



# AQUASNAP 30RB / 30RQ 30RBY / 30RQY

PRO-DIALOG+

CE



Installation, operation and maintenance instructions

**30RB/30RQ  
30RBY/30RQY**

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## **ENGLISH**

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

# 30RB/30RQ - 30RBY/30RQY

## 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.

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### 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 \_\_\_\_\_ A

Main circuit breaker rating \_\_\_\_\_

#### PHYSICAL DATA

##### Coil:

Entering air temp.: \_\_\_\_\_ °C

Leaving air temp.: \_\_\_\_\_ °C

##### Plate heat exchanger:

Entering water 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.

ENGLISH

# 30RB

## Physical data and electrical data - Model RB

**Table I: Physical data - Model RB**

30RB		017	021	026	033
<b>Operating weight</b>					
with hydronic module	Kg	189	208	255	280
without hydronic module	Kg	173	193	237	262
Refrigerant charge R-410A	Kg	5,5	6,4	5,8	8,6
<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
Water connections (MPT gas)	inches	1	1	1-1/4	1-1/4
Maximum water pressure (unit without hydronic module)	kPa	1000	1000	1000	1000
Maximum water pressure (unit with hydronic module)	kPa	400	400	400	400
<b>Hydronic module</b>		Pump, mesh filter, expansion tank, flow switch, pressure gauges, automatic air purge valve and drain plug and safety valve.			
Pump		One single-speed pump			
Water inlet connection (MPT gas)	inches	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
Closed expansion tank water volume	l	5	5	8	8
Pre-charge of expansion vessel	bar	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
<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
No. of blades		3	3	7	7
Air flow (high speed)	l/s	2212	2212	3530	3530
Fan speed (high speed)	g/min	870	870	900	900

**Table II: Electrical data - Model RB**

30RB		017	021	026	033
<b>Power</b>		V-ph-Hz			
Voltage range	V	340-460			
Starting current*	A	75	95	118	118
Maximum power drawn (Vn) **	kW	7,8	9,1	11,0	13,8
Rated current***	A	8	12	16	17
Maximum power drawn (Vn) ****	A	13	16	20	24
Maximum power drawn (Vn +/-15%) †	A	15	18	23	27
<p>* Max. starting current within the operation limits (corresponding to the current of locked rotor in the compressor)</p> <p>** 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)</p> <p>*** The currents shown refer to Eurovent conditions (evaporator water inlet and outlet temperature = 12/7°C with air to the condenser at 35°C)</p> <p>**** Max. operating current related to the max. input power and rated voltage (400 V)</p> <p>† Max. operating current related to the max. input power and within the range 340-460 V</p>					

Table I: Physical data - Model RQ

30RQ		017	021	026	033
<b>Operating weight</b>					
with hydronic module	Kg	206	223	280	295
without hydronic module	Kg	191	208	262	277
Refrigerant charge R-410A	Kg	6,4	7,7	7,6	9,5
<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
Water connections (MPT gas)	inches	1	1	1-1/4	1-1/4
Maximum water pressure (unit without hydronic module)	kPa	1000	1000	1000	1000
Maximum water pressure (unit with hydronic module)	kPa	400	400	400	400
<b>Hydronic module</b>		Pump, mesh filter, expansion tank, flow switch, pressure gauges, automatic air purge valve and drain plug and safety valve.			
Pump		One single-speed pump			
Water inlet connection (MPT gas)	inches	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
Closed expansion tank water volume	l	5	5	8	8
Pre-charge of expansion vessel	bar	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
<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
No. of blades		3	3	7	7
Air flow (high speed)	l/s	2217	1978	3530	3530
Fan speed (high speed)	g/min	870	870	900	900

Table II: Electrical data - Model RQ

30RQ		017	021	026	033
<b>Power</b>		400-3-50			
Voltage range	V	340-460			
Starting current*	A	75	95	118	118
Maximum power drawn (Vn) **	kW	7,8	9,1	11,0	13,8
Nominal current drawn***	kW	8	12	16	17
Maximum power drawn (Vn) ****	A	13	16	20	24
Maximum power drawn (Vn +/-15%) †	A	15	18	23	27
<p>* Max. starting current within the operation limits (corresponding to the current of locked rotor in the compressor)</p> <p>** 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)</p> <p>*** The currents shown refer to Eurovent conditions (evaporator water inlet and outlet temperature = 12/7°C with air to the condenser at 35°C)</p> <p>**** Max. operating current related to the max. input power and rated voltage (400 V)</p> <p>† Max. operating current related to the max. input power and within the range 340-460 V</p>					

# 30RBY

## Physical data and electrical data - Model RBY

**Table I: Physical data - Model RBY**

30RBY		017	021	026	033
<b>Operating weight**</b>					
with hydronic module	Kg	209	228	255	280
without hydronic module	Kg	193	213	237	262
Refrigerant charge R-410A	Kg	5,5	6,4	5,8	8,6
<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
Water connections (MPT gas)	inches	1	1	1-1/4	1-1/4
Maximum water pressure (unit without hydronic module)	kPa	1000	1000	1000	1000
Maximum water pressure (unit with hydronic module)	kPa	400	400	400	400
<b>Hydronic module</b>		Pump, mesh filter, expansion tank, flow switch, pressure gauges, automatic air purge valve and drain plug and safety valve.			
Pump		One single-speed pump			
Water inlet connection (MPT gas)	inches	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
Closed expansion tank water volume	l	5	5	8	8
Pre-charge of expansion vessel	bar	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
<b>Condenser</b>		One, copper tubes and aluminium fins			
<b>Fan</b>		Two radial fans with backward blades		One axial fan	
Diameter	mm	495	495	710	710
No. of blades		3	3	7	7
Outlet static pressure	Pa	80	80	80	80
Air flow (high speed)	l/s	2212	2212	3530	3530
Fan speed (high speed)	g/min	870	870	900	900

**Table II: Electrical data - Model RBY**

30RBY		017	021	026	033
<b>Power</b>		V-ph-Hz			
Voltage range	V	360 - 440			
Starting current*	A	75	95	118	118
Maximum power drawn (Vn) **	kW	8,0	9,3	11,2	14,0
Rated current***	W	8	12	20	21
Maximum power drawn (Vn) ****	A	13	16	20	24
Maximum power drawn (Vn +/-15%) †	A	15	18	23	27
<p>* Max. starting current within the operation limits (corresponding to the current of locked rotor in the compressor)</p> <p>** 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)</p> <p>*** The currents shown refer to Eurovent conditions (evaporator water inlet and outlet temperature = 12/7°C with air to the condenser at 35°C)</p> <p>**** Max. operating current related to the max. input power and rated voltage (400 V)</p> <p>† Max. operating current related to the max. input power and within the range 360-440 V</p>					

Table I: Physical data - Model RQY

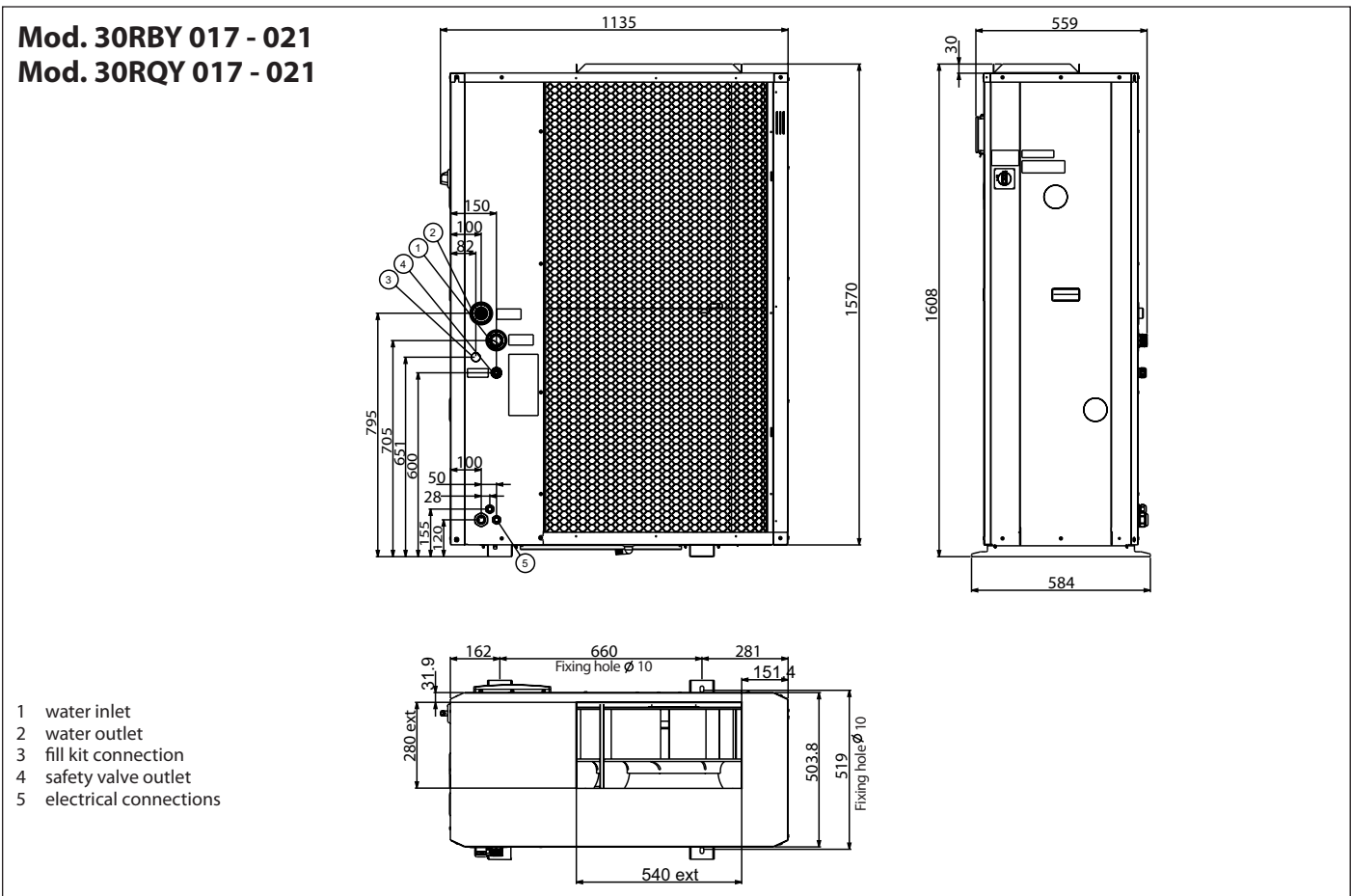
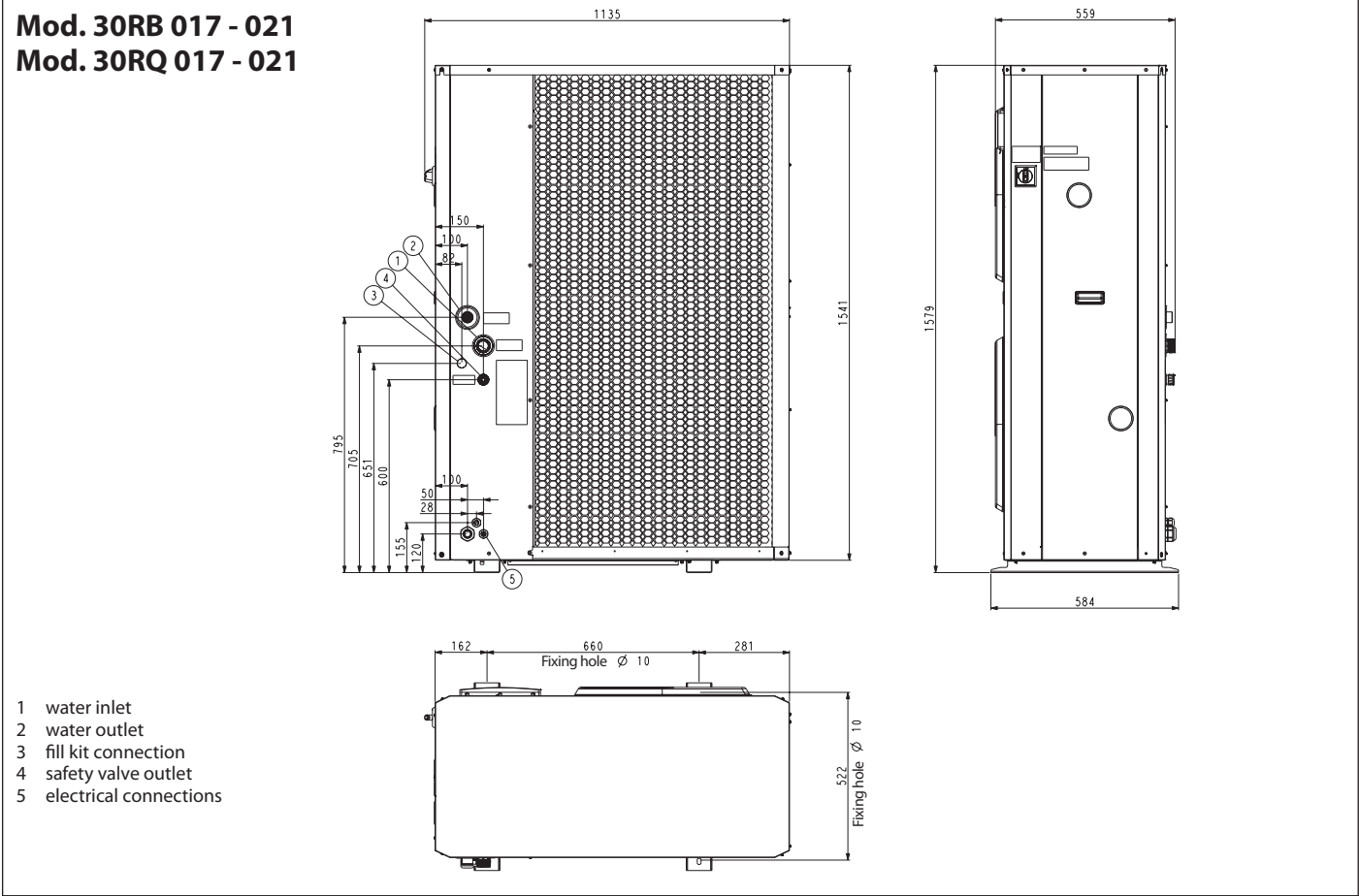
30RQY		017	021	026	033
<b>Operating weight**</b>					
with hydronic module	Kg	226	243	280	295
without hydronic module	Kg	211	228	262	277
Refrigerant charge R-410A	Kg	6,4	7,7	7,6	9,5
<b>Compressor</b>		One scroll compressor			
<b>Evaporator</b>		One plate heat exchanger			
Net water volume	l	1,52	1,9	2,28	2,85
Water connections (MPT gas)	inches	1	1	1-1/4	1-1/4
Maximum water pressure (unit without hydronic module)	kPa	1000	1000	1000	1000
Maximum water pressure (unit with hydronic module)	kPa	400	400	400	400
<b>Hydronic module</b>		Pump, mesh filter, expansion tank, flow switch, pressure gauges, automatic air purge valve and drain plug and safety valve.			
Pump		One single-speed pump			
Water inlet connection (MPT gas)	inches	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
Closed expansion tank water volume	l	5	5	8	8
Pre-charge of expansion vessel	bar	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
<b>Condenser</b>		One, copper tubes and aluminium fins			
<b>Fan</b>		Two radial fans with backward blades		One axial fan	
Diameter	mm	495	495	710	710
No. of blades		3	3	7	7
Outlet static pressure	Pa	80	80	80	80
Air flow (high speed)	l/s	2217	1978	3530	3530
Fan speed (high speed)	g/min	870	870	900	900

Table II: Electrical data - Model RQY

30RQY		017	021	026	033
<b>Power</b>					
Voltage range	V-ph-Hz	400-3-50			
	V	360 - 440			
Starting current*	A	75	95	118	118
Maximum power drawn (Vn) **	kW	8,0	9,3	11,2	14,0
Nominal current drawn***	W	8	12	20	21
Maximum power drawn (Vn) ****	A	13	16	20	24
Maximum power drawn (Vn +/-15%) †	A	15	18	23	27
<p>* Max. starting current within the operation limits (corresponding to the current of locked rotor in the compressor)</p> <p>** 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)</p> <p>*** The currents shown refer to Eurovent conditions (evaporator water inlet and outlet temperature = 12/7°C with air to the condenser at 35°C)</p> <p>**** Max. operating current related to the max. input power and rated voltage (400 V)</p> <p>† Max. operating current related to the max. input power and within the range 360-440 V</p>					

# 30RB/30RQ - 30RBY/30RQY

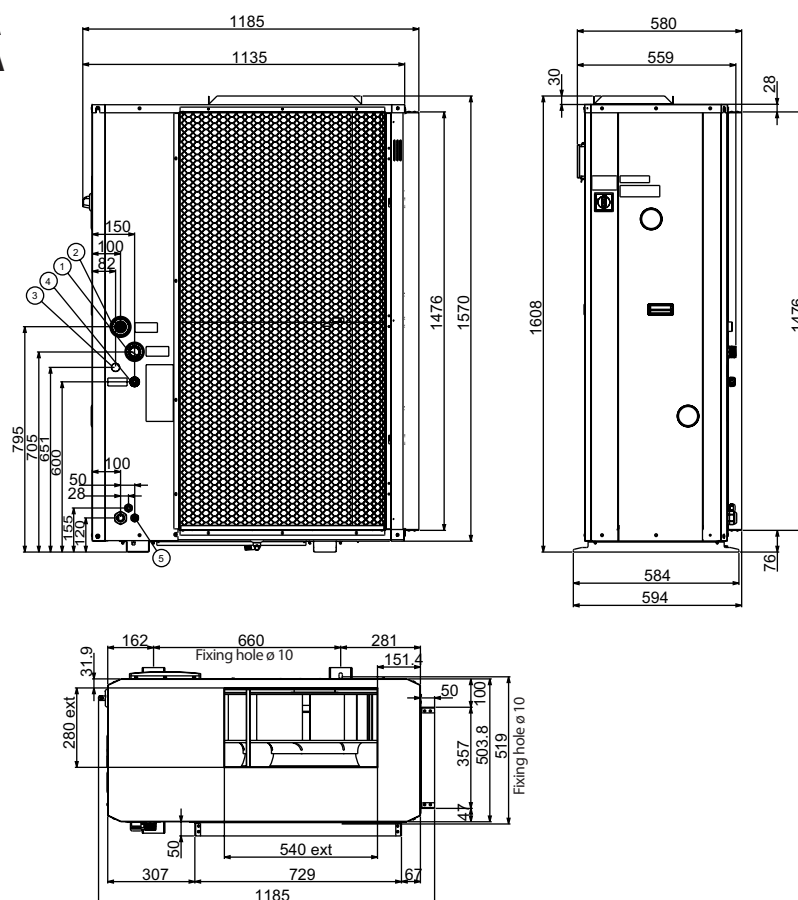
## Dimensions and location of hydraulic connections (mm)





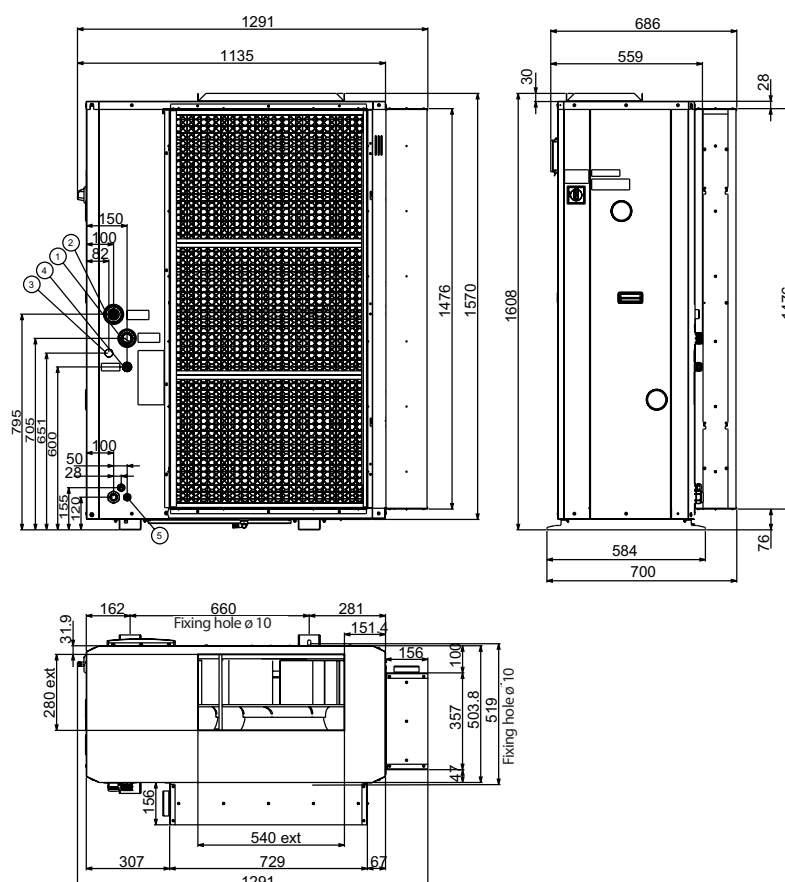
### Dimensions and location of hydraulic connections (mm)

**Mod. 30RBY 017 - 021xxA**  
**Mod. 30RQY 017 - 021xxA**



- 1 water inlet
- 2 water outlet
- 3 fill kit connection
- 4 safety valve outlet
- 5 electrical connections

**Mod. 30RBY 017 - 021xxB**  
**Mod. 30RQY 017 - 021xxB**



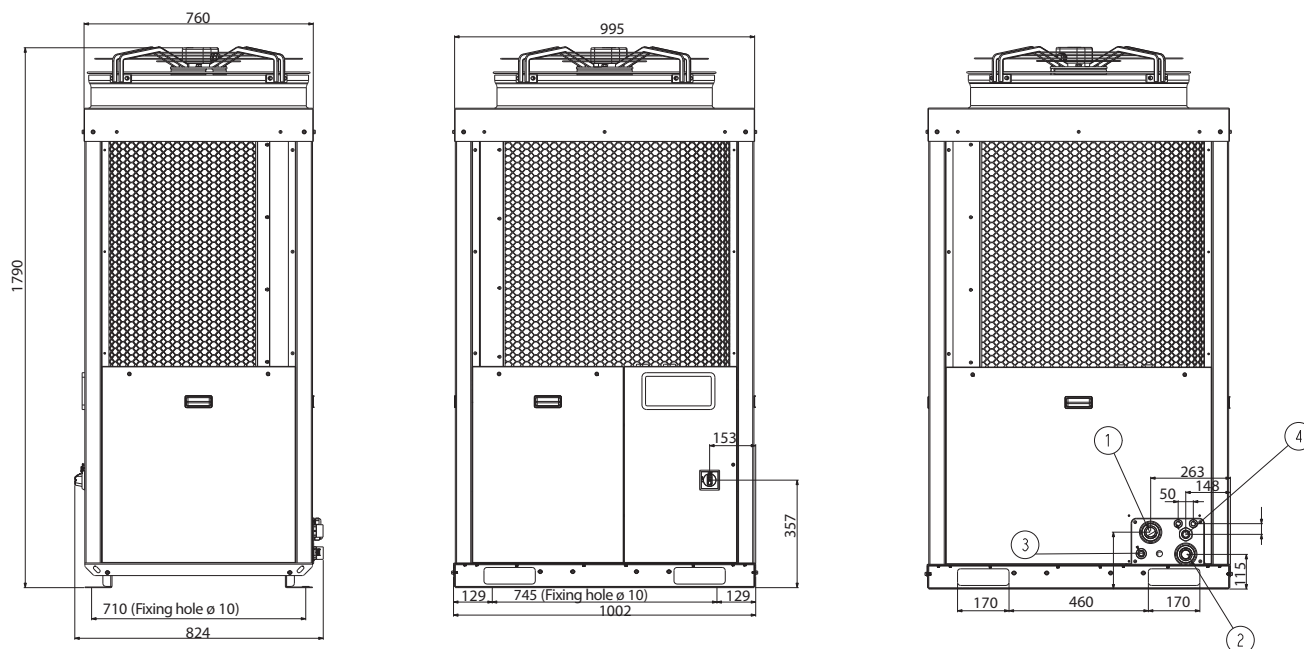
- 1 water inlet
- 2 water outlet
- 3 fill kit connection
- 4 safety valve outlet
- 5 electrical connections

# 30RB/30RQ - 30RBY/30RQY

## Dimensions and location of hydraulic connections (mm)

**Mod. 30RB 026 - 033**

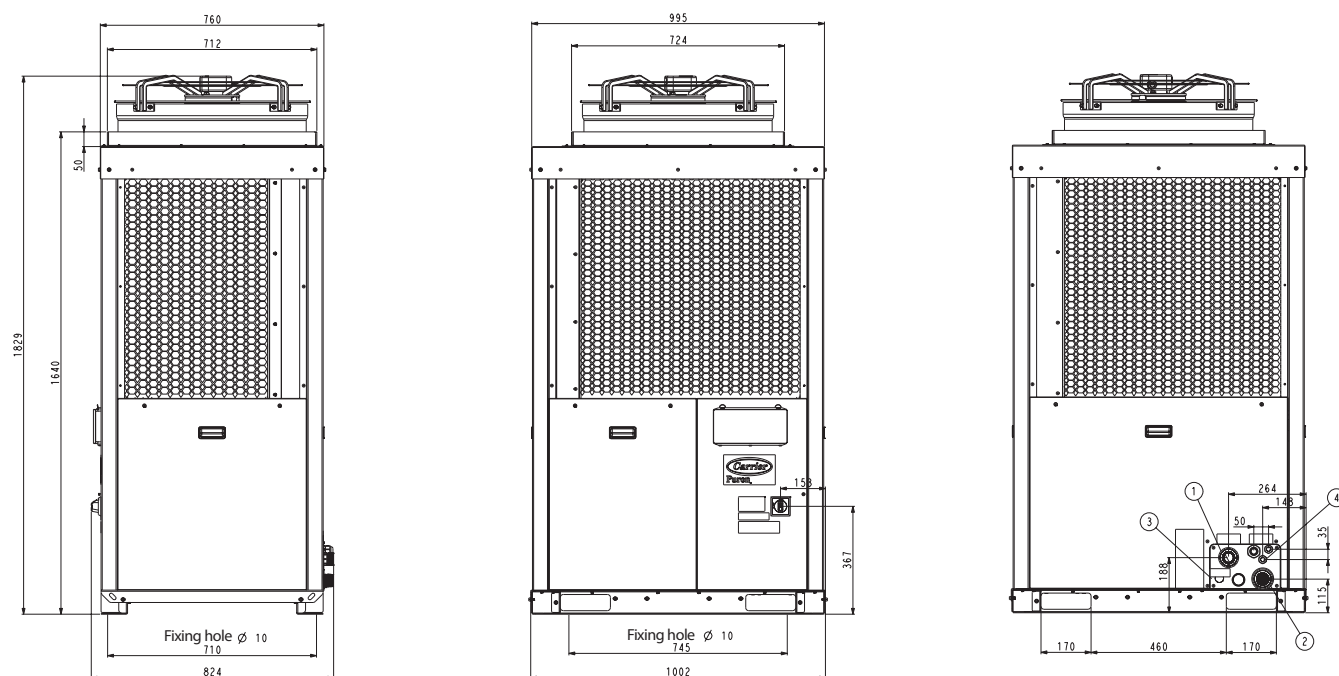
**Mod. 30RQ 026 - 033**



- 1 water inlet
- 2 water outlet
- 3 automatic fill kit connection (optional)
- 4 electrical connections

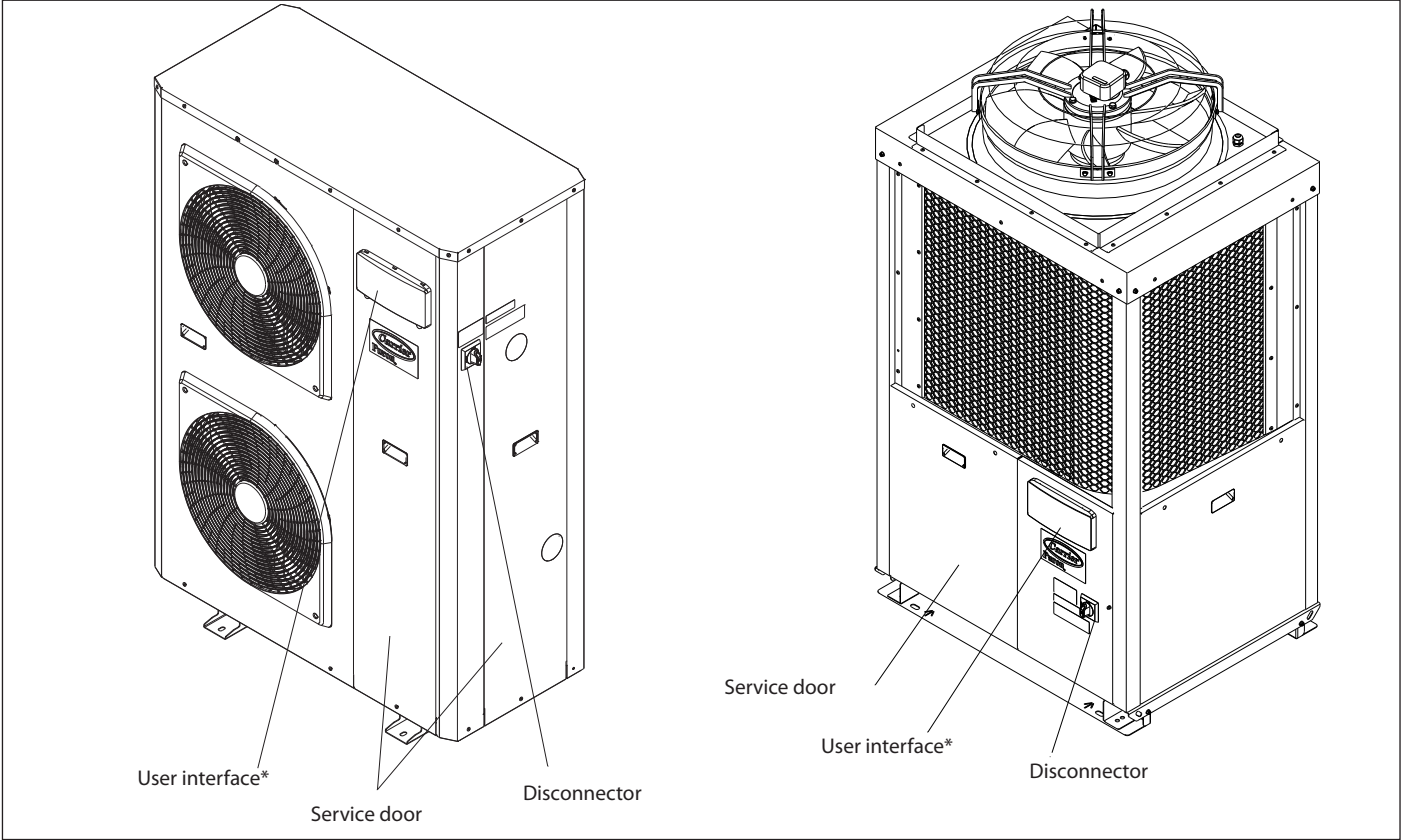
**Mod. 30RBY 026 - 033**

**Mod. 30RQY 026 - 033**



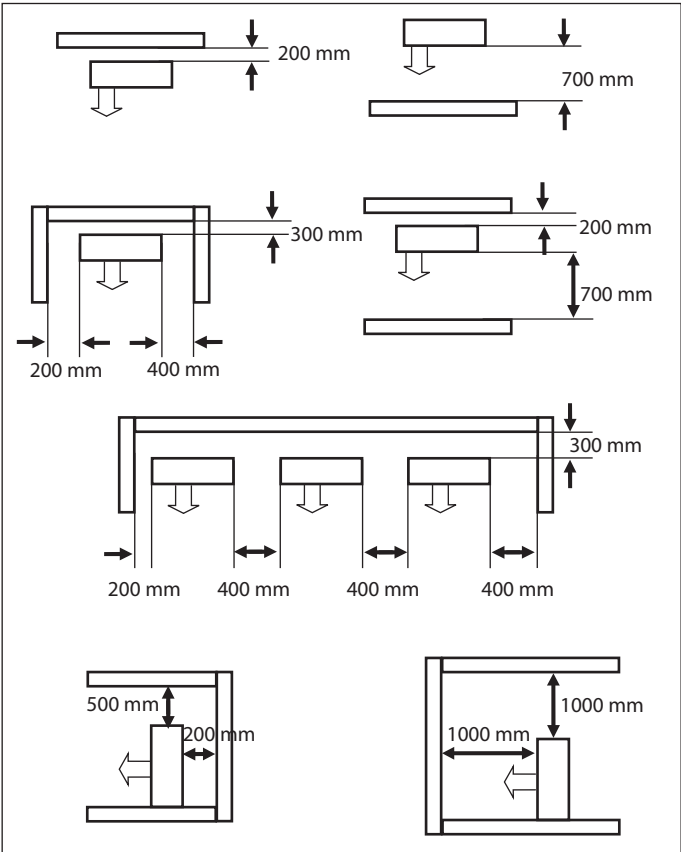
- 1 water inlet
- 2 water outlet
- 3 automatic fill kit connection (optional)
- 4 electrical connections

# 30RB/30RQ - 30RBY/30RQY User interface and main switch

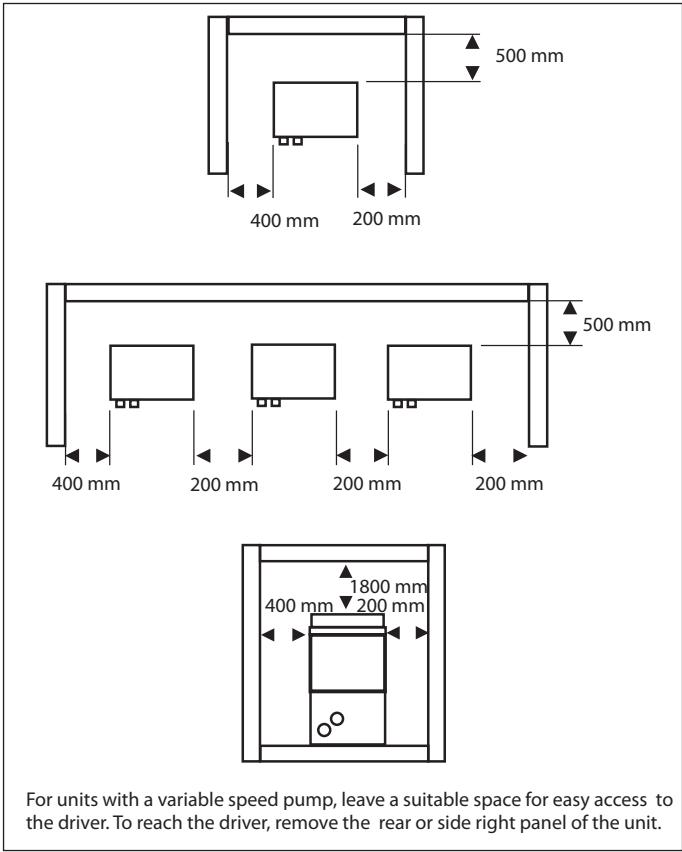


\* Check that the user interface is protected as described in section “Electronic control”.

## Clearances (mm) for horizontal outlet unit (30RB-30RQ017-021)



## Clearances (mm) for vertical outlet unit (30RB-30RQ026-033)



For units with a variable speed pump, leave a suitable space for easy access to the driver. To reach the driver, remove the rear or side right panel of the unit.

# 30RB/30RQ - 30RBY/30RQY

## General information and hydronic module

### 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 hydronic connections and then electrical connections. If unit is uninstalled first disconnect electrical cables, then the hydronic 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 hydronic 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. 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.

#### **Installation instructions for ductable units**

Units 30RBY and 30RQY (ductable unit ) can be installed in buildings and connected by means of duct systems

- on the outside air inlet side (only units size 17-21 kW)
- on the fan side where the air is released after passing through the air/ refrigerant exchanger.

Therefore the unit can be installed in a building without changing the indoor air temperature.

**These units are designed for a static pressure of 80 Pa: for this reason, the friction loss of any intake duct added up to the friction loss of the supply duct must not exceed the indicated value. For units size 17-21 kW: if the units are not provided with a supply duct, a protective grille must be installed to prevent access to fans.**

*Unit with optional intake filters (size 17 -21 kW).*

Access to filters for maintenance of units 17 and 21 kW is possible by removing the screws on the filter support side.

After removing the screws remove the closing panel.

Remove the filters on the unit back side as shown below.

The friction loss of the filters with nominal air flow is 7 Pa.

Check the filter is clean every two or three months (more often if the unit is installed in a dusty place) and when the friction loss is twice the nominal value.

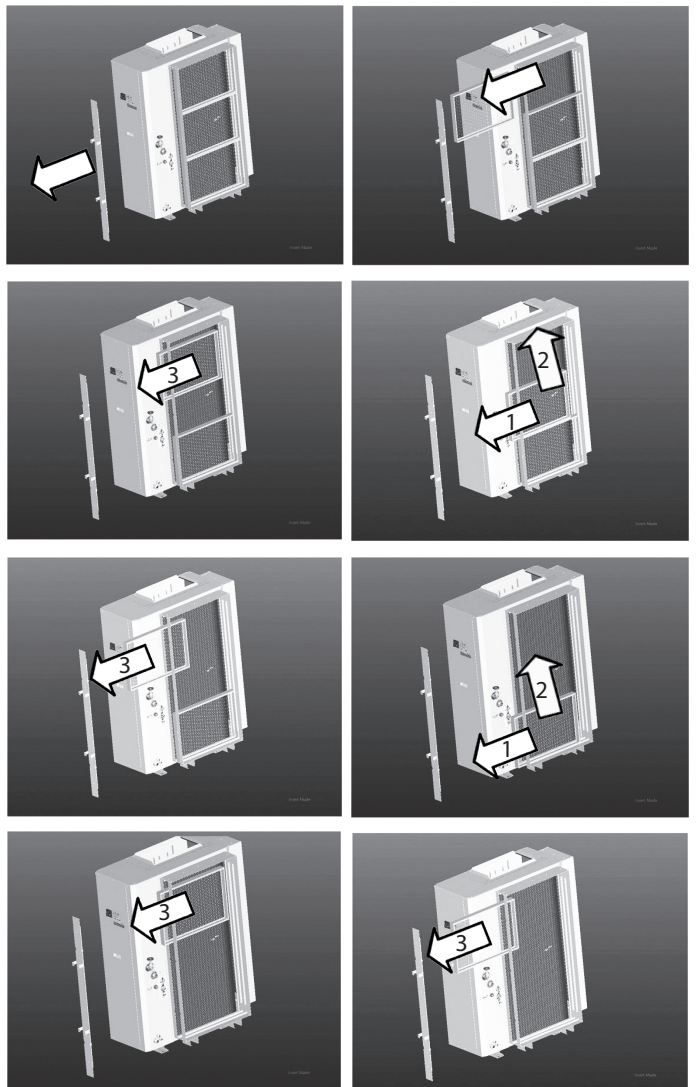
A dirty filter causes a decrease in air flow and in the unit efficiency.

The filter should be cleaned with air (not water) as it is made of aluminium.

#### *Fan supply*

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 – 33 kW).

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

On sizes 26- 33 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.

### **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 26-33 kW) fix the vibration absorbers under a feet-supporting frame of the unit.

### **Transport**

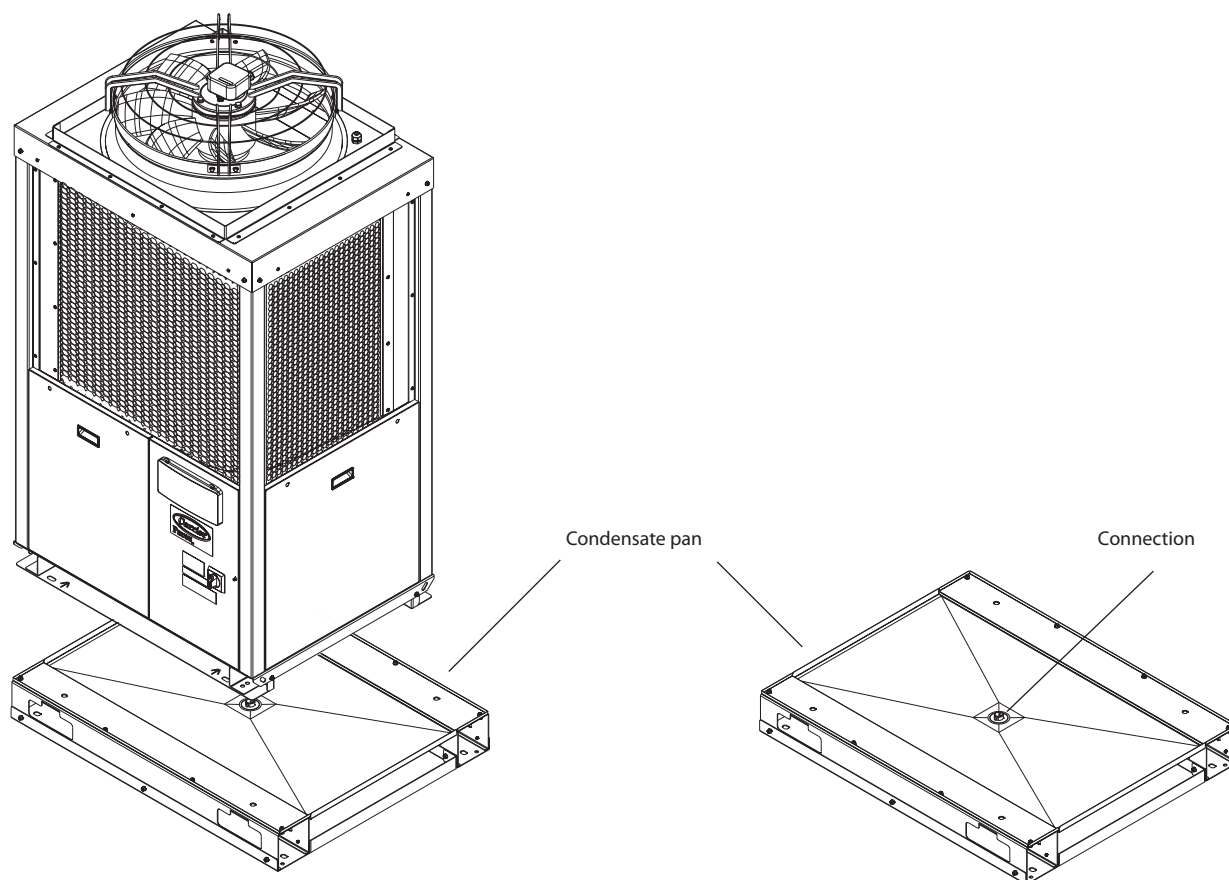
1. Use spreader bars to lift the unit to avoid damage to the panels. Avoid violent movements.
2. Never roll or swing the unit more than 15°.

### **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.**



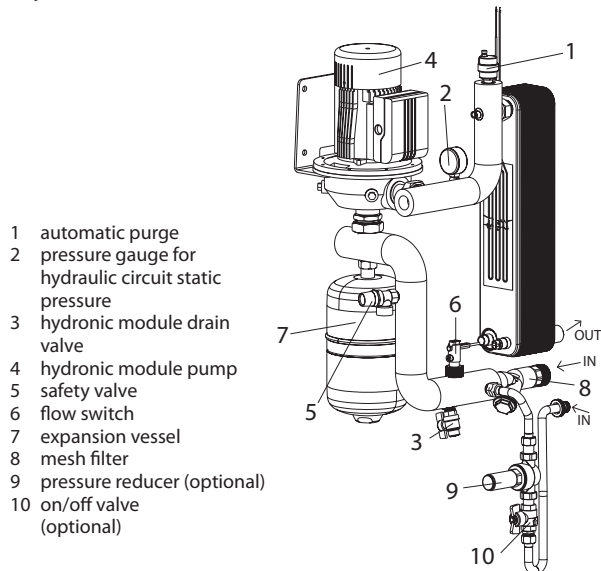
# 30RB/30RQ - 30RBY/30RQY

## General information and hydronic module

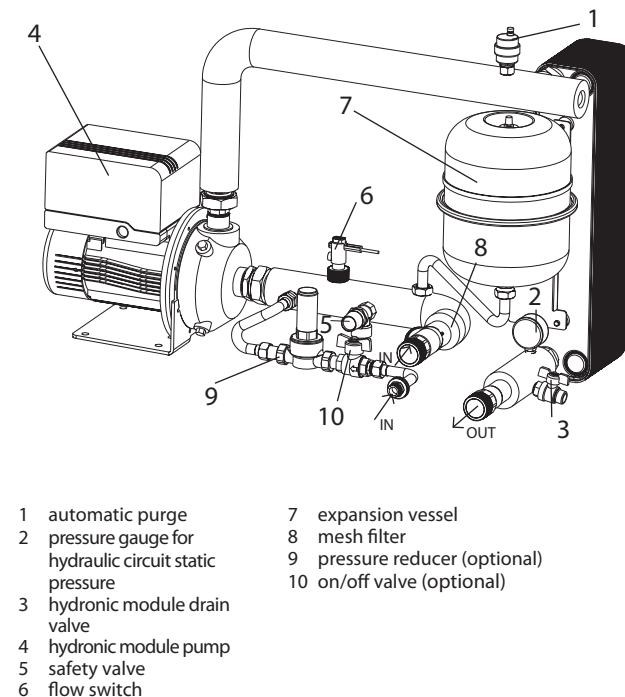
### Hydronic module

The hydronic module is factory-installed.  
This eliminates the need to install the necessary components on-site, making the unit more compact and easy to install.

#### Hydronic module for unit 30RB/30RQ017-021



#### Hydronic module for unit 30RB/30RQ026-033



### Units with variable speed pump

In this type of unit, water flow is not controlled through a nominal value. In fact, it is controlled by changing the pump rotation speed to maintain a water thermal head (by default) or a water outlet pressure according to the user preset value.

The control parameter is detected by temperature sensors placed at the water inlet and outlet of the unit (by default) or by a pressure sensor installed on the water outlet of the unit.

The control system detects the temperature difference from the sensors (by default) or the pressure detected by the sensor installed on the outlet and compares it to the value the user has preset to adjust the

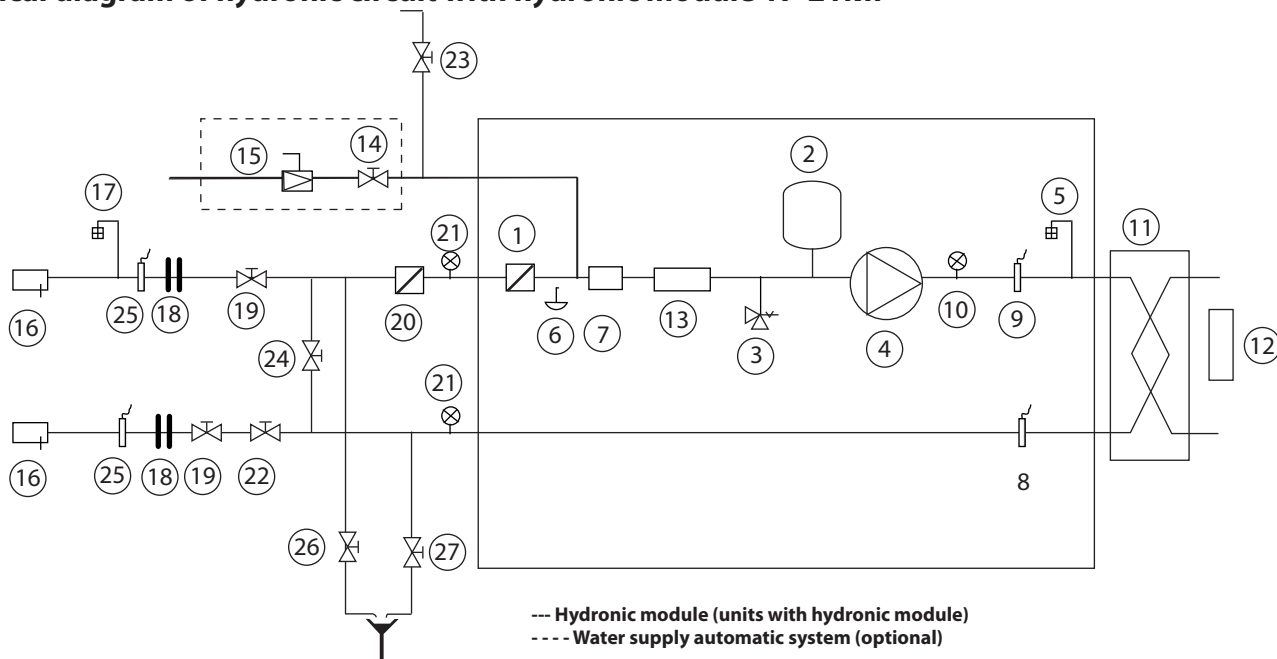
pump rotation speed as follows:

- If the temperature difference (by default) is greater than the setpoint or the detected pressure is lower than the setpoint, pump speed and flow rate are increased.
- If the temperature difference (by default) is lower than the setpoint or the detected pressure is greater than the setpoint, pump speed and flow rate are decreased.

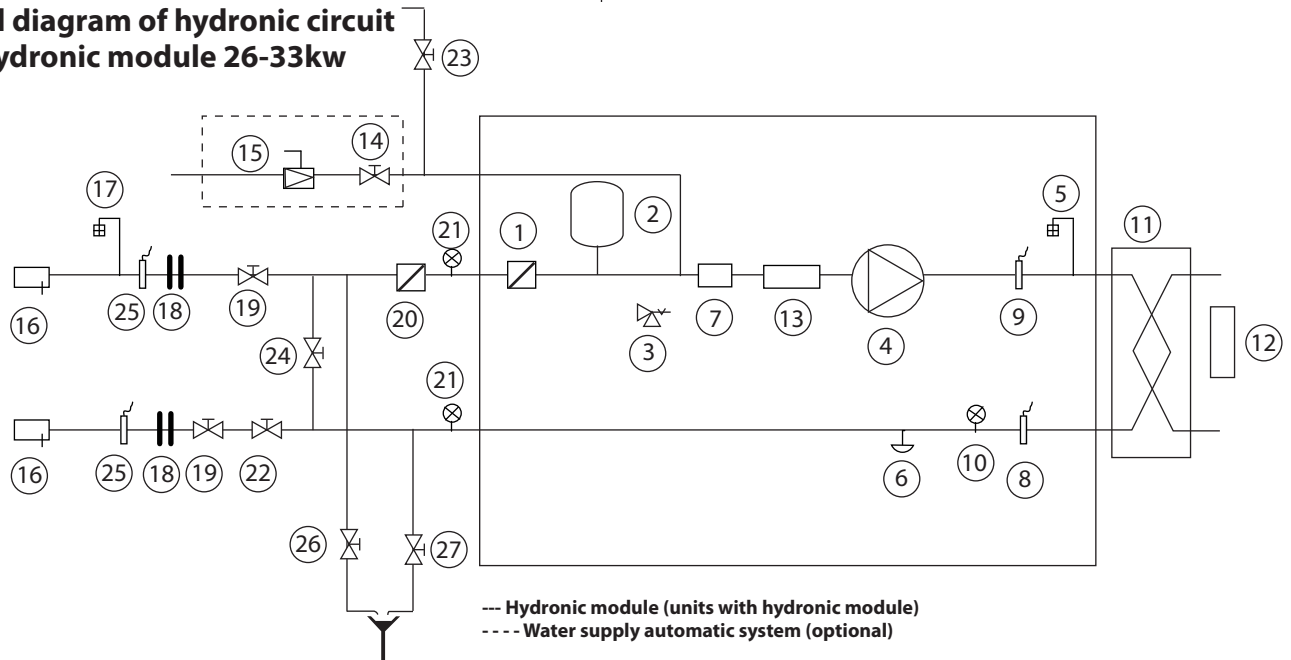
Flow rate is modified considering the maximum and minimum flow rates allowed for the unit as well as the maximum and minimum supply rate of the pump.

In case that alarms occur during start-up, refer to the control manual.

#### Typical diagram of hydronic circuit with hydronic module 17-21kw



**Typical diagram of hydronic circuit with hydronic module 26-33kw**



### LEGEND

#### HYDRONIC COMPONENTS

- 1 Mesh filter
- 2 Expansion tank
- 3 Safety 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 Pressure gauge
- 11 Plate heat exchanger
- 12 Anti-freeze electric heater for refrigerant - water exchanger
- 13 Anti-freeze electric heater for pipes
- 14 On/off valve ( automatic system for water filling- optional)
- 15 Pressure reducer (automatic system for water filling- optional)

#### SYSTEM COMPONENTS

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

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.

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 hydronic 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 (unit without hydronic module).
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 hydronic 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 hydronic 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 and propylene glycol allowed is 40%.

#### Frost protection

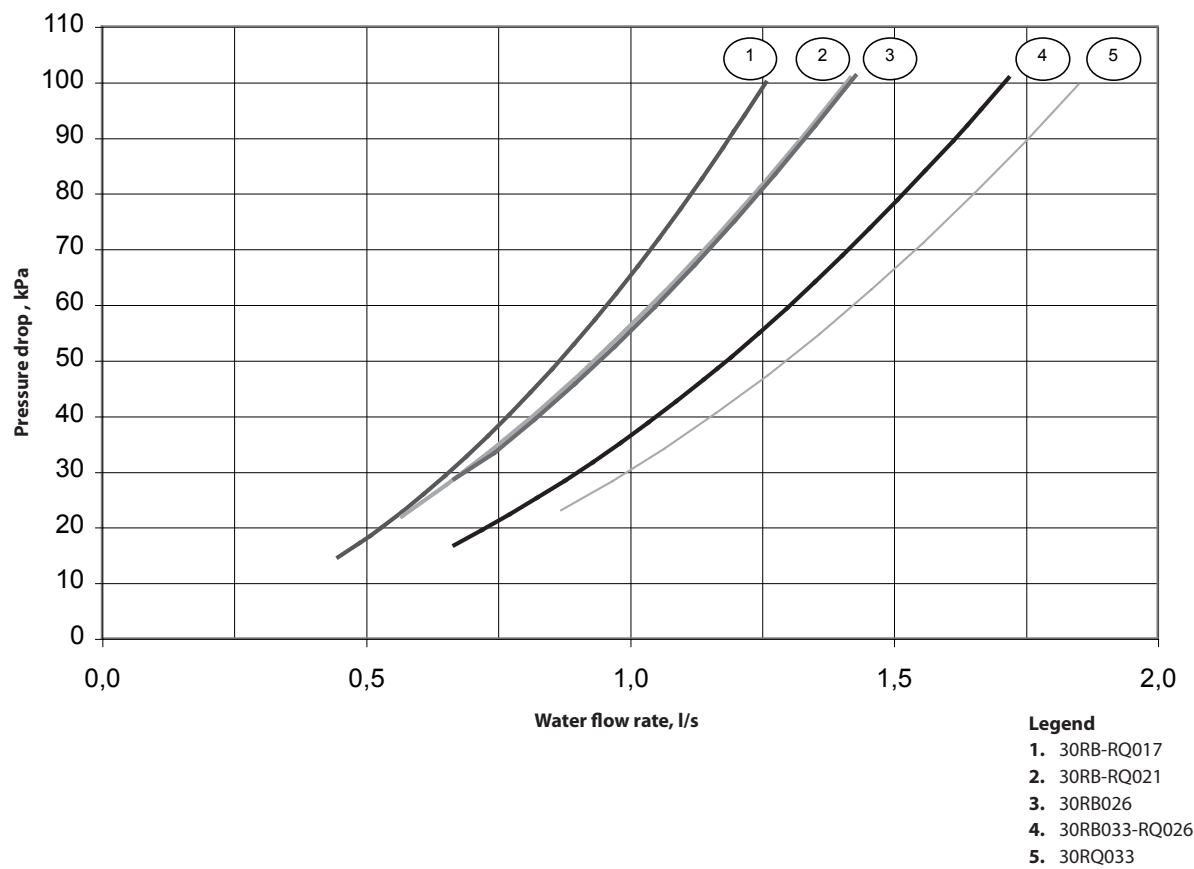
Frost protection of the plate heat exchanger and of the circuit inside the hydronic module is always guaranteed down to -10°C by the electric heaters that are automatically activated if needed. The power supply to the electric heaters of the plate heat exchanger and to the internal circuit of the hydronic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

**IMPORTANT: Both the unit main switch (1Q) and the auxiliary switch (2Q) must always be set in cut-in position (positions 1Q and 2Q are shown on the electric diagram).**

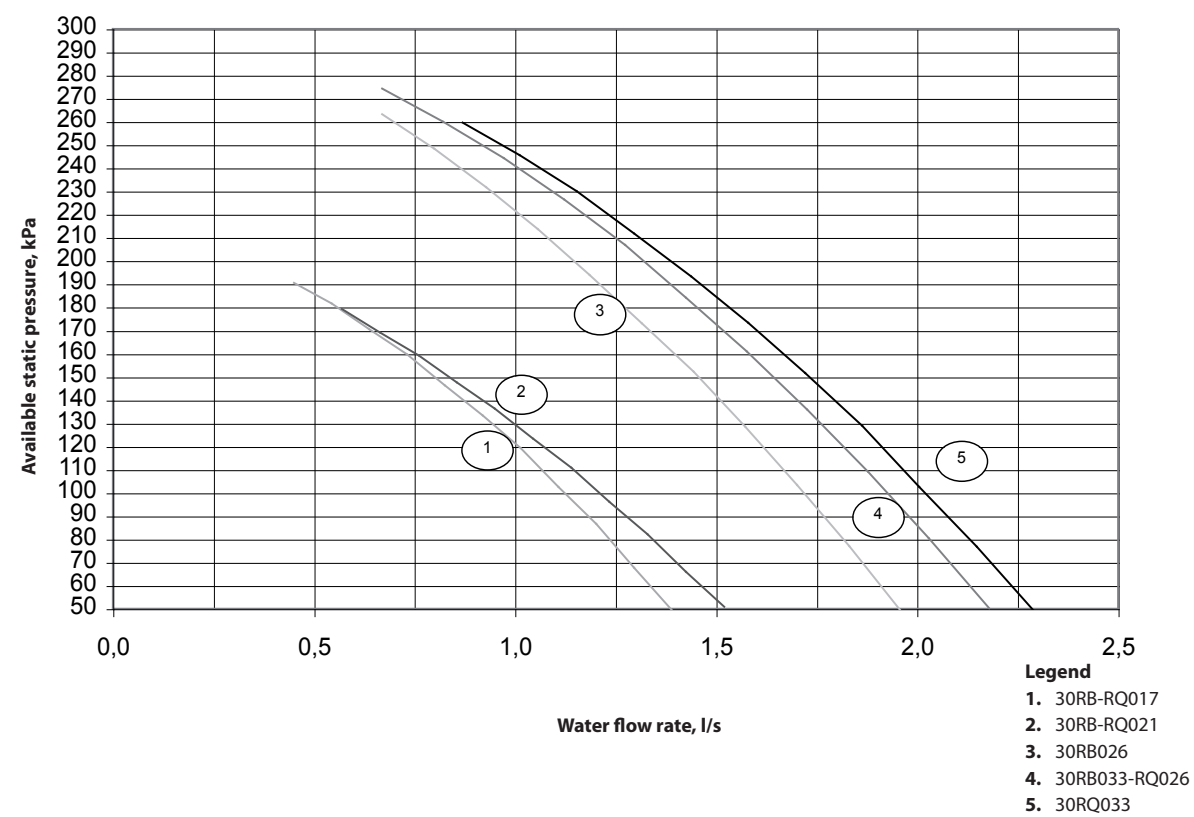
# 30RB/30RQ - 30RBY/30RQY

## Water connections

Water pressure drop of the unit without hydronic module



Outlet available static pressure of the unit with hydronic module





### 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 disconnector 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	30RB/30RQ 017	30RB/30RQ 021	30RB/30RQ 026	30RB/30RQ 033
Cable section	5 x 2,5 mm²			5 x 4 mm²
Power supply cable	H07 RN-F			
Fuse (type "gG")	25 A	32A	40 A	50 A

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 (%) =

$$\frac{\text{Largest deviation from average voltage} \times 100}{\text{Average voltage}}$$

#### 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 disconnector 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 pressure gauge and the liquid level gauge can be checked by removing the plugs from the side panel (there is no need to remove the whole panel).

### Liquid refrigerant charge

#### Checking the charge

#### CAUTION:

**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.**

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.

- 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:

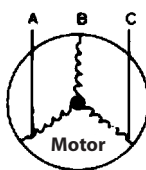
Regularly carry out leak checks and immediately repair any leak found.

#### 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); in this case:
  - 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.



# 30RB/30RQ - 30RBY/30RQY

## Refrigerant charge and electronic control

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- 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.

---

### CAUTION:

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

Combustion of refrigerant produces toxic phosgene gas.

### 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.

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## 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 recalibrates 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).

# 30RB/30RQ - 30RBY/30RQY

## Start-up, compressor replacement

### 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.

#### 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.

### Compressor replacement

As the compressors are hermetic, when an internal fault occurs, the compressor must be replaced.  
For sizes 26 and 33, 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.
- Unbraid 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.
- Braid 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.



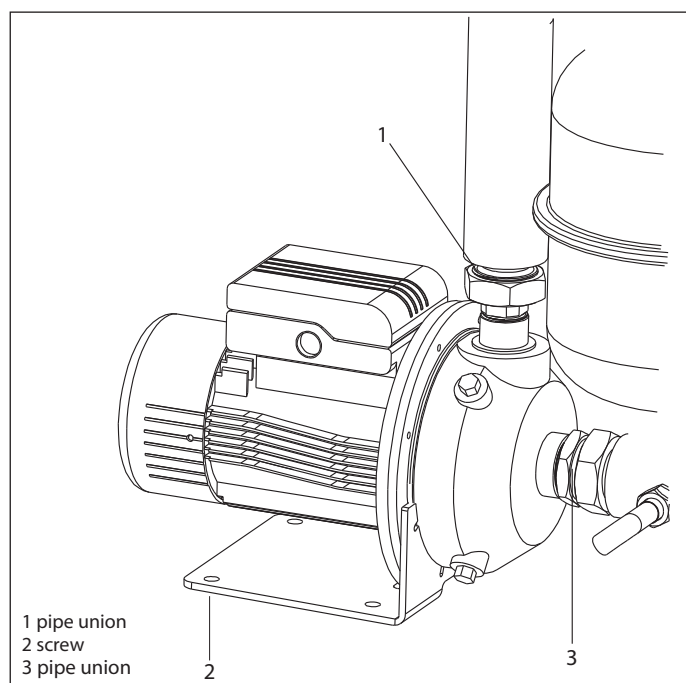
# 30RB/30RQ - 30RBY/30RQY

## Pump replacement, unit protection devices

### 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 hydronic 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.



### Description of unit protection devices

The unit includes the following protection devices:

- Internal compressor protection.
- Fan motor internal thermal protection.
- Main switch.
- Anti-short-cycle protection.
- Thermomagnetic main switch.
- Thermomagnetic control switch.
- Fan circuit breaker, heaters and compressor.
- Defrost thermostat.
- Fault detector for the temperature and pressure sensors.
- High pressurestat: this protects the unit against excessive condensing pressure.  
The high pressurestat has factory-fixed non-adjustable settings.  
The appliance stops due to the intervention of the high pressure alarm threshold, before the high pressurestat intervenes. This function is performed by the electronic control device via a pressure transducer.
- Low pressurestat: This function is performed by the electronic control device via a pressure transducer.

Only on appliances with hydronic module.

- Pump motor external thermal protection.

### Table III: Pressure switch settings

	Cut-out	Reset
High pressurestat	44 bar	Manual

**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.

### Operating limits 30RB

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

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

### Operating limits 30RQ

Cooling cycle		
Plate heat exchanger	Minimum °C	Maximum °C
Water entering temp. (at start-up)	7,8*	30
Water leaving temp. (in operation)	5**	18
Coil:		
Air entering temperature	-10	48
Heating cycle		
Plate heat exchanger	Minimum °C	Maximum °C
Water entering temp. (at start-up)	10	45
Water leaving temp. (in operation)	20	50
Coil:	Minimum °C	Maximum °C
Plate heat exchanger	-15	40

\* Contact Carrier if an entering water temperature lower than 7.8 °C is necessary

\*\* "

If glycol is used but leaving water temperatures are greater than 5°, select option "medium brine" by the user interface. UI by selecting the "medium brine"  
If you are using but the glycol outlet temperature is greater than 5 °C, you must select the user interface option "medium brine"

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

	Minimum flow rate, l/s	Maximum flow rate, l/s*	Maximum flow rate, l/s**
30RB-RQ017	0,45	1,4	1,3
30RB-RQ021	0,57	1,6	1,5
30RB026	0,67	2	1,5
30RQ026	0,67	2,2	1,8
30RB033	0,87	2,2	1,8
30RQ033	0,87	2,3	1,9

\* Maximum water flow rate with an available static pressure of 50 kPa (units with hydronic module)

\*\* Maximum water flow rate at a plate heat exchanger pressure drop of 100 kPa (units without hydronic module)

### Water circuit water content

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

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

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.

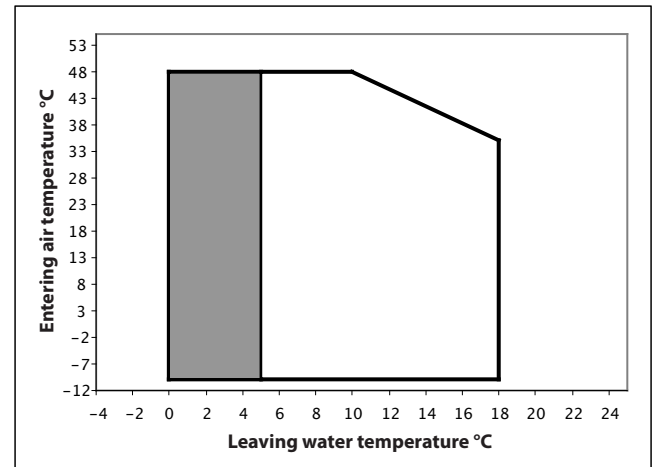
### Maximum water content of hydraulic circuit

The units provided with hydronic module are supplied with an expansion vessel 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.

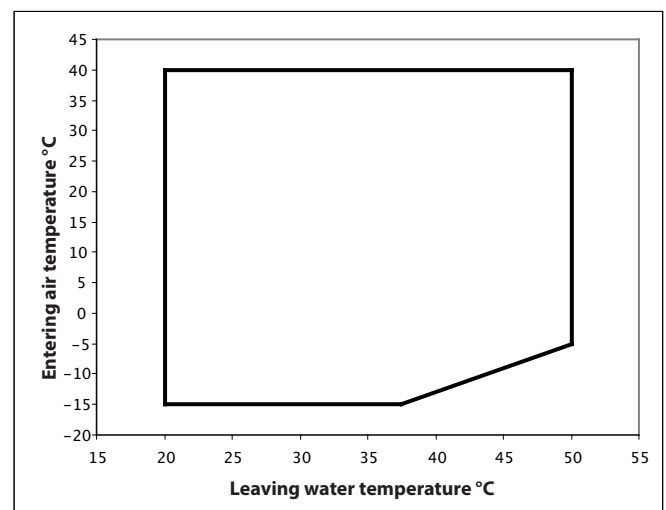
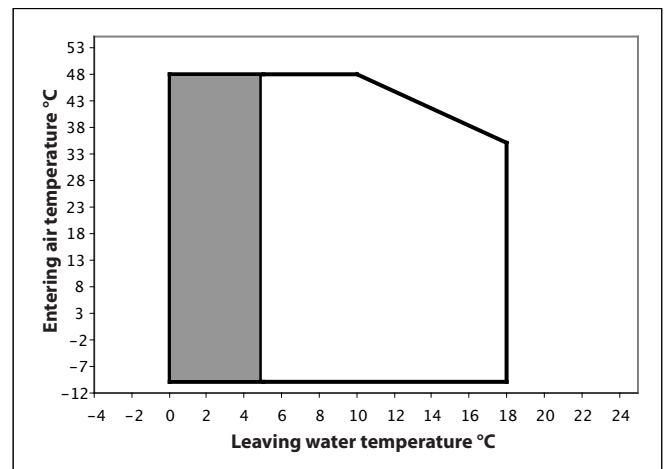
30RB-30RQ		017 - 021		026 - 033	
Static pressure	bar	1,5	3	1,5	3
Water	litri	200	50	350	140
GE 10%	litri	150	38	263	105
GE 20%	litri	110	28	193	77
GE 30%	litri	90	23	158	63
GE 40%	litri	75	19	131	53

GE: ethylene glycol

### Operating range - 30RB units



### Operating range - 30RQ units



#### Note:

- Operating range with anti-freeze solution and with special configuration of the Pro-Dialog control system



# 30RB/30RQ - 30RBY/30RQY

## General maintenance, maintenance and final recommendations

### 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 hydronic 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.

#### - 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.

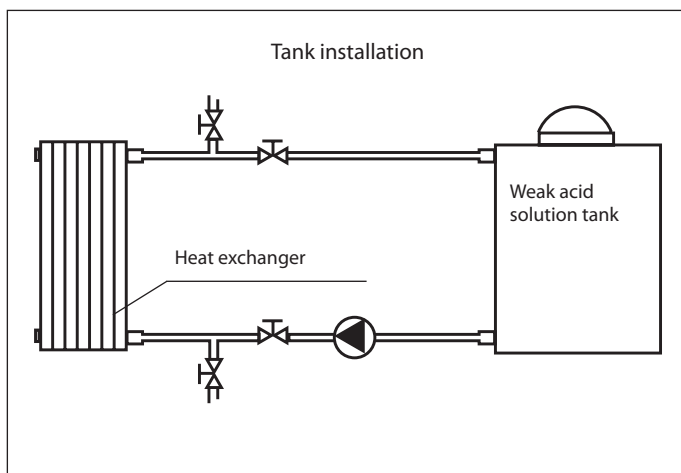
The tank installation can be permanent or, alternatively, the connections can be prepared and, at any given time, a portable cleaning device can be connected.

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.

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.



#### - Controls:

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

### 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.
- 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. Always wear the protective gloves and safety glasses. 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.
- 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.

### 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.

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.

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 continually 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 delayed;  
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:

- Pipe 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.



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The manufacturer reserves the right to change any product specifications without notice.