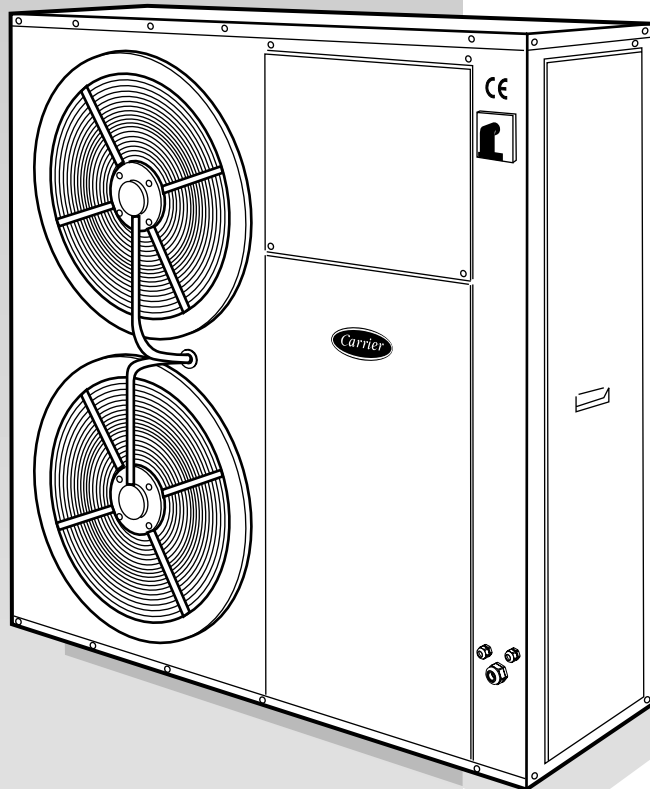




AQUASNAP 30RA / 30RH

PRO-DIALOG Plus control



INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

30RA

Physical data and electrical data - Model RA

Table I: Physical data - Model RA

30RA		017	021	026	033
Net cooling capacity*	kW	17.70	21.60	25.80	31.70
Operating weight					
without hydronic module	kg	200	220	250	285
with hydronic module	kg	220	240	280	315
Refrigerant charge R-407C	kg	4.80	5.13	6.41	7.70
Compressor		One scroll compressor			
Evaporator		One plate heat exchanger			
Net water volume	l	1.50	1.88	2.16	2.82
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
Hydronic module		Pump, mesh filter, expansion tank, flow switch, pressure gauges, automatic air purge valve and drain plug, flow control valve and safety valve.			
Pump		One single-speed pump			
Available pressure**	kPa	138	126	150	138
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	8	8	8	8
Water fill system (option)					
Inlet/outlet diameter (MPT gas)	inches	1/2	1/2	1/2	1/2
Condenser		One, copper tubes and aluminium fins			
Tube diameter	inches	3/8	3/8	3/8	3/8
No. of rows		2	3	2	3
Tubes/row		52	52	60	60
Fin spacing	mm	1.81	1.81	1.81	1.81
Fan		Two, axial type with two speeds			
Diameter	mm	500	500	610	610
No. of blades		5	5	5	5
Air flow (high speed)	l/s	2450	2222	3278	3000
Fan speed (high speed)	r/s	12.83	12.91	11.05	10.96

* The ratings indicated refer to an evaporator entering/leaving temperature of 12/7 °C, and air entering the condenser at 35 °C.

** At nominal water flow rate.

Table II: Electrical data - Model RA

30RA		017	021	026	033
Power supply	V-ph-Hz	400-3-50 / 400-3-50+N			
Voltage range	V	360-440			
Nominal power input*	kW	6.43	8.57	9.56	12.39
Effective power input**	kW	6.54	8.72	9.75	12.60
Nominal current drawn*	A	10.75	15.50	18.80	24.55
Effective current drawn**	A	10.95	15.75	19.10	24.95
Maximum power drawn***	kW	7.87	10.8	12.23	14.95
Maximum current drawn**	A	13.50	20.00	22.50	28.00
Starting current	A	87	132	134	139
Pump power input	kW	0.65	0.68	0.89	0.93

* Based on an outdoor entering air temperature of 35 °C db, an evaporator entering water temperature of 12 °C and an evaporator leaving water temperature of 7 °C, unit without hydronic module

** The power and current values indicated refer to Eurovent Standard conditions.

*** The power and current values indicated refer to an evaporator leaving water temperature of 10 °C and condenser entering air temperature of 46 °C.

Table I: Physical data - Model RH

30RH		017	021	026	033
Net cooling capacity*	kW	16.70	21.60	24.60	29.00
Net heating capacity**	kW	18.80	24.80	27.80	34.00
Operating weight					
without hydronic module	kg	235	265	285	315
with hydronic module	kg	255	285	315	345
Refrigerant charge R-407C	kg	7.15	7.84	9.30	11.00
Compressor		One scroll compressor			
Control system		Pro Dialog-Plus			
Refrigerant-water heat exchanger		One plate heat exchanger			
Net water volume	l	1.50	1.88	2.16	2.82
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
Hydronic module		Pump, mesh filter, expansion tank, flow switch, pressure gauges, automatic air purge valve and drain plug, flow control valve and safety valve.			
Pump		One single-speed pump			
Available pressure***	kPa	142	125	155	149
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
Drain tap coupling (MPT gas)	inches	1/2	1/2	1/2	1/2
Closed expansion tank water volume	l	8	8	8	8
Water fill system (option)					
Inlet/outlet diameter (MPT gas)	inches	1/2	1/2	1/2	1/2
Refrigerant-air heat exchanger		One, copper tubes and aluminium fins			
Tube diameter	inches	3/8	3/8	3/8	3/8
No. of rows		3	2	3	4
Tubes/row		52	60	60	60
Fin spacing	mm	1.81	1.81	1.81	1.81
Fan		Two, axial type with two speeds			
Diameter	mm	500	610	610	610
No. of blades		5	5	5	5
Air flow (high speed)	l/s	2222	3611	3111	3333
Fan speed (high speed)	r/s	12.83	10.83	11.67	11.83

* The ratings indicated refer to an evaporator entering/leaving temperature of 12/7 °C, and air entering the condenser at 35 °C.

** The ratings indicated refer to a condenser entering/leaving temperature of 40/45 °C, and air entering the condenser at 7 °C d.b. and 6 °C w.b.

*** At nominal water flow rate during cooling.

Table II: Electrical data - Model RH

30RH		017	021	026	033
Power supply	V-ph-Hz	400-3-50 / 400-3-50+N			
Voltage range	V	360-440			
Nominal power input*	kW	6.21	7.95	9.13	11.83
Effective power input**	kW	6.30	8.10	9.30	12.00
Nominal current drawn*	A	10.75	14.80	18.70	23.65
Effective current drawn**	A	10.90	15.05	19.05	24.00
Maximum power drawn***	kW	7.87	10.8	12.23	14.95
Maximum current drawn***	A	13.50	20.00	22.50	28.00
Starting current	A	87	132	134	139
Pump power input	kW	0.65	0.68	0.89	0.93

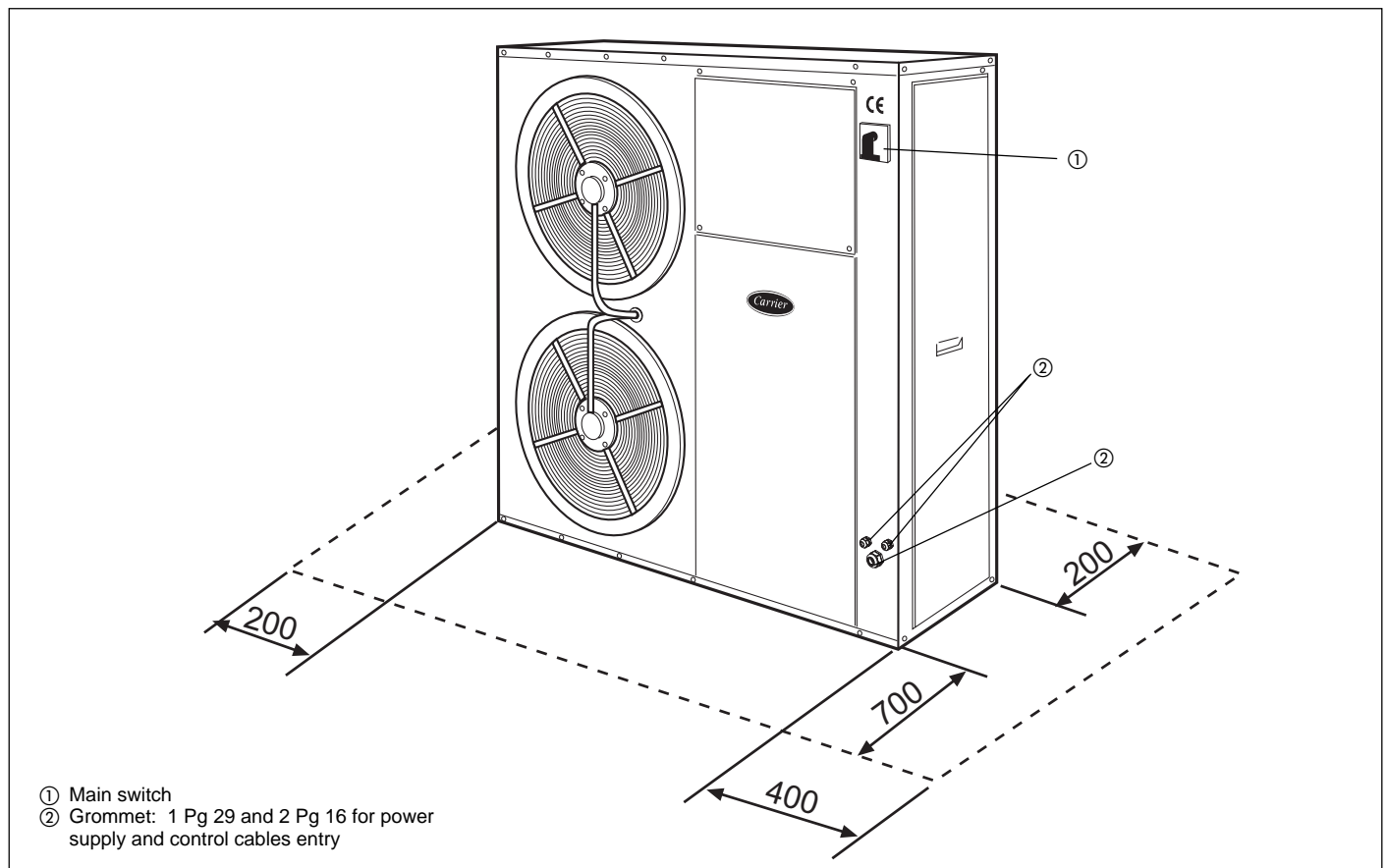
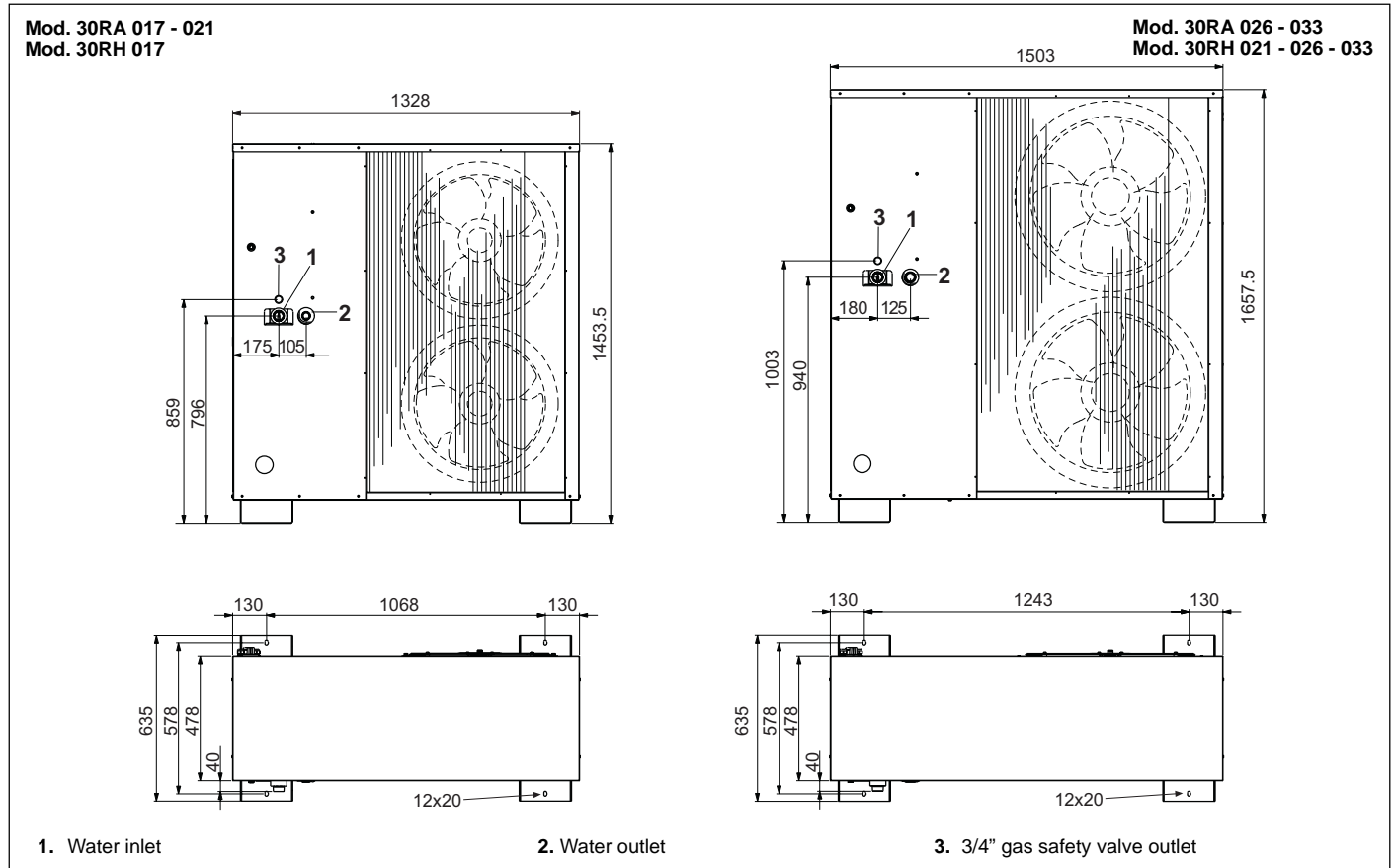
* Based on an outdoor entering air temperature of 35 °C db, an evaporator entering water temperature of 12 °C and an evaporator leaving water temperature of 7 °C, unit without hydronic module

** The power and current values indicated refer to Eurovent Standard conditions.

*** The power and current values indicated refer to an evaporator leaving water temperature of 10 °C and a condenser entering air temperature of 46 °C.

30RA/30RH

Dimensions and location of hydraulic connections (mm)



Unit installation

Read this instruction manual thoroughly before starting the installation.

This unit complies with low-voltage (EEC/73/23) and electromagnetic compatibility (EEC/89/336) directives.

- 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.

WARNING:

Disconnect the mains power supply switch before servicing the system or handling any internal parts of the unit. All mains supply circuits must be disconnected.

- 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.
- Inspect equipment for damage due to improper transportation or handling: file an immediate claim with the shipping company. 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 R407-C 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.

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.

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.

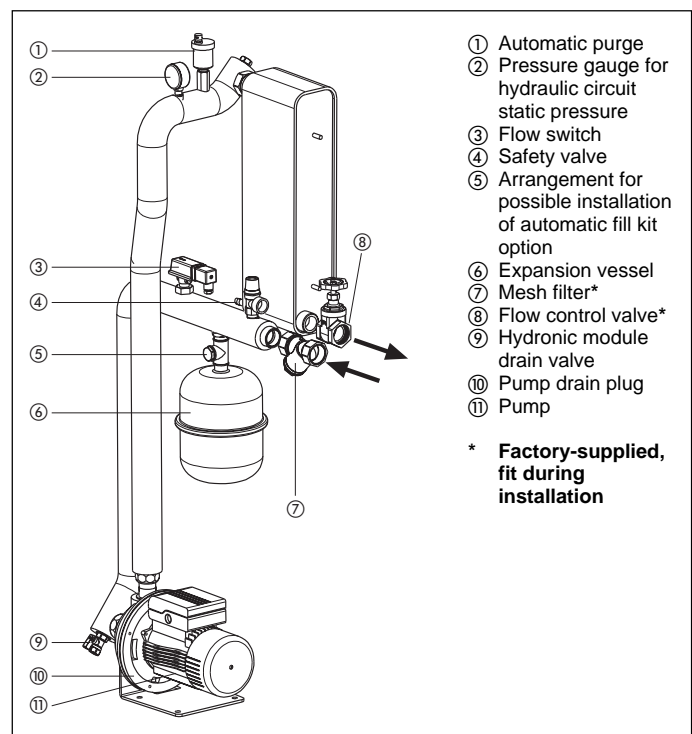
IMPORTANT:

Always ensure that the unit is levelled correctly.

Hydronic module

The hydronic module is factory-installed.

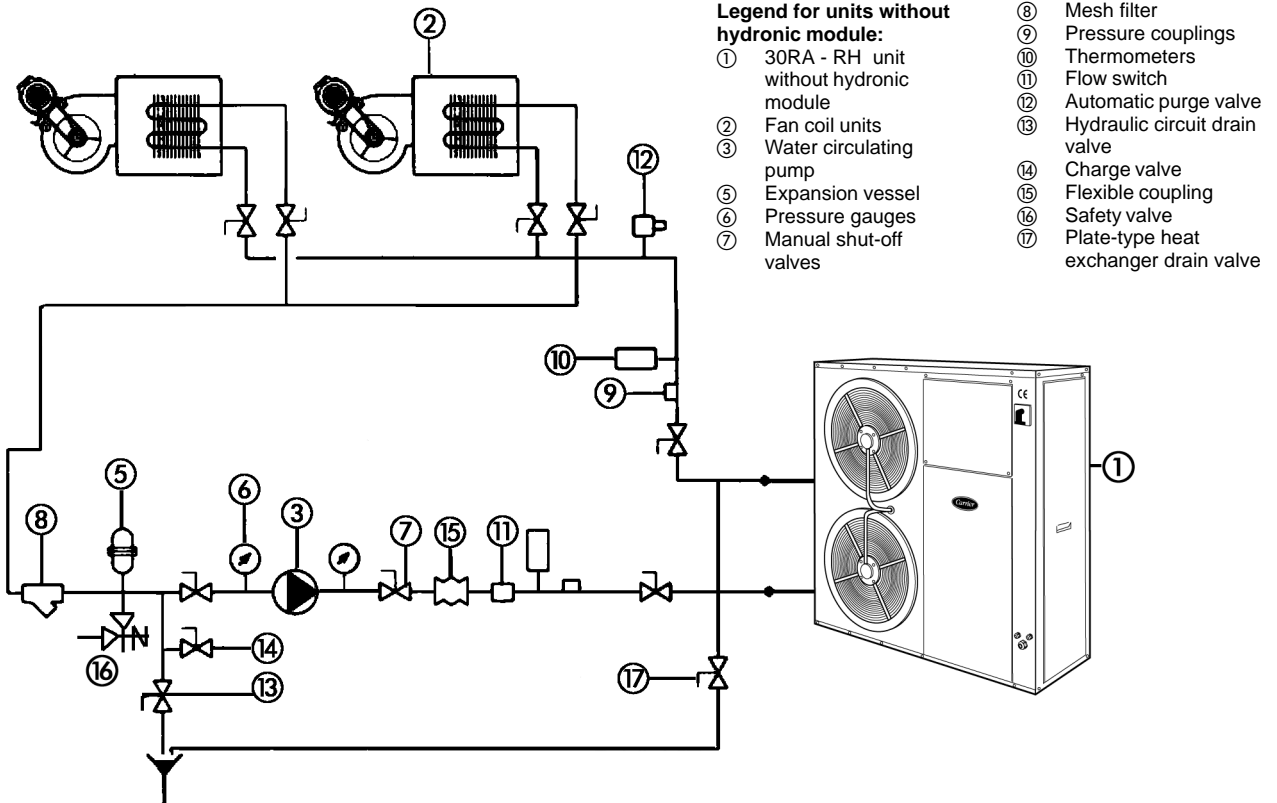
This eliminates the need to install the necessary components on-site, making the unit more compact and easy to install.



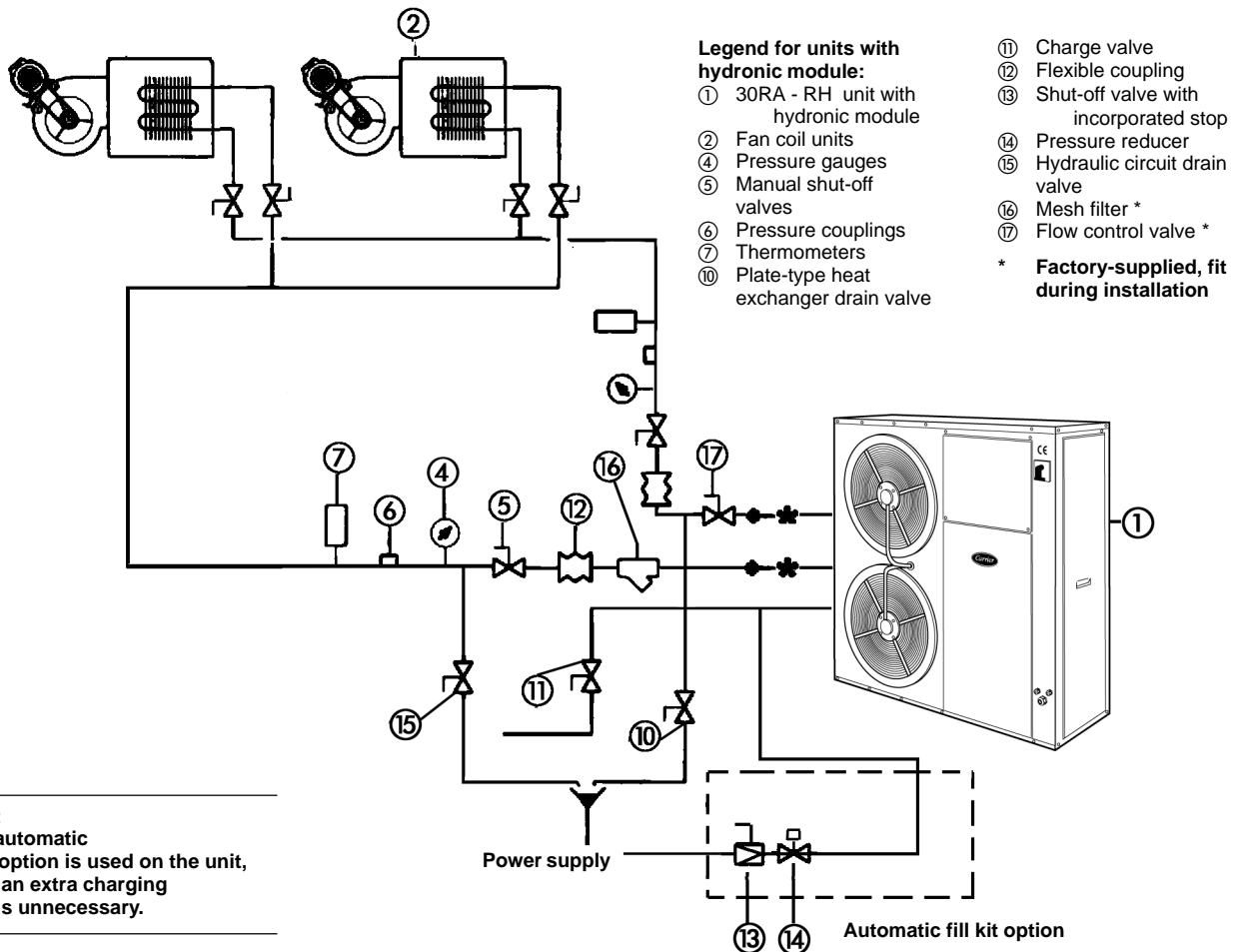
30RA/30RH

Water connections

Typical water circuit diagram for units without hydronic module

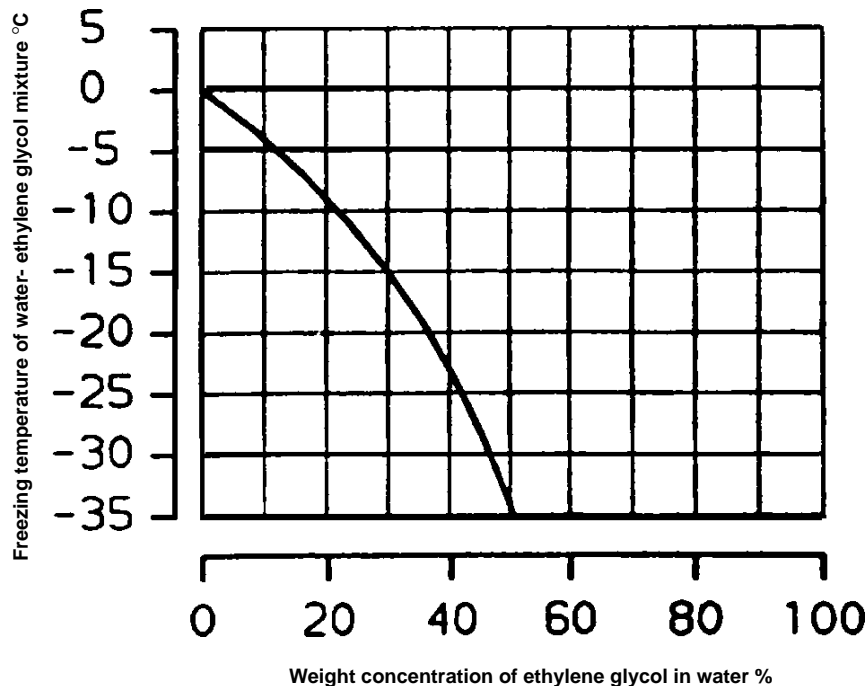


Typical water circuit diagram for units with hydronic module



NOTE:
If the automatic fill kit option is used on the unit, fitting an extra charging valve is unnecessary.

Ethylene glycol curve



ATTENTION:
The pump leakproof components are not suitable for use with propylene glycol.

CAUTION:
Using water with glycol may make it necessary to change the configuration of the control system.

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. A flow switch should be installed in a straight horizontal stretch with a length of at least five times the line diameter on either side.
The flow switch must be positioned in the exchanger inlet pipe. It must be electrically connected in accordance with the wiring diagram (only unit without hydronic module).
If this is not possible, the installation should incorporate a protection device which is activated when there is no water circulating in the heat exchanger.
2. 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/cm².

The standard supply of the unit with hydronic module includes a mesh filter to be fitted during installation.

3. 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.
4. 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.
5. In case of water refrigeration at temperatures lower than 5°C, or if the unit is installed in areas where temperatures drop below 0°C, water must be mixed with a proper quantity of ethylene glycol (see the curve above).
Use the curve to determine the correct ethylene glycol concentration for the temperature.

Frost protection

The plate heat exchanger and the water connections of the hydronic module pump may be damaged in spite of the anti-freeze protection system these units are fitted with.

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.

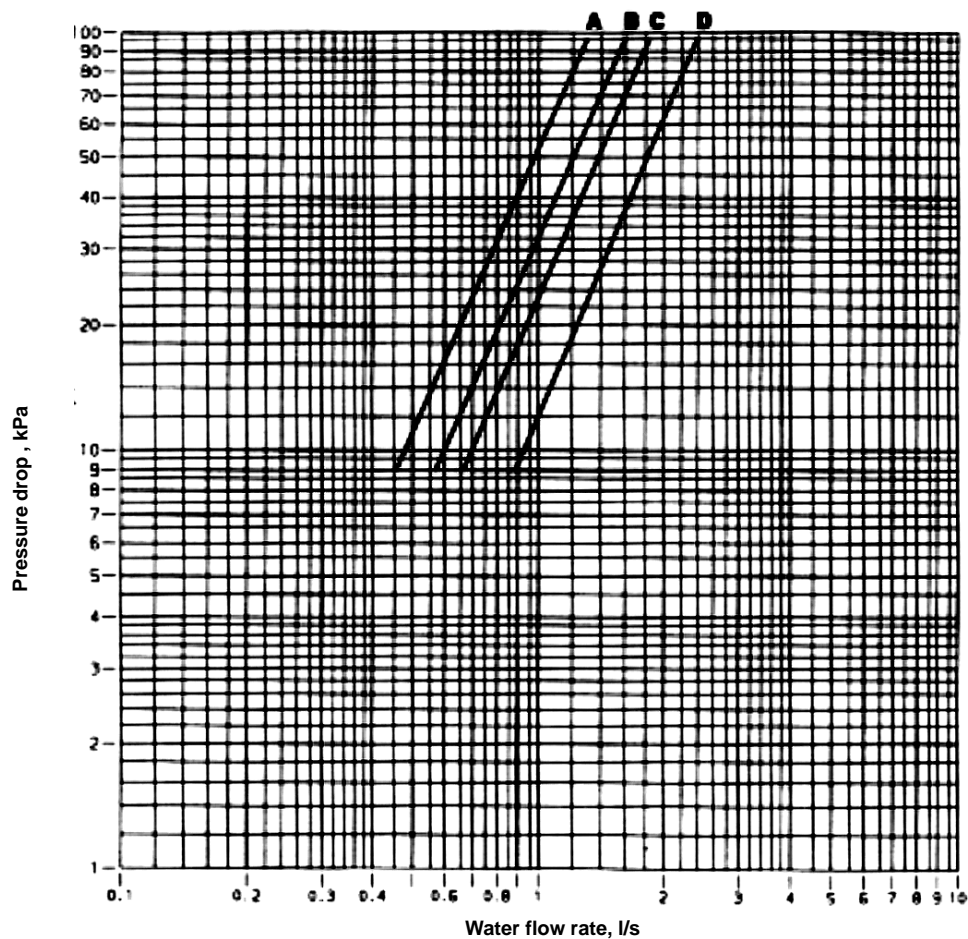
IMPORTANT:

Both the appliance main switch (Q1) and the auxiliary protection switch for the electric heaters (QF101) must always be in the closed position (the positions of Q1 and QF101 are indicated in the wiring diagram).

30RA/30RH

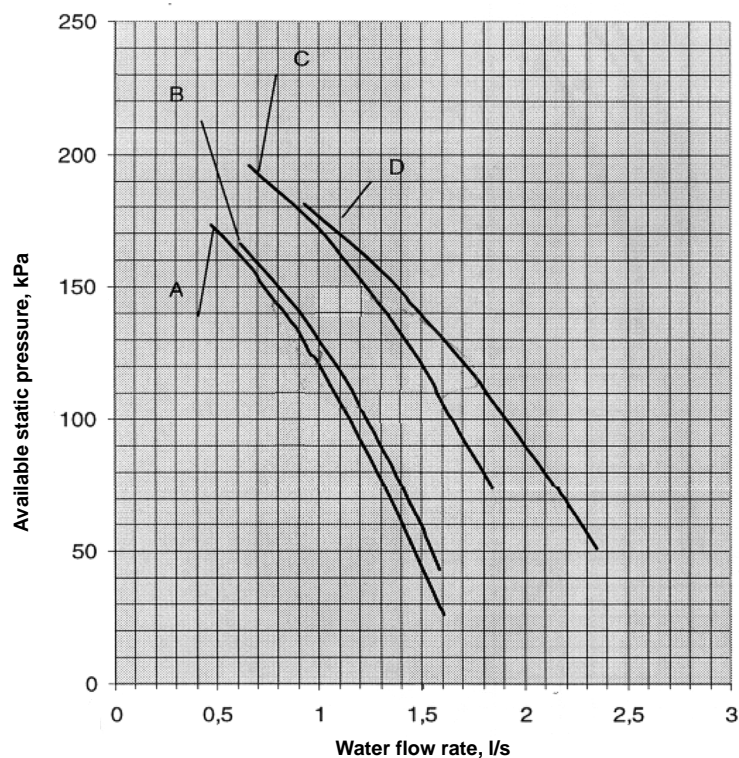
Water connections

Water pressure drop of the unit without hydronic module



- A. 30RA-RH 017
- B. 30RA-RH 021
- C. 30RA-RH 026
- D. 30RA-RH 033

Outlet available static pressure of the unit with hydronic module



- A. 30RA-RH 017
- B. 30RA-RH 021
- C. 30RA-RH 026
- D. 30RA-RH 033

Electrical connections

WARNING:

To prevent electrical shock or equipment damage, make sure disconnects are open before electrical connections are made. If this action is not taken, personal injury may occur.

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 earthing multicore cable of the unit must be connected to the main disconnecting switch by passing it through the grommet on the front pedestal after removing the lateral access panel. The maximum section allowable for flexible copper cable is 25 mm². Before connection, check that phase sequence L1 – L2 – L3 is correct.

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.

Before selecting the power supply line fuses - which must be of the type "gG" - check the voltage and the size indicated on the unit name plate is.

WARNING:

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 (%) =

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

Average voltage

Example:

Nominal supply: 400-3-50

AB = 404 V

BC = 399 V

AC = 394 V

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

Determine maximum deviation from average voltage

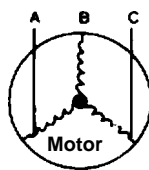
AB = 404 - 400 = 4

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.

Liquid refrigerant charge

Checking the charge

WARNING:

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.

30RA-RH 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.

WARNING:

To ensure proper operation of 30RA-RH units there must be at least 5 K of subcooling as the liquid refrigerant enters the expansion valve.

30RA-RH units use a HFC-407C 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

CAUTION:

30RA-RH units are charged with liquid HFC-407C refrigerant.

This non-azeotropic refrigerant blend consists of 23% R-32, 25% of R-125 and 52% R-134a, and is characterised by the fact that at the time of the change in state the temperature of the liquid/vapour mixture is not constant, as with azeotropic refrigerants.

All checks must be pressure tests, and the appropriate pressure/temperature ratio table must be used for the interpretation of the values.

Leak detection is especially important for units charged with refrigerant R-407C.

Depending on whether the leak occurs in the liquid or in the vapour phase, the proportion of the different components in the remaining fluid is not the same.

NOTE:

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

30RA/30RH

Refrigerant charge and electronic control

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).
 - 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.

WARNING:

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.
 - The complete refrigerant charge must never be filled into the suction line.
 - Do not overcharge the system with refrigerant.
-

Electronic control

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

The instructions supplied with the control include comprehensive descriptions.

PRO-Dialog Plus electronic control

PRO-DIALOG Plus is an advanced numeric control system that combines complex intelligence with great operating simplicity. PRO-DIALOG Plus 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 PLUS 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 Plus 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: LEDs and two numeric displays ensure immediate verification of all unit operating data.

10 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 Plus allows remote control and monitoring of the unit through a wired connection: start/stop, cooling/heating mode selection (only 30RH 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).

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.

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.
- Unbraze 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.

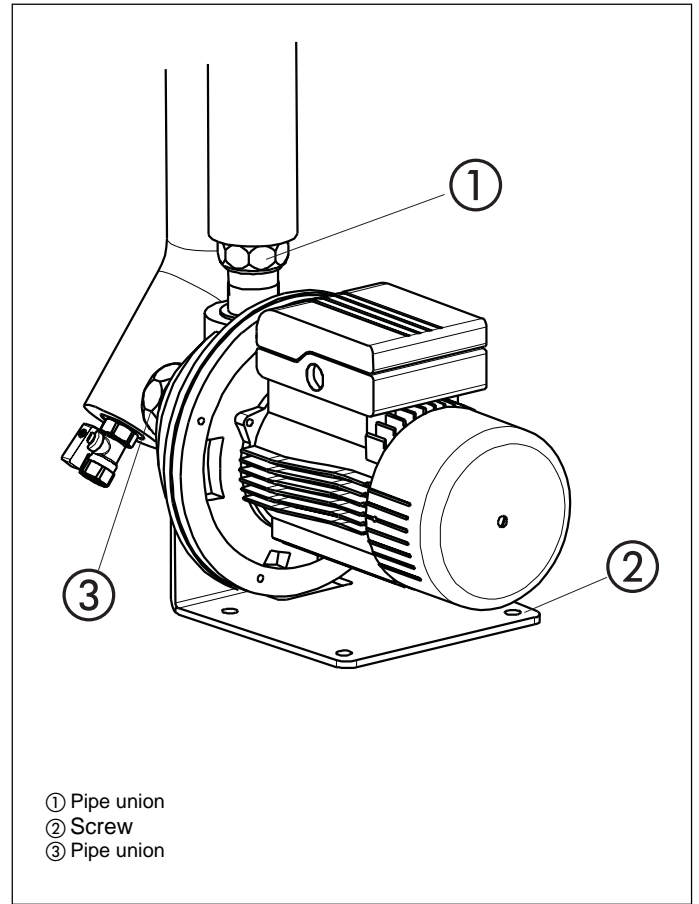
NOTE:

This operation must be carried out by a qualified person.

Pump replacement

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

- Disconnect the unit from the power supply.
- Remove the access panel.
- Electrically disconnect the pump.
- Empty all water from the hydronic module.
- Loosen the pipe unions a and c.
- Remove the four pump fixing screws b.
- Replace the pump.
- Fit the pump fixing screws b.
- Tighten the pipe unions a and c.
- 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.
- Fans and electric heaters thermomagnetic switch.
- 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.

30RA/30RH

Unit protection devices, operating limits and operating range

Table III: Pressure switch settings

	Cut-out	Reset
High pressurestat	30 bar	Manual

WARNING:

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 Plus system configuration.

30RA - Operating limits

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**	13
Water entering temp. (at shut-down)	-	55
Condenser	Minimum °C	Maximum °C
Air entering temperature	-10	46

30RH - Operating limits

Cooling cycle

Plate heat exchanger	Minimum °C	Maximum °C
Water entering temp. (at start-up)	7,8	30
Water leaving temp. (in operation)	5**	13
Water entering temp. (at shut-down)	-	55

Coil

Air entering temperature	-10	46
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Heating cycle

Plate heat exchanger	Minimum °C	Maximum °C
Water entering temp. (at start-up)	10	45
Water leaving temp. (in operation)	25	50
Water entering temp. (at shut-down)	-	55

Coil

Air entering temperature	-10	20
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- * Contact Carrier if an entering water temperature lower than 7.8 °C is necessary.
- ** In case of operation with a leaving temperature of less than 5 °C, it is necessary to add ethylene glycol to the water in circulation.

Minimum and maximum water flow rates in the plate heat exchangers

30 RA	RH	Minimum flow rate, l/s	Maximum flow rate, l/s*	Maximum flow rate, l/s**
017		0,45	1,4	1,3
021		0,57	1,6	1,6
026		0,67	2,1	1,9
033		0,87	2,3	2,4

- * 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:

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

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

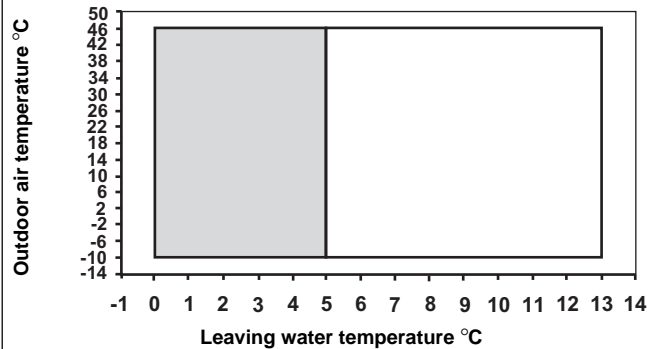
This volume is necessary for stable operation and accurate temperature control. It is often necessary to add a buffer water tank to the circuit in order to achieve the required volume.

NOTE:

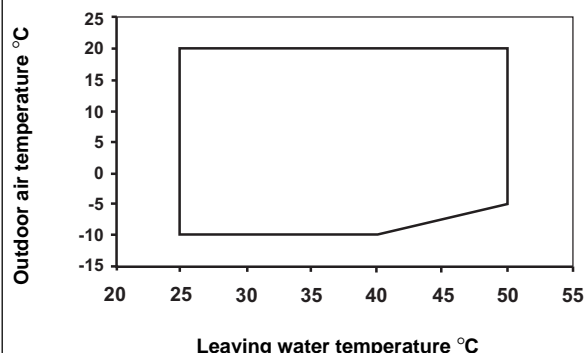
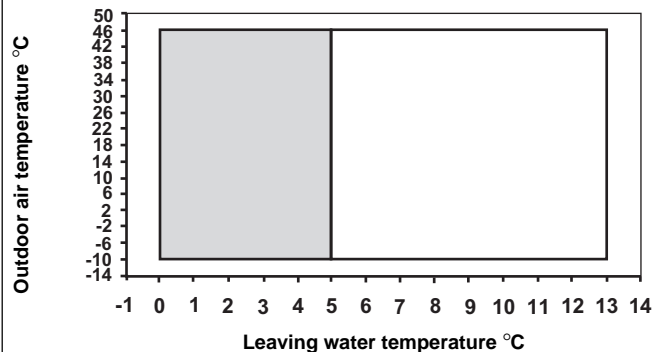
For industrial process cooling applications, where high stability of water temperature levels must be achieved, the values above must be increased.

We recommend consulting the factory for these particular applications.

Operating range - 30RA units



Operating range - 30RH units



Notes:

1. The temperature rise of the water through the plate heat exchanger = 5K.
2. Both the plate exchanger and the circuit inside the hydronic module are protected against frost down to a temperature of -10°C.

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

General maintenance

ATTENTION:

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.

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.

In these cases the installation of a descaling filter is recommended.

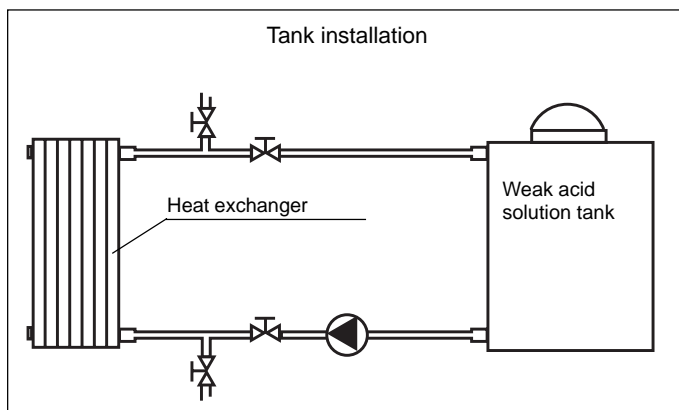
The heat exchanger can always be cleaned by circulating a cleaning fluid.

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.

30RA/30RH

Troubleshooting

A list of possible faults, as well as the probable cause and suggested solutions is shown as follows. In the event of a unit malfunction it is recommended to disconnect the power supply and ascertain the cause.

Symptoms	Cause	REMEDY
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Unit does not start:

- No power supply;
CONNECT POWER SUPPLY.
- Main switch open;
CLOSE SWITCH.
- Low line voltage;
CHECK VOLTAGE AND REMEDY THE DEFICIENCY.
- A protection has tripped;
RESET.
- Contactor stuck open;
CHECK AND IF NECESSARY REPLACE CONTACTOR.
- Seized compressor;
CHECK AND IF NECESSARY REPLACE COMPRESSOR.
- Loose electrical connections;
CHECK CONNECTIONS.

Unit runs continuously or starts and stops frequently:

- Defective compressor contactor;
CHECK AND IF NECESSARY REPLACE CONTACTOR.
- Defective compressor;
CHECK AND IF NECESSARY REPLACE COMPRESSOR.
- Refrigerant losses;
CHECK AND ADD THE NECESSARY QUANTITY.
- Total water flow too low
CHECK FOR PRESSURE DROP IN THE HYDRAULIC CIRCUIT.
- Static pressure in the hydraulic circuit too low;
CHECK IT ON THE PRESSURE GAUGE AND RESTORE IT IF NECESSARY.

Unit continuously cuts out at low pressure:

- Refrigerant losses;
CHECK AND ADD THE NECESSARY QUANTITY.
- Low water flow in the exchanger;
CHECK WATER PUMP.
- Unit start-up delay;
WAIT UNTIL THE SYSTEM HAS STABILISED.

Unit continuously cuts out at high pressure:

- Defective high pressurestat;
CHECK AND IF NECESSARY REPLACE PRESSURESTAT.
- Blocked expansion valve;
CHECK AND REPLACE IF NECESSARY.
- Blocked filter drier;
CHECK AND IF NECESSARY REPLACE FILTER.
- The outdoor fan/s does/do not work;
CHECK THE CONDITION OF THE FAN MOTOR/S AND ITS/THEIR ELECTRICAL CONNECTIONS.
- Obstructed or dirty battery;
REMOVE THE OBSTRUCTION OR CLEAN THE BATTERY.

Abnormal system noise:

- Piping vibration;
SUPPORT PIPING.
- Noisy compressor;
CHECK AND CHANGE IF NECESSARY.
- Hissing expansion valve;
CHECK AND ADD REFRIGERANT IF NECESSARY.

- Badly fitting panels;
INSTALL CORRECTLY.

Compressor loses oil:

- Leaking refrigeration circuit;
REPAIR LEAK.

Water loss:

- Defective entering or leaving connections;
CHECK AND TIGHTEN IF NECESSARY.

The unit does not defrost (only for 30RH units):

- Four-way reversing valve faulty;
CHECK AND REPLACE THE VALVE IF NECESSARY.
- Defrost sensor broken;
CHECK AND REPLACE THE SENSOR IF NECESSARY.



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