CHILLERS

iC 003

MAINTENANCE AND OPERATING MANUAL

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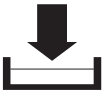
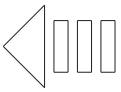
CHAPTER 1

GENERAL INFORMATION

1.1 Terminology

The machines described in this manual are called “WATER CHILLERS” or simply “CHILLERS”. These chillers have been designed to cool a liquid flow.
In most applications, the liquid to be cooled is water and the term “WATER” will be used even if the liquid to be cooled is different from water (e.g. a mixture of water and glycol).
The liquid to be cooled must be compatible with the materials used.
This manual is written for those responsible for the installation, use and maintenance of the chiller.
Here below the term “PRESSURE” will be used to indicate the gauge pressure.
The following symbols are shown on the stickers on the unit as well as on the overall dimension drawing and refrigeration circuits in this manual. Their meaning is the following:

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	Unit water inlet		Unit water outlet
	Indications for lifting the unit		Water drainage point from the machine
	Water filling point		Cooling air flow (for air-condensed units)
	Electric shock risk		Direction of the refrigerant fluid flow and water circuit

ATTENTION

This manual provides the user, installer and maintenance technician with all the technical information required for installation, operation and carrying out routine maintenance operations to ensure long life.
If spare parts are required, this must be original.
Requests for SPARE PARTS and for any INFORMATION concerning the unit must be sent to the distributor or to the nearest service centre, providing the MODEL and MACHINE NUMBER shown on the machine data plate and on the last page of this manual.

CHAPTER 2

SAFETY

This machinery was designed to be safe in the use for which it was planned provided that it is installed, started up and maintained in accordance with the instructions contained in this manual.
The manual must therefore be studied by all those who want to install, use or maintain the machinery.
The machine contains electrical components which operate at the line voltage, and also moving parts as fans and/or pumps. It must therefore be isolated from the electricity supply network before being opened.
All maintenance operations which require access to the machinery must be carried out by expert or appropriately trained persons who have a perfect knowledge of the necessary precautions.

2.1 General

When handling or maintaining the unit and all auxiliary equipment, the personnel must operate with care observing all instructions concerning health and safety at installation site.
Most accidents which occur during the operation and maintenance of the machinery are a result of failure to observe basic safety rules or precautions. An accident can often be avoided by recognising a situation that is potentially hazardous.
The user should make sure that all personnel concerned with operation and maintenance of the unit and all auxiliary equipment have **read and understood** all warnings, cautions, prohibitions and notes written in this manual as well as on the unit.
Improper operation or maintenance of the unit and auxiliary equipment could be dangerous and result in an accident causing injury or death.
Do not operate the unit and auxiliary equipment until the instructions in the Operating section of this manual are understood by all personnel concerned. **Do not** carry out any servicing, repair or maintenance work on the unit and auxiliary equipment until the instructions in the relevant sections of this manual are clearly understood by all personnel concerned.
We cannot anticipate every possible circumstance which might represent a potential hazard. The warnings in this manual are therefore not all-inclusive. If the user employs an operating procedure, an item of equipment or a method of working which is not specifically recommended, he must ensure that the unit and auxiliary equipment will not be damaged or made unsafe and that there is no risk to persons or property.

ATTENTION

⚠ *The hot / cold water produced by ICS units cannot be used directly for domestic hygiene or food applications. In the case of such applications, the installer is responsible for fitting an intermediate exchanger.*
If the intermediate exchanger is not fitted, the installer should affix a notice stating "non-drinking water".

2.2 General precautions

2.2.1 Liquids to be cooled

The liquids to be cooled must be compatible with the materials used.
These can be water or mixtures of water and glycol, for example. In case of distilled or demineralised water, check the compatibility with materials.
It is advisable to work with pH between 7 and 8. If using chemical additives consult your supplier for more information concerning compatibility with materials in contact with the process fluid of the chiller.
The liquids to be cooled must not be flammable.

ATTENTION

⚠ *If the liquids to be cooled contains dangerous substances (e.g. ethylene glycol) it is very important to collect any liquid which leaks because it could cause damages to the ambient. Furthermore, when the chiller is no longer used, dangerous liquids must be disposed of by firms specialised and authorised for treating them.*

2.2.2 Lifting and carriage precautions

Handling the chillers using fork-lift trucks must be carried out in accordance with the drawings in annexes.

2.2.3 Installation precautions

For the connection to the electrical net see chapter " Installation".

2.2.4 Precautions during operation

Operation must be carried out by competent personnel under a qualified supervisor. All the cooled water or cooling water piping must be painted or clearly marked in accordance with local safety regulations in the place of installation.

ATTENTION

⚠ *Never remove or tamper with the safety devices, guards or insulation materials fitted to the unit or auxiliary equipment.*

All electrical connections must comply with local codes. The unit and auxiliary equipment must be earthen and protected by fuses against short-circuits and overloading.

ATTENTION

⚠ *Do not open any electrical panels or cabinets while voltage.*

2.2.5 Maintenance and repair precautions

Maintenance, overhaul and repair work must be carried out by competent personnel under a qualified supervisor.

ATTENTION

⚠ *When disposing of parts and waste material of any kind make sure that there is no pollution of any drain or natural water-course and that no burning of waste takes place which could cause pollution of the air. Protect the environment by using only approved methods of disposal.*

If replacement parts are needed use only 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 period can reveal adverse operating conditions which should be corrected.
Use only refrigerant gas specified on the plate of the unit.
Make sure that all instructions concerning operation and maintenance are strictly followed and that the complete unit, with all accessories and safety devices, is kept in good working order.
The accuracy of temperature/pressure measuring devices must be checked regularly; renew measuring devices when the measurement tolerance is outside the specified range of values.
Keep the machine clean at all times. Protect components and exposed openings by covering them, for example, with clean cloth or tape during maintenance and repair work.
Do not weld or carry out any operation which produces heat near a system which contains oil or flammable liquids. The systems which may contain oil or flammable liquids must be completely drained and cleaned (with steam, for example), before carrying out these operations. Never weld, nor modify in any way, a vessel which may be put under pressure.
To prevent an increase in working temperature and pressure, inspect and clean heat transfer surfaces (i.e. condenser fins) regularly. For every unit establish a suitable time schedule for cleaning operations.
Avoid damage to safety valves and other pressure relief devices. Avoid plugging by paint, oil or dirt accumulation.
Precautions must be taken when carrying out welding or any repair operation which generates heat, flames or sparks. The adjacent components must always be screened with non-flammable material and if the operation is to be carried out near any part of the lubrication system, or close to a component which may contain oil, the system must first be thoroughly purged, preferably by steam cleaning.
Never use a light source with an open flame to inspect any part of the machine.
Before dismantling any part of the unit ensure that all heavy movable parts are secured.
When a repair has been completed, make sure no tools, loose parts or rags are left in, or on the machine.
All guards must be reinstated after carrying out repair or maintenance work.
Do not use flammable liquid to clean any component during operation. If chlorinated hydrocarbon non-flammable fluids are used for cleaning, safety precautions must be taken against any toxic vapours which may be released.
Before removing any panels or dismantling any part of the unit, carry out the following operations:

- Isolate the chiller unit from the main electrical power supply by disconnecting the cable from the electrical power source. Lock the isolator in the “OFF” position with a lock.
- Attach a warning label to the main isolator switch conveying: “WORK IN PROGRESS - DON NOT APPLY VOLTAGE”. Do not switch on electrical power 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.

2.2.6 Refrigerant gases

R134a is used as refrigerant in these units.
Never attempt to mix refrigerant gases.
To clean out a very heavily contaminated refrigerant system, e.g. after a refrigerant compressor burnout, a qualified refrigeration engineer must be consulted to carry out the task.
The manufacturer's instructions and local safety regulations should always be observed when handling and storing high pressure gas cylinders.

2.3 Safety schedule

R134a	
Denomination:	R134a (1,1,1,2 - tetrafluoroethane)
INDICATION OF THE DANGERS	
Major dangers:	Asphyxia
Specific dangers:	Unknown
FIRST AID MEASURES	
General information:	Do not give anything to unconscious persons
Inhalation:	Take the person outdoors. Use oxygen or artificial respiration if necessary. Do not administer adrenaline or similar substances
Contact with the eyes:	Thoroughly wash with plenty of water for at least 15 minutes and call a doctor
Contact with the skin:	Wash immediately with plenty of water. Remove contaminated clothing immediately
FIRE-FIGHTING MEASURES	
Means of extinction:	Any means
Specific dangers:	Pressure increase
Specific methods:	Cool the containers with water sprays
MEASURES IN THE EVENT OF ACCIDENTAL LEAKAGE	
Individual precautions:	Evacuate personnel to safe areas. Provide adequate ventilation. Use means of personal protection
Environmental precautions:	Evaporates
Cleaning methods:	Evaporates
HANDLING AND STORAGE	
Handling technical measures/ precautions:	Only use in well-aired premises
recommendations for safe use:	tightness test. Do not carry out any pressure tests with air/R134a mixtures. It can form a combustible mixture with the air at pressures above atmospheric pressure when the ratio in volume exceeds 60%
Storage:	Close properly and store in a cool, dry well-ventilated place
CONTROL OF EXPOSURE/INDIVIDUAL PROTECTION	
Control parameters:	1000 ppm v/v or ml/m3 as weighted average over 8 hours
Respiratory protection:	For rescue and maintenance work in tanks, use autonomous breathing apparatus. The vapours are heavier than air and can cause suffocation, reducing the oxygen available for breathing
Protection of the eyes:	Safety goggles
Protection of the hands:	Rubber gloves
Hygiene measures:	Do not smoke
PHYSICAL AND CHEMICAL PROPERTIES	
Colour:	Colourless
Odour:	Similar to ether
Boiling point:	-26.5°C / -15.7°F at atm. press.
Flammability point:	Non flammable
Relative density:	1.21 kg/l at 25°C
Solubility in water:	0,15% in weight (25°C at atm. press.)
STABILITY AND REACTIVITY	
Stability:	No reactivity if used with the relative instructions
Materials to avoid:	Alkaline metal, earthy alkaline metals, granulated metals salts, Al, Zn, Be, etc. in powder.
Hazardous decomposition products:	Halogen acids, traces of carbonyl halides
TOXICOLOGICAL INFORMATION	
Acute toxicity:	ALC/inhalation /4 hours/lab. rats = 567 ml/l
Local effects:	Concentrations substantially above 1000 ppm v/v can cause narcotic effects. Inhalation of products in decomposition can lead to respiratory difficulty (pulmonary oedema)
Long-term toxicity:	Has not shown any cancerogenic, teratogenic or mutagenic effects in experiments on animals

R134a	
ECOLOGICAL INFORMATION	
Global warming potential HGWP (R11=1):	0.28
Ozone depletion potential ODP (R11=1):	0
Considerations on disposal:	Usable with reconditioning

CHAPTER 3

TECHNICAL DATA

3.1 Data plate and meaning of abbreviations

The main technical data are given on the machine data plate:

MODEL and CODE	The model number and the code identify the size of the unit (see Chapter 1 "General information") and the type of construction.
MANUAL	This is the code number of the manual.
SERIAL NUMBER	This is the construction number of the unit.
MANUFACTURING YEAR	This is the year of the final test of the unit.
VOLTAGE/PHASE/FREQUENCY	Electric alimentation characteristics.
MAX. CONSUMPTION (Imax)	This is electrical current consumed by the unit during the limit working conditions (refrigerant condensing temperature is 65°C = 149°F; refrigerant evaporating temperature is 10°C = 50°F).
INSTALLED POWER (Pmax)	It is the power absorbed by the unit during the limit working conditions (refrigerant condensing temperature is 65°C = 149°F; refrigerant evaporating temperature is 10°C = 50°F).
PROTECTION	As defined by the EN 60529 European standard.
REFRIGERANT	This is the refrigerant fluid in the unit.
REFRIGERANT QUANTITY	This is the quantity of refrigerant fluid contained in the unit.
MAX. COOLING PRESSURE	This is the design pressure of the refrigeration circuit.
MAX. COOLING TEMPERATURE	This is the design temperature of the refrigeration circuit.
USER CIRCUIT FLUID	Fluid cooled by the unit (normally water).
MAX. OPERATING PRESSURE	Max. design pressure of the user circuit.
MAX. TEMPERATURE	Design temperature of the user circuit; this should not be confused with the maximum working temperature which is established when the offer is made.
CONDENSER COOLING FLUID	Fluid used by the unit to cool the condenser (this data is not present if the unit is air cooled condensed).
MAX. OPERATING PRESSURE	Max. design pressure of the condenser cooling circuit (this data is not present if the unit is air cooled condensed).
MAX. TEMPERATURE	Max. design temperature of the condenser cooling circuit (this data is not present if the unit is air cooled condensed).
SOUND PRESSURE LEVEL	Sound pressure level in free field in hemispheric irradiation conditions (open field) at a distance of 1 m from the unit, condenser side, and at a distance of 1.6 m from the ground.
AMBIENT TEMPERATURE	Min. and max. cooling air temperature value.
WEIGHT	This is the approximate weight of the unit before packing.

On the wiring diagram you will find the following abbreviations (see the first column in the table above):

$\mathbf{I}_{MAX}$ max. electric current
$\mathbf{P}_{MAX}$ max. power
$\mathbf{I}_{LR}$ electric current with rotor stopped

ATTENTION

⚠ *The performance of the refrigerant depends principally on the flow rate and temperature of the cooled water and on the temperature of the condenser cooling fluid (ambient temperature or water input temperature respectively, depending on whether the condenser is air or water-cooled). These data are defined in the offer and it is to these that reference should be made.*

Other data for standard units:

MODEL			iC 003
Tank capacity		[litres]	8
Pump	water flow rate	[l/min]	0/9
	pump head	[bar]	3.5/0
	nominal power	[kW]	0.25
	type	peripheric	

NOTE

Standard pumps are of peripheral type, so the pump heads indicated in the table are respectively at no flow and at max. flow. It is possible for the pump installed to be different from the standard one. In this case reference should be made to the data in the offer.

NOTE

The pump must never run dry.

3.1.1 Sound level measurements

	Lp dB(A) *	Lw dB(A) **
iC 003	63,2	76,2

* at distance of 1 metre
** global

Test conditions

Noise levels refer to operation of the unit at full load in nominal conditions.
Sound pressure level in hemispherical irradiation conditions at a distance of 1 m from the condenser side of the unit and height of 1.6 m from the ground. Values tolerance ± 2 dB.
Sound power level: in compliance with ISO 3744

3.1.2 Limit operating conditions

		Minimum	Maximum
Ambient air temperature	°C	5	40
Evaporator water inlet temperature	°C	5	35
Evaporator water outlet temperature	°C	0(1)	30

(1) For temperatures below +5°C use antifreeze solutions (see 5.3 “Antifreeze protection”).

CHAPTER 4

DESCRIPTION

4.1 Operating principle

The chiller described in this manual work on the basis of the same principle. A refrigerant circuit cools the exchange surface of an evaporator through which the liquid to be cooled passes.
The evaporator finds inside the tank.
The thermostat controls the temperature of the water in the tank to maintain it within preset limits.
Also consult Chapter 7 “Thermostat“.

4.1.1 Refrigeration compressor

Of hermetic type with pistons, cooled by the refrigerant fluid drawn in, and protected by a thermal relay.
The compressor is mounted on anti-vibration supports.

4.1.2 Casing

Built with galvanised panels and painted with epoxy resins.
The panels have no structural function so that they can easily be removed to permit total access to all the components.

4.1.3 Materials in contact with the liquid to be cooled

Stainless steel, copper, brass, plastics.

4.1.4 Condenser and fan

Air cooled condensers are used without steel tubes; in this case it is the fins that form the tube by means of long collars inserted one inside the other and brazed with copper in a controlled atmosphere oven. The condensing coils are equipped with an axial fan complete with protective grille. The fan is of the "pressure" type: the air is drawn from the interior of the unit and expelled into the atmosphere, flowing through the condensing coil along its route.

4.1.5 Evaporator

Consisting of a copper tube in tube exchanger. The water flows in counter-current to the evaporating refrigerant.

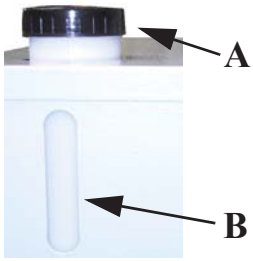
4.1.6 Pump

Of peripheric type, body in brass/bronze, impeller in brass, shaft in stainless steel.

NOTE

The pump must never run dry.

4.1.7 Accumulation tank



In these units are used stainless steel accumulation tanks.
The tanks, hermetically closed, contain the evaporator.
The hydraulic circuit is of atmospherical type and by a plastic receptacle with a capacity of about 1,5 litres, complete with a plug (**A**), it is possible to fill the unit.
This receptacle is fixed to the machine casing in which there is a slot (**B**) for inspecting the water level and a hole which permits access to the filling plug from the outside.

4.2 Overall dimensions

See enclosures

4.3 Minimum distances from walls

See enclosures.

4.4 Water and refrigerant circuits

See enclosures.

4.4.1 Water circuit

The water flowing through the evaporator pipes cools and flows into the tank.
Then the water is sucked by a peripheric pump which sends it directly to the user.
The pump delivery is connected to the evaporator by a **by-pass pipe** which guarantees a minimum water flow through the pump should a pipe at any point of the hydraulic circuit be closed by mistake.

4.4.2 Refrigerant circuit

The refrigerant is pumped by the refrigerant compressor to the condenser. The condenser is a heat exchanger and is cooled by an air flow produced by a fan.
After the condenser, the refrigerant liquid passes through a drying filter and a laminating element (capillary tube).
The refrigerant then enters the evaporator's circuit in which it flows in counter-current with respect to the water to be cooled.
When it exits the evaporator, the refrigerant is again sucked by the compressor and the cycle repeats itself.

4.5 Electrical circuit

See the enclosed electrical diagrams.

CHAPTER 5

INSTALLATION

ATTENTION

⚠ *Before carrying out the installation or operating on this machine, ensure that all the personnel has read and understood the " Safety" chapter in this manual.*

5.1 Inspection

Immediately after uncrating, inspect the unit.

5.2 Positioning

1. The chiller must be installed indoors only.
2. The room must be well ventilated. In some cases it may be necessary to install fans or extractors to limit the temperature of the room.
3. The ambient air must be clean and not contain flammable gas or solvents. The minimum and maximum working ambient temperatures are specified on the unit data plate. In extreme temperature conditions, the protection devices may trip.
4. The machine can be positioned on any flat surface capable of supporting its weight.
5. Leave free space in front of the unit to permit access during service operations (see chapter "4.2 Overall dimensions").
6. Do not obstruct or disturb the condenser's flow of cooling air. **Position the chiller in such a way that the cooling air cannot recirculate in the intake grilles.** Ensure that the chiller is not subject to warm air from the cooling systems of other machines.

5.3 Antifreeze protection

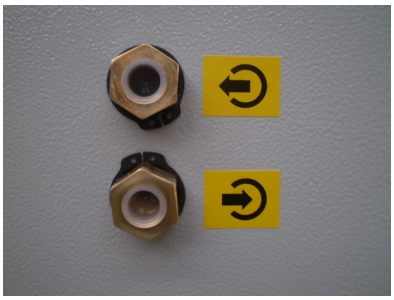
Even if the minimum working ambient temperature is above 0°C it is possible for the chiller - during stoppages in the cold seasons - to find itself in an environment with a temperature below 0°C. In these cases, if the chiller is not emptied, antifreeze (ethylene glycol) must be added in the following percentages to prevent the formation of ice:

Ambient temperature up to [°C]	Ethylene Glycol [% in weight]
0	0
-5	15
-10	25
-15	30
-20	40

According to the outlet temperature of cooled water, it is necessary to add the following antifreeze (ethylene glycol) percentages in order to avoid freezing:

Water outlet minimum temperature [°C]	Ethylene Glycol [% in weight]
0<T	15

5.4 Plumbing connections



It is recommended to insert a filter of "Y" type on the water inlet connection, in order to stop eventual impurities of water which could cause big damages to the pump.

1.Connect the chiller to the water piping. See the overall dimension drawings for the size and type of connections.

2.Provide two cocks (inlet and outlet) to by-pass the machine for maintenance purposes without having to empty the water circuit of the user.

3.Fill the water receptacle by unscrewing the plug of the receptacle and filling the circuit with water (for example using a hose connected to the cock) until the level in the receptacle is about half-way up the slot. The filling of tank before starting-up the unit is very important as the pump can not operate without water.

The receptacle used for filling the circuit acts as an open expansion tank. It is therefore necessary to pay attention to the volumes and dimensions in play.

5.5 Electrical connections

Check that the power supply voltage and frequency match the requirements of the unit as shown on the unit data plate and they are within the tolerances given in the wiring diagram.
Ensure that the electrical installation complies with local wiring and safety regulations.
Check that there is a neutral line in the electrical installation and it is earthen in the transformer cabin (TN system in compliance with IEC 364 - HD 384 - CEI 64-8) or that this is done by the electricity supply company (TT system).
The electrical supply cable must be connected to the electrical installation and pay attention to connect the neutral wire of the unit (indicated by the appropriate colour) to the neutral wire of the installation.
The electrical supply cable must be the one supplied with the unit and/or indicated in the electrical wiring diagrams.
At the beginning of the electrical supply cable

1. must be guaranteed a protection against direct contacts with a protection degree of IP2X or IPXXB at least;
2. must be installed protection devices that:
   - protect against overcurrents, the power supply cable and the cables not protected by the electrical plant of the machine;
     (see information in the electrical wiring)
   - limit the 17 kA peak short circuit current to its own nominal cut-off power when the short circuit current at the operation point is higher than 10 kA effective;
   - protect against indirect contacts on the unit, (such as short-circuiting between the phase and protection circuit) by cutting off the supply automatically (see IEC 364 - HD 384, CEI 64-8);
     Use a differential switch (normally with operation nominal differential current of 0.03 A)
   - protect against phase failures where the electrical supply is three-phase.

For protection circuit dimensions, please refer to the data specified in the wiring diagrams attached (max. absorption, pick-up currents, cables section).

CHAPTER 6

START UP

ATTENTION

⚠ *Before starting up or operating these units be sure that all personnel have read and understood the " Safety" section of this manual.*

1. Check that the machine's on/off valves are open.
2. Check that the level of the liquid in the receptacle is at about the middle of the graduated scale.
3. Check that the ambient temperature is within the limits indicated on the machine data plate.
4. Check that the push-button switch is in the OFF position ("O").
5. Check that the power supply voltage is correct.

6. Turn the machine push-button switch ON ("I"). The pump and the refrigerant compressor start immediately and together.
   For this reason the circuit must be full of water.

7. The pump is not ready to start.

If with the first start-up, there is a high ambient temperature and the temperature of the water in the hydraulic circuit is much higher than the working value **(e.g. 25-30°C)** this means that the chiller starts up overloaded with the consequence of **possible tripping of the compressor protection devices. To reduce this overload, a chiller outlet valve can be gradually** (but not totally!) **closed to reduce the flow of water passing through it.** Open the valve as the water temperature in the hydraulic circuit reaches the working value.
If the thermal load is lower than that produced by the chiller, the water temperature drops until it reaches the set point. When the value is reached, the thermostat controlling the water temperature stops the compressor. **The water pump continues to operate.**
With operating pump, if the unit is in normal operation, the water should be at mid-slot in the receptacle.

CHAPTER 7

THERMOSTAT

In iC 003 there is a Prodigy thermostat with ON/OFF switch for starting the compressor.

7.1 Water temperature detection in the tank

Prodigy thermostat regulates and controls the water temperature inside the accumulation tank.

CHAPTER 8

OPERATION AND MAINTENANCE

8.1 Operation

The machine operates in completely automatic mode.
There is no need to turn it off when there is no thermal load as it turns off automatically when the preset water temperature has been reached.

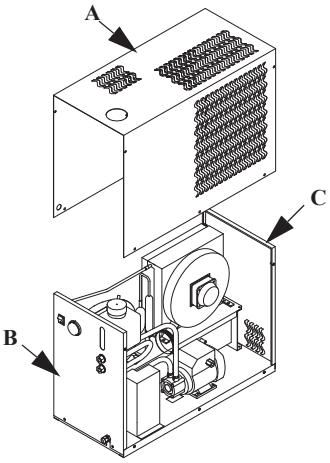
8.2 Maintenance

ATTENTION

⚠ *Before proceeding with the maintenance of these units be sure that all personnel concerned have read and understood the " Safety" section of this manual.*

8.2.1 Unit access

To access the components of the refrigerant circuit, remove the unit top panel “A”. The front panel “B” and the back panel “C” remain fixed.



8.2.2 Maintenance Schedule

OPERATION	1 day	1 month	6 months	annually
Check that the water output temperature is within the envisaged range.	•			
Check that the water intake temperature is lower than the value used for selecting the chiller.	•			
Check that the ambient temperature is lower than the value used for selecting the chiller. Check that the environment is well ventilated.		•		
Check the level of water in the filling tank from the slot in the outer casing.	•			
Check that the unit current absorption is with the value on the data plate.			•	
Carry out visual inspection of refrigerant circuit, looking out for any deterioration of the piping or any traces of oil which might indicate a refrigerant leak.			•	
Check the condition and security of piping connections.			•	
Check the condition and security of wiring and electrical connections.			•	
Check that fan operation is not noisy. Thoroughly clean the fins of the condenser with soft sponge and/or jet of clean compressed air. Check that the grilles of the unit are free from dirt and any other obstructions.			•	

ATTENTION

⚠ *This plan is based on an average working situation.*

In some installations it may be necessary to increase the frequency of maintenance.

CHAPTER 9

TROUBLE SHOOTING

PROBLEM	CAUSE	SYMPTOM	REMEDY
A Water temperature higher than the expected value.	**A1** Thermal load too high.	**A1.1** Water temperature higher than expected value.	Restore the thermal load to within the preset limits.
	A2 Ambient temperature too high.	**A2.1** See A1.1	Restore the ambient temperature to within the preset limits.
	A3 Condenser fins dirty.	**A3.1** See A1.1	Clean the condenser fins.
	A4 Front surface of the condenser obstructed.	**A4.1** See A1.1	Free the front surface of the condenser.
	A5 No refrigerant fluid in the plant.	**A5.1** • See A1.1 • low evaporation pressure.	Get a technician to check for leaks and eliminate them. Fill the plant.
B Low water pressure at pump outlet.	**B1** Clearance between the impeller and the pump casing too high. Wear parts.	**B1.1** Low water pressure at pump outlet.	Verify and replace the pump impeller.
C The chiller is obstructed and the water does not flow.	**C1** Set point too low so that the water freezes.	**C1.1** • Water does not pass; • intake pressure too low.	Choose between: • Raise the set point; • add an appropriate % of ethylene glycol (antifreeze) (see Chapter 5 “Installation“).
	C2 Evaporator obstructed by dirt carried by the water to be cooled.	**C2.1** High water temperature difference between inlet and outlet.	Depending on the type of dirt: • clean the evaporator by running a detergent solution which is not aggressive for steel, aluminium and copper; • run a high water flow against the stream. Install a filter upstream from the chiller.
D Compressor protection tripped (hermetic compressors klixon).	**D1** Thermal load = (water flow) x (water inlet - water outlet temperature) too high in concomitance with high ambient temperature.	**D1.1** • The head and body of the compressor are very hot; • the compressor stops and attempts to start after a brief period.	Stop the machine and restore the load within the preset limits. Wait a few minutes before restarting.
	D2 Thermal load = (water flow) x (water inlet - water outlet temperature) too high in concomitance with a lack of refrigerant in the circuit (also see A5).	**D2.1** See D1.1.	Get a engineer to check for leaks and eliminate them. Get the engineer to fill the circuit.