



ARA

AIR-COOLED WATER CHILLERS 00182 - 00202 - 00232 - 00252 - 00302 - 00403 - 00504	A - D - L
AIR-COOLED HEAT PUMPS 00182 - 00202 - 00232 - 00252 - 00302 - 00403 - 00504	H - P - Q
FREE COOLING CHILLERS 00182 - 00202 - 00232 - 00252 - 00302	E
ULTRA-LOW NOISE LEVEL FREE COOLING CHILLERS 00152 - 00182 - 00202 - 00232 - 00252 - 00302	M

INSTRUCTION MANUAL



© UNIFLAIR 2000.



AQUAFLAIR

UNIFLAIR ITALIA S.r.l.

Via dell'Industria, 10
35020 BRUGINE (Padova) Italy
Tel. +39 (0)49 9713211
Fax. +39 (0)49 5806906
Internet: www.UNIFLAIR.com
E-Mail: info@UNIFLAIR.com

Release: 1.4	Date: 01 - 12 - 2000
Checked by:	

CONTENTS

WARNINGS	Page.	4
SYMBOLS USED		5
SAFETY		5
GENERAL DESCRIPTION		6
Documentation included with the unit		6
Available versions and accessories		7
Data plate		8
General description and intended use of the unit		8
Access to main components		10
Description of the main components of the unit		12
Free cooling System - Free cooling		14
Recovery of condensation heat		15
INSTALLATION		16
Transport and handling		16
Receiving and storing the unit		17
Positioning the unit – working space		18
Water connections		19
Low-temperature operation with anti-freeze mixture		20
Guide to sizing of the expansion tank		21
Electrical connections		22
Remote control, local networks and supervision systems		24
Check list for start-up and testing		27
PROGRAMMING AND REGULATION		29
Microprocessor control		29
Introduction		29
Basic control		29
Advanced mP20 control		29
Regulation of cooling capacity		31
Setting the safety devices		32
TECHNICAL DATA		33
Current absorption – Cooling only versions and Heat Pumps		33
Current absorption – Free cooling version		34
Current absorption – Ultra-Quiet free cooling version		35
Dimensions and weights		36
ARA Basic version (cooling only)	- Models 00182 - 00232	37
ARA Heat pump	- Models 00182 - 00232	37
ARA Ultra low-noise version	- Models 00182 - 00232	37
ARA Basic version (cooling only)	- Models 00252 - 00504	38
ARA Heat pump	- Models 00252 - 00504	38
ARA Ultra low-noise version	- Models 00252 - 00504	38
ARA Free cooling version	- Models 00182 - 00232	39
ARA Free cooling Low Noise Level	- Models 00152 - 00232	39
ARA Free cooling version	- Models 00252 - 00302	40
ARA Free cooling Low Noise level	- Models 00252 - 00302	40
PROBLEM SOLVING		41
Guide to problem solving		41
Bleeding the water circuit		44
Refrigerant charge		44
Maintenance and cleaning		46
Changing the air filter		46
APPENDIX		
Instruction manual for ARA microprocessor controls		

This unit has been subjected to risk analysis under EC Directive 98/37/CEE (89/392/CEE). The technical solutions implemented during the design phase are described in the unit's technical file.

This equipment is manufactured to function safely for the purposes for which it was designed **as long as the installation, operation and maintenance are carried out according to the instructions in this manual and on the labels attached to the unit.**

Warnings in this manual which are particularly important for user safety are shown by this danger symbol.

IMPORTANT WARNINGS



This unit contains refrigerant gas circuits, chilled water under pressure, live electrical components, hot surfaces, sharp edges (the fins on the coils) and rotating devices such as the fans.

All service and maintenance operations which require access to the inside of the unit while it is in operation must be performed by qualified and experienced personnel who are aware of the necessary precautions.



Before accessing the inside of the unit, disconnect it from the electrical power supply.

In any case, all safety legislation of the installation location must be followed.

In the event of fire water and other conductive substances must not be used to put out the fire near live electrical components. This warning must be displayed on notices in the unit installation location.

If the refrigerants used come into contact with fire they decompose, forming acids and other irritants. The smell of these substances, **even at concentrations below danger levels**, gives enough warning to allow evacuation of the area at risk.



Make sure that the mains supply to the unit is the same as that shown on the rating plate.

Drain all water from the system before the winter season to avoid freezing.

In periods in which the temperature may fall below 0°C, empty the unit in order to prevent the serious damage caused by the formation of ice.







This precaution is not necessary if the unit is charged with an appropriate anti-freeze mixture.

Free cooling chillers must be loaded with anti-freeze.

If the unit is fitted with the *optional* heating cable, it must be turned off without cutting the electrical power supply.

Install a mechanical filter in the section of tubing near the intake of the unit to prevent the fouling of the heat exchanger with pieces of welding or flakes of oxidised metal from the water mains.

SYMBOLS USED

SYMBOL	MEANING	SYMBOL	MEANING
	DANGER		MOVING COMPONENTS
	IMPORTANT WARNING		HOT SURFACES – DANGER OF BURNING
	HIGH VOLTAGE – ELECTRICAL RISK		SHARP EDGES

SAFETY

The new range of UNIFLAIR **ARA** water chillers and heat pumps features state-of-the-art technology to give maximum reliability, safety, quietness of operation and respect for the environment.

- 1) **RELIABILITY:** Trouble-free operation of Uniflair precision chillers is ensured by rigorous production process controls under ISO 9001-certified quality procedures:
 - quality control of components;
 - pressure testing of refrigerant and water circuits;
 - testing of current absorption and IEC safety testing;
 - calibration and testing of instruments and safety devices;
 - final testing of unit under operating conditions

- 2) **ACTIVE SAFETY:** UNIFLAIR safety and control systems have a supervision and prevention function with:
 - automatic blocking of components in dangerous conditions;
 - indication of function status; reading and continuous display of circulating fluid temperature;
 - management of compressor start-ups to reduce excessive switching on and off
 - compressor start timing to reduce total unit start-up current
 - indication of anomalous function conditions and/or alarms.

- 3) **PASSIVE SAFETY:** The essential functions of UNIFLAIR chillers are protected against anomalous function conditions and potential damage with:
 - high and low pressostats on the refrigerant circuit (HP with manual re-set)
 - safety valve on the high pressure refrigerant line
 - anti-freeze protection to prevent freezing of the evaporator, pump and tank
 - compressor motor electrical protection
 - standard differential flow gauge
 - water circuit safety (with optional pump group)
 - compressor crankcase heater (standard on free-cooling and heat pump versions).

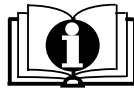
- 4) **PERSONAL SAFETY.** The design and cabling of all UNIFLAIR chillers conforms to IEC electro-technical norms. Electrical panels have auxiliary 24V circuits and are equipped with:
 - general switch and door lock switch;
 - automatic circuit-breaker switches;
 - double protection panel on fan compartment.

The fans are protected by an external metal grille which conforms to applicable safety norms.

GENERAL DESCRIPTION



DOCUMENTATION INCLUDED WITH THE UNIT



Every **ARA** chiller is delivered complete with the following documentation:

- ARA and microprocessor control instruction manuals
- Unit installation diagrams
- Diagrams of the refrigerant and hydraulic circuits of the unit
- Electrical diagrams
- List of spare parts
- CE declaration with list of European directives and norms to which the unit conforms
- Guarantee Conditions.

AVAILABLE VERSIONS AND ACCESSORIES

Models	ARA00152 (<i>only M versions</i>), ARA00182, ARA00202, ARA00232, ARA00252, ARA00302, ARA00403 (<i>not supplied for E and M versions</i>), ARA00504 (<i>not supplied for E and M versions</i>)
Configurations	A : Basic version: mechanical cooling with on-off condensation control D : Basic version with modulating condensation control L : Ultra low-noise version with modulating condensation control H : Heat pump with on-off condensation control P : Heat pump with modulating condensation control Q : Ultra low-noise heat pump with modulating condensation control E : Free cooling version with modulating condensation control M : Ultra low-noise free cooling version with modulating condensation control
Pump group	Group with 1 type A pump (0.9 kW) Group with 2 type A pumps (0.9 kW) Group with 1 type B pump (1.1 kW) Group with 2 type B pumps (1.1 kW) Group with 1 type C pump (1.85 kW) Group with 2 type C pumps (1.85 kW)
Reservoir tank (only with pump group)	Tank type "A" (210 litres) Tank type "B" (300 litres) Tank type "C" (500 litres)
Heat recovery	Partial heat recovery (<i>with modulating condensation control as standard - not supplied for heat pump versions</i>)
Power supply	400V/3ph+N/50Hz
Electrical accessories	Power phase correction capacitors
Control	Basic control (<i>not available on free-cooling versions</i>) Basic control with remote terminal (<i>not available on free-cooling versions</i>) mP20 control without user terminal (<i>not available on heat pumps</i>) mP20 control with local user terminal (<i>not available on heat pumps</i>) mP20 control with remote user terminal (<i>not available on heat pumps</i>)
Serial connections	LAN (<i>with mP20 control</i>) RS485 serial output (<i>with basic control</i>) RS485 serial output (<i>with mP20 control</i>) RS422 serial output + LAN (<i>with mP20 control</i>) RS485 serial output + LAN (<i>with mP20 control</i>)
Refrigerant	R22 R407C R134a
Norms	ISPESL (Italian) TÜV (German)
Refrigerant Accessories	Anti-freeze heater on evaporator (<i>not supplied for Free cooling versions</i>) Anti-freeze heater on pumps (<i>not supplied for Free cooling versions</i>) Anti-freeze heater on tank (<i>not supplied for Free cooling versions</i>) High/Low pressure manometers
Pressure sensors	Low pressure sensor (<i>with mP20 control only</i>) High pressure sensor
Options	Rubber anti-vibration feet Coil protection grilles Metal filters for free cooling coil.

DATA PLATE

The chiller data plate is in the electrical panel and gives the following information:

- Model of the unit
- Serial number
- Voltage, number of phases and power supply frequency for primary and auxiliary circuits
- Current and power absorbed
- OA (Operating current), FLA (Full load current) and LRA (Locked rotor current)
- Safety device settings
- Refrigerant type and charge in kg for each circuit.

MODEL	SERIAL No.			
POWER SUPPLY VOLTAGE				
CURRENT				
OA	FLA	LRA	KW	TOTALI
SAFETY DEVICE SETTINGS				
REFRIGERANT				

GENERAL DESCRIPTION AND INTENDED USE

Air-cooled and water-cooled **ARA** air-cooled liquid chillers and heat pumps are designed for outdoor installation in comfort and industrial applications. The chilled water produced can be sent to fan coils or room air conditioning units or can be used for industrial process cooling.

Units fitted with the mP20 microprocessor control can be connected in parallel on a single water circuit thanks to the possibility to connect the microprocessor control boards in a local network. The cooling capacity of the system can therefore be altered at any time.

FUNCTION LIMITS

In free cooling and heat pump versions or in applications which require the production of chilled water in winter as well as summer, an anti-freeze mixture (water and ethylene glycol) must be used (see "Low-temperature operation with anti-freeze mixture"). **The standard cooling-only unit can operate at air temperatures up to +46°C.**

EASE OF INSTALLATION AND MAINTENANCE

The compact dimensions and reduced weight of these chillers facilitates installation even where space is limited. All models are fitted with a main switch to enable direct connection to the mains power supply without the need for an external switch; short-circuit protection fuses should be fitted however.

All units are assembled and fully tested in the factory, making installation simply a question of connection to the electrical power supply and water circuits. An important feature of the design is the positioning of components to allow easy access for service and maintenance.

RESISTANCE TO THE ELEMENTS

Uniflair chillers boast excellent corrosion resistance and are built to withstand the harshest of conditions. The structure is in galvanised steel sheet painter with polyester powder; all external fastenings are in stainless steel.

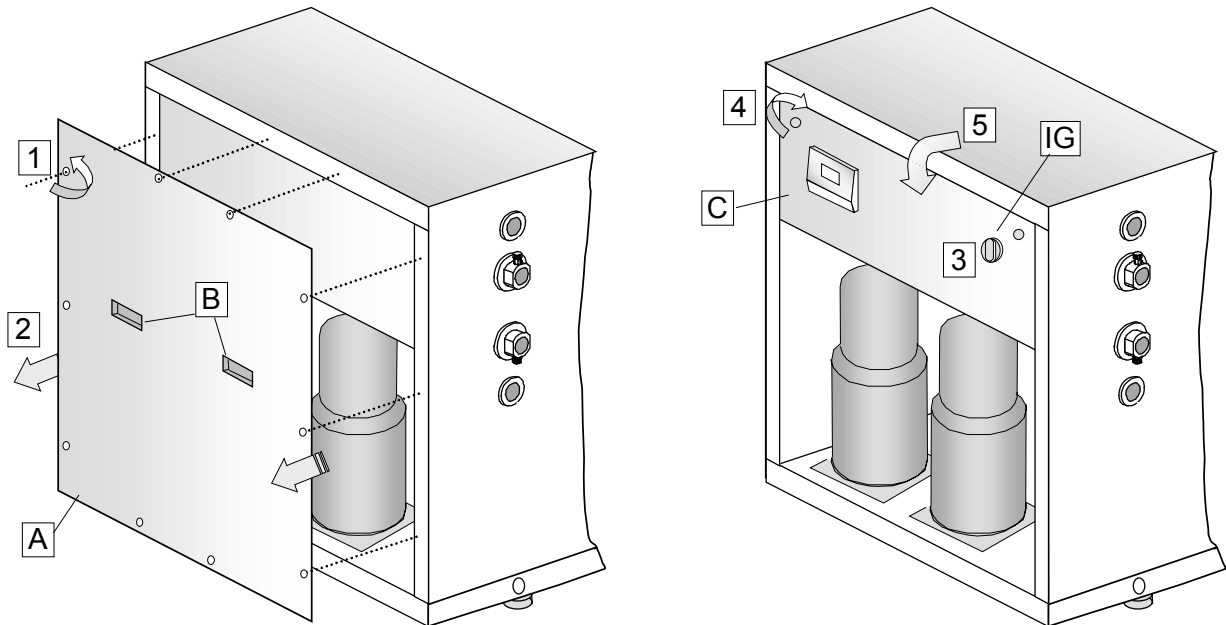
LOW NOISE LEVELS

Even the basic units have very low noise levels thanks to large exchange surfaces and low fan running speeds. For special applications where near-silent operation is required there are ultra-low noise versions available; these units have vibration dampers on the compressor output, sound insulation on the compressor housing and modulating fan speed control.

ACCESS TO MAIN COMPONENTS

COMPRESSOR HOUSING

To access the compressor housing, remove the 8 fixing screws **1** and lift panel **A** using the two front handles **B**. Removing panel **A** gives access to the compressor housing, the microprocessor control user terminal and to the optional high and low pressure manometers..



DANGER – HOT SURFACES! RISK OF BURNING. When panel **A** has been removed the compressor and refrigerant tubes are exposed – during normal unit operation these components are very hot and can cause burns.



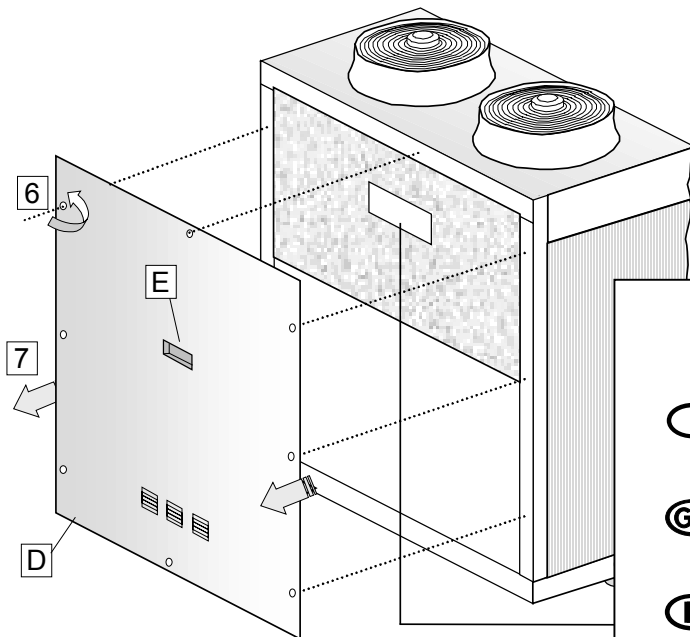
IMPORTANT: Removing panel **A** does not stop the unit and the power supply to the compressors is not interrupted. For service and maintenance, the main switch **IG** must be turned off (position 'O').

ELECTRICAL PANEL

To access the electrical panel move the main switch **IG** to position "O" and turn the two screws **4** 1/4 turn. This enables panel **C**, hinged at the base of the electrical panel to be opened.

PUMP GROUP

To access the optional pump group and the free cooling pump remove the six fixing screws **6** and remove panel **D** using front handle **E**. To avoid contact with the fan blades there is a further steel protection panel **F**, fixed with screws.



- I** **ATTENZIONE**
PRIMA DI QUALSIASI INTERVENTO LEGGERE ATTENTAMENTE IL LIBRETTO DI ISTRUZIONI. APPARECCHIO IN TENSIONE E CON ORGANI ROTANTI: PRIMA DI INTERVENIRE SU QUALSIASI PARTE ELETTRICA OPPURE SUL VENTILATORE/I TOGLIERE TENSIONE ALL'APPARECCHIO.
- GB** **WARNING**
BEFORE ANY OPERATIONS ON THIS UNIT READ THE INSTRUCTION MANUAL CAREFULLY. THIS EQUIPMENT CONTAINS COMPONENTS AT MAINS VOLTAGE AS WELL AS ROTATING FANS: DISCONNECT POWER BEFORE ANY OPERATION ON ELECTRICAL COMPONENTS OR FANS.
- D** **ACHTUNG**
VOR ALLEN ARBEITEN AN DIESEM GERÄT IST DIE BEDIENUNGSANLEITUNG GENAU STUDIEREN. DIESES GERÄT ENTHÄLT BÜTEILE, DIE UNTER SPANNUNG STEHEN SOWIE SICH DREHENDE VENTILATOREN: VOR ARBEITEN IM GERÄT IST DIE NETZZULEITUNG ABZUSCHALTEN.
- F** **ATTENTION**
LIRE ATTENTIVEMENT LE MANUEL D'INSTRUCTIONS AVANT TOUTE INTERVENTION. CET EQUIPEMENT UTILISE DES COMPOSANTS ÉLECTRIQUE SOUS TENSION ET DES PIÈCES EN MOUVEMENT. COUPER L'ALIMENTATION AU DISJONCTEUR AVANT TOUTE INTERVENTION SUR LES COMPOSANTS ÉLECTRIQUES.
- E** **ATENCIÓN**
ANTES DE CUALQUIER INTERVENCIÓN LEER ATENTAMENTE EL MANUAL DE INSTRUCCIONES. APARATO BAJO TENSIÓN Y CON COMPONENTES ROTANTES. ANTES DE INTERVENIR SOBRE CUALQUIER PARTE ELÉCTRICA O SOBRE EL VENTILADOR/ES QUITAR TENSION AL APARATO.



IMPORTANT: Before removing panel **D** switch off the unit by moving main switch IG to position 'O' to make sure that there is no power supply to the compressors and circulation pumps.

DESCRIPTION OF MAIN COMPONENTS

STRUCTURE

These units are normally installed outdoors, often on the roof of a building. For this reason the structure of the unit is made entirely in galvanised steel, painted with corrosion-resistant polyester powder. All external fastenings are in stainless steel.

The panels can be easily removed to facilitate maintenance and all internal components can be accessed via two sides of the unit.

COMPRESSORS

Ultra-reliable rotating SCROLL compressors from a leading manufacturer are used (in tandem on models 00403 and 00504). All ARA units have two independent refrigerant circuits, ensuring at least 50% capacity in the unlikely event of a fault in one of the circuits.

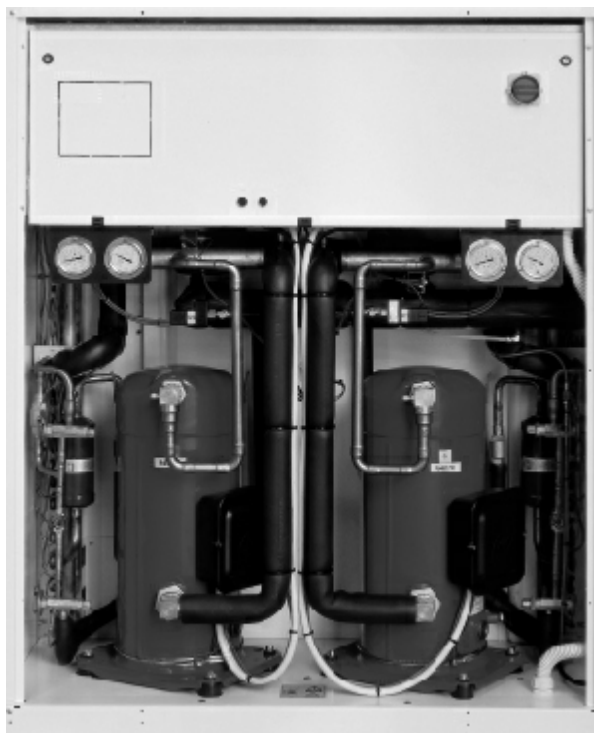
The microprocessor control manages the switching on and off of the compressors in order to ensure effective control of unit capacity; capacity steps depend on the type of control fitted; in the case of the mP20 control the steps are:

0 - 45 - 100%	on models 00182 and 00232
0 - 50 - 100%	on models 00202, 00252 and 00302
0 - 45 - 70 - 100%	on model 00403
0 - 25 - 50 - 75 - 100%	on model 00504

These units are available in versions for use with HCFC-R22 and HFC-R407C (environment-friendly) refrigerants. Units for operation with R134a are available on special order from UNIFLAIR ITALIA Srl.

In order to prevent the refrigerant fluid diluting the oil and creating foam when the unit is started all free cooling or heat pump ARA models are fitted with oil heaters which switch on automatically when the compressor stops.

Each compressor is fitted on rubber mountings to reduce vibration transmission.



FANS

The sickle-blade axial fans are directly connected to external rotor motors which can be fitted with voltage modulation speed control. The metal support grille conforms to all the main safety standards. The motors have class F insulation and IP44 protection under DIN VDE 0470 section 1/11.92 and EN 60529.

Modulating condensation temperature control is available with fan speed regulation. This control is standard with certain unit configurations (ultra low-noise versions, free cooling versions, partial heat recovery).

EVAPORATOR

The brazed plate heat exchangers are in AISI 316 stainless steel. The exchanger is fully lined with closed-cell expanded polyurethane to prevent the formation of condensation and to limit heat loss. Given the internal volume and operating pressure, the evaporator does not need ISPEL or TÜV homologation under the standards for pressurised containers.

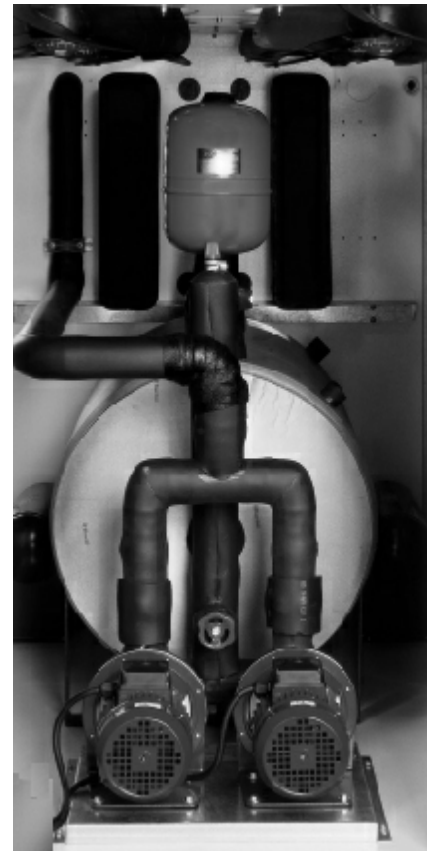
CHILLED WATER PUMP GROUP (optional)

The pump group for the circulation of chilled water is available in different configurations:

- one pump (type "A", "B" or "C");
- two pumps (one in stand-by);
- one pump plus reservoir tank;
- two pumps (one in stand-by) plus reservoir tank.

The pumps, with 2-pole motors (2900 rpm), are fitted with the related connections, collectors and electrical panel (located in the main electrical panel housing). The pump panel controls rotation of operation between the two pumps on the basis of run time or alarms. The electrical panel contains the run hour counter for each pump and red LED alarm indicators.

Pump body, flange and impeller are AISI 304 stainless steel, insulation is class F and protection is to IP55. The materials used ensure correct pump operation with liquid temperatures from -10°C to +85°C.



CIRCULATING PUMPS

ARA	00152	00182	00202	00232	00252	00302	00403	00504	
Solo freddo	n.a.	A - B - C			B - C			C	Cooling only
Pompa di calore	n.a.	A - B - C			B - C			C	Heat pump
Free cooling		A - B - C			B - C		n.a.	n.a.	Free cooling
Free cooling silenzioso		A - B - C			B - C		n.a.	n.a.	Low noise - Free cooling

n.a. = Non disponibile

n.a. = Not available

RESERVOIR TANK

ARA	00152	00182	00202	00232	00252	00302	00403	00504	
Solo freddo	n.a.	A			A - B			A - B - C	Cooling only
Pompa di calore	n.a.	A			A - B			A - B - C	Heat pump
Free cooling		A			A - B		n.a.	n.a.	Free cooling
Free cooling silenzioso	A			A - B		A - B - C	n.a.	n.a.	Low noise - Free cooling

n.a. = Non disponibile

n.a. = Not available

FINNED COILS

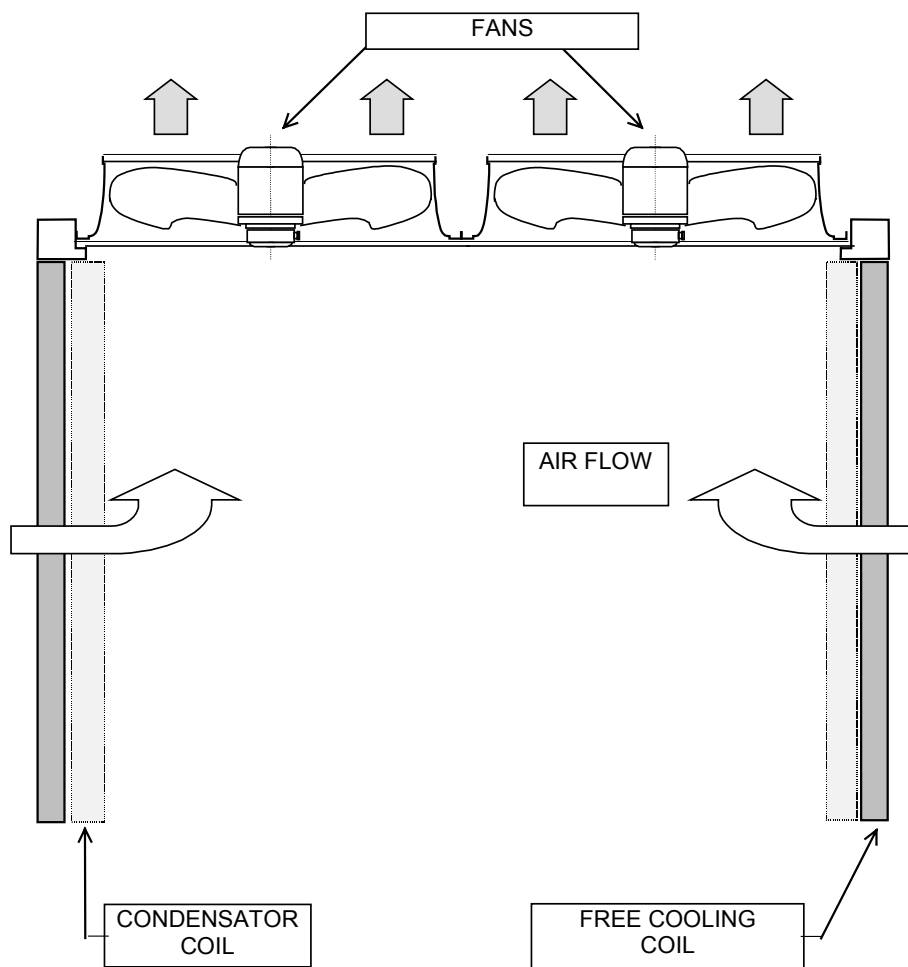
In air-cooled versions the condenser consists of coils with aluminium fins and copper tubes mechanically expanded to obtain an optimum metallic contact and maximum exchange efficiency. The coil has a very large surface area for operation with high ambient temperatures and has an integrated super-cooling circuit.

If there are harsh conditions in the installation environment, various treatments are available for the exchanger: pre-painted aluminium, copper-copper protection and cataforesis aluminium treatment; cataforesis provides the best compromise between cost and performance.

FREE COOLING

During normal chiller functioning, the water consumed is treated in the brazed plate heat exchanger. When the external air temperature drops to such a level as to allow water pre-cooling, the control activates a recirculation pump which sends the water to a finned pipe coil, mounted in front of the condenser.

For the correct power supply of the thermostatic valve it is necessary to maintain the condensation pressure sufficiently high. For this reason, in the event of combined functioning of free cooling and mechanical cooling with the compressors, the speed of the fans is reduced (regulation of the standard speed of all ARA models with free cooling).



Positioning of the Free Cooling Coil.

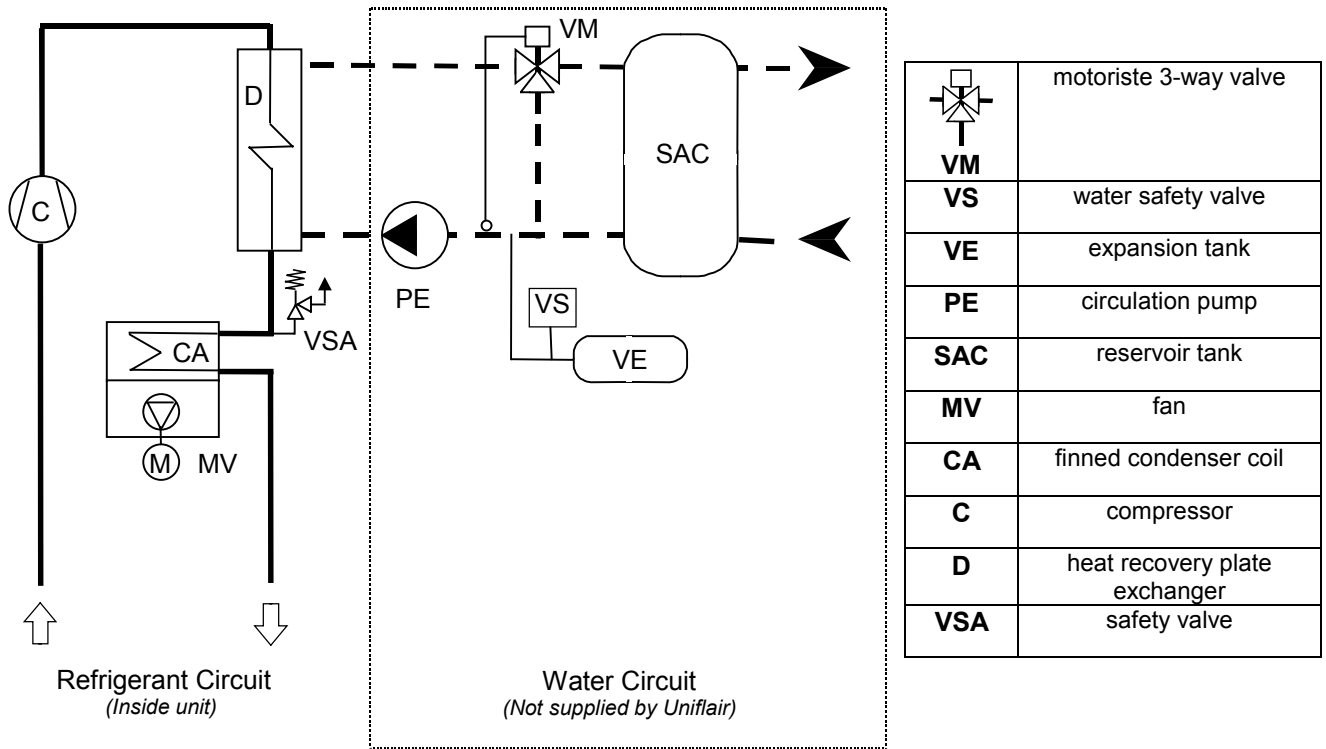


Since water passes through the free cooling coils, chillers must be loaded with antifreeze, or guarantee conditions may be effected.

RECOVERY OF CONDENSATION HEAT

Recovery of heat from de-superheating and condensation of the refrigerant leaving the compressor enables the production of hot water. Without heat recovery this heat is dissipated in the environment via the finned condenser coils.

The diagram below shows the partial heat recovery circuit. The cooling and hydraulic circuit diagrams are included with all ARA units with heat recovery.



Heat Recovery Diagram

In order to ensure the correct functioning of the chillers avoid that the heat recovery plate exchanger **D** is powered by water which is too cold. For this reason use of a three way valve **VM** is strongly advised yet remains the responsibility of the installer (see diagram).


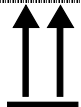




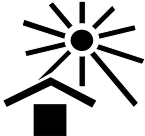
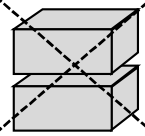
Heat recovery uses plate heat exchangers located on the output line before the air-cooled condensers and supplied with water from the user system. Condensation control, as described above, is included in units with heat recovery.

INSTALL a metal filter on the piping at the unit intake to stop the heat exchanger getting blocked by flakes of welding or rust.

INSTALLATION GUIDE

TRANSPORT AND MOVEMENT

The symbols on the packaging conform to the ISO7000 standard and are explained below:

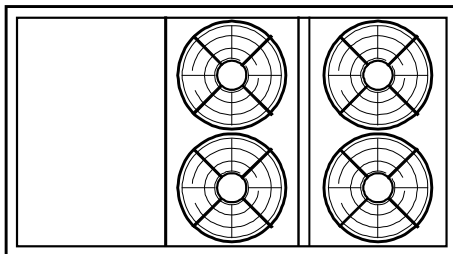
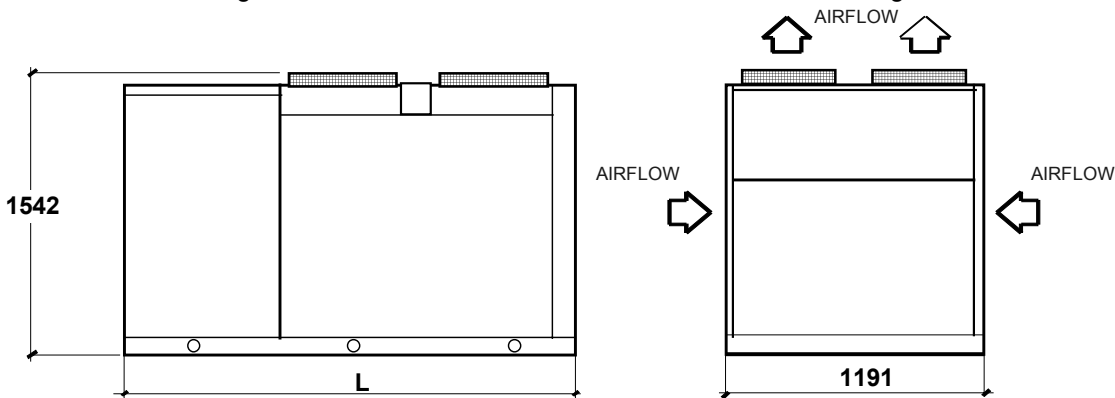
SYMBOL	MEANING	SYMBOL	MEANING
	FRAGILE: handle with care		THIS SIDE UP shows the orientation of the unit.
	PROTECT AGAINST MOISTURE: the packaged unit must be stored in a dry place.		TEMPERATURE LIMITS: the unit must not be stored outside these limits.
	CENTRE OF GRAVITY: shows the centre of gravity of the packaged unit.		NO HOOKS: do not use hooks to lift the packed unit.
	KEEP AWAY FROM HEAT: the unit must be kept away from heat sources.		DO NOT STACK.

Transport the unit as near as possible to the installation location before removing the packaging.

Lifting can be done either:

- with a fork-lift, inserting the forks under the base beams
- by inserting 4 sections of Ø 50mm, 4mm-thick steel tube in the special holes in the base beams of the unit and using the ends as lifting points.

Unit dimensions are given in the technical data tables and installation drawings included with the unit.



Cooling only and heat pumps							
Model:	00182	00202	00232	00252	00302	00403	00504
L (mm)	1950		2300			3200	
Weight (kg) ⁽¹⁾	530	550	620	635	655	800	850

(1) : Weight of basic version (without hydraulic kit)

Free cooling version						
Model:	00152	00182	00202	00232	00252	00302
L (mm)	1950			2300		
Weight (kg) ⁽¹⁾	600	620	640	730	745	765

(1) : Weight of basic version (without hydraulic kit)

Ultra low-noise free cooling version						
Model:	00152	00182	00202	00232	00252	00302
L (mm)	1950		2300			3200
Weight (kg) ⁽¹⁾	610	715	730	745	760	920

(1) : Weight of basic version (without hydraulic kit)

Dimensions and weights

RECEIVING AND STORING THE UNIT

Every unit leaves the factory in perfect condition. Therefore please check the unit very carefully on delivery and notify the transport company immediately and in writing of any damage.

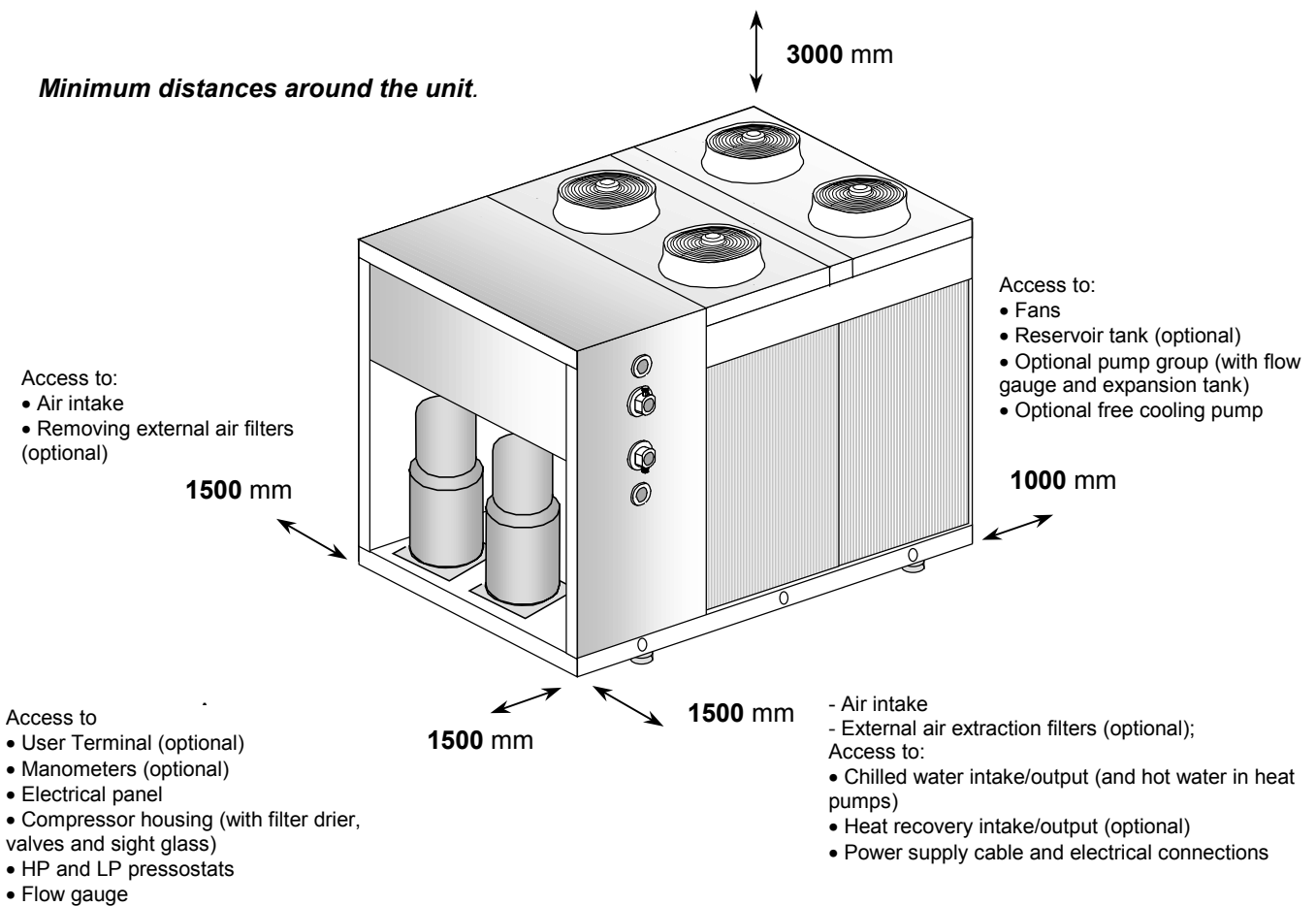


Check that the load capacity of the floor is sufficient to support the weight of the unit.

The unit must be located on a solid and flat surface. After positioning, with the help of a spirit level use the optional adjustable feet (and spacers if necessary) to level the unit: **any gradient must be no more than 0.5°.**

IMPORTANT: the unit must never be tilted or turned upside down.

The characteristics of the fans **do not allow the ducting of condensation air.**



POSITIONING THE UNIT – WORKING SPACE

This unit is designed and built for outdoor installation with free airflow to the condenser coils. The unit can be installed in a semi-closed position if the ventilation system is efficient enough to maintain temperatures below the values given in the section on Function Limits.

The fan intake airflow through the condenser coils must not be obstructed in order not to compromise the efficiency of the unit and to prevent the unit being stopped by the safety devices. In any case the safety regulations of the installation must be respected, as well as the minimum access distances shown in the diagram below. It is also recommended that the unit is protected from the wind by positioning so that the coils are parallel to the direction of the prevailing wind.

It is recommended that the unit is protected from rain, snow, water falling from gutters, etc.

Do not install the unit near the sea (minimum recommended distance 200m) or near sulphur springs. If the installation location is particularly harsh, contact the Uniflair Sales dept. for possible technical solutions.

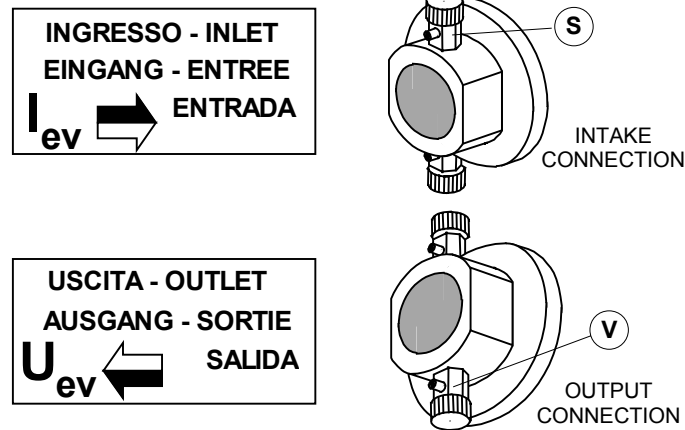
The optional rubber feet reduce the transmission of vibrations to the floor.

HYDRAULIC CONNECTIONS

(see also the enclosed installation drawings and hydraulic diagram)

1) CHECK that the section of the chilled water pipes and the power of the circulation pump fitted are sufficient. An inadequate water flow significantly reduces the cooling capacity of the unit.

2) CHECK the water intake/output directions. There are labels next to the intake, output and heat recovery connections as shown in the diagram below. The bleed (S) and drain (V) valves are part of the special input and output connections.



ARA	Water Intake	Water Output	Heat recovery intake	Heat recovery output
00152	Ø 2" GAS F.	Ø 2" GAS F.	Ø 1 1/4" GAS F.	Ø 1 1/4" GAS F.
00182	Ø 2" GAS F.	Ø 2" GAS F.	Ø 1 1/4" GAS F.	Ø 1 1/4" GAS F.
00202	Ø 2" GAS F.	Ø 2" GAS F.	Ø 1 1/4" GAS F.	Ø 1 1/4" GAS F.
00232	Ø 2" GAS F.	Ø 2" GAS F.	Ø 1 1/4" GAS F.	Ø 1 1/4" GAS F.
00252	Ø 2" GAS F.	Ø 2" GAS F.	Ø 1 1/4" GAS F.	Ø 1 1/4" GAS F.
00302	Ø 2" GAS F.	Ø 2" GAS F.	Ø 1 1/4" GAS F.	Ø 1 1/4" GAS F.
00403	Ø 2" GAS F.	Ø 2" GAS F.	Ø 1 1/4" GAS F.	Ø 1 1/4" GAS F.
00504	Ø 2" GAS F.	Ø 2" GAS F.	Ø 1 1/4" GAS F.	Ø 1 1/4" GAS F.

3) CONNECT the chiller using flexible tubes to stop the transmission of vibrations. Fit shut-off valves so that the unit can be isolated from the water circuit;

4) INSULATE the chilled water pipes to stop the formation of condensation;

5) FIT temperature measuring points on the pipes near the intake and output connections;

6) INSTALL a metal filter in the section of pipe next to the unit intake to prevent pieces of welding or flakes of rust entering the heat exchanger.

7) PROVIDE a discharge well near the output connection in case the unit needs to be emptied.

LOW-TEMPERATURE OPERATION WITH ANTIFREEZE MIXTURE

In the cooling phase, standard units can be operated with a water output temperature of 5°C.



It is possible to cool fluids **down to a temperature of -10°C** as long as the chilled water contains enough anti-freeze liquid to prevent freezing inside the evaporator and by using special low-temperature versions of the unit (consult the nearest UNIFLAIR service agent).

For low temperature function the settings of the LP pressostat and anti-freeze thermostat are changed and special low temperature seals are used.

The table below gives the minimum recommended percentages of glycol in relation to the output temperature of the cooled fluid; it also gives the settings for the minimum pressostat and the antifreeze safety threshold.

Minimum fluid temp. with unit in operation (1)	5 °C	3 °C	0 °C	- 3 °C	- 6 °C	- 10 °C
Percentage (by weight) of ethyl glycol (2)	0%	10%	15%	20%	25%	30%
Antifreeze safety threshold (unit stop)	4 C°	2°C	-1 °C	- 4 °C	- 7 °C	- 11 °C
Freezing	0 °C	- 4 °C	- 7 °C	- 10 °C	- 13°C	- 17 °C

NOTES: (1) If it is necessary to produce liquid at less than -10°C, Uniflair Italia srl must be informed at the time of ordering.
 (2) The dimensions of the pump motors used in standard units permit a maximum glycol percentage of 30%

IMPORTANT: *insulate tubes and chilled water connections carefully to avoid the formation of frost.*



The percentage of glycol used must reflect the minimum external air temperature of the installation: see section on WINTER FUNCTIONING. **Before the outside temperature reaches the freezing point of the mixture the unit's hydraulic circuit must be drained.**

Special units with 30% glycol by weight can function at temperatures down to a minimum temperature of -10°C, below which the hydraulic circuit must be drained to prevent freezing.

IMPORTANT WARNING



Standard units are designed for output temperatures down to 5°C. Units with glycoled water can operate with water output temperatures down to -10°C.

Free cooling chillers must be loaded with antifreeze.

If the optional heating cable is fitted, the electrical power supply must not be interrupted when the unit is turned off.

GUIDE TO THE SIZING OF THE EXPANSION TANK

As a consequence of the variation in temperature of the water between intake and output, the volume occupied by the water changes, this change increasing with increase in the temperature variation. The buffer tank on the hydraulic circuit compensates for this change in volume.

If this buffer tank were not fitted, the water, which already fills the available internal volume of the system, would increase in pressure to potentially dangerous levels and could cause joints to break.

The project elements to consider when selecting the dimensions of the buffer tank for a system are:

- C** The quantity of water in the system in litres
- e** the expansion coefficient of the water, calculated as the maximum temperature difference between when the system is off and when the system is running (the values are given in the table below)
- p_i** The absolute initial pressure, equivalent to the pre-charge pressure of the buffer tank (normally 2.5 bar, i.e. 1.5 bar-r);
- p_f** The absolute tolerated pressure, which must be less than the pressure at which the safety valve is set, taking account of any difference in height between the valve and the tank.

The total capacity of the buffer tank is expressed as:

$$V_t = \frac{C \cdot e}{1 - \frac{p_i}{p_f}}$$

using the expansion coefficient values in the following table.

Water temp. [°C]	Density [kg/m ³]	Value of "e" at 10°C
10	999.6	-
20	997.9	0.0017
30	995.6	0.0040
40	992.2	0.0075
50	988.1	0.0116

Water temp. [°C]	Density [kg/m ³]	Value of "e" at 10°C
60	983.2	0.0167
70	977.8	0.0223
80	971.8	0.0286
90	965.3	0.0355
100	958.4	0.0430

Water expansion coefficient

It is also possible to calculate the average value of 'e' between the initial water temperature (generally assumed to be 10°C) and the operating temperature, using:

$$e = 7,5 \cdot 10^{-6} \cdot (T - 4)^2 \quad T \text{ [°C]}$$

IMPORTANT: On units with the optional pump group the water circuit is fitted with an expansion tank with safety valve set at 3 bar. In applications which require water side pressure higher than 3 bar the unit must not be fitted with the pump group. In this case all enquiries must be addressed to UNIFLAIR ITALIA before the order is placed.

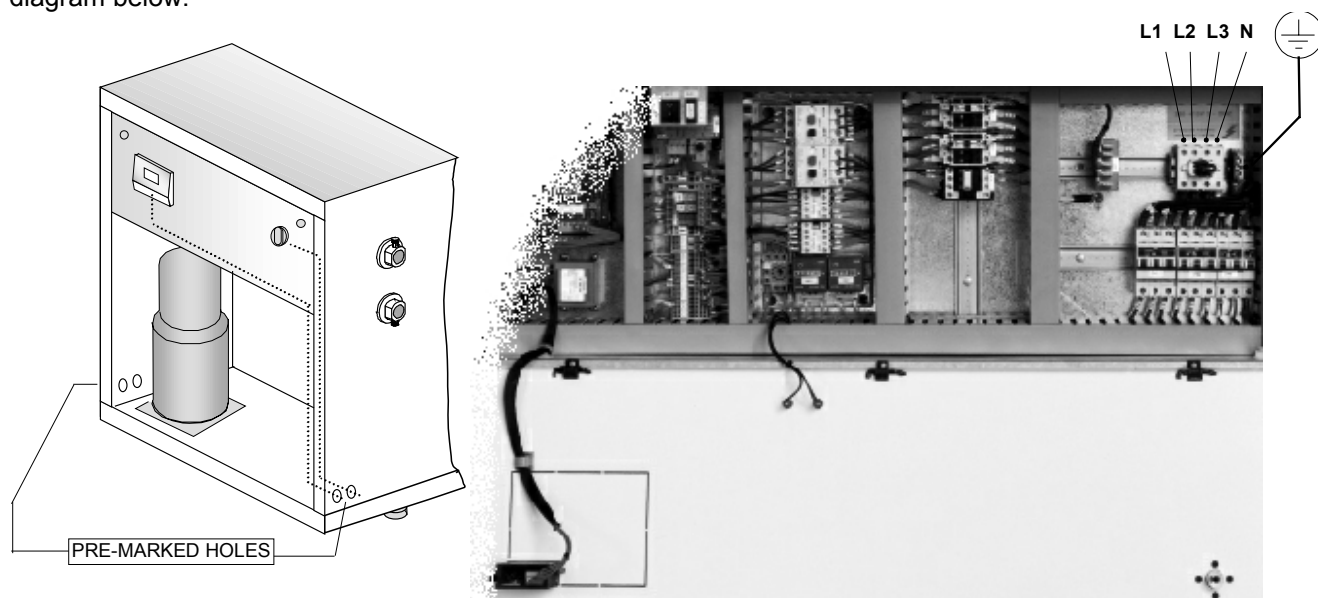
ELECTRICAL CONNECTIONS

(See also the electrical diagram enclosed with the unit)



Before doing any work on electrical components make sure that the power supply is disconnected. Correct and accurate electrical connections which comply with applicable safety regulations are vital for preventing injuries and for correct long-term unit operation.

- 1) **OPEN** the cover of the electrical panel on the front of the unit above the compressor housing;
- 2) **CHECK** that the power supply corresponds to the information given on the unit's data plate (voltage, phases, frequency)
- 3) **ATTACH** the power supply cable, passing it through one of the pre-cut holes in the unit shown in the diagram below.



There are holes in the base of the electrical panel to allow passing of:

- a. power supply cable to be connected to the IG main switch terminals on the right of the electrical panel;
- b. signal cables to be connected to the microprocessor control terminals on the left of the electrical panel.

The power supply cable is not provided by Uniflair; the installer must select and obtain the correct cable size. For short distances (<30 metres) the following cable sizes are recommended:

ARA	00152	00182	00202	00232	00252	00302	00403	00504
Power supply cable	4x10+10PE		4x16+16PE			4x25+25PE		

- 4) **CONNECT** the three power supply phases to the terminals of the IG main switch after checking that there is no power supply to the unit. Check that the wires are correctly inserted and tighten the screws.

To switch the unit on and off or to change heat pump function between cooling and heating from a remote switch::

5) CONNECT the remote ON/OFF switch to terminals 10 and 50 on the electrical panel;

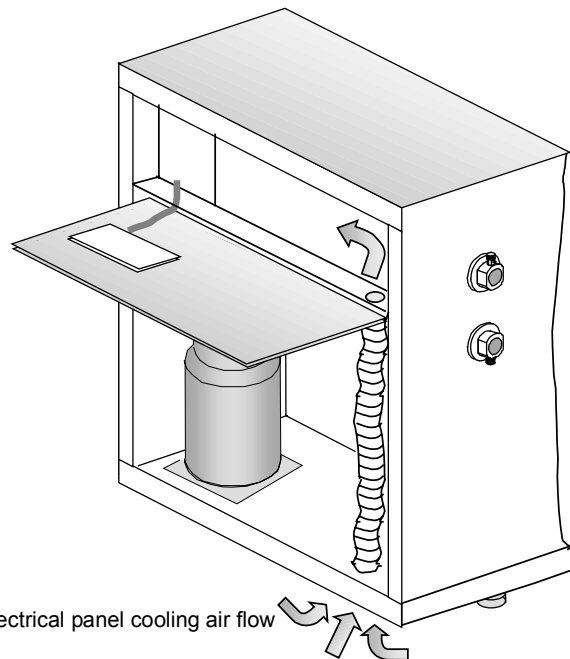
6) CONNECT the remote SUMMER/WINTER selector to terminals 10 and 51.

For remote alarm signalling (without a remote user terminal):

7) USE terminals 311 and 321 for the PUMP ALARM signal to protect the pump motors;

8) USE terminals 700 and 710 to signal a general alarm when one of the protection devices intervenes.

9) CLOSE the IG main switch and check that the LEDs light up on the RSF phase sequence relay on the top of the electrical panel. If this does not happen, invert two of the phases.



IMPORTANT: inside the unit on the right there is a plastic tube for the introduction of air to cool the electrical panel. Cables must not be passed through this tube and it must be checked regularly to make sure that the free flow of air is not blocked by leaves, dust, etc.

REMOTE CONTROL, LOCAL NETWORKS AND SUPERVISION SYSTEMS

REMOTE CONTROL

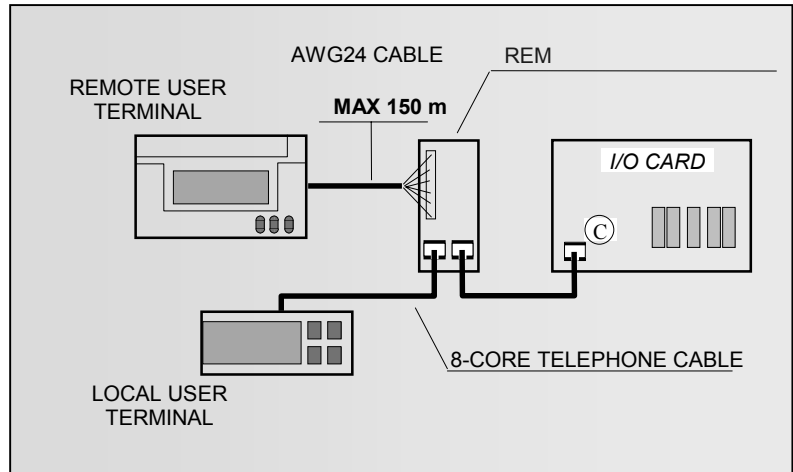
It is possible to use remote switches to turn the unit on and off and change function from cooling to heating, as shown on the unit's electrical diagram and in the section START-UP AND TESTING CHECK LIST.

The microprocessor control panel can also be remote:

- (*units with the mP20 control*) at a distance up to 200m; the mP20 or LAN manuals give further information.
- (*units with basic control –not supplied with free cooling versions*) up to 150m.

In this case the 'TUR' remote user terminal is an optional accessory supplied with the 'REM' remote control board. The REM board is connected via an 8-core telephone cable with connectors at both ends to the C socket on the I/O CARD and to the TUR terminal via a three twisted pair AWG24 shielded cable.

The 'TUR' remote terminal can be installed instead of the 'TUL' local terminal or in addition to it; in the latter case it should be connected to the REM board via an 8-core telephone cable.



In heat pump versions only: in order to change the summer/winter mode via remote control a remote switch with potential-free contacts must also be fitted to terminals 10 and 51 of the electrical panel; when the contact is open the unit functions in cooling (Summer mode).

In this case the SLR connector in the front electrical panel must be in the R position.

LOCAL NETWORK CONNECTION (see also LAN manual)

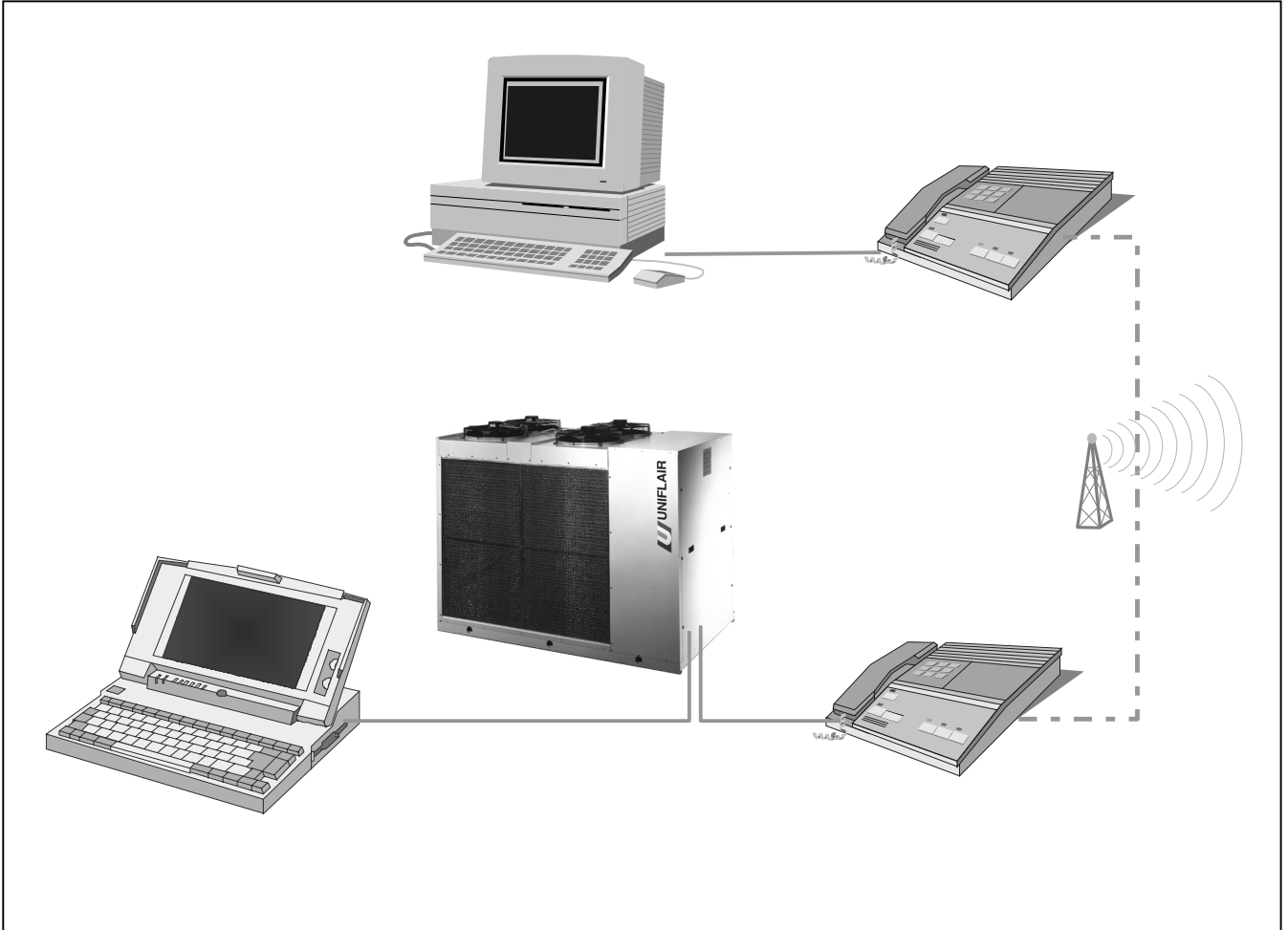
(*units with mP20 control only*) If more than one chiller (up to a total of five) is connected on the same water circuit all the microprocessor control boards can be connected and a single user terminal can be installed. In this way the units will be controlled as one, sharing set points, compressor rotation, fault management, etc. The local network uses high-speed RS485 communication (64 kByte/s) with 2-core shielded telephone cable.

CONNECTION TO A SUPERVISION SYSTEM

(units with mP20 control only) With the addition of a serial circuit, the microprocessor control enables chiller function to be controlled by a centralised supervision system.

For the connection of the control to the supervision systems, an optional serial board enables opto-isolated interface with a standard RS422 network for the transmission of unit data at 1.2 kByte/s. Alternatively a shielded 2-core telephone cable can be used for RS485 communication at 19.2 kByte/s.

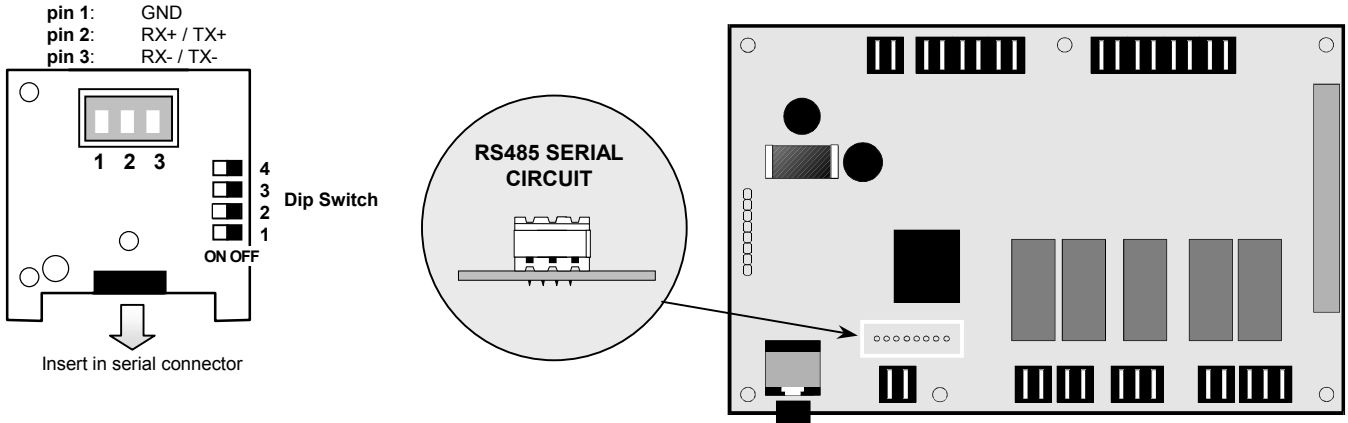
The MODBUS communication protocol used enables connection with all the main supervision systems



Connection to supervision system.

(Units with basic control – not supplied with free cooling versions) The control panel enable data exchange with a supervision system via RS485 serial connection. The optional connection cable must be ordered to be attached to the SERIAL socket on the I/O board.

FITTING THE OPTIONAL RS485 BOARD



1. Disconnect the power supply to the board;
2. Insert the RS485 card on the SERIAL connector of the main board;
3. When making the connection of the serial line, pay attention to polarities as shown;
4. The serial line must be closed by means of a 120Ω - 1/4W resistance, placed between the TX/RX+ and TX/RX- terminals of the board at the endline of the network.
5. The address of the board is set using the dip switches, adding the HA parameter value (default = 1):

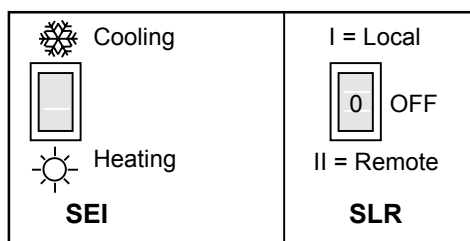
Net. Addr.	Par. HA	Dip 1	Dip 2	Dip 3	Dip 4
0+1	1	OFF	OFF	OFF	OFF
16+1	1	OFF	OFF	OFF	ON
32+1	1	OFF	OFF	ON	OFF
48+1	1	OFF	OFF	ON	ON
64+1	1	OFF	ON	OFF	OFF

Net. Addr.	Par. HA	Dip 1	Dip 2	Dip 3	Dip 4
80+1	1	OFF	ON	OFF	ON
96+1	1	OFF	ON	ON	OFF
112+1	1	OFF	ON	ON	ON
128+1	1	ON	OFF	OFF	OFF

CHECK LIST FOR START-UP AND TESTING

After installation and before start-up the following points should be checked. In the event of problems, consult the troubleshooting section in this manual or contact the technical assistance staff at UNIFLAIR

- 1) **CLOSE** the general switch and arm the automatic switches IM1, IM2, e IM8;
- 2) **SELECT LOCAL OR REMOTE CONTROL**
 The unit can be turned on and off by a remote ON/OFF switch connected to terminals 10 and 50. There is a 3-position SLR local/remote selector on the cover of the electrical panel:
 - a) Default position is “L” – local control of unit; summer/winter switching must be done with the SEI selector in the electrical panel.
 - b) If the unit has a remote control switch connected to terminals 10 and 50, the selector must be set to “R”: unit in stand-by with remote on/off control activated and local summer/winter control deactivated. For remote summer/winter switching, connect a remote switch with potential-free contact to terminals 10 e 51
 - c) in the “0” position the unit is off.



- 3) **SUMMER/WINTER FUNCTION MODE SELECTION:**
 On heat pump units the ‘SEI’ switch in the electrical panel is used to select:
 - Summer mode ❄️ (cooling);
 - Winter mode ☀️ (heating).
 (see microprocessor control instruction manual).

The ‘SEI’ selector is only active when the ‘SLR’ selector is set to Local (see point 2.). In cooling-only versions the summer/winter selector is on the electrical panel cover but does not function.

- 4) **OIL HEATING**
(standard on heat pump versions, optional on cooling-only versions)
 Connect the unit to the power supply **at least 12 hours** before the seasonal start-up of the system in order to heat the compressor oil sufficiently. The reason for this is that during longer shutdowns there may be a spontaneous migration of refrigerant with re-condensation of liquid in the compressor crankcase heaters. When the compressor is started this liquid can flow into the cylinders, damaging the compressor. The pre-heating of the oil is necessary to eliminate this risk. Do not switch off the power supply for weekly shutdowns.

AT LEAST 12 HOURS after the power supply was connected, start the unit as follows:

- 5) **OPEN** all valves and water intercept taps;
SWITCH ON the water circulation pump and check correct function;

6a) SWITCHING ON THE CONTROL (Units with mP20 control only)


Connect the power supply to the auxiliary circuit of the unit electrical panel (IM8); the control is activated as follows:

- the yellow power LED on the circuit board switches on (see Layout of circuit board);
- there is a short acoustic signal;
- the display shows the start-up screen for 10 seconds, then goes to unit stopped status;

When the unit is **connected** to the power supply but **not operating**, 3 fields are active on the terminal display:

- Current time and date (if clock circuit it is fitted);
- Water return temperature and (in free-cooling units only) external temperature;
- Indication of unit switched off by: ON/OFF switch, supervision system, time program, manual override.

WATER IN TEMP. °C
WATER OUT TEMP. °C
UNIT OFF

TO TURN ON the unit press the  button on the control; close the remote On/Off switch (if fitted).

CHECK that no red alarm LED is on. In the event that a red LED does come on, refer to the section on Troubleshooting and to the mP20 microprocessor control instruction manual.

Use the local terminal to turn the unit off so that the pump stops at least 10 seconds after the chiller: this prevents the unit from stopping when there is no water flow.

6b) SWITCHING ON THE BASIC CONTROL

Connect the power supply to the auxiliary circuit of the unit electrical panel (IM8); the control is activated as follows:

- the display shows the water temperature detected by the intake sensor;
- the “Comp”, “Heat ❄” or “Cool ❄” LEDs switch on to indicate compressor function and function mode (cooling or heating).
- if there is an alarm code (“E ...”) refer to the microprocessor control instruction manual

If a remote user terminal is fitted, the ❄ and ❄ buttons are de-activated; see point 2 for summer/winter changeover.

Use the local terminal to turn the unit off so that the pump stops at least 10 seconds after the chiller: this prevents the unit from stopping when there is no water flow.



Any damage caused by failure to follow these instructions is not covered by the terms of the guarantee.

PROGRAMMING AND REGULATION

MICROPROCESSOR CONTROL

INTRODUCTION

The control system consists of a microprocessor base circuit fitted in the unit and a user interface which can be either local or remote.

Sophisticated algorithms enable monitoring and protection of unit components and the user interface provides clear information on unit status and any current alarms.

The main functions of the microprocessor control are:

- chilled water temperature regulation
- anti-freeze protection
- compressor protection and timing
- alarm code signalling and collection for cumulative remote alarm communication
- compressor run hour counter
- remote on/off command
- LAN connection
- Serial output connection.

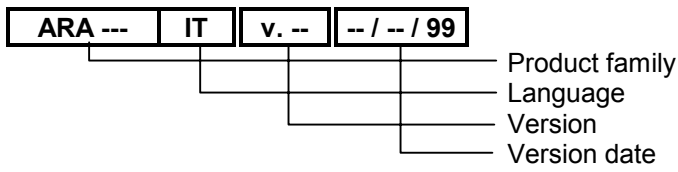
BASIC CONTROL *(excluding free cooling versions)*



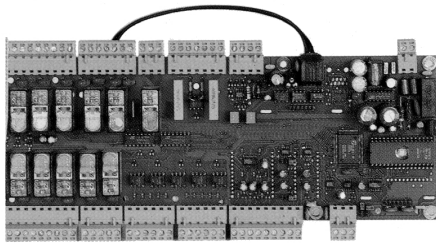
This type of control uses an expansion board in addition to the microprocessor control circuit for the independent management of two refrigerant circuits.

mP20 ADVANCED CONTROL

This type of control, fitted where higher levels of sophistication are required, is intended for technological applications and enables independent control of all compressors. The control system regulation program, contained in the EPROM on the base circuit, is identified by an alphanumeric code, explained below.



The programming of the control parameters (set points, differentials, alarm thresholds) and the displaying of data and events (set point readings, monitored values, function events and alarms) are done using the optional **User Terminal** shown in the diagram below.



IMPORTANT WARNING

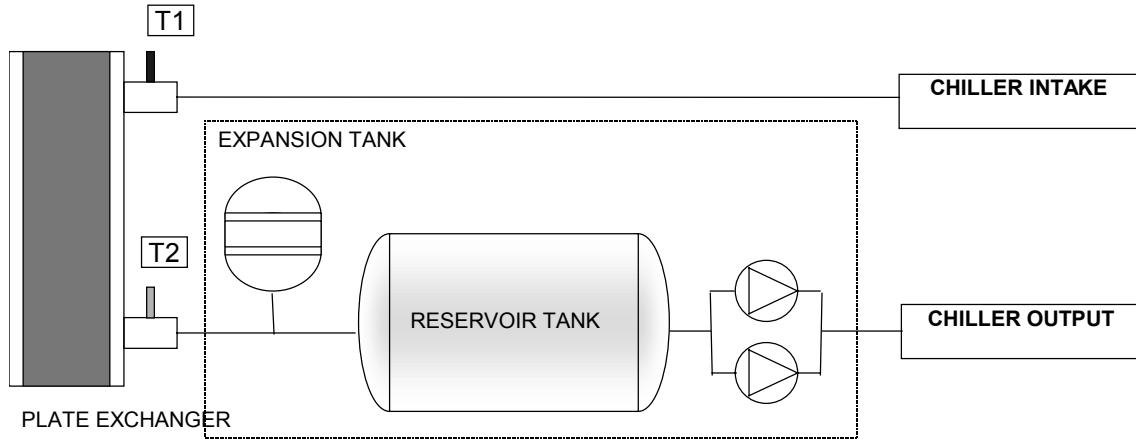


It is essential to read carefully the instructions in the enclosed microprocessor control instruction manual.

Electronic components are sensitive to static discharges from the human body. Touch an earth connection before handling any electronic component and/or the base circuit.

REGULATION OF COOLING CAPACITY

The unit's cooling capacity is regulated by activating the various cooling capacity steps, depending on the temperature measured by intake water sensor T1.



Refrigerant circuit diagram.

Sensor T2 on the chiller output line interrupts compressor function when the temperature drops below the value set for risk of freezing.

0 % Compressors	25 % C	50 % C	75 % C	100 % C
0 % V	100% Fans			
0 % P	100% Pump			

Example of regulation as a function of sensor T1 temperature reading.

SETTING THE SAFETY DEVICES

The function parameter values set on the microprocessor control are given in the enclosed instruction manual. The table below gives the settings of the safety devices; these are also on the data plate on the unit.

Component	Setting	Differential	Re-set
Refrigerant circuit (R22 – R407C)			
High pressure pressostat (AP1-AP2)	27.5 bar	--	manual
Low pressure pressostat (BP1-BP2) ¹	2.6 bar	1.4 bar	4.0 bar
Anti-freeze protection ¹	4 °C	4 °C	
Refrigerant safety valve (VSA1-VSA2) - Models 0152...0302	32.0 bar	--	--
Refrigerant safety valve (VSA1-VSA2) - Models 0403...0504	28.0 bar	--	--
Water circuit			
Flow gauge ²	105 mbar	80 mbar	
Water side safety valve	3.0 bar		

¹ Values refer to standard version with pure water.

² With optional pump group.

Setting of safety devices.

TECHNICAL DATA

ELECTRICAL CURRENT

(Cooling only versions – heat pumps)

MODEL	VOLTAGE	COMPRESSOR circuit 1					COMPRESSOR circuit 2					FANS			
		No.	kW	OA	FLA	LRA	No.	kW	OA	FLA	LRA	No.	kW	OA	FLA
00182	400V/3ph 50Hz	1	5.9	11.4	15	98	1	8.8	16	21	130	4	0.28	0.87	1.3
00202	400V/3ph 50Hz	1	8.8	16	21	130	1	8.8	16	21	130	4	0.28	0.87	1.3
00232	400V/3ph 50Hz	1	8.8	16	21	130	1	11	21	26	175	6	0.28	0.87	1.3
00252	400V/3ph 50Hz	1	11	21	26	175	1	11	21	26	175	6	0.28	0.87	1.3
00302	400V/3ph 50Hz	1	13.5	24	30	175	1	13.5	24	30	175	6	0.28	0.87	1.3
00403	400V/3ph 50Hz	1	13.5	24	30	175	1	18	33	40	170	8	0.28	0.87	1.3
00504	400V/3ph 50Hz	1	18	33	40	170	1	18	33	40	170	8	0.28	0.87	1.3

KW : (kW) Power absorbed in nominal conditions (water 12/7°C; outdoor 35 °C) (1)

OA : (A) Nominal operating current (1)

FLA : (A) Full load current (1)

LRA : (A) Start-up (1)

(1): per motor

MODEL	VOLTAGE	PUMPS (optional)						COMPLETE UNIT Base version			
		N (1)	TYPE	kW	OA	FLA	LRA	kW	OA	FLA	LRA
00182	400V/3ph 50Hz	1	A	1.34	2.4	-	10.8	15.8	30.9	41.2	152.2
00202	400V/3ph 50Hz	1	A	1.34	2.4	-	10.8	18.7	35.5	47.2	164.2
00232	400V/3ph 50Hz	1	B	1.5	2.8	-	16.8	21.5	42.2	54.8	211.8
00252	400V/3ph 50Hz	1	B	1.5	2.8	-	16.8	23.7	43.7	59.8	217.8
00302	400V/3ph 50Hz	1	B	1.5	2.8	-	16.8	28.7	51.5	67.8	217.8
00403	400V/3ph 50Hz	1	C	2.35	4.4	-	28.2	33.7	64.0	80.4	243.4
00504	400V/3ph 50Hz	1	C	2.35	4.4	-	28.2	38.2	73.0	90.4	238.4

(1) N : indicates the number of pumps functioning simultaneously; even in units with two pumps, one is always in stand-by.

ELECTRICAL CURRENT

(Free cooling version)

MODEL	VOLTAGE	COMPRESSOR circuit 1					COMPRESSOR circuit 2					FANS			
		No.	kW	OA	FLA	LRA	No.	kW	OA	FLA	LRA	No.	kW	OA	FLA
00152	400V/3ph 50Hz	1	5.9	11.4	15	98	1	5.9	11.4	15	98	4	0.30	1.37	1.8
00182	400V/3ph 50Hz	1	5.9	11.4	15	98	1	8.8	16	21	130	4	0.30	1.37	1.8
00202	400V/3ph 50Hz	1	8.8	16	21	130	1	8.8	16	21	130	4	0.30	1.37	1.8
00232	400V/3ph 50Hz	1	8.8	16	21	130	1	11	21	26	175	6	0.30	1.37	1.8
00252	400V/3ph 50Hz	1	11	21	26	175	1	11	21	26	175	6	0.30	1.37	1.8
00302	400V/3ph 50Hz	1	13.5	24	30	175	1	13.5	24	30	175	6	0.30	1.37	1.8

KW : (kW) Power absorbed in nominal conditions (water 12/7°C; outdoor 35 °C) (1)

OA : (A) Nominal operating current (1)

FLA : (A) Full load current (1)

LRA : (A) Start-up (1)

(1): per motor

MODEL	VOLTAGE	PUMPS (optionals)						Free cooling PUMP		COMPLETE UNIT base version			
		N (1)	TYPE	kW	OA	FLA	LRA	KW	OA	kW	OA	FLA	LRA
00152	400V/3ph 50Hz	1	A	1.34	2.4	-	10.8	0.81	1.5	13.8	29.8	38.7	123.7
00182	400V/3ph 50Hz	1	A	1.34	2.4	-	10.8	0.81	1.5	16.7	34.4	44.7	155.7
00202	400V/3ph 50Hz	1	A	1.34	2.4	-	10.8	0.81	1.5	19.6	39.0	50.7	167.7
00232	400V/3ph 50Hz	1	B	1.5	2.8	-	16.8	0.81	1.5	22.4	46.7	59.3	216.3
00252	400V/3ph 50Hz	1	B	1.5	2.8	-	16.8	0.81	1.5	24.6	48.2	64.3	222.3
00302	400V/3ph 50Hz	1	B	1.5	2.8	-	16.8	0.81	1.5	27.6	56.0	72.3	222.3

(1) N : indicates the number of pumps functioning simultaneously; even in units with two pumps, one is always in stand-by.

ELECTRICAL CURRENT

(Ultra-Low noise Free cooling versions)

MODEL	VOLTAGE	COMPRESSOR circuit 1					COMPRESSOR circuit 2					FANS			
		No.	kW	OA	FLA	LRA	No.	kW	OA	FLA	LRA	No.	kW	OA	FLA
00152	400V/3ph 50Hz	1	5.9	11.4	15	98	1	5.9	11.4	15	98	4	0.28	0.87	1.3
00182	400V/3ph 50Hz	1	5.9	11.4	15	98	1	8.8	16	21	130	6	0.28	0.87	1.3
00202	400V/3ph 50Hz	1	8.8	16	21	130	1	8.8	16	21	130	6	0.28	0.87	1.3
00232	400V/3ph 50Hz	1	8.8	16	21	130	1	11	21	26	175	6	0.28	0.87	1.3
00252	400V/3ph 50Hz	1	11	21	26	175	1	11	21	26	175	6	0.28	0.87	1.3
00302	400V/3ph 50Hz	1	13.5	24	30	175	1	13.5	24	30	175	8	0.28	0.87	1.3

KW : (kW) Power absorbed in nominal conditions (water 12/7°C; outdoor 35 °C) (1)

OA : (A) Nominal operating current (1)

FLA : (A) Full load current (1)

LRA : (A) Start-up (1)

(1): per motor

MODEL	VOLTAGE	PUMPS (optionals)						Free cooling PUMP		COMPLETE UNIT base version			
		N (1)	TYPE	kW	OA	FLA	LRA	kW	OA	kW	OA	FLA	LRA
00152	400V/3ph 50Hz	1	A	1.34	2.4	-	10.8	0.81	1.5	13.7	27.8	36.7	121.7
00182	400V/3ph 50Hz	1	A	1.34	2.4	-	10.8	0.81	1.5	17.2	34.1	45.3	156.3
00202	400V/3ph 50Hz	1	A	1.34	2.4	-	10.8	0.81	1.5	20.1	38.7	51.3	168.3
00232	400V/3ph 50Hz	1	B	1.5	2.8	-	16.8	0.81	1.5	22.3	43.7	56.3	213.3
00252	400V/3ph 50Hz	1	B	1.5	2.8	-	16.8	0.81	1.5	24.5	45.2	61.3	219.3
00302	400V/3ph 50Hz	1	B	1.5	2.8	-	16.8	0.81	1.5	30.1	54.7	71.9	221.9

(1) N : indicates the number of pumps functioning simultaneously; even in units with two pumps, one is always in stand-by.

DIMENSIONS AND WEIGHTS

AQUAFLAIR chillers are developed in three side groups, with a fixed height and depth and variable width. The weight of the unit is variable in accordance to the configuration of the pump group, the reservoir tank and other internal accessories.

CLASSI DIMENSIONALI

SIDE GROUPS

CLASSI	ARA	00152	00182	00202	00232	00252	00302	00403	00504	SIDE GROUPS
Solo freddo		n.a.	1	1	2	2	2	3	3	Cooling only
Pompa di calore		n.a.	1	1	2	2	2	3	3.	Heat pump
Free cooling		1	1	1	2	2	2	n.a.	n.a.	Free cooling
Free cooling silenziato		1	2	2	2	2	3	n.a.	n.a.	Low noise - Free cooling

n.a. = Non disponibile

n.a. = Not available

DIMENSIONI		1	2	3	DIMENSIONS
Altezza	mm	1542	1542	1542	Height
Profondità	mm	1191	1191	1191	Depth
Larghezza	mm	1950	2300	3200	Width
Ingombro in pianta	m ²	2.3	2.7	3.8	Footprint

PESI	ARA	00152	00182	00202	00232	00252	00302	00403	00504	WEIGHTS
Peso versione base	kg (*)	n.a.	530	550	620	635	655	800	850	Weight of basic version
Peso con gruppo pompe e serbatoio	kg	n.a.	630 (1)	650	730	745 (2)	765	935 (3)	985	Weight with pump group and tank
Peso versione free cooling	kg (*)	600	620	640	730	745	765	n.a.	n.a.	Weight of free cooling version
Peso versione free cooling ultra-silenziata	kg (*)	610	715	730	745	760	920	n.a.	n.a.	Weight of low noise free cooling version

(*) Dati riferiti al versione base senza kit idrico

(1) Dati riferiti al refrigeratore con kit idrico opzionale costituito da 2 pompe di tipo 'A' e dal serbatoio da 210 litri

(2) Dati riferiti al refrigeratore con kit idrico opzionale costituito da 2 pompe di tipo 'B' e dal serbatoio da 300 litri

(3) Dati riferiti al refrigeratore con kit idrico opzionale costituito da 2 pompe di tipo 'C' e dal serbatoio da 500 litri

Base version without hydraulic kit (*)

Chiller with optional hydraulic kit:
2 type-A pumps and 210 litre tank (1)

Chiller with optional hydraulic kit:
2 type-B pumps and 300 litre tank (2)

Chiller with optional hydraulic kit:
2 type-C pumps and 500 litre tank (3)

ARA Versione base ("solo freddo")

ARA Basic version ("cooling only")

DATI TECNICI

TECHNICAL DATA

MODELLO	ARA	00182	00202	00232		MODEL
Alimentazione	V/ph/Hz	400 / 3 / 50				Power supply
Refrigerante		R22				Refrigerant
Potenzialità frigorifera nomin. (1)	kW	44.1	51.6	59.5		Nominal cooling capacity (1)
Potenza el. assorbita nominale (1)	kW	15.7	18.6	21.2		Cooling operation input power (1)
EER (Potenza frigorifera nomin. / Potenza el. assorbita nominale) (1)		2.81	2.77	2.81		Nominal cooling capacity / Cooling operation input power (1)
Portata aria nominale	m ³ /h	14000	14000	21000		Air volume (1)
Numero di ventilatori / N° poli		4 / 6	4 / 6	6 / 6		Number of fans / pole
N° / tipo compressore		2 SCROLL	2 SCROLL	2 SCROLL		N° / compressor type
Numero batterie del condensatore		1+1				Number of coils
Livello di potenza sonora	dB	71	71	73		Sound power level
Livello di pressione sonora a 10 m (3)	dB(A)	43	43	45		Sound pressure level at 10 m free-field conditions (3)

GRUPPO POMPE (opzionale)

CHILLED WATER PUMP GROUP

Pompa		Type 'A'	Type 'A'	Type 'B'		
Portata acqua nominale (1)	l/h	7595	8880	10235		Nominal water supply (1)
Prevalenza disponibile (2)	kPa	181	170	113		Available head pressure (2)

ARA Versione pompa di calore

ARA Heat pumps

DATI TECNICI

TECHNICAL DATA

MODELLO	ARA	00182	00202	00232		MODEL
Potenzialità di riscaldamento nomin. (4)	kW	52.5	59.4	69.3		Nominal heating capacity (4)
Potenza el. assorbita in riscaldamento nominale (4)	kW	13.7	15.7	18.8		Heating absorbed power (4)

ARA Versione supersilenziosa

ARA Low noise

DATI TECNICI

TECHNICAL DATA

MODELLO	ARA	00182	00202	00232		MODEL
Livello di pressione sonora a 10 m (3)	dB(A)	41	41	43		Sound pressure level at 10 m free-field conditions (3)

(1) Dati riferiti alle condizioni nomin. acqua 12/7 °C; ambiente a 35 °C.

(2) Con pompa a bordo (opzionale).

(3) Misurato in campo libero a 10 metri di distanza dall'unità funzionante alle condizioni nominali.

(4) Dati riferiti alle condizioni nominali: acqua 40/45°C, temperatura esterna 7°C bulbo secco, 6°C bulbo umido.

Data refer to nominal conditions: water at 12/7°C, ambient at 35°C (1)

With optional built-in pump (2)

Noise pressure level in free-field conditions at a distance of 10 m from the unit (3)

Data refers to nominal conditions: outdoor temp. DB 7°C/WB 6°C, water temperature 40-45°C (4)

ARA Versione base ("solo freddo")
ARA Basic version ("cooling only")
DATI TECNICI
TECHNICAL DATA

MODELLO	ARA	00252	00302	00403	00504	MODEL
Alimentazione	V/ph/Hz	400 / 3 / 50				Power supply
Refrigerante		R22				Refrigerant
Potenzialità frigorifera nomin. (1)	kW	69.7	77.9	88.2	98.4	Nominal cooling capacity (1)
Potenza el. assorbita nominale (1)	kW	23.6	28.5	32.5	37.9	Cooling operation input power (1)
EER (Potenza frigorifera nomin. / Potenza el. assorbita nominale) (1)		2.95	2.73	2.71	2.60	Nominal cooling capacity / Cooling operation input power (1)
Portata aria nominale	m ³ /h	21000	21000	28000	28000	Air volume (1)
Numero di ventilatori / N° poli		6 / 6	6 / 6	8 / 6	8 / 6	Number of fans / pole
N° / tipo compressore		2 SCROLL	2 SCROLL	3 SCROLL	4 SCROLL	N° / compressor type
Numero batterie del condensatore		1+1				Number of coils
Livello di potenza sonora	dB	73	73	74	74	Sound power level
Livello di pressione sonora a 10 m (3)	dB(A)	45	45	46	46	Sound pressure level at 10 m free-field conditions (3)

GRUPPO POMPE (opzionale)
CHILLED WATER PUMP GROUP

Pompa		Type 'B'	Type 'B'	Type 'C'	Type 'C'	
Portata acqua nominale (1)	l/h	11990	13400	15180	16930	Nominal water supply (1)
Prevalenza disponibile (2)	kPa	111	109	140	133	Available head pressure (2)

ARA Versione pompa di calore
ARA Heat pumps
DATI TECNICI
TECHNICAL DATA

MODELLO	ARA	00252	00302	00403	00504	MODEL
Potenzialità di riscaldamento nomin. (4)	kW	77.5	85.0	99.6	110.0	Nominal heating capacity (4)
Potenza el. assorbita in riscaldamento nominale (4)	kW	20.9	24.4	30.5	36.3	Heating absorbed power (4)

ARA Versione supersilenziata
ARA Low noise
DATI TECNICI
TECHNICAL DATA

MODELLO	ARA	00252	00302	00403	00504	MODEL
Livello di pressione sonora a 10 m (3)	dB(A)	43	43	44	44	Sound pressure level at 10 m free-field conditions (3)

- (1) Dati riferiti alle condizioni nomin. acqua 12/7 °C; amb. 35 °C.
 (2) Con pompa a bordo (opzionale).
 (3) Misurato in campo libero a 10 metri di distanza dall'unità funzionante alle condizioni nominali.
 (4) Dati riferiti alle condizioni nominali: acqua 40/45°C, temperatura esterna 7°C bulbo secco, 6°C bulbo umido.

- Data refer to nominal conditions: water at 12/7°C, ambient at 35°C (1)
 With optional built-in pump (2)
 Noise pressure level in free-field conditions at a distance of 10 m from the unit (3)
 Data refers to nominal conditions: outdoor temp. DB 7°C/WB 6°C, water temperature 40-45°C (4)

ARA Versione free cooling
ARA with free cooling function
DATI TECNICI
TECHNICAL DATA

MODELLO	ARA	00152	00182	00202	00232	MODEL
Alimentazione	V/ph/Hz	400 / 3 / 50				Power supply
Refrigerante		R22				Refrigerant
Potenza resa in free cooling (1)	kW	-	28.1	29.3	36.1	Nom. cooling capacity (free cooling) (1)
Potenzialità frigorifera nomin. in raffreddamento meccanico (2)	kW	-	44.9	52.7	59.5	Nominal mechanical cooling capacity (2)
Potenza el. assorbita nominale in raffreddamento meccanico (2)	kW	-	15.7	18.4	22.0	Cooling input power (2)
EER (Potenza frigorifera nomin. / Potenza el. assorbita nominale) (2)		-	2.86	2.86	2.71	Nominal cooling capacity / Cooling input power (mechanical cooling) (2)
Portata aria nominale	m ³ /h	-	16000	16000	21000	Air volume
Numero di ventilatori / N° poli		-	4 / 4	4 / 4	6 / 4	Number of fans / pole
N° / tipo compressore		-	2 SCROLL	2 SCROLL	2 SCROLL	N° / compressor type
Numero batterie del condensatore		1+1				Number of coils
Livello di pressione sonora a 10 m (3)	dB(A)	-	51	51	52	Sound pressure level at 10 m free-field conditions (3)

ARA Versione free cooling – supersilenziata
ARA Free cooling low noise version
DATI TECNICI
TECHNICAL DATA

MODELLO	ARA	00152	00182	00202	00232	MODEL
Alimentazione	V/ph/Hz	400 / 3 / 50				Power supply
Refrigerante		R22				Refrigerant
Potenza resa in free cooling (1)	kW	25.0	30.9	32.7	33.5	Nom. cooling capacity (free cooling) (1)
Potenzialità frigorifera nomin. In raffreddamento meccanico (2)	kW	38.1	45.5	54.0	58.5	Nominal mechanical cooling capacity (2)
Potenza el. assorbita nominale in raffreddamento meccanico (2)	kW	13.2	14.8	17.3	22.0	Cooling input power (2)
EER (Potenza frigorifera nomin. / Potenza el. assorbita nominale) (2)		2.88	3.08	3.12	2.66	Nominal cooling capacity / Cooling input power (mechanical cooling) (2)
Portata aria nominale	m ³ /h	13000	18400	18400	18400	Air volume
Numero di ventilatori / N° poli		4 / 6	6 / 6	6 / 6	6 / 6	Number of fans / pole
N° / tipo compressore		2 SCROLL	2 SCROLL	2 SCROLL	2 SCROLL	N° / compressor type
Numero batterie del condensatore		1+1				Number of coils
Livello di pressione sonora a 10 m (3)	dB(A)	43	44	44	44	Sound pressure level at 10 m free-field conditions (3)

(1) Dati riferiti a condizioni nominali: ingresso acqua 15°C, ambiente a +5°C, glicole 20%;

(2) Dati riferiti alle condizioni nomin. acqua 12/7 °C; ambiente a 35 °C.

(3) Misurato in campo libero a 10 metri di distanza dall'unità funzionante alle condizioni nominali.

In nominal conditions: water inlet: 15°C, ambient +5°C
20% glycol (1)

Data refer to nominal conditions: water at 12/7°C, ambient at 35°C (2)

Noise pressure level in free-field conditions at a distance of 10 m from the unit (3)

ARA Versione free cooling

ARA with free cooling function

DATI TECNICI

TECHNICAL DATA

MODELLO	ARA	00252	00302		MODEL
Alimentazione	V/ph/Hz	400 / 3 / 50			Power supply
Refrigerante		R22			Refrigerant
Potenza resa in free cooling	kW	37.8	38.3		Nominal cooling capacity (free cooling)
Potenzialità frigorifera nomin. in raffreddamento meccanico (1)	kW	69.7	78.7		Nominal mechanical cooling capacity (1)
Potenza el. assorbita nominale in raffreddamento meccanico (1)	kW	24.3	28.6		Cooling input power (1)
EER (Potenza frigorifera nomin. / Potenza el. assorbita nominale) (1)		2.87	2.75		Nominal cooling capacity / Cooling input power (mechanical cooling) (1)
Portata aria nominale	m ³ /h	21000	21000		Air volume (1)
Numero di ventilatori / N° poli		6 / 4	6 / 4		Number of fans / pole
N° / tipo compressore		2 SCROLL	2 SCROLL		N° / compressor type
Numero batterie del condensatore		1+1			Number of coils
Livello di pressione sonora a 10 m (3)	dB(A)	52	52		Sound pressure level at 10 m free-field conditions (3)

ARA Versione free cooling – supersilenziata

ARA Free cooling low noise version

DATI TECNICI

TECHNICAL DATA

MODELLO	ARA	00252	00302		MODEL
Alimentazione	V/ph/Hz	400 / 3 / 50			Power supply
Refrigerante		R22			Refrigerant
Potenza resa in free cooling	kW	35.0	44.9		Nominal cooling capacity (free cooling)
Potenzialità frigorifera nomin. in raffreddamento meccanico (1)	kW	68.3	79.3		Nominal mechanical cooling capacity (1)
Potenza el. assorbita nominale in raffreddamento meccanico (1)	kW	24.4	27.8		Cooling input power (1)
EER (Potenza frigorifera nomin. / Potenza el. assorbita nominale) (1)		2.79	2.86		Nominal cooling capacity / Cooling input power (mechanical cooling) (1)
Portata aria nominale	m ³ /h	18400	23800		Air volume (1)
Numero di ventilatori / N° poli		6 / 6	8 / 6		Number of fans / pole
N° / tipo compressore		2 SCROLL	2 SCROLL		N° / compressor type
Numero batterie del condensatore		1+1			Number of coils
Livello di pressione sonora a 10 m (3)	dB(A)	44	46		Sound pressure level at 10 m free-field conditions (3)

(1) Dati riferiti a condizioni nominali: ingresso acqua 15°C, ambiente a +5°C, glicole 20%;

(2) Dati riferiti alle condizioni nomin. acqua 12/7 °C; ambiente a 35 °C.

(3) Misurato in campo libero a 10 metri di distanza dall'unità funzionante alle condizioni nominali.

In nominal conditions: water inlet: 15°C, ambient +5°C
20% glycol (1)

Data refer to nominal conditions: water at 12/7°C, ambient at 35°C (2)

Noise pressure level in free-field conditions at a distance of 10 m from the unit (3)

PROBLEM SOLVING

GUIDE TO PROBLEM SOLVING

PROBLEM	POSSIBLE CAUSE	CHECK/CORRECTIVE ACTION
THE CHILLER DOES NOT WORK	The electrical panel has no power supply	Check for mains power Check that the main switch is closed
	The microprocessor control circuit board has no power supply	Check that the IM8 automatic auxiliary circuit switch is armed Check that the fuses are active
	The microprocessor control has power supply but does not start the unit.	Check for alarm conditions
HIGH OUTPUT PRESSURE OR INTERVENTION OF HIGH PRESSURE PRESSOSTAT	Airflow to the condenser is insufficient or the intake temperature is too high.	Check for any re-circulation of condensation air and that the distances given in the section on "Positioning the chiller" are respected Check that the temperature of the condensation air is within the unit's function limits Check that the coils / metal filters are not dirty. Check the fan rotation direction
	The condensation pressure control system is not efficient	Check the setting and correct function of the fan speed regulator.
	One or more fans is not working	Check for intervention of fan protection Re-set or change the faulty fans
	There is air in the circuit, shown by bubbles despite over-cooling	Evacuate and re-charge the circuit
	There is too much refrigerant in the circuit; the condenser is partially flooded.	Excessive cooling of the liquid at the condenser output; remove some refrigerant from the circuit.
	Dirty condenser or metal filters	Remove obstructing material (leaves, paper, etc.)

PROBLEM	POSSIBLE CAUSE	CHECK/CORRECTIVE ACTION
HIGH OUTPUT PRESSURE OR INTERVENTION OF HIGH PRESSURE PRESSOSTAT	High intake pressure	Check the chilled water return temperature and the control set values
LOW OUTPUT PRESSURE OR INTERVENTION OF LOW PRESSURE PRESSOSTAT	The thermostatic valve is not set or defective	Check that the superheating of the thermostatic valve is correct (approx. 5°C) Check that the bulb has not lost pressure
	The filter drier cartridge is dirty	Check whether the filter dryer cartridge needs to be changed; the temperature differential before and after the filter must be less than 2°C
	With cold outside temperatures, the LP pressostat intervenes before the cooling circuit is stable	Set the LP pressostat inhibition time on start-up to 120 seconds
	Insufficient refrigerant charge	Check for leaks and re-charge until supercooling of the liquid at the condenser output is 3-5°C.
	Insufficient water flow (wide difference between chilled water intake and output temperatures.	Check the installation specifications and the pump characteristics: Check for leaks from piping.
THE ANTI-FREEZE PROTECTION CUTS IN	The chilled water output temperature is too low.	Check that the water flow is sufficient and that the difference between intake and output temperature is not too high
	The setting of the antifreeze alarm or antifreeze sensor is incorrect.	Check the alarm setting on the control

PROBLEM	POSSIBLE CAUSE	CHECK/CORRECTIVE ACTION
THE COMPRESSOR DOES NOT WORK WHEN CALLED BY THE THERMOSTAT	One of the unit's safety devices has intervened	Check for alarms on the user terminal display
	Short circuit protection has intervened	Check the cause of the short circuit and change the fuses
	The LP pressostat or anti-freeze protection has intervened	See 'Low output pressure or intervention of low pressure pressostat' or 'The anti-freeze protection cuts in'
	The control system is not giving a correct system	Check the control system
	The flow gauge does not give the compressor start-up command	Check the water flow and the flow gauge and pump function
THE COMPRESSOR INTERNAL PROTECTION CUTS IN N.B. Before starting the compressor, check compressor winding resistance and continuity	A phase is missing	Check the compressor's electrical connections
	The motor is overloaded	Check that the unit is functioning within the temperature limits given in this manual
	The rotor is blocked	Change the compressor
THE COMPRESSOR IS NOISY	Liquid return to the compressor	Check the function and superheating of the expansion valve
	The compressor is damaged	Call the nearest service centre for repair or replacement of the compressor
LOW OUTPUT PRESSURE	The condensation pressure control system is not efficient	Check the function of the fan speed regulators Check the function of the air temperature sensor
	The chiller is functioning with external air temperatures which are too low	Check that the unit is functioning within the temperature limits given in this manual
HIGH INTAKE PRESSURE	Chilled water return temperature is higher than normal	Check that the unit is functioning within the temperature limits given in this manual
	Liquid refrigerant return to the compressor	Check the function of the expansion valve and the correct positioning of the bulb
		Check that superheating of the thermostatic valve is correct (approx. 5°C)

BLEEDING THE WATER CIRCUIT

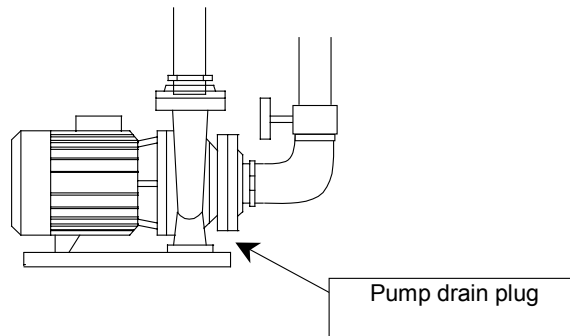
If there is air in the water circuit it can be bled using the valves:

- on the chilled water intake connection
- on the optional reservoir tank

During the winter shutdown (cooling-only versions) or for special maintenance, it may be necessary to drain the water circuit. To enable this there are valves:

- on the chilled water output connection
- on the bottom of the reservoir tank

as well as a plug to drain the water in the pump (see diagram):



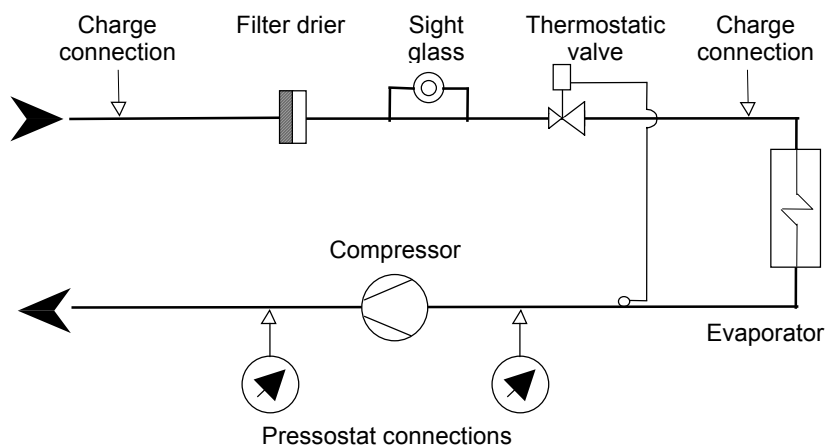
The chilled water temperature should be set to the maximum possible; this will cause the microprocessor control to switch on the pump by itself, thus facilitating the draining of the system.

REFRIGERANT CHARGE

Units are pre-charged in the factory and do not need re-charging unless there have been problems during transport or installation or the safety valve has intervened. In the event that it is necessary to adjust the charge, follow the instructions below. If the circuit has been drained for the replacement of components, a vacuum must be created in the circuit before re-charging.

CREATING A VACUUM IN THE CIRCUIT Connect the vacuum pump to the valves in the compressor housing and take the vacuum in the system to 0.3 mbar; remember that the vacuum must not be created too quickly (at least 120 minutes). When the vacuum level is reached, maintain it for at least 60 minutes.

REFRIGERANT CHARGE The system must be charged with liquid refrigerant fluid via the needle valve between the thermostatic expansion valve and the evaporator until there are no bubbles in the flow sight glass. The charge must be done under normal conditions and with an output pressure of 16-18 bar. Check the quantity of refrigerant on the



Refrigerant charge connections

data plate and verify that liquid supercooling at the thermostatic intake is 3 to 5°C less than the condensation temperature on the manometer scale and that the superheating is between 4 and 7°C

NOTE: when charging with R407C check the liquid supercooling value (3 to 5°C) and not the sight glass.

IMPORTANT WARNINGS



Check the type of refrigerant used on the unit data plate and on the compressor data plate.

If it is necessary to top up the oil, use only the oils listed below:

Refrigerant	Recommended oil
R22 (Mineral oil)	Maneurop 160P - Mineral / ISO 32
R407C (POE)	Maneurop 160SZ

Do not use the compressor to create a vacuum in the system.

When charging the unit, use refrigerant in the liquid state.

MAINTENANCE AND CLEANING

All maintenance and cleaning operations must be carried out safely, following the instructions in this manual. To ensure the correct functioning of the unit it is advisable to check regularly that the heat exchanger coils, the metal filters and the protection grilles are clean.

IMPORTANT WARNING



Disconnect the unit from the electric power supply before accessing internal components.

All service and maintenance operations which require access to the internal components of the unit while it is operating must be carried out by qualified experts who are aware of the necessary precautions to take.

CHANGING THE PROTECTION GRILLES

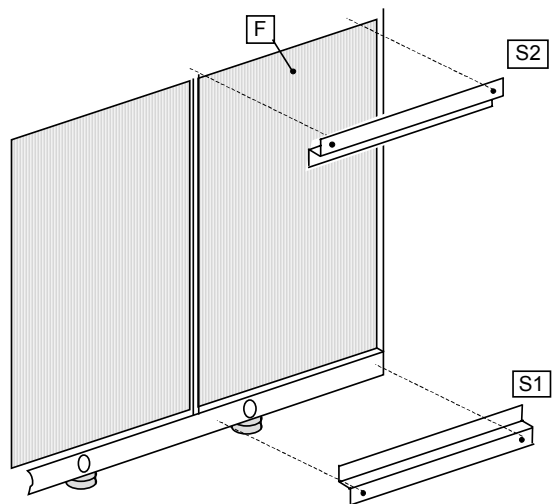
The condenser coils can be fitted with protection grilles on the intake. To clean or change these grilles:

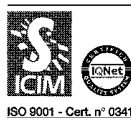
- remove posts **S1** and **S2** screwed to the structure of the unit.
- remove the grilles **F**;

To replace the grilles, do this in reverse.



IMPORTANT: when removing the grilles, be careful of the **sharp edges** on the surface of the coils.





UNIFLAIR ITALIA S.r.l.

Via dell'industria, 10
35020 BRUGINE (Padova) - Italy
Tel. +39 (0)49 9713211
Fax +39 (0)49 5806906

Internet: www.UNIFLAIR.com
E-mail: INFO@UNIFLAIR.com