



United Technologies

PRODUCT SELECTION DATA



- Easy and fast installation
- Hydronic module available
 - Economical operation
 - Superior reliability

Air-Cooled Liquid Chillers/Air-to-Water Heat Pumps

30RB/RQ 017-040



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



30RB/RQ 017-040

Nominal cooling capacity 16-40 kW

Nominal heating capacity 17-40 kW

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:

- Ozone-friendly refrigerant R410A
- Scroll compressors
- Low-noise fans
- Auto-adaptive microprocessor control

The Aquasnap units are equipped with a hydronic 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.

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.

Access panels, sizes 017-021



Easy and fast installation

- Integrated hydronic module
 - Class A Variable 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 hydronic 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 14825/2013 in average climate, the Seasonal Coefficient of performance (SCOP) reaches 3.01 for an energy label of A.
- Reduced maintenance costs
 - Maintenance-free scroll compressors
 - Fast diagnosis of possible incidents and their history via the Pro-Dialog+ control
 - R410A refrigerant is easier to use than other refrigerant blends

Environmental care

- Ozone-friendly R410A refrigerant
 - Chlorine-free refrigerant of the HFC group with zero ozone depletion potential
 - Very efficient - gives an increased energy efficiency ratio (EER)
- Leak-tight refrigerant circuit
 - Brazed refrigerant connections for increased leak-tightness
 - Verification of pressure transducers and temperature sensors without transferring refrigerant charge

Hydronic module, sizes 026-040



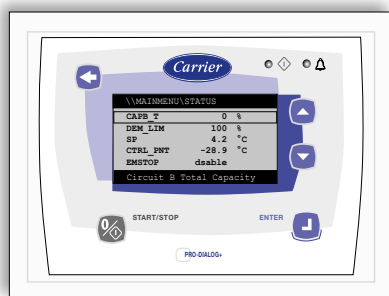
Superior reliability

- 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 hydronic 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.

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
 - Master/slave 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

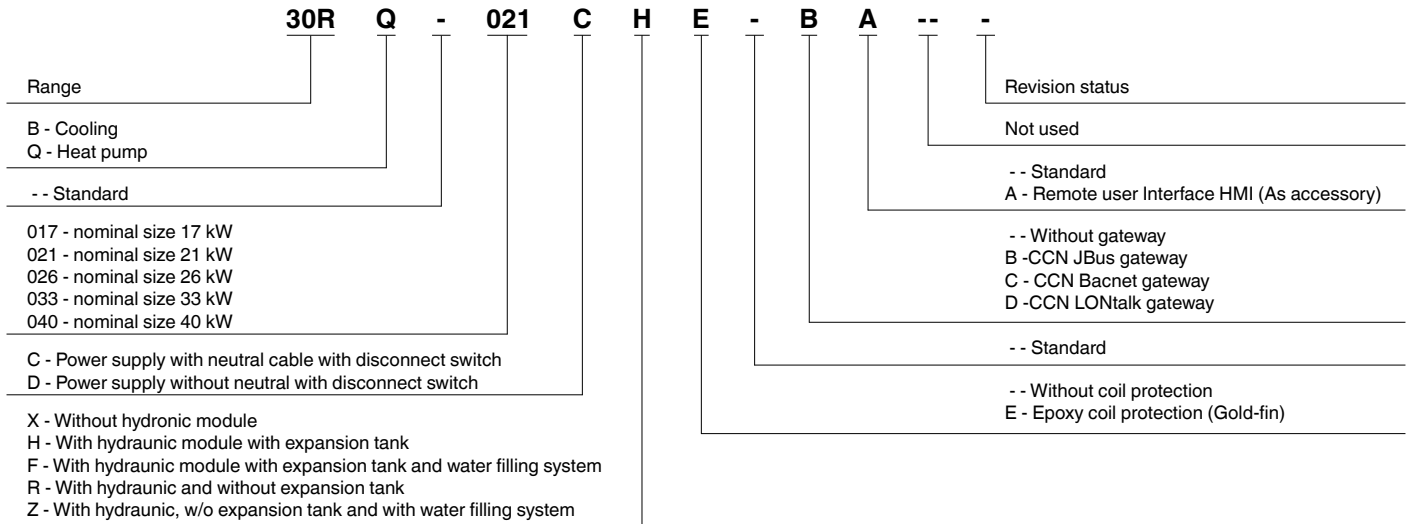
Remote interface (option)

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, sizes 026-040



Type key



Hydronic module

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

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

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

Physical and electrical data

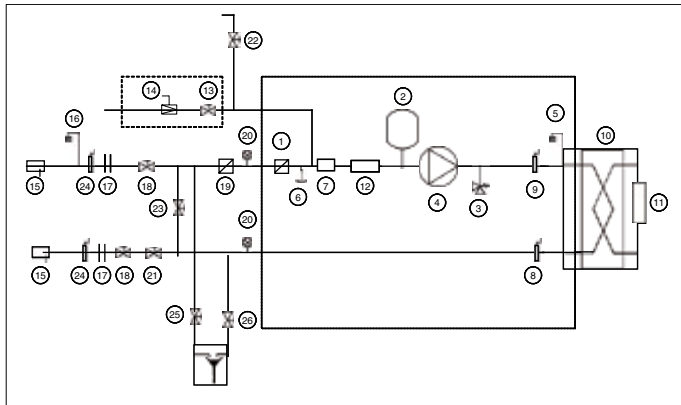
These are the same as for the standard unit except:

30RB/RQ - units with hydronic module		017	021	026	033	040
Hydronic module						
Expansion tank volume	l	5	5	8	8	8
Maximum water-side operating pressure	kPa	400	400	400	400	400
Pumps						
Water pump		Pump, screen filter, expansion tank, flow switch, automatic purge valve, safety valve				
Power input*	kW	0.54	0.59	0.99	1.10	1.20
Nominal operating current draw*	A	1.30	1.40	2.40	2.60	2.80

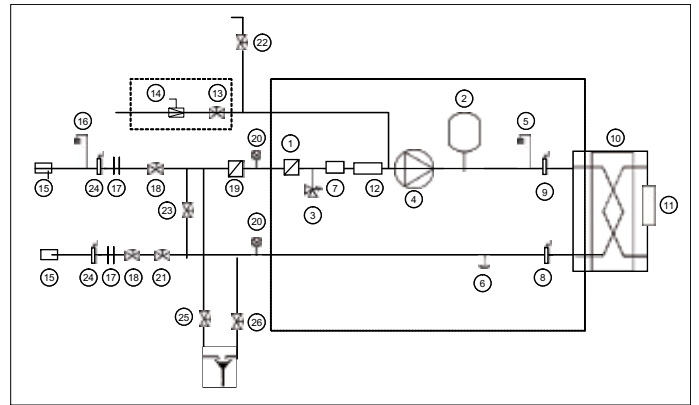
*Nominal conditions: evaporator entering/leaving water temperature 12°C/7°C, outside air temperature 35°C, evaporator fouling factor = 0 m² K/kW.
Gross performances, not in accordance with EN14511-3:2013. These performances do not take into account the correction for the proportional heating capacity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

Typical hydronic circuit diagram

17-21 kW



26-40 kW



— Hydronic module (unit with hydronic module)
 - - - Automatic water fill system option

Legend

Components of the unit and hydronic module

1. Screen filter
2. Expansion tank
3. Safety 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
13. Shut-off valve (automatic water fill option)
14. Pressure reducer (automatic water fill option)

System components

15. Temperature sensor well
16. Air purge
17. Flexible connections
18. Shut-off valve
19. Screen filter (obligatory for a unit without hydronic module)
20. Pressure gauge
21. Flow control valve (factory-supplied for field installation)
22. Charge valve
23. Frost protection bypass (when shut-off valves are closed in winter)
24. Pressure sensor
25. System drain valves
26. Plate heat exchanger drain valve

Physical data, 30RB units

30RB			017	021	026	033	040	
Cooling								
Standard unit	C1	Nominal capacity	kW	16,40	21,40	27,30	33,30	41,40
Full load performances*	C1	EER	kW/kW	3,04	3,11	3,08	3,28	2,96
	C1	Eurovent class cooling		B	A	B	A	B
	C2	Nominal capacity	kW	22,70	29,50	38,60	45,80	56,90
	C2	EER	kW/kW	3,80	3,86	4,01	4,11	3,52
Full load performances**	C1	Gross nominal capacity	kW	16,6	21,6	27,7	33,6	41,6
	C1	Gross EER	kW/kW	3,15	3,25	3,24	3,45	3,03
	C2	Gross nominal capacity	kW	22,9	29,9	39,2	46,5	57,3
	C2	Gross EER	kW/kW	4,03	4,12	4,37	4,46	3,65
Seasonal efficiency*	C1	ESEER	kW/kW	3,46	3,47	3,44	3,62	3,29
Operating weight ⁽¹⁾								
		Standard unit, with hydronic module	kg	189	208	255	280	291
		Standard unit, without hydronic module	kg	173	93	237	262	273
Sound power level ⁽²⁾								
		Sound power level at 10 m ⁽³⁾	dB(A)	72	74	78	78	80
		Sound pressure level at 10 m ⁽³⁾	dB(A)	40	42	46	46	48
Dimensions								
		Length x depth x height	mm	1136 x 584 x 1579			1002 x 824 x 1790	1002 x 824 x 1790
Compressor								
One hermetic scroll compressor								
Refrigerant charge R-410A								
		kg		5,5	6,4	5,8	8,6	8,8
		teqCO ₂		11,5	13,4	12,1	18,0	18,4
Control								
Pro-Dialog+								
Fans								
				Two twin-speed axial fans, 3 blades		One twin-speed axial fan, 7 blades		
		Diameter	mm	495	495	710	710	710
		Air flow	l/s	2212	2212	3530	3530	3530
		Speed	r/s	14,5	14,5	15	15	15
Water heat exchanger								
				Plate heat exchanger, maximum operating pressure 1000 kPa				
		Water volume	l	1,52	1,9	2,28	2,85	3,8
Air heat exchanger								
				Copper tubes and aluminium fins				
		Pipe diameter	in	3/8	3/8	3/8	3/8	3/8
		Number of rows		2	2	2	3	3
		Number of pipes per row		60	60	60	60	60
		Fin spacing	mm	1,69	1,69	1,69	1,69	1,69
Standard unit								
		Water connections (BSP gas)	in	1	1	1-1/4	1-1/4	1-1/4
Unit with hydronic module**								
				Pump, screen filter, expansion tank, flow switch, automatic air purge valve, safety valve				
		Pump		One single-speed pump, maximum water-side operating pressure 400 kPa				
		Expansion tank capacity	l	5	5	8	8	8
		Entering water connection	in	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4
		Leaving water connection	in	1	1	1-1/4	1-1/4	1-1/4
		Nominal operating current**	A	1,3	1,4	2,4	2,6	2,8
Chassis paint colour								
Beige								

* In accordance with standard EN14511-3:2013

** Not in accordance with standard EN14511-3:2013. These performances do not take into account the correction for the proportionnal heating capacity and power input generated by the water pump to overcome the internal pressure drop in the heat exchanger.

C1 Cooling mode conditions: evaporator water entering/leaving temperature 12°C/7°C, outside air temperature 35°C, evaporator fouling factor 0 m².K/W

C2 Cooling mode conditions: evaporator water entering/leaving temperature 23°C/18°C, outside air temperature 35°C, evaporator fouling factor 0 m².K/W

(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 values

Electrical data, 30RB/RQ units

30RB/RQ		017	021	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)*	A	75	95	118	118	176
Unit power factor at nominal capacity**		0.84	0.79	0.77	0.81	0.9
Maximum operating power input**	kW	7.8	9.1	11	13.8	17.5
Nominal current drawn***	A	8	12	16	17	25
Maximum operating current draw (Un)****	A	13	16	20	24	30
Maximum operating current draw (Un-15%)†	A	15	18	23	27	36

* Maximum instantaneous start-up current (locked rotor current of the compressor).

** 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).

*** Standardised Eurovent conditions: Water heat exchanger entering/leaving water temperature 12°C/7°C, outside air temperature 35°C.

**** Maximum unit operating current at maximum unit power input and 400 V (values given on the unit nameplate).

† Maximum unit operating current at maximum unit power input and 340-460V for sizes 017 to 033 or 360-440V for size 040.

Part load performances

Part load performances

30RB 017-040

30RB		017	021	026	033	040
ESEER	kW/kW	3.46	3.47	3.44	3.62	3.29

30RQ 017-040

30RQ		017	021	026	033	040
ESEER	kW/kW	3.61	3.44	3.36	3.58	3.25

ESEER (in accordance with EUROVENT)

The ESEER (European seasonal energy efficiency ratio) permits evaluation of the average energy efficiency at part load, based on four operating conditions defined by Eurovent. The ESEER is the average value of energy efficiency ratios (EER) at different operating conditions, weighted by the operating time.

ESEER (European seasonal energy efficiency ratio)

Load %	Air temperature °C	Energy efficiency	Operating time %
100	35	EER ₁	3
75	30	EER ₂	33
50	25	EER ₃	41
25	20	EER ₄	23
ESEER = EER ₁ x 3% + EER ₂ x 33% + EER ₃ x 41% + EER ₄ x 23%			

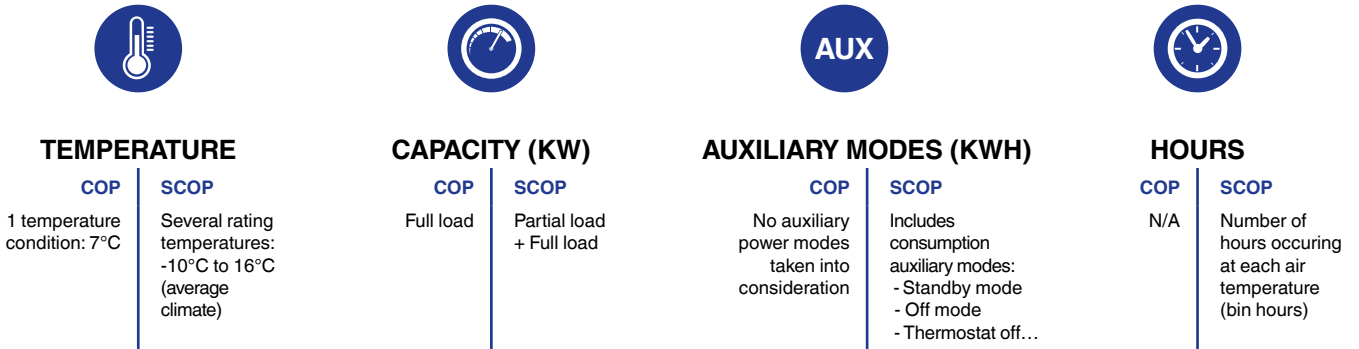
New energy efficiency metric: SCOP

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 replaces the Coefficient of Performance (COP), which measured the ratio of power consumed to power produced in the heating mode on a single operating point.

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

SCOP versus COP efficiency (for heat pumps)



SCOP Calculation

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

$$SCOP = \frac{\text{ANNUAL HEATING DEMAND}}{\text{ANNUAL ENERGY INPUT*}}$$

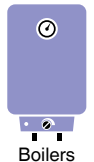
- * Annual energy input:
- Compressor running (SCOPon)
- Compressor not running: thermostat OFF, standby, OFF mode & crankcase heater
- Backup heater to supplement heat pump capacity

ηs: 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: ηs (eta s).

$$\eta_s = SCOP / 2.5^* \times 100 - i^{**}$$

Primary energy



Primary energy



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

- ** Air source heat pump i = 3
Water source heat pump: i = 8
- *** Source: EU Regulation 813/2013
- *** Source: EU Regulation 813/2013

Sound spectrum, 30RB/RQ units

30RB/RQ		Octave bands, Hz						Sound power levels	
		125	250	500	1000	2000	4000		
017	dB	75	72	70	67	61	60	dB(A)	72
021	dB	80	75	70	69	63	60	dB(A)	74
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

Operating limits

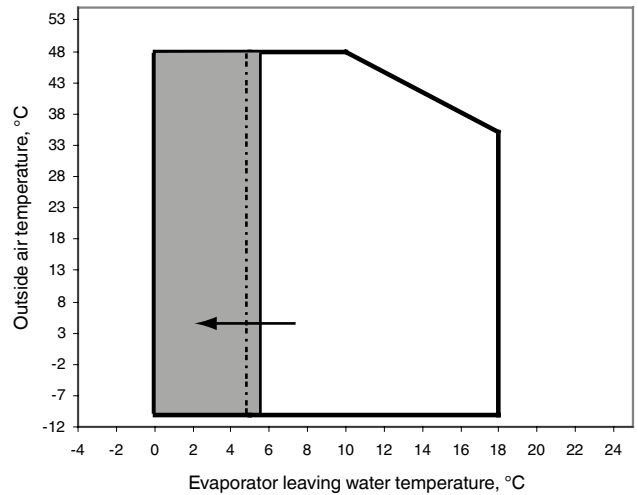
Water heat exchanger water flow rate

30RB	Flow rate, l/s		
	Minimum	Maximum*	Maximum**
017	0.45	1.39	1.26
021	0.57	1.52	1.42
026	0.67	1.96	1.43
033	0.87	2.18	1.72
040	1.05	2.60	2.70

30RQ	Flow rate, l/s		
	Minimum	Maximum*	Maximum**
017	0.45	1.39	1.26
021	0.57	1.52	1.42
026	0.67	2.18	1.72
033	0.87	2.29	1.85
040	1.05	2.60	2.70

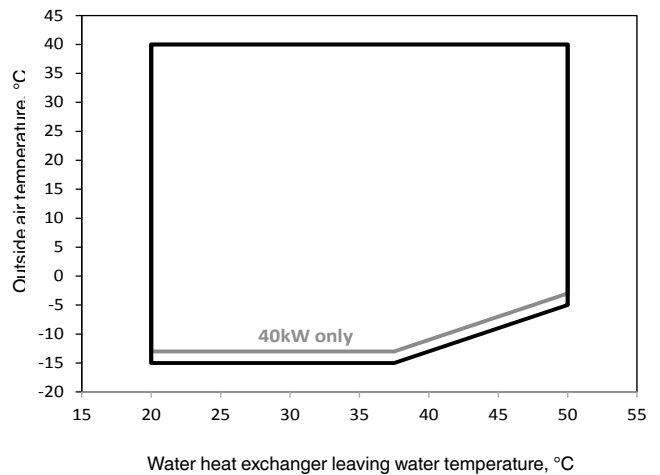
* Maximum flow rate at an available pressure of 50 kPa (unit with hydronic module)
 ** Maximum flow rate at pressure drop of 100 kPa in the plate heat exchanger (unit without hydronic module).

30RB/RQ (cooling mode)



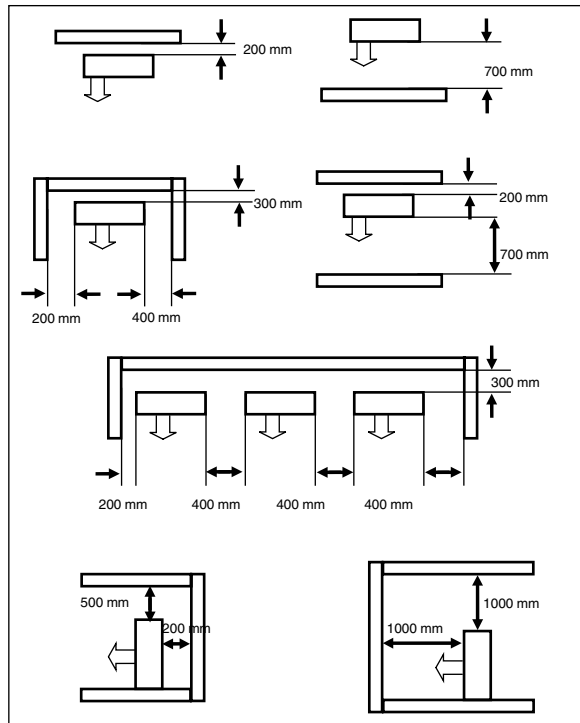
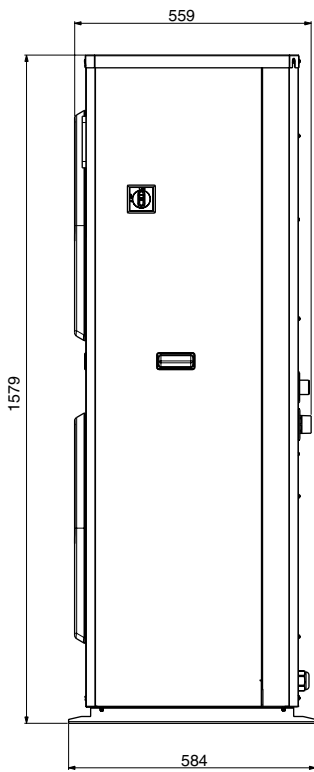
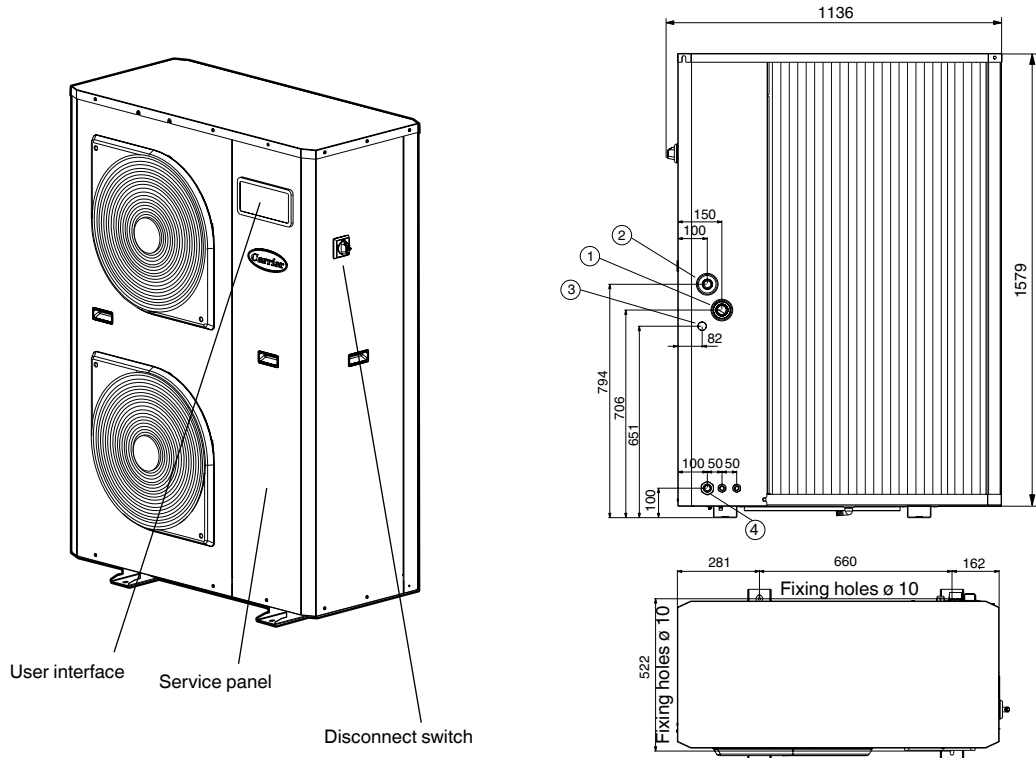
Operating range with anti-freeze solution and Pro-Dialog configuration.

30RQ (heating mode)



Dimensions/clearances

30RB/RQ 017-021



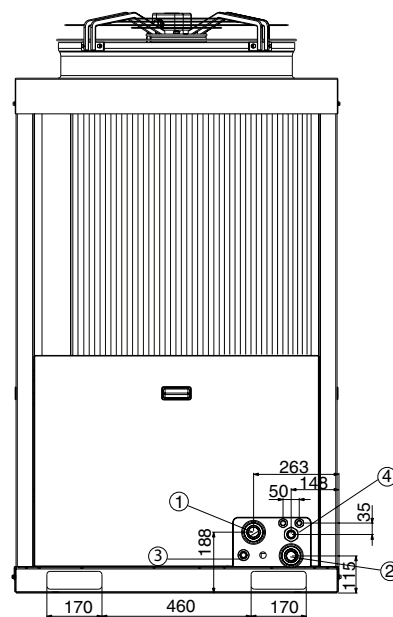
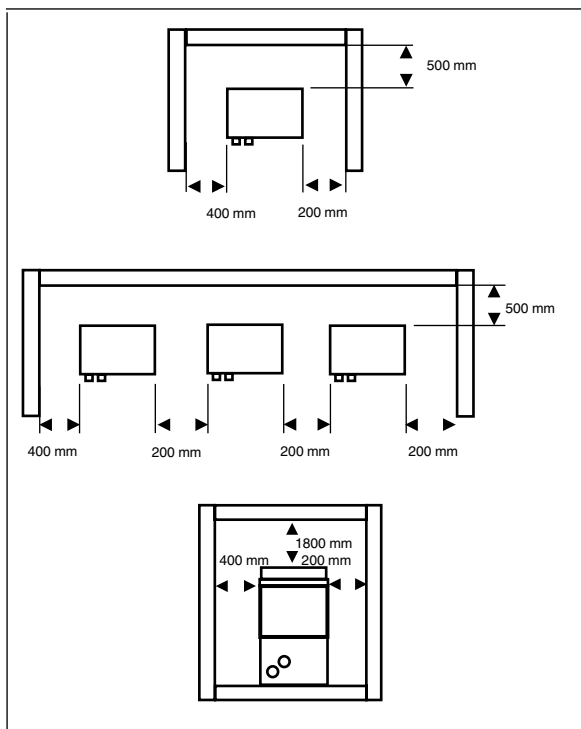
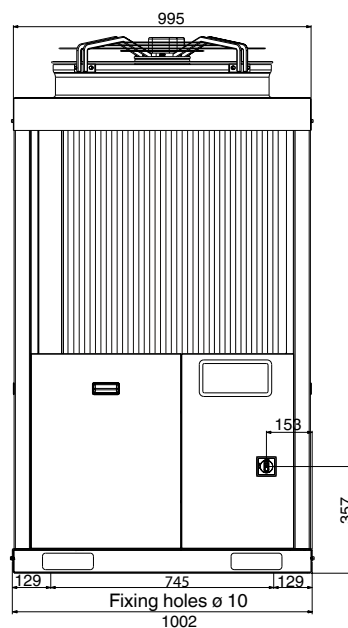
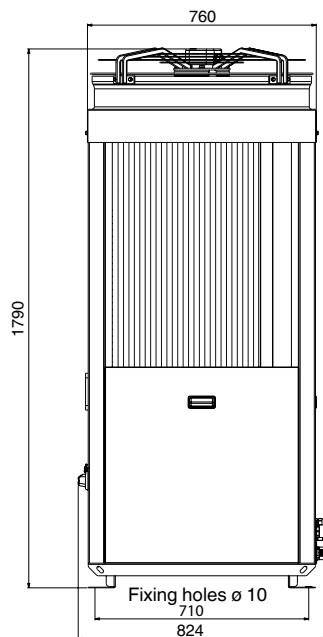
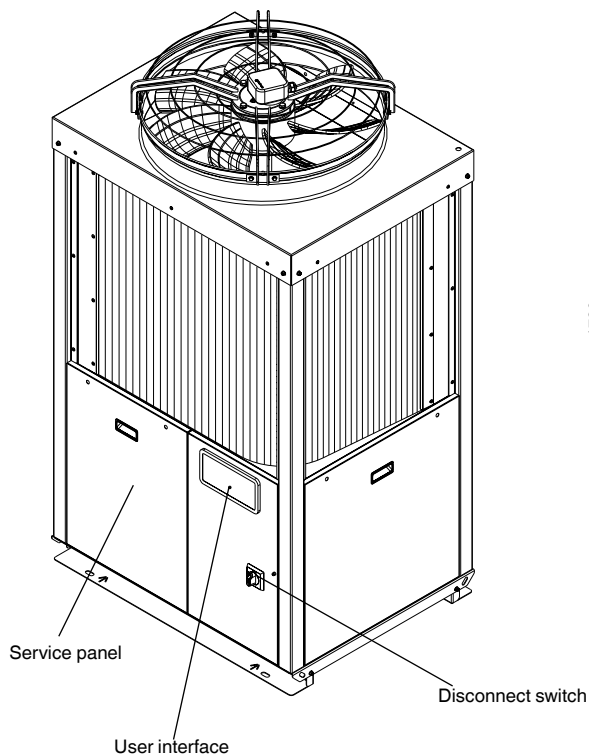
Legend

All dimensions are in mm

1. Water inlet
2. Water outlet
3. Water fill kit connection (option)
4. Power connections

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