

## AIR-TO-WATER SCROLL HEAT PUMP WITH GREENSPEED® INTELLIGENCE



Unit with low noise level option

- High full and part-load efficiency
- Compact and simple to install
- Low sound level
- Low refrigerant charge
- Superior reliability

# 30RQM/30RQP



Nominal heating capacity 179-434 kW  
Nominal cooling capacity 154-510 kW

The AquaSnap® heat pumps are the best value solution for commercial and industrial applications where installers, consultants and building owners require reduced installed costs, optimal performances and maximum quality.

The new generation AquaSnap® features two new versions:

- The AquaSnap® (30RQM) version features a compact all-in-one package optimised for full-load applications where reduced investment cost (low Capex) is required.
- The AquaSnap Greenspeed® (30RQP) version features a compact all-in-one package optimised for part-load applications where high SCOP and SEER are required. The AquaSnap Greenspeed® equipped with variable speed fans and variable speed pump provides premium part load efficiency to reduce utility costs over the lifespan of the heat pump. Additionally, the low sounds levels achieved at part load conditions can be very beneficial for sensitive acoustic applications.



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

# AQUASNAP® WITH GREENSPEED INTELLIGENCE

## SIMPLICITY

The simplicity of AquaSnap®, tried and trusted

### ■ Experience

With more than 60,000 units installed since 1998, AquaSnap® sets the standard in “plug & play” air conditioning and heating solutions. Compact and simple to install, the new generation of AquaSnap® with Greenspeed intelligence combines **trusted reliability with even more innovation.**

### ■ Easy installation

AquaSnap® integrates an hydraulic module with pressure transducers for digital water flow rate display on the user interface and pump protection against low hydraulic pressure.

The **variable-speed pump allows easy and fast installation start-up** thanks to the electronic setting of the nominal water flow.

### ■ Adaptability

**The new AquaSnap® heat pumps can operate in all climates with large operating maps in cooling and heating modes.** Thanks to special coil coatings, the AquaSnap® heat pumps can withstand operation in corrosive environments. To match specific commercial or industrial application requirements, the unit can be equipped with multiple options.

THE STANDARD IN  
«PLUG & PLAY»  
AIR CONDITIONING AND  
HEATING SOLUTIONS

UP TO 15% MORE EFFICIENCY  
WITH THE SAME DIMENSIONS AS  
PREVIOUS GENERATION

ONE PRODUCT FOR  
MANY APPLICATIONS

&

## INTELLIGENCE

Greenspeed intelligence: the smart innovation

### ■ Smart efficiency

The new generation of AquaSnap® heat pumps delivers on the energy savings and reduced carbon footprint required by the latest European regulations. AquaSnap® heat pumps with Greenspeed intelligence offer **Seasonal Coefficient of Performance (SCOP) in heating of up to 3.35 and Seasonal Energy Efficiency (SEER) in cooling of up to 4.11**, making them the best value air conditioning solution in commercial and industrial applications.

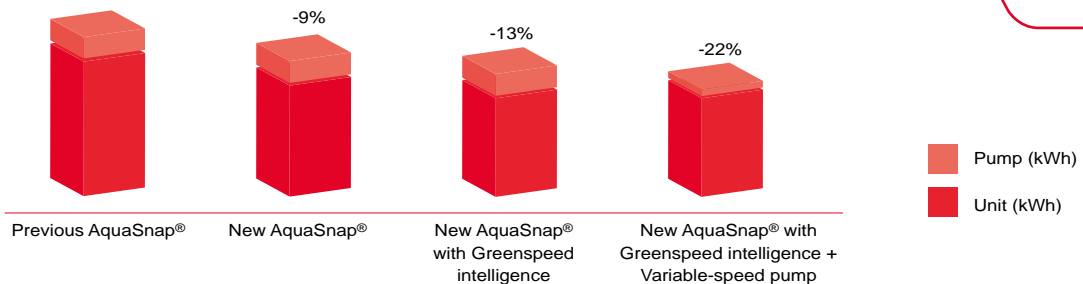
### ■ Acoustic comfort

Thanks to the variable-speed fans, AquaSnap® heat pumps with Greenspeed intelligence offer **smooth fan speed variation during partial load operation.** For noise sensitive environments during both night and day, the AquaSnap® noise level can be automatically factory-set or tuned on-site.

### ■ Advanced control

An advanced control algorithm calculates energy efficiency and **readjusts fan speed in real time** to reduce energy consumption. «Free Defrost», an **innovative defrosting solution**, can significantly improve the SCOP of the heat pump during positive outside air temperature conditions. For further energy savings, the water flow rate can be **electronically controlled** to meet real application needs, thus significantly reducing pumping energy consumption both night and day.

### LIFETIME ENERGY SAVINGS



Source: Carrier estimates based on 15-year energy savings calculations comparing a 400kW AquaSnap® heat pump of the previous generation to a new AquaSnap® heat pump, a new AquaSnap® Greenspeed heat pump with variable speed pump in a variable primary flow water system design at an office building in an average European climate, 3500 running hours and 1000 stand-by hours per year. This information is intended as an example for comparison purposes only.

## 30RQP TECHNICAL INSIGHT

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### AquaSnap® scroll heat pumps with Greenspeed intelligence 30RQP



## FEATURES AND BENEFITS

The AquaSnap® heat pumps are designed to meet current and future Ecodesign and F-Gas European regulation requirements in terms of energy efficiency and reduced CO<sub>2</sub> emissions. They use the best technologies available today:

- Reduced refrigerant charge of non-ozone depleting R-410A refrigerant
- Scroll compressors
- Greenspeed® variable-speed driven fans (30RQP models)
- Brazed plate heat exchangers with reduced pressure drops
- Auto-adaptive microprocessor control with Greenspeed® intelligence
- Smart View control with web connectivity possibilities and colour touch screen user display
- Extra energy savings through partial heat recovery

Both AquaSnap® versions can be equipped with an integrated hydraulic module, limiting the installation to conventional operations such as connection of the power supply and the supply and return piping (plug & play), according to the dimensions of the standard unit.

Recommended by Carrier, AquaSnap® can be equipped with one or two Greenspeed® variable-speed pumps to significantly reduce energy costs linked to pumping (reduction of more than two-thirds), ensure optimum water flow rate control, and improve overall system reliability.



### Highly economical operation

- High unit full and part load energy efficiency and efficient design of the water side:
  - Standardised Eurovent values in accordance with EN 14511-3:2013 EER up to 2.9 (30RQP version)
  - 30RQP and 30RQM ranges are compliant with EU Ecodesign Tier 2 Minimum Efficiency Performance Standards (MEPS) in heating that apply from September 2017
  - Multiple scroll compressors equipped with a high-efficiency motor that permit exact matching of the capacity to the load
  - Electronic expansion device permitting operation at a lower condensing pressure and improved utilisation of the evaporator heat exchange surface (superheat control)
  - Air heat exchanger with Greenspeed® variable speed fans (30RQP version)
  - Low pressure drop brazed plate heat exchangers (pressure drops < 45 kPa at Eurovent conditions).
- Specific control functions to reduce unit energy use during occupied and unoccupied periods:
  - Internal timer programming: Permits heat pump on/off control and operation at a second set-point
  - Set-point automatically offset based on the outside air temperature or room air temperature (via an option)
  - Floating high-pressure management
  - Variable-speed fan control
  - Cooling and heating demand limitation.

Refer to control chapter for more information.

- On Heat pump version 30RQM/30RQP specific Free Defrost algorithm to optimise performance & comfort even during defrost period.

- Greenspeed® variable-speed pump to reduce pumping energy use up to 2/3 (option recommended by Carrier):
  - Eliminate energy losses through the water flow rate control valve by electronically setting the nominal water flow rate
  - Save energy during stand-by periods or part-load operation by automatically reducing the water pump speed. The energy consumption of the pump motor varies according to the cube of the speed, so that a reduction in speed of just 40% can reduce energy consumption by 80%
  - Improved unit part-load performance (Increased SCOP and SEER values with variable water flow rate as per the EN14825 standard).

Refer to hydraulic option chapter for more information.



Extra energy savings through partial heat recovery option that permits free hot water production.

Reduced maintenance costs

- Fast diagnosis of possible incidents and their history via the control
- R-410A refrigerant is easier to use than other refrigerant blends.

### Low sound level

Coil section with fixed speed fans (30RQM models):

- Condenser coils in V-shape with an open angle, allowing quieter air flow across the coil
- Low-noise 4th generation Flying Bird fans, made of a composite material (Carrier patent)
- Rigid fan installation for reduced noise (Carrier patent).

Coil section with Greenspeed® variable-speed fans (30RQP models recommended by Carrier for even quieter operation):

- Exceptional acoustic signature during part-load operation through smooth fan speed variation.

■ Specific control functions or features to reduce noise level during night or unoccupied periods:

- Night time sound control with capacity and fan speed limitation
- Low-noise scroll compressors with low vibration level
- The compressor assembly is installed on an independent chassis and supported by flexible anti-vibration mountings.
- Dynamic suction and discharge piping support, minimising vibration transmission (Carrier patent)
- Acoustic compressor enclosure, reducing radiated noise emissions (option).



## FEATURES AND BENEFITS

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### Quick and easy installation

- Compact design
  - The AquaSnap® units are designed to offer compact dimensions and low weight for easy installation.
- Integrated hydraulic module (option)
  - Low or high-pressure water pump (as required)
  - Single or dual pump (as required) with operating time balancing and automatic changeover to the back-up pump if a fault develops
  - Water filter protecting the water pump against circulating debris
  - Pressure transducers for direct numerical display of the water flow rate and water pressures
  - Thermal insulation and frost protection down to -20 °C, using an electric resistance heater (option)
  - High-capacity membrane expansion tank (option).
- Integrated hydraulic module with Greenspeed® variable-speed pump (option recommended by Carrier)
  - Quick and easy electronic setting of the nominal water flow rate when the unit is commissioned, thus eliminating the need to adjust the water flow rate control valve
  - Automatic control of the pump speed based on constant speed, constant pressure difference or constant temperature difference.
- Simplified electrical connections
  - A single power supply point without neutral
  - Main disconnect switch with high trip capacity
  - 24 V control circuit without risk from a transformer included.
- Fast unit commissioning
  - Systematic factory test before shipment
  - Quick-test function for step-by-step verification of the sensors, electrical components and motors.

### Reduced installation costs

- Optional Greenspeed® variable-speed pump with hydraulic module (option recommended by Carrier)
  - Elimination of the water flow control valve cost
  - Water system design with variable primary flow (VPF) can provide significant installation cost savings compared with traditional constant primary-variable secondary systems; elimination of the secondary distribution pump, etc.
  - Water system design with fan coils fitted with 2-way valves instead of 3-way valves.

### Environmental responsibility

- R-410A non-ozone depleting refrigerant.
- Reduced direct warming potential (10% of total equivalent warming impact):
  - Low R410-A refrigerant charge
  - Leak-tight refrigerant circuit with minimum brazed connections
  - Qualified Carrier maintenance personnel to provide refrigerant servicing
  - ISO 14001 manufacturing site.
- Reduced indirect warming potential (90% of total equivalent warming impact):
  - Reduced unit energy use (high full- and part-load efficiency)
  - Pumping energy consumption can be reduced by up to 2/3 using Greenspeed® variable-speed pumps.
- Refrigerant leak detection: Available as an option, this additional dry-contact allows reporting of possible leaks. The leak detector (by others) should be mounted in the most likely leak location. An Immediate customer notification of refrigerant losses to the atmosphere, allowing timely corrective actions.

### Superior reliability

- State-of-the-art concept
  - Two independent refrigerant circuits; the second one automatically takes over if the first one develops a fault, maintaining partial cooling under all circumstances
  - All compressor components are easily accessible on site, minimising downtime
  - V-coil design to protect the coils against hail impact
  - Optional anti-corrosion coil coating for use in moderately corrosive environments.
  - Electronic flow switch. Auto-setting according to cooler size and fluid type
- Auto-adaptive control
  - Control algorithm prevents excessive compressor cycling and reduces the quantity of water in the water loop (Carrier patent)
  - Automatic compressor unloading in case of abnormally high condensing pressure
  - Automatic fan speed adjustment in case of coil fouling (30RQP models)
  - Smooth fan start to increase unit lifetime (30RQP models).
- Exceptional endurance tests
  - Partnerships with specialised laboratories and use of simulation tools (finite element analysis) for the design of critical components
  - Transport simulation test on an endurance circuit based on a military standard.

## FEATURES AND BENEFITS

### SMART VIEW Control

The Smart View features a control with advanced communication technology over Ethernet (IP), user-friendly and intuitive user interface with 4"3 colour touch screen.

- Energy management configuration
  - Internal time schedule clock: Controls heat pump on/off times and operation at a second set-point
  - Set-point offset based on the outside air temperature
  - Master/slave control of two heat pumps operating in parallel with operating time equalisation and automatic change-over in case of a unit fault.
  - Innovative smart energy monitoring, providing users with smart data such as real time electric energy consumption, cooling/heating capacity, and instantaneous and average seasonal energy efficiency ratios.
- Advanced communication features
  - Night mode: Capacity and fan speed limitation for reduced noise level
  - With hydraulic module: Water pressure display and water flow rate calculation
  - High-speed user-friendly communication technology over Ethernet (IP) to a centralised building management system
  - Access to multiple unit parameters.
- Functionality of maintenance
  - Compulsory maintenance reminder– FGAS sealing check
  - Periodic maintenance reminder Maintenance alarm which can be configured to days, months or hours of operation
- 4"3-inch Smart View user interface



- Intuitive and user-friendly 4"3 inch touch screen interface
- Concise and clear information is available in local languages
- Complete menu, customised for different users (end user, service personnel or Carrier engineers).

### Remote management (standard)

Units with Smart View control can be easily accessed from the internet, using a PC with an Ethernet connection. This makes remote control quick and easy and offers significant advantages for service operations.

The AquaSnap® is equipped with an RS485 serial port that offers multiple remote control, monitoring and diagnostic possibilities. Carrier offers a vast choice of control products, specially designed to control, manage and supervise an air conditioning system. Please consult your Carrier representative for more information.

The AquaSnap® also communicates with other centralised building management systems via optional communication gateways.

A connection terminal allows remote control of the AquaSnap® by wired cable:

- Start/stop: Opening of this contact will shut down the unit
- Dual set-point: closing of this contact activates a second set-point (e.g.: unoccupied mode).
- Demand limit: Closing of this contact limits the maximum heat pump capacity to a predefined value.
- Operation indication: This volt-free contact indicates that the heat pump is operating (cooling load).
- Alarm indication: This volt-free contact indicates the presence of a major fault that has led to the shut-down of one or several refrigerant circuits.

### Energy management module (option)

The Energy Management Module offers extended remote control possibilities:

- Room temperature: Permits set-point reset based on the building indoor air temperature (with Carrier thermostat)
- Set-point reset: Ensures reset of the cooling set-point based on a 4-20 mA
- Demand limit: Permits limitation of the maximum heat pump power based on a 4-20 mA signal
- Demand limit 1 and 2: Closing of these contacts limits the maximum heat pump power or current to two predefined values.
- User safety: This contact can be used for any customer safety loop; opening the contact generates a specific alarm.
- Ice storage end: When ice storage has finished, this input permits return to the second set-point (unoccupied mode).
- Time schedule override: Closing of this contact cancels the time schedule effects.
- Out of service: This signal indicates that the heat pump is completely out of service.
- Unit capacity: This analogue output (0-10 V) gives an immediate indication of the unit capacity.
- Alert indication: This volt-free contact indicates the necessity to carry out a maintenance operation or the presence of a minor fault.
- Boiler control: This on/off output controls an independent boiler to provide hot water.
- Electric heater control: this on/off output controls up to 4 electric heater stages to provide additional heating capacity during the cold season.

## OPTIONS

Options	No.	Description	Advantages	Use
Corrosion protection, traditional coils	3A	Fins made of pre-treated aluminium (polyurethane and epoxy)	Improved corrosion resistance, recommended for moderate marine and urban environments	30RQM/30RQP 160-520
Low temperature brine solution	6B	Low temperature chilled water production down to -8°C with ethylene or propylene glycol	Covers specific applications such as ice storage and industrial processes	30RQP 180-230-270-310
High static fans	12	Unit equipped with high static variable speed fan (maximum 200Pa), each fan being equipped with a connection flange allowing the connection to the ducting system.	Ducted fan discharge, optimised temperature control, based on the operating conditions and system characteristics	30RQM/30RQP 160-520
Low noise level	15	Aesthetic and sound absorbing compressor enclosure	Noise level reduction by 1 to 2 dB(A)	30RQM/30RQP 160-520
Very low noise level	15LS	Acoustic compressor enclosure and low-speed fans	Noise level reduction for sensible site	30RBM 160-520
IP54 control box	20A	Increased leak tightness of the unit	Protects the inside of the electric box from dust, water and sand. In general this option is recommended for installations in polluted environments	30RQM/30RQP 160-520
Grilles and enclosure panels	23	Metal grilles on the 4 unit sides, plus side enclosure panels at each end of the coils	Improves aesthetics, protection against intrusion to the unit interior, coil and piping protection against impacts.	30RQM/30RQP 160-520
Enclosure panels	23A	Side enclosure panels at each end of the coil	Improves aesthetics, coil and piping protection against impacts.	30RQM/30RQP 160-520
Soft Starter	25	Electronic starter on each compressor	Reduced start-up current	30RQM/30RQP 160-520
Winter operation down to -20°C	28	Fan speed control of lead fan for each circuit using a variable frequency drive	Stable unit operation for outside air temperatures from 0°C down to -20°C in cooling mode	30RQM 160-520
Water exchanger frost protection	41	Electric heater on the water exchanger and the water piping	Water exchanger module frost protection between 0°C and -20°C outside air temperature	30RQM/30RQP 160-520
Exchanger & hydraulic frost protection	42A	Electric heater on the water exchanger hydraulic module and optional expansion tank	Water exchanger and hydraulic module frost protection down to an outside air temperature of -20°C	30RQM/30RQP 160-520
Partial heat recovery	49	Unit equipped with one desuperheater on each refrigerant circuit	Production of free high-temperature hot-water simultaneously with chilled water production (or hot water for Heat pump)	30RQM/30RQP 160-520
Master/slave operation	58	Unit equipped with supplementary water outlet temperature sensor kit to be field-installed allowing master/slave operation of two units connected in parallel	Optimised operation of two units connected in parallel operation with operating time equalisation	30RQM/30RQP 160-520
Compressor discharge valves	93A	Shut-off valves on the compressor discharge piping	Simplified maintenance. Possibility to store the refrigerant charge in the condenser side during servicing	30RQM/30RQP 160-520
HP single-pump hydraulic module	116R	Single high-pressure water pump, water filter, electronic water flow control, pressure transducers. For more details, refer to the dedicated chapter (expansion tank not included. Option with built-in hydraulic safety components available)	Easy and fast installation (plug & play)	30RQM/30RQP 160-520
HP dual-pump hydraulic module	116S	Dual high-pressure water pump, water filter, electronic water flow control, pressure transducers. For more details, refer to the dedicated chapter (expansion tank not included. Option with built-in hydraulic safety components available)	Easy and fast installation (plug & play)	30RQM/30RQP 160-520
LP single-pump hydraulic module	116T	Single low-pressure water pump, water filter, electronic water flow control, pressure transducers. For more details, refer to the dedicated chapter (expansion tank not included. Option with built-in hydraulic safety components available)	Easy and fast installation (plug & play)	30RQM/30RQP 160-520
LP dual-pump hydraulic module	116U	Dual low-pressure water pump, water filter, electronic water flow control, pressure transducers. For more details, refer to the dedicated chapter (expansion tank not included. Option with built-in hydraulic safety components available)	Easy and fast installation (plug & play)	30RQM/30RQP 160-520
Evap. HP variable-speed single-pump	116V	Single high-pressure water pump with variable speed drive (VSD), water filter, electronic water flow control, pressure transducers. Multiple possibilities of water flow control. For more details, refer to the dedicated chapter (expansion tank not included. Option with built-in hydraulic safety components available)	Easy and fast installation (plug & play), significant pumping energy cost savings (more than two-thirds), tighter water flow control, improved system reliability	30RQM/30RQP 160-520

## OPTIONS

Options	No.	Description	Advantages	Use
HP VSD dual-pump hydraulic mod.	116W	Dual high-pressure water pump with variable speed drive (VSD), pressure transducers. Multiple possibilities of water flow control. For more details, refer to the dedicated chapter (expansion tank not included. Option with built-in hydraulic safety components available)	Easy and fast installation (plug & play), significant pumping energy cost savings (more than two-thirds), tighter water flow control, improved system reliability	30RQM/30RQP 160-520
Lon gateway	148D	Two-directional communication board complying with LonTalk protocol	Connects the unit by communication bus to a building management system	30RQM/30RQP 160-520
Bacnet over IP	149	Two-directional high-speed communication using BACnet protocol over Ethernet network (IP)	Easy and high-speed connection by ethernet line to a building management system. Allows access to multiple unit parameters	30RQM/30RQP 160-520
Modbus over IP and RS485	149B	Bi-directional high-speed communication using Modbus protocol over Ethernet network (IP)	Easy and high-speed connection by ethernet line to a building management system. Allows access to multiple unit parameters	30RQM/30RQP 160-520
Energy Management Module	156	EMM Control board with additional inputs/outputs. See Energy Management Module option chapter	Extended remote control capabilities (Set-point reset, ice storage end, demand limits, boiler on/off command...)	30RQM/30RQP 160-520
Input contact for Refrigerant leak detection	159	0-10 V signal to report any refrigerant leakage in the unit directly on the controller (the leak detector itself must be supplied by the customer)	Immediate customer notification of refrigerant losses to the atmosphere, allowing timely corrective actions	30RQM/RQP 160-520
Compliance with Russian regulations	199	EAC certification	Compliance with Russian regulations	30RQM/30RQP 160-520
Compliance with Australian regulations	200	Unit approved to Australian code	Compliance with Australian regulations	30RQM/30RQP 160-520
Power factor correction	231	Capacitors for automatic regulation of power factor (cos phi) value to 0,95.	Reduction of the apparent electrical power, compliance with minimum power factor limit set by utilities	30RQM/30RQP 160-520
Coil defrost resistance heaters	252	Electric heaters under the coils and the condensate pans	Prevents frost formation on the coils; compulsory in the heating mode, if the outdoor is below 0°C	30RQM/30RQP 160-520
Welded evaporator connection kit	266	Victaulic piping connections with welded joints	Easy installation	30RQM/30RQP 160-520
230 V electric plug	284	230 VAC power supply source provided with plug socket and transformer (180 VA, 0.8 A)	Permits connection of a laptop or an electrical device during unit commissioning or servicing	30RQM/30RQP 160-520
Expansion vessel	293	6-bar expansion tank integrated into the hydraulic module (option 116 required)	Easy and fast installation (plug & play), & Protection of closed water systems from excessive pressure	30RQM/30RQP 160-520
Screwed water connection sleeve kit for DSH	303	DSH connections with screw connection sleeves	Easy installation. Allows unit connection to a screw connector	30RQM/30RQP 160-520
Welded water connection kit for DSH	304	DSH inlet/outlet welded connection sleeves	Easy installation	30RQM/30RQP 160-520
Set-point adjustment by 4-20 mA signal	311	Connections enabling a 4-20 mA signal input	Easy energy management, allow to adjust set-point by a 4-20mA external signal	30RQM/30RQP 160-520



## BRINE OPTIONS (OPTION 6B)

Brine production from 0°C to -8°C is only possible with the low-temperature brine option 6B, available on sizes 30RQP 180-230-270-310 only.

The unit is equipped with insulation on the intake tubes. The insulation is reinforced on the low-temperature brine solution option.

The operating range depends on:

- the unit size,
- the glycol type,
- its concentration,
- the flow rate,
- the temperature of the glycol solution,
- the condensing pressure (ambient temperature).

## UNITS WITH FANS WITH AVAILABLE PRESSURE FOR INDOOR INSTALLATION (OPTION 12 - STATIC HIGH PRESSURE FAN)

This option applies to 30RQP 160-520 units installed inside the building in a plant room.

For this type of installation, the cold or hot air leaving the air heat exchangers is discharged by the fans to the outside of the building, using a duct system that causes a pressure drop in the air path.

Therefore, this option features more powerful fan motors than those fitted to standard units.

For each installation, the duct pressure drops differ, depending on the duct length, the duct section and the direction changes.

30RQP units with option 12 are designed to operate with air discharge ducts with maximum pressure drop of 200 Pa (units are equipped with variable-speed fans with a maximum speed of 19 r/s, instead of 15.8 r/s for standard units).

Use of variable speed up to 19 r/s can overcome the duct pressure drop while maintaining an optimized air flow per circuit. All fans in the same circuit, operating at the same time, have the same speed.

The fan power input for fans with a speed of 19 r/s is increased compared to that of standard fans with a speed of 15.8 r/s (the multiplier coefficient is the same as the cube of the speed ratio, i.e. x 1.72).

In the cooling / heating mode, the full-load or part-load speed is controlled by a patented algorithm that permanently optimizes the condensing / evaporating temperature to ensure the best unit energy efficiency (EER / COP) whatever the operating conditions and pressure drop of the system ductwork.

If necessary for a specific installation, the maximum fan speed of 30RQP unit can be fixed between 13.3 and 19 r/s, using the

Service Configuration menu. Consult the 30RQM/RQP Smart View Control manual for this modification.

The maximum configured speed applies to both the cooling and heating modes.

The performances (capacities, efficiencies) depend on the speed of the fans, then on the duct pressure drop:

- between 0 and 100 Pa, the unit performances are only slightly affected
- between 100 and 200 Pa, the unit performances may vary considerably, depending on the operating conditions (outdoor air temperature and water conditions)

The noise level into the ductwork and radiated around the unit is also related to the pressure drop.

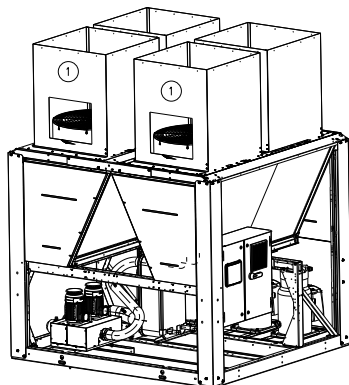
Please refer to the Carrier Electronic catalogue to evaluate the impact of the estimated duct system on the 30RQP unit operating conditions.

### Nominal and maximum air flows per circuit (A and B) for 30RQP sizes

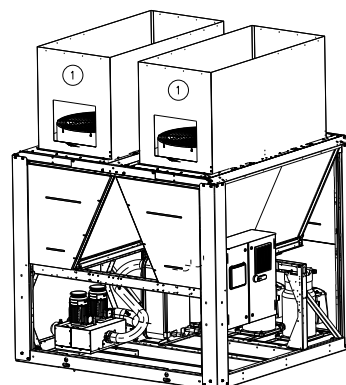
30RQP	Circuit A Nominal/maximum air flow (l/s)	Circuit B Nominal/maximum air flow (l/s)
160	4514 / 5417	9028 / 10833
180-230	9028 / 10833	9028 / 10833
240-270	9028 / 10883	13542 / 16250
310-330	9028 / 10883	18056 / 21667
380	13542 / 16250	18056 / 21667
430-520	18056 / 21667	18056 / 21667

### Principle of the installation of the ducts

Solution 1



Solution 2



1. Fan motor access hatches (provide a 700 x 700 mm hatch) for each single and dual duct

## HYDRAULIC MODULE (OPTION 116)

The new generation of Carrier hydraulic module saves a lot of installation time. The heat pump is factory-equipped with the main components for the hydraulic system: Water pump, electronic flow switch, Victaulic screen filter, pressure transducers, water temperature sensors, pressures taps (2), relief valve, drain valve, air vent, water purge, optional hydraulic module heater and optional expansion tank.

The pressure transducers allow the control to:

- Display the available pressure at the unit outlet and the static system pressure
- Calculate the instantaneous flow rate, using an algorithm that integrates the unit characteristics
- Integrate the system and water pump protection devices (lack of water, water pressure, water flow rate, etc.).

On units fitted with Greenspeed® variable-speed pump, the user display enables to:

- Adjust the required pump speed
- Adjust the required available pressure at the unit outlet and the static system pressure, to real customer needs thus saving energy: no need any more for a water flow control valve used for creating artificial pressure drops that are wasting energy.

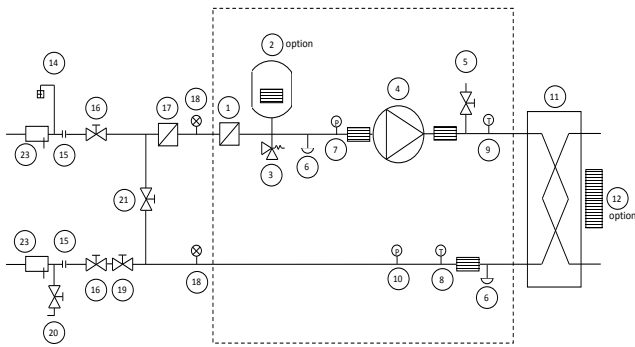
Several water pump types are available to suit any application:

- Single or dual low-pressure pump or single or dual high-pressure pump
- Greenspeed® variable-speed single or dual high-pressure pump.

If necessary, increased frost protection down to -20 °C is possible by adding the heater option to the hydraulic module piping (see options 42A).

The hydraulic module option is integrated into the heat pump without increasing its dimensions and saves the space normally used for the water pump.

### Typical hydraulic circuit diagram



### Hydraulic module



#### Key

#### Components of the unit and hydraulic module:

1. Screen filter (mesh opening 1.2 mm)
2. Expansion tank (option)
3. Relief valve
4. Available pressure pump (single pump or dual pump)
5. Air purge
6. Water drain valve
7. Pressure sensor  
**Note:** Gives pump suction pressure information
8. Temperature probe -  
**Note:** Gives heat exchanger leaving temperature information
9. Temperature probe -  
**Note:** Gives heat exchanger entering temperature information
10. Pressure sensor  
**Note:** Gives unit leaving pressure information
11. Plate heat exchanger
12. Evaporator frost protection heater (option)

#### Installation components

14. Air purge
15. Flexible connection
16. Shut-off valve
17. Screen filter (obligatory for a unit without hydraulic module)
18. Pressure gauge
19. Water flow control valve  
**Note:** Not necessary for a hydraulic module with a variable-speed pump
20. Charge valve
21. Frost protection bypass valve (when shut-off valves [16] are closed during winter)
23. Temperature probe well
- Hydraulic module (unit with hydraulic module)

#### Notes:

- The installation must be protected against frost.
- The hydraulic module and unit evaporator are protected (option 42A, factory installed) against frost with electric heaters (item 12 + ).
- The pressure sensors are installed at connections without Schraeder valves. Depressurise and drain the system before any intervention.

### Electrical data, units with hydraulic modules

The pumps that are factory installed in these units are eco-design compliant 2015 (EU regulation N°547/2012 for pumps) and have motors with efficiency class IE3. The additional electrical data required by regulation 640/2009 is given in the installation, operation and maintenance manual.

This regulation concerns the application of directive 2009/125/EC on the eco-design requirements for electric motors.

## VARIABLE WATER FLOW SYSTEM (VWF) 30RQM/30RQP 160-520

### Carrier Variable Water Flow

Recommended by Carrier, the AquaSnap® can be equipped with one or two variable-speed pumps to save significant pumping energy costs (more than two-thirds), ensure tighter water flow rate control, and improve overall system reliability.



Carrier Variable Water Flow (VWF) is a hydraulic control function package that controls the water flow rate.

Carrier VWF not only ensures control at full load, a specific Carrier algorithm linked to an electronic frequency converter also continuously modulates the flow rate to minimise pump consumption at full load as well as part load.

The Carrier hydraulic module includes pressure transducers that permit intelligent measurement of the water flow rate and real-time display on the or Smart View user interface. All adjustments can be made directly on the interface, speeding up start-up and maintenance.

As Carrier VWF acts directly on the pump, the system no longer requires the control valve at the unit outlet. However, for applications with two-way valves a bypass system must be kept to guarantee the minimum flow rate.

### Operating principle

#### ■ Full-load set-point

The flow rate at full load is controlled by the interface, which reduces the pump speed. This first control saves energy that would normally be dissipated in the control valve. For example, if the pressure supplied by the pump is reduced by 20%, the energy consumption of the pump is reduced by the same ratio, compared to a conventional installation.



#### ■ Operating mode at part load

Smart View includes three part-load operating modes:

- Fixed speed control
- Constant delta P control
- Constant delta T control.

#### 1 - Fixed speed

The control continuously ensures a constant pump speed based on compressor capacity.

When the compressor capacity is equal to zero, the pump speed can be automatically reduced to a second set-point (adjustable down to 60%) to save energy during low occupancy periods.

This solution is suitable for traditional installations with constant water flow and terminal units equipped with three-way valves. This solution reduces pumping energy costs especially when the flow can be reduced during night-time periods.

#### 2 - Constant delta P control

The control continuously acts on the pump speed to ensure a constant delta P.

This solution is suitable for installations with two-way valves. When these close, the water speed will accelerate in the system branches that are still open. For a fixed-speed pump this results in an unnecessary increase of the pressure at the pump outlet.

The constant delta P control mode ensures that each circuit branch always has a uniform supply, without unnecessary energy waste.

In industrial processes such as plastic injection moulding, this solution ensures that each terminal unit has the correct pressure supply.

#### 3 - Constant delta T control

The VWF algorithm maintains a constant delta T no matter what the unit load, reducing the flow rate to the minimum. It is suitable for the majority of comfort applications.

# PHYSICAL DATA, SIZES 160 TO 520

30RQP			160	180	210	230	240	270	310	330	380	430	470	520	
<b>Heating</b>															
<b>Standard unit</b> Full load performances*	HA1	Nominal capacity	kW	181	198	240	216	272	294	342	359	415	474	457	436
		COP	kW/kW	3,75	3,79	3,81	3,56	3,86	3,75	3,74	3,82	3,72	3,72	3,62	3,57
	HA2	Nominal capacity	kW	174	191	232	245	262	282	329	345	399	456	498	537
		COP	kW/kW	2,99	3,05	3,04	2,91	3,11	2,96	2,98	3,04	2,95	2,97	2,95	2,94
<b>Standard unit</b> Seasonal energy efficiency**	HA1	SCOP <sub>30/35°C</sub>	kWh/kWh	<b>3,38</b>	<b>3,38</b>	<b>3,39</b>	<b>3,39</b>	<b>3,38</b>	<b>3,39</b>	<b>3,41</b>	<b>3,40</b>	<b>3,43</b>	<b>3,46</b>	<b>3,47</b>	<b>3,41</b>
		η <sub>s heat</sub> <sub>30/35°C</sub>	%	<b>132</b>	<b>132</b>	<b>133</b>	<b>133</b>	<b>132</b>	<b>132</b>	<b>133</b>	<b>133</b>	<b>134</b>	<b>135</b>	<b>136</b>	<b>134</b>
		P <sub>rated</sub>	kW	121	134	159	169	159	194	211	231	268	305	339	356
<b>Cooling</b>															
<b>Standard unit</b> Full load performances*	CA1	Nominal capacity	kW	154	168	201	225	232	264	297	322	372	424	458	510
		EER	kW/kW	2,76	2,87	2,73	2,74	2,89	2,86	2,86	2,87	2,87	2,90	2,75	2,74
		Eurovent class	C	C	C	C	C	C	C	C	C	C	B	C	C
<b>Standard unit</b> Seasonal energy efficiency**		SEER <sub>12/7°C</sub> Comfort low temp.	kWh/kWh	4,07	4,08	4,09	4,13	4,16	4,21	4,16	4,23	4,32	4,33	4,30	4,22
		SEPR <sub>12/7°C</sub> Process high temp.	kWh/kWh	5,24	5,29	5,29	5,16	5,13	5,39	5,52	5,45	5,56	5,63	5,40	5,18
<b>Unit + option 6</b> Seasonal energy efficiency**		SEPR <sub>-2/-8°C</sub> Process medium temp.***	kWh/kWh	NA	<b>3,55</b>	NA	<b>3,47</b>	NA	<b>3,36</b>	<b>3,67</b>	NA	NA	NA	NA	NA
<b>Sound levels</b>															
<b>Standard unit</b>															
Sound power level <sup>(1)</sup>		dB(A)	90	91	91	91	92	92	93	93	94	94	94	94	
Sound pressure level at 10 m <sup>(2)</sup>		dB(A)	58	59	59	59	60	60	61	61	62	62	62	62	
<b>Standard unit + option 15<sup>(3)</sup></b>															
Sound power level <sup>(1)</sup>		dB(A)	89	90	90	90	91	91	91	92	92	93	93	93	
Sound pressure level at 10 m <sup>(2)</sup>		dB(A)	57	58	58	58	59	59	59	60	60	61	61	61	
<b>Standard unit + option 15LS<sup>(3)</sup></b>															
Sound power level <sup>(1)</sup>		dB(A)	84	85	86	86	86	87	87	87	88	89	89	89	
Sound pressure level at 10 m <sup>(2)</sup>		dB(A)	52	53	54	54	54	55	55	55	56	57	57	57	
<b>Dimensions</b>															
Length		mm	2410	2410	2410	2410	3604	3604	3604	3604	4797	4797	4797	4797	
Width		mm	2322	2322	2322	2322	2322	2322	2322	2322	2322	2322	2322	2322	
Height		mm	2297	2297	2297	2297	2297	2297	2297	2297	2297	2297	2297	2297	
<b>Operating weight<sup>(4)</sup></b>															
Standard unit		kg	1450	1526	1654	1677	2085	2233	2355	2585	3050	3331	3343	3393	
Standard unit + option 15/15LS		kg	1533	1609	1762	1785	2193	2359	2481	2729	3212	3512	3524	3573	
Standard unit + option 15/15LS + option 116W <sup>(3)</sup>		kg	1673	1749	1914	1936	2354	2568	2699	2934	3416	3757	3806	3854	
Unit + option 15 + option 116W + Water buffer tank option		kg	2632	2708	2873	2895	3313	3527	3658	3893	4375	4716	4765	4813	
<b>Compressors</b>															
Hermetic Scroll 48.3 r/s															
Circuit A			1	1	2	2	2	2	2	2	3	4	4	4	
Circuit B			2	2	2	2	2	3	3	4	4	4	4	4	
No. of control stages			3	3	4	4	4	5	5	6	7	8	8	8	

\* In accordance with standard EN14511-3:2013.  
 \*\* In accordance with standard EN14825:2016, average climate  
 \*\*\* With EG 30%  
 HA1 Heating mode conditions: Water heat exchanger water entering/leaving temperature 30°C/35°C, outside air temperature tdb/twb = 7°C db/6°C wb, evaporator fouling factor 0 m<sup>2</sup>.K/W  
 HA2 Heating mode conditions: Water heat exchanger water entering/leaving temperature 40°C/45°C, outside air temperature tdb/twb = 7°C db/6°C wb, evaporator fouling factor 0 m<sup>2</sup>.K/W  
 CA1 Cooling mode conditions: Evaporator water entering/leaving temperature 12°C/7°C, outside air temperature 35°C, evaporator fouling factor 0 m<sup>2</sup>.K/W  
**η<sub>s heat</sub><sub>30/35°C</sub> & SCOP<sub>30/35°C</sub>** **Bold values compliant to Ecodesign regulation: (EU) No 813/2013 for Heat Pump application**  
 SEER<sub>12/7°C</sub> & SEPR<sub>12/7°C</sub> Values calculated in accordance with EN14825:2016  
 SEPR<sub>-2/-8°C</sub> **Bold values compliant to Ecodesign regulation: (EU) No 2015/1095 for Process application**  
 NA Non Authorized for the specific application for CEE market  
 (1) In dB ref=10-12 W. (A) weighting. Declared dual number noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3 dB(A)). Measured in accordance with ISO 9614-1 and certified by Eurovent at nominal conditions EN14511 - cooling mode.  
 (2) In dB ref 20 μPa. (A) weighting. Declared dual number noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3 dB(A)). For information. calculated from the sound power level Lw(A).  
 (3) Options: 15 = Low noise level. 116S = High Pressure dual-pump hydraulic module  
 (4) Weights are guidelines only. Refer to the unit nameplate.



Eurovent certified values

## PHYSICAL DATA, SIZES 160 TO 520

30RQP	160	180	210	230	240	270	310	330	380	430	470	520	
<b>Refrigerant<sup>(4)</sup></b>	R410A												
Circuit A charge	kg	14,5	22,0	23,0	24,0	27,0	27,0	30,0	33,0	42,0	53,0	54,0	56,0
	teqCO <sub>2</sub>	30,3	45,9	48,0	50,1	56,4	56,4	62,6	68,9	87,7	110,7	112,8	116,9
Circuit B charge	kg	23,0	23,0	23,0	24,0	35,0	36,0	48,5	53,0	53,0	53,0	54,0	56,0
	teqCO <sub>2</sub>	48,0	48,0	48,0	50,1	73,1	75,2	101,3	110,7	110,7	110,7	112,8	116,9
<b>Capacity control</b>	Smart View Control												
Minimum capacity	%	33%	33%	25%	25%	25%	20%	20%	17%	14%	13%	13%	13%
<b>Air heat exchangers</b>	Grooved copper tubes and aluminium fins												
<b>Fans</b>	Axial Flying Bird 4 with rotating shroud												
Quantity		3	4	4	4	5	5	6	6	7	8	8	8
Maximum total air flow	l/s	13542	18056	18056	18056	22569	22569	27083	27083	31597	36111	36111	36111
Maximum rotation speed	r/s	16	16	16	16	16	16	16	16	16	16	16	16
<b>Water heat exchanger</b>	Dual-circuit plate heat exchanger												
Water content	l	15	15	15	19	27	27	35	44	44	44	47	53
Max. water-side operating pressure without hydraulic module	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
<b>Hydraulic Module (option)</b>	Pump, Victaulic screen filter, relief valve, water valve and air purge, pressure sensors, expansion tank (option)												
Pump	Centrifugal, monocell, 48,3 r/s, low or high pressure (as required), single or dual pump(as required)												
Expansion vessel volume	l	50	50	50	50	80	80	80	80	80	80	80	80
Max. water-side operating pressure with hydraulic module	kPa	400	400	400	400	400	400	400	400	400	400	400	400
<b>Water connections with or without hydraulic module</b>													
Diameter	inch	3	3	3	3	4	4	4	4	4	4	4	4
External diameter	mm	88,9	88,9	88,9	88,9	114,3	114,3	114,3	114,3	114,3	114,3	114,3	114,3
<b>Chassis paint colour</b>	Colour code RAL 7035												

(4) Weights are guidelines only. Refer to the unit nameplate.