30RB 026-040 A
30RQ 026-040 A

AIR-COOLED LIQUID CHILLERS/ AIR-TO-WATER HEAT PUMPS DUCTABLE AIR-COOLED LIQUID CHILLERS

AQUASNAP®

Nominal cooling capacity
30RB: 27 - 41 kW
Nominal cooling capacity
30RQ: 26 - 39 kW
Nominal heating capacity
30RQ: 29 - 41 kW

EASY AND FAST INSTALLATION
HYDRAULIC MODULE AVAILABLE
ECONOMICAL OPERATION
SUPERIOR RELIABILITY

The Aquasnap liquid chiller/heat pump range was designed for commercial applications such as the air conditioning of offices and hotels etc.

The new Aquasnap units integrate the latest technological innovations:

- Non-ozone depleting refrigerant R-410A
- Scroll compressors
- Low-noise fans
- Auto-adaptive microprocessor control

The Aquasnap units are equipped with a hydraulic module integrated into the unit chassis, limiting the installation to straightforward operations like connection of the power supply and the water supply and return piping.

EUROVENT CERTIFIED PERFORMANCE
www.eurovent-certification.com

CARRIER participates in the ECP programme for LCP-HP Check ongoing validity of certificate: www.eurovent-certification.com

Original document

FEATURES

Quiet operation

- Compressors
  - Low-noise scroll compressors with low vibration levels
  - The compressor assembly is supported by anti-vibration mountings
- Air heat exchanger section
  - Vertical air heat exchanger coils
  - The latest-generation low-noise fans are now even quieter and do not generate intrusive low-frequency noise
  - Rigid fan installation for reduced start-up noise.

Easy and fast installation

- Integrated hydraulic module
  - Fixed speed circulator
  - Water filter protecting the water pump against circulating debris
  - High-capacity membrane expansion tank ensures pressurisation of the water circuit
  - Overpressure valve, set to 4 bar
  - Automatic purge valve positioned at the highest point of the hydraulic module to remove air from the system.
  - Thermal insulation and frost protection down to -10°C, using an electric resistance heater and pump cycling.
  - Integrated water fill system to ensure correct water pressure (option)
- Physical features
  - With its small footprint the unit blends in with any architectural styles.
  - The unit is enclosed by easily removable panels, covering all components (except air heat exchanger and fans).
- Simplified electrical connections
  - A single power supply point (power supply without neutral available as an option and in standard for units size 40kW)
  - Main disconnect switch with high trip capacity
  - Transformer for safe 24 V control circuit supply included
- Fast commissioning
  - Systematic factory operation test before shipment
  - Quick-test function for step-by-step verification of the instruments, electrical components and motors.

Economical operation

- Increased energy efficiency at part load
  - In accordance with standard EN 14825/2022 in average climate, the Seasonal Coeficent of performance (SCOP) reaches 3,27 for an energy label of A.
  - Specific Free Defrost algorithm is present to optimise performance and comfort even during defrost period.
- Reduced maintenance costs
  - Maintenance-free scroll compressors
  - Fast diagnosis of possible incidents and their history via the Pro-Dialog+ control
  - R-410A refrigerant is easier to use than other refrigerant blends

Environmental care

- Ozone-friendly R-410A refrigerant
  - Chlorine-free refrigerant of the HFC group with zero ozone depletion potential
  - Very efficient - gives an increased energy efficiency ratio (EER/SEER/COP/SCOP)
- Leak-tight refrigerant circuit
  - Brazed refrigerant connections for increased leak-tightness
  - Verification of pressure transducers and temperature sensors without transferring refrigerant charge

Hydraulic module

Superior reliability

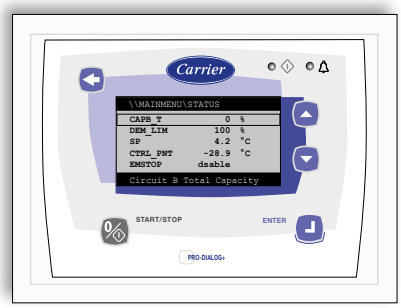
- State-of-the-art concept
  - Cooperation with specialist laboratories and use of limit simulation tools (finite element calculations) for the design of the critical components, e.g. motor supports, suction/discharge piping etc.
- Auto-adaptive control
  - Control algorithm prevents excessive compressor cycling and permits reduction of the water quantity in the hydraulic circuit (Carrier patent).
- Exceptional endurance tests
  - Corrosion resistance tests in salt mist in the laboratory
  - Accelerated ageing test on components that are submitted to continuous operation: compressor piping, fan supports
  - Transport simulation test in the laboratory on a vibrating table.

FEATURES

Pro-Dialog+ control

Pro-Dialog+ combines intelligence with operating simplicity. The control constantly monitors all machine parameters and precisely manages the operation of compressors, expansion devices, fans and of the water heat exchanger water pump for optimum energy efficiency.

Pro-Dialog+ interface



- Energy management
  - Seven-day internal time schedule clock: Permits unit on/off control and operation at a second set point
  - Set point reset based on the outside air temperature or the return water temperature or on the water heat exchanger delta T
  - Lead/Lag control of two units operating in parallel with operating time equalisation and automatic change-over in case of a unit fault.
  - Change-over based on the outside air temperature
- Integrated features
  - Night mode: Capacity and fan speed limitation for reduced noise level
- Ease-of-use
  - The new backlighted LCD interface includes a manual control potentiometer to ensure legibility under any lighting conditions.
  - The information is displayed clearly in English, French, German, Italian and Spanish (for other languages please consult Carrier)
  - The Pro-Dialog+ navigation uses intuitive tree-structure menus, similar to the Internet navigators. They are user-friendly and permit quick access to the principal operating parameters: number of compressors operating, suction/discharge pressure, compressor operating hours, set point, air temperature, entering/leaving water temperature.

Remote operating mode with volt-free contacts (standard)

A simple two-wire communication bus between the RS485 port of the Aquasnap and the Carrier Comfort Network offers multiple remote control, monitoring and diagnostic possibilities. Carrier offers a vast choice of control products, specially designed to control, manage and supervise the operation of an air conditioning system. Please consult your Carrier representative for more information on these products.

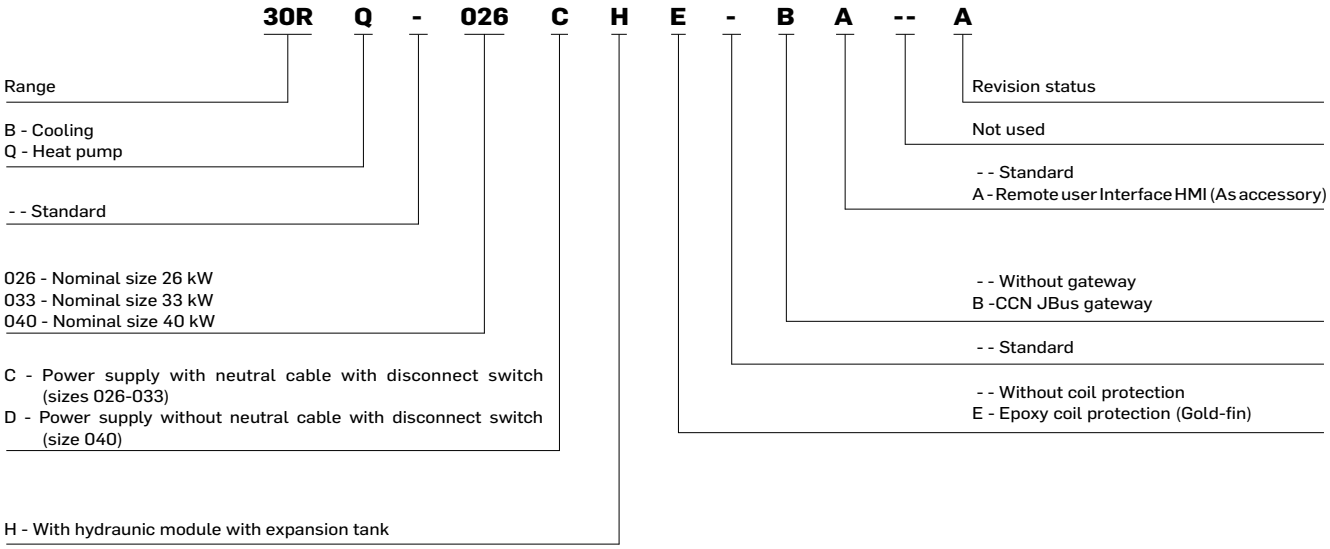
- Start/stop: Opening of this contact will shut down the unit
- Dual set point: Closing of this contact activates a second set point (example: Unoccupied mode)
- Alert indication: This volt-free contact indicates the presence of a minor fault
- Alarm indication: This volt-free contact indicates the presence of a major fault that has led to the shut-down of the unit
- User safety: This contact can be used for any customer safety loop, closing of the contact generates a specific alarm
- Out of service: This signal indicates that the unit is completely out of service
- Unit capacity: This analogue output (0-10 V) gives an immediate indication of the unit capacity
- Compressor operation: This contact signals that the compressor is in operation

Remote interface (option)

This interface allows access to the same menus as the unit interface and can be installed up to 300 m away. It includes a box that can be mounted inside the building. The power supply is provided via a 220 V/24V transformer supplied.

Interface access

TYPE KEY


30R Q - 026 C H E - B A -- A
Range
B - Cooling
Q - Heat pump
- - Standard
026 - Nominal size 26 kW
033 - Nominal size 33 kW
040 - Nominal size 40 kW
C - Power supply with neutral cable with disconnect switch (sizes 026-033)
D - Power supply without neutral cable with disconnect switch (size 040)
H - With hydraunic module with expansion tank
- - Without coil protection
E - Epoxy coil protection (Gold-fin)
- - Standard
- - Without gateway
B -CCN JBus gateway
- - Standard
A - Remote user Interface HMI (As accessory)
Not used
Revision status

HYDRAULIC MODULE

The hydraulic module reduces the installation time. The unit is factory-equipped with the main hydraulic components required for the installation: screen filter, variable speed circulator, expansion tank and relief valve.

The water heat exchanger and the hydraulic module are protected against frost down to -10°C, using an electric resistance heater (standard) and pump cycling.

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

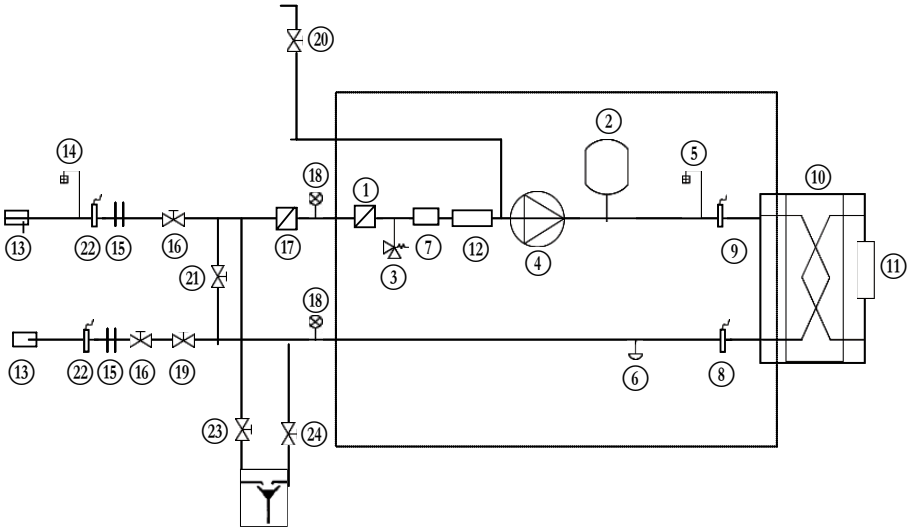
Physical and electrical data

These are the same as for the standard unit except:

30RB/RQ		026	033	040
Hydraulic module				
Expansion tank volume	l	8	8	8
Maximum water-side operating pressure	kPa	400	400	400
Pumps				
Water pump		Pump, screen filter, expansion tank, flow switch, automatic purge valve, relief valve		
Power input(1)	kW	0,99	1,10	1,20
Nominal operating current draw(1)	A	2,40	2,60	2,80

(1) Nominal conditions: evaporator entering/leaving water temperature 12°C/7°C, outside air temperature 35°C, evaporator fouling factor = 0 m² K/kW. Gross performances, not in accordance with EN14511-3:2013. These performances do not take into account the correction for the proportional heating capacity and power input generated by the water pump to overcome the internal pressure drop in the heat exchanger.

Typical hydraulic circuit diagram
26-40 kW



Hydraulic module (unit with hydraulic module)
Automatic water fill system option (option)

Legend

Components of the unit and hydraulic module

1. Screen filter
2. Expansion tank
3. Relief valve
4. High-pressure pump
5. Air purge
6. Water drain valve
7. Flow sensor
8. Plate heat exchanger leaving temperature sensor
9. Plate heat exchanger entering temperature sensor
10. Plate heat exchanger
11. Heat exchanger frost protection heater
12. Pipe frost protection heater

System components

13. Temperature sensor well
14. Air purge
15. Flexible connections
16. Shut-off valve
17. Screen fiter
18. Pressure gauge
19. Flow control valve (factory-supplied for field installation)
20. Charge valve
21. Frost protection bypass (when shut-off valves are closed in winter)
22. Pressure sensor
23. System drain valves
24. Plate heat exchanger drain valve

PERFORMANCES DATA, 30RB / 30RQ UNITS

				30RB 26-A	30RB 33-A	30RB 40-A	30RQ 26-A	30RQ 33-A	30RQ 40-A
Heating									
Standard unit Full load performances*	HA1	Nominal capacity	kW	-	-	-	30,4	34,0	38,4
		COP	kW/kW	-	-	-	3,99	3,99	3,53
	HA2	Nominal capacity	kW	-	-	-	29,4	32,8	40,6
		COP	kW/kW	-	-	-	3,22	3,20	3,17
Standard unit Seasonal energy efficiency**	HA1	**$SCOP_{30/35°c}$**	**kW/kW**	**-**	**-**	**-**	**3,34**	**3,34**	**3,30**
		$\eta s\ heat_{30/35°c}$	**%**	**-**	**-**	**-**	**131**	**131**	**129**
		P_{rated}	kW	-	-	-	20	23	31
		Energy labelling		-	-	-	A++	A++	A++
Cooling									
Standard unit Full load performances*	CA1	Nominal capacity	kW	27,5	33,5	41,5	26,4	32,5	39,4
		EER	kW/kW	3,12	3,32	2,99	2,98	3,19	2,88
	CA2	Nominal capacity	kW	38,9	46,2	57,1	34,2	43,2	54,4
		EER	kW/kW	4,03	4,15	3,55	3,61	3,92	3,46
Standard unit Seasonal energy efficiency**		**$SEPR_{-2/-8°C}$ Process medium temp.***	**kWh/kWh**	**3,17**	**3,02**	**3,07**	**-**	**-**	**-**
		$SEPR_{12/7°c}$ Process high temp.	kWh/kWh	5,25	5,28	5,18	5,06	5,20	3,98
		$SEER_{12/7°c}$ Comfort low temp.	kWh/kWh	3,44	3,63	3,53	3,39	3,57	3,41
		$SEER_{23/18°c}$ Comfort medium temp.	kWh/kWh	3,96	4,08	4,04	3,87	4,02	3,96
Integrated Part Load Value		IPLV.SI	kW/kW	4,340	4,540	4,030	4,068	4,352	3,846
Operating weight[1]									
Standard unit, with hydraulic module			kg	255	280	291	280	295	305
Sound power level[2]			dB(A)	78	78	80	78	78	80
Sound pressure level at 10 m[3]			dB(A)	46	46	48	46	46	48

* In accordance with standard EN14511-3:2022

** In accordance with standard EN14825:2022, average climate

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 fooling factor 0 m².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 fooling factor 0 m².K/W

CA1 Cooling mode conditions: evaporator water entering/leaving temperature 12°C/7°C, outside air temperature 35°C, evaporator fooling factor 0 m².K/W

CA2 Cooling mode conditions: evaporator water entering/leaving temperature 23°C/18°C, outside air temperature 35°C, evaporator fooling factor 0 m².K/W

$\eta s\ heat_{30/35°c}$ & $SCOP_{30/35°c}$ **Bold values compliant to Ecodesign regulation: (EU) No 813/2013 for Heat Pump application**

$SEPR_{-2/-8°C}$ **Bold values compliant to Ecodesign regulation: (EU) No 2015/1095 for Process application**

$SEER_{12/7°C}$ & $SEPR_{12/7°C}$ Values calculated in accordance with EN14825:2022

$SEER_{23/18°C}$ Values calculated in accordance with EN14825:2022

IPLV.SI Calculations according to standard performances AHRI 551-591 (SI)

(1) Weight shown is a guideline only. Please refer to the unit nameplate

(2) In dB ref=10^{-12} W, (A) weighting. Declared dualnumber noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). Measured in accordance with ISO 9614-1 and certified by Eurovent.

(3) In dB ref 20µPa, (A) weighting. Declared dualnumber noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). For information, calculated from the sound power level Lw(A).

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

Eurovent certified values

PHYSICAL DATA, 30RB / 30RQ UNITS

		30RB 26-A	30RB 33-A	30RB 40-A	30RQ 26-A	30RQ 33-A	30RQ 40-A
Dimensions							
Length	mm	1002					
Depth	mm	824					
Height	mm	1790					
Compressor		One hermetic scroll compressor					
Refrigerant charge R-410A	kg	5,8	8,6	8,8	7,6	9,5	9,8
	$teqCO_2$	12,1	18,0	18,4	15,9	19,8	20,5
Control		Pro-Dialog+					
Fans		One twin-speed axial fan, 7 blades					
Diameter	mm	710					
Air flow	l/s	3530					
Speed	r/s	15					
Water heat exchanger		Plate heat exchanger, maximum operating pressure 1000 kPa					
Water volume	l	2,28	2,85	3,8	2,28	2,85	3,8
Air heat exchanger		Copper tubes and aluminum fins					
Pipe diameter	in	3/8	3/8	3/8	3/8	3/8	3/8
Number of rows		2	3	3	2,5	3	3
Number of pipes per row		60	60	60	60	60	60
Fin spacing	mm	1,69	1,69	1,69	1,69	1,69	1,69
Standard unit							
Water connections (MPT gas)	in	1-1/4					
Unit with hydraulic module		Pump, screen filter, expansion tank, flow switch, pressure gauge, automatic air purge valve, relief valve					
Pump		One single-speed pump, maximum water-side operating pressure 400 kPa					
Expansion tank capacity	l	8					
Entering water connection	in	1-1/4					
Leaving water connection	in	1-1/4					
Nominal operating current	A	2,4	2,6	2,8	2,4	2,6	2,8
Chassis paint colour		RAL 7035					

ELECTRICAL DATA, 30RB/RQ UNITS

30RB/RQ		026	033	040
Power circuit				
Nominal power supply	V-ph-Hz	400-3+N-50 (power supply option C) or 400-3-50 (power supply option D)		400-3-50 (STD - no option)
Voltage range	V	340-460		360-440
Control circuit supply		24 V via internal transformer		
Maximum start-up current (Un)(1)	A	118	118	176
Unit power factor at nominal capacity(2)		0,77	0,81	0,9
Maximum operating power input(2)	kW	11	13,8	17,5
Nominal current drawn(3)	A	16	17	25
Maximum operating current draw (Un)(4)	A	20	24	30
Maximum operating current draw (Un-15%)(5)	A	23	27	36

(1) Maximum instantaneous start-up current (locked rotor current of the compressor).
(2) Power input, compressors and fans, at the unit operating limits (saturated suction temperature 10°C, saturated condensing temperature 65°C) and nominal voltage of 400 V (data given on the unit nameplate).
(3) Standardised Eurovent conditions: Water heat exchanger entering/leaving water temperature 12°C/7°C, outside air temperature 35°C.
(4) Maximum unit operating current at maximum unit power input and 400 V (values given on the unit nameplate).
(5) Maximum unit operating current at maximum unit power input and 340-460V for sizes 026 to 033 or 360-440V for size 040.

PART LOAD PERFORMANCES

SEER for comfort chillers (in accordance with EU ECODESIGN)

The **SEER** (**S**easonal **E**nergy **E**fficiency **R**atio) measures the seasonal energy efficiency of comfort **chillers** by calculating the ratio between annual cooling demand of the building and annual energy demand of the chiller. It takes into account the energy efficiency achieved for each outdoor temperature weighted by the number of hours observed for each of these temperatures, using actual climate data.

SEER is a new way of measuring the true energy efficiency of chillers for **comfort cooling** over an entire year. This new indicator gives a more realistic indication of the real energy efficiency and environmental impact of a cooling system (Ecodesign Regulation 2016/2281).

SCOP (In accordance with standard N14825:2022, average climate)

The **SCOP** (**S**easonal **C**oefficient **o**f **P**erformance) permit evaluation of the average energy efficienty at part load, based on multipoint conditions (16°C to -10°C for average climate) and number of hours occurring at each air temperature (Bin hours).

To be able to compare the energy efficiency of boilers using a primary energy source (gas or fuel) with heat pumps using a final energy source (electricity), the seasonal efficiency criteria used by the Ecodesign regulations is known as it is based on the use of primary energy sources and expressed in %.

SEPR for process chillers (in accordance with EU ECODESIGN)

The **SEPR** (**S**easonal **E**nergy **P**erformance **R**atio) measures the seasonal energy efficiency of **process chillers** by calculating the ratio between annual cooling demand of the process and annual energy demand of the chiller. It takes into account the energy efficiency achieved at each outdoor temperature of an average climate weighted by the number of hours observed for each of these temperatures.

SEPR is a new way of measuring the true energy efficiency of chillers for **process cooling** over an entire year. This new indicator gives a more realistic indication of the real energy efficiency and environmental impact of the cooling system (Ecodesign Regulation 2015/1095).

ENERGY EFFICIENCY METRIC: SCOP

Because buildings have a thermal load depending on outdoor air temperature

The Seasonal Coefficient of Performance (SCOP) is a new European parameter to evaluate the energy efficiency of heat pumps. It replacesthe Coefficient of Performance (COP), which measured the ratio of power consumed to power produced in the heating mode on a singleoperating point.

Unlike its predecessor, the SCOP is representative of operation during the heating season as it includes seasonal variationsby defining several realistic measurement points. Together, these contribute to classification in the correct energy efficiency class.

SCOP versus COP efficiency (for heat pumps)

TEMPERATURE		CAPACITY (KW)		AUXILIARY MODES (KWH)		HOURS	
COP	**SCOP**	**COP**	**SCOP**	**COP**	**SCOP**	**COP**	**SCOP**
1 temperature condition: 7°C	Several rating temperatures: -10°C to 16°C (average climate)	Full load	Partial load + Full load	No auxiliary power modes taken into consideration	Includes consumption auxiliary modes: - Standby mode - Off mode - Thermostat off...	N/A	Number of hours occuring at each air temperature (bin hours)

SCOP Calculation

SCOP is the ratio between annual heating demand and annual energy input over an entire heating season.

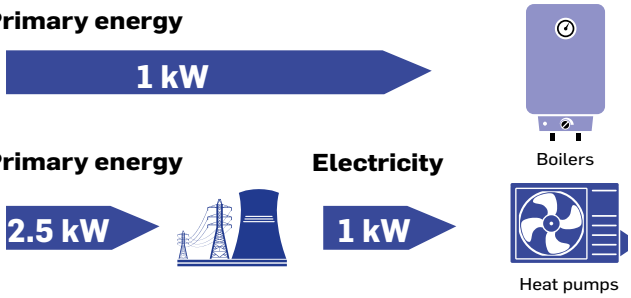
$$SCOP = \frac{\text{ANNUAL HEATING DEMAND}}{\text{ANNUAL ENERGY INPUT}^{(1)}}$$

(1) Annual energy input:
- Compressor running (SCOPon)
- Compressor not running: thermostat OFF, standby, OFF mode & crankcase heater
- Backup heater to supplement heat pump capacity

ŋs: seasonal primary energy efficiency metrics:

In order to compare the energy efficiency of products using different sources of energy, such as boilers (gas, fuel) and electric heat pumps, the Ecodesign regulation introduces a new measurement expressed in primary energy: ŋs (eta s).

$$\eta_s = SCOP/2.5^{(1)} \times 100 - i^{(2)}$$



In Europe, on average, 2.5 kW(3) of primary energy is required to generate 1 kW of electricity.

(2) Air source heat pump i = 3
Water source heat pump: i = 8
(3) Source: EU Regulation 813/2013

SOUND SPECTRUM

30RB/RQ units

Sound power level (Lw)-Cooling mode

30RB/RQ		Sound Power level spectrum(1)						Overall Sound Power level(2)	
		125	250	500	1000	2000	4000		
026	dB	79	76	76	74	67	60	dB(A)	78
033	dB	79	76	76	74	67	60	dB(A)	78
040	dB	82	79	77	76	71	65	dB(A)	80

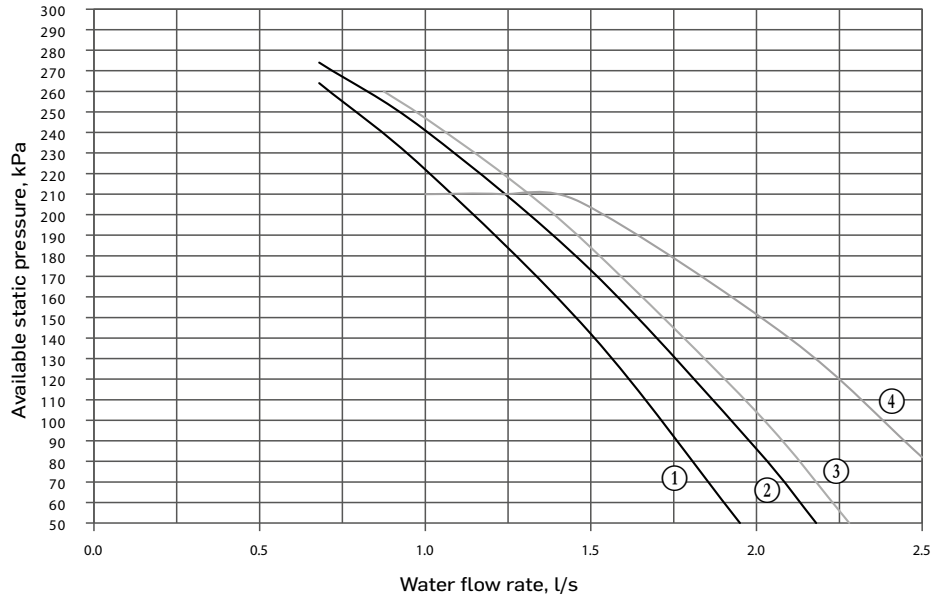
(1) In dB ref=10^{-12} W, as a guideline. Measured in accordance with ISO 9614-1.
(2) In dB ref=10^{-12} W, weighting (A), with uncertainty +/-3 dB. Measured in accordance with ISO 9614-1 and certified by Eurovent.

AVAILABLE STATIC SYSTEM PRESSURE

Data applicable for:

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

30RB/RQ 026-040



Legend

1. 30RB 026
2. 30RB 033 - 30RQ 026
3. 30RQ 033
4. 30RB/RQ 040

OPERATING LIMITS

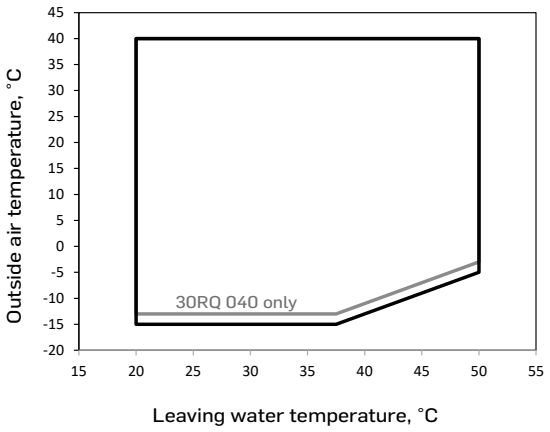
Water heat exchanger water flow rate

30RB	Minimum flow rate	Maximum flow rate(1)
	l/s	l/s
26	0,63	1,96
33	0,82	2,18
40	0,99	2,6

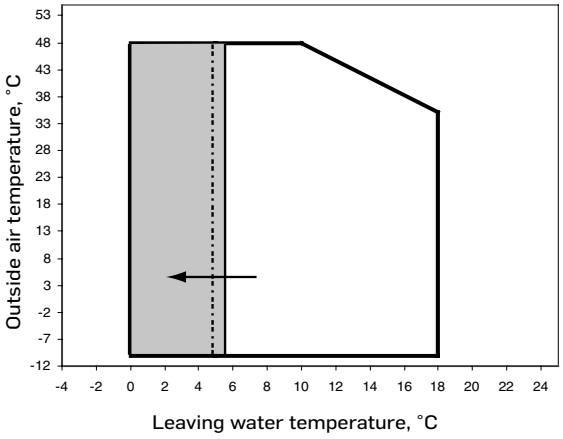
30RQ	Minimum flow rate	Maximum flow rate(1)
	l/s	l/s
26	0,67	2,18
33	0,87	2,29
40	1,05	2,6

(1) Maximum flow rate at an available pressure of 50 kPa (unit with hydraulic module)

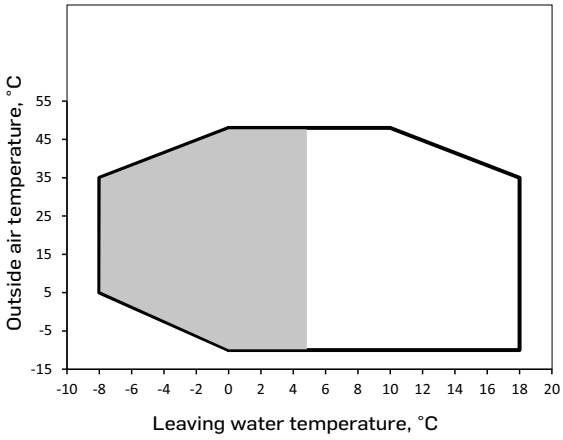
30RQ (heating mode)



30RQ (cooling mode)



30RB (cooling mode)



Operating range with anti-freeze solution Ethylen Glycol only and Pro-Dialog configuration.

Operating range with anti-freeze solution Ethylen Glycol only and Pro-Dialog configuration.

VARIABLE WATER FLOW SYSTEM (VWF)

Variable water flow is a hydraulic control function package that permits control of the water flow rate.

The 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 hydraulic module includes pressure transducers that permit intelligent measurement of the water flow rate and real-time display on the Pro-Dialog+ interface. All adjust-ments can be made directly on the interface, speeding up start-up and maintenance.

As 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 logic

- Full-load set point

The flow rate control at full load uses the Pro-Dialog+ interface, reducing 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 power consumption of the pump is reduced by the same ratio, compared to a traditional installation.

- Operating mode at part load

Pro-Dialog+ includes two part-load operating modes:
- Constant outlet pressure control
- Constant delta T control.

1 – Constant unit outlet pressure control

The control continuously acts on the pump speed to ensure a constant outlet pressure.

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 outlet pressure 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.

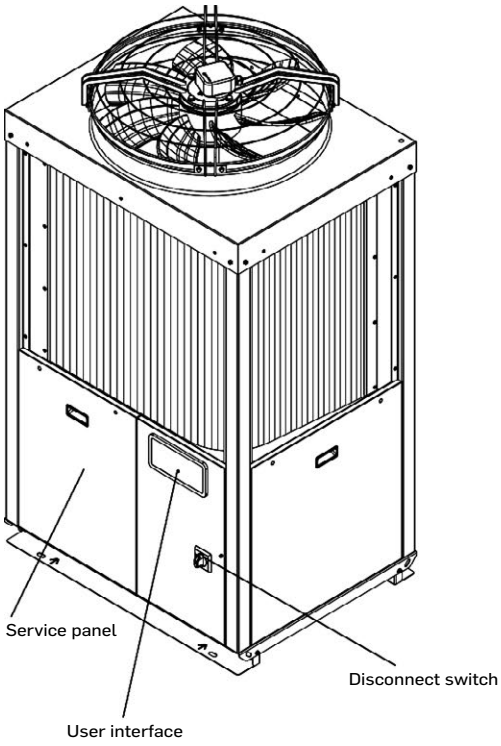
2 – Constant delta T control

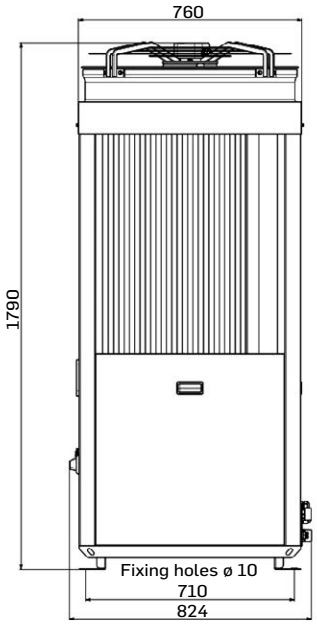
The VWF algorithm maintains a constant delta T no matter what the unit load, reducing the flow rate to the minimum.

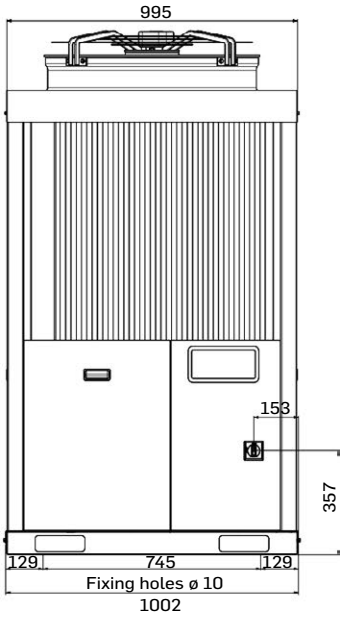
This solution can be used for systems with two-way or three-way valves and achieves higher energy savings than the “Constant unit outlet pressure control” mode. It is suitable for the majority of comfort applications.

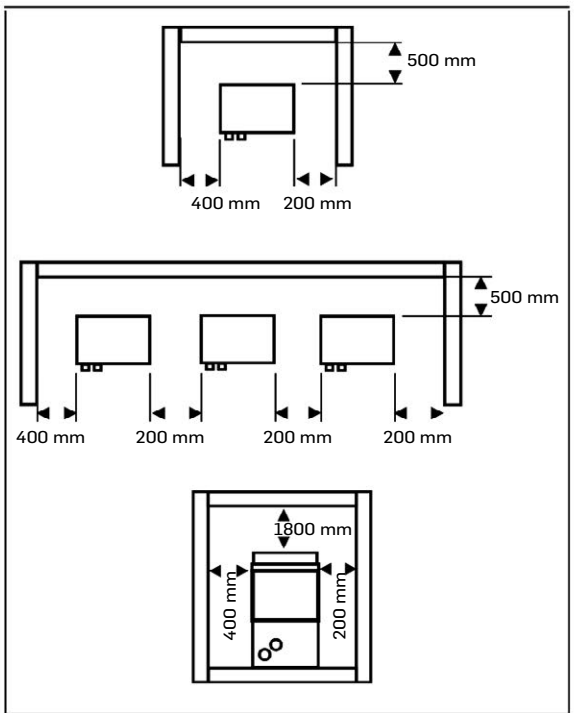
DIMENSIONS/CLEARANCES

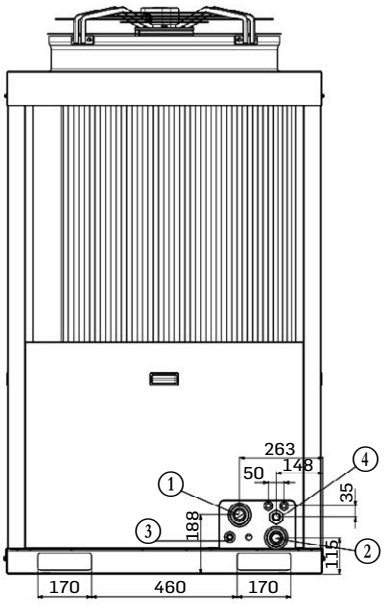
30RB/RQ 026-040











Legend
All dimensions are in mm
1. Water inlet
2. Water outlet
3. Water fill kit connection (option)
4. Power connections

The quality management system of this product's assembly site has been certified in accordance with the requirements of the ISO 9001 standard (latest current version) after an assessment conducted by an authorized independent third party.
The environmental management system of this product's assembly site has been certified in accordance with the requirements of the ISO 14001 standard (latest current version) after an assessment conducted by an authorized independent third party.
The occupational health and safety management system of this product's assembly site has been certified in accordance with the requirements of the ISO 45001 standard (latest current version) after an assessment conducted by an authorized independent third party.
Please contact your sales representative for more information

Order No.: 10748, 03.2024. Supersedes order No.: 10748, 01.2023. Carrier, Montluel, France.
Manufacturer reserves the right to change any product specifications without notice.
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