 2.	⚠	Activates alarm relay output Compressor shutdown	Automatic With correct reprogramming
ACF5	Configuration alarm	Selection for temperature control with one probe not enabled	⚠	Activates alarm relay output Compressor shutdown	Automatic With correct reprogramming

Code on display	Meaning	Cause	Icon	Action	Reset
EE	EEPROM error alarm	Loss of data in memory	⚠	Activates alarm relay output Compressor shutdown	Manual If alarm re-appears after reset the device remains blocked.
Afr	Mains frequency alarm	Mains frequency outside range	⚠	Activates alarm relay output Compressor shutdown	Automatic Return of frequency to within working range

8.17 Key to probes

This chapter refers to the probes Pb1, Pb2, Pb3: the association between these probe names and the symbols used in the wiring diagram and cooling circuit diagram is shown in the table below:

DE0250÷0700-0800		
Name used in manual	**Symbol used in diagrams**	**Description**
Pb1	**BDPT**	dew point probe
Pb2	**BIAT**	air inlet temperature probe
Pb3	**BOAT**	air outlet temperature probe

DE1000÷2000		
Name used in manual	**Symbol used in diagrams**	**Description**
Pb1	**BDPT1**	dew point probe 1
Pb2	**BDPT2**	dew point probe 2
Pb3	**BIAT**	air inlet temperature probe

8.17.1 Serial line for monitoring systems

The device is fitted with a connector for serial connection via Modbus-RTU.

CHAPTER 9

SAFETY PRESSURE SWITCHES

9.1 Pressure switches

The presence of one or more pressure switches depends on the model of the machine.
For this purpose, please consult the technical specifications on Table 1 and the attached refrigeration circuit diagram, if necessary.
Depending on the model, the dryer is fitted with the following pressure switches:

1. **fan pressure switch (PV)** (see Table 1)
   This monitors the condensing pressure.
   It is only fitted on air-cooled units.
   It controls the fan in order to keep condenser pressure within rated limits.
2. **low pressure switch (LP)** (see Table 1)
   This controls the suction pressure of the refrigerant compressor and prevents it from falling to values that may jeopardise compressor performance.
   In some machines, if the electronic board allows (see Chapter 8 “tDRY Electronic controller“), the cut-in of this pressure switch may be delayed in order to prevent simple suction pressure variations or false alarms interfering with dryer performance.
   It is always of the “automatic reset” type.
   It opens the power circuit of the compressor, the electronic board and the thermostat (if present), thereby blocking the compressor (see electrical diagram).
   After the alarm cuts in, if the suction pressure of the compressor increases and exceeds the reset point of the pressure switch, it automatically resets.
   Unless the reason why it cut in is eliminated, this cycle may repeat continuously.
3. **high pressure switch (HP)** (see Table 1)
   This monitors the discharge pressure of the refrigerant compressor and prevents it from increasing to dangerous levels for the compressor and people within the immediate vicinity.
   Depending on the model, it is of the “manual reset” or “automatic reset” type.
   It opens the power circuit of the compressor, the electronic board and the thermostat (if present), thereby blocking the compressor (see electrical diagram).
   When delivery pressure decreases and falls below the reset point, **it only resets automatically if it is of the “automatic reset” type**.
   If it is of the “manual reset” type, the unit must be opened, observing the safety procedures, in order to press the reset button located at the top of the pressure switch.
   At this point, after closing the unit and powering it by turning on the main switch, the electronic board starts the compressor after the relative delay has elapsed (see Chapter 8 “tDRY Electronic controller“).
   When the high pressure switch cuts in, this is always a sign of faulty machine operation.
   If the reason it cut in has not been found and eliminated, the cut-in and reset cycle may repeat continuously.

If present, the pressure switches are screwed to SCHRADER valves (with pins) welded to the delivery and suction piping of the compressor; these prevent the refrigerant from leaking if the pressure switches are replaced.
The TRIP and RESET values of the above pressure switches depend upon the refrigerant gas, see the table below:

COMPONENT	MODEL	TRIP				RESET			
		barg	psig	°C	°F	barg	psig	°C	°F
PV	See Table 1	11.0	159.5	46.5	115.7	8.5	123.2	37.7	99.9
LP	See Table 1	0.5	7.25	-17.2	1	1.5	21.75	-4.3	24.3
HP	DE 0250 ÷ DE 1000, DE1600, DE2000	20	290	69.8	157.6	15	217.5	58.1	136.6
HP	DE 1220	21,6	313.3	73	163.4	16.6	240.8	61.9	143.4

CHAPTER 10

CONDENSATE DRAIN

Each unit is fitted with either a timed or capacitive condensate drain depending on which option is ordered.
The timed condensate drain is automatically controlled by the electronic board with which it is possible to set the condensate drain intervals (see Chapter 8 “tDRY Electronic controller“).
The capacitive condensate drain features an electronic condensate level control system with a two-level capacitive sensor.
The electronic board of the drain continuously reads the signal sent to it by the capacitive sensor.
When the level of condensate reaches the upper limit of the sensor, the solenoid valve is energised in order to discharge the condensate.
When the level of condensate reaches the lower limit of the sensor, the solenoid valve is de-energised in order to interrupt the discharge of condensate.
The table of possible configurations (Table 1) indicates the type of capacitive condensate drain installed on each model of dryer.

10.1 Timed condensate drain

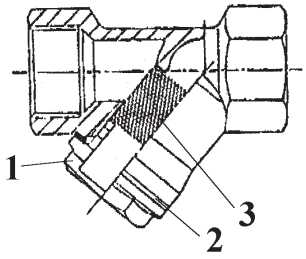
The timed condensate drain must be carefully checked and serviced in order to prevent the separated condensate from being entrained with the flow of compressed air into the distribution system.

10.1.1 Filter cleaning

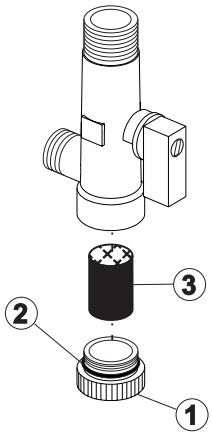
When a dryer is installed for the first time, it is common for particles of rust, pipe scale, metal filings etc. to find their way into the separator and then into the filter.
It should therefore be cleaned about a month after installation.Thereafter it should be cleaned once every 3 months.
In some installations, even more frequent cleaning may be required.
Depending on the type of machine, a normal mechanical filter or a condensate drain strainer with incorporated strainer (see figure on side) may be installed

- To remove the strainer mesh [3] close the on/off valve upline from the dryer.
- If the timed condensate drain is fitted with a Filterstop tap, just close the tap.
- Press the manual condensate drain button (see paragraph 8.10.3) to check that the filter is not pressurised.
- Open the IG main switch to disconnect the power supply to the dryer.
- Carefully unscrew the filter cap [1] retaining the sealing gasket [2] and remove the strainer mesh [3].
- Once cleaned, re-insert the mesh making sure it is home and square and tighten cap [1].
- Replace the sealing gasket [2] if it is damaged.
- After re-opening the on/off valve or the Filterstop tap, switch on IG again and re-start the unit.

Mechanical condensate filter



Condensate drain strainer



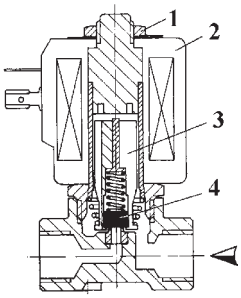
1. Filter cap
2. Sealing gasket
3. Strainer

10.1.2 Solenoid valve maintenance

The solenoid valve must always be protected by an appropriate filter to prevent solid particles preventing it from opening and closing correctly. However, if these particles manage to cross the filter and cause the valve to malfunction, all its internal components must be cleaned.
Proceed as follows:.

- isolate and depressurise the dryer;
- open the main switch IG to turn off power to the dryer;
- unscrew the nut fixing the cap for the valve power supply;
- lift up and remove the cap;
- remove the solenoid valve from the pipe and tightly clamp the body in a vice;
- unscrew the nut [1] fixing the solenoid valve [2] and remove it from the tie-rod [3];
- unscrew the tie-rod from the valve seat; check the condition of the O-ring seal [4] and of all other components and clean them carefully;
- re-assemble the components by reversing the above procedures;
- make sure that the valve is re-installed with the arrow pointing in the right direction.

Condensate drain solenoid valve



1. Fixing Nut
2. Solenoid
3. Rod
4. O-ring

DANGER

Do not tighten the nut [1] excessively as this could cause the valve to open and close incorrectly.

10.2 Capacitive condensate drain

The capacitive condensate drain is normally supplied packed in a cardboard box located at the bottom of the machine and must be installed.
It is already wired and connected to the machine power unit and is therefore ready to work.
Before starting the machine, install the condensate drain as shown in the attached diagrams at the end of this manual.
Before installing it, remove the protective cap from the lagged piping in the lower part of the unit.
The condensate drain connectors are contained in a nylon bag fixed to the lagged piping of the condensate drain.
The various connectors should be assembled using dope and applying heat insulation.
The operating and maintenance instructions manual for the capacitive condensate drain is contained inside the cardboard box.

CHAPTER 11

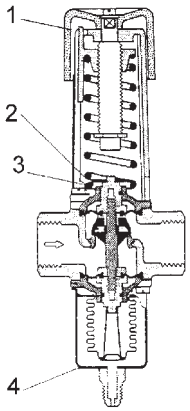
WATER PRESSURE VALVE

(water-cooled models only, see Chapter 2)

Set the water pressure regulating valve with the knob [1] to operate with the pressure-temperature values indicated in the table below.

Main components:

1. Knob;
2. Cup spring;
3. O-Ring;
4. Bellows sensor.



Check the water pressure regulating valve regularly as impurities in the water could cause it to malfunction.
This valve is fitted with a knob [1] for adjusting the set-point.

R 134 a	barg	psig	°C	°F
	9.1	131.9	40	104

Operating principle:

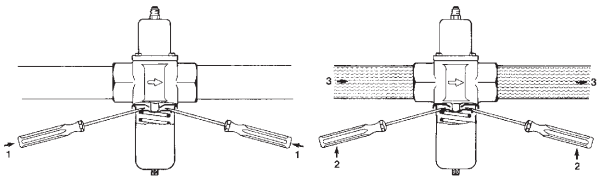
The pressure signal arrives at the bellows [4] which, via the main valve rod, opens and closes the valve.
The resistance of the spring opposing the operation of the bellows, can be regulated with the knob [1].
The differential pressure required to open the valve can therefore be adjusted.

11.1 Water pressure regulating valve maintenance

(water-cooled models only, see Chapter 2)

The valve may capture impurities.
To remove them proceed as follows:

- set the knob [1] to the minimum pressure value (“1” on the scale);
- make sure the bellows unit [4] is not pressurised;
- put a screwdriver through the slot and remove the retaining cup spring [2] from its seat;



- open the valve;
- rinse dirty parts;
- replace any worn O-rings [3], if necessary;
- grease the cylindrical surface with non acidic grease;
- lubricate screws and tie-rods before reassembling the valve.

DANGER

Do not open the bellows unit when the system is pressurised as this could cause it to permanently deform.

CHAPTER 12

GENERAL OPERATING AND MAINTENANCE REGULATION

12.1 Operation

Do not switch off the dryer if there is no compressed air flow.

The dryer switches on and off automatically.

The number of starts and stops depends on the flow of compressed air, its temperature and ambient temperature.

As explained in the Chapter 8 “tDRY Electronic controller“, the control board automatically switches off the refrigerant compressor when there is no air flow.

In this case, the refrigerant compressor will run occasionally and for brief periods to compensate for the dispersion of heat between the thermal mass and the surrounding ambient air.

The dryer is therefore ready to dry compressed air as soon as the flow is restarted.

However, it is perfectly safe to switch off the dryer at night or at weekends when the air compressor is not running.

In this case, remember to start the dryer at least 10-15 minutes before the air compressor.

12.2 Maintenance

ATTENTION

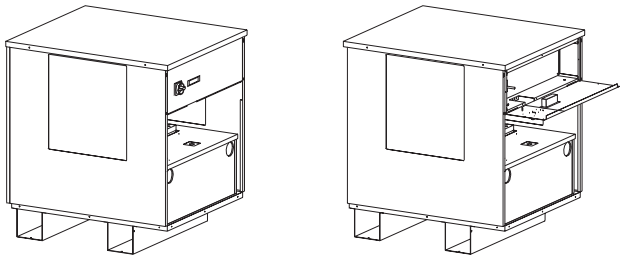
Before starting up or operating these dryers be sure that all personnel have read and understood Chapter 3 “Safety“ of this manual.

These dryers will give many years of trouble-free service if they are properly maintained and serviced.

12.2.1 Dryer access

To access the components of the refrigerant circuit turn the fasteners fixing the front panel. Also remove the side-panels, if necessary.

It is possible to access the components of the electrical panel by turning the fasteners fixing the control board.



The control board has been especially studied to be opened to 90° (see figure), thereby simplifying servicing and/or repairs to the components of the electrical panel.

12.2.2 Inspection and maintenance schedule

OPERATION	1 day	1 month	6 months	annual
Check there are no alarm signals.	•			
Check the dew-point indicator. With compressed air flowing, check that the air outlet temperature lies between 0°C (32°F) and 4°C (39°F); Brief excursions outside this range may occur when there are big fluctuations in air flow without compromising the operation of the dryer.	•			
Push the manual condensate drain button and check the valve discharges correctly.	•			
If the dryer is fitted with a timed condensate drain, find out if there is an excessive production of condensate and, if so, increase the opening (ON) time of the valve.Make sure the solenoid valve opens correctly observing the times set with the electronic board.	•			
Check that the compressed air inlet temperature is lower than the limit for which dryer was selected (normally 35-40°C 95-104°F).		•		
With the compressor running, check the top part is not too hot (over 50°C / 122°F approx.). Check current consumption of dryer lies within data plate values.			•	
Remove, clean and put back the condensate drain filter. If the filter is always clogged with material it may be necessary to dismantle and clean the whole condensate drain.		•		
Make a visual inspection of the refrigerant circuit to make sure the piping has not deteriorated and that there are no traces of oil which may indicate a leak of refrigerant.			•	
Check the condition and safety of piping connections.			•	

OPERATION	1 day	1 month	6 months	annual
In the models in which the intake and delivery piping are fixed to the refrigeration compressor with ring nuts, use a wrench to check the these are not loose.			•	
Check the tightness, condition and safety of the wiring and electrical connections.			•	
Air-cooled dryers (see Chapter 2)				
Check that the ambient air temperature is lower than the limit used to select the dryer (normally 25-30°C / 77-86°F). Check the area is well ventilated.		•		
Check that the fan-motor assembly is switched on automatically and check for any unusual noises. Clean the condenser fins with a jet of clean compressed air. Check that the grilles are free from dirt and any other obstructions.			•	
Clean the condenser fins with a mild detergent.				•
Water-cooled dryers (see Chapter 2)				
Check that the cooling water temperature is lower than the value used to select the dryer (normally 25-30°C 77-86°F).		•		
Check that the available head pressure for the dryer (difference between the inlet and outlet cooling water pressure) is at least 1-1.5 bar (14.5-21.75 psi).			•	
When the cooling water is very hard (high concentration of carbonates, calcium and magnesium salts as in the case of circuits with cooling towers) remove the scale from the inner surface of the condenser (water side) with a suitable chemical making sure it does not react with copper and carbon steel.				•

ATTENTION

The above maintenance schedule is based on average operating conditions.
In some cases it may be necessary to increase maintenance frequency.

CHAPTER 13

TROUBLE SHOOTING

PROBLEM	CAUSE	SYMPTOM	REMEDY
A Dew-point higher than expected.	**A1** Compressed air inlet temperature too high.	**A1.1** • Dew-point and compressed air inlet temperatures higher than expected; • the alarm signal relative to the problem is displayed on the electronic board panel (see paragraph 8.16 "Alarm codes"); • main alarm relay tripped (if envisaged by the electronic board fitted on the unit (see Chapter 8 "tDRY Electronic controller")).	Reduce the compressed air inlet temperature to within rated limits.
	A2 Compressed air flow too high.		Reduce the flow of compressed air to within rated limits.
	A3 Compressed air pressure too low.		Increase the compressed air operating pressure to within rated limits.
	A4 Air-cooled dryers: ambient temperature too high.		If the unit is installed indoors, reduce the ambient temperature to within rated limits (e.g. install fans to extract the air).
	A5 Water-cooled dryers: cooling water temperature too high (low water flow).		Reduce the water inlet temperature to within rated limits (e.g. increase the water flow).
	A6 Air-cooled dryers: dirty condenser fins.		Clean the condenser fins.
	A7 Air-cooled dryers: front surface of condenser blocked.		Remove obstruction from the front surface of the condenser.
	A8 Air-cooled dryers with three-phase supply: the fan runs backwards.		Invert the position of two phases of the power supply.
	A9 Water-cooled dryers: surface of exchanger piping dirty. If the cooling circuit uses mains water or it is an open circuit with cooling towers the concentration of calcium carbonates and magnesium in the water may reach such levels as to cause the formation of scale on the hot walls of the exchanger tubes (the higher the condenser outlet water temperature the greater the probability is that scale will form).		Clean the surface of the piping with a descaling solution that does not react with steel or copper.
	A10 Shortage of refrigerant fluid in circuit. If you suspect that the dryer is short of refrigerant, measure the suction temperature (equivalent suction pressure) of the refrigerant compressor by using the relative Schraeder valve. Slowly vary the air flow through the dryer until a temperature value of 3°C (+37.4°F) is displayed; the suction temperature (shown on the temperature scale of the refrigerant fluid used) will vary from -3°C (26.6°F) to 0°C (32°F) approx.; if the temperature is lower, the dryer is probably short of refrigerant.	**A10.1** • Compressor doesn't stop even if there is a little or no air flow; • the head of the refrigerant compressor is very hot; • frosting on the evaporator capillary inlet; • power absorption lower than expected; • see also A1.1	Call in a qualified refrigeration engineer to check for leaks and fill circuit with refrigerant.
B Excessive compressed air pressure drop.	**B1** See A2 and A3.	**B1.1** Possible increase in dew-point (see also A1.1); pressure downstream from the dryer lower than expected.	Increase the compressed air pressure and flow to within rated limits.
	B2 There is an increase in pressure drop and the dryer ices up.	**B2.1** See point C.	See point C.
	B3 Heat exchanger tubes blocked by impurities conveyed by the compressed air.	**B3.1** Pressure downstream from the dryer lower than expected.	Clean the exchanger tubes with a mild detergent suitable for steel and copper. Install a prefilter.

English

PROBLEM	CAUSE	SYMPTOM	REMEDY
C Dryer blocked and no airflow.	**C1** Incorrect position of temperature probe and as a result the thermal mass temperature reduced to below 0°C (32°F) with consequent freezing inside exchanger tubes. (The temperature probe may have been dislodged from its position during maintenance work carried out inside the dryer)	**C1.1** The value measured by the probe remains higher than 0°C (32°F) even if the compressor operates for long periods (e.g. more than 10-15 minutes) without compressed air flowing.	Adjust the position of the probe in the collector by pushing it in up to the relative indicator marked on the probe.
	C2 A calibration error or malfunction in the electronic board, or a change in the set point (if envisaged by the electronic board fitted on the unit (see Chapter 8 "tDRY Electronic controller")) cause ice to form.	**C2.1** The compressor doesn't stop even if the dew-point is near to 0°C (32°F).	Increase the set point by 1 or 2°C, 1.8÷3.6°F (if envisaged by the electronic board fitted on the unit (see Chapter 8 "tDRY Electronic controller")). If this doesn't solve the problem, replace the control board.
	C3 Incorrect calibration of temperature probe.	**C3.1** Everything seems to work properly but the air doesn't flow.	Use a tester to check the ohmic resistance of the probe at 20°C / 68°F as indicated in Chapter 8 "tDRY Electronic controller". If necessary, replace the probe.
D Presence of condensate downstream from the dryer.	**D1** The piping of the distribution line is located in a cold environment (temperature lower than the pressure dew-point of the compressed air) and is not insulated. In this case, condensation forms on the internal surfaces of the piping.	**D1.1** Dryer runs normally. Problems are caused by external factors.	Insulate the piping exposed to low ambient temperatures.
	D2 The compressed air flow and/or the pressure are out of their rated limits. If you suspect that the dryer is short of refrigerant, measure the suction temperature (equivalent suction pressure) of the refrigerant compressor by using the relative Schraeder valve. Slowly vary the air flow through the dryer until a temperature value of 3°C (+37.4°F) is displayed; the suction temperature (shown on the temperature scale of the refrigerant fluid used) will vary from -3°C (26.6°F) to 0°C (32°F) approx.; if the temperature is lower, the dryer is probably short of refrigerant. See also A2 and A3.	**D2.1** • Dew-point and compressed air inlet temperatures higher than expected; • The alarm signal relative to the problem is displayed on the electronic board panel (see paragraph 8.16 "Alarm codes"); • Main alarm relay tripped (if envisaged by the electronic board fitted on the unit (see Chapter 8 "tDRY Electronic controller")).	Reduce the compressed air flow and pressure to within rated limits. If necessary, position the dryer upline from the air receiver or increase the capacity of the air receiver.
E Presence of condensate downstream from the dryer (units with timed condensate drain (if fitted on the unit (see Table 1)).	**E1** Condensate drain solenoid valve coil burnt out.	**E1.1** The condensate and/or compressed air are not discharged when the manual check button is pressed.	Replace the condensate drain solenoid valve coil.
	E2 Blocked strainer upline from the solenoid valve.	**E2.1** Very little condensate is discharged when the valve opens.	Remove and clean the strainer (see Chapter 10 "Condensate drain").
	E3 Solenoid valve opening time too short.	**E3.1** The condensate continues to flow when the manual check button is pressed after a programmed discharge.	Increase the solenoid valve opening time (see paragraph 8.10 "Condensate drain management").
	E4 (if envisaged by the electronic board fitted on the unit (see Chapter 8 "tDRY Electronic controller")) Solenoid valve closing time too long.		Reduce the solenoid valve closing time (if envisaged by the electronic board fitted on the unit (see Chapter 8 "tDRY Electronic controller")).
	E5 Solenoid valve orifice blocked.	**E5.1** The condensate and/or compressed air are not discharged when the manual check button is pressed.	Isolate the filter from the compressed air circuit, dismantle the solenoid valve, clean the components and re-assemble the solenoid valve (see Chapter 10 "Condensate drain").
	E6 The electronic board relay controlling the solenoid valve doesn't work.		Use a tester to check that the relay contacts controlling the solenoid valve do not close when the manual discharge button is pressed. If the relay doesn't work, replace the electronic board.
F Presence of condensate downstream from the dryer	**F1** condensate drain fault.	**F1.1** The condensate and/or compressed air are not discharged when the manual check button is pressed.	Repair or replace the condensate drain.

PROBLEM	CAUSE	SYMPTOM	REMEDY
G The high pressure switch (HP) trips (if fitted on the unit (see Table 1))	**G1** The fan doesn't work.	**G1.1** • The refrigerant compressor stops; • The alarm signal relative to the problem is displayed on the electronic board (see chapter relative to the alarms of the electronic board fitted on the unit (see paragraph 8.16 "Alarm codes"); • main alarm relay tripped (if envisaged by the electronic board fitted on the unit (see Chapter 8 "tDRY Electronic controller")).	Repair or replace the fan. Where fitted, check the circuit breaker of the fan. Start the unit again (see paragraph 8.7.1 "Displaying and resetting an alarm" (see Chapter 8 "tDRY Electronic controller")).
	G2 Air-cooled dryers: ambient air temperature too high.	**G2.1** • Ambient air temperature higher than maximum permitted value; • the condenser is invaded by warm air expelled by the air compressor; • See also G1.1.	If the unit is installed indoors, reduce ambient temperature to within rated limits, e.g. installing fans to extract the air. Start the unit again (see paragraph 8.7.1 "Displaying and resetting an alarm").
	G3 Air-cooled dryers: recirculation of warm air due to incorrect installation.	**G3.1** • Condenser cooling air temperature higher than the max. permitted value; • See also G1.1.	Change the position of the unit or the position of any nearby obstructions in order to prevent recirculation. Start the unit again (see paragraph 8.7.1 "Displaying and resetting an alarm").
	G4 Air-cooled dryers: see also A6.	**G4.1** • The refrigerant compressor stops; • The alarm signal relative to the problem is displayed on the electronic board (see paragraph 8.16 "Alarm codes"); • Main alarm relay tripped (if envisaged by the electronic board fitted on the unit (see Chapter 8 "tDRY Electronic controller")).	Clean the condenser fins. Start the unit again (see paragraph 8.16 "Alarm codes").
	G5 Air-cooled dryers: see also A7.		Remove the obstruction from the front surface of the compressor. Start the unit again (see paragraph 8.7.1 "Displaying and resetting an alarm").
	G6 Air-cooled dryers: ambient air temperature relatively high and fan rotates in the wrong direction (on three-phase supply units).	**G6.1** • The cooling air flows through the fan and then crosses the condenser; • he refrigerant compressor stops; • main alarm relay tripped (if envisaged by the electronic board fitted on the unit (see "tDRY Electronic controller")).	Invert the position of two phases of the mains supply.

English

PROBLEM	CAUSE	SYMPTOM	REMEDY
H The high pressure switch (HP) trips (if fitted on the unit (see Table 1))	**H1** Water-cooled dryers: water inlet temperature too high.	**H1.1** • The refrigerant compressor stops; • the alarm signal relative to the problem is displayed on the electronic board (see paragraph 8.16 "Alarm codes"); • main alarm relay tripped (if envisaged by the electronic board fitted on the unit (see Chapter 8 "tDRY Electronic controller")).	Reduce the water temperature to within rated limits. Start the unit again (see paragraph 8.7.1 "Displaying and resetting an alarm").
	H2 Water-cooled dryers: water flow too low. If the cooling circuit uses mains water or it is an open circuit with cooling towers the concentration of calcium carbonates and magnesium in the water may reach such levels as to cause the formation of scale on the hot walls of the exchanger tubes (the higher the condenser outlet water temperature the greater the probability is that scale will form).		Increase the available head pressure at the dryer in order to increase the water flow. Start the unit again (see paragraph 8.7.1 "Displaying and resetting an alarm").
	H3 Water-cooled dryers: surface of exchanger piping dirty.		Clean the inside of the heat exchanger piping with a mild descaling agent that dissolves carbonates but is suitable for steel and copper. Start the unit again (see paragraph 8.7.1 "Displaying and resetting an alarm").
	H4 Compressed air flow or temperature too high combined with high ambient temperature.	**H4.1** • High dew-point (high evaporation pressure and therefore high load on condenser); • refrigerant compressor stops; • main alarm relay tripped (if envisaged by the electronic board fitted on the unit (see Chapter 8 "tDRY Electronic controller")).	Reduce the compressed air flow and temperature to within rated limits. Start the unit again (see paragraph 8.7.1 "Displaying and resetting an alarm").
I Low pressure switch (LP) trips (if fitted on the unit (see Table 1)).	**I1** No refrigerant fluid in the circuit. (see also A10).	**I1.1** • Refrigerant compressor stops; • the alarm signal relative to the problem is displayed on the electronic board (see paragraph 8.16 "Alarm codes"); • main alarm relay tripped (if envisaged by the electronic board fitted on the unit (see Chapter 8 "tDRY Electronic controller")).	Call in a qualified refrigeration engineer to check for leaks and fill up refrigerant circuit.
	I2 When starting the unit for the first time, the ambient temperature is too low and the thermal mass is at the same temperature.		Increase ambient temperature to above the min. value, by introducing warm compressed air.
J Compressor protection trips.	**J1** Compressed air flow or temperature too high combined with high ambient temperatures.	**J1.1** • The head and the body of the compressor are very hot; • the compressor stops and tries to restart after a short time (even a few seconds).	Stop the unit and reduce the air flow and temperature to within rated limits. Wait a few minutes before starting the unit again. Before replacing the fuse or resetting the automatic switch, check the conditions of all the safety devices (built-in or external motor circuit breakers and/or high pressure switch) positioned downstream from the fuse or automatic switch. In case of doubt, replace all the devices.
	J2 Compressed air flow or temperature too high combined with a shortage of refrigerant (see also A10).		Call in a qualified refrigeration engineer to check for leaks and fill up the circuit with refrigerant. Before replacing the fuse or resetting the automatic switch, check the conditions of all the safety devices (built-in or external motor circuit breakers and/or high pressure switch) positioned downstream from the fuse or automatic switch. In case of doubt, replace all the devices.
	J3 See points G1 to H2.		Before replacing the fuse or resetting the automatic switch, check the conditions of all the safety devices (built-in or external motor circuit breakers and/or high pressure switch) positioned downstream from the fuse or automatic switch. In case of doubt, replace all the devices. See points G1 to H2.

PROBLEM	CAUSE	SYMPTOM	REMEDY
K All LED's off although the main switch IG is on ("I").	**K1** Control board circuit breaker trips. Power supply fluctuations or 'spikes'.	**K1.1** Despite the presence of power at the input terminals, the digital display and all LED's remain unlit.	Provide cleaner power supply to the dryer.
	K2 Abnormal power consumption by one or more of the control board components.		If the circuit breaker continues to trip, replace the control board.
L Temperature probe fault alarm (see paragraph 8.16 "Alarm codes").	**L1** Probes in open circuit or in short circuit.	**L1.1** • Refrigerant compressor stops; • main alarm relay tripped (if envisaged by the electronic board fitted on the unit (see Chapter 8 "tDRY Electronic controller").	Check that the temperature probe is correctly connected to the control board terminals and that the cable is undamaged. If necessary replace the temperature probe.
M General available alarm is displayed.	**M1** An alarm device tripped and the signal was sent to the board through the input terminals of the available alarm, as envisaged by the attached electrical diagram.	**M1.1** • Main alarm relay tripped (if envisaged by the electronic board fitted on the unit (see Chapter 8 "tDRY Electronic controller")); • the alarm signal relative to the problem is displayed on the electronic board (see chapter relative to the alarms of the electronic board fitted on the unit (see paragraph 8.16 "Alarm codes").	Identify and remove the cause of the alarm.
N Alarm relative to the microprocessor or its Eprom memory (see paragraph 8.16 "Alarm codes").	**N1** Control board microprocessor initialising error or microprocessor mistake in reading data.	**N1.1** The alarm signal relative to the problem is displayed on the electronic board (see paragraph 8.16 "Alarm codes") and the unit is blocked.	Turn the unit off and on. If this doesn't solve the problem, contact the nearest service centre.
O Automatic switches or fuses fitted on the unit trip (see wiring diagram).	**O1** Compressor motor or compressor supply line short-circuited.	**O1.1** The compressor doesn't start even if the thermostat function requires it to.	Use a tester to check the motor windings and supply line. Replace the compressor or the cable if necessary. Replace the fuse or reset the automatic switch. Before replacing the fuse or resetting the automatic switch, check the conditions of all the safety devices (built-in or external motor circuit breakers and/or high pressure switch) positioned downstream from the fuse or automatic switch. In case of doubt, replace all the devices.
	O2 Short-circuit of solenoid valve, fan and electronic board supply lines.	**O2.1** Apparent power supply failure.	Use a tester to check the components and cables. Replace the damaged component or cable. Replace the fuse or reset the automatic switch. Before replacing the fuse or resetting the automatic switch, check the conditions of all the safety devices (built-in or external motor circuit breakers and/or high pressure switch) positioned downstream from the fuse or automatic switch. In case of doubt, replace all the devices.
	O3 Short circuit in the fan or in the fan and transformer auxiliary power lines.		Use a tester to check the components and cables. Replace the damaged component or cable. Replace the fuse or reset the automatic switch. Before replacing the fuse or resetting the automatic switch, check the conditions of all the safety devices (built-in or external motor circuit breakers and/or high pressure switch) positioned downstream from the fuse or automatic switch. In case of doubt, replace all the devices.

English

CHAPTER 14

LIST OF ATTACHMENTS

- LIFTING AND TRANSPORT DIAGRAMS
- EXPLODED VIEW
- OVERALL DIAGRAMS
- REFRIGERANT CIRCUIT DIAGRAM
- INSTALLATION DIAGRAMS OF CAPACITIVE CONDENSATE DRAIN