



Pro-Dialog+

## INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS



CE

Air-cooled liquid chillers and reversible cycle  
air-water heat pump with integrated hydraulic  
module

30RB/30RQ 017-040 A

**AQUASNAP. AQUASNAP.**  
Reversible

# CONTENTS

---

<b>PHYSICAL DATA AND ELECTRICAL DATA .....</b>	<b>4</b>
Model 30RB .....	4
Model 30RQ .....	5
<b>DIMENSIONS AND LOCATION OF HYDRAULIC CONNECTIONS (MM) .....</b>	<b>6</b>
Mod. 30RB/30RQ 017-021 .....	6
Mod. 30RB/30RQ 026-040 .....	7
<b>USER INTERFACE AND MAIN SWITCH .....</b>	<b>7</b>
<b>CLEARANCES (MM) .....</b>	<b>8</b>
For horizontal outlet unit (30RB-30RQ 017-021) .....	8
For vertical outlet unit (30RB-30RQ 026-040) .....	8
<b>GENERAL INFORMATION AND HYDRAULIC MODULE .....</b>	<b>9</b>
Unit installation .....	9
Hydraulic module .....	11
<b>WATER CONNECTIONS .....</b>	<b>12</b>
Outlet available static pressure of the unit with hydraulic module .....	14
<b>ELECTRICAL CONNECTIONS AND REFRIGERANT CHARGE .....</b>	<b>15</b>
Electrical connections .....	15
Liquid refrigerant charge .....	15
<b>REFRIGERANT CHARGE AND ELECTRONIC CONTROL .....</b>	<b>16</b>
Electronic control .....	17
<b>START-UP, COMPRESSOR REPLACEMENT .....</b>	<b>18</b>
Start-up .....	18
Compressor replacement .....	18
<b>PUMP REPLACEMENT, UNIT PROTECTION DEVICES .....</b>	<b>19</b>
Pump replacement .....	19
Safety considerations related to protection devices .....	19
Description of unit protection devices .....	19
Table III: Pressure switch settings .....	19
Operating limits 30RB .....	19
Operating limits 30RQ .....	20
Minimum and maximum water flow rates in the plate heat exchangers .....	20
<b>UNIT PROTECTION DEVICES, OPERATING LIMITS AND OPERATING RANGE .....</b>	<b>21</b>
Brine operation .....	21
Maximum water content of hydraulic circuit .....	22
<b>GENERAL MAINTENANCE, MAINTENANCE AND FINAL RECOMMENDATIONS .....</b>	<b>23</b>
General maintenance .....	23
Maintenance .....	24
Final recommendations .....	25
Fire and explosion .....	25
Log book .....	25
<b>TROUBLESHOOTING .....</b>	<b>26</b>
<b>START-UP CHECK LIST .....</b>	<b>27</b>

## **AIR-COOLED LIQUID CHILLERS AND REVERSIBLE AIR-TO-WATER HEAT PUMPS WITH INTEGRATED HYDRONIC MODULE**

---

For the use of the control system, refer to the Pro-Dialog+ control manual.

# 1 - PHYSICAL DATA AND ELECTRICAL DATA

## 1.1 - Model 30RB

**Table I: Physical data**

30RB		017	021	026-A	033-A	040-A
<b>Operating weight</b>						
With hydraulic module	Kg	189	208	255	280	291
Refrigerant charge R-410A	Kg	5,5	6,4	5,8	8,6	8,8
<b>Compressor</b>		One scroll compressor				
<b>Evaporator</b>		One plate heat exchanger				
Net water volume	l	1,52	1,9	1,71	2,28	3,8
Water connections (MPT gas)	inches	1	1	1-1/4	1-1/4	1-1/4
Maximum water pressure (unit without hydraulic module)	kPa	1000	1000	1000	1000	1000
Maximum water pressure (unit with hydraulic module)	kPa	400	400	400	400	400
<b>Hydraulic module</b>		Pump, mesh filter, expansion tank, flow switch, automatic air purge valve and drain plug and relief valve.				
<b>Pump</b>		One single-speed pump				
Water inlet connection (MPT gas)	inches	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4
Water outlet connection (MPT gas)	inches	1	1	1-1/4	1-1/4	1-1/4
Closed expansion tank water volume	l	5	5	8	8	8
Pre-charge of expansion vessel	bar	1,5	1,5	1,5	1,5	1,5
<b>Water fill system (option)</b>						
Inlet/outlet diameter (MPT gas)	inches	1/2	1/2	1/2	1/2	1/2
<b>Condenser</b>		One, copper tubes and aluminium fins				
<b>Fan</b>		Two, axial type with two speeds		Two-speed axial type		
Diameter	mm	495	495	710	710	710
No. of blades		3	3	7	7	7
Air flow (high speed)	l/s	2212	2212	3530	3530	3530
Fan speed (high speed)	g/min	870	870	900	900	900
<b>Sound levels</b>						
Sound power level 10 <sup>-12</sup> W <sup>(1)</sup>	dB(A)	72	74	78	78	80

(1) Declared dualnumber noise emission values in accordance with ISO 4871 (with an associated uncertainty of +3dB). The values have been rounded and are for information only and not contractually binding.

**Table II: Electrical data**

30RB		017	021	026-A	033-A	040-A
Power	V-ph-Hz	400-3+N-50 (power supply option C) or 400-3-50 (power supply option D)		400-3+N-50 (power supply option C)		400-3-50 (STD - no option)
Voltage range	V	340-460				360-440
Starting current <sup>(1)</sup>	A	75	95	118	118	176
Maximum power drawn (Vn) <sup>(2)</sup>	kW	7,8	9,1	11,0	13,8	17,5
Nominal current drawn <sup>(3)</sup>	A	8	12	16	17	25
Maximum current (Vn) <sup>(4)</sup>	A	13	16	20	24	30
Maximum current (Vn +/-15 or 10%) <sup>(5)</sup>	A	15	18	23	27	36

(1) Max. starting current within the operation limits (corresponding to the current of locked rotor in the compressor)

(2) Input power when the unit is at its operation limits (evaporation temperature = 10°C, condensation temperature = 65°C) and at the rated voltage (400 V)

(3) The currents shown refer to Eurovent conditions (evaporator water inlet and outlet temperature = 12/7°C with air to the condenser at 35°C)

(4) Max. operating current related to the max. input power and rated voltage (400 V)

(5) Max. operating current related to the max. input power and within the range 340-460 V for units size 17 to 33 kW, and 360-440 V for units size 40 kW.

# 1 - PHYSICAL DATA AND ELECTRICAL DATA

## 1.2 - Model 30RQ

**Table I: Physical data**

30RQ		017	021	026-A	033-A	040-A
<b>Operating weight</b>						
With hydraulic module	Kg	206	223	280	295	305
Without hydraulic module	Kg	191	208	-	-	-
Refrigerant charge R-410A	Kg	6,4	7,7	7,6	9,5	9,8
<b>Compressor</b>		One scroll compressor				
<b>Evaporator</b>		One plate heat exchanger				
Net water volume	l	1,52	1,9	2,28	2,85	3,8
Water connections (MPT gas)	inches	1	1	1-1/4	1-1/4	1-1/4
Maximum water pressure (unit without hydraulic module)	kPa	1000	1000	-	-	-
Maximum water pressure (unit with hydraulic module)	kPa	400	400	400	400	400
<b>Hydraulic module</b>		Pump, mesh filter, expansion tank, flow switch, automatic air purge valve and drain plug and relief valve.				
<b>Pump</b>		One single-speed pump				
Water inlet connection (MPT gas)	inches	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4
Water outlet connection (MPT gas)	inches	1	1	1-1/4	1-1/4	1-1/4
Closed expansion tank water volume	l	5	5	8	8	8
Pre-charge of expansion vessel	bar	1,5	1,5	1,5	1,5	1,5
<b>Water fill system (option)</b>						
Inlet/outlet diameter (MPT gas)	inches	1/2	1/2	1/2	1/2	1/2
<b>Condenser</b>		One, copper tubes and aluminium fins				
<b>Fan</b>		Two, axial type with two speeds		Two-speed axial type		
Diameter	mm	495	495	710	710	710
No. of blades		3	3	7	7	7
Air flow (high speed)	l/s	2217	1978	3530	3530	3530
Fan speed (high speed)	g/min	870	870	900	900	900
<b>Sound levels</b>						
Sound power level 10 <sup>-12</sup> W <sup>(1)</sup>	dB(A)	72	74	78	78	80

(1) Declared dual number noise emission values in accordance with ISO 4871 (with an associated uncertainty of +3dB). The values have been rounded and are for information only and not contractually binding.

**Table II: Electrical data**

30RQ		017	021	026-A	033-A	040-A
Power	V-ph-Hz	400-3+N-50 (power supply option C) or 400-3-50 (power supply option D)		400-3+N-50 (power supply option C)		400-3-50 (STD - no option)
Voltage range	V	340-460				360-440
Starting current <sup>(1)</sup>	A	75	95	118	118	176
Maximum power drawn (Vn) <sup>(2)</sup>	kW	7,8	9,1	11,0	13,8	17,5
Nominal current drawn <sup>(3)</sup>	A	8	12	16	17	25
Maximum current (Vn) <sup>(4)</sup>	A	13	16	20	24	30
Maximum current (Vn +/-15 or 10%) <sup>(5)</sup>	A	15	18	23	27	36

(1) Max. starting current within the operation limits (corresponding to the current of locked rotor in the compressor)

(2) Input power when the unit is at its operation limits (evaporation temperature = 10°C, condensation temperature = 65°C) and at the rated voltage (400 V)

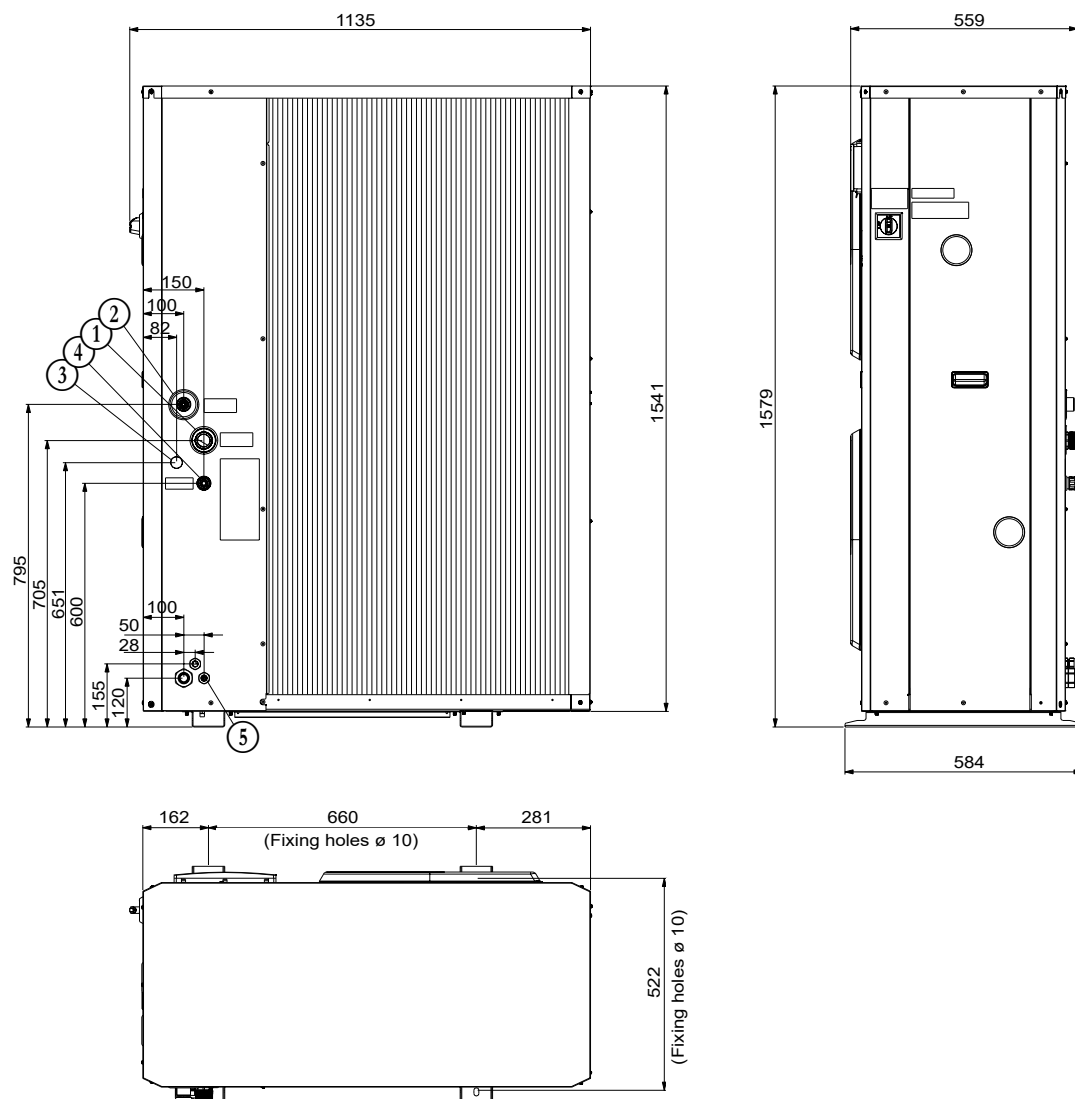
(3) The currents shown refer to Eurovent conditions (evaporator water inlet and outlet temperature = 12/7°C with air to the condenser at 35°C)

(4) Max. operating current related to the max. input power and rated voltage (400 V)

(5) Max. operating current related to the max. input power and within the range 340-460 V for units size 17 to 33 kW, and 360-440 V for units size 40 kW.

## 2 - DIMENSIONS AND LOCATION OF HYDRAULIC CONNECTIONS (MM)

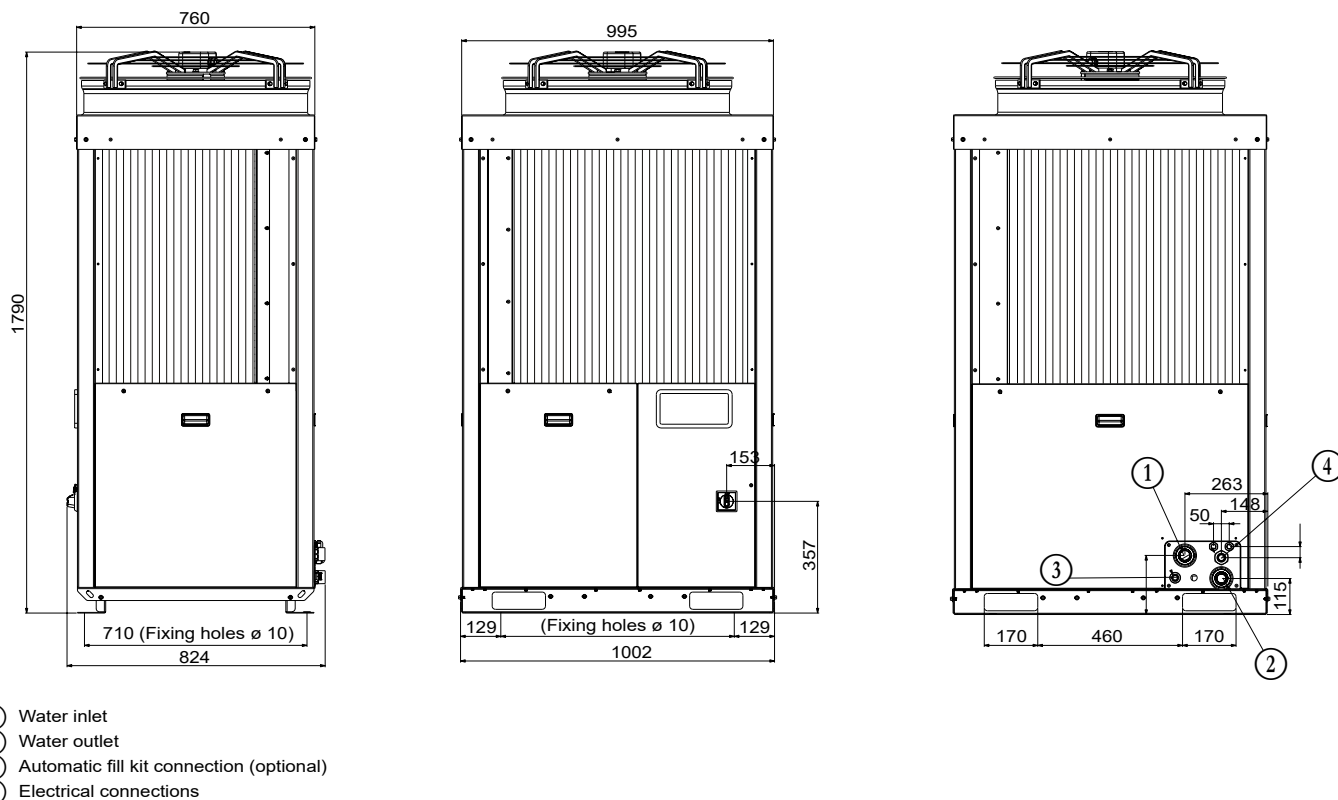
### 2.1 - Mod. 30RB/30RQ 017-021



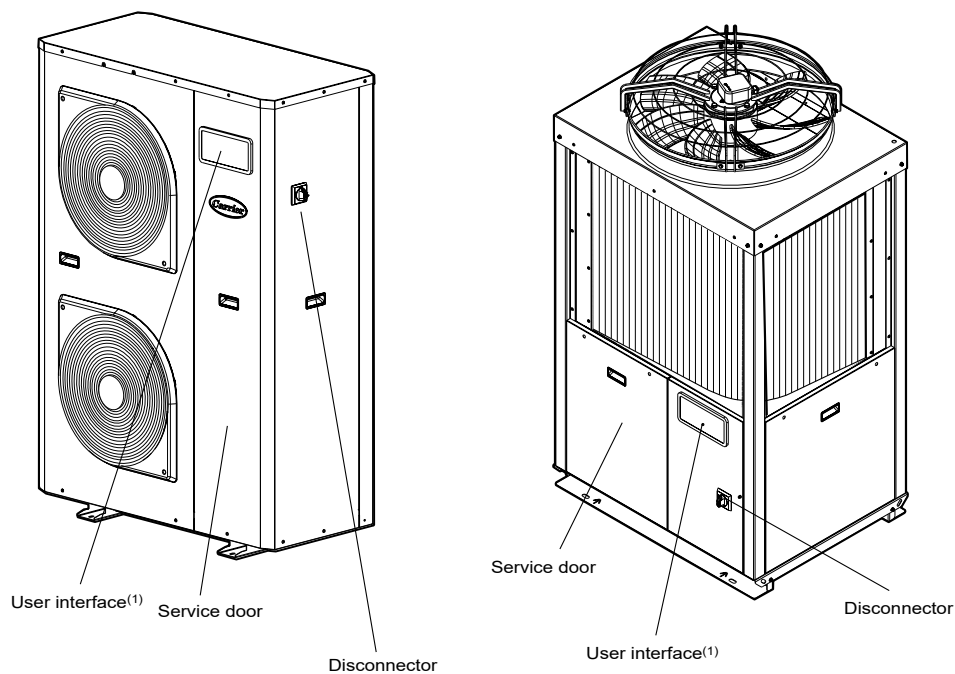
- ① Water inlet
- ② Water outlet
- ③ Fill kit connection
- ④ Relief valve outlet
- ⑤ Electrical connections

## 2 - DIMENSIONS AND LOCATION OF HYDRAULIC CONNECTIONS (MM)

### 2.2 - Mod. 30RB/30RQ 026-040



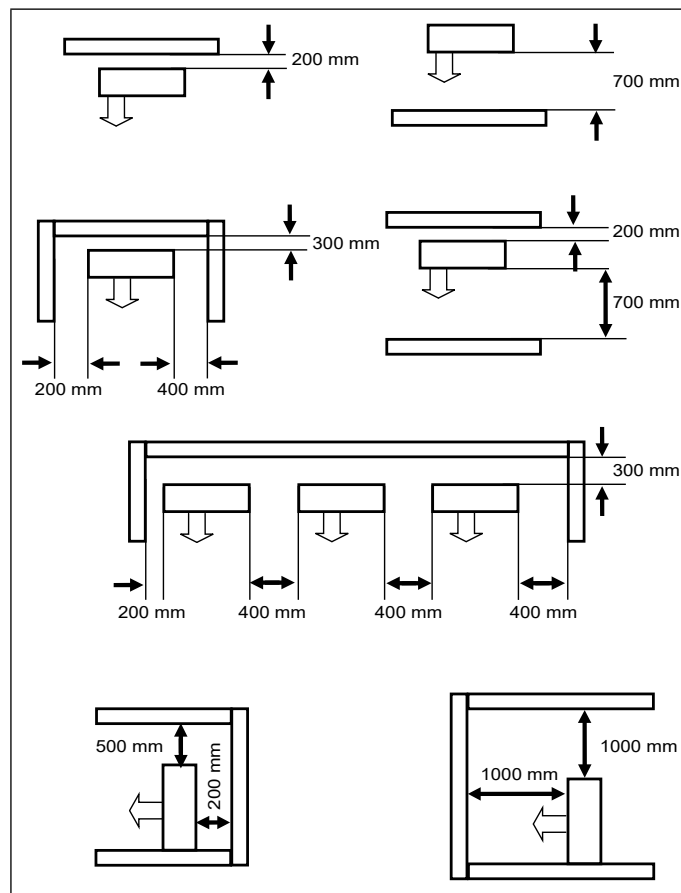
## 3 - USER INTERFACE AND MAIN SWITCH



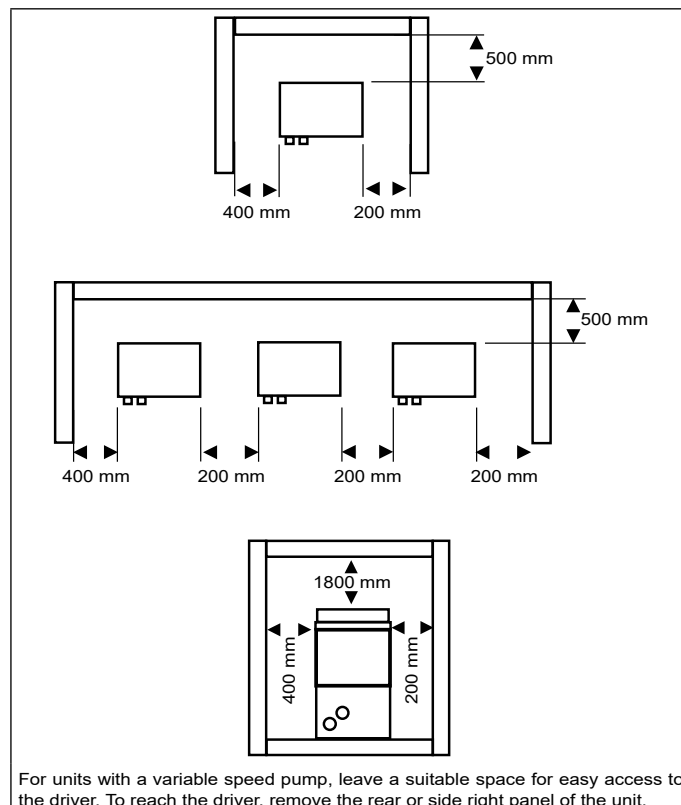
(1) Check that the user interface is protected as described in section "Electronic control".

## 4 - CLEARANCES (MM)

### 4.1 - For horizontal outlet unit (30RB-30RQ 017-021)



### 4.2 - For vertical outlet unit (30RB-30RQ 026-040)





## 5 - GENERAL INFORMATION AND HYDRAULIC MODULE

### 5.1 - Unit installation

**Read this manual thoroughly before starting machine installation.**

**The device complies with the low voltage directives, Machinery Directive and EMC Directive.**

- The installation must be carried out by a qualified installer.
- Follow all current national safety code requirements. In particular ensure that a properly sized and connected ground wire is in place.
- Check that voltage and frequency of the mains power supply are those required; the available power must be adequate to operate any other possible appliances connected to the same line. Also ensure that national safety code requirements have been followed for the mains supply circuit.
- After installation thoroughly test the system operation and explain all system functions to the owner.
- Leave this manual with the owner for consultation during future periodic maintenance.
- Be sure the unit and its components are checked periodically to look for loosen, damaged or broken components. In case of persisting defects, the unit may cause personal injury or property damage.

**IMPORTANT :**

***During the unit installation make first the hydraulic connections and then electrical connections. If unit is uninstalled first disconnect electrical cables, then the hydraulic connections.***

**CAUTION :**

***Disconnect the mains power supply switch before servicing the system or handling any internal parts of the unit.***

- The manufacturer declines any liability for damage resulting from modifications or errors in the electrical or hydraulic connections.
- Failure to observe the installation instructions or use of the unit under conditions other than those indicated in Tables "Operating limits", will immediately void the unit warranty.
- Failure to observe electric safety codes may cause a fire hazard in case of short circuits.
- Do not install or use damaged units.
- During unit operation, some of the refrigerant circuit elements could reach a temperature in excess of 70°C, so only trained and qualified personnel should access areas protected by access panels.
- In case of any malfunctioning turn the unit off, disconnect the mains power supply and contact a qualified service engineer.
- **All of the manufacturing and packaging materials used for your new appliance are compatible with the environment and can be recycled.**

- Dispose of the packaging material in accordance with local requirements.
- This equipment contains refrigerant R-410A that must be disposed of in a proper manner. When disposing of the unit after its operational life, remove it carefully. The unit must then be delivered to an appropriate disposal center or to the original equipment dealer.
- Carefully recover refrigerant within this unit before final disposal or when servicing. Never vent refrigerant to atmosphere.

#### **Choosing the installation site**

- This unit should not be installed in an explosive atmosphere.
- The unit can operate in normal radioelectric atmospheres in residential, commercial and light industrial installations. For other applications, please consult Carrier.
- In the case of heat pump operation with an outdoor temperature of less than 0°C the unit must be installed at least 300 mm above ground level. This is necessary to prevent ice from accumulating on the frame and to permit correct operation also in the event of heavy snowfalls. The unit must be levelled on both axes (the tolerance is less than 2 mm per metre).
- In some cases it may be necessary to fit deflectors against strong winds and to stop snow from hitting the coil directly. These deflectors must be installed so that the normal air circulation is not obstructed.

The standard ducted units are supplied with a rectangular flange. It is advisable to connect the supply duct by interposing a flexible joint to avoid vibrations and noise are transmitted to the building structure. Do not use ducts with a weight exceeding 10 kg to avoid damages to the unit.

Make sure all intake inlets and air outlets are free from any obstacle (such as an open door).

#### Auxiliary condensate drain pan

During the heat pump operation, it might be necessary to drain up to 15 l of condensate.

On demand, Carrier may supply an optional condensate drain pan to be placed under the unit. The corresponding codes are 30RB9003 (for units 17-21 kW) and 30RB9004 (for units 26-40kW).

The pan must then be connected to the condensate drainage system by means of a ø 16 mm vinyl pipe (use the condensate drainage connection supplied with the pan).

On sizes 26- 40 kW, it is possible to disconnect the end of the condensate drain pipe which is fixed to the rear panel and convey the condensate water from the heat exchanger to the auxiliary pan.

When installing the pan, make sure it is levelled and that the condensate water from the unit is discharged correctly.

## 5 - GENERAL INFORMATION AND HYDRAULIC MODULE

### Siting the unit

Check that:

- The location is able to support unit operating weight (Table I).
- There is sufficient space for servicing and air flow around the unit (see "Clearances" figure).
- The selected site is without dust or foreign material which could obstruct the coil.
- When installing the unit on the ground, the selected site is not subject to flooding.
- The installation is in accordance with local rules and standards governing the installation of air conditioning equipment.
- Vibration absorbers have been provided throughout the installation to prevent noise from being transmitted.
- To avoid possible damages (in particular to sizes 26-40 kW) fix the vibration absorbers under a feet-supporting frame of the unit.
- No force or effort must be applied to pressurised parts.

### Transport

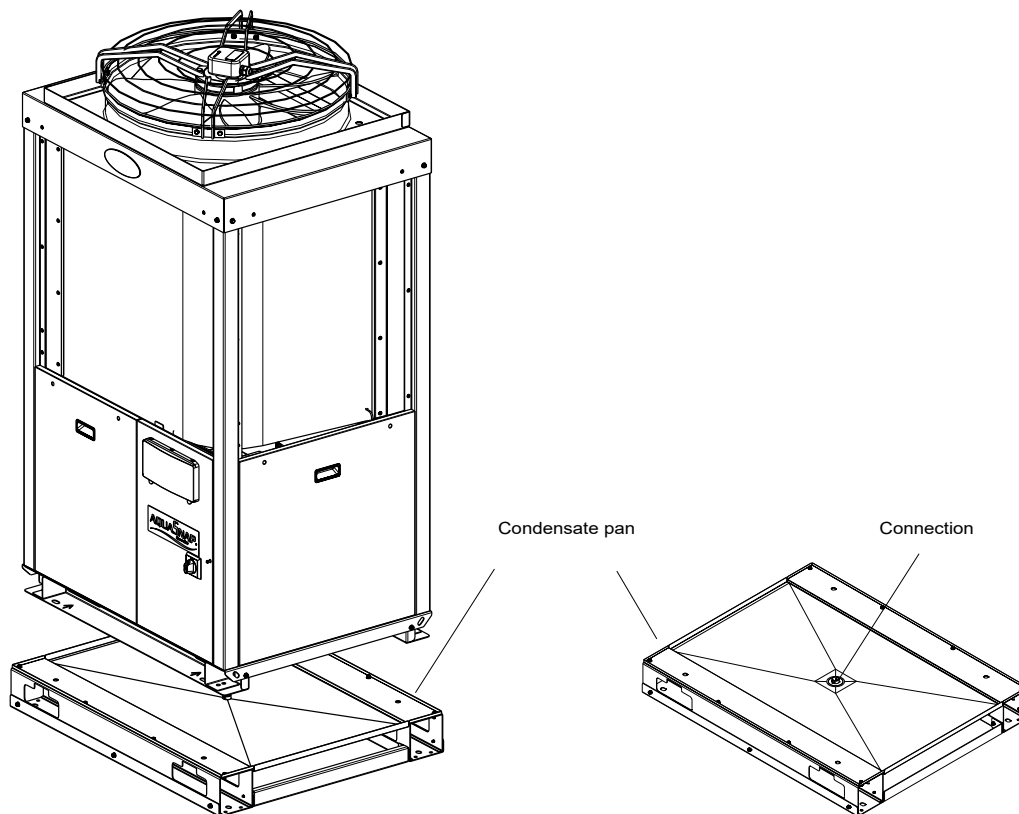
1. Use spreader bars to lift the unit to avoid damage to the panels. Avoid violent movements.
2. Never roll or swing the unit more than 15°.

#### **IMPORTANT:**

**Ensure that all unit panels are fixed in place before moving the unit. Raise and set down the unit carefully.**

#### **IMPORTANT:**

**Always ensure that the unit is levelled correctly.**



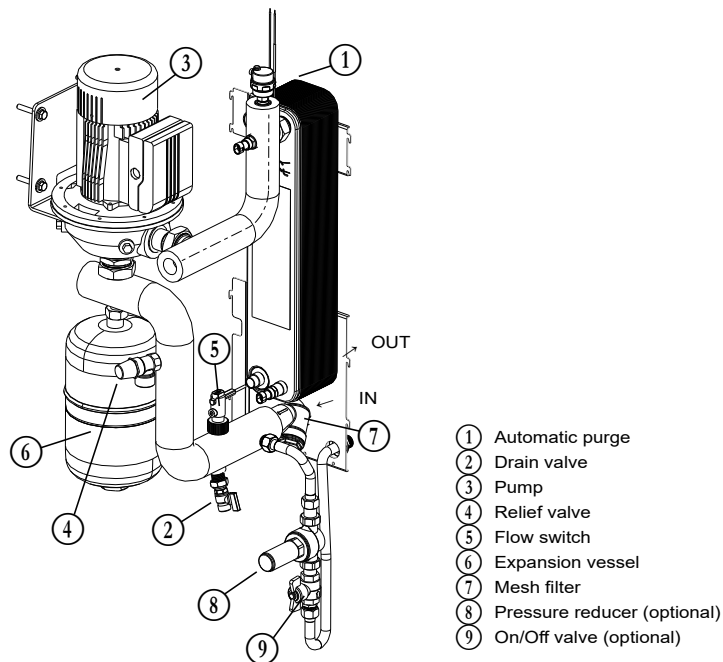
## 5 - GENERAL INFORMATION AND HYDRAULIC MODULE

### 5.2 - Hydraulic module

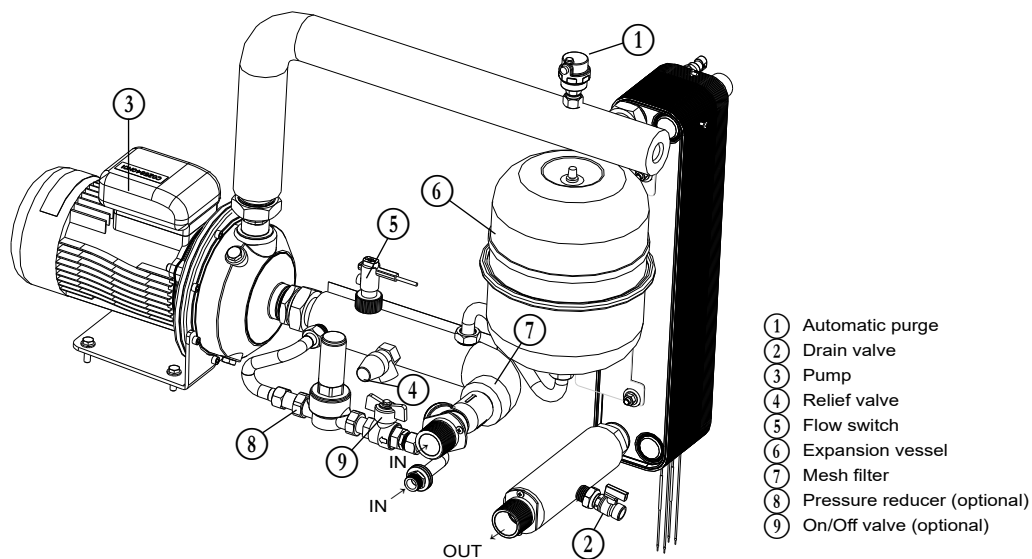
The hydraulic module is factory-installed.

This eliminates the need to install the necessary components on-site, making the unit more compact and easy to install.

#### 5.2.1 - Hydraulic module for 30RB/30RQ 017-021 unit

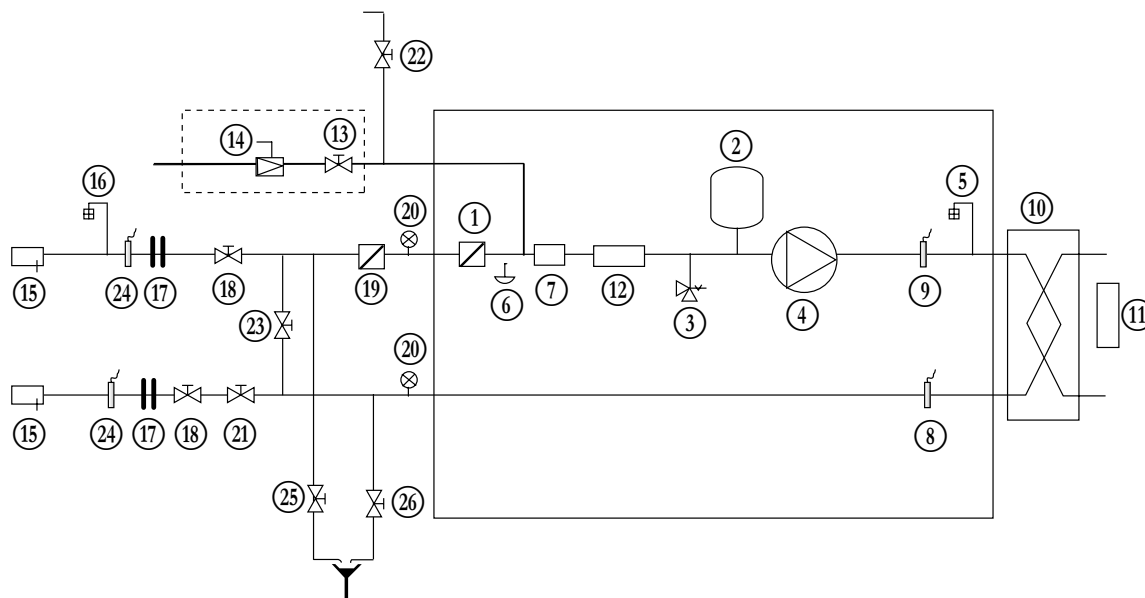


#### 5.2.2 - Hydraulic module for 30RB/30RQ 026-040 unit

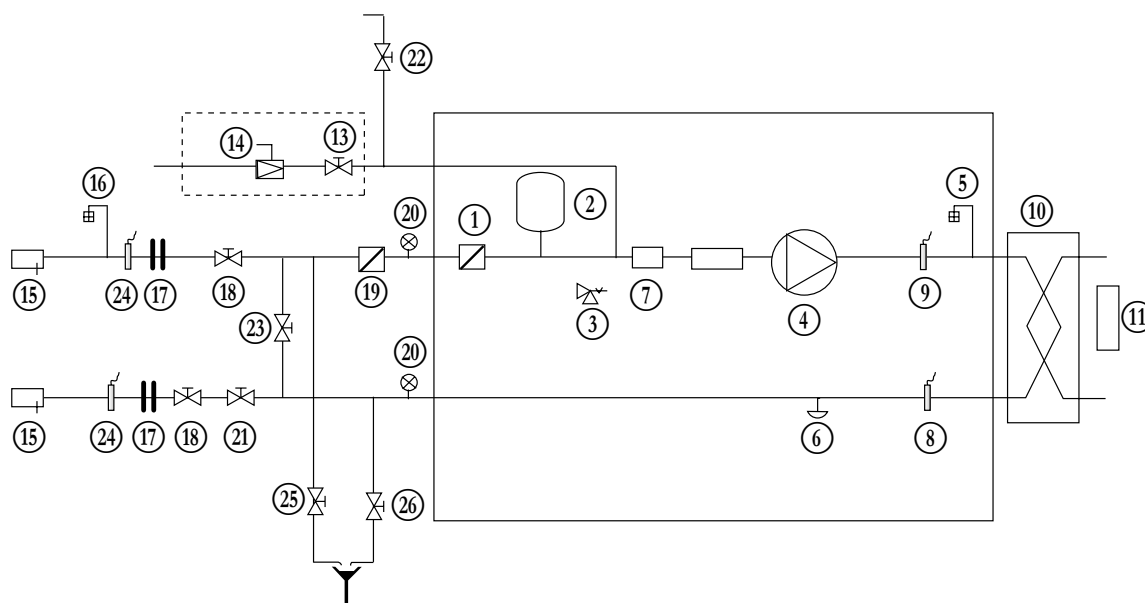


## 6 - WATER CONNECTIONS

Typical diagram of hydraulic circuit with hydraulic module 17-21kw



Typical diagram of hydraulic circuit with hydraulic module 26-40kw



--- Hydraulic module (units with hydraulic module)  
 --- Water supply automatic system (optional)

### Legend

#### Hydraulic components

- ① Mesh filter
- ② Expansion tank
- ③ Relief valve
- ④ High pressure pump
- ⑤ Breather
- ⑥ Water drain valve
- ⑦ Flow sensor
- ⑧ Leaving temperature sensor from refrigerant - water exchanger
- ⑨ Entering temperature sensor from refrigerant - water exchanger
- ⑩ Plate heat exchanger
- ⑪ Anti-freeze electric heater for refrigerant - water exchanger
- ⑫ Anti-freeze electric heater for pipes
- ⑬ On/off valve ( automatic system for water filling- optional)
- ⑭ Pressure reducer (automatic system for water filling- optional)

#### System components

- ⑮ Pocket for temperature sensor
- ⑯ Breather
- ⑰ Flexible connections
- ⑱ On/Off valve
- ⑲ Mesh filter (compulsory if the unit is not equipped with hydraulic module)
- ⑳ Pressure gauge
- ㉑ Water flow control valve (factory supplied but to be installed on site)
- ㉒ Charge valve
- ㉓ Bypass valve for anti-freeze protection (when, in winter, on/off valves are closed)
- ㉔ Pressure sensor
- ㉕ Water drain valve from the plant
- ㉖ Water drain valve from refrigerant-water exchanger

## 6 - WATER CONNECTIONS

Make the plate heat exchanger hydraulic connections with the necessary components, using material which will guarantee that the screwed joints are leakproof.

The typical hydraulic circuit diagram shows a typical water circuit installation in an air conditioning system.

**ATTENTION: Use of units in an open loop is forbidden.**

For an application with a water circuit, the following recommendations must be taken into account:

1. The pump must be fitted immediately before of the heat exchanger and after the connection to the system return (unit without hydraulic module).
2. It is advisable to install shut-off valves to allow isolation of the most important circuit components, as well as the heat exchanger itself.  
These valves (ball, globe or butterfly valves) should produce a minimum loss of charge when they are open.
3. Provide unit and system drains and vents at the lowest system point.
4. Install purges in the higher sections of the installation.
5. Pressure ports and pressure gauges should be installed upstream and downstream of the water pump.
6. Thermometers should be installed in the unit water inlet and outlet.
7. All piping must be adequately insulated and supported.

Installation of the following components is obligatory:

1. The presence of particles in the water can lead to obstructions in the heat exchanger.  
It is therefore necessary to protect the heat exchanger inlet with an extractable mesh filter. The filter mesh gauge must be at least 10 mesh/cm<sup>2</sup>. The equipment standard version with hydraulic module is equipped with mesh filter, included in the supply and installed.
2. After assembling the system, or repairing the circuit, the whole system must be thoroughly cleaned with special attention paid to the state of the filters.
3. Pump flow rate control is made through a flow control valve supplied with the unit with hydraulic module, which must be installed on the delivery pipe during installation.
4. When water has to reach temperatures below 5°C, or the equipment is installed in areas subject to temperatures below 0°C, it is necessary to mix water with glycol in suitable quantity. The maximum amount of ethylene glycol allowed is 30%.

### Frost protection

Frost protection of the plate heat exchanger and of the circuit inside the hydraulic module is always guaranteed down to -10°C by the electric heaters that are automatically activated if needed. The power supply to the electric heaters of the plate heat exchanger and to the internal circuit of the hydraulic module must never be interrupted.

**IMPORTANT: Filling, completing and draining the water circuit charge must be done by qualified personnel, using the air purges and materials that are suitable for the products.**

Before any start-up verify that the heat exchange fluid is compatible with the materials and the water circuit coating.

### Carrier recommendations on heat exchange fluids:

- No NH<sub>4</sub><sup>+</sup> ammonium ions in the water, they are very detrimental for copper. This is one of the most important factors for the operating life of copper piping. A content of several tenths of mg/l will badly corrode the copper over time (the plate heat exchangers used for these units have brazed copper joints).
- Cl<sup>-</sup> Chloride ions are detrimental for copper with a risk of perforations by corrosion by puncture. If possible keep below 10 mg/l.
- SO<sub>4</sub><sup>2-</sup> sulfate ions can cause perforating corrosion, if their content is above 30 mg/l.
- No fluoride ions (<0.1 mg/l).
- No Fe<sub>2</sub><sup>+</sup> and Fe<sub>3</sub><sup>+</sup> ions with non negligible levels of dissolved oxygen must be present. Dissolved iron < 5 mg/l with dissolved oxygen < 5 mg/l.
- Dissolved silica: silica is an acid element of water and can also lead to corrosion risks. Content < 1mg/l. Water hardness: > 0.5 mmol/l. Values between 1 and 2.5 can be recommended. This will facilitate scale deposit that can limit corrosion of copper. Values that are too high can cause piping blockage over time. A total alkalimetric titre (TAC) below 100 is desirable.
- Dissolved oxygen: Any sudden change in water oxygenation conditions must be avoided. It is as detrimental to deoxygenate the water by mixing it with inert gas as it is to over-oxygenate it by mixing it with pure oxygen. The disturbance of the oxygenation conditions encourages destabilisation of copper hydroxides and enlargement of particles.
- Electric conductivity 600µS/cm
- pH: Ideal case pH neutral at 20-25°C - 7 < pH < 8

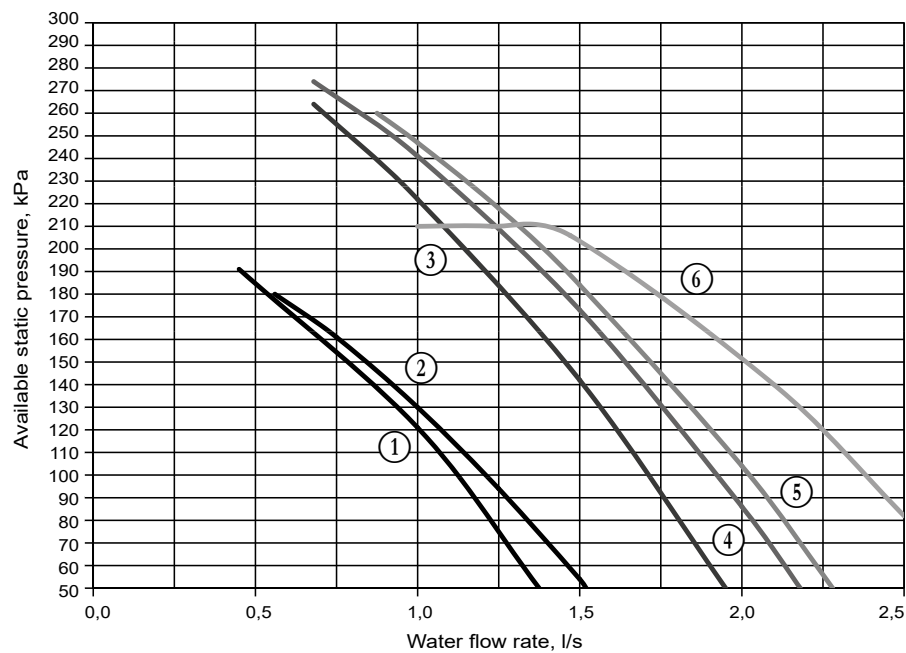
Do not introduce any significant static or dynamic pressure into the heat exchange circuit (with regard to the design operating pressures).

## 6 - WATER CONNECTIONS

### 6.1 - Outlet available static pressure of the unit with hydraulic module

Data applicable for:

- Fresh water 20°C
- In case of use of the glycol, the maximum water flow is reduced.



#### Legend

- ① 30RB-RQ 017
- ② 30RB-RQ 021
- ③ 30RB 026
- ④ 30RB 033-RQ 026
- ⑤ 30RQ 033
- ⑥ 30RB-RQ 040

## 7 - ELECTRICAL CONNECTIONS AND REFRIGERANT CHARGE

### 7.1 - Electrical connections

#### CAUTION:

**To prevent electrical shock or equipment damage, make sure disconnects are open before electrical connections are made.**

Power supply cable size and external connection must be made by the installer according to the unit installation characteristics and the applicable standards. The power supply and earth multicore cable of the device has to be connected to the general disconnect by routing the cable through the grommet installed in the device, after removing the access panel/s. The maximum section allowable for flexible copper cable is 25 mm<sup>2</sup>. Before connection, check that phase sequence L1 – L2 – L3 is correct. The table below should be considered as a reference and does not involve Carrier responsibility.

Unit	017	021	026	033	040
Cable section	5 x2,5 mm²		5 x4 mm²		1x16 mm²
Power supply cable	H07 RN-F				
Fuse (type "gG")	25 A	32A	40 A	50 A	63A

Take special care when making the earth connection.

The maximum permitted voltage and current imbalance is 10% of the values indicated in Table II.

Contact your local power company for correction of an incorrect line voltage.

#### CAUTION:

**Operation of the unit on improper line voltage constitutes abuse and is not covered by the Carrier warranty.**

#### IMPORTANT:

**To ensure the correct unit power supply (cable entry, conductor cross section, protection devices etc.), consult the electrical data table, the wiring diagram supplied with the unit and the applicable standards concerning the installation of air conditioning equipment.**

Never operate a unit if the voltage imbalance exceeds 2%.

The following formula must be used to determine the percentage of voltage imbalance.

Voltage imbalance (%) =

Largest deviation from average voltage x 100

Average voltage

#### Example:

Supply voltage: 400-3-50

AB = 404 V

BC = 399 V

AC = 394 V

Average voltage =  $\frac{404 + 399 + 394}{3} = 399 \approx 400$  V

Determine maximum deviation from average voltage:

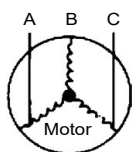
AB = 404 - 400 = 4

BC = 400 - 399 = 1

AC = 400 - 394 = 6

Largest deviation is 6 volts. Percentage voltage imbalance is therefore:

$\frac{6}{400} \times 100 = 1,5 \%$



#### CAUTION:

**The installer must install protection devices, as required by the applicable legislation.**

For sizes 17-21 kW, the power supply cable must be routed through the grommet of the electric control panel. To connect the power supply cable to the main disconnect remove the metal protection box (by removing the two fixing screws). After completing all connections, re-install the protection box by fixing the two screws which were previously removed.

The liquid level gauge can be checked by removing the plug from the side panel (there is no need to remove the whole panel).

The protection level of all the control boxes is IPX4.

### 7.2 - Liquid refrigerant charge

#### Important information regarding the refrigerant used:

**This product contains fluorinated greenhouse gas covered by the Kyoto protocol.**

**Fluid type: R410A**

**Global Warming Potential (GWP): 2088**

#### CAUTION:

- Any intervention on the refrigerant circuit of this product should be performed in accordance with the applicable legislation. In the EU, the regulation is called F-Gas, N°517/2014.**
- Ensure that the refrigerant is never released to the atmosphere during installation, maintenance or equipment disposal.**
- The deliberate gas release into the atmosphere is not allowed.**
- If a refrigerant leak is detected, ensure that it is stopped and repaired as quickly as possible.**
- Only a qualified and certified personnel can perform installation operations, maintenance, refrigerant circuit leak test as well as the equipment disposal and the refrigerant recovering.**
- The gas recovery for recycling, regeneration or destruction is at customer charge.**
- Periodic leak tests have to be carried out by the customer or by third parties. The EU regulation set the periodicity here after:**

System WITHOUT leakage detection		No Check	12 Months	6 Months	6 Months
System WITH leakage detection		No Check	24 Months	12 Months	6 Months
Refrigerant charge/ circuit (CO <sub>2</sub> equivalent)		< 5 Tons	5 ≤ Charge < 50 Tons	50 ≤ Charge < 500 Tons	Charge > 50 Tons <sup>(1)</sup>
Refrigerant charge/ Circuit (kg)	R134A (GWP 1430)	Charge < 3,5 kg	3,5 ≤ Charge < 34,9 kg	34,9 ≤ Charge < 349,7 kg	Charge > 349,7 kg
	R407C (GWP 1774)	Charge < 2,8 kg	2,8 ≤ Charge < 28,2 kg	28,2 ≤ Charge < 281,9 kg	Charge > 281,9 kg
	R410A (GWP 2088)	Charge < 2,4 kg	2,4 ≤ Charge < 23,9 kg	23,9 ≤ Charge < 239,5 kg	Charge > 239,5 kg
	HFO's: R1234ze	No requirement			

(1) From 01/01/2017, units must be equipped with a leakage detection system



## 7 - ELECTRICAL CONNECTIONS AND REFRIGERANT CHARGE

8. *A logbook must be established for equipments subject to periodic leak tests. It should contain the quantity and the type of fluid present within the installation (added and recovered), the quantity of recycled fluid, regenerated or destroyed, the date and output of the leak test, the designation of the operator and its belonging company, etc.*
9. *Contact your local dealer or installer if you have any questions.*

### Checking the charge

#### CAUTION:

*Accidental exhaust of refrigerant, whether due to a small leak or to a large discharge from a piping rupture, can cause frostbites and burns to the exposed person. Never neglect such injures. The installers, owners and especially the repairers for small outdoor units, must:*

- *Set a procedure to consult medical experts prior to treat such injuries,*
- *Provide first aid equipments, especially for rapid treatment of eye injuries.*

*We recommend them to apply the EN 378-3 Annex 3.*

*When adjusting the refrigerant charge, always ensure that water is circulating in the heat exchanger to prevent any possibility of freezing up. Damage caused by freezing is not covered by the product warranty.*

## 8 - REFRIGERANT CHARGE AND ELECTRONIC CONTROL

30RB-RQ units are shipped with a full operating charge of refrigerant. Refer to Table I.

If it is nevertheless necessary to add more refrigerant, run the unit for some time in cooling mode and then slowly add liquid refrigerant into the suction side until there are no bubbles in the sight glass.

30RB-RQ units use a R-410A refrigerant charge. For your information, we are reproducing here some extracts from the official publication dealing with the design, installation, operation and maintenance of air conditioning and refrigeration systems and the training of people involved in these activities, agreed by the air conditioning and refrigeration industry.

### Refrigerant guidelines

Refrigeration installations must be inspected and maintained regularly and rigorously by specialists. Their activities must be overseen and checked by properly trained people.

To minimise discharge to the atmosphere, refrigerants and lubricating oil must be transferred using methods which reduce leaks and losses to a minimum.

If an oil draining or recovery operation becomes necessary, the fluid transfer must be made using mobile containers.

- Leaks must be repaired immediately.
- Service valves fitted to the flow and return lines permit charge transfer to a suitably arranged external container.
- It is indispensable to use a dedicated transfer station.
- Compressor lubricating oil contains refrigerant. Any oil drained from a system during maintenance must therefore be handled and stored accordingly.
- Refrigerant under pressure must never be discharged to the atmosphere.

### Recharging liquid refrigerant

R-410A refrigerant operates at 50%-70% higher pressures than R-22.

Be sure that servicing equipment and replacement components are designed to operate with R-410A.

The cylinders that contain R-410A are pink.

The cylinders that contain R-410A are provided with a dip tube that allows fluid to escape from the cylinder both when in upright position and when turned upside down.

Unit R-410A should be charged with liquid refrigerant. Apply a common flow regulator available on the market to the hose pipe to vaporize the liquid refrigerant before it enters the unit.

R-410A, like other HFCs, is only compatible with the oils selected by the manufacturer of compressors(POE).

#### NOTE:

**Regularly carry out leak checks and immediately repair any leak found.**

### Undercharge

If there is not enough refrigerant in the system, this is indicated by gas bubbles in the moisture sight glass.

There are two possibilities:

- Small undercharge (bubbles in the sight glass, no significant change in suction pressure).
  - After detection and repair the unit can be recharged.
  - The replenishment of the charge must always be done in the cooling mode, **slowly** introducing liquid refrigerant at the suction side, until there are no bubbles in the sight glass.
- Significant undercharge (large bubbles in the sight glass, significant drop in suction pressure). In this case:
  - Completely drain the refrigerant charge, using a refrigerant recovery unit. After detection and repair check the charge with the unit off, drain the system and recharge the full amount of liquid refrigerant (see Table I) on the suction and discharge side.
  - The refrigerant container used must contain a minimum of 10% of its initial charge.



## 8 - REFRIGERANT CHARGE AND ELECTRONIC CONTROL

### CAUTION:

***If brazing is to be done, the refrigerant circuit must be filled with nitrogen.***

***Combustion of refrigerant produces toxic phosgene gas.***

***Change the refrigerant after an equipment failure, following a procedure such as the one described in NF E29-795 or carry out a refrigerant analysis in a specialist laboratory.***

### IMPORTANT:

***Never use the compressor as a vacuum pump.***

***Always add refrigerant via the suction line.***

***Refrigerant must be added very slowly.***

***Do not overcharge the system with refrigerant.***

***If the refrigerant circuit remains open for longer than a day after an intervention (such as a component replacement), the openings must be plugged and the circuit must be charged with nitrogen (inertia principle). The objective is to prevent penetration of atmospheric humidity and the resulting corrosion on the internal walls and on non-protected steel surfaces.***

### 8.1 - Electronic control

Operation and control of all units is carried out via the electronic control.

The instructions supplied with the control include comprehensive descriptions.

After use, check the user interface is properly inserted into its housing and the cover is closed by means of the screw supplied. This way, the electronic control and the unit are protected against any impacts and atmospheric agents.

#### Pro-Dialog+ electronic control

Pro-Dialog+ is an advanced numeric control system that combines complex intelligence with great operating simplicity.

Pro-Dialog+ constantly monitors all machine parameters and safety devices, and precisely manages the operation of compressor and fans for optimum energy efficiency.

It also controls the operation of the water pump.

#### A powerful control system

The PID control algorithm with permanent compensation for the difference between entering and leaving water temperature and anticipation of load variations regulates compressor operation for intelligent leaving water temperature control.

To optimise power absorption, the Pro-Dialog+ automatically re-calibrates the set point of the entering water temperature based on the outside air temperature to one of the two pre-set values (occupied building and of an unoccupied building for example).

Pro-Dialog+ control is auto-adaptive for full compressor protection. The system permanently optimises compressor run times according to the application characteristics (water loop inertia), preventing excessive cycling. In most comfort air conditioning applications this feature makes a buffer tank unnecessary.

#### Clear and easy-to-use control system

The operator interface is clear and user-friendly: two LEDs and digital displays allow the immediate control of the device operating data.

The menus offer direct access to all machine controls, including a history of possible faults, for rapid and complete chiller fault diagnosis.

#### Extended communications capabilities

Pro-Dialog+ allows remote control and monitoring of the unit through a wired connection: 7-8 x 0.5 mm<sup>2</sup> multiple cables. The cable should be screened of the FROH2R or BELTEN 9842 type.

The screening should be grounded only on the electric unit panel board. Functions available are start/stop, cooling/heating mode selection (only 30RQ unit), power demand limit or dual set-point and customer safety lock.

The system permits remote signalling of any general anomaly for each refrigerant circuit.

Three independent time schedules permit definition of: chiller start/stop, operation at the second set-point (e.g. unoccupied mode), and operation at low fan speed (e.g. during the night).

This option also permits cascade operation of two units and remote control via communication bus (RS 485 serial port).

## 9 - START-UP, COMPRESSOR REPLACEMENT

### 9.1 - Start-up

Unit start-up is done by the electronic control described above, and must always be carried out under the supervision of a qualified air conditioning engineer.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning the use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

#### Necessary checks/precautions before start-up

- Ensure that all electrical connections are properly tightened.
- Ensure that the unit is level and well-supported.
- Check that the hydraulic circuit has sufficient water flow and that the pipe connections correspond to the installation diagram.
- Ensure that there are no water losses. Check the correct operation of the valves installed.
- All panels should be fitted and firmly secured with the corresponding screws.
- Make sure that there is sufficient space for servicing and maintenance purposes.
- Ensure that there are no refrigerant leaks.
- Confirm that the electrical power source agrees with the unit nameplate rating, wiring diagram and other documentation for the unit.
- Ensure that the power supply corresponds to the applicable standards.
- Make sure that compressors float freely on the mounting springs.



### 9.2 - Compressor replacement

As the compressors are hermetic, when an internal fault occurs, the compressor must be replaced.

For sizes 26 to 40, access to the oil level gauge is possible by removing the 6 screws of the electric box.

This must be done as detailed below:

- Disconnect the unit from the electrical supply.
- Remove the access panels.
- Remove the gas from the refrigerant circuit using recovery equipment to avoid harming the atmosphere.
- Electrically disconnect the compressor.
- Unbrazed or unscrew the suction and discharge lines, taking care not to damage the rest of the components.
- Remove the compressor fastenings.
- Replace the compressor, ensuring that it contains sufficient oil.
- Braze or screw in the lines.
- Connect the compressor according to the wiring diagram.
- Evacuate the compressor.
- Introduce the quantity of refrigerant indicated on the nameplate through the service couplings located on the high and low pressure side.

#### NOTE:

**This operation must be carried out by a qualified person.**



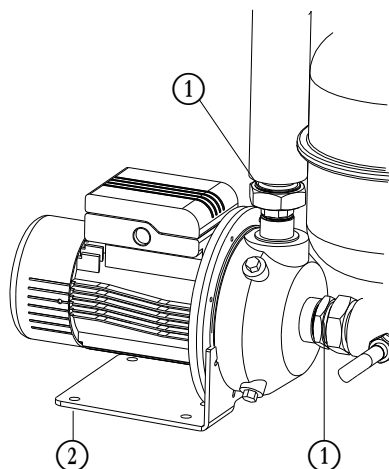
Shift the electric box to allow access to the oil level gauge.

## 10 - PUMP REPLACEMENT, UNIT PROTECTION DEVICES

### 10.1 - Pump replacement

If the water pump needs to be replaced, proceed as follows:

- Disconnect the unit from the power supply.
- Open/remove the access panel/s
- Electrically disconnect the pump.
- Empty all water from the hydraulic module.
- Loosen the pipe unions 1 and 3.
- Remove the four pump fixing screws 2.
- Replace the pump.
- Fit the pump fixing screws 2.
- Tighten the pipe unions 1 and 3.
- Electrically connect the pump.
- Connect the unit to the power supply.
- Make sure the pump rotates in the right direction using the hole in the back panel.
- Reinstall the lateral access panel.



- ① Pipe union
- ② Screw

### 10.2 - Safety considerations related to protection devices

	Safety accessories <sup>(1)</sup>	Over pressure protection in case of an external fire <sup>(2)</sup>
<b>Refrigerant Side</b>		
High pressure switch	X	
External relief valve <sup>(3)</sup>		X
Rupture disk		X
Fuse plug		X
<b>Heat transfert fluid side</b>		
External relief valve	(4)	(4)

- (1) Classified for protection in normal service situations.
- (2) Classified for protection in abnormal service situations. These accessories are sized for fires with a thermal flow of 10kW/m<sup>2</sup>. No combustible matter should be placed within 6.5m of the unit.
- (3) The instantaneous over-pressure limitation of 10% of the operating pressure does not apply to this abnormal service situation.  
The control pressure can be higher than the service pressure. In this case either the design temperature or the high-pressure switch ensures that the service pressure is not exceeded in normal service situations.
- (4) The selection of these discharge valves must be made by the personnel responsible for completing the hydraulic installation.

### 10.3 - Description of unit protection devices

The unit includes the following protection devices:

- Internal compressor protection.
- Fan motor internal thermal protection (unit sizes 26, 33 and 40kW).
- Main switch.
- Thermomagnetic control and heaters protection.
- Thermomagnetic fan protection (unit sizes 17, 21 and 40 kW).
- Defrost thermostat.
- Fault detector for the temperature and pressure sensors.
- High pressure switch: this protects the unit against excessive condensing pressure.

The high pressure switch has factory-fixed non-adjustable settings. The appliance stops due to the intervention of the high pressure alarm threshold, before the high pressure switch intervenes.

This function is performed by the electronic control device via a pressure transducer.

- Low pressure switch: This function is performed by the electronic control device via a pressure transducer.

Only on appliances with hydraulic module.

- Pump motor:
  - External thermal protection (unit sizes 17 to 33 kW)
  - Thermomagnetic protection (only unit sizes 40 kW).

### 10.4 - Table III: Pressure switch settings

	Cut-out	Reset
High pressure switch (017 to 033)	44 bar	Manual
High pressure switch (040)	44,2 bar	Automatic

**CAUTION:** Alteration of factory settings other than the design set-point, without manufacturer's authorisation, may void the warranty.

**In case of use other than the manufacturer configuration, Carrier Service must be asked for permission to change the Pro-Dialog+ system configuration.**

### 10.5 - Operating limits 30RB

These units have been designed to operate within the following limits:

Evaporator		Minimum	Maximum
Water entering temp. (at start-up)	°C	7,8 <sup>(1)</sup>	30
Water leaving temp. (in operation)	°C	5 <sup>(2)</sup>	18
Condenser		Minimum	Maximum
Air entering temperature	°C	-10	48

- (1) Contact Carrier if an entering water temperature lower than 7.8°C is necessary.
- (2) For low-temperature applications, where the leaving water temperature is below 5°C, a frost protection solution must be used.

## 10 - PUMP REPLACEMENT, UNIT PROTECTION DEVICES

### 10.6 - Operating limits 30RQ

#### Cooling cycle

Plate heat exchanger		Minimum	Maximum
Water entering temp. (at start-up)	°C	7,8 <sup>(1)</sup>	30
Water leaving temp. (in operation)	°C	5 <sup>(2)</sup>	18
Coil		Minimum	Maximum
Air entering temperatur	°C	-10	48

#### Heating cycle

Plate heat exchanger		Minimum	Maximum
Water entering temp. (at start-up)	°C	10	45
Water leaving temp. (in operation)	°C	20	50
Coil		Minimum	Maximum
Plate heat exchanger	°C	-15 <sup>(3)</sup>	40

- (1) Contact Carrier if an entering water temperature lower than 7.8°C is necessary.  
 (2) For low-temperature applications, where the leaving water temperature is below 5°C, a frost protection solution must be used.  
 (3) -13°C for units size 40kW.

### 10.7 - Minimum and maximum water flow rates in the plate heat exchangers

30RB	Minimum flow rate, l/s	Maximum flow rate <sup>(1)</sup> , l/s	Maximum flow rate <sup>(2)</sup> , l/s
17	0,4	1,39	1,26
21	0,47	1,52	1,42
26	0,63	1,96	-
33	0,82	2,18	-
40	0,99	2,6	-

30RQ	Minimum flow rate, l/s	Maximum flow rate <sup>(1)</sup> , l/s	Maximum flow rate <sup>(2)</sup> , l/s
17	0,45	1,39	1,26
21	0,57	1,52	1,42
26	0,67	2,18	-
33	0,87	2,29	-
40	1,05	2,6	-

- (1) Maximum flow rate at an available pressure of 50kPa (unit with hydraulic module).  
 (2) Maximum flow rate at pressure drop of 100kPa in the plate heat exchanger (unit without hydraulic module).

#### Water circuit water content

Whatever the size of the system, the minimum content of the water circuit is given by the following formula:

$$\text{Content} = \text{CAP}_{(\text{kW})} \times N = \text{Litres}$$

where CAP is the nominal system capacity (kW) at nominal operating conditions of the installation.

Application	N
Air conditioning	3,5
Industrial process cooling	See note

The water content is necessary to ensure the stability of plant operation and accurate temperature control.

It is often necessary to add a buffer water tank to the circuit in order to achieve the required volume.

#### NOTE:

**For industrial process cooling applications, where high stability of water temperature levels must be achieved, the values above must be increased.**

**We recommend consulting the factory for these particular applications.**

## 11 - UNIT PROTECTION DEVICES, OPERATING LIMITS AND OPERATING RANGE

The water content is necessary to ensure the stability of plant operation and accurate temperature control.

It is often necessary to add a buffer water tank to the circuit in order to achieve the required volume.

### NOTE:

**For industrial process cooling applications, where high stability of water temperature levels must be achieved, the values above must be increased.**

**We recommend consulting the factory for these particular applications.**

### 11.1 - Brine operation

For 30RQ units, it is possible to produce brine down to 0°C.

For 30RB units, it is possible to produce brine down to -8°C.£. The unit is equipped with suction pipe insulation.

The operating range is a function of the suction pressure, which in turn is a function of:

- The brine type,
- The brine concentration,
- The flow rate,
- The brine temperature,
- The condensing pressure (ambient temperature).

The evaporator low pressure and frost protection depends on the amount of antifreeze added to the water circuit. The evaporator approach (LWT - SST) as well as frost protection are based on this amount.

It is therefore essential to control the amount of antifreeze in the water loop at the first start-up (circulate for 30 minutes to ensure good homogeneity of the mixture before taking the sample). Refer to the manufacturer's data to define the frost protection, based on the concentration rate measured.

The frost protection temperature must be used in the unit software parameters.

It is recommended that the commissioning of a brine system is done by manufacturer.

For information: The protection values given by our supplier, based on the antifreeze solutions used in the Carrier Montluel laboratory, are as follows: (these values can change for different suppliers).

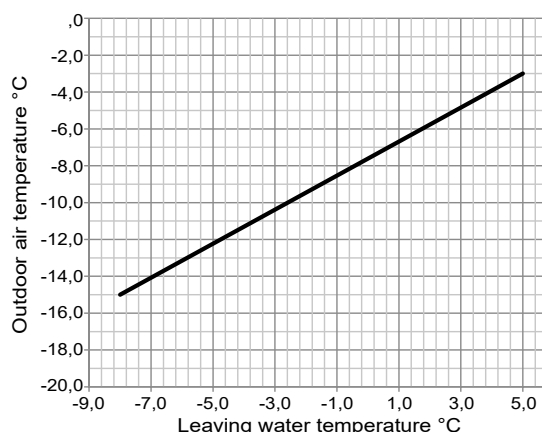
% by weight, glycol	Freeze point, °C ethylene glycol
10	-3,8
15	-6,1
20	-8,8
25	-11,8
30	-15,2

Based on the table above, if the ethylene glycol concentration by weight in the water loop is 30% the value of -15.2°C must be used in the software.

It is essential to carry out an annual check (minimum) of the amount of glycol, and adjust the frost protection value in the software based on the rate measured. This procedure must be systematic, if water or antifreeze solution is added.

The curve below shows the minimum frost protection temperature that must be observed, based on the leaving water temperature.

**Minimum frost protection temperature**



### NOTES:

- For unit frost protection at low air temperature, the brine percentage must be evaluated.
  - The maximum glycol rate for units with hydraulic kit is 30%.
  - The maximum recommended temperature difference is 5K.
- IMPORTANT: For glycol concentrations below 20% a corrosion inhibitor suitable for the application must be used to avoid corrosion due to the aggressive nature of brine.**

**The presence of glycol reduces the life of the pump fittings. It is recommended to change the fittings or the pump regularly.**

**To facilitate maintenance operations, it is recommended to install shut-off valves upstream and downstream of the unit.**

# 11 - UNIT PROTECTION DEVICES, OPERATING LIMITS AND OPERATING RANGE

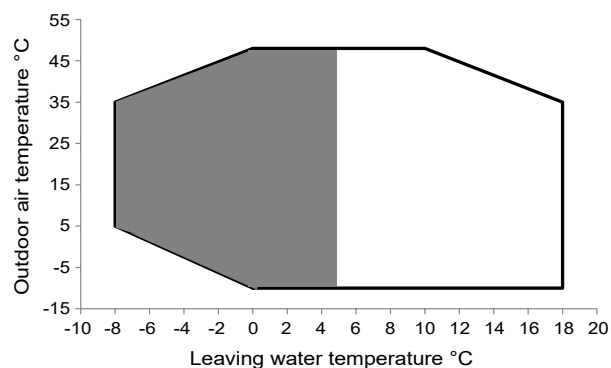
## 11.2 - Maximum water content of hydraulic circuit

The units provided with hydraulic module are supplied with an expansion vessel (in option) to limit the water content of the hydraulic circuit. The table below shows the maximum content of water and a mix of water/ethylene glycol of the hydraulic circuit.

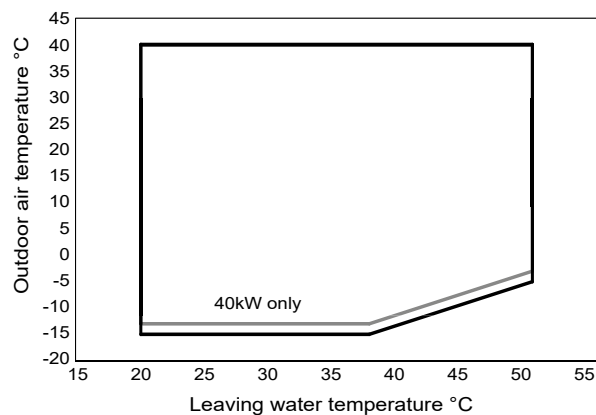
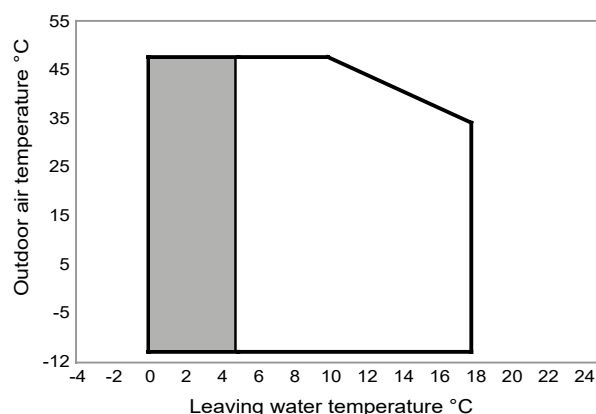
30RB-30RQ		017-021		026-040	
Static pressure	bar	1,5	3	1,5	3
Water	liters	200	50	350	140
GE 10%	liters	150	38	263	105
GE 20%	liters	110	28	193	77
GE 30%	liters	90	23	158	63

GE: Ethylene glycol

Operating range - 30RB units



Operating range - 30RQ units



### Notes

Operating range with anti-freeze solution Ethylen Glycol only



## 12 - GENERAL MAINTENANCE, MAINTENANCE AND FINAL RECOMMENDATIONS

### 12.1 - General maintenance

**CAUTION:** Before starting any servicing or maintenance operation on the unit, make sure that the power supply has been disconnected.

**A current discharge could cause personal injury.**

In order to obtain maximum performance from the unit special attention should be paid to the following points:

#### ■ Electrical connections:

The supply voltage should be within the limits indicated in Table II.

Ensure that no faulty contacts exist in the terminal blocks, contactor boards, etc.

Make sure that all the electrical connections are properly tightened, and that all the electrical components (contactors, relays, etc) are firmly secured to the corresponding rails.

Pay special attention to the condition of the connecting cables between the control elements and the electrical box, and to that of the unit power supply cable.

They should not be twisted and there should be no slits or notches in the insulation.

Check that the starting and running consumptions are within the limits specified in Table II.

#### ■ Water connections:

Make sure there are no water leaks from the system. Should the unit be shutdown for long periods, open the drain valve installed on the hydraulic module and partially drain the pump and the water pipes as well as the drain valve on the plate-type exchanger, which must be installed on the hydraulic circuit. To completely drain the pump, remove the cap on it. This operation is essential if temperatures are expected to drop below freezing. If the unit is not drained, the main switch should remain connected so that the defrost thermostat can operate. Carefully clean the system water filter.

If the water circuit must be emptied for longer than one month, the complete circuit must be placed under nitrogen charge to avoid any risk of corrosion by differential aeration.

#### ■ Plate heat exchanger cleaning:

In some applications, for example when very hard water is used, there is an increased tendency for fouling. The heat exchanger can always be cleaned by circulating a cleaning fluid.

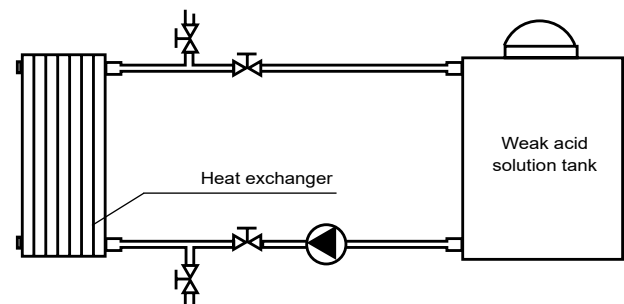
A weak acid solution should be used (5% phosphoric acid or, if frequently cleaned 5% oxalic acid), and the cleaning fluid should be pumped through the exchanger.

The tank installation can be permanent or, alternatively, the connections can be prepared and, at any given time, a portable cleaning device can be connected.

To achieve optimum cleaning the acid solution should be circulated at a minimum of 1.5 times the normal operational flow speed, and preferably in reverse direction.

The installation should then be flushed with large amounts of water to totally remove the acid before the system is started up.

#### Tank installation



Cleaning should be done at regular intervals and should never be left until the unit has become blocked.

The time intervals between cleaning depend on the quality of the water used, but as a general rule it is advisable to clean it at least once a year.

#### ■ Refrigerant circuit:

Ensure that there is no leakage of refrigerant or oil from the compressor.

Check that the high and low side operating pressures are normal.

Check the cleanliness of the refrigerant-water heat exchangers by checking the pressure drop across them.

The compressors do not require any specific maintenance.

Nevertheless the preventive system maintenance operations prevent specific compressor problems. The following periodic preventive maintenance checks are strongly recommended:

- Check the operating conditions (evaporating temperature, condensing temperature, discharge temperature, heat exchanger temperature difference). These operating parameters must always be within the compressor operating range.
- Check that the safety devices are all operational and correctly controlled.
- Check oil level and quality. If there is a colour change in the sight glass, check the oil quality. This may include an acidity test, moisture control, a spectrometric analysis etc.
- Check the leak tightness of the refrigerant circuit.
- Check the compressor motor power input, as well as the voltage imbalance between phases.
- Check the tightening of all electrical connections.
- Ensure that the compressor is clean and runs correctly; verify that there is no rust on the compressor shell and no corrosion or oxidation at the electrical connections and the piping.

**ATTENTION:** The compressor and piping surface temperatures can in certain cases exceed 100°C and cause burns. Particular caution is required during maintenance operations. At the same time, when the compressor is in operation, the surface temperatures can also be very cold (down to -15°C for units with a low leaving water temperature), and can cause frost burns.

## 12 - GENERAL MAINTENANCE, MAINTENANCE AND FINAL RECOMMENDATIONS

### ■ Controls:

Check the operation of all the electrical components, the high pressure switch and of the high and low pressure transducers and the water, air and defrost temperature detector.

### ■ Coils:

We recommend, that finned coils are inspected regularly to check the degree of fouling. This depends on the environment where the unit is installed, and will be worse in urban and industrial installations and near trees that shed their leaves.

Recommendations for maintenance and cleaning of round tube plate fin (RTPF) condenser coils (based on the AFNOR X60-010 standard):

- If the condensers are fouled, clean them gently in a vertical direction, using a brush.
- Only work on condensers with the fans switched off.
- For this type of operation switch off the HVAC unit if service considerations allow this.
- Clean condensers guarantee optimal operation of your HVAC unit.

This cleaning is necessary when the condensers begin to become fouled. The frequency of cleaning depends on the season and location of the HVAC unit (ventilated, wooded, dusty area, etc.).

### ■ Vibration:

Ensure regularly that the vibration levels remain acceptable and close to those at the initial unit start-up.

### ■ Corrosion:

Periodically inspect all valves, fittings and pipes of the refrigerant and hydraulic circuits to ensure that they do not show any corrosion or any signs of leaks; also on components coating.

## 12.2 - Maintenance

### Servicing recommendations

- Maintenance of the unit must be carried out by skilled personnel only.  
Nevertheless, the easiest operations, such as cleaning of the battery and the unit external parts can be carried out by non-skilled personnel.
- No part of the unit must be used as a walkway, rack or support. Periodically check and repair or if necessary replace any component or piping that shows signs of damage. Do not step on refrigerant lines. The lines can break under the weight and release refrigerant, causing personal injury. Do not climb on a machine. Use a platform, or staging to work at higher levels.
- For any operation on the unit follow thoroughly the instructions shown in the manual and on the unit labels as well as the Safety Standards.

Equip the engineers that work on the unit as follows:

Personal protection equipment (PPE) <sup>(1)</sup>	Operations		
	Handling	Maintenance, service	Welding or brazing <sup>(2)</sup>
Protective gloves, eye protection, safety shoe, protective clothing.	X	X	X
Ear protection.		X	X
Filtering respirator.			X

(1) We recommend to follow the instructions in EN 378-3.

(2) Performed in the presence of A1 refrigerant according to EN 378-1.

Pay attention to burns when brazing.

- Use only Carrier Original Spare Parts when repair is required. Always make sure the spare parts are installed correctly. Always install the spare parts in the original position.
- The products that may be added for thermal insulation of the containers during the water piping connection procedure must be chemically neutral in relation to the materials and coatings to which they are applied. This is also the case for the products originally supplied by Carrier.
- Before replacing any of the elements in the cooling circuit, ensure that the entire refrigerant charge is removed from both the high and low pressure sides of the unit.
- The control elements of the cooling system are highly sensitive. If they need to be replaced, care should be taken not to overheat them with blowlamps whilst soldering.  
A damp cloth should be wrapped around the component to be soldered, and the flame directed away from the component body.
- Silver alloy soldering rods should always be used.
- If the total unit gas charge has to be replaced, the quantity should be as given on the nameplate and the unit should be properly evacuated beforehand.
- During unit operation all panels should be in place, including the electrical box access panel.
- If it is necessary to cut the lines of the refrigerant circuit, tube cutters should always be used and never tools which produce burrs. All refrigerant circuit tubing should be of copper, specially made for refrigeration purposes.
- **Do not drain water circuits containing industrial brines, without informing the technical service department at the installation site or a competent body first.**
- Any manipulation (opening or closing) of a shut-off valve must be carried out by a qualified and authorised engineer, observing applicable standards (e.g. during draining operations). The unit must be switched off while this is done.
- Repairs and modifications must be performed by qualified operators following operating procedures,



## 12 - GENERAL MAINTENANCE, MAINTENANCE AND FINAL RECOMMENDATIONS

### 12.3 - Final recommendations

The unit you have purchased has undergone strict quality control procedures before leaving the factory.

All components, including the control systems and electrical equipment, etc., are certified by our Quality Control Department, and tested under the harshest possible operating conditions in our laboratories. However, after leaving the factory, it is possible that one or more of these elements may be damaged due to causes beyond our control. In such an event, **the user should not work on any of the internal components, or subject the unit to operating conditions which are not specified in this manual**, since serious damage may result and the guarantee would be invalidated. Repair and maintenance work should always be left to the installer.

We recommend to apply the EN 378-4.

All recommendations concerning unit installation are intended as a guideline. The installer should carry out the installation according to the design conditions and should comply with all applicable regulations for air conditioning and refrigeration installations.

**NOTE: The manufacturer does not accept responsibility for any malfunctions resulting from misuse of the equipment.**

### 12.4 - Fire and explosion

When this machine is subjected to the heat of a fire, a device prevents explosion releasing the refrigerant (by a fusible plug). This fluid can be decomposed into toxic waste when subjected to flame:

- Stay away from this machine,
- Set up the warning and recommendation for personnel responsible for stopping fire,
- Appropriate fire extinguishers for the system and the refrigerant types used must be within easy reach.

### 12.5 - Log book

Carrier recommends the following drafting for a logbook (the table below should be considered as reference and does not involve Carrier responsibility):

Intervention		Name of the commissioning engineer	Applicable national regulations	Verification Organism
Date	Nature <sup>(1)</sup>			

(1) Maintenance, repairs, regular verifications (EN 378), leakage, etc.

## 13 - TROUBLESHOOTING

There follows a list of failures which might occur and their possible causes and repairs.

In case the unit is not working properly, disconnect it from the mains before trying to repair it.

Defect	Possible Cause	Suggested repair
--------	----------------	------------------

### The unit does not start:

- Power supply disconnected;  
CONNECT POWER SUPPLY.
- Main switch is cut-out;  
CUT-IN THE MAIN SWITCH.
- Supply voltage too low;  
CHECK SUPPLY VOLTAGE.
- Triggering of a protection device;  
RESET THE PROTECTION DEVICE.
- Blocked contactor;  
CHECK AND REPLACE THE BLOCKED CONTACTOR IF NECESSARY.
- Seizing of compressor;  
CHECK AND REPLACE COMPRESSOR IF NECESSARY.
- Loose electric connections;  
CHECK AND TIGHTEN THE ELECTRIC CONNECTIONS.

### The unit works continuously or cycles too often:

- Failure of compressor contactor;  
CHECK AND REPLACE CONTACTOR IF NECESSARY.
- Compressor failure;  
CHECK AND REPLACE COMPRESSOR IF NECESSARY.
- Refrigerant leak;  
CHECK THE CHARGE AND ADD MORE REFRIGERANT.
- Water flow is insufficient;  
CHECK PRESSURE LOSS IN THE WATER CIRCUIT.
- Static pressure in water circuit is insufficient;  
CHECK IT ON THE PRESSURE GAUGE AND RESTORE IT IF NECESSARY.

### The unit stops because of low pressure alarm:

- Refrigerant leak;  
CHECK THE CHARGE AND ADD MORE REFRIGERANT.
- Water flow in the heat exchanger is insufficient;  
CHECK THE WATER PUMP.
- Unit starting delay;  
WAIT UNTIL THE SYSTEM IS STABLE.

### The unit stops because of high pressure alarm:

- Failure of high pressure switch;  
CHECK AND REPLACE PRESSURE SWITCH IF NECESSARY.
- The expansion valve is blocked;  
CHECK AND REPLACE THE EXPANSION VALVE IF NECESSARY.
- Dehydrating filter clogged;  
CHECK AND REPLACE FILTER IF NECESSARY.
- Outdoor fan/s not working;  
CHECK THE FANS/S MOTOR/S AND ITS ELECTRIC CONNECTIONS.
- Coil clogged or dirty;  
REMOVE CLOGGING OR CLEAN THE COIL.

### The unit is too noisy:

- Piping vibration;  
FIX THE PIPES PROPERLY.
- The compressor is too noisy;  
CHECK AND REPLACE COMPRESSOR IF NECESSARY.
- The expansion valve blows;  
CHECK THE CHARGE AND ADD REFRIGERANT IF NECESSARY.
- Panels are not installed correctly;  
INSTALL THE PANELS PROPERLY.

### Oil leak from the compressor:

- Leaks from the refrigerant circuit;  
FIND AND REPAIR LEAKS.

### Water leaks:

- Defects at inlet and/or outlet water connections;  
CHECK AND TIGHTEN CONNECTIONS IF NECESSARY.

### The defrost system of the unit is not working (only on units 30RQ):

- Failure of 4-way backflow valve;  
CHECK AND REPLACE VALVE IF NECESSARY.
- Defrost probe is not working;  
CHECK AND REPLACE PROBE IF NECESSARY.

## 14 - START-UP CHECK LIST

..... Start up date .....

Equipment sold by: ..... Contract No: .....

Installed by: ..... Contract No: .....

Site address: .....

Equipment type and serial No: 30RB .....

30RQ .....

### ELECTRICAL DATA:

Supply voltage Ph 1: .....V Ph 2: .....V Ph 3: .....V

Nominal voltage: .....V % network voltage .....

Current draw Ph 1: .....A Ph 2: .....A Ph 3: .....A

Control circuit voltage: .....V Control circuit fuse .....

Main circuit breaker rating .....

### PHYSICAL DATA

**Coil:** ..... **Plate heat exchanger:** .....

Entering air temp.: ..... °C Entering water temp.: ..... °C

Leaving air temp.: ..... °C Leaving water temp.: ..... °C

Loss of head (water): ..... kPa

### SAFETY DEVICE SETTING:

High pressure switch: cut-out: ..... kPa Cut-in: ..... kPa

Oil level: .....

### OPTIONS:

Commissioning engineer .....

Customer agreement .....

Name: ..... Date: .....

**Note: Complete this start-up list at the time of installation.**

.....



**CARRIER** participates in the ECP programme for  
LCP-HP  
Check ongoing validity of certificate:  
[www.eurovent-certification.com](http://www.eurovent-certification.com)

The quality management system of this product's assembly site has been certified in accordance with the requirements of the ISO 9001 standard (latest current version) after an assessment conducted by an authorized independent third party.

The environmental management system of this product's assembly site has been certified in accordance with the requirements of the ISO 14001 standard (latest current version) after an assessment conducted by an authorized independent third party.

The occupational health and safety management system of this product's assembly site has been certified in accordance with the requirements of the ISO 45001 standard (latest current version) after an assessment conducted by an authorized independent third party.

Please contact your sales representative for more information.

Order No: 10004, 03.2024. Supersedes order No: 10004, 11.2017.

Manufacturer reserves the right to change any product specifications without notice.

Carrier, Montluel, France.  
Printed in the European Union.