

# AQL/AQH 20-75 AQC 40-75



English

Français

Deutsch

Italiano

Español



20  
↓  
77 kW



20  
↓  
86 kW



## Air Cooled Water Chillers and Heat Pumps

Refroidisseurs de liquide à condensation par air et pompes à chaleur air-eau

Luftgekühlte Flüssigkeitskühler und Wärmepumpen

Refrigeratori d'Acqua e Pompe di Calore Raffreddati ad Aria

Enfriadores de Agua y Bomba de Calor Condensadas con Aire

Part number / Code / Code / Codice / Código: **342597/E**

Supersedes / Annule et remplace / Annulliert und ersetzt / Annulla e sostituisce /

Anula y sustituye: **035B09040-000D**

Notified Body / Organisme Notifié / Benannte Zertifizierungsstelle /

Organismo Notificato / Organismo Notificado N°. 1115 **PASCAL**





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# 1 - Foreword

## 1.1 Introduction

Units, manufactured to state-of-the-art design and implementation standards, ensure top performance, reliability and fitness to any type of air-conditioning systems.

These units are designed for cooling water or glycoled water (and for water heating in heat pump models) and are unfit for any purposes other than those specified in this manual.

This manual includes all the information required for a proper installation of the units, as well as the relevant operating and maintenance instructions.

It is therefore recommended to read this manual carefully before installation or any operation on the machine. The chiller installation and maintenance must be carried out by skilled personnel only (where possible, by one of Authorised Service Centers).

The manufacturer may not be held liable for any damage to people or property caused by improper installation, start-up and/or improper use of the unit and/or failure to implement the procedures and instructions included in this manual.

## 1.2 Warranty

These units are delivered complete, tested and ready for being operated. Any form of warranty will become null and void in the event that the appliance is modified without manufacturer's preliminary written authorisation.

This warranty shall apply providing that the installation instructions have been complied with (either issued by manufacturer, or deriving from the current practice), and the Form 1 ("Start-up") has been filled-in and mailed to manufacturer (attn. After-Sales Service).

In order for this warranty to be valid, the following conditions shall be met:

- The machine must be operated only by skilled personnel from Authorised After-Sales Service.
- Maintenance must be performed only by skilled personnel - from one of Authorised After-Sales Centers.
- Use only original spare parts.
- Carry out all the planned maintenance provided for by this manual in a timely and proper way.

Failure to comply with any of these conditions will automatically void the warranty.

## 1.3 Emergency stop / Normal stop

The emergency stop of the unit can be enabled using the master switch on the control panel (move down the lever).





For a normal stop, press the relevant push-buttons.

To restart the appliance, follow the procedure detailed in this manual.

## 1.4 An introduction to the manual

For safety reasons, it is imperative to follow the instructions given in this manual. In case of any damage caused by non-compliance with these instructions, the warranty will immediately become null and void.

Conventions used throughout the manual:

	The DANGER sign recalls your attention to a certain procedure or practice which, if not followed, may result in serious damage to people and property.
	The WARNING sign precedes those procedures that, if not followed, may result in serious damage to the appliance.
	The NOTE contain important observations.
	The USEFUL TIPS provide valuable information that optimises the efficiency of the appliance.

This manual and its contents, as well as the documentation which accompanies the unit, are and remain the property of manufacturer, which reserves any and all rights thereon. This manual may not be copied, in whole or in part, without manufacturer's written authorization.

## 2 - Safety

### 2.1 Foreword

These units must be installed in conformity with the provisions of Machinery Directive 2006/42/EC, Low Voltage Directive 2006/95/EC, Pressure Vessels Directive 97/23/EC, Electromagnetic Interference Directive 2004/108/EC, as well as with other regulations applicable in the country of installation. If these provisions are not complied with, the unit must not be operated.



The unit must be grounded, and no installation and/or maintenance operations may be carried out before deenergising the electrical panel of the unit.

Failure to respect the safety measures mentioned above may result in electrocution hazard and fire in the presence of any short-circuits.



Inside the heat exchangers, the compressors and the refrigeration lines, this unit contains liquid and gaseous refrigerant under pressure. The release of this refrigerant may be dangerous and cause injuries.



The units are not designed to be operated with natural refrigerants, such as hydrocarbons. Manufacturer may not be held liable for any problems deriving from the replacement of original refrigerant or the introduction of hydrocarbons.

Units are designed and manufactured according to the requirements of European Standard PED 97/23/EC (pressure vessels).

- The used refrigerants are included in group II (non-hazardous fluids).
- The maximum working pressure values are mentioned on the unit's data plate.
- Suitable safety devices (pressure switches and safety valves) have been provided, to prevent any anomalous overpressure inside the plant.
- The vents of the safety valves are positioned and oriented in such a way as to reduce the risk of contact with the operator, in the event that the valve is operated. Anyway, the installer will convey the discharge of the valves far from the unit.
- Dedicated guards (removable panels with tools) and danger signs indicate the presence of hot pipes or components (high surface temperature).



The guards of the fans (only for units provided with air heat exchangers) must be always mounted and must never be removed before de-energising the appliance.



It is the User's responsibility to ensure that the unit is fit for the conditions of intended use and that both installation and maintenance are carried out by experienced personnel, capable of respecting all the recommendations provided by this manual. It is important that the unit is adequately supported, as detailed in this manual. Non-compliance with these recommendations may create hazardous situations for the personnel.



The unit must rest on a base which meets the characteristics specified in this manual; a base with inadequate characteristics is likely to become a source of serious injury to the personnel.



The unit has not been design to withstand loads and/or stress that may be transmitted by adjacent units, piping and/or structures. Each external load or stress transmitted to the unit may break or cause breakdowns in the unit's structure, as well as serious dangers to people. In these cases, any form of warranty will automatically become null and void.



The packaging material must not be disposed of in the surrounding environment or burnt.

## 2 - Safety

### 2.2 Definitions

**OWNER:** means the legal representative of the company, body or individual who owns the plant where unit has been installed; he/she has the responsibility of making sure that all the safety regulations specified in this manual are complied with, along with the national laws in force.

**INSTALLER:** means the legal representative of the company who has been given by the owner the job of positioning and performing the hydraulic, electric and other connections of unit to the plant: he/she is responsible for handling and properly installing the appliance, as specified in this manual and according to the national regulations in force.

**OPERATOR:** means a person authorised by the owner to do on unit all the regulation and control operations expressly described in this manual, that must be strictly complied with, without exceeding the scope of the tasks entrusted to him.

**ENGINEER:** means a person authorised directly by manufacturer or, in all EC countries, excluding Italy, under his full responsibility, by the distributor of product, to perform any routine and extraordinary maintenance operations, as well as any regulation, control, servicing operations and the replacement of pieces, as may be necessary during the life of the unit.

### 2.3 Access to the unit

The unit must be placed in an area which can be accessed also by OPERATORS and ENGINEERS; otherwise the unit must be surrounded by a fence at not less than 2 meters from the external surface of the machine.

OPERATORS and ENGINEERS must enter the fenced area only after wearing suitable clothing (safety shoes, gloves, helmet etc.). The INSTALLER personnel or any other visitor must always be accompanied by an OPERATOR.

For no reason shall any unauthorised personnel be left alone in contact with the unit.

### 2.4 General precautions

The OPERATOR must simply use the controls of the unit; he must not open any panel, other than the one providing access to the control module.

The INSTALLER must simply work on the connections between plant and machine; he must not open any panels of the machine and he must not enable any control.

When you approach or work on the unit, follow the precautions listed below:

- do not wear loose clothing or jewellery or any other accessory that may be caught in moving parts
- wear suitable personal protective equipment (gloves, goggles etc.) when you have to work in the presence of free flames (welding operations) or with compressed air
- if the unit is placed in a closed room, wear ear protection devices
- cut off connecting pipes, drain them in order to balance the pressure to the atmospheric value before disconnecting them,

disassemble connections, filters, joints or other line items

- do not use your hands to check for any pressure drops
- use tools in a good state of repair; be sure to have understood the instructions before using them
- be sure to have removed all tools, electrical cables and any other objects before closing and starting the unit again

### 2.5 Precautions against residual risks

#### Prevention of residual risks caused by the control system

- be sure to have perfectly understood the operating instructions before carrying out any operation on the control panel
- when you have to work on the control panel, keep always the operating instructions within reach
- start the unit only after you have checked its perfect connection to the plant
- promptly inform the ENGINEER about any alarm involving the unit
- do not reset manual restoration alarms unless you have identified and removed their cause

#### Prevention of residual mechanical risks

- install the unit according to the instructions provided in this manual
- carry out all the periodical maintenance operations prescribed by this manual
- wear a protective helmet before accessing the interior of the unit
- before opening any panelling of the machine, make sure that it is secured to it by hinges
- do not touch air condensation coils without wearing protective gloves
- do not remove the guards from moving elements while the unit is running
- check the correct position of the moving elements' guards before restarting the unit

#### Prevention of residual electrical risks

- connect the unit to the mains according to the instructions provided in this manual
- periodically carry out all the maintenance operations specified by this manual
- disconnect the unit from the mains by the external disconnecting switch before opening the electrical board
- check the proper grounding of the unit before start-up
- check all the electrical connections, the connecting cables, and in particular the insulation; replace worn or damaged cables

## 2 - Safety

- periodically check the board's internal wiring
- do not use cables having an inadequate section or flying connections, even for limited periods of time or in an emergency

### Prevention of other residual risks

- make sure that the connections to the unit conform to the instructions provided in this manual and on the unit's panelling
- if you have to disassemble a piece, make sure that it has been properly mounted again before restarting the unit
- do not touch the delivery pipes from the compressor, the compressor and any other piping or component inside the machine before wearing protective gloves
- keep a fire extinguisher for electrical appliances near the machine
- on the units installed indoor, connect the safety valve of the refrigeration circuit to a piping network that can channel any overflowing refrigerant outside
- remove and leak of fluid inside and outside the unit
- collect the waste liquids and dry any oil spillage
- periodically clean the compressor compartment, to remove any fouling
- do not store flammable liquids near the unit
- do not disperse the refrigerant and the lubricating oil into the environment
- weld only empty pipes; do not approach flames or other sources of heat to refrigerant pipes
- do not bend/hit pipes containing fluids under pressure

### 2.6 Precautions during maintenance operations

Maintenance operations can be carried out by authorised technicians only.

Before performing any maintenance operations:

- disconnect the unit from the mains with the external disconnecting switch

- place a warning sign "do not turn on - maintenance in progress" on the external disconnecting switch
- make sure that on-off remote controls are inhibited
- wear suitable personal protective equipment (helmet, safety gloves, goggles and shoes etc.)

To carry out any measurements or checks which require the activation of the machine:

- work with the electrical board open only for the necessary time
- close the electrical board as soon as the measurement or check has been completed
- for outdoor units, do not carry out any operations in the presence of dangerous climatic conditions (rain, snow, mist etc.)

The following precautions must be always adopted:

- do not scatter the fluids of the refrigeration circuit in the surrounding environment
- when replacing an eprom or electronic cards, use always suitable devices (extractor, antistatic bracelet, etc.)
- to replace a compressor, the evaporator, the condensing coils or any other weighty element, make sure that the lifting equipment is consistent with the weight to be lifted
- in air units with independent compressor compartment, do not access the fan compartment unless you have disconnected the machine by the disconnecting switch on the board and you have placed a warning sign "do not turn on - maintenance in progress"
- contact manufacturer for any modifications to the refrigeration, hydraulic or wiring diagram of the unit, as well as to its control logics
- contact manufacturer if it is necessary to perform very difficult disassembly and assembly operations
- use only original spare parts purchased directly from manufacturer or the official retailers of the companies on the recommended spare parts list
- contact manufacturer if it is necessary to handle the unit one year after its positioning on site or if you wish to dismantle it.

## 2 - Safety

### 2.7 Safety labels

#### Identification of the refrigerant - External door



#### Identification of the unit Outside, on the right-hand front column

COD. PRODOTTO NEUTRO	(B)
MODELLO	(A)
CE	(C)
MATRICOLA	(NOTA)
ANNO DI COSTRUZIONE	
CARICA REFR. IL CIRCUIT (1/2/3/4)	Kg (D)
REFRIGERANT CHARGE	(E) (E)
PS (LATO ALTA / LATO BASSA) PS (HIGH/LOW SIDE)	bar (M) (N)
TS (ALTA / BASSA) TS (HIGH/LOW)	°C (G) (R)
ALIM. POTENZA MAIN SUPPLY	V/PHz (P) (I) (O)
CORRENTE DI SPUNTO ISA	amp A (G)
CORRENTE A PIENO CARICO IA	amp A (H)
POTENZA ASSORBITA POWER INPUT	amp Kw (I)
PRESS. MAX ESERCIZIO ACQUA MAX WATER OPERATING PRESSURE	bar 10
MASSA MASS	kg (L)
DISTRIBUITO AC S.I.J. Via XXV Aprile 29 20025 SANGIULIANO MI (ITALY) MADE IN ITALY COD.028802485-000 P	
MODELLO:	
MATRICOLA:	ANNO DI COSTRUZIONE
MODELLO:	
MATRICOLA:	ANNO DI COSTRUZIONE
MODELLO:	
MATRICOLA:	ANNO DI COSTRUZIONE

#### Pump operation - Outside, on the right-hand front column

LAS BOMBAS MONTADAS EN ESTA UNIDAD NO PUEDEN TRABAJAR SIN AGUA  
DIE PUMPEN DIESES GERÄTES DÜRFEN NICHT OHNE WASSER BETRIEBEN WERDEN  
THE PUMPS ON BOARD OF THIS UNIT CAN NOT WORK WITHOUT WATER  
LES POMPES A BORD DE CETTE UNITE NE PEUVENT PAS FONCTIONNER SANS EAU  
LE POMPE A BORD DI QUESTA UNITÀ NON POSSONO FUNZIONARE SENZA ACQUA

#### Circuit drain - Outside, on the right-hand front column

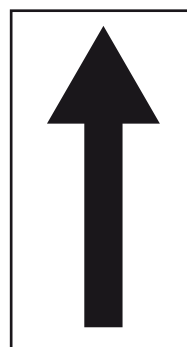


**ATTENTION!** Don't leave the unit with water inside hydraulic circuit during winter or when it is in stand by.  
**ATTENZIONE!** Non lasciare l'unità con acqua nel circuito idraulico durante l'inverno o quando non è funzionante.  
**ATTENTION!** Ne laissez pas l'unité avec de l'eau dans le circuit hydraulique pendant l'hiver ou quand elle ne travaille pas.  
**WARNING!** Lassen Sie nicht das Wasser in die Schaltung während des Winters oder wenn es nicht funktioniert.  
**¡ATENCIÓN!** No deje el agua en el circuito hidráulico durante el invierno o cuando no está trabajando.

#### Use of filter and flow switch - Adjacent to fittings

**!** E'OBBLIGATORIO L'USO DI FILTRO E FLUSSOSTATO ACQUA  
THE USE OF FILTER AND FLOW SWITCH IS MANDATORY  
EL USO DEL FILTRO Y DEL INTERRUPTOR DE FLUJO ES OBLIGATORIO  
L'UTILISATION DU FILTRE ET DU FLUXOSTAT EST OBLIGATOIRE  
DER GEBRAUCH VON FILTER UND STRÖMUNGSWÄCHTER IST VORGESCHRIEBEN

#### Lifting point - Base




ACCESSORI inclusi  
ACCESSORY enclosed  
ZUBEHÖR eingeschlossen  
ACCESSOIRE ci-inclus  
ACCESORIOS incluidos

Product code	A
Model	B
Notified body	C
Serial number	D
Year of construction	E
Refrigerant type	F
Refrigerant charge	G
High pressure	H
Low pressure	I
Main supply	L
Start up current	M
Full load current	N
Power input	O
Water operation pressure	P
Mass	Q
IP class	R



## 2 - Safety

### Electrical warning Adjacent to the master switch

	<b>ATTENZIONE !</b> Prima di aprire togliere tensione	<b>ATTENTION !</b> Enlever l'alimentation électrique avant d'ouvrir
<b>ACHTUNG !</b> Vor öffnen des gehäuses hauptschalter ausschalten	<b>CAUTION !</b> Disconnect electrical supply before opening	<b>ATENCIÓN !</b> Cortar la corriente antes de abrir el aparato

### Start-up warning - Outside the door of the electrical board

**ATTENZIONE**  
INSERIRE LE RESISTENZE DI RISCALDAMENTO OLIO ALMENO 12 ORE PRIMA DI OGNI AVVIAMENTO (SE PREVISTE)  
PRIMA DELLA MESSA IN TENSIONE ASSICURARSI CHE LE VITI DEI CIRCUITI ELETTRICI SIANO SERRATE COMPLETAMENTE

**WARNING**  
ENERGIZE THE CRANCKCASE HEATER FOR AT LEAST 12 HOURS BEFORE EACH STARTING (IF FITTED)  
BEFORE TIGHTENING-UP, TO TIGHTEN ALL TERMINAL SCREWS ESPECIALLY THOSE IN MAIN CIRCUIT

**WARNUNG**  
OLSUMPFFHEIZUNG (FALLS VORHANDEN) 12 STUNDEN VOR DEM START EINSCHALTEN  
VOR INBETRIEBNAHME ALLE SCHRAUBENVERBINDUNGEN NACHZIEHEN, BESONDERS DIE ELEKTRISCHEN ANSCHLUSSE

**ATTENTION**  
ALIMENTER ELECTRIQUEMENT LA RESISTANCE DE CARTER AU MOINS 12 HEURES AVANT CHAQUE DEMARRAGE (SI MONTE SUR LE PRODUIT)  
AVANT DE DEMARRER LA MACHINE, VERIFIER LE SERRAGE DE TOUTES LES BORNES A VIS, SPECIALEMENT DANS LE BOITIER ELECTRIQUE

**ATENCIÓN**  
ATENCIÓN ALIMENTAR ELÉCTRICAMENTE LA RESISTENCIA DE CARTER AL MENOS 12 HORAS ANTES DE CADA PUESTA EN MARCHA (SI ESTA EQUIPADA EN LA UNIDAD)  
ANTES DE LA PUESTA EN MARCHA, COMPROBAR QUE LOS BORNES ESTAN BIEN APRETADOS, ESPECIALMENTE EN EL CUADRO ELÉCTRICO

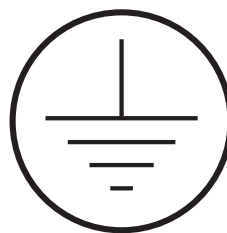
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MADE IN ITALY

### Final Test Certificate - Inside the external door

CERTIFICATO DI COLLAUDO PRODUZIONE PRODUCTION TEST CERTIFICATE		
PRODOTTORE DESIGNATION	NUMERO SOTTOCANTIERE SERIAL NUMBER / PRODUCTION	GRUPPO PRODOTTORE MACHINE MANUFACTURER
PROG. COLL. CHECK NUMBER	DESCRIZIONE DEI TEST IDENTIFICATION OF QUALITY CHECK	TEMPO OPERAT. INSP. CODE
1	VERIFICA ASSEMBLAGGIO CHECK ASSEMBLY PARTS	
2	VERIFICA VISIVA CABLAGGIO COLLEG. ELETTRICI E CONNESSIONE CHECK WIRING CONNECTION	
3	VUOTO E CARICA VACUUM AND REFRIGERANT CHARGE	
4	VERIFICA CON CERCAFOGHI TENUTA CIRCUITO FRIGORIFERO REFRIGERANT LEAK TEST	
5	TEST SICUREZZA ELETTRICA SAFETY TEST	
6	PROVE FUNZIONALI CON RILIEVI TEMPERATURE PRESSION/RUN/NOISE FUNCTIONAL AND RUN TEST: NOISE TEST	
7	VERIFICA INTERVENTI SICUREZZE PRESSIONE E TEMPERATURA CHECK SAFETY DEVICES	
8	VERIFICA VISIVA SONDE VISUAL CHECK SENSOR	
9	VERIFICA TENUTA CIRCUITO IDR. E FUNZIONAMENTO POMPA (SU PACK) HYDRAULIC CIRCUIT TEST (PUMP CHECK ONLY FOR PACK UNIT)	
10	VERIFICA MONTAGGIO ACCESSORI (SE PREVISTI) E DOCUMENTAZIONE CHECK ACCESSOR ES DOCUMENTATION	
11	CONTROLLI ESTETICO FINALE TENUTA CIRCUITO E PULIZIA VISUAL CHECK/LEAK FINAL TEST AND CLEANING ASPECTS	

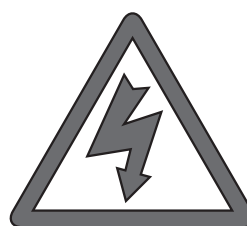
### Grounding connection on the electrical board, adjacent to the connection



### Read the instruction on the electrical board



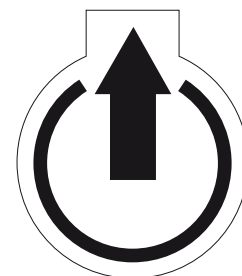
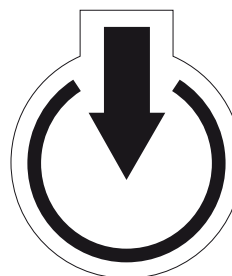
### On voltage - Adjacent to the master switch



### Fan Danger



### Fitting identification - Adjacent to fittings



### Sequence phase control on the electrical board

**ATTENZIONE**  
QUESTO COMPRESSORE RICHIEDE UN CORRETTO SENSO DI ROTAZIONE  
RISPETARRE LA CORRETTA SEQUENZA DELLE FASI

**CAUTION**  
THIS COMPRESSOR REQUIRES PROPER DIRECTION OF ROTATION  
CHECK PROPER ELECTRICAL PHASING

**ACHTUNG**  
KOMPRESSOREN BENÖTIGEN KORREKTES DREHFELD  
ELEKTRISCHE ANSCHLÜSSE AUF DREHFELD ÜBERPRÜFEN

**ATTENTION**  
CES COMPRESSEURS NECESSITENT UN BON SENS DE ROTATION  
VERIFIER LE CABLAGE DES PHASES

**ATENCIÓN**  
ESTOS COMPRESORES DEBEN FUNCIONAR EN EL SENTIDO DE ROTACIÓN CORRECTO  
COMPROBAR EL CABLEADO DE LAS FASES

## 2 - Safety

### 2.8 Safety regulations

REFRIGERANT DATA	SAFETY DATA: R410A
<b>Toxicity</b>	Low.
<b>Contact with skin</b>	<p>If sprayed, the refrigerant is likely to cause frost burns. If absorbed by the skin, the danger is very limited; it may cause a slight irritation, and the liquid is degreasing. Unfreeze the affected skin with water.</p> <p>Remove the contaminated clothes with great care - in the presence of frost burns, the clothes may stick to the skin. Wash with plenty of warm water the affected skin.</p> <p>In the presence of symptoms such as irritation or blisters, obtain medical attention.</p>
<b>Contact with eyes</b>	<p>Vapours do not cause harmful effects. The spraying of refrigerant may cause frost burns.</p> <p>Wash immediately with a proper solution or with tap water for at least 10 minutes, and then obtain medical attention.</p>
<b>Ingestion</b>	<p>Very unlikely - should something happen, it will cause frost burns.</p> <p>Do not induce vomiting. Only if the patient is conscious, wash out mouth with water and give some 250 ml of water to drink. Then, obtain medical attention.</p>
<b>Inhalation</b>	<p>R410A: remarkable concentrations in the air may have an anaesthetic effect, up to fainting.</p> <p>The exposure to considerable amounts may cause irregular heartbeat, up to the sudden death of the patient. Very high concentrations may result in the risk of asphyxia, due to the reduction in the oxygen percentage in the atmosphere. Remove the patient to fresh air and keep warm and at rest.</p> <p>If necessary, give oxygen. In case of breathing difficulties or arrest, proceed with artificial respiration.</p> <p>In case of cardiac arrest, proceed with cardiac massage. Then, obtain medical attention.</p>
<b>Recommendations</b>	<p>Semiotics or support therapy is recommended. Cardiac sensitisation has been observed that, in the presence of circulating catecholamines such as adrenalin, may cause cardiac arrhythmia and accordingly, in case of exposure to high concentrations, cardiac arrest.</p>
<b>Prolonged exposure</b>	<p>R410A: a study on the effects of exposure to 50,000 ppm during the whole life of rats has identified the development of benign testicle tumour.</p> <p>This situation should therefore be negligible for personnel exposed to concentrations equal to or lower than professional levels.</p>
<b>Professional levels</b>	R410A: Recommended threshold: 1000 ppm v/v - 8 hours TWA.
<b>Stability</b>	R410A: Not specified.
<b>Conditions to avoid</b>	Do not use in the presence of flames, burning surfaces and excess humidity.
<b>Hazardous reactions</b>	<p>May react with sodium, potassium, barium and other alkaline metals.</p> <p>Incompatible substances: magnesium and alloys with magnesium concentrations &gt; 2%.</p>
<b>Hazardous decomposition products</b>	R410A: Halogen acids produced by thermal decomposition and hydrolysis.

## 2 - Safety

### 2.8 Safety regulations (continued)

REFRIGERANT DATA	SAFETY DATA: R410A
<b>General precautions</b>	Do not inhale concentrated vapours. Their concentration in the atmosphere should not exceed the minimum preset values and should be maintained below the professional threshold. Being more weighty than the air, the vapour concentrates on the bottom, in narrow areas. Therefore, the exhaust system must work at low level.
<b>Respiratory system protection</b>	If you are in doubt about the concentration in the atmosphere, it is recommended to wear a respirator approved by an accident-prevention Authority, of the independent or oxygen type.
<b>Storage</b>	Cylinders must be stored in a dry and fresh place, free from any fire hazard, far from direct sunlight or other sources of heat, radiators etc. Keep a temperature below 50 °C.
<b>Protective clothing</b>	Wear overalls, protective gloves and goggles or a mask.
<b>Accidental release measures</b>	It is important to wear protective clothing and a respirator. Stop the source of the leak, if you can do this without danger. Negligible leaks can be left evaporating under the sun, providing that the room is well ventilated. Considerable leaks: ventilate the room. Reduce the leak with sand, earth or other absorbing substances. Make sure that the liquid does not channelled into gutters, sewers or pits where the vapours are likely to create a stuffy atmosphere.
<b>Disposal</b>	The best method is recovery and recycling. If this method is not practicable, dispose according to an approved procedure, that shall ensure the absorption and neutralization of acids and toxic agents.
<b>Fire fighting information</b>	R410A: Not flammable in the atmosphere.
<b>Cylinders</b>	The cylinders, if exposed to fire, shall be cooled by water jets; otherwise, if heated, they may explode.
<b>Protective fire fighting equipment</b>	In case of fire, wear an independent respirator and protective clothing.

## 2 - Safety

### 2.8 Safety regulations (continued)

LUBRICANT OIL DATA	SAFETY DATA: POLYESTER OIL (POE)
<b>Classification</b>	Not harmful.
<b>Contact with skin</b>	May cause slight irritation. Does not require first aid measures. It is recommended to follow usual personal hygiene measures, including washing the exposed skin with soap and water several times a day. It is also recommended to wash your overalls at least once a week.
<b>Contact with eyes</b>	Wash thoroughly with a suitable solution or tap water.
<b>Ingestion</b>	Seek medical advice immediately.
<b>Inhalation</b>	Seek medical advice immediately.
<b>Conditions to avoid</b>	Strong oxidising substances, caustic or acid solutions, excess heat. May corrode some types of paint or rubber.
<b>Protection of the respiratory system</b>	Use in well ventilated rooms.
<b>Protective clothing</b>	Always wear protective goggles or a mask. Wearing protective gloves is not mandatory, but is recommended in case of prolonged exposure to refrigerant oil.
<b>Accidental release measures</b>	It is important to wear protective clothing and, especially, goggles. Stop the source of the leak. Reduce the leak with absorbing substances (sand, sawdust or any other absorbing material available on the market).
<b>Disposal</b>	The refrigerant oil and its waste will be disposed of in an approved incinerator, in conformity with the provisions and the local regulations applicable to oil waste.
<b>Fire fighting information</b>	In the presence of hot liquid or flames, use dry powder, carbon dioxide or foam. If the leak is not burning, use a water jet to remove any vapours and to protect the personnel responsible for stopping the leak.
<b>Cylinders</b>	The cylinders exposed to a fire will be cooled with water jets in case of fire.
<b>Fire fighting protective equipment</b>	In case of fire, wear an independent respirator.

## 3 - Transport, Handling and Storage

AQL/AQH units are supplied fully assembled and tested (except for accessories supplied loose in the units – absorbers, filter, etc.). They are ready to be installed and started on the field.

R410A units are only charged with liquid refrigerant and with oil in the quantity required for operation.



The low pressure side of the refrigerating circuit on R410A units shall be charged by means of the service valve arranged on the thermal expansion valve before the device is operated.

### 3.1 Inspection

The unit shall be immediately inspected upon receipt to find out any damage since it has been delivered ex works and transported at the customer's risk. It is also necessary to make sure that all the parcels specified on the delivery note have been delivered.

Any damage you may find out shall be immediately reported in writing to the carrier. Even if the damage is only on the surface, please notify our local representative too.

The manufacturer disclaims all responsibility for the shipment even if it has provided for its organisation.

### 3.2 Handling

AQL/AQH units are designed to be lifted from above, by means of cables and eyebolts. A spacer shall be arranged between the cables in order to prevent them from damaging the unit (see the figure aside).

Before handling the devices, make sure the site you have chosen for the installation can withstand its weight and support its mechanical impact.

Avoid touching sharp parts (such as the fins of batteries, for example) while handling the unit.

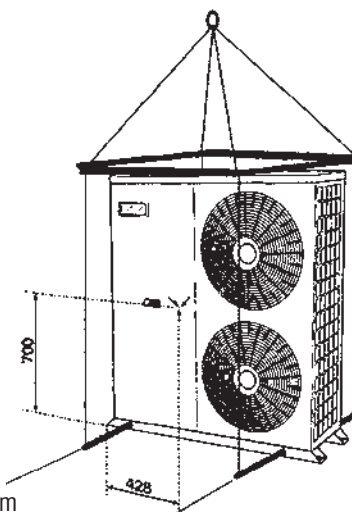
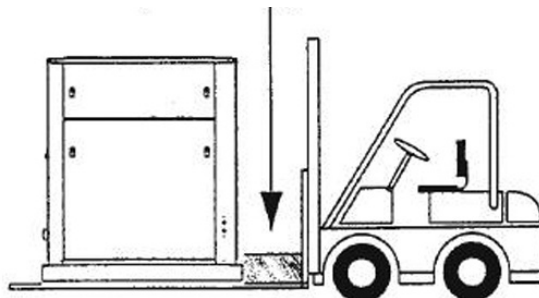


The unit shall never be placed on rollers.

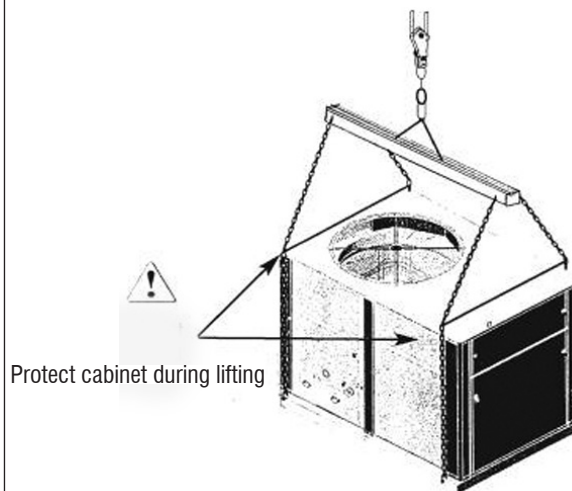
Act as follows to lift and handle the unit:

- Insert and secure the eyebolts into the frame holes which have been marked on purpose.
- Connect the cables to the eyebolts.
- Insert the spacer between the cables.
- Provide for hooking at the centre of gravity of the device.
- Cables shall have such a length that the angle they form with the horizon when under tension is not less than 45°.

Space requirements request to handling



Holes Ø 30 mm



Protect cabinet during lifting



While lifting and handling the unit, pay attention. Otherwise, you might damage the finned block of the coils arranged on both sides of the unit. The sides of the unit shall be protected by cardboard or plywood sheets.

## 3 - Transport, Handling and Storage



Until the unit is ready for operation, do not remove the plastic envelope and the coil protections which are intended to prevent dirt, dust and any foreign matter from penetrating into the unit through the inlets of fans or from damaging the external surfaces.

### 3.3 Anchoring

It is not essential to secure the unit to the foundations, unless in areas where there is a serious risk of earth-quake, or if the appliance is installed on the top of a steel frame.

### 3.4 Storage

If the unit is to be stored before the installation for some time, take at least the following precautions to prevent damage, corrosion and/or deterioration:

- Make sure all openings, such as for example water connections, are well plugged and sealed.

- Never store the units in a room where temperature is above 50 °C (R410A units) or where the units are directly exposed to the sunlight.
- Minimum storage temperature is -25 °C.
- It is recommended to leave the finned coils covered to protect them against any risk of corrosion, especially if building works are still in progress.
- Store the units in areas where minimum activity is likely to take place in order to avoid any risk of accidental damage.
- Never use steam to clean the unit.
- Remove all the keys required to have access to the control panel and give them to the person in charge of the field.

It is also recommended to provide for visual inspections at regular intervals.

## 4 - Installation

### 4.1 Installation Site



**Before installing the unit, make sure that the building structure and/or the supporting surface can withstand the weight of the device. The weights of the units are detailed by Chapter 9 of this manual.**

These units have been designed to be installed on the floor, in the open air. As a standard, they are equipped with rubber vibration-damping supports which shall be arranged in the middle, beneath the supporting plates.

When the unit is to be installed on the ground, provide for a concrete bedplate which shall assure a uniform distribution of the weights. No special subbase is generally required.

When selecting the installation site, never forget to consider as follows:

- The longitudinal axis of the unit shall be parallel to the direction of the prevailing winds so as to assure a uniform air distribution on finned exchangers.
- The unit shall never be installed in the proximity of chimneys for the discharge of boiler flue gases.
- The unit shall never be installed downwind of sources of grease contaminated air, such as for example the outlets of large-kitchen extractors. Otherwise, grease might build up on the fins of refrigerant / air exchangers or condensers, act as a fixing agent for any sort of atmospheric impurity and rapidly cause the exchangers to clog.
- The unit shall never be installed in areas exposed to heavy snowfalls.
- The unit shall never be installed in areas exposed to flooding or beneath drip stones, etc.
- The unit shall never be installed in narrow inner court yards or in any other restricted space where the noise may be reflected by the walls or where the air expelled by the fans may short-circuit on the refrigerant/air heat exchangers or condensers.
- The installation site shall be characterised by the presence of the space required for air circulation and for the performance of maintenance operations (see chapter 9 for further details).

### 4.2 External Water Circuit



The external water circuit shall guarantee a constant water flow rate through the circulating refrigerant/water heat exchanger (evaporator) under steady operating conditions and in case of a load variation.

The circuit shall be composed by the following elements:

- A circulation pump which can ensure the necessary flow rate and head.
- The total content of the primary water circuit shall never be lower than 2.5 lt/kW in terms of refrigerating capacity. If the total water volume in the primary circuit should be unable to reach such a value, an additional heat-insulated storage tank should be installed. This tank is intended to avoid any repetitive start of the compressor.
- A membrane expansion tank complete with a safety valve and a drain which shall be visible.



The expansion tank shall be dimensioned in such a way that it can absorb a 2% expansion of the total volume of the water in the plant (exchanger, pipelines, uses and storage tank, if available). The expansion tank shall never be insulated when the circulating fluid is not flowing through it.

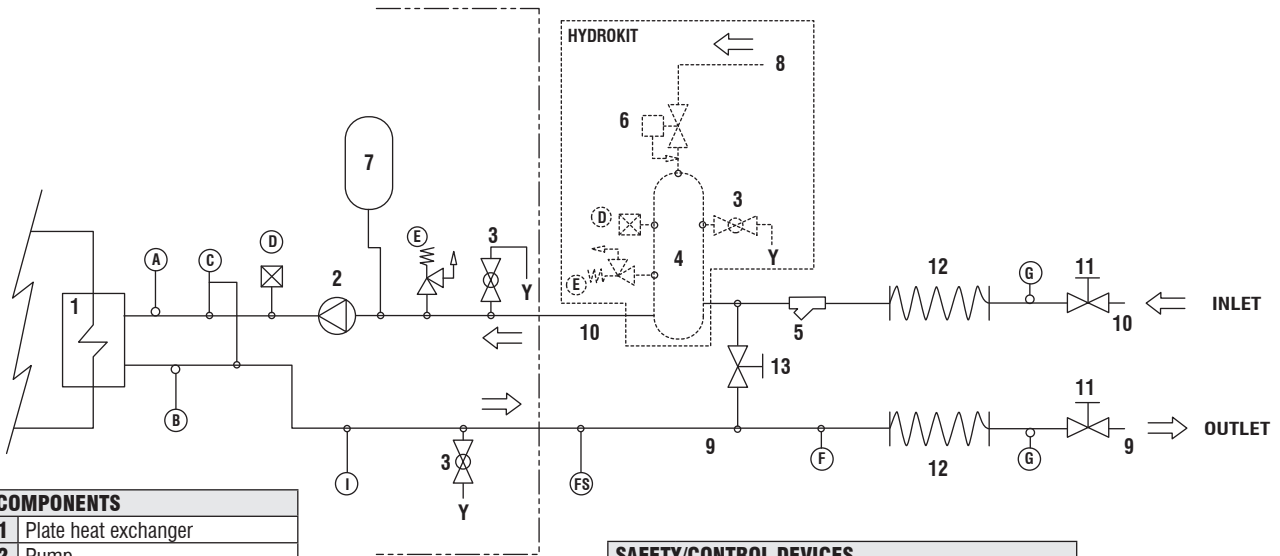
A differential pressure switch is mounted as a standard. It will stop the unit whenever it senses a load loss through the heat exchanger which may result in a flow rate problem.

In addition:

- Install on/off valves (accessory) on the lines at the inlet and outlet of the manifolds of the exchangers (evaporator).
- Arrange a by-pass complete with an on/off valve between the manifolds of the heat exchangers.
- Arrange air vent valves at the high points of the water lines.
- Arrange drain points complete with plugs, clocks, etc. in the proximity of the low points of the water lines.
- Insulate the water lines to prevent the heat from blowing back into the unit.

# 4 - Installation

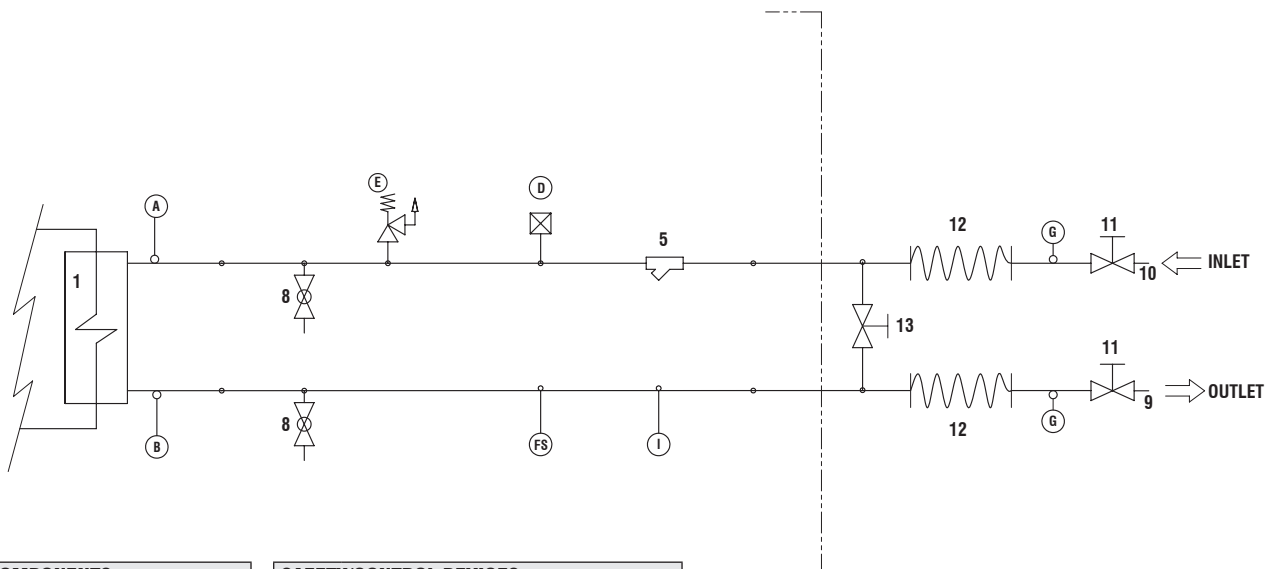
## External water circuit AQL/AQH 20 to 35 - R410A



COMPONENTS	
1	Plate heat exchanger
2	Pump
3	Draining valve
4	Water buffer tank
5	Water filter
6	Automatic water charging valve
7	Pressure expansion tank
8	Water charging line
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By-pass valve

SAFETY/CONTROL DEVICES	
A	Inlet water temperature sensor
B	Outlet water temperature sensor
C	Water differential pressure switch (105 mbar)
D	Vent valve
E	Water safety valve (3 bar)
F	Manometer
FS	Flow switch
G	Thermometer
I	Hydrometer
---	Unit side
Y	Water drain

## External water circuit AQL/AQH 40 to 75 - R410A - Basic Unit



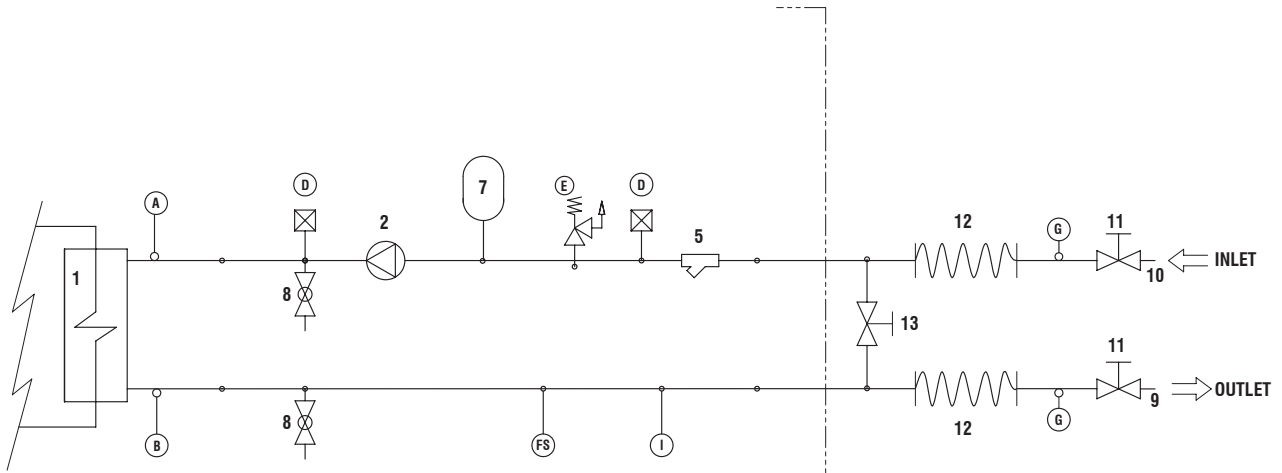
COMPONENTS	
1	Plate heat exchanger
5	Water filter
8	Pressure point/drain valve
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By-pass valve

SAFETY/CONTROL DEVICES	
A	Inlet water temperature sensor
B	Outlet water temperature sensor
D	Vent valve (105 mbar)
E	Water safety valve (3 bar)
FS	Flow switch
G	Thermometer
I	Hydrometer
---	Unit side



# 4 - Installation

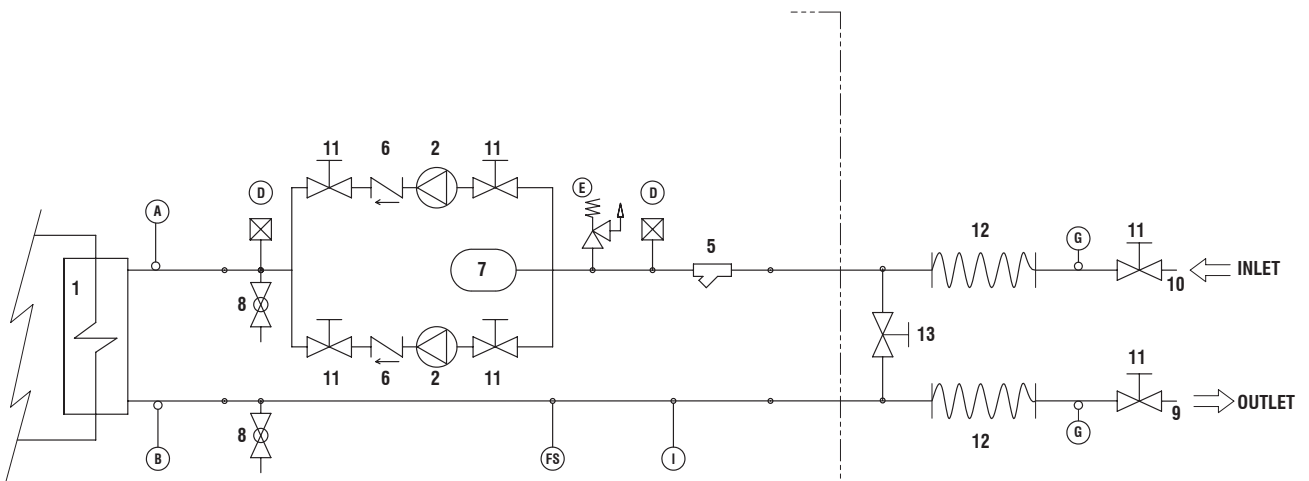
## External water circuit AQL/AQH 40 to 75 - R410A - 1 Pump



COMPONENTS	
1	Plate heat exchanger
2	Pump
5	Water filter
7	Pressure expansion tank
8	Pressure point/drain valve
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By-pass valve

SAFETY/CONTROL DEVICES	
A	Inlet water temperature sensor
B	Outlet water temperature sensor
D	Vent valve (105 mbar)
E	Water safety valve (3 bar)
FS	Flow switch
G	Thermometer
I	Hydrometer
----	Unit side

## External water circuit AQL/AQH 40 to 75 - R410A - 2 Pump

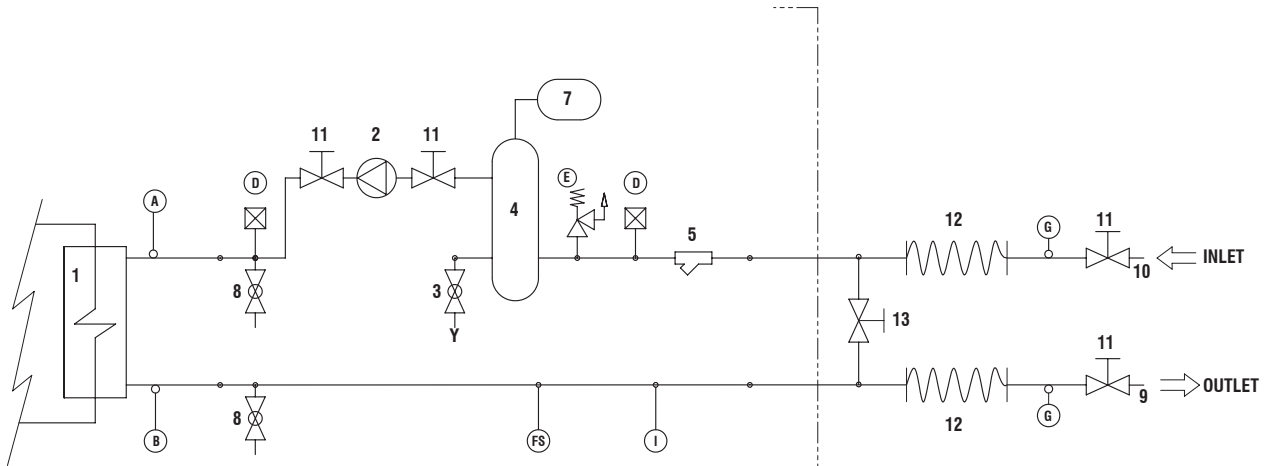


COMPONENTS	
1	Plate heat exchanger
2	Pump
5	Water filter
6	Non-return valve
7	Pressure expansion tank
8	Pressure point/drain valve
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By-pass valve

SAFETY/CONTROL DEVICES	
A	Inlet water temperature sensor
B	Outlet water temperature sensor
D	Vent valve (105 mbar)
E	Water safety valve (3 bar)
FS	Flow switch
G	Thermometer
I	Hydrometer
----	Unit side

## 4 - Installation

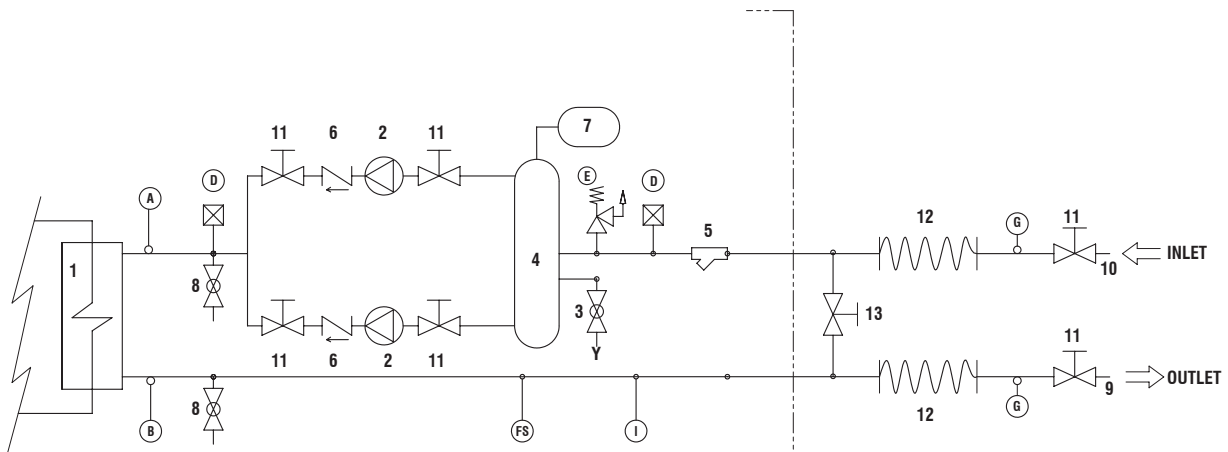
### External water circuit AQL/AQH 40 to 75 - R410A - 1 Pump + tank



COMPONENTS	
1	Plate heat exchanger
2	Pump
3	Draining valve
4	Water buffer tank
5	Water filter
7	Pressure expansion tank
8	Pressure point/drain valve
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By-pass valve

SAFETY/CONTROL DEVICES	
A	Inlet water temperature sensor
B	Outlet water temperature sensor
D	Vent valve (105 mbar)
E	Water safety valve (3 bar)
FS	Flow switch
G	Thermometer
I	Hydrometer
----	Unit side
Y	Water drain

### External water circuit AQL/AQH 40 to 75 - R410A - 2 Pump + tank



COMPONENTS	
1	Plate heat exchanger
2	Pump
3	Draining valve
4	Water buffer tank
5	Water filter
6	Non-return valve
7	Pressure expansion tank
8	Pressure point/drain valve
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By-pass valve

SAFETY/CONTROL DEVICES	
A	Inlet water temperature sensor
B	Outlet water temperature sensor
D	Vent valve (105 mbar)
E	Water safety valve (3 bar)
FS	Flow switch
G	Thermometer
I	Hydrometer
----	Unit side
Y	Water drain

## 4 - Installation



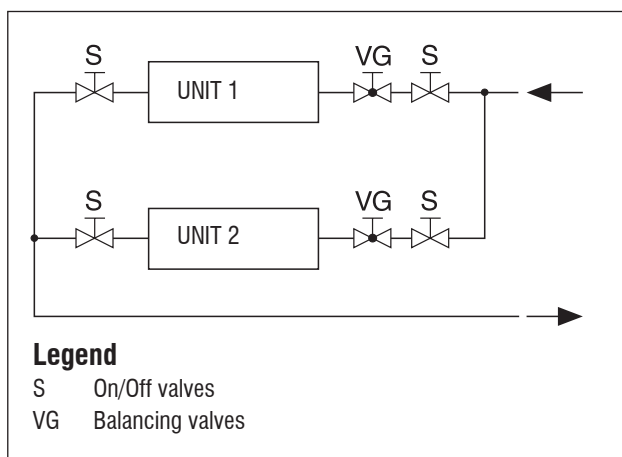
Before filling the installation, remove any impurity, such as sand, crushed stones and welding scales, coating drops and any other material which might damage the evaporator.

It is advisable to flush with disposable water bypassing the exchanger to avoid clogging.



The water used to fill the circuit shall be treated in such a way that the pH will have the correct value.

When two or several units are connected in parallel, to balance the load losses of the various circuits, it is recommended to execute a "reverse return" connection (see the diagram below).



### 4.3 Water connections

The flow switch and the filter water, although not included in the supply, must always be fitted such as plant components. Their installation is mandatory for warranty.



The attachments at the water inlet and outlet shall be connected in compliance with the instructions which can be found on the labels in the proximity of the attachments.

Connect the water lines of the plants with the attachments of the unit whose diameters and positions are shown in Chapter 9.

### 4.4 Defrost water drainage (only for AQH units)

When heat pump units work in heating mode, during defrosting cycles, they may discharge water from the base. This is why the units should be installed at least 200 mm above the floor level, so as to allow the free drainage of waste water, without the risk of producing ice banks.

The heat pump units must be installed in positions where the defrosting water cannot create any damage.

### 4.5 Water buffer tank

The accumulation tank which has been designed to be mounted on AQL/AQH units is complete with all the hydraulic and electrical components required for the correct operation of the system.

These systems are carefully assembled and tested at works. They are ready for operation after having correctly realised all electrical and hydraulic connections.

#### 4.5.1 Features

Units AQL 20-35 have one single tank. The kit will include an Antifreeze Electric Heater, a drain valve, an automatic filling unit and an automatic air vent.

No pump is arranged on the kit since it is mounted on the unit.

A tank arranged for mounting a heating booster resistance kit may be optionally required (5 traps).

The tank is completely insulated with 30 Kg/m<sup>3</sup> closed cell polyethylene in a silver colour and enclosed by a bearing structure made of passivated and painted plates. The box is equipped with bulkheads which can be easily opened for internal inspection.

The kit is installed beneath the chiller. It is an integral part of the unit without changing the support area.

#### 4.5.2 Supplied Material

The kits will be supplied with pipelines ready for installation. An antifreeze resistance with wiring, an automatic water filling valve, a 3 bar safety valve, a drain valve and a vent valve have already been assembled.

Hydrokit is shipped with a film to protect it from atmospheric agents. Packaging has been designed in order to stack it up.

#### 4.5.3 Antifreeze Electric Heater

The antifreeze resistance of the tank (TEH) shall be wired with the panel as it is shown by the diagram attached to the unit.

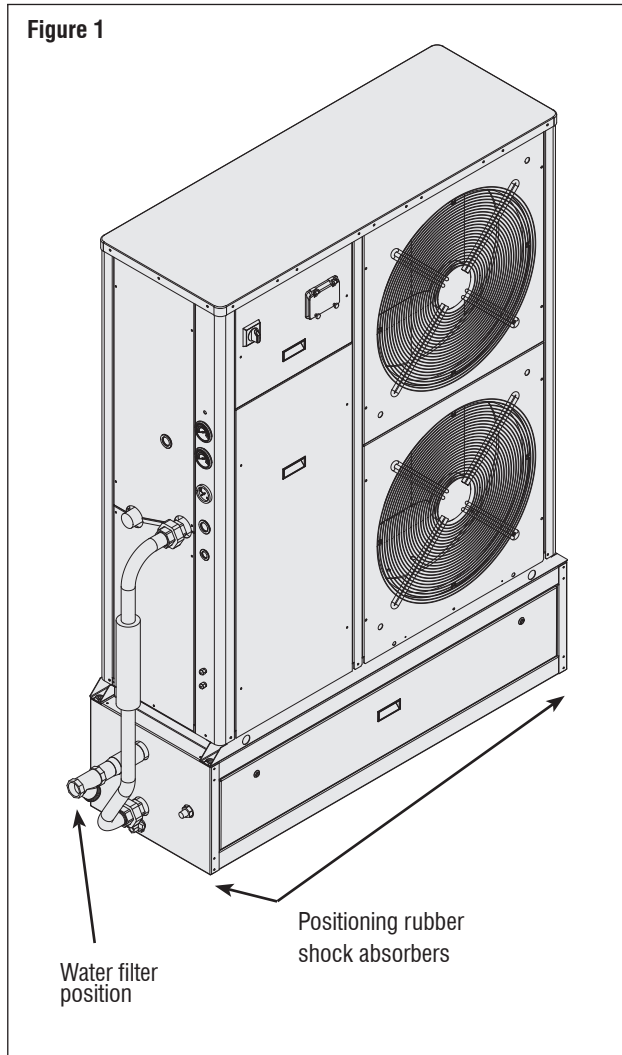
#### 4.5.4 Water Filter

The kit will use the water filter of the unit.

## 4 - Installation

### CAUTIONS

The unit + tank system shall be equipped with a filter. Use the filter + union as it is shown by Figure 1.



### 4.5.5 Installation Procedure

For the size 20-35 the hydrokit shall be arranged beneath the unit. It will not change its overall dimensions (Figure 1).

Arrange the rubber shock absorbers beneath the kit before providing for its connection.

Provide for the hydraulic and electrical connections. Doing that, observe the diameters shown by the quoted drawings.

The wiring for the standard antifreeze resistance is arranged as it is shown by . The resistance is connected with the main terminal box.

See the wiring diagram attached to the unit for the correct execution of the electrical connections.

Install the water filter as it is shown by Figure 1.

Instead for the size 40-75 the Hydrokit if required, will be installed on the unit.

### 4.6 Power supply



**Before carrying out any operations on the electrical system, make sure that the unit is deenergized.**



**It is important that the appliance is grounded.**



The company in charge of the installation shall conform to the standards applicable to outdoor electrical connections.

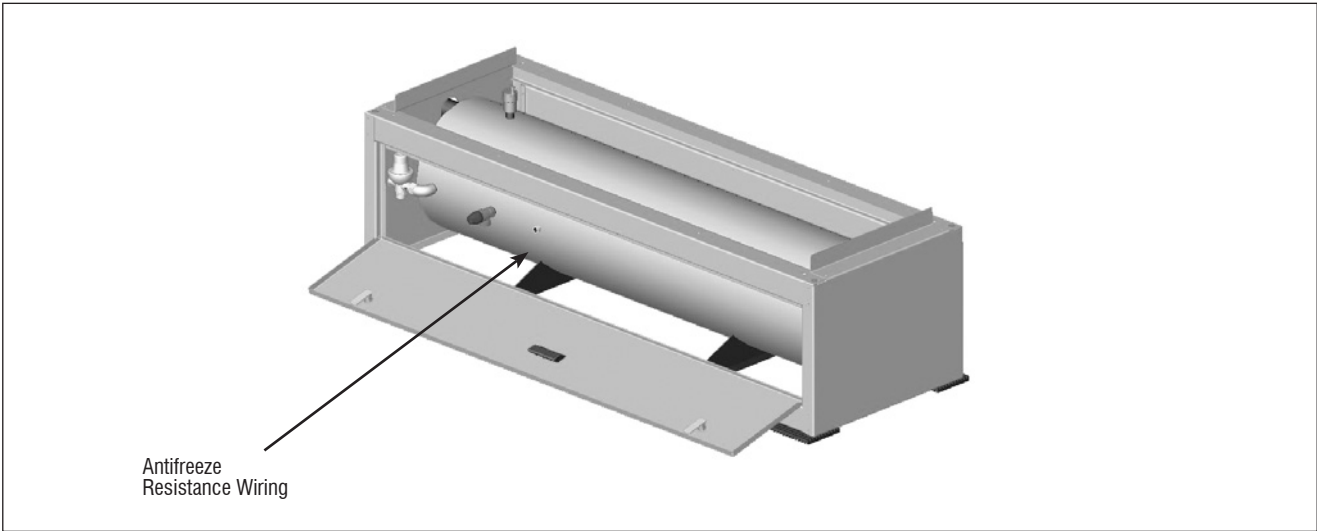
**The manufacturer may not be held liable for any damage and/or injury caused by failure to comply with these precautions.**

The unit conforms to EN 60204-1.

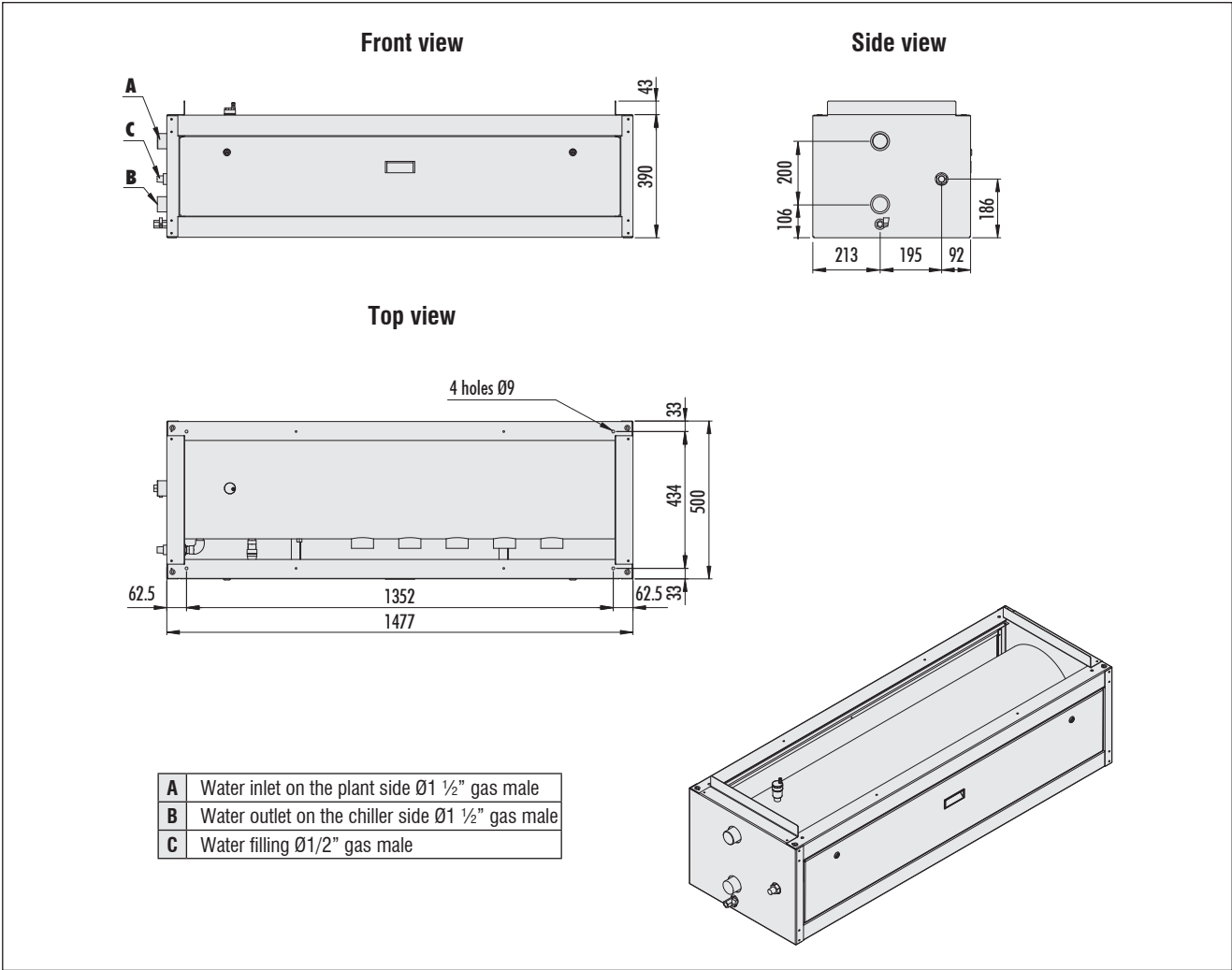
The following connections shall be provided:

- A 3-phase and grounding connection for the power supply circuit.
- The electrical distribution system shall meet the power absorbed by the appliance.
- The disconnecting and magnetothermal switches must be sized to control the starting current of the unit.
- The power supply lines and the insulation devices must be designed in such a way that every line independent.
- It is recommended to install differential switches, to prevent any damage caused by phase drops.
- The fans and compressors are supplied through contactors controlled from the control panel.
- Each motor is provided with an internal safety thermal device and external fuses.
- The power supply cables must be inserted into dedicated openings on the front of the unit, and they will enter the electrical board through holes drilled on the bottom of the board.

# 4 - Installation



## Storage Kit (112 I) for AQL/AQH 20-35 - Dimensional Data



## 4 - Installation

### 4.7 Electrical connections

**The unit must be installed on site according to the usual procedures and standards applicable in the place of installation. The unit must not be operated if its installation has not been carried out according to the instructions provided in this manual.**

**The power supply lines must consist of insulated copper conductors, dimensioned for the maximum absorbed current.**

Connection to terminals must be performed according to the diagram of connections (User's Terminal Box) provided in this manual and according to the wiring diagram which accompanies the unit.



Before connecting the power supply lines, check that the available voltage value does not exceed the range specified in the Electric Data (Chapter 9).

For 3-phase systems, check also that the unbalance between the phases does not exceed 2%. To perform this check, measure the differences between the voltage of each phase couple and their mean value during operation. The maximum % value of these differences (unbalance) must not exceed 2% of the mean voltage.

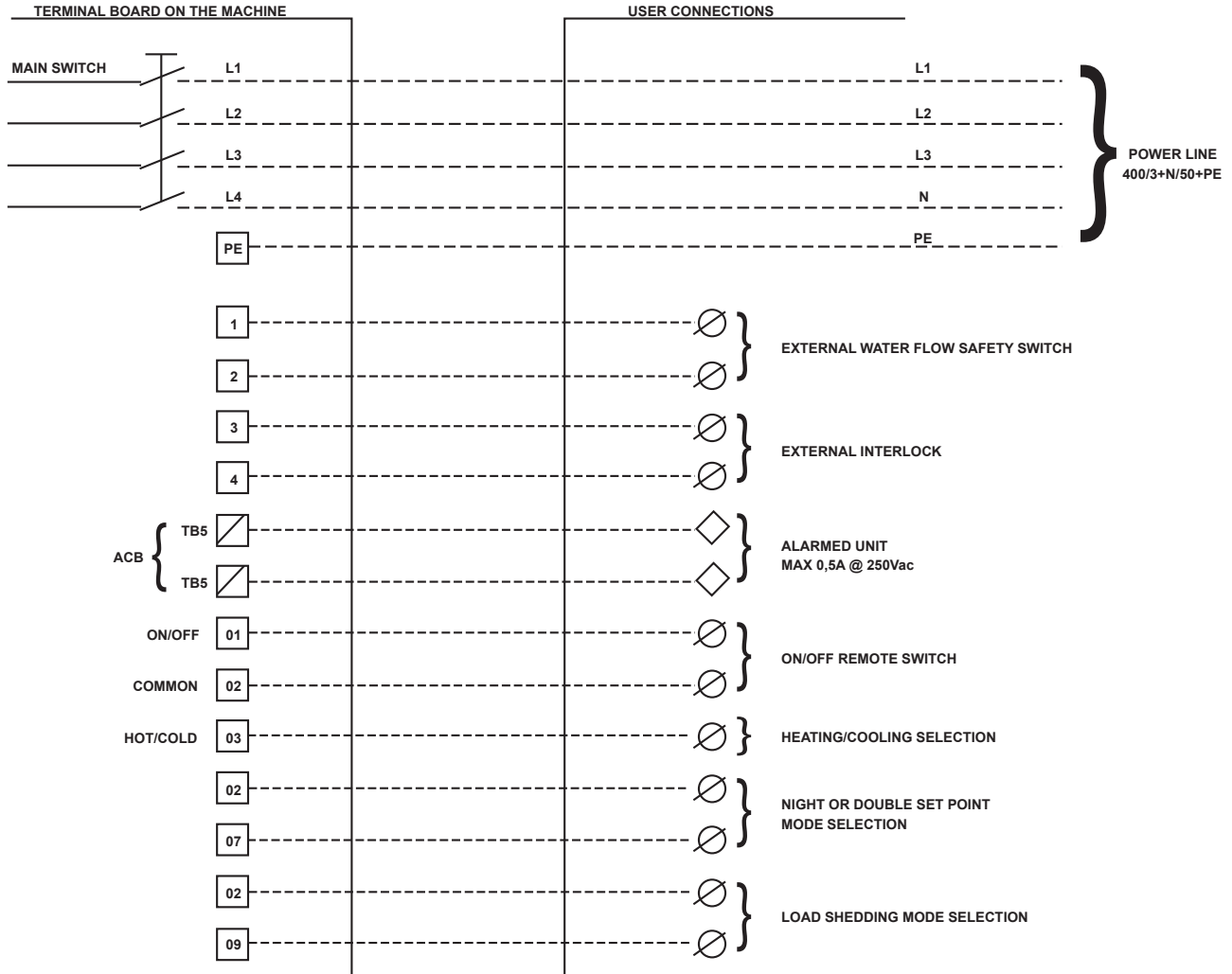
If the unbalance is unacceptable, contact the Energy Distributor to solve this problem.



Supplying the unit through a line whose unbalance exceeds the permissible value will automatically void the warranty.

# 4 - Installation

## AQL/AQH Version - Electrical Connections



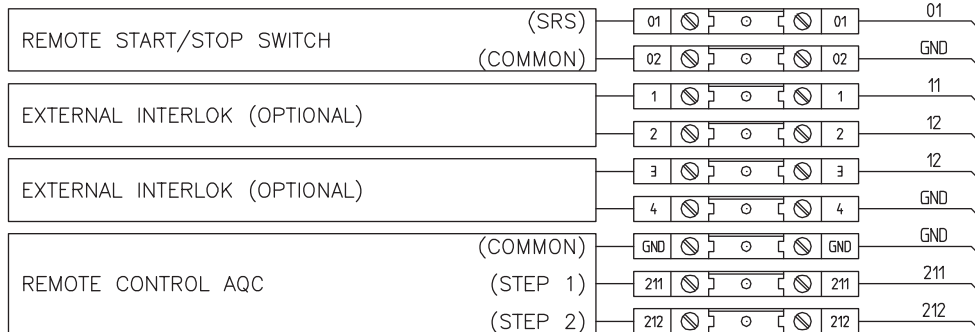
- TERMINALS ON THE MACHINE
- TERMINALS CONTROL BOARD
- TERMINALS ON THE EXTERNAL CONNECTIONS
- VOLTAGE-FREE CONTACTS

NOTE: always refers to the diagram on the machine

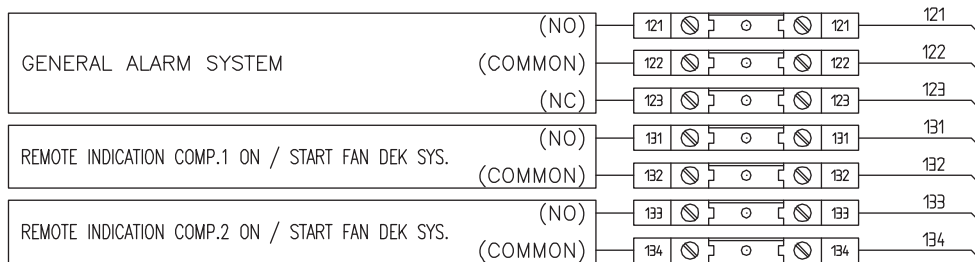
# 4 - Installation

## AQC Version - Electrical Connections

### QG - Y1



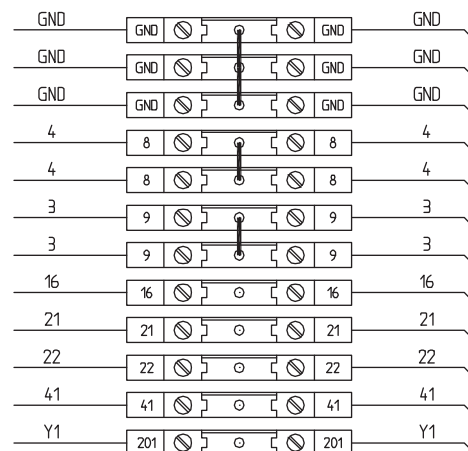
### QG - Y2



### QG - Y3



### QG - X1





## 5 - Start-up



The unit must be started for the first time by personnel suitably trained by one of Authorised Service Centre. Failure to meet this requirement will immediately void the warranty.



The operations carried out by authorised personnel are limited to the start-up of the unit, and do not include any other operation on the plant, such as, for example, electrical and hydraulic connections etc. All the other operations before start-up, including oil pre-heating for at least 12 hours, must be performed by the Installer.

### 5.1 Preliminary check

The checks listed below shall be performed before starting the unit and before the arrival of the personnel authorised.

- Check the section of power supply and grounding cables; make sure that terminals are tightened and check the correct operation of contactors, with the main switch open.
- Check that any voltage and phase variation in the power supply does not exceed the prefixed thresholds.
- Connect the contacts of the flow switch and the thermal relay of the pump and of the other devices (if any), to terminals 1-2 and 3-4, respectively.
- Check that the components of the external water circuit (pump, user equipment, filters, power supply tank and reservoir, if any) have been installed properly, and according to the manufacturer's instructions.
- Check the filling of the hydraulic circuits, and make sure that the fluid circulation is correct, without any trace of leaks and air bubbles. If you use ethylene glycol as antifreeze, check that its percentage is correct (do not exceed 35% glycol percentage).
- Check that the direction of rotation of the pumps is correct, and that fluids have been circulating for at least 12 hours for both pumps. Then, clean the filters on the suction side of the pumps.
- Adjust the liquid distribution network in such a way that the flow rate is within the specified range.
- Check that the water quality is up to the specifications.
- Check that oil heaters, if any, have been turned on at least 12 hours before.

### 5.2 Start-up

Start-up sequence:

- Turn on the Main switch (at least 12 hours before).
- Check that the oil in the compressor has reached the requested temperature (the minimum temperature outside the pan must be approx. 40°C) and that the auxiliary control circuit is energised.

- Check the operation of all the external equipment, and make sure that the control devices of the plant are properly calibrated.
- Start the pump and check that the water flow is correct.
- Set the desired fluid temperature on the control board.
- Start the appliance (see Chapter 6).
- Check the correct direction of rotation of compressors. Scroll compressors cannot compress the refrigerant when they rotate in the opposite direction. To make sure that they are rotating in the correct direction, simply check that, just after the start-up of the compressor, the pressure drops on the LP side and rises on the HP side. Furthermore, if a scroll compressor rotate in the opposite direction, there is a considerable rise in the sound level of the unit, as well as in a dramatic reduction of current absorption compared to normal values. In case of wrong rotation, the scroll compressor can be definitely damaged. Phase monitor is assembled in the unit as a standard to prevent wrong compressors rotation.
- After about 15 minutes of operation check that there are no bubbles, through the sight glass on the liquid line.



The presence of bubbles may indicate that a part of the refrigerant charge has been released in one or more points. It is important to remove these leaks before proceeding.

- Repeat the start-up procedure after removing the leaks.

### 5.3 Checking the operation

Check the following:

- The temperature of the water entering the evaporator.
- The temperature of the water leaving the evaporator.
- The level of the water flow rate in the evaporator, if possible.
- The current absorption upon the start of the compressor and in case of stabilised operation.
- The fan's current absorption.

Check that the condensing and evaporation temperatures, during operation at high and low pressure detected by the pressure gauges of the refrigerant, are within the following range :

(On the units not provided with HP/LP pressure gauges for the refrigerant, connect a pressure gauge to the Schrader valves on the refrigeration circuit).

HP side	Approx. 15 to 21 °C above the temperature of the air entering the condenser, for R410A units.
LP side	Approx. 2 to 4 °C below the temperature of the leaving chilled water, for R410A units.

### 5.4 Delivery to the customer

- Train the user according to the instructions provided in Section 6.

## 6 - AQL/AQH Control

### 6.1 Electronic Card Control

#### Keyboard



#### SM1 switch:

- Position **0**: machine OFF. The electrical heaters and pump may be enabled.
- Position **1**: machine ON.

#### button:

makes it possible to horizontally scroll through the MENUS and to display the parameter values.

#### button:

makes it possible to vertically scroll through the MENUS and SUB-MENUS and to increase the numerical value of the parameters.



#### Test switch (internal)



Starts an automatic testing procedure for all the main functions of the unit.

Two levels of menu are used, standard and factory. The factory level requires a 3 digit code for access.

At any time the standard parameter level menu can be entered by pressing simultaneously the test button and both display buttons for 5s.

In either parameter level menu if no button is pressed for 10s the display reverts back to normal mode.

The parameters are scrolled using the  button and selected using the  button.

When selected the values can be changed by using the  button to scroll from the present value to max then min and can be selected by pushing the  button. After selection the menu will return to the beginning of the same parameter level menu.

	Display	Meaning	Min value	Max value	Step	Default value 410A
1.	OPeR	Cooling/Heating mode selection	COOL	HEAt	---	COOL
2.	CSP	Cooling Setpoint	CSPL	23	0.5	12
3.	HSP	Heating setpoint	20	47	1	40
4.	wtc	Control Mode Operation	ewt	lwt	---	Ewt
5.	nB	Neutral Band valid in LWT control	1	6	0.5	2

**OPeR:** parameter used to select operative mode between Cool and Heat. Active only if unit is heatpump.  
**Other parameters to be used only by authorized technician.**

## 6 - AQL/AQH Control

### 6.2 Dip Switches

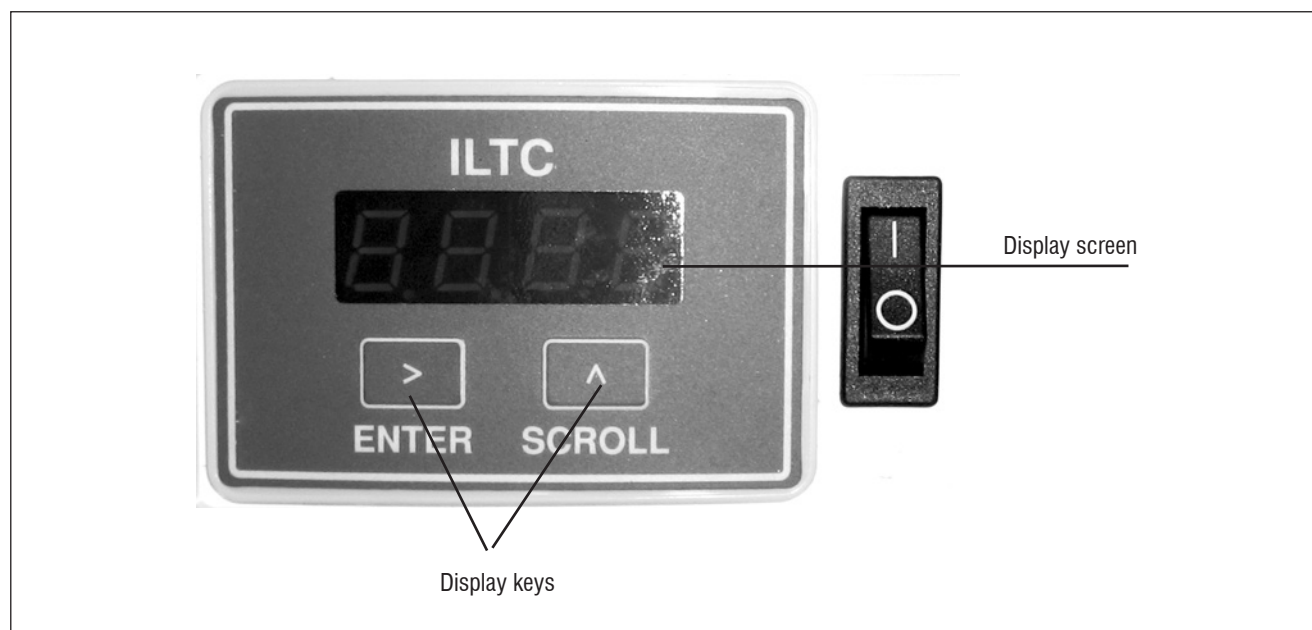
The control is provided with 2 DIP switch blocks: DSW1 (12 dials) and DSW2 (8 dials).

#### Function of DSW1 DIPS (user setting)

DIP	OFF	ON	STANDARD
1	Pump ON only if the unit is ON	Pump always ON	OFF
2	Step ventilation	Continuous ventilation	OFF
3	Pump Off in antifreeze protection	Pump On in antifreeze protection	ON
4	Discharge of comp. 1	Discharge of comp. 2	OFF
5	Normal	Slave	OFF
6	Ambient temperature compensation	No compensation	ON
7	Enable input 5 pump' thermal switch	Disable input 5	pack unit = OFF non pack = ON
8	Forced defrosting OFF	Forced defrosting ON	OFF
9	Serial address		OFF
10	Serial address		OFF
11	Serial address		OFF
12	Serial address		OFF

#### DSW2 dials setting: only for service technician

#### Display keys



All the information is displayed on 4 displays (7-segments).

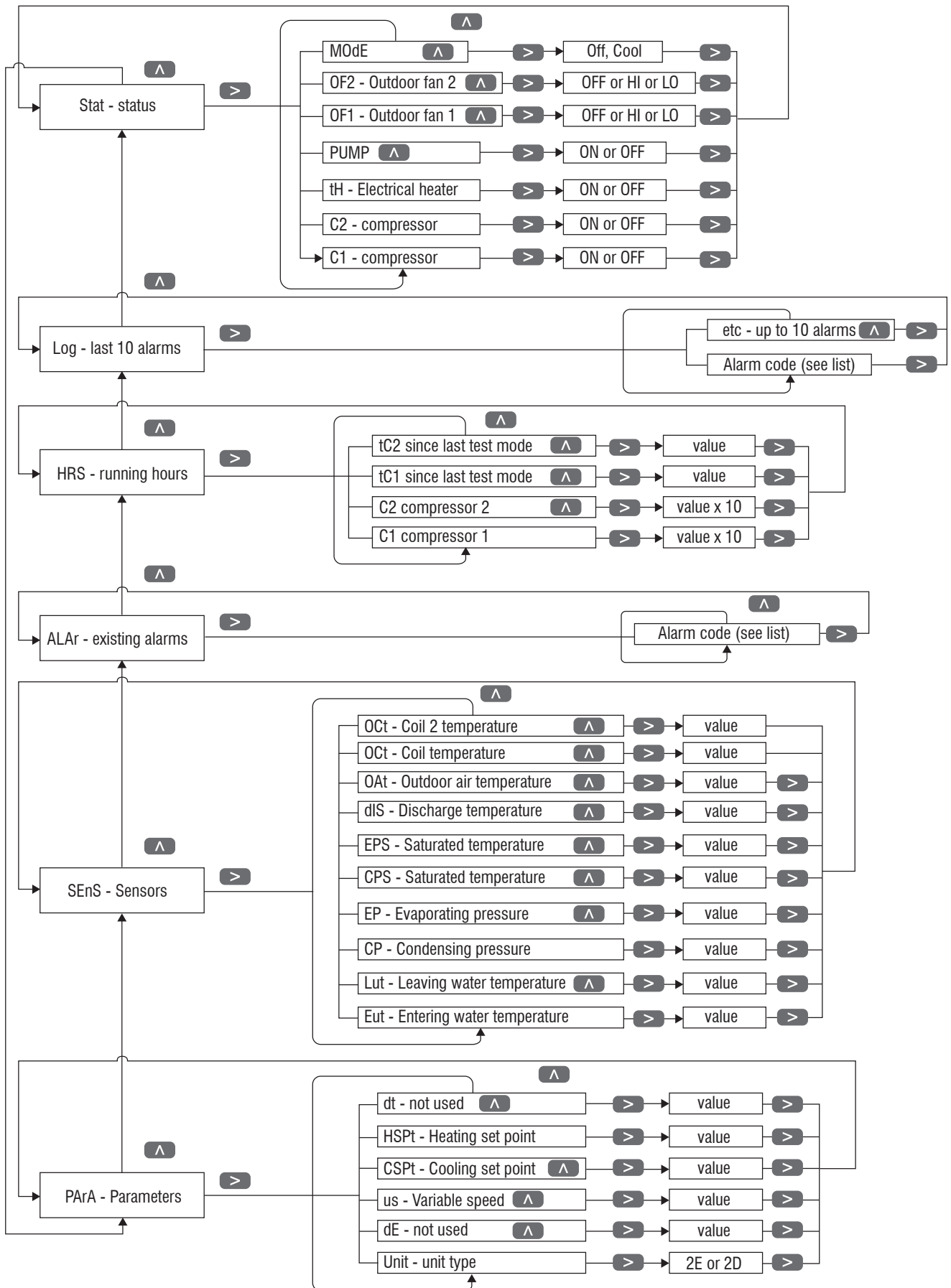
Cool and heat setpoint: can be selected inside the standard parameter menu.

Use the  and  keys to enter the display menus as follows :

## 6 - AQL/AQH Control

1	2	3
PArA (Parameters)	Unit	2E or 2D
	DE	Select to show present value
	Vs	
	CSPT	
	HSPT	
	EPIC	
	tD	
SEnS (Sensor)	EWT	Select to show present value (if connected)
	LWT	
	CP	
	EP	
	CPS – saturated temperature	
	EPS – saturated temperature	
	Dis	
	OAT – OC1T – OC2T	
ALAr (Existing Faults)	See alarm list below	Scrolls through all active faults (if any)
HRS (Running hours)	C1 (x10 hrs)	Select to show hrs
	C2 (x10 hrs)	
	tC1 (hrs)	
	tC2 (hrs)	
Log (Alarm log)	Same choice as alarm list	Scrolls through last 10 alarms in order
StAt	C1	ON or OFF
	C2	ON or OFF
	rv	ON or OFF
	TH	ON or OFF
	THC	ON or OFF
	Pump	ON or OFF
	OFAN1	HI or LO or OFF
	OFAN2	HI or LO or OFF
	dEIC	De-ice in operation
	BYP	ON or OFF
	Mode	OFF or COOL or HEAT

# 6 - AQL/AQH Control



## 6 - AQL/AQH Control

### 6.3 ALAr and LOg Menus

The activated alarms of the unit are displayed in the ALAr menu. More alarms can be activated at the same time. The alarms are recorded in a permanent LOG memory.

The last 10 recorded alarms are displayed in the LOg menu. The following table shows the alarm codes and description:

Code	Alarm description	Auto	Manual	Notes
ADC	microprocessor error		●	
CPF	failure of HP transducer, off scale	●		
EPF	failure of LP transducer, off scale	●		
REF	refrigerant leak - low pressure	●		
CPnc	failure of HP transducer, unchanged pressure	●		
EPnc	failure of LP transducer, unchanged pressure	●		
CFC1	failure of compressor 1		●	wrong rotation
CFC2	failure of compressor 2		●	wrong rotation
EWTH	failure of return water probe	●		short-circuit
EWTL	failure of return water probe	●		not connected
LWTC	no variation in the leaving water temperature	●		
LWTH	failure of leaving water probe	●		short-circuit
LWTL	failure of leaving water probe	●		not connected
DISH	failure of compressor discharge temperature probe	●		short-circuit
DISL	failure of compressor discharge temperature probe	●		not connected
OATH	failure of air temperature probe	●		short-circuit
OATL	failure of air temperature probe	●		not connected
OC1H	failure of temperature probe - coil 1	●		short-circuit
OC1L	failure of temperature probe - coil 1	●		not connected
OC2H	failure of temperature probe - coil 2	●		short-circuit
OC2L	failure of temperature probe - coil 2	●		not connected
HPP	first high pressure protection	●		stop1 compressor
HP	high pressure protection from transducer	●	●	auto reset 3 times
HPC	high pressure protection - locked circuit		●	
LP	low pressure protection	●	●	auto reset 3 times
DIS	excessive discharge temperature of compressors		●	
LO	too low leaving water temperature	●	●	auto reset 3 times
HI	excessive entering water temperature	●		
FS	electrical flow switch or water differential pressure switch	●		
CF1	thermal protection, compressor 1		●	
CF2	thermal protection, compressor 2		●	
OF1	thermal protection, fans		●	
PF	thermal protection, pump		●	
LOu	low water volume	●		
EEP	microprocessor error		●	
JUMP	failure dip switch		●	not connected
ConF	wrong configuration		●	

## 6 - AQL/AQH Control

### 6.4 SEnS Menu – Sensors reading

Displayed Code	Meaning
EWT	entering water temp
LWT	leaving water temp
CP	discharge pressure
EP	intake pressure
CPS	sat. temperature (discharge)
EPS	sat. temperature (intake)
Dis	compressor's discharge temp
OAT	room air temp
OCT 1	probe temperature in coil 1
OCT 2	probe temperature in coil 2

### 6.5 SIF version configuration

Units equipped with special inverter fans (SIF) can be set-up on the field to give the unit a specific static pressure.

By entering parameter CO5 (FCM control), it is possible to modify high static pressure.

The table below shows the correspondence between chiller model, fan RPM, high static pressure.

	High Static Pressure Fan P(Pa)	Fan RPM	Parameter
<b>40</b>	145	900	69
	195	1000	79
	220	1050	84
	245	1100	100
<b>45</b>	145	900	69
	195	1000	79
	220	1050	84
	245	1100	100
<b>50</b>	145	900	69
	195	1000	79
	220	1050	84
	245	1100	100
<b>60</b>	45	1000	79
	68	1050	84
	120	1100	100
<b>65</b>	45	1000	79
	68	1050	84
	120	1100	100
<b>75</b>	45	1000	79
	68	1050	84
	120	1100	100

## 7 - AQC Control

### Introduction

This document contains the information and the operating instructions for AQC 2 compressors & electronic control.

This information is for the after-sales service and the production operators, for the end-of-line testing.

### Main characteristics

- microprocessor control
- user-friendly keyboard
- access code to enter the Manufacturer's Level
- access code to enter the Assistance Level
- alarm and LED
- backlighted LCD
- pump-down logic (start-stop)
- rotation of the compressor operation
- oil return function
- night mode (or Low Noise) control
- counting of the pump/compressors' hours of operation
- display of discharge and suction pressure values
- display of temperature sensor
- history of stored alarms (option)
- programming of different setpoints with 4 ranges of time/setpoint.

The following accessories can be also connected:

- serial communication RS485 card; to connect the "Chiller Control" to a BMS network
- remote display terminal
- wire remote control.

### 7.1 Control of AQC with 2 compressors - The "CHILLER CONTROL" system

AQC units are provided with a microprocessor card which is fully programmed by default for the control of a condensing unit.

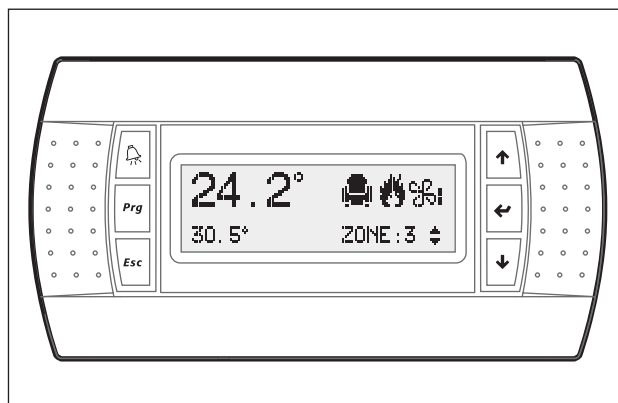
The control system consists of:

#### Keyboard & Display Terminal

##### General information

The figure shows the terminal with the front door open.

It is provided with a LCD 4 lines x 20 columns, keyboard and microprocessor-controlled LED's, so as to allow the programming of the control parameters (setpoint, differential bands, alarm thresholds) and themain operations to be carried out by the user.



##### Terminal & Key Board description

The terminal makes it possible to carry out the following operations:








- the initial configuration of the machine
- the change of all the main operating parameters
- the display of the detected alarms
- the display of all the measured quantities

The terminal and the card are connected by a 6-way phone cable.

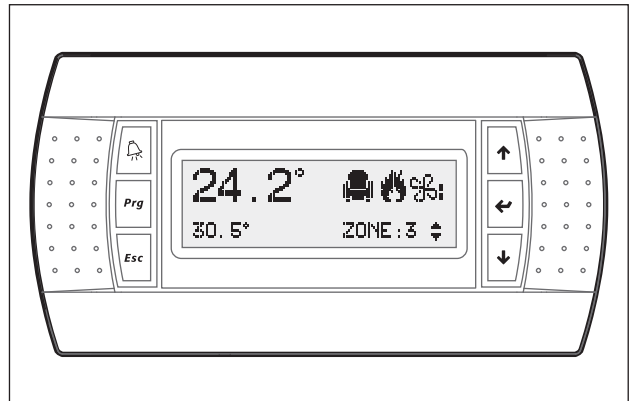
The connection of the terminal to the basic card is not essential for the normal operation of the controller.



# 7 - AQC Control

	Access to the "display mask" of the machine status.
	<div style="border: 1px dashed black; padding: 5px; margin-bottom: 10px;">                     User                      Manufactured                      Maintenance                      In/Out                 </div> <div style="border: 1px dashed black; padding: 5px;">                     Setpoint                      Release                      On/Off                      Daily time zone                 </div>
	<b>Esc key:</b> allows you to move from one mask to another.
	<b>Alarm key:</b> used to display the alarms, to reset them in manual. Press it one to display the mask of the activated alarm, press it again to reset the alarm signal.
	<b>Prg+Esc keys:</b> pressing these keys at the same time, allows you to turn the unit On/Off.
	<b>Up-down keys:</b> allows you to set the control parameters' values and to move from one mask to another (not backlighted).
	<b>Enter key:</b> used to move the cursor inside the masks and to save the values of the set parameters.
	<b>Alarm+Enter keys:</b> press these keys at the same time to enter the "storical alarm" after 1' come back at status machine menu.

## 7.2 Display



The display is an LCD 4 lines x 20 columns. The quantities and the information about the operation of the unit are alternated in the form of subsequent screens, named.

## 7.3 Keyboard

### Arrows key - Up/Down/Enter

If the cursor is in the top left-hand corner (Home), press the UP/DOWN keys to access the subsequent masks associated to the selected branch. If a mask includes some value setting fields and you press the ENTER key, the cursor will reach these fields.

Once you have reached the quantity setting field, you can modify any value (within the expected limits) by pressing the UP/DOWN keys.

After you have selected the desired value, press the ENTER key again to store it.

## 7 - AQC Control

### 7.4 Alarms

Code	Alarm unit description	Compressor Status	Fan Status	Pump Status	Aut/Man Reset	Delay	Notes
AL02	Flow meter/Interbloc alarm	Off	Off	Off	Man	Parameters	
AL03	High pressure “manual reset”	Off	On	On	Man	No	
AL05	Failure of transducer B6-SP	On	Max	On	Auto	10 sec	TXV only
AL07	Failure of transducer B7-DP	On	Max	On	Auto	10 sec	
AL09	Failure of sensor B3-Tair	On	Max	On	Auto	10 sec	
AL15	Failure of sensor B8-T tandem	On	Max	On	Auto	10 sec	
AL17	Maintenance of compressor 1	On	On	On	Man	No	
AL18	Maintenance of compressor 2	On	On	On	Man	No	
AL22	Failure of clock card	On	On	On	Man	No	
AL23	Thermal switch, compressor 1	Off Comp. 1	On	On	Man	No	
AL23a	Thermal switch, compressor 1-AUTO Reset	Off Comp. 1	On	On	Auto		
AL24	Thermal switch, compressor 2	Off Comp. 2	On	On	Man	No	
AL24a	Thermal switch, compressor 2-AUTO Reset	Off Comp. 2	On	On	Auto		
AL27	Low pressure alarm	Off	On	On	Man	Parameters	
AL27a	Low pressure alarm -AUTO Reset	Off	On	On	Auto		
AL29	Thermal switch, fans	Off	Off	On	Man	No	
AL29a	Thermal switch, fans- AUTO Reset	Off	Off	On	Auto		
AL33	Eprom failure	Off	Off	Off	Man	No	
AL60	High limit discharge temperature	Off	Off	Off	Man	No	
AL60a	High limit discharge temperature	Off	Off	Off	Auto		

### Setpoint

Pressing the Set key allows you to enter the Set point level accessible to the user.

The parameters that can be set are listed below, along with the limit values and the default values (standard shop settings):

User parameters	Control mode	Min. value	Max. value	Default
<b>System On/Off</b>				
System 1 #	—	OFF	ON	OFF

## 8 - Product Description

### 8.1 General Information

**AQL/AQH** units are one-block type with one refrigerant circuit. They are intended to cool down the water required for any air-conditioning application as well as any other fluid, such as for example glycol water.

These units are completely assembled at works. They are equipped with all the refrigerating connections and the internal electrical wiring required for a rapid installation on the field.

An operation test is performed after assembly, with water flowing through the refrigerant/water exchanger in order to make sure that every refrigerating circuit is properly working. The refrigerating circuits of every unit are pressure tested before inspection, drained and charged with R410A.

A low noise level is the result of a careful study. It is achieved on chillers by using technologically advanced components without negatively affecting the operation performances and limits of the units.

**AQL** models can cool down chilled water at a temperature between + 18 and - 8 °C.

**AQH** heat pump models can warm up water at a temperature between 20 °C and 50 °C for AQH 20-35 and 55 °C for AQH 40-75.

All units can operate with a double set point.

#### Body and Frame

The base and frame of these units are made with galvanized steel elements, assembled with stainless steel screws. All panels can be removed to ensure easy access to internal components. All galvanized steel parts are protected by epoxy powder paint.

#### Compressors

The models are equipped with two SCROLL airtight tandem compressors with an internal motor protection.

The compressors of all models are assembled on rubber shock absorbers. Their motors can be directly started. They are cooled down by the aspirated refrigerant gas and equipped with internal thermistor protections against overloads.

Overload protections are automatically reset after having tripped. The compressor terminal box has an IP21 protection degree.

Compressors are powered on and off by the microprocessor of the unit control system which is intended to control the delivery of the thermal refrigerating capacity.

#### Evaporators

Evaporators are made of stainless steel plates. They are thermally insulated by means of a thick flexible insulating mattress with closed cells. The maximum operating pressures correspond to 10 bar for the water side and to 45 bar for the refrigerant side. Antifreeze protection for the water in the exchangers is ensured by electrical heaters and differential pressure switches. The water side of these exchangers is connected by manifolds which will provide for the connection to the plant by means of one single 1" 1/2 (for the size 20-35) and 2" (for the size 40-75) gas threaded attachment.

#### Condensing coils

Condensers are coils made of copper tubes arranged in staggered rows and mechanically expanded inside an aluminium finned pack.

The maximum operating pressure on the refrigerant side of the condensing batteries is 45 bar.

#### Condenser Fans

The condenser fans are of a helical type. They are directly coupled and have an impeller with wing contoured aluminium blades. Each fan is equipped with a galvanised steel accident-prevention protection which is painted after manufacture. The fans motors are completely closed. They have an IP54 protection degree and a protection thermostat embedded in the windings.

#### Fans Control

All models have a step speed controller as a standard. It will act according to the condensing pressure and allow the operation down to an Air temperature operation of + 10 °C.

For 40-75 sizes refer to chapter 8.3.

#### Refrigerating Circuits

Each unit has a single refrigerating circuit equipped with an external service valves intended to measure the refrigerant pressure and charge, a sight glass with a humidity indicator, a dryer filter and a thermal expansion valve.

Refrigerating circuits are also complete with a high pressure switch as well as a high and low transducer.

#### Control Supply Panel

All components of the control system and those necessary to start the motors are shop connected and tested. The control compartment contains an electronic card and a control board with an external keyboard and display, to show the operational functions, as well as the intervention of the alarms and the working blocks.

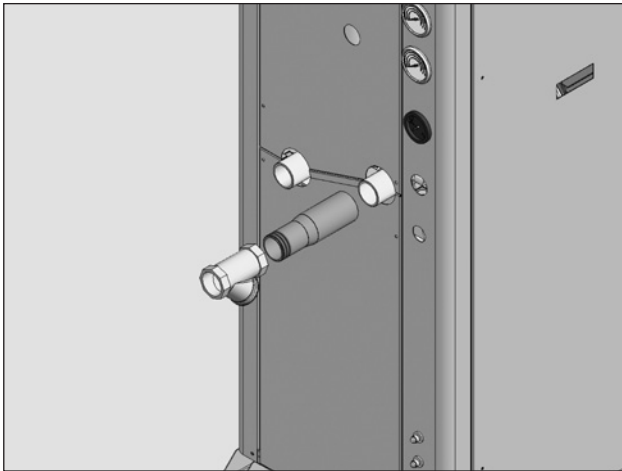
## 8 - Product Description

### 8.2 Accessories AQL/AQH 20-35

#### Water Filter

1-1/2" filter is included in the supplied equipment.

It is supplied loose and has to be mounted by the customer.



#### Anti-Vibration Kit

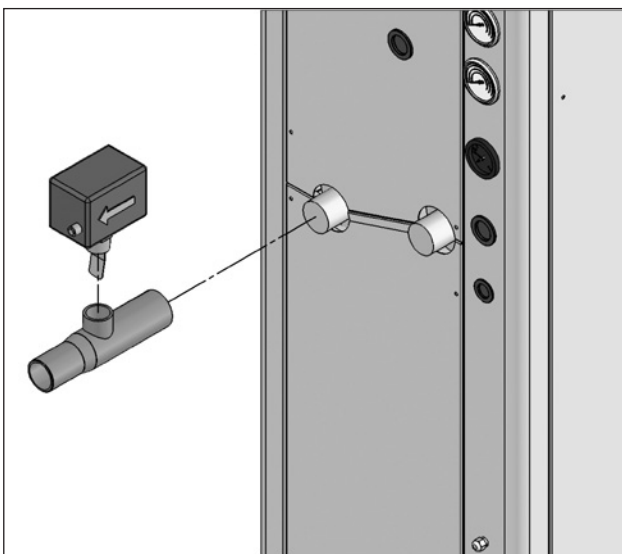
Anti-vibration kit made of special rubber pad is provided together with the unit.

#### Water Differential Pressure Switch

Water differential pressure switch is mounted as standard in the unit.

#### Flow switch kit

Flow switch kit is available as an accessory. It is supplied loose and as to be mounted by the customer. Connect terminals 1-2 of the flow switch with terminals 1-2 of the Aqu@Logic electrical box.



#### Corrosion proofing protection for condensing

Two-level optional coil finishing:

1) Fin guard Silver.

2) Blue fins.

#### Intrusion proofing protection for condensing

A galvanised and painted steel wire net protection is assembled outside the unit.

#### Water Gauge

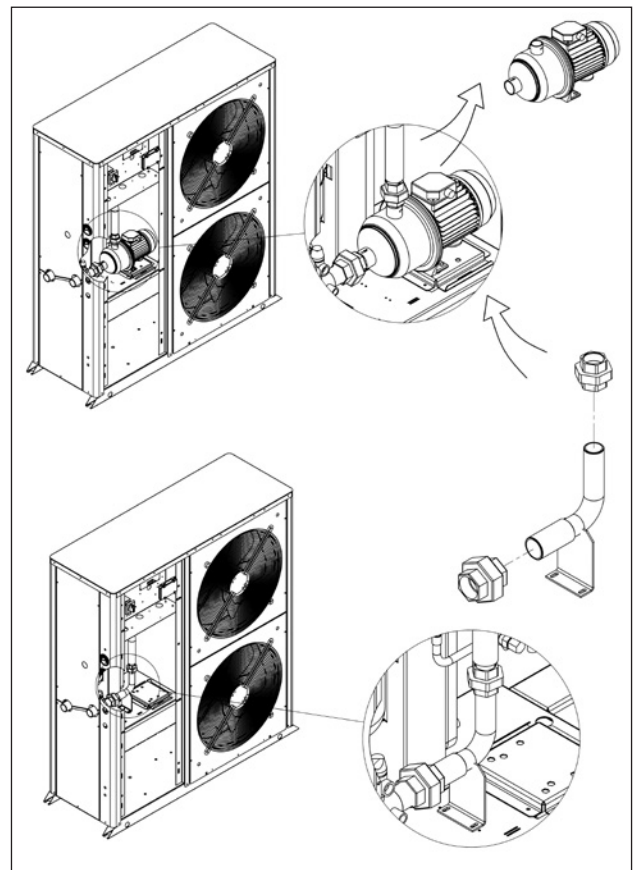
It is assembled on the unit as a standard.

#### Pump

Min. 100 kPa head pressure pump is mounted as a standard in the unit.

#### No pump kit

No pump kit is available as an accessory whenever the customer doesn't need pump fitted in the unit.



#### Phase Monitor Kit

It is assembled on the unit as a standard.

## 8 - Product Description

### Airway Packaging

Complete wooden package for units without refrigerant and with nitrogen precharge. No refrigerant charge is shipped loose with the unit. The customer has to fill the unit through the apposite connection.

### Water buffer tank

The hydro module is available for the units with a pump. It is installed beneath the unit through the connection pipe supplied with the unit.

The module is entirely enclosed in a RAL 9001 galvanised and painted steel body. The tank is completely insulated with 30 Kg/m<sup>3</sup> closed cell polyethylene in a silver colour.

Antifreeze resistances or a heating booster kit are installed in the tank (upon request).

### On/Off Remote Kit

It enables the operator to power on the unit when it is in standby mode, to display alarms and to switch over cooling – heat pump. The kit will include a 3 metre long cable for installation on the wall.

### Sequencer kit - 4 units

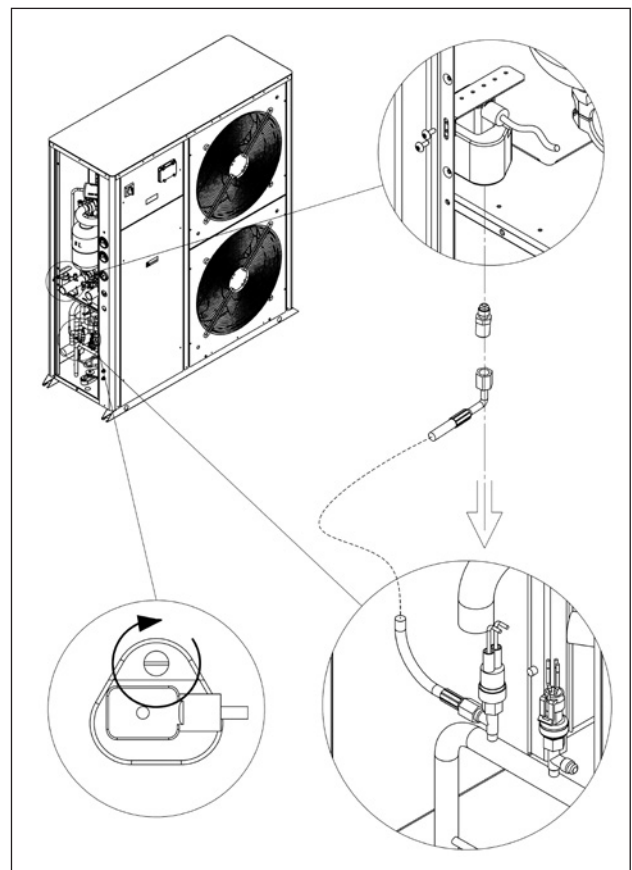
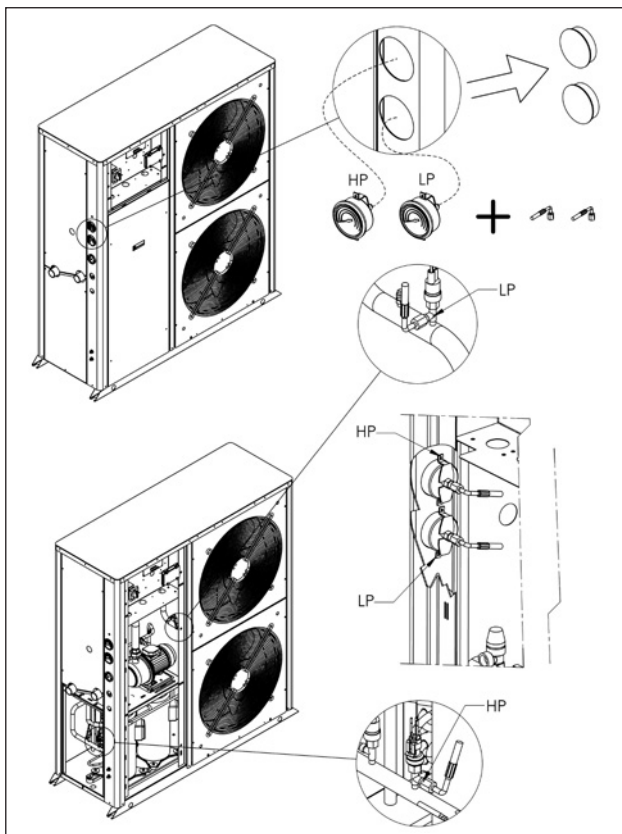
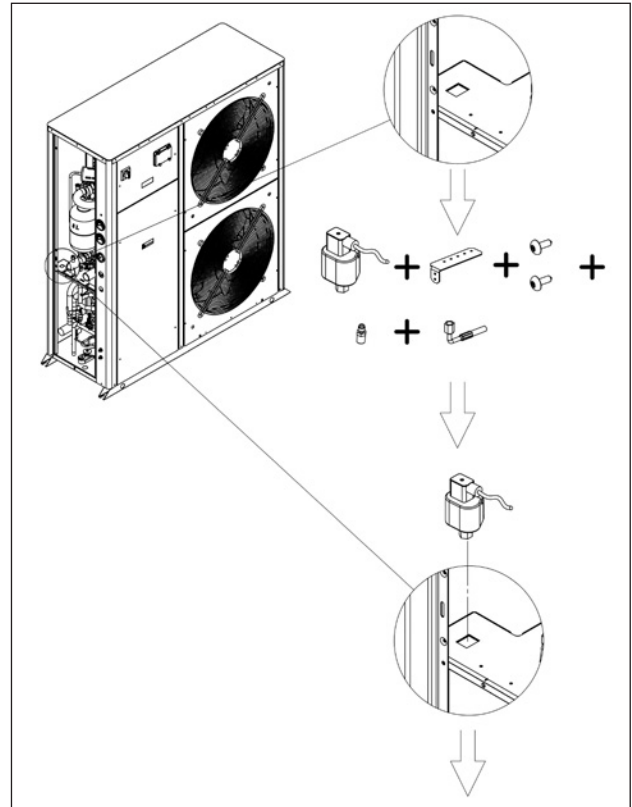
It can easily pilot up to 4 units fitted in parallel, 50 metres maximum apart.

### Gauge kit

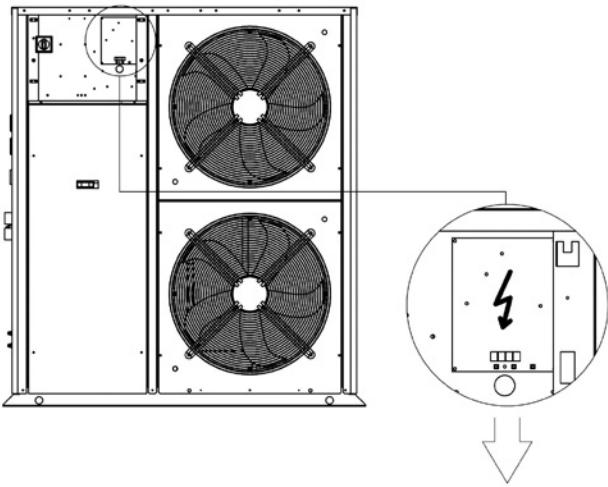
Gauge kit is available as accessory. It is shipped loose and it's not possible to have it factory mounted.

### Fan speed control -10 °C

Fan speed control is available as accessory to allow the chiller to operate down to external air temperature.

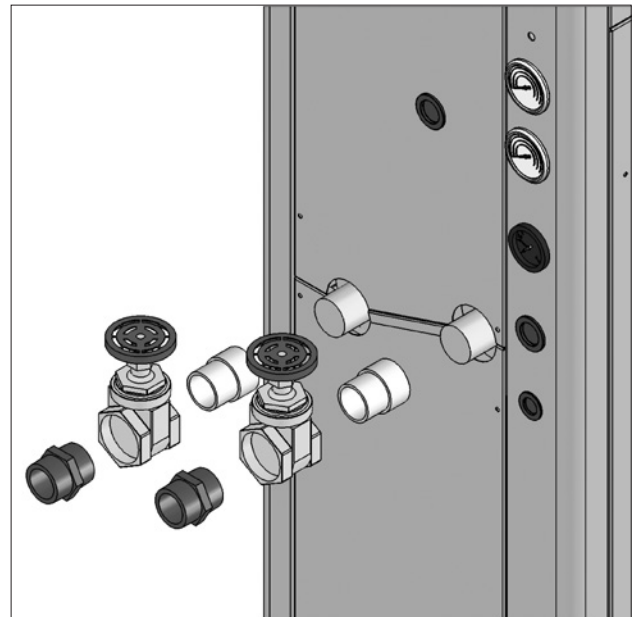


# 8 - Product Description



## In/out valve kit

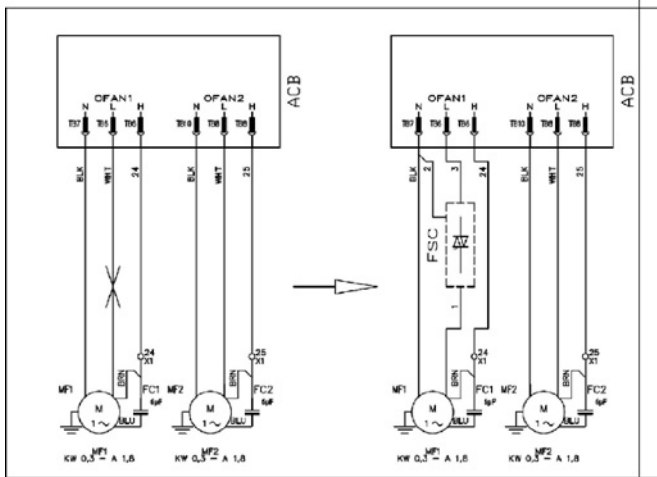
In/Out valve kit is available as accessory.



## Parameters setting when install fan speed control

SETTING	
nigh	3
nfc	0
OFCS	16
OFLS	25
OSL1	31
OLH1	34

The diagram shows a terminal block labeled '05 - Y1' with terminals numbered 1 through 34. A lightning bolt symbol is positioned above the terminals, and an arrow points to terminal 25.



Add in the Control Board when install the Fan Speed Control

## 8 - Product Description

### 8.3 Accessories AQL/AQH 40 to 75

#### Water Filter

It is assembled on the unit as a standard.

#### Anti-Vibration Kit

See figure below.

#### Flow switch kit

It is assembled on the unit as a standard

#### Corrosion proofing protection for condensing

Two-level optional coil finishing

1) Fin guard Silver.

2) Blue fins.

#### Pump

The unit is available:

- without pump

- with 1 pump that guarantee 150 kPa of available static pressure;
- with 2 pumps that guarantee 150 kPa of available static pressure

#### Water buffer tank

The hydro module is available for the units with a pump; it is fitted inside and integrated in the circuit.

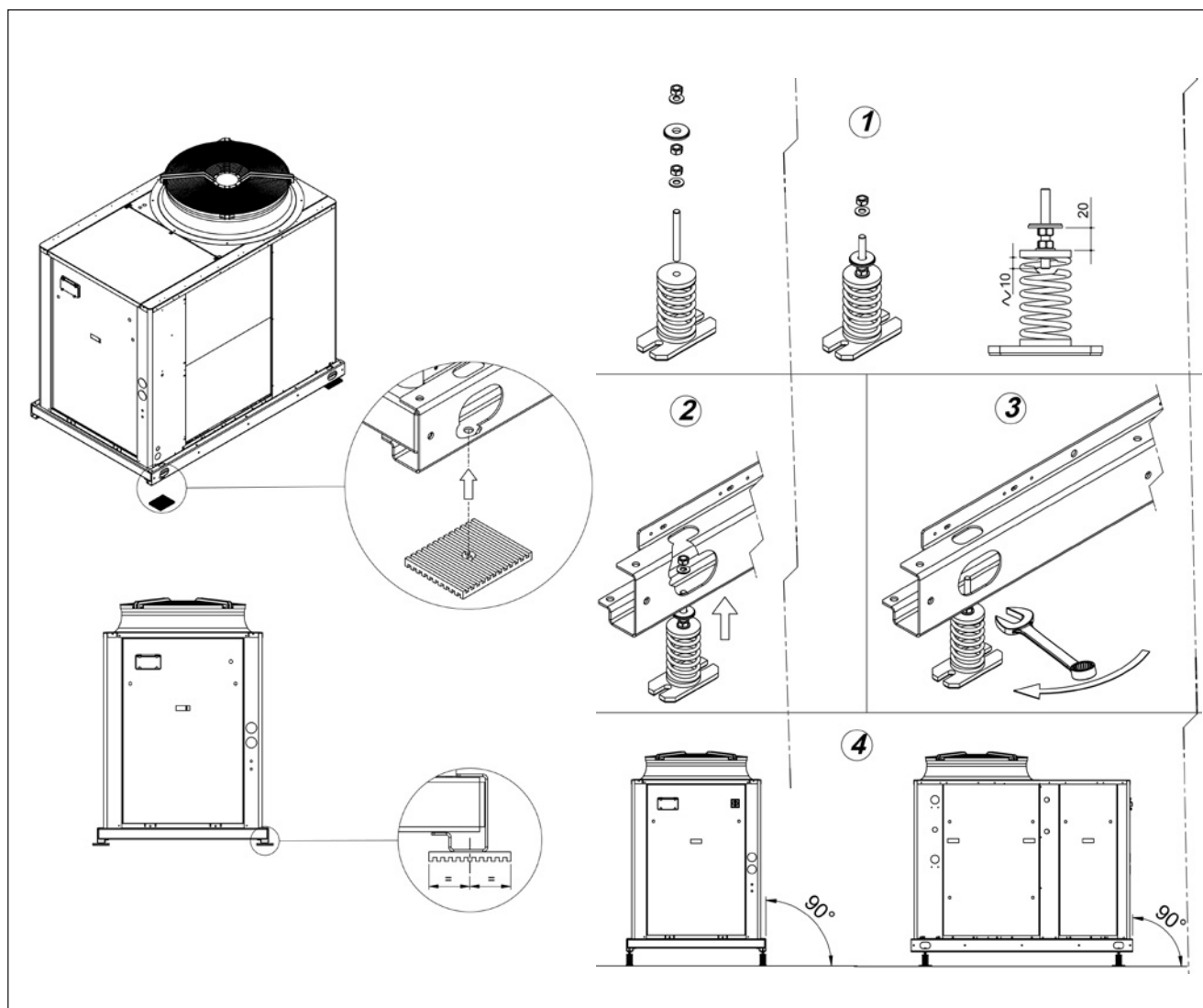
The module is entirely enclosed in a RAL 9001 galvanised and painted steel body.

The tank is covered with 10mm polyethylene insulation and it is provided with a 200W anti-freezing heater.

#### On/Off Remote kit

It enables the operator to power on the unit when it is in stand by mode, to display alarm and to switch over cooling – heat pump.

The kit will include a 3 metre long cable for installation on the wall.

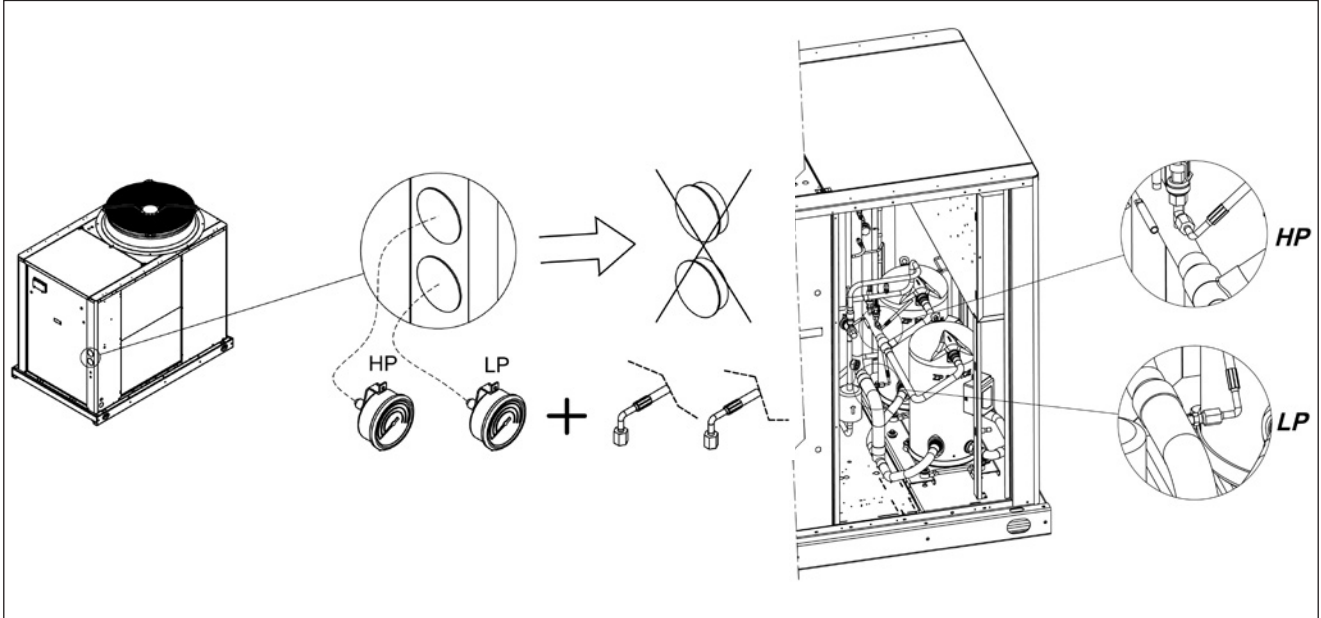




# 8 - Product Description

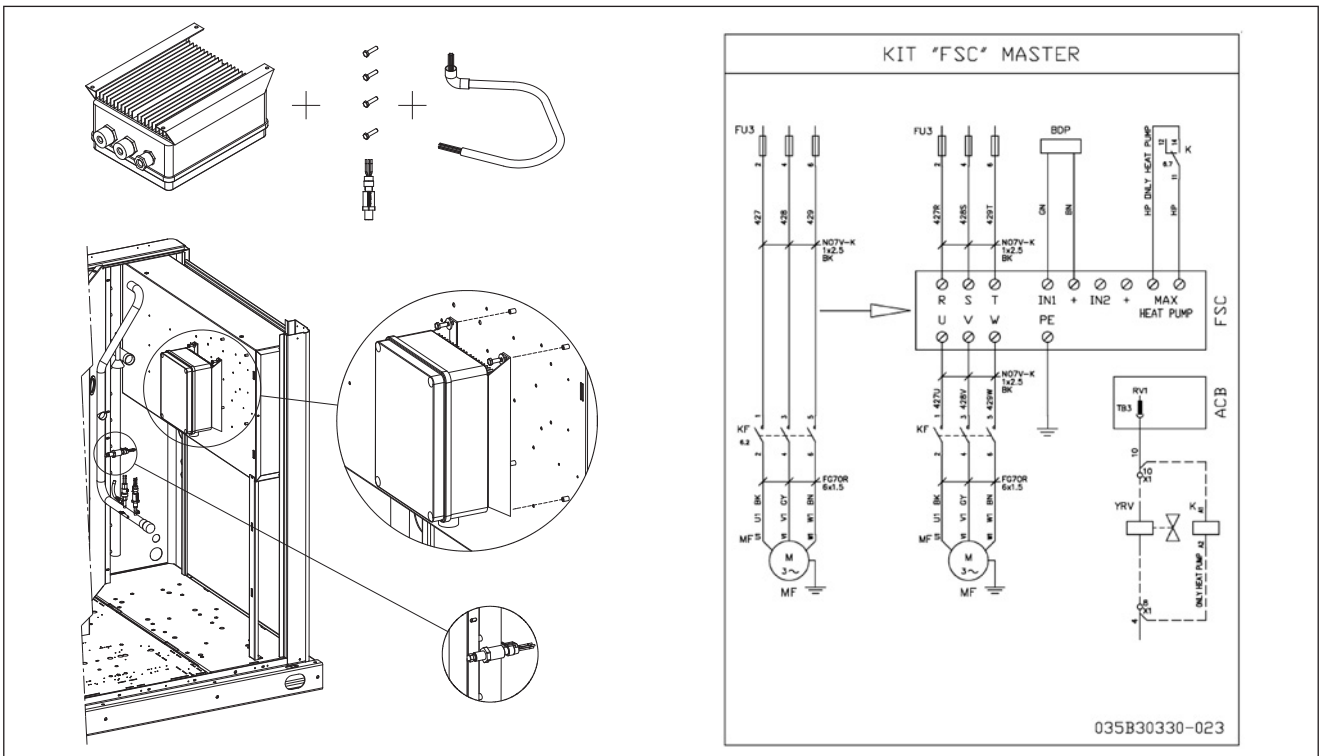
## Gauges kit

Gauges kit is available as accessory. It is shipped loose and it's not possible to have it factory mounted.



## Fan speed control

Fan speed control is available as accessory to allow the chiller to operate down to external air temperature.



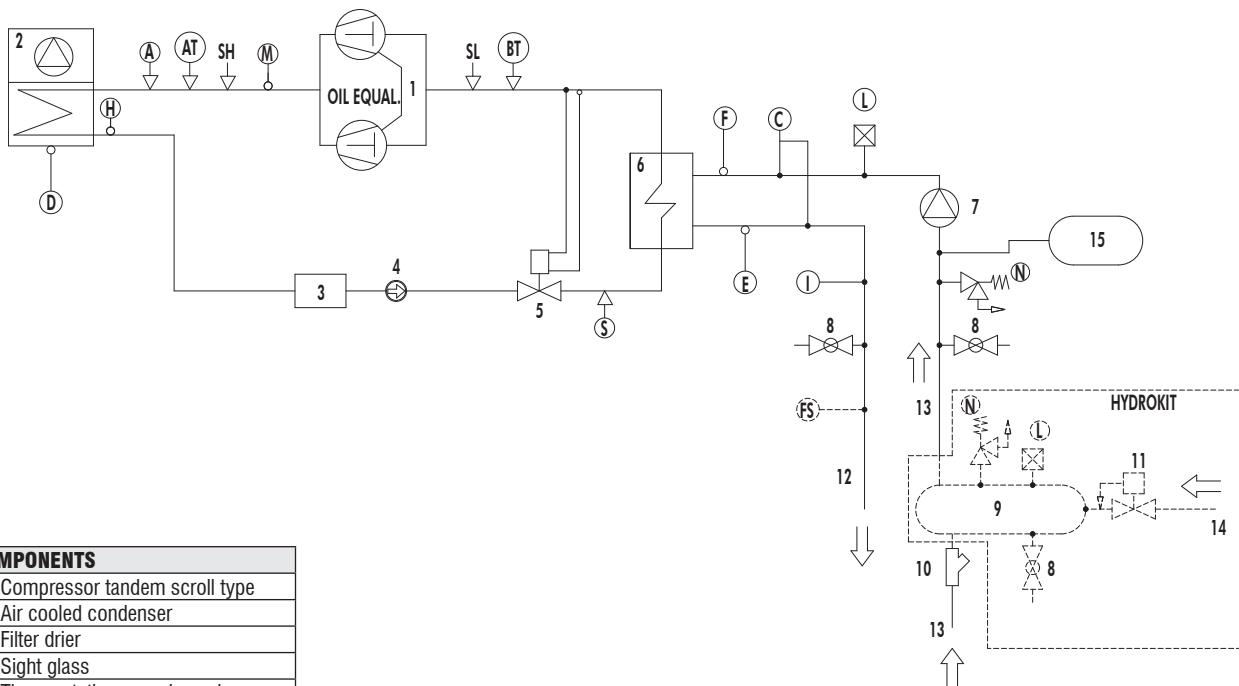
## In/Out valve kit

In/Out valve kit is available as accessory.



# 8 - Product Description

## 8.4 Refrigerant flow diagram - AQL 20 to 35 - R410A

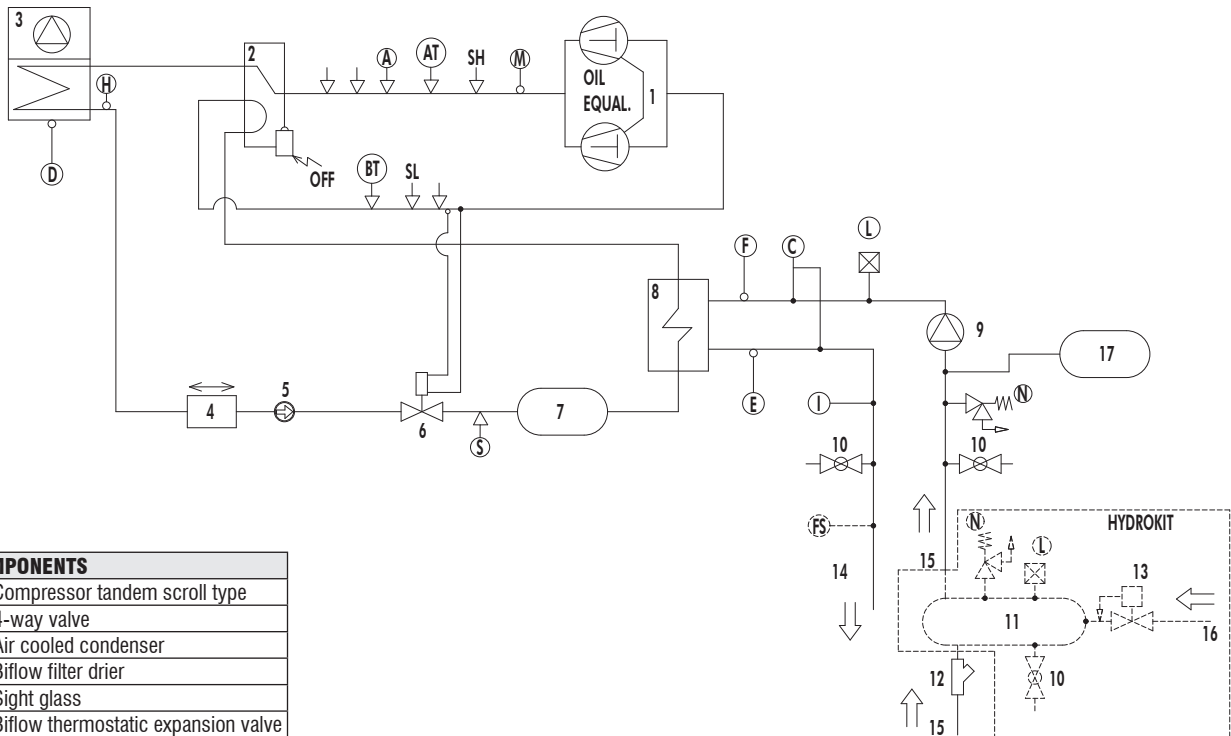


COMPONENTS	
1	Compressor tandem scroll type
2	Air cooled condenser
3	Filter drier
4	Sight glass
5	Thermostatic expansion valve
6	Plate heat exchanger
7	Pump
8	Drain valve
9	Water buffer tank
10	Water filter (supplied loose)
11	Automatic water charging valve
12	Water outlet
13	Water inlet
14	Water charging line
15	Pressure expansion tank

SAFETY/CONTROL DEVICES									
A	High pressure switch	H	Defrost temperature sensor						
AT	High pressure transducer	I	Hydrometer						
BT	Low pressure transducer	L	Vent valve						
C	Water differential pressure switch	M	Discharge temperature sensor						
D	Air temperature sensor	N	Water safety valve						
E	Outlet water temperature sensor	S	5/16" Shrader valve (charging point)						
F	Inlet water temperature sensor	SH	5/16" high pressure Shrader valve						
FS	Flow switch	SL	5/16" low pressure Shrader valve						
			<table border="1"> <tr> <td></td> <td>Pipe connection with Shrader valve</td> </tr> <tr> <td></td> <td>Optional parts</td> </tr> <tr> <td></td> <td>Sensors</td> </tr> </table>		Pipe connection with Shrader valve		Optional parts		Sensors
	Pipe connection with Shrader valve								
	Optional parts								
	Sensors								

# 8 - Product Description

## Refrigerant flow diagram - AQH 20 to 35 - R410A

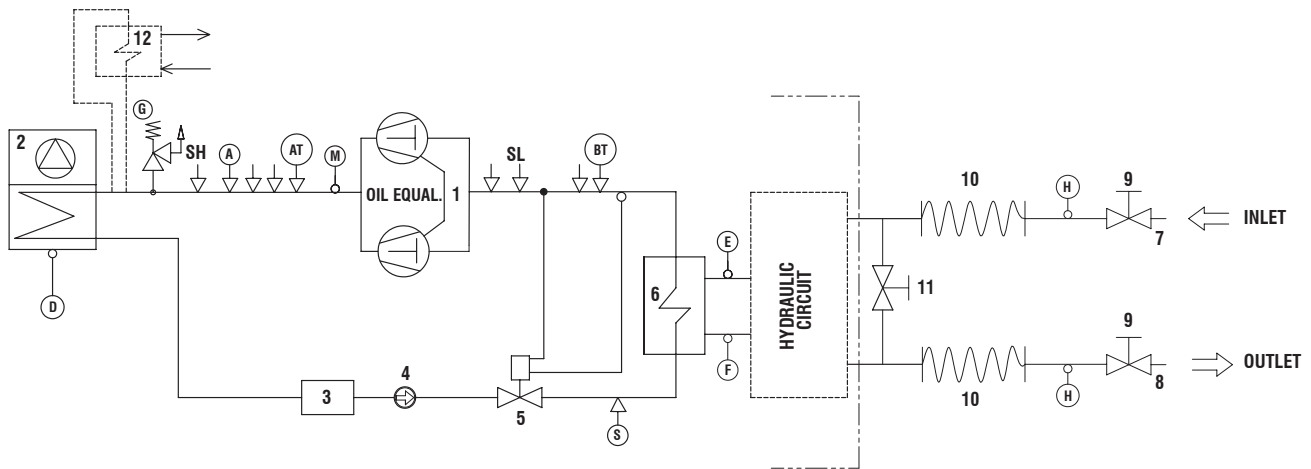


COMPONENTS	
1	Compressor tandem scroll type
2	4-way valve
3	Air cooled condenser
4	Biflow filter drier
5	Sight glass
6	Biflow thermostatic expansion valve
7	Liquid receiver
8	Plate heat exchanger
9	Pump
10	Drain valve
11	Water buffer tank
12	Water filter (supplied loose)
13	Automatic water charging valve
14	Water outlet
15	Water inlet
16	Water charging line
17	Pressure expansion tank

SAFETY/CONTROL DEVICES									
A	High pressure switch	H	Defrost temperature sensor						
AT	High pressure transducer	I	Hydrometer						
BT	Low pressure transducer	L	Vent valve						
C	Water differential pressure switch	M	Discharge temperature sensor						
D	Air temperature sensor	N	Water safety valve						
E	Outlet water temperature sensor	S	5/16" Shrader valve (charging point)						
F	Inlet water temperature sensor	SH	5/16" high pressure Shrader valve						
FS	Flow switch	SL	5/16" low pressure Shrader valve						
			<table border="1"> <tr> <td></td> <td>Pipe connection with Shrader valve</td> </tr> <tr> <td></td> <td>Optional parts</td> </tr> <tr> <td></td> <td>Sensors</td> </tr> </table>		Pipe connection with Shrader valve		Optional parts		Sensors
	Pipe connection with Shrader valve								
	Optional parts								
	Sensors								

# 8 - Product Description

## Refrigerant flow diagram - AQL 40 to 75 - R410A



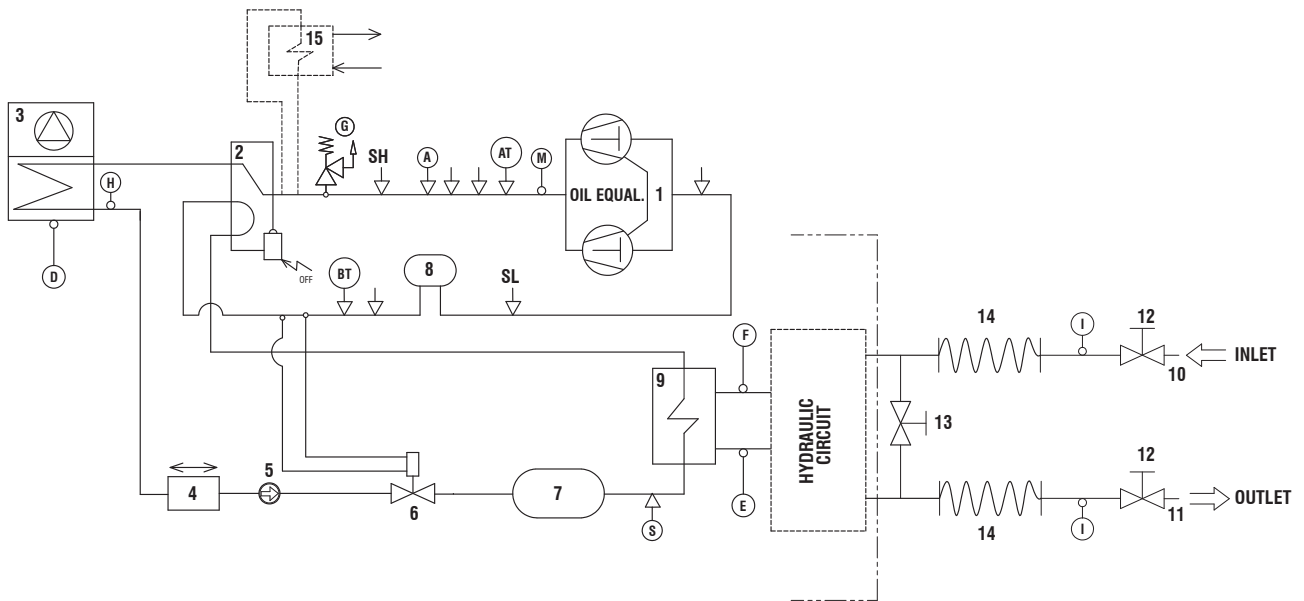
### AQL R410A (Fluid group 2):

COMPONENTS	VESSEL CATEGORY ( $\geq 2$ )/EVALUATION MODULE
1 Compressor tandem scroll type	2 / mod. D1
2 Air cooled condenser	
3 Filter drier	
4 Sight glass	
5 Thermostatic expansion valve	
6 Plate heat exchanger	2 (sizes 60 to 75) / mod. B+D
7 Water inlet	
8 Water outlet	
9 In/Out valve	
10 Flexible pipes	
11 By-pass valve	
12 Desuperheater (optional)	

SAFETY/CONTROL DEVICES	HAZARD CATEGORY / EVALUATION MODULE
A High pressure switch (40.5 bar)	4 / mod. B+D
AT High pressure transducer	
BT Low pressure transducer	
D Air temperature sensor	
E Inlet water temperature sensor	
F Outlet water temperature sensor	
G Safety valve (45 bar)	4 / mod. H1
M Discharge temperature sensor	
S 5/16" SAE Schrader valve (charging point)	
SH 5/16" SAE high pressure Schrader valve	
SL 5/16" SAE low pressure Schrader valve	
H Thermometer	
↓ v	Pipe connection with Schrader valve 1/4" SAE
○	Probes
--- ···	Unit side
-----	Optional parts

# 8 - Product Description

## Refrigerant flow diagram - AQH 40 to 75 - R410A



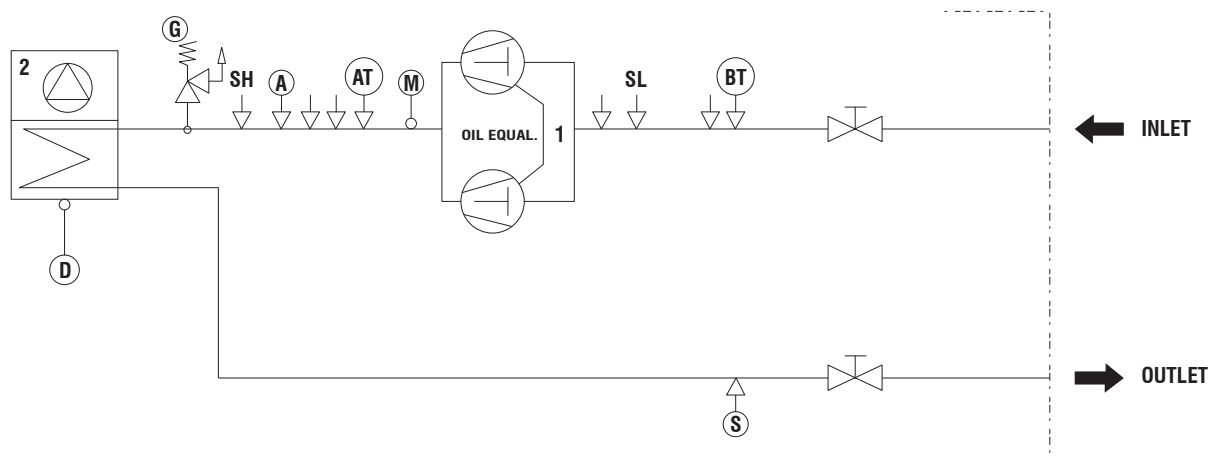
### AQH R410A (Fluid group 2):

COMPONENTS	VESSEL CATEGORY ( $\geq 2$ )/EVALUATION MODULE
1 Compressor tandem scroll type	2 / mod. D1
2 4-way valve	
3 Air cooled condenser	
4 Biflow filter drier	
5 Sight glass	
6 Biflow thermostatic expansion valve	
7 Liquid receiver	2 / mod. D1
8 Suction accumulator	2 / mod. D1
9 Plate heat exchanger	2 (sizes 60 to 75) / mod. B+D
10 Water inlet	
11 Water outlet	
12 In/Out valve	
13 By-pass valve	
14 Flexible pipes	
15 Desuperheater (optional)	

SAFETY/CONTROL DEVICES	HAZARD CATEGORY / EVALUATION MODULE
A High pressure switch (40.5 bar)	4 / mod. B+D
AT High pressure transducer	
BT Low pressure transducer	
D Air temperature sensor	
E Outlet water temperature sensor	
F Inlet water temperature sensor	
G PED safety valve (45 bar)	4 / mod. H1
H Defrost temperature sensor	
M Discharge temperature sensor	
S 5/16" SAE Schrader valve (charging point)	
SH 5/16" SAE high pressure Schrader valve	
SL 5/16" SAE low pressure Schrader valve	
I Thermometer	
↓ Pipe connection with Schrader valve 1/4" SAE	
○ Probes	
--- Unit side	
----- Optional parts	

## 8 - Product Description

### Refrigerant flow diagram - AQC 40 to 75 - R410A



#### AQC R410A (Fluid group 2):

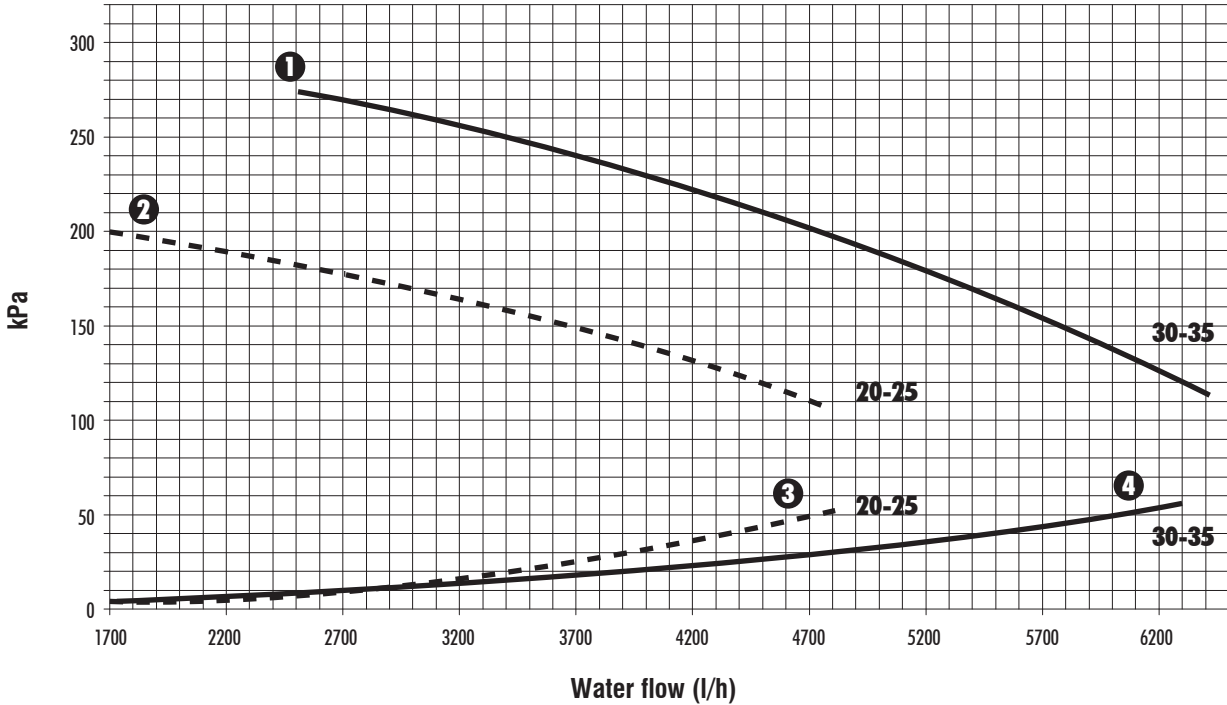
COMPONENTS	VESSEL CATEGORY ( $\geq 2$ )/EVALUATION MODULE
1 Compressor tandem scroll type	2 / mod. D1
2 Air cooled condenser	

SAFETY / CONTROL DEVICES	HAZARD CATEGORY / EVALUATION MODULE
<b>A</b> High pressure switch (40.5 bar)	4 / mod. B+D
<b>AT</b> High pressure transducer	
<b>BT</b> Low pressure transducer	
<b>D</b> Air temperature sensor	
<b>G</b> Safety valve (45 bar)	4 / mod. H1
<b>M</b> Discharge temperature sensor	
<b>S</b> 5/16" SAE Schrader valve (charging point)	
<b>SH</b> 5/16" SAE high pressure Schrader valve	
<b>SL</b> 5/16" SAE low pressure Schrader valve	
Pipe connection with Schrader valve 1/4" SAE	
--- . . . . . Unit side	
----- Optional	
○ Probes	

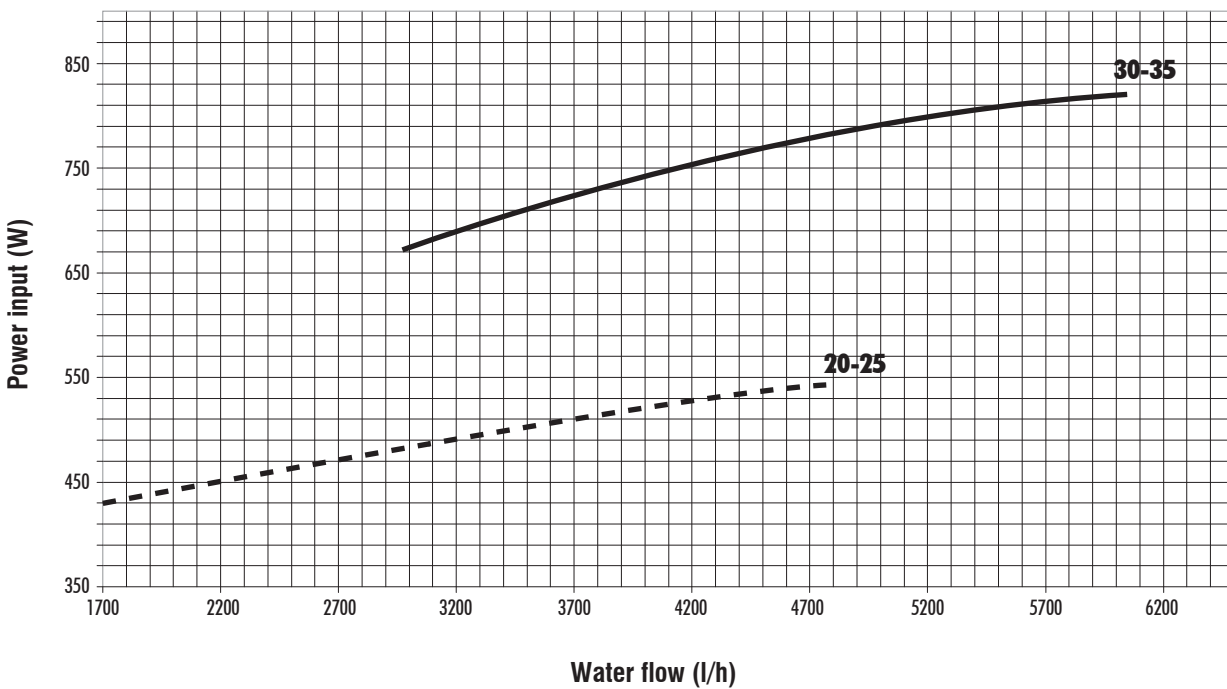
# 9 - Technical Data

## 9.1 Hydraulic Features

Units AQL/AQH 20-35

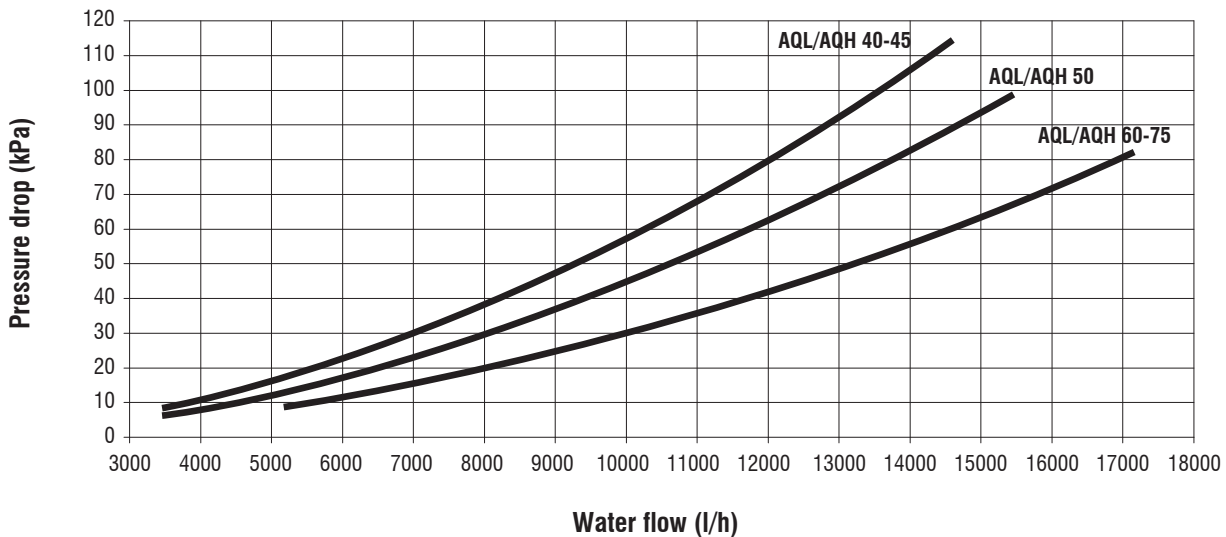


- ① and ② unit external static pressure curves.
- ③ and ④ plate heat exchanger water pressure drop curves.

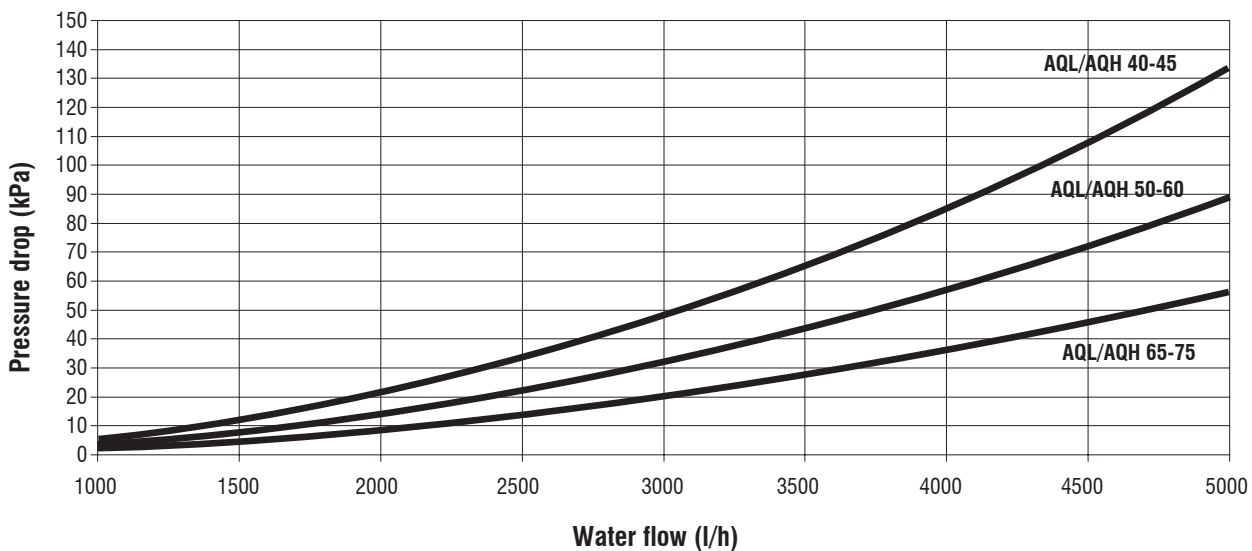


# 9 - Technical Data

## Evaporator water pressure drop - AQL/AQH 40 to 75 - R410A

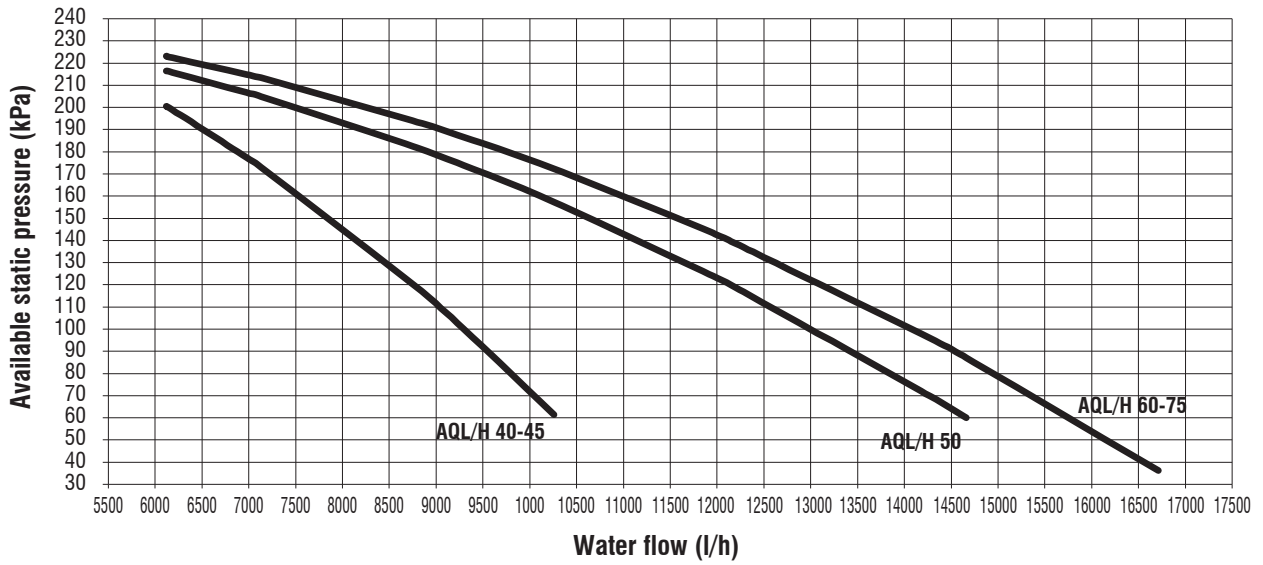


## Desuperheater water pressure drop - AQL/AQH 40 to 75 - R410A



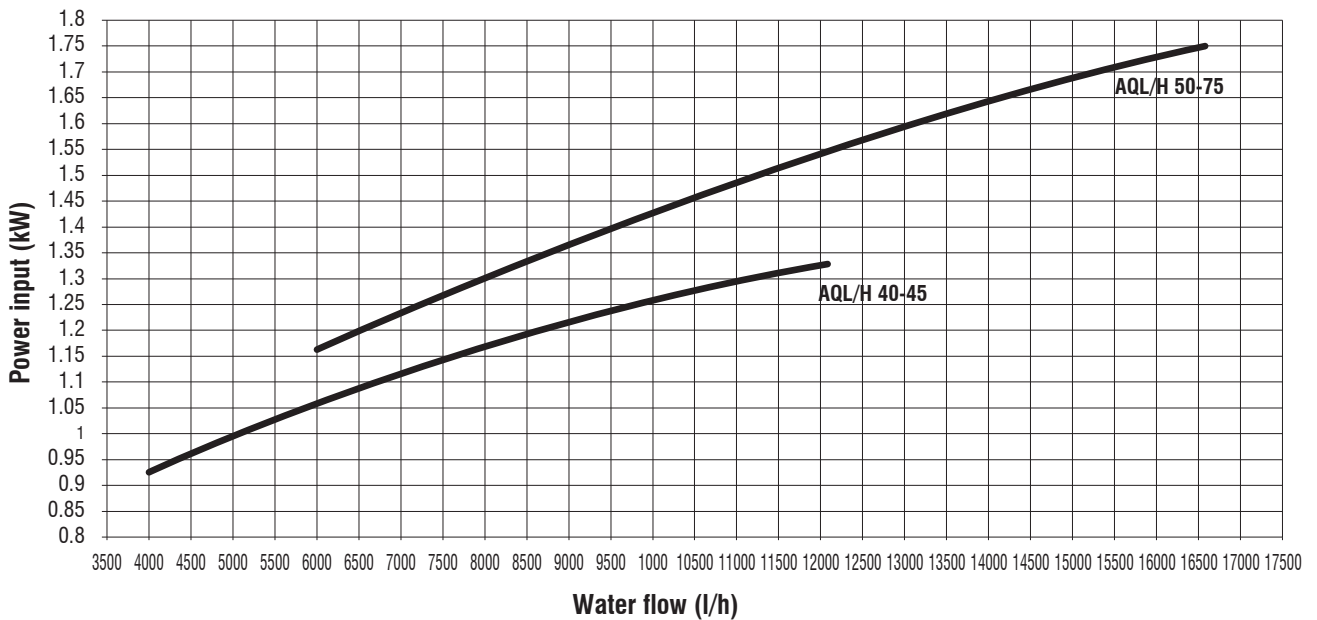
## 9 - Technical Data

### Optional pump available static pressure - AQL/AQH 40 to 75 - R410A



**Note:** The curves are referred to 2P+T unit. Unit without tank could have higher performance.

### Optional pump power input - AQL/AQH 40 to 75 - R410A





## 9 - Technical Data

### 9.2 Physical data

#### AQL 20 to 35

AQL		20	25	30	35
Power supply	V/ph/Hz	400 ± (10%)/3+N/50			
Number of refrigerant circuits		1	1	1	1
Total capacity steps	%	0-50-100	0-50-100	0-50-100	0-50-100
<b>REFRIGERANT</b>					
Type		R410A			
Charge (1)	kg	5.1	7.0	7.0	7.8
<b>COMPRESSOR</b>					
Type		Scroll			
Number		2	2	2	2
Start-up type		Direct			
Oil type		POE			
N°of loading stages		0/100	0/100	0/100	0/100
<b>EVAPORATOR</b>					
Type		Plate			
Number		1	1	1	1
Water flow Rate	l/s	Refer to Hydraulic Features			
Pressure drop	kPa				
<b>FANS</b>					
Type		Axial			
Number		2	2	2	2
Nominal speed	rpm	630	630	630	630
Air flow rate	m³/s	3.1	3.6	3.6	3.5
Power input	kW	0.6	0.6	0.6	0.6
<b>AIR COOLED CONDENSER</b>					
Type		Coil			
Number		2	2	2	2
Total coil face area per coil	m²	1.5	2.0	2.0	2.0
Number of rows		2	2	2	3
<b>HYDRAULIC CONNECTIONS</b>					
Type		Threaded gas male			
Inlet Diameter	inch	1" 1/2	1" 1/2	1" 1/2	1" 1/2
Outlet Diameter	inch	1" 1/2	1" 1/2	1" 1/2	1" 1/2
<b>WEIGHT</b>					
Shipping Weight	kg	279	297	304	318
Operating Weight	kg	276	294	302	316
<b>DIMENSIONS</b>					
Length	mm	1477	1477	1477	1477
Width	mm	538	538	538	538
Height	mm	1625	1625	1625	1625

(1) Indicative value. Always refer to the value specified on the unit's label.

## 9 - Technical Data

### AQL 40 to 75 - BLN Version

AQL BLN		40	45	50	60	65	75
Power supply	V/ph/Hz	400V/3/50Hz					
Number of refrigerant circuits		1	1	1	1	1	1
Total capacity steps	%	0-50-100	0-50-100	0-50-100	0-44-56-100	0-50-100	0-50-100
<b>REFRIGERANT</b>							
Type		R410A					
Charge (1)	kg	9.5	10.7	11.9	14.3	15.5	17.9
<b>COMPRESSOR</b>							
Type		Scroll					
Number		2	2	2	2	2	2
Start-up type		Direct					
Oil type		POE					
N°of loading stages		0/100	0/100	0/100	0/100	0/100	0/100
<b>EVAPORATOR</b>							
Type		Plate					
Number		1	1	1	1	1	1
Water flow rate	l/s	1.9	2.1	2.4	2.9	3.2	3.6
Pressure drop	kPa	Refer to Hydraulic features					
<b>DESUPERHEATER</b>							
Type		Plate					
Number		1	1	1	1	1	1
Water flow rate	l/s	0.50	0.56	0.65	0.75	0.85	0.97
Pressure drop	kPa	18	21	21	24	22	26
<b>FANS</b>							
Type		Axial					
Number		1	1	1	1	1	1
Nominal speed	rpm	680	680	680	900	900	900
Air flow rate	m³/s	4	4	3.7	5.9	5.9	5.9
Power input	kW	0.98	0.98	0.98	2.00	2.00	2.00
<b>AIR COOLED CONDENSER</b>							
Type		Coil					
Number		1	1	1	1	1	1
Total coil face area per coil	m²	2.6	2.6	2.6	3.2	3.2	3.2
Number of rows		2	2	3	3	3	3
<b>HYDRAULIC CONNECTIONS (EVAPORATOR)</b>							
Type		Threaded gas male					
Inlet diameter	inch	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"
<b>HYDRAULIC CONNECTIONS (DESUPERHEATER)</b>							
Type		Threaded gas male					
Inlet diameter	inch	1"	1"	1"	1"	1"	1"
Outlet diameter	inch	1"	1"	1"	1"	1"	1"
<b>WEIGHT</b>							
Shipping weight	kg	403	411	436	476	483	488
Operating weight	kg	413	421	446	489	499	502
<b>DIMENSIONS</b>							
Length	mm	1750	1750	1750	2200	2200	2200
Width	mm	1100	1100	1100	1100	1100	1100
Height	mm	1580	1580	1580	1580	1580	1580

(1) Indicative value. Always refer to the value specified on the unit's label.

## 9 - Technical Data

### AQL 40 to 75 - ELN Version

AQL ELN		40	45	50	60	65	75
Power supply	V/ph/Hz	400V/3/50Hz					
Number of refrigerant circuits		1	1	1	1	1	1
Total capacity steps	%	0-50-100	0-50-100	0-50-100	0-44-56-100	0-50-100	0-50-100
<b>REFRIGERANT</b>							
Type		R410A					
Charge (1)	kg	9.5	10.7	11.9	14.3	15.5	17.9
<b>COMPRESSOR</b>							
Type		Scroll					
Number		2	2	2	2	2	2
Start-up type		Direct					
Oil type		POE					
N°of loading stages		0/100	0/100	0/100	0/100	0/100	0/100
<b>EVAPORATOR</b>							
Type		Plate					
Number		1	1	1	1	1	1
Water flow rate	l/s	1.8	2.0	2.3	2.8	3.0	3.5
Pressure drop	kPa	Refer to Hydraulic features					
<b>DESUPERHEATER</b>							
Type		Plate					
Number		1	1	1	1	1	1
Water flow rate	l/s	0.50	0.55	0.64	0.74	0.81	0.95
Pressure drop	kPa	17	21	20	23	20	26
<b>FANS</b>							
Type		Axial					
Number		1	1	1	1	1	1
Nominal speed	rpm	530	530	530	720	720	720
Air flow rate	m³/s	3.05	3.05	2.86	4.4	4.4	4.4
Power input	kW	0.57	0.57	0.57	1.27	1.27	1.27
<b>AIR COOLED CONDENSER</b>							
Type		Coil					
Number		1	1	1	1	1	1
Total coil face area per coil	m²	2.6	2.6	2.6	3.2	3.2	3.2
Number of rows		2	2	3	3	3	3
<b>HYDRAULIC CONNECTIONS (EVAPORATOR)</b>							
Type		Threaded gas male					
Inlet diameter	inch	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"
<b>HYDRAULIC CONNECTIONS (DESUPERHEATER)</b>							
Type		Threaded gas male					
Inlet diameter	inch	1"	1"	1"	1"	1"	1"
Outlet diameter	inch	1"	1"	1"	1"	1"	1"
<b>WEIGHT</b>							
Shipping weight	kg	403	411	436	476	483	488
Operating weight	kg	413	421	446	489	499	502
<b>DIMENSIONS</b>							
Length	mm	1750	1750	1750	2200	2200	2200
Width	mm	1100	1100	1100	1100	1100	1100
Height	mm	1580	1580	1580	1580	1580	1580

(1) Indicative value. Always refer to the value specified on the unit's label.

## 9 - Technical Data

### AQL 40 to 75 - SIF Version

AQL SIF		40	45	50	60	65	75
Power supply	V/ph/Hz	400V/3/50Hz					
Number of refrigerant circuits		1	1	1	1	1	1
Total capacity steps	%	0-50-100	0-50-100	0-50-100	0-44-56-100	0-50-100	0-50-100
<b>REFRIGERANT</b>							
Type		R410A					
Charge (1)	kg	9.5	10.7	11.9	14.3	15.5	17.9
<b>COMPRESSOR</b>							
Type		Scroll					
Number		2	2	2	2	2	2
Start-up type		Direct					
Oil type		POE					
N°of loading stages		0/100	0/100	0/100	0/100	0/100	0/100
<b>EVAPORATOR</b>							
Type		Plate					
Number		1	1	1	1	1	1
Water flow rate	l/s	2.0	2.2	2.6	2.9	3.2	3.7
Pressure drop	kPa	Refer to Hydraulic features					
<b>DESUPERHEATER</b>							
Type		Plate					
Number		1	1	1	1	1	1
Water flow rate	l/s	0.51	0.57	0.67	0.75	0.83	0.97
Pressure drop	kPa	19	22	22	24	20	27
<b>FANS</b>							
Type		Axial					
Number		1	1	1	1	1	1
Nominal speed	rpm	1110	1110	1110	1110	1110	1110
Air flow rate	m³/s	7.00	7.00	6.75	7.0	7.0	7.0
Power input	kW	2.67	2.67	2.67	2.67	2.67	2.67
<b>AIR COOLED CONDENSER</b>							
Type		Coil					
Number		1	1	1	1	1	1
Total coil face area per coil	m²	2.6	2.6	2.6	3.2	3.2	3.2
Number of rows		2	2	3	3	3	3
<b>HYDRAULIC CONNECTIONS (EVAPORATOR)</b>							
Type		Threaded gas male					
Inlet diameter	inch	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"
<b>HYDRAULIC CONNECTIONS (DESUPERHEATER)</b>							
Type		Threaded gas male					
Inlet diameter	inch	1"	1"	1"	1"	1"	1"
Outlet diameter	inch	1"	1"	1"	1"	1"	1"
<b>WEIGHT</b>							
Shipping weight	kg	403	411	436	476	483	488
Operating weight	kg	413	421	446	489	499	502
<b>DIMENSIONS</b>							
Length	mm	1750	1750	1750	2200	2200	2200
Width	mm	1100	1100	1100	1100	1100	1100
Height	mm	1580	1580	1580	1580	1580	1580

(1) Indicative value. Always refer to the value specified on the unit's label.

## 9 - Technical Data

### AQH 20 to 35

AQH		20	25	30	35
Power supply	V/ph/Hz	400 ± (10%)/3+N/50			
Number of refrigerant circuits		1	1	1	1
Total capacity steps	%	0-50-100	0-50-100	0-50-100	0-50-100
<b>REFRIGERANT</b>					
Type		R410A			
Charge (1)	kg	5.1	7.0	7.0	7.8
<b>COMPRESSOR</b>					
Type		Scroll			
Number		2	2	2	2
Start-up type		Direct			
Oil type		POE			
N°of loading stages		0/100	0/100	0/100	0/100
<b>EVAPORATOR</b>					
Type		Plate			
Number		1	1	1	1
Water flow Rate	l/s	Refer to Hydraulic Features			
Pressure drop	kPa				
<b>FANS</b>					
Type		Axial			
Number		2	2	2	2
Nominal speed	rpm	630	630	630	630
Air flow rate	m³/s	3.1	3.6	3.6	3.5
Power input	kW	0.6	0.6	0.6	0.6
<b>AIR COOLED CONDENSER</b>					
Type		Coil			
Number		2	2	2	2
Total coil face area per coil	m²	1.5	2.0	2.0	2.0
Number of rows		2	2	2	3
<b>HYDRAULIC CONNECTIONS</b>					
Type		Threaded gas male			
Inlet Diameter	inch	1" 1/2	1" 1/2	1" 1/2	1" 1/2
Outlet Diameter	inch	1" 1/2	1" 1/2	1" 1/2	1" 1/2
<b>WEIGHT</b>					
Shipping Weight	kg	292	310	318	333
Operating Weight	kg	289	307	316	331
<b>DIMENSIONS</b>					
Length	mm	1477	1477	1477	1477
Width	mm	538	538	538	538
Height	mm	1625	1625	1625	1625

(1) Indicative value. Always refer to the value specified on the unit's label.

## 9 - Technical Data

### AQH 40 to 75 - BLN Version

AQH BLN		40	45	50	60	65	75
Power supply	V/ph/Hz	400V/3/50Hz					
Number of refrigerant circuits		1	1	1	1	1	1
Total capacity steps	%	0-50-100	0-50-100	0-50-100	0-44-56-100	0-50-100	0-50-100
<b>REFRIGERANT</b>							
Type		R410A					
Charge (1)	kg	9.5	10.7	11.9	14.3	15.5	17.9
<b>COMPRESSOR</b>							
Type		Scroll					
Number		2	2	2	2	2	2
Start-up type		Direct					
Oil type		POE					
N°of loading stages		0/100	0/100	0/100	0/100	0/100	0/100
<b>EVAPORATOR</b>							
Type		Plate					
Number		1	1	1	1	1	1
Water flow rate	l/s	1.9	2.1	2.4	2.9	3.2	3.6
Pressure drop	kPa	Refer to Hydraulic features					
<b>DESUPERHEATER</b>							
Type		Plate					
Number		1	1	1	1	1	1
Water flow rate	l/s	0.51	0.57	0.67	0.75	0.83	0.97
Pressure drop	kPa	19	22	22	24	20	27
<b>FANS</b>							
Type		Axial					
Number		1	1	1	1	1	1
Nominal speed	rpm	680	680	680	900	900	900
Air flow rate	m³/s	4.1	4.1	4.1	6.2	6.2	6.2
Power input	kW	0.98	0.98	0.98	2.00	2.00	2.00
<b>AIR COOLED CONDENSER</b>							
Type		Coil					
Number		1	1	1	1	1	1
Total coil face area per coil	m²	2.6	2.6	2.6	3.2	3.2	3.2
Number of rows		2	2	3	3	3	3
<b>HYDRAULIC CONNECTIONS (EVAPORATOR)</b>							
Type		Threaded gas male					
Inlet diameter	inch	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"
<b>HYDRAULIC CONNECTIONS (DESUPERHEATER)</b>							
Type		Threaded gas male					
Inlet diameter	inch	1"	1"	1"	1"	1"	1"
Outlet diameter	inch	1"	1"	1"	1"	1"	1"
<b>WEIGHT</b>							
Shipping weight	kg	422	430	457	504	511	517
Operating weight	kg	431	440	467	517	524	530
<b>DIMENSIONS</b>							
Length	mm	1750	1750	1750	2200	2200	2200
Width	mm	1100	1100	1100	1100	1100	1100
Height	mm	1580	1580	1580	1580	1580	1580

(1) Indicative value. Always refer to the value specified on the unit's label.

## 9 - Technical Data

### AQH 40 to 75 - ELN Version

AQH ELN		40	45	50	60	65	75
Power supply	V/ph/Hz	400V/3/50Hz					
Number of refrigerant circuits		1	1	1	1	1	1
Total capacity steps	%	0-50-100	0-50-100	0-50-100	0-44-56-100	0-50-100	0-50-100
<b>REFRIGERANT</b>							
Type		R410A					
Charge (1)	kg	9.5	10.7	11.9	14.3	15.5	17.9
<b>COMPRESSOR</b>							
Type		Scroll					
Number		2	2	2	2	2	2
Start-up type		Direct					
Oil type		POE					
N°of loading stages		0/100	0/100	0/100	0/100	0/100	0/100
<b>EVAPORATOR</b>							
Type		Plate					
Number		1	1	1	1	1	1
Water flow rate	l/s	1.8	2.0	2.3	2.8	3.0	3.5
Pressure drop	kPa	Refer to Hydraulic features					
<b>DESUPERHEATER</b>							
Type		Plate					
Number		1	1	1	1	1	1
Water flow rate	l/s	0.50	0.55	0.64	0.74	0.81	0.95
Pressure drop	kPa	17	21	20	23	20	26
<b>FANS</b>							
Type		Axial					
Number		1	1	1	1	1	1
Nominal speed	rpm	530	530	530	720	720	720
Air flow rate	m³/s	3.2	3.2	3	4.7	4.7	4.7
Power input	kW	0.57	0.57	0.57	1.27	1.27	1.27
<b>AIR COOLED CONDENSER</b>							
Type		Coil					
Number		1	1	1	1	1	1
Total coil face area per coil	m²	2.6	2.6	2.6	3.2	3.2	3.2
Number of rows		2	2	3	3	3	3
<b>HYDRAULIC CONNECTIONS (EVAPORATOR)</b>							
Type		Threaded gas male					
Inlet diameter	inch	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"
<b>HYDRAULIC CONNECTIONS (DESUPERHEATER)</b>							
Type		Threaded gas male					
Inlet diameter	inch	1"	1"	1"	1"	1"	1"
Outlet diameter	inch	1"	1"	1"	1"	1"	1"
<b>WEIGHT</b>							
Shipping weight	kg	422	430	457	504	511	517
Operating weight	kg	431	440	467	517	524	530
<b>DIMENSIONS</b>							
Length	mm	1750	1750	1750	2200	2200	2200
Width	mm	1100	1100	1100	1100	1100	1100
Height	mm	1580	1580	1580	1580	1580	1580

(1) Indicative value. Always refer to the value specified on the unit's label.

## 9 - Technical Data

### AQH 40 to 75 - SIF Version

AQH SIF		40	45	50	60	65	75
Power supply	V/ph/Hz	400V/3/50Hz					
Number of refrigerant circuits		1	1	1	1	1	1
Total capacity steps	%	0-50-100	0-50-100	0-50-100	0-44-56-100	0-50-100	0-50-100
<b>REFRIGERANT</b>							
Type		R410A					
Charge (1)	kg	9.5	10.7	11.9	14.3	15.5	17.9
<b>COMPRESSOR</b>							
Type		Scroll					
Number		2	2	2	2	2	2
Start-up type		Direct					
Oil type		POE					
N°of loading stages		0/100	0/100	0/100	0/100	0/100	0/100
<b>EVAPORATOR</b>							
Type		Plate					
Number		1	1	1	1	1	1
Water flow rate	l/s	2.0	2.2	2.6	2.9	3.2	3.7
Pressure drop	kPa	Refer to Hydraulic features					
<b>DESUPERHEATER</b>							
Type		Plate					
Number		1	1	1	1	1	1
Water flow rate	l/s	0.51	0.57	0.67	0.75	0.83	0.97
Pressure drop	kPa	19	22	22	24	20	27
<b>FANS</b>							
Type		Axial					
Number		1	1	1	1	1	1
Nominal speed	rpm	1110	1110	1110	1110	1110	1110
Air flow rate	m³/s	7	7	6.75	7	7	7
Power input	kW	2.67	2.67	2.67	2.67	2.67	2.67
<b>AIR COOLED CONDENSER</b>							
Type		Coil					
Number		1	1	1	1	1	1
Total coil face area per coil	m²	2.6	2.6	2.6	3.2	3.2	3.2
Number of rows		2	2	3	3	3	3
<b>HYDRAULIC CONNECTIONS (EVAPORATOR)</b>							
Type		Threaded gas male					
Inlet diameter	inch	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"
<b>HYDRAULIC CONNECTIONS (DESUPERHEATER)</b>							
Type		Threaded gas male					
Inlet diameter	inch	1"	1"	1"	1"	1"	1"
Outlet diameter	inch	1"	1"	1"	1"	1"	1"
<b>WEIGHT</b>							
Shipping weight	kg	422	430	457	504	511	517
Operating weight	kg	431	440	467	517	524	530
<b>DIMENSIONS</b>							
Length	mm	1750	1750	1750	2200	2200	2200
Width	mm	1100	1100	1100	1100	1100	1100
Height	mm	1580	1580	1580	1580	1580	1580

(1) Indicative value. Always refer to the value specified on the unit's label.



## 9 - Technical Data

### AQC 40 to 75 - BLN Version

AQC BLN		40	45	50	60	65	75
Power supply	V/ph/Hz	400V/3/50Hz					
Number of refrigerant circuits		1	1	1	1	1	1
Total capacity steps	%	0-50-100	0-50-100	0-50-100	0-44-56-100	0-50-100	0-50-100
<b>REFRIGERANT</b>							
Type		R410A					
<b>COMPRESSOR</b>							
Type		Scroll					
Number		2	2	2	2	2	2
Start-up type		Direct					
Oil type		POE					
N°of loading stages		0/100	0/100	0/100	0/100	0/100	0/100
<b>FANS</b>							
Type		Axial					
Number		1	1	1	1	1	1
Nominal speed	rpm	680	680	680	900	900	900
Air flow rate	m <sup>3</sup> /s	4	4	3.7	5.9	5.9	5.9
Power input	kW	0.98	0.98	0.98	2.00	2.00	2.00
<b>AIR COOLED CONDENSER</b>							
Type		Coil					
Number		1	1	1	1	1	1
Total coil face area per coil	m <sup>2</sup>	2.6	2.6	2.6	3.2	3.2	3.2
Number of rows		2	2	3	3	3	3
<b>REFRIGERANT CONNECTIONS</b>							
Inlet diameter	inch	5/8"	5/8"	5/8"	7/8"	7/8"	7/8"
Outlet diameter	inch	1"3/8	1"3/8	1"3/8	1"3/8	1"3/8	1"3/8
<b>WEIGHT</b>							
Shipping weight	kg	391	399	422	456	466	469
<b>DIMENSIONS</b>							
Length	mm	1750	1750	1750	2200	2200	2200
Width	mm	1100	1100	1100	1100	1100	1100
Height	mm	1580	1580	1580	1580	1580	1580

## 9 - Technical Data

### AQC 40 to 75 - ELN Version

AQC ELN		40	45	50	60	65	75
Power supply	V/ph/Hz	400V/3/50Hz					
Number of refrigerant circuits		1	1	1	1	1	1
Total capacity steps	%	0-50-100	0-50-100	0-50-100	0-44-56-100	0-50-100	0-50-100
<b>REFRIGERANT</b>							
Type		R410A					
<b>COMPRESSOR</b>							
Type		Scroll					
Number		2	2	2	2	2	2
Start-up type		Direct					
Oil type		POE					
N°of loading stages		0/100	0/100	0/100	0/100	0/100	0/100
<b>FANS</b>							
Type		Axial					
Number		1	1	1	1	1	1
Nominal speed	rpm	530	530	530	720	720	720
Air flow rate	m³/s	3	3	2.9	4.4	4.4	4.4
Power input	kW	0.57	0.57	0.57	1.27	1.27	1.27
<b>AIR COOLED CONDENSER</b>							
Type		Coil					
Number		1	1	1	1	1	1
Total coil face area per coil	m²	2.6	2.6	2.6	3.2	3.2	3.2
Number of rows		2	2	3	3	3	3
<b>REFRIGERANT CONNECTIONS</b>							
Inlet diameter	inch	5/8"	5/8"	5/8"	7/8"	7/8"	7/8"
Outlet diameter	inch	1"3/8	1"3/8	1"3/8	1"3/8	1"3/8	1"3/8
<b>WEIGHT</b>							
Shipping weight	kg	391	399	422	456	466	469
<b>DIMENSIONS</b>							
Length	mm	1750	1750	1750	2200	2200	2200
Width	mm	1100	1100	1100	1100	1100	1100
Height	mm	1580	1580	1580	1580	1580	1580

## 9 - Technical Data

### AQC 40 to 75 - SIF Version

AQC SIF		40	45	50	60	65	75
Power supply	V/ph/Hz	400V/3/50Hz					
Number of refrigerant circuits		1	1	1	1	1	1
Total capacity steps	%	0-50-100	0-50-100	0-50-100	0-44-56-100	0-50-100	0-50-100
<b>REFRIGERANT</b>							
Type		R410A					
<b>COMPRESSOR</b>							
Type		Scroll					
Number		2	2	2	2	2	2
Start-up type		Direct					
Oil type		POE					
N°of loading stages		0/100	0/100	0/100	0/100	0/100	0/100
<b>FANS</b>							
Type		Axial					
Number		1	1	1	1	1	1
Nominal speed	rpm	1110	1110	1110	1110	1110	1110
Air flow rate	m³/s	7.0	7.0	6.8	7.0	7.0	7.0
Power input	kW	2.67	2.67	2.67	2.67	2.67	2.67
<b>AIR COOLED CONDENSER</b>							
Type		Coil					
Number		1	1	1	1	1	1
Total coil face area per coil	m²	2.6	2.6	2.6	3.2	3.2	3.2
Number of rows		2	2	3	3	3	3
<b>REFRIGERANT CONNECTIONS</b>							
Inlet diameter	inch	5/8"	5/8"	5/8"	7/8"	7/8"	7/8"
Outlet diameter	inch	1"3/8	1"3/8	1"3/8	1"3/8	1"3/8	1"3/8
<b>WEIGHT</b>							
Shipping weight	kg	391	399	422	456	466	469
<b>DIMENSIONS</b>							
Length	mm	1750	1750	1750	2200	2200	2200
Width	mm	1100	1100	1100	1100	1100	1100
Height	mm	1580	1580	1580	1580	1580	1580

## 9 - Technical Data

### AQC Refrigerant Lines

AQC Unit	Unit connections		Suction line dimensions [inch]			Liquid line dimensions [inch]		
	Suction	Liquid	Total equivalent length [m]			Total equivalent length [m]		
	[inch]	[inch]	10	20	30	10	20	30
40	5/8"	1"3/8	1"3/8	1"3/8	1"3/8	7/8"	7/8"	7/8"
45	5/8"	1"3/8	1"3/8	1"3/8	1"5/8	7/8"	7/8"	7/8"
50	5/8"	1"3/8	1"3/8	1"3/8	1"5/8	1"1/8	1"1/8	1"1/8
60	7/8"	1"3/8	1"3/8	1"3/8	1"5/8	1"1/8	1"1/8	1"1/8
65	7/8"	1"3/8	1"3/8	1"5/8	1"5/8	1"1/8	1"1/8	1"1/8

AQC	Line length	ø Suction line		ø Liquid line		R410A
	[m]	[inch]	[mm]	[inch]	[mm]	[Kg/m]
40	10	1"3/8	34,93	7/8"	22,23	0,34
	20	1"3/8	34,93	7/8"	22,23	0,34
	30	1"3/8	34,93	7/8"	22,23	0,34
45	10	1"3/8	34,93	7/8"	22,23	0,34
	20	1"3/8	34,93	7/8"	22,23	0,34
	30	1"5/8	41,28	7/8"	22,23	0,35
50	10	1"3/8	34,93	1"1/8	28,58	0,53
	20	1"3/8	34,93	1"1/8	28,58	0,53
	30	1"5/8	41,28	1"1/8	28,58	0,54
60	10	1"3/8	34,93	1"1/8	28,58	0,53
	20	1"3/8	34,93	1"1/8	28,58	0,53
	30	1"5/8	41,28	1"1/8	28,58	0,54
65	10	1"3/8	34,93	1"1/8	28,58	0,53
	20	1"5/8	41,28	1"1/8	28,58	0,54
	30	1"5/8	41,28	1"1/8	28,58	0,54

Data valid per each refrigerant circuit.

## 9 - Technical Data

### 9.3 Electrical data

AQL/AQH		20	25	30	35
Rated voltage	V/ph/Hz	400 ± (10%)/3+N/50			
Max. absorbed power	kW	10.1	13.6	15.8	18.0
Max. current FLA	A	21.5	25.5	35.3	35.3
Max. start-up current LRA	A	61.5	79.5	94.3	121.3
External fuses	A	25	32	40	40
Max. cable section (*)	mm <sup>2</sup>	6	6	10	10
EXCHANGER RESISTANCE					
Rated voltage	V/ph/Hz	230 ± (10%)/1/50			
Max. absorbed power	W	35			

(\*) The dimensioning of the unit's power cables is the responsibility of the installer, who shall consider: the rating, the maximum working temperature in the room, the type of insulation and the cable laying, the maximum length of the power supply line.

AQL/AQH/AQC BLN without pump		40	45	50	60	65	75
Rated voltage	V/ph/Hz	400V/3/50Hz					
Max. absorbed power with pump	kW	19	21	25	29	32	36
Max. current FLA	A	34	44	46	57	66	84
Max. start-up current LRA	A	113	134	142	166	175	217
External fuses	A	63	63	63	80	80	100
Max. cable section (*)	mm <sup>2</sup>	25	25	25	35	35	50
EXCHANGER RESISTANCE							
Rated voltage	V/ph/Hz	230/1/50					
Max. absorbed power	W	35					

AQL/AQH/AQC ELN without pump		40	45	50	60	65	75
Rated voltage	V/ph/Hz	400V/3/50Hz					
Max. absorbed power with pump	kW	19	21	24	28	31	35
Max. current FLA	A	33	43	45	56	65	83
Max. start-up current LRA	A	112	133	141	165	174	216
External fuses	A	63	63	63	80	80	100
Max. cable section (*)	mm <sup>2</sup>	25	25	25	35	35	50
EXCHANGER RESISTANCE							
Rated voltage	V/ph/Hz	230/1/50					
Max. absorbed power	W	35					

AQL/AQH/AQC SIF without pump		40	45	50	60	65	75
Rated voltage	V/ph/Hz	400V/3/50Hz					
Max. absorbed power with pump	kW	21	23	27	29	32	37
Max. current FLA	A	36	46	48	57	66	84
Max. start-up current LRA	A	115	136	144	166	175	217
External fuses	A	63	63	63	80	80	100
Max. cable section (*)	mm <sup>2</sup>	25	25	25	35	35	50
EXCHANGER RESISTANCE							
Rated voltage	V/ph/Hz	230/1/50					
Max. absorbed power	W	35					

## 9 - Technical Data

### Compressor electrical data

AQL/AQH		20	25	30	35
Number		2	2	2	2
Max. absorbed power	kW	4.3+4.3	6.1+6.1	7.2+7.2	8.3+8.3
Rated current	A	8.0+8.0	10.0+10.0	15.0+15.0	15.0+15.0
Max. current	A	48.0+48.0	64.0+64.0	74.0+74.0	101.0+101.0
Oil pan resistor	W	70+70	70+70	70+70	70+70

AQL/AQH/AQC BLN-ELN-SIF		40	45	50	60	65	75
Number		2	2	2	2	2	2
Max. absorbed power	kW	9.1+9.1	10.2+10.2	12+12	14.8+12	14.8+14.8	17.1+17.1
Rated current	A	95+95	111+111	118+118	140+118	140+140	173+173
Max current	A	16+16	21+21	22+22	31+22	31+31	40+40
Oil pan resistor	W	90+90	90+90	90+90	90+90	90+90	90+90

### Fan electrical data

AQL/AQH		20	25	30	35
Rated voltage	V/ph/Hz	230 ± (10%) / 1 / 50			
Number		2	2	2	2
Rated power	kW	0.3+0.3	0.3+0.3	0.3+0.3	0.3+0.3
Absorbed rated current FLA	A	1.8+1.8	1.8+1.8	1.8+1.8	1.8+1.8

AQL/AQH/AQC BLN		40	45	50	60	65	75
Rated voltage	V/ph/Hz	400V/3/50Hz					
Number		1	1	1	1	1	1
Rated power	kW	0.98	0.98	0.98	2.00	2.00	2.00
Absorbed rated current FLA	A	2.4	2.4	2.4	4.3	4.3	4.3

AQL/AQH/AQC ELN		40	45	50	60	65	75
Rated voltage	V/ph/Hz	400V/3/50Hz					
Number		1	1	1	1	1	1
Rated power	kW	0.57	0.57	0.57	1.27	1.27	1.27
Absorbed rated current FLA	A	1.2	1.2	1.2	2.5	2.5	2.5

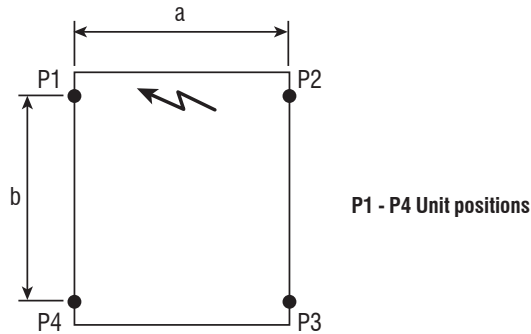
AQL/AQH/AQC SIF		40	45	50	60	65	75
Rated voltage	V/ph/Hz	400V/3/50Hz					
Number		1	1	1	1	1	1
Rated power	kW	2.67	2.67	2.67	2.67	2.67	2.67
Absorbed rated current FLA	A	4.1	4.1	4.1	4.1	4.1	4.1

### Pump electrical data

AQL/AQH 1/2P		40	45	50	60	65	75
Nominal power	kW	1.32	1.32	1.84	1.84	1.84	1.84
Max. running current	A	2.61	2.61	3.49	3.49	3.49	3.49

# 9 - Technical Data

## 9.4 Position of shock absorbers and weight distribution on supports



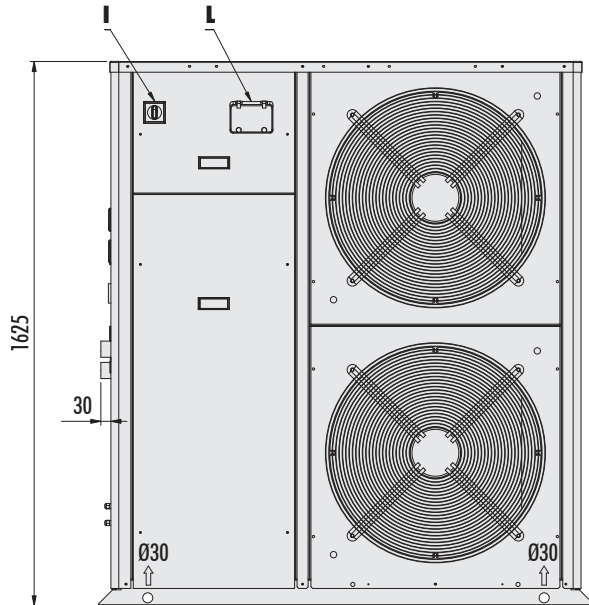
	AQL								AQH								AQC							
	Weight distribution				Operating weight (kg)	Shipping weight (kg)	P1-P4 Coordinates*		Weight distribution				Operating weight (kg)	Shipping weight (kg)	P1-P4 Coordinates*		Weight distribution				Shipping weight (kg)	P1-P4 Coordinates*		
	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)			a (mm)	b (mm)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)			a (mm)	b (mm)	P1 (kg)	P2 (kg)	P3 (kg)	P4 (kg)		a (mm)	b (mm)	
40	120	113	87	93	413	403	1054	1977	126	120	89	96	431	422	1054	1977	114	108	81	88	391	1054	1977	
45	123	117	87	94	421	411	1054	1977	130	123	90	97	440	430	1054	1977	117	111	82	88	399	1054	1977	
50	130	120	93	103	446	436	1054	1977	137	127	96	106	467	457	1054	1977	123	113	88	98	422	1054	1977	
60	150	138	94	106	489	476	1054	1977	161	149	98	110	517	504	1054	1977	141	129	87	99	456	1054	1977	
65	143	131	105	117	496	483	1054	1977	153	141	109	121	524	511	1054	1977	134	122	99	111	466	1054	1977	
75	144	132	107	118	502	488	1054	1977	155	143	110	122	530	517	1054	1977	135	123	100	112	469	1054	1977	
40 1P	121	115	104	110	450	434	1054	1977	127	121	107	113	468	453	1054	1977								
45 1P	124	118	105	111	458	442	1054	1977	131	124	107	114	476	461	1054	1977								
50 1P	132	122	111	121	486	470	1054	1977	140	130	114	123	507	490	1054	1977								
60 1P	143	132	124	136	535	516	1054	1977	153	142	128	140	563	545	1054	1977								
65 1P	145	134	126	137	542	523	1054	1977	157	145	128	140	570	552	1054	1977								
75 1P	145	134	126	137	548	529	1054	1977	159	148	129	140	576	557	1054	1977								
40 2P	129	122	110	117	478	460	1054	1977	135	128	113	120	497	479	1054	1977								
45 2P	132	126	111	118	487	468	1054	1977	139	132	114	121	505	487	1054	1977								
50 2P	140	130	119	129	518	499	1054	1977	148	138	121	131	538	520	1054	1977								
60 2P	151	139	131	143	565	544	1054	1977	162	149	135	147	593	572	1054	1977								
65 2P	153	141	133	145	572	551	1054	1977	165	153	135	147	600	579	1054	1977								
75 2P	153	141	132	145	578	556	1054	1977	168	156	135	147	606	585	1054	1977								
40 1P+T	141	135	152	159	587	476	1054	1977	148	141	155	162	606	494	1054	1977								
45 1P+T	144	138	153	159	595	484	1054	1977	151	144	156	162	614	503	1054	1977								
50 1P+T	152	142	160	170	623	512	1054	1977	159	150	163	172	644	532	1054	1977								
60 1P+T	175	163	195	207	740	572	1054	1977	185	172	200	212	769	600	1054	1977								
65 1P+T	179	167	195	207	748	579	1054	1977	188	175	200	212	776	607	1054	1977								
75 1P+T	180	168	197	208	753	585	1054	1977	190	178	200	213	781	613	1054	1977								
40 2P+T	146	139	157	164	607	495	1054	1977	152	145	160	167	625	513	1054	1977								
45 2P+T	149	143	158	165	615	503	1054	1977	156	149	161	168	633	522	1054	1977								
50 2P+T	157	147	166	176	646	534	1054	1977	165	155	168	179	667	554	1054	1977								
60 2P+T	181	169	201	214	765	595	1054	1977	191	177	206	219	793	623	1054	1977								
65 2P+T	184	172	202	214	772	602	1054	1977	194	181	206	219	800	631	1054	1977								
75 2P+T	186	174	203	215	778	608	1054	1977	196	183	206	219	806	636	1054	1977								

\* Dimensions are referred to unit with antivibration mounted isolators.

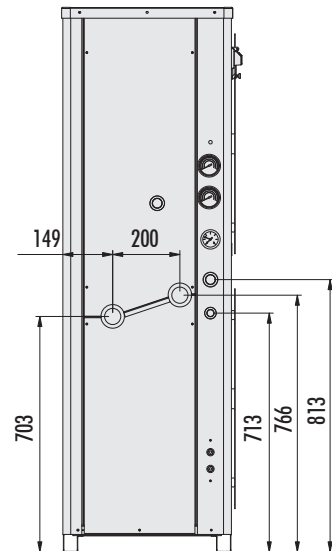
# 9 - Technical Data

## 9.5 Dimensional Drawings - Units AQL/AQH 20-35

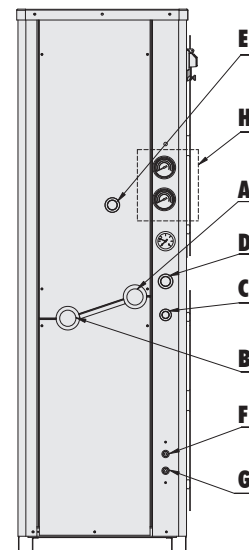
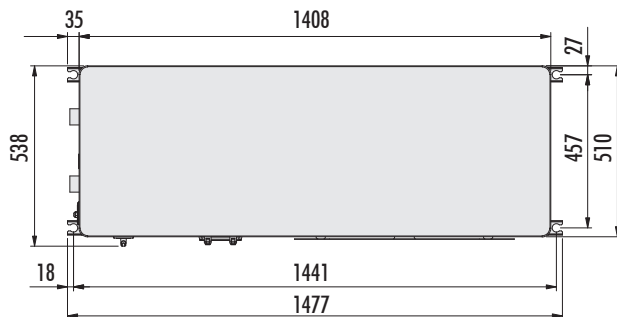
Front view



Side view



Top view



<b>A</b>	Water inlet Ø1 1/2" gas male
<b>B</b>	Water outlet Ø1 1/2" gas male
<b>C</b>	Auxiliary lines
<b>D</b>	Electrical power supply
<b>E</b>	Sight glass inspection
<b>F</b>	High pressure tap
<b>G</b>	Low pressure tap
<b>H</b>	Gauge kit (optional)
<b>I</b>	Main switch
<b>L</b>	Control keypad/display

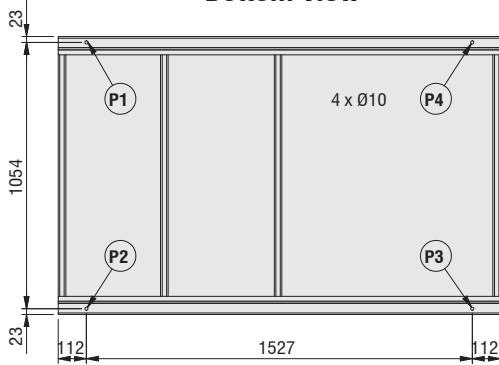
Dimensions in mm.



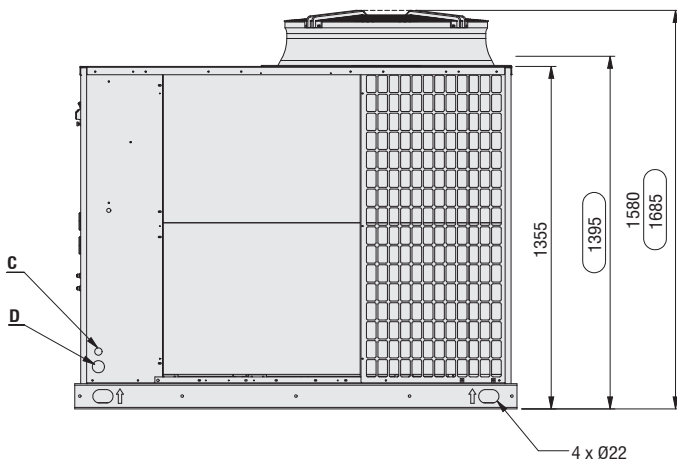
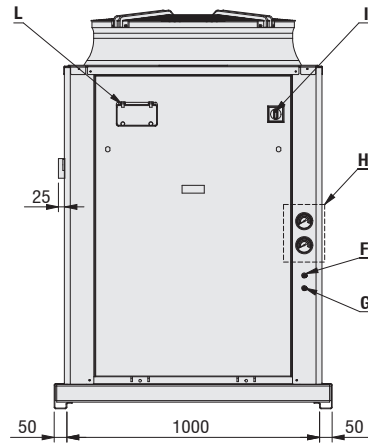
# 9 - Technical Data

## Dimensional Drawings - Units AQL/AQH 40-50

**Bottom view**

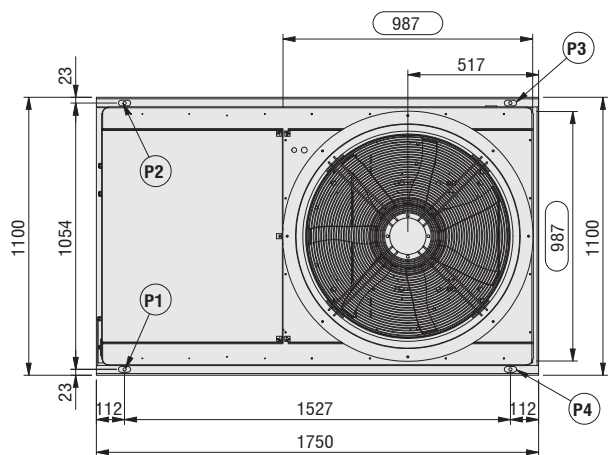
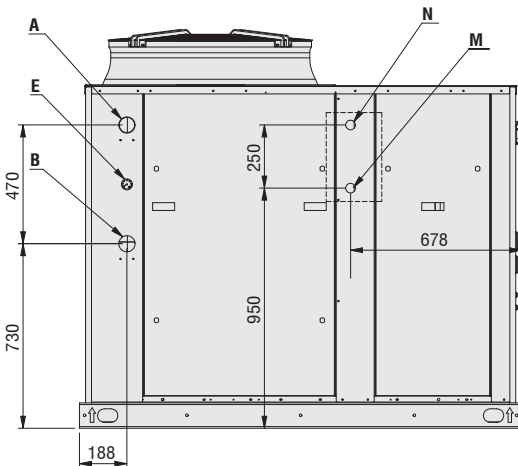


**Front view**



**Side view**

**Top view**



Dimensions in mm.

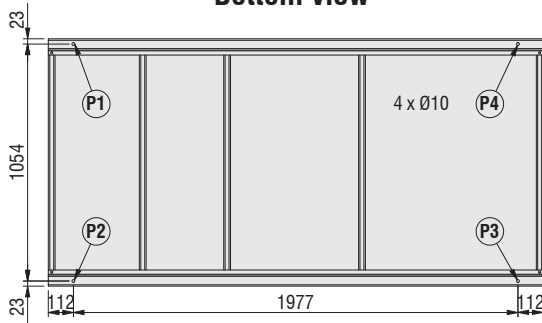
<b>A</b>	Water inlet Ø2" gas male	<b>F</b>	High pressure tap
<b>B</b>	Water outlet Ø2" gas male	<b>G</b>	Low pressure tap
<b>C</b>	Electrical auxiliary lines	<b>H</b>	Gauge kit (accessory)
<b>D</b>	Electrical power supply	<b>I</b>	Main switch
<b>E</b>	Hydrometer	<b>L</b>	Control keypad/display

<b>M</b>	Desuperheater water inlet Ø1" gas male (optional)
<b>N</b>	Desuperheater water outlet Ø1" gas male (optional)
<b>XXX</b>	Only for SIF fan model
<b>P1, P2, P3, P4</b>	AVM position

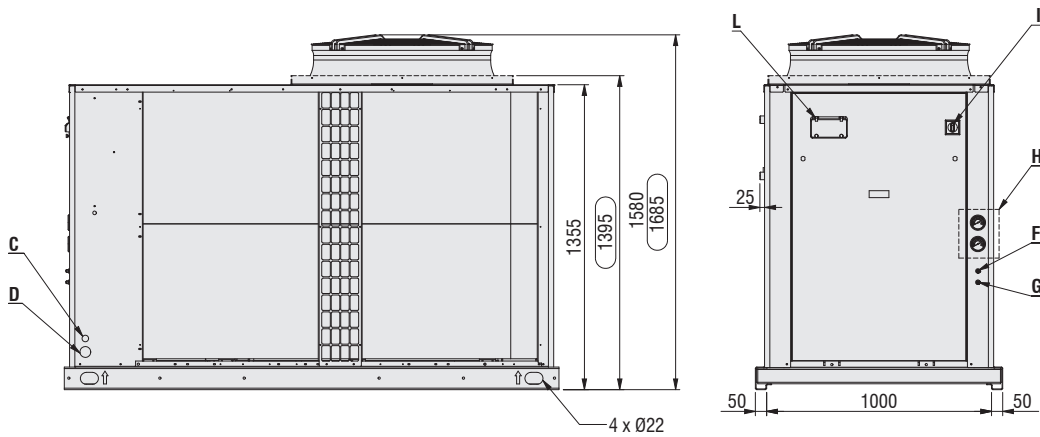
# 9 - Technical Data

## Dimensional Drawings - Units AQL/AQH 60-75

Bottom view

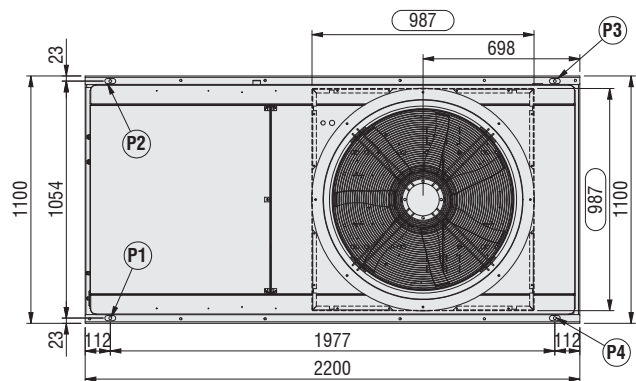
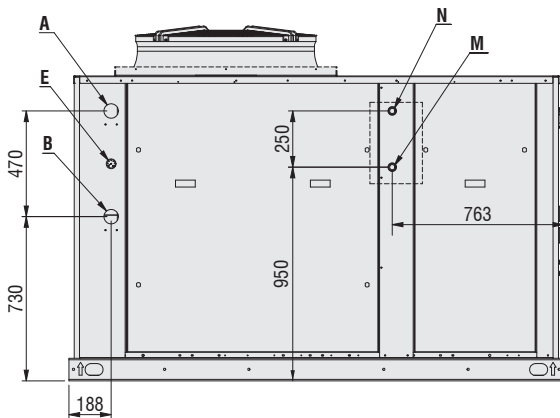


Front view



Side view

Top view



Dimensions in mm.

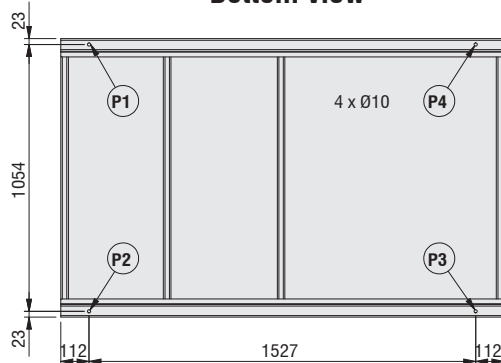
<b>A</b>	Water inlet Ø2" gas male	<b>F</b>	High pressure tap
<b>B</b>	Water outlet Ø2" gas male	<b>G</b>	Low pressure tap
<b>C</b>	Electrical auxiliary lines	<b>H</b>	Gauge kit (accessory)
<b>D</b>	Electrical power supply	<b>I</b>	Main switch
<b>E</b>	Hydrometer	<b>L</b>	Control keypad/display

<b>M</b>	Desuperheater water inlet Ø1" gas male (optional)
<b>N</b>	Desuperheater water outlet Ø1" gas male (optional)
<b>XXX</b>	Only for SIF fan model
<b>P1, P2, P3, P4</b>	AVM position

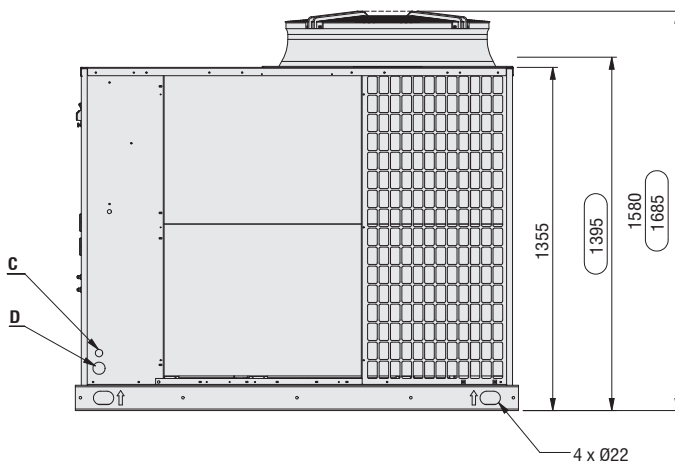
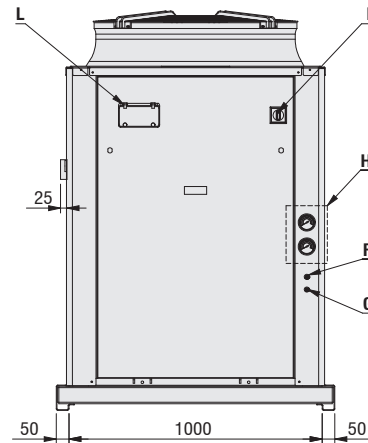
# 9 - Technical Data

## Dimensional Drawings - Units AQC 40 to 50 - R410A

**Bottom view**

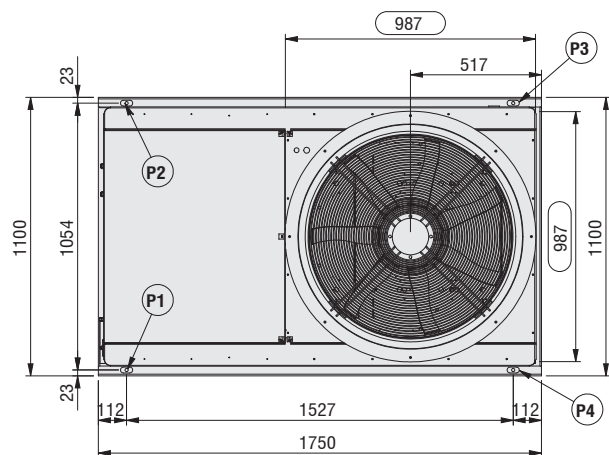
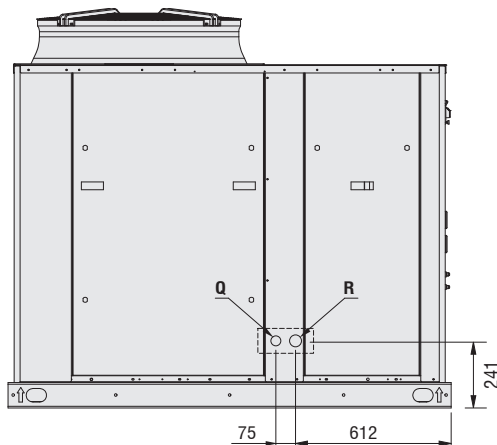


**Front view**



**Side view**

**Top view**



Dimensions in mm.

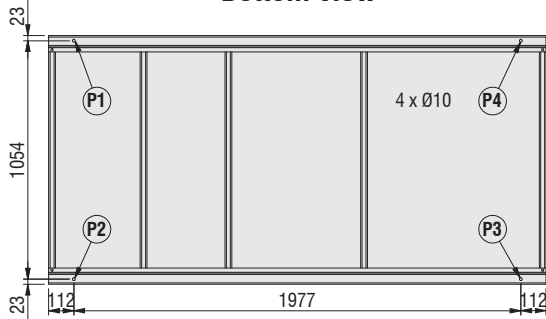
<b>C</b>	Electrical auxiliary lines
<b>D</b>	Electrical power supply
<b>F</b>	High pressure tap
<b>G</b>	Low pressure tap
<b>H</b>	Gauge kit (accessory)
<b>I</b>	Main switch
<b>L</b>	Control keypad/display

<b>XXX</b>	Only for SIF fan model
<b>P1, P2, P3, P4</b>	AVM position
<b>Q</b>	Liquid line Ø 5/8"
<b>R</b>	Suction line Ø 1 3/8"

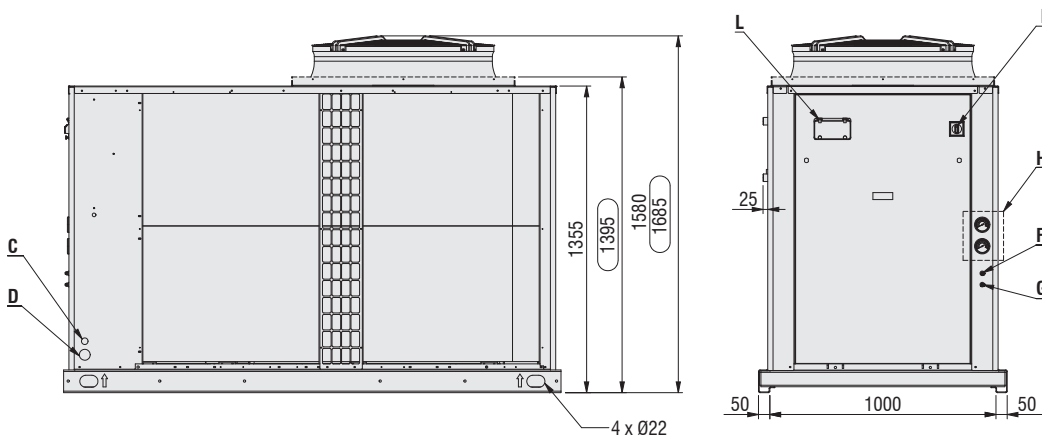
# 9 - Technical Data

## Dimensional Drawings - Units AQC 60 to 75 - R410A

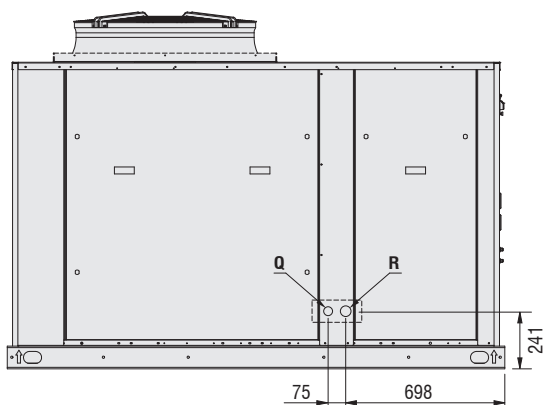
Bottom view



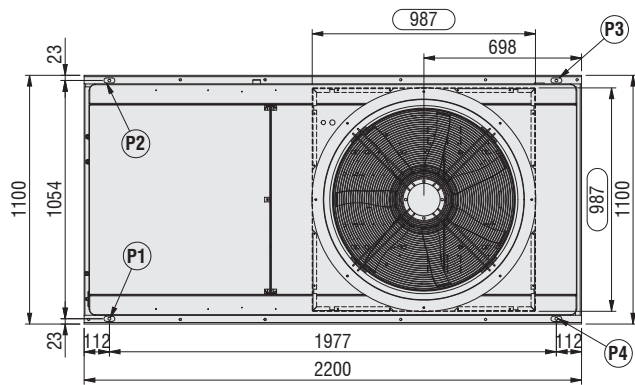
Front view



Side view



Top view



Dimensions in mm.

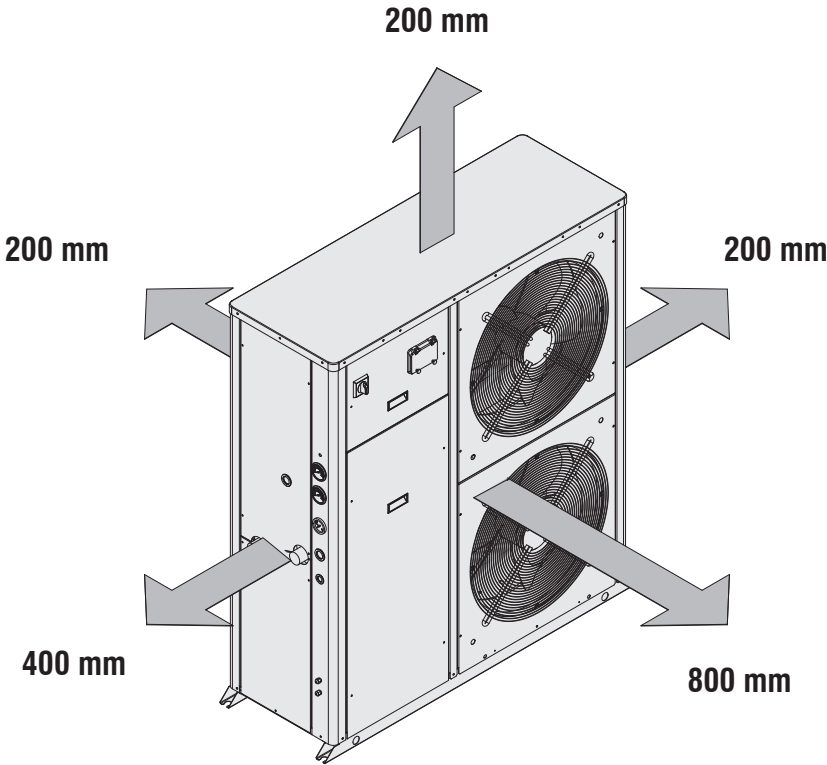
<b>C</b>	Electrical auxiliary lines
<b>D</b>	Electrical power supply
<b>F</b>	High pressure tap
<b>G</b>	Low pressure tap
<b>H</b>	Gauge kit (accessory)
<b>I</b>	Main switch
<b>L</b>	Control keypad/display

<b>XXX</b>	Only for SIF fan model
<b>P1, P2, P3, P4</b>	AVM position
<b>Q</b>	Liquid line Ø 7/8"
<b>R</b>	Suction line Ø 1 3/8"

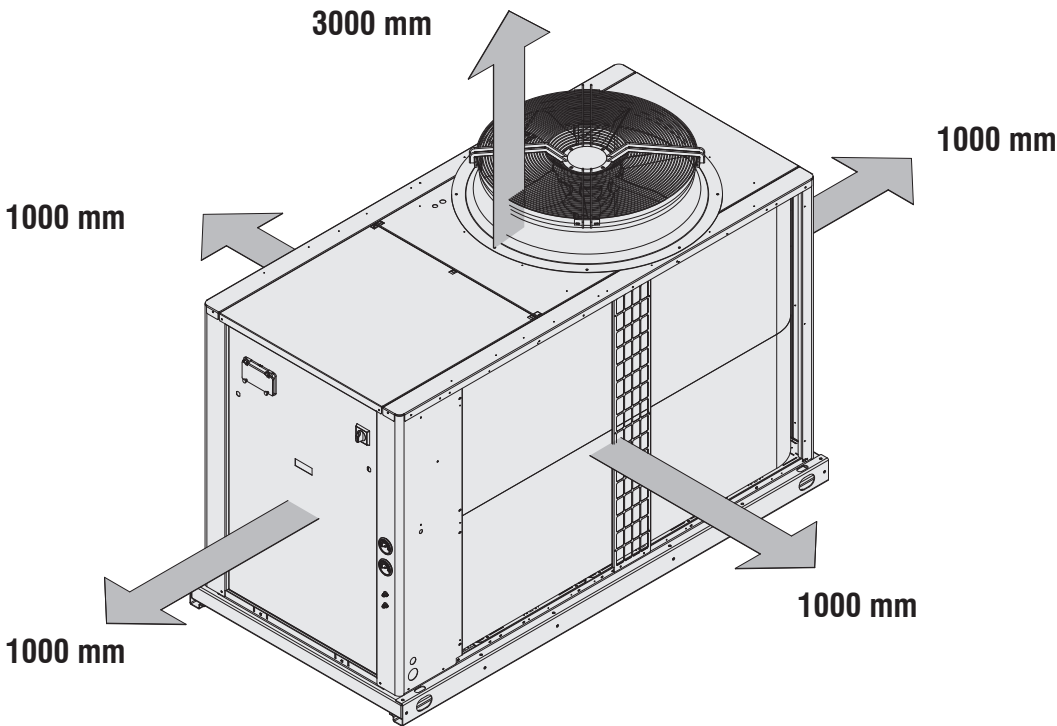
# 9 - Technical Data

## 9.6 Space Requirements

Units AQL/AQH 20 to 35





Units AQL/AQH/AQC 40 to 75



# 10 - Maintenance

Carefully read the “Safety” section of this manual before carrying out any maintenance operations.

	<p><b>Do not discharge the refrigerant into the atmosphere while the refrigeration circuits are being drained. Use appropriate recovery equipment.</b></p> <p><b>When the recovered refrigerant cannot be re-used, return it to the manufacturer.</b></p>
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	<p><b>Do not throw away the waste oil of the compressor, because it contains refrigerant in solution.</b></p> <p><b>The waste oil must be returned to the manufacturer.</b></p>
---	---

Unless otherwise specified, the operations described below may be carried out only by a trained maintenance operator.

## 10.1 General requirements

Units have been designed for continuous operation, providing that they are subjected to regular maintenance, within the limits specified in this manual. Each unit must be serviced according to the programme by the User/Customer, and must be inspected at regular intervals by the personnel of one authorised Service Centers.

It is the responsibility of the User to meet these maintenance requirements and/or to enter into an agreement with one of authorised Service Centers, so as to properly safeguard the operation of the appliance.

During the warranty period, in case of damage or failures caused by improper maintenance, manufacturer will not refund the costs incurred to repair the appliance in its original state.

The provisions of this section apply only to standard units; according to the order requirements, other documentation may be added, concerning any modifications or supplementary accessories.

## 10.2 Planned maintenance


Maintenance inspections must be carried out according to the program below, by a qualified person.


As a general rule, units cannot be repaired directly by the user, who shall not try to service or repair any failures or anomalies identified during daily inspections. If you are in doubt, please contact authorised Service Centre.

Operations	Daily	Weekly	Monthly	Beginning of season	End of season
Check the temperature of the leaving fluid	●				
Check the pressure drops in the heat exchanger		●			
Check for electric absorption		●			
Check suction pressure and temperature		●			
Check delivery pressure and temperature		●			
Check the oil level in the compressor		●			
Check that there are no gas bubbles in the liquid line		●			
Check that the fins of the external coil are clean (if any)			●		
Check the operation of the oil heaters			●		
Check the remote control switches			●		
Check the operation of the LP pressure switch				●	
Check the operation of the HP pressure switch				●	
Check the insulation of the heat exchanger				●	
Check that terminals are tightened				●	
Check that the terminals' screws are tightened				●	
Clean the exterior of the unit with water and soap				●	
Check the density of the antifreeze (if any)				●	●
Check the operation of the flow switches				●	
Check the operation of the solenoid valve				●	●

## 10 - Maintenance

### 10.3 Refrigerant charge

	<p><b>Do not inject refrigerant liquid into the LP side of the circuit. Be very careful, and charge the circuit properly.</b></p> <p><b>If the charge is insufficient, the efficiency of the unit will be lower than expected. In the worst of cases the LP transducer may stop the unit.</b></p> <p><b>In the presence of an excess charge, the condensing pressure will rise (in the worst of cases, the HP pressure switch may be activated, resulting in the stop of the equipment), and the consumption will increase as well.</b></p>
---	---

	<p><b>It is strictly forbidden to use the compressor as a vacuum pump to drain the plant.</b></p>
---	---

Fill the refrigeration circuit after it has been drained for maintenance purposes (leaks, replacement of the compressor etc.). The amount of the charge is indicated on the plate affixed to the unit.

Before refilling, it is important to drain and de-hydrate the circuit, thus obtaining a minimum abs. pressure value of 50 Pa.


Inject the refrigerant fluid before removing the vacuum, then fill the circuit up to 90% of the total gas requirement (in liquid form). The appliance must be filled through the filling valve on the liquid line, on the outlet side of the condenser.

It is recommended to connect the refrigerant cylinder to the filling valve on the liquid line, and to arrange it in such a way as to inject only liquid refrigerant.

### 10.4 Compressor


Compressors are delivered with the necessary charge of lubricating oil. During normal operation, this charge is sufficient for the whole life of the unit, providing that the efficiency of the refrigeration circuit is satisfactory and if it has not been overhauled.

If the compressor needs to be replaced (following a mechanical failure or if burnt), contact one of authorised Service Centers.

	<p><b>Compressors use polyester oil. During maintenance operations on the compressor, or if you have to open the refrigerant circuit in any point, remember that this type of oil is highly hygroscopic, and accordingly it is important that it is not left exposed to the weather for prolonged periods, as this would require the replacement of the oil.</b></p>
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### 10.5 Condenser

The condenser's coils consist of copper pipes and aluminium fins. In the presence of leaks caused by any damage or shock, the coils shall be repaired or replaced by one authorised Service Center. To ensure the effective and correct operation of the condenser coils, it is important to keep the condenser's surface perfectly clean, and to check that there is no foreign matter, such as leaves, wires, insects, waste etc. If the coil becomes dirty, there is an increase in the absorption of electric energy. Furthermore, the maximum pressure alarm may be activated and may halt the unit.

	<p><b>Be careful not to damage the aluminium fins during cleaning.</b></p>
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The condenser must be cleaned with a LP compressed air jet, parallel to the aluminium fins, in the direction opposite to the air circulation.

To clean the coil you can use also a vacuum cleaner, or a jet of water and soap.

### 10.6 Fans

The fans of the condenser, of axial type, are complete with impeller with aerodynamic profile blades and a cylindrical nozzle. The motor's bearings are lubricated forever.

### 10.7 Dehydrating filter

The refrigeration circuits are provided with dehydrating filters.

The filter clogging is marked by the presence of air bubbles in the sight glass, or by the difference between the temperatures measured downstream from and upstream of the drying filter. If, once the cartridge has been cleaned, there are still some air bubbles, the appliance has lost a part of the refrigerant charge in one or more points, that must be identified and serviced.

## 10 - Maintenance

### 10.8 Sight glass

The sight glass is used for inspecting the refrigerant flow and the humidity % of the refrigerant. The presence of bubbles indicates that the dehydrating filter is clogged or the charge insufficient.

A colour indicator is positioned inside the sight glass. If you compare the colour of the indicator to the scale on the ring of the sight glass, you can calculate the percentage of humidity of the refrigerant. If it is excessive, replace the filter's cartridge, operate the appliance for 1 day and then check the humidity % again. When the humidity % is within the pre-determined range, no other operations are required. If the humidity % is still too high, replace the dehydrating filter again, start the unit and operate it for another day.

### 10.9 Thermostatic expansion valve

The circuit of the unit is equipped with a thermostatic expansion valve, with external equalizer.

The valve is factory calibrated for an overheating of 5 °C.

Procedure to check for overheating:

- Measure the suction pressure with the pressure gauges on the board of the unit or using a pressure gauge connected to the service valve on the suction side.
- From the pressure gauge's temperature scale, measure the saturated suction temperature (Tsa) which corresponds to the pressure value.
- Using a contact pressure gauge affixed to the outlet fitting of the gas of the evaporator, measure the actual temperature (Tse).

Overheating calculation (S):

$$S = Tse - Tsa$$

Overheating is regulated through the thermostatic expansion valve.

Make the adjusting screw follow a complete turn, and operate the appliance for five minutes.

Check again and, if necessary, repeat the regulation.

If the expansion valve cannot be regulated, it is probably broken, and shall be replaced. The replacement must be carried out by a Service Centre.

### 10.10 Evaporator

Check at regular intervals that the water side of the heat exchanger is perfectly clean. To do this, measure the pressure drop, water side (see Section 9) or measure the temperature of the liquid leaving and entering the heat exchanger, and compare it to the evaporation temperature.

To obtain an effective heat exchange, the difference between the temperature of the leaving water and the saturated evaporating temperature must be in the 2 - 4 °C range. A greater difference would indicate a low efficiency of the heat exchanger (i.e. the heat exchanger is dirty).

In this case, the heat exchanger must be subjected to chemical cleaning, an operation that shall be carried out by authorised engineers.

For other maintenance operations (extraordinary overhauling, replacement of the heat exchanger etc.), contact an authorised Service Centre.



## 11 - Troubleshooting

The table below lists the anomalies of operation of the unit, the relevant causes and the corrective measures. For anomalies of any other type or not listed, contact one of authorised Service Centre for technical assistance.

Anomaly	Cause	Operation
<b>The unit continues to work, but without cooling</b>	Insufficient charge of refrigerant.	Refill.
	The dehydrating filter is clogged.	Replace.
<b>Ice on the suction line</b>	Wrong calibration of overheating.	Increase overheating.
		Check the charge.
<b>Excessive noise</b>	Vibration of lines.	Check the clamping brackets, if any.
	Whistler emitted by the thermostatic expansion valve.	Refill.
		Check the dehydrating filter.
	Noisy compressor.	Seized bearings; replace the compressor.
Check that the compressor's locknuts are tightened.		
<b>Low oil level in the compressor</b>	One or more gas or oil leaks in the circuit.	Identify and remove leaks.
	Mechanical failure of the compressor.	Request the intervention of a Service Centre.
	Anomaly of the oil heater of the compressor's base.	Check the electric circuit and the resistor of the heater of the motor base, and replace defective components.
<b>One or both compressors are not working</b>	Breaking of the electric circuit.	Check the electric circuit and detect any ground dispersions and short circuits. Check fuses.
	Intervention of the HP pressure switch.	Reset the pressure switch and the control panel and restart the appliance. Identify and remove the cause that enabled the pressure switch.
	The fuse of the control circuit is broken.	Check for ground dispersions and short circuits. Replace fuses.
	Loosened terminals.	Check and tighten.
	Halt caused by thermal overload of the electric circuit.	Check the operation of check and safety devices. Identify and remove the cause.
	Wrong wiring.	Check wiring of check and safety devices.
	The line voltage is too low.	Check voltage. If problems regard the system, solve them. If they are caused by the distribution network, inform the Energy Distributor.
	Short-circuit of the compressor's motor.	Check the continuity of the winding.
	Seized compressor.	Replace the compressor.
<b>Activation of the LP alarm, stop of the unit</b>	Gas leak.	Identify and remove the leak.
	Insufficient charge.	Refill.
<b>Activation of the HP alarm, stop of the unit</b>	Failure of the pressure switch.	Check the operation of the pressure switch, replace it if defective.
	The delivery valve is partially closed.	Open the valve and replace it, if faulty.
	Substances with condensable gases in the circuit.	Drain the circuit.
	The fan of the condenser is stopped.	Check cables and motor. If defective, repair or replace.
<b>The liquid line is too hot</b>	Insufficient charge.	Identify and remove the cause of the loss of charge and refill.
<b>Frosting of the liquid line</b>	The valve of the liquid line is partially closed.	Check that valves are open.
	The liquid filter is clogged.	Replace the cartridge or the filter.

## 12 - Spare Parts

### 12.1 Spare part list

The table below shows the list of spare parts recommended during the first two years of operation.

Component	Number
Fan	1
High pressure switch	2
Differential water pressure switch	1
High pressure transducer	2
Low pressure transducer	2
Expansion valve	1
Gas filter	1
Four-way valve	1
Electronic main board	1
Auxiliary main board transformer	1
Auxiliary circuit transformer	1
Compressor contactor	2
Pump contactor	1
Water sensor	4
Air sensor	1
Automatic switch compressor protection	2
Automatic switch pump protection	1
Auxiliary contact	4
Fan capacitor	1
Auxiliary switch	1
Fuses	4

### 12.2 Oil for compressors

The compressors are lubricated with polyester oil (P.O.E.).

### 12.3 Wiring diagrams

The wiring diagrams are installed inside the doors of the electrical panels of the unit. Any request for wiring diagrams shall be forwarded to manufacturer's Service Centre.

## 13 - Dismantling, Demolition and Scrapping



**During the draining of the refrigeration circuits, do not let the refrigerant overflow in the surrounding atmosphere.**

**The circuit must be drained using suitable recovery equipment.**



**Do not disperse the waste oil of the compressors in the environment, since it contains some dissolved refrigerant.**

**For the disposal, contact the competent authority for information.**

Unless otherwise specified, the maintenance operations listed below may be carried out by any trained maintenance operator.

### 13.1 Generalities

Open each line that supplies the unit, including the ones of control circuits. Make sure that all disconnecting switches are secured in the off position. The power cables can be disconnected and disassembled. Refer to Chapter 4 for the position of connection points.

Remove all the refrigerant from the refrigeration circuits of the unit and store it in suitable containers, using a recovery unit. If its characteristics have remained the same, the refrigerant can be used again. Contact the competent authority to obtain information about disposal. In **NO** event shall the refrigerant be discharged into the atmosphere. The oil in each refrigeration circuit must be drained and collected into a suitable container; then it shall be disposed of in conformity with local regulations that apply to the disposal of waste lubricants. Any oil spillage must be recovered and disposed of in like manner.

Isolate the unit's heat exchangers from the external hydraulic circuits and drain the heat exchange sections of the plant.



**If no shutoff valves have been provided, it may be necessary to drain the whole plant.**

**If a glycoled solution or a similar fluid has been used in the hydraulic circuits, or if chemical additives have been added to the circulating water, the circulating fluid MUST be drained in a proper way.**

**For NO reason shall a circuit containing glycoled water or a similar solution be discharged directly into the drains or surface waters.**

After draining operations, the piping of the hydraulic networks can be disconnected and disassembled.

Once they have been disconnected as specified, the packaged units can be disassembled in a single piece. First of all, disassemble the anchoring screws and then lift the unit from the position of installation, and hook it to the lifting points provided, using suitable lifting equipment.

To this end, refer to Chapter 4 for the installation of these appliances, to Chapter 9 for their weights and Chapter 3 for handling.

The units that, once disconnected, cannot be removed in a single piece, must be dismantled on site; in this case, be very careful with the weight and handling of every single component.

It is always advisable to dismantle the units following the installation steps, but in reverse.



**Some residues of oil, glycoled water or similar solutions may remain in certain parts of the unit. These residues must be recovered and disposed of according to the procedures specified above.**

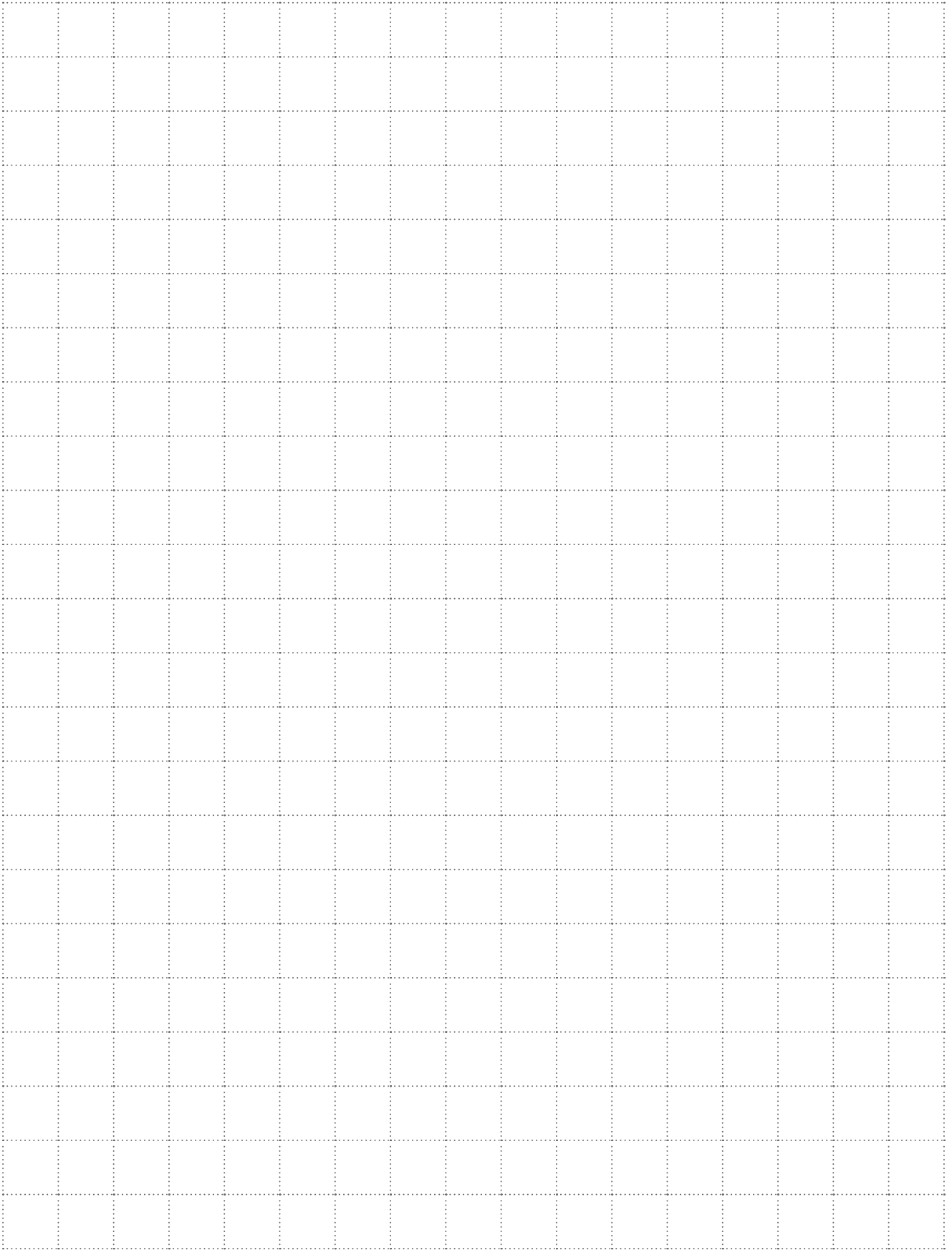
It is very important to ensure that, while a component of the unit is being removed, all the others are properly supported.



**Use only lifting means of adequate capacity.**

Once disassembled, the components of the unit can be disposed of in conformity with current regulations.







## **BUONE NORME DI MANUTENZIONE DEI DISPOSITIVI DI SICUREZZA MONTATI SUL GRUPPO FRIGORIFERO**

Gentile Cliente,

Le ricordiamo alcune indicazioni circa le modalità di manutenzione dei dispositivi di sicurezza montati sul gruppo frigorifero da Lei acquistato.

I dispositivi di sicurezza montati sul gruppo sono stati verificati dal COSTRUTTORE a norma di legge.

È opportuno che l'utente provveda periodicamente (è consigliato ogni anno) a far verificare da personale qualificato la taratura ed il corretto intervento dei dispositivi di sicurezza montati sul gruppo.

In particolare la taratura della/e valvole di sicurezza dovrebbe essere verificata al banco intercettando opportunamente il circuito e/o il refrigerante e registrando l'avvenuta verifica sulla scheda di manutenzione del gruppo frigorifero (a disposizione dei tecnici CE/PED che eventualmente ne prenderanno visione).

L'utente avrà cura di conservare efficienti ed in buono stato l'evaporatore ed i suoi accessori e provvederà ad eventuali sostituzioni degli stessi con altri di tipo analogo.

In caso di sostituzione, la valvola di sicurezza e i pressostati di alta pressione dovranno avere caratteristiche equivalenti a quelle fornite e rilasciate con certificato CE/PED.

Si consiglia in occasione della verifica delle valvole di sicurezza di far controllare il corretto intervento dei pressostati di alta pressione.

Per informazioni circa le modalità operative, la strumentazione e la scelta di personale qualificato, è possibile contattare IL COSTRUTTORE.

### **IMPORTANT NOTICE – Maintenance instructions**

Please read carefully the following instructions for the maintenance of safety devices fitted on this refrigeration machine.

All safety devices fitted on the machine by MANUFACTURE have been checked and tested in accordance with European Regulations.

The machine has been designed to operate continuously provided it is regularly maintained and operated within the limitations given in the "Installation, Commissioning, Operation and Maintenance Manual". The unit should be maintained in accordance with the schedule by the operator/customer, backed up regular service and maintenance visit by an authorised service Centre.

It is the responsibility of the owner to provide for these regular maintenance requirements by a competent person. If in any doubt contact your local Service Centre.

In particular, all safety valves where fitted and safety pressure switches should be tested and calibrated. Where necessary test certificate provided by a certified authority must be retained as a record together with the Maintenance Log.

Date: 18/01/2012

**Nazareno Mantovani**

Quality / Service Director



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