



Water-Cooled/Condenserless Liquid Chillers with Integrated Hydronic Module

PRO-DIALOG PLUS

AQUASNAP



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Quality Management System Approval

30RW/30RWA

Nominal cooling capacity 20-310 kW

- The new generation of 30RW/30RWA Aquasnap liquid chillers features the latest technological innovations: scroll compressors, digital auto-adaptive Pro-Dialog control and ecological refrigerant HFC-407C. Aquasnap includes hydronic evaporator and condenser modules as standard, limiting the installation to simple operations such as the entering and leaving water piping connection. An auto-adaptive control algorithm intelligently controls condenser water pump speed and the operation of the glycol cooler fans (30RW) or of the air-cooled condenser fans (30RWA) to ensure reliable and economical operation under any climate conditions.
- “Plug and Play” installation**
- Integrated hydronic modules: they minimise site installation complexity and reduce the required space for the chiller installation.
 - Evaporator hydronic module**
This consists of a removable screen filter, water pump, expansion tank, water flow switch, safety valve, pressure gauge, and purge valve. A control valve permits adjustment of the flow rate to the water system characteristics. All components are isolated to prevent condensation.
 - Condenser hydronic module**
 - This consists of a removable screen filter, variable-speed water pump, expansion tank, safety valve, pressure gauge, and purge valve. The variable-speed pump controls the chiller condensing pressure and makes the installation of a three-way mixing valve on the condenser water circuit unnecessary.
 - Fan control: Pro-Dialog also controls the fans of the glycol cooler or remote air-cooled condenser. There are two methods: up to 8 stages maximum with balancing of fan operation times (30RW/RWA), or continuous speed variation (30RWA).
 - Quick electrical connections: Aquasnap is equipped with a general disconnect switch and a 24 V control circuit supply transformer as standard. A single power supply entry (three-phase without neutral) supplies the chiller.
- Economical operation**
- The condensing pressure is optimised by a patented auto-adaptive algorithm. At part load or moderate outside temperature an algorithm intelligently controls the condenser water pump speed and the operation of the glycol cooler (30RW) or the condenser (30RWA) fans to maintain the condensing pressure at its lowest possible value.

The standard 30RW chiller can operate down to -20°C outside temperature.

- The variable-speed condenser water pump automatically adjusts the water flow rate to maintain the ideal condensing conditions. At part load the power consumption of the pump is significantly reduced. A further advantage: as the three-way valve on the condenser circuit is not required, the hydronic circuit pressure drops are lower and the condenser water pump uses less energy.
- High-performance welded evaporator and condenser plate heat exchangers. With their counter-flow technology the heat exchangers maximise the thermodynamic properties of refrigerant HFC-407C. They are sized for very low water pressure drops. From size 30RW 160 upwards the evaporator and the condenser have two interlaced refrigerant circuits.

Finds space anywhere

- The Aquasnap chiller saves space, as it does not require additional space for the water pumps - everything is built into the unit. A further advantage: as routine unit maintenance operations are carried out via the front or side panels, the chiller can be installed against a wall.
- No plant room required. With its aesthetically pleasing casing design and the water connections at the top (30RW 020-150) the Aquasnap chiller can be installed in a place that is open to the public (garage, basement etc.), if local regulations permit.
- Low-noise operation. Aquasnap is equipped with quiet, vibration-free scroll compressors. These are well known for their durability and reliability, and they require no maintenance.

Reliability

- The ecological refrigerant HFC-407C has no effect on the ozone layer, and is the replacement for R-22 in air conditioning applications with small and medium capacities. It has been extensively tested by Carrier for several years and offers the same reliability and even slightly superior performances to those of R-22.
- The refrigerant circuit is designed to be completely leak-proof. All pipes and the refrigeration components are welded, the capillaries, a source of leaks in the past, have been replaced. Pressure sensors, mounted directly on the pipes, take the place of the pressure switches. From size 30RW 160 upwards, two independent refrigerant circuits ensure partial cooling capacity in all circumstances.

PRO-DIALOG Plus control

PRO-DIALOG Plus is an advanced numeric control system that combines intelligence with great operating simplicity. It controls the operation of compressors, evaporator and condenser water pumps and fans (glycol cooler or condenser).

Energy demand optimisation

- A patented auto-adaptive control algorithm optimises the condensing pressure at part load to reduce the compressor load, ensuring a perfect supply of the evaporator with liquid refrigerant. The algorithm controls the operation of the variable-speed condenser water pump and of the fans (glycol cooler or condenser).

- PRO-DIALOG Plus automatically resets the chilled-water

temperature set point based on the outside air temperature or the return water temperature. The control can also operate on a second set point (example: unoccupied mode).

Total chiller protection

- A patented auto-adaptive algorithm controls the compressor operation and permanently adapts to the system characteristics (water loop inertia). Dangerous compressor cycling is prevented. The chiller can operate safely with a low water volume, and this frequently makes a buffer tank unnecessary (see minimum water volume later in this document).
- PRO-DIALOG permanently analyses the compressor suction and discharge pressures and temperatures. When an abnormal situation is detected, the control reacts e.g. by unloading one refrigerant circuit. As a result the compressors always operate in their ideal temperature range and many chiller fault shut-downs can be prevented.

Easy-to-use system

- The PRO-DIALOG operator interface is clear and user-friendly: LEDs and two numeric displays offer an immediate check of all unit operating data.
- By pushing the buttons conveniently positioned on a synoptic chiller diagram you have an immediate display of the following parameters: temperatures, pressures, set point, compressor run times etc.
- 10 menus offer direct access to all machine data, including a history of possible faults, for rapid and complete chiller fault diagnosis.

Easy remote control

- PRO-DIALOG Plus allows remote control and monitoring of the chiller through a wired connection: start/stop, cooling/heat reclaim mode selection, power demand limit or dual set point and customer safety lock. The system permits remote signalling of any possible anomaly for each refrigerant circuit.
- The optional "CCN Clock Board" offers other control possibilities. Three independent time schedules permit definition of:
 - chiller start/stop
 - operation at the second chilled-water set-point (e.g. unoccupied mode)
 - operation with a reduced number of fans (e.g. during the night).

This option also permits parallel operation of two units and remote control via communication bus (RS 485 serial port).



PRO-DIALOG Plus operator interface

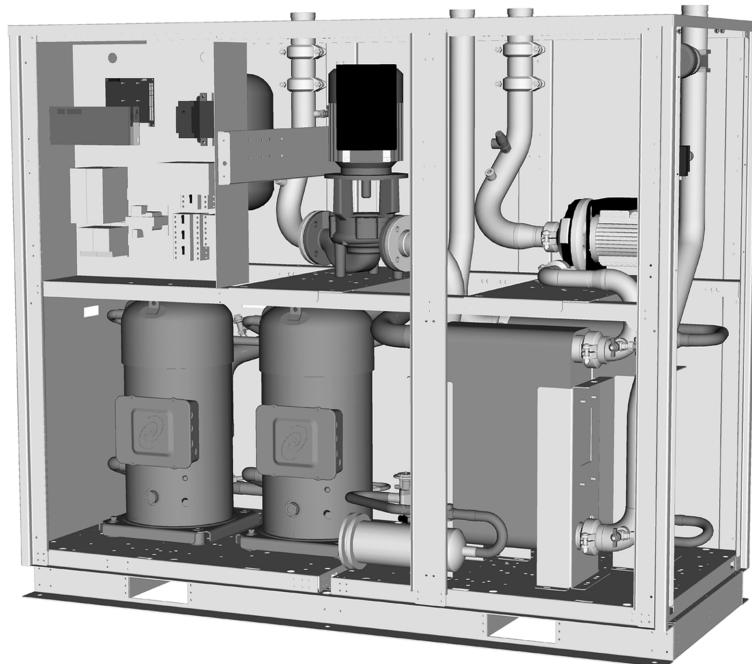
Options and accessories

	Option	Accessory
Chiller with a dual evaporator and condenser water pump (30RW 060-300)	X	
Chiller without condenser 30RWA (with hydronic evaporator module)	X	
Chiller without hydronic module	X	
Heat pump (hot or cold water control)	X	
Low leaving water temperature down to -10°C (30RW)	X	
Electronic starter for reduced start-up current	X	
CCN Clock Board RS485 communications and time schedule board	X	X
Communications board for the AQUASMART "the hydronic solution" system	X	

The glycol coolers or air-cooled condensers of the Carrier 09 series are supplied ready for installation with a control box. A simple communication bus connects the liquid chiller to the heat rejection unit. As all control components are installed and tested in the factory, installation and start-up of the chiller and its associated glycol cooler are simplified.



Glycol cooler 09



Chiller 30RW

Physical data

30RW/RWA		020	025	030	040	045	060	070	080	090	110	120	135	150	160	185	210	245	275	300		
Nominal cooling capacity 30RW*	kW	20.2	25.9	29.9	39.7	45.3	56.0	70.0	80.0	91.0	108.0	123.0	139.0	149.0	162.0	183.0	216.0	247.0	284.0	310.0		
Nominal cooling capacity 30RWA**	kW	19.0	24.4	28.2	37.8	43.5	54.0	67.0	76.0	87.0	102.0	117.0	134.0	143.0	148.0	170.0	198.0	226.0	264.0	291.0		
Operating weight 30RW																						
With hydronic module, single pump	kg	377	396	399	432	452	717	748	789	815	959	1032	1052	1072	1404	1469	1697	1811	1897	1897		
With hydronic module, dual pump	kg	-	-	-	-	-	901	931	973	999	1134	1207	1226	1247	1519	1584	1913	2027	2113	2113		
Without hydronic module	kg	350	369	372	405	425	689	719	761	787	872	945	964	985	1089	1154	1367	1481	1567	1572		
Operating weight 30RWA																						
With hydronic module, single pump	kg	333	347	347	370	383	638	658	693	714	788	851	860	871	1193	1241	1404	1558	1596	1596		
With hydronic module, dual pump	kg	-	-	-	-	-	728	749	783	804	903	966	975	985	1248	1296	1517	1671	1709	1709		
Without hydronic module	kg	325	339	339	361	375	627	648	682	703	777	840	849	859	953	1001	1164	1318	1361	1371		
Refrigerant 30RW†																						
R-407C																						
Circuit A	kg	3.2	3.3	3.3	4.2	6.2	7.5	9.6	11.0	12.4	14.0	16.4	18.5	19.3	15	17	19	19	24	24		
Circuit B	kg	-	-	-	-	-	-	-	-	-	-	-	-	-	15	17	19	19	24	24		
Compressors 30RW/30RWA																						
Hermetic scroll, 48,3 r/s																						
Circuit A		1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
Circuit B		-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2	2	2	2		
Number of capacity steps		1	1	1	1	1	2	2	2	2	2	2	2	2	4	4	4	4	4	4		
Minimum capacity	%	100	100	100	100	100	46	43	50	50	42	50	46	50	25	25	21	25	23	25		
Control																						
PRO-DIALOG Plus																						
Condensers (30RW)																						
Welded plate heat exchangers																						
Water volume	l	2.0	2.9	2.9	3.8	4.8	6.1	7.8	9.0	9.7	12.2	13.7	15.8	17.9	26.5	26.5	34.9	34.9	46.6	46.6		
Max. water-side operating pressure, without hydronic module	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
Max. water-side operating pressure, with hydronic module	kPa	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	
Hydronic condenser module (30RW)																						
Condenser pump (single centrifugal)		One, composite, variable speed by frequency converter (48,3 r/s)										One, variable speed by frequency converter (48,3 r/s)										
Expansion tank volume, condenser loop		8	8	8	8	8	12	12	12	25	25	25	25	25	35	35	35	50	50	50		
Evaporator (30RW/30RWA)																						
Welded direct-expansion plate heat exchanger																						
Water volume	l	2.0	2.9	2.9	3.8	4.8	6.1	7.8	9.0	9.7	12.2	13.7	15.8	17.9	26.5	26.5	34.9	34.9	46.6	46.6		
Max. water-side operating pressure, without hydronic module	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
Max. water-side operating pressure, with hydronic module	kPa	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	
Hydronic evaporator module (30RW/30RWA)																						
Evaporator pump (single centrifugal)		One composite pump, 48,3 r/s													One, 48,3 r/s							
Expansion tank volume, evaporator loop	l	8	8	8	8	8	12	12	12	25	25	25	25	25	35	35	35	50	50	50		
Water connections (30RW/30RWA)																						
Victaulic‡ (30RW 025-045 without hydronic module: threaded gas connections)																						
Standard field connection diameter, Victaulic	in	2	2	2	2	2	2	2	2	2	3 OD	3 OD	3 OD	3 OD	3	3	3	3	3	3		
Welded field connection diameter	mm	60.3	60.3	60.3	60.3	60.3	60.3	60.3	60.3	60.3	76.1	76.1	76.1	76.1	88.9	88.9	88.9	88.9	88.9	88.9		
Field refrigerant connections (30RWA)																						
Welded copper tube																						
Outside discharge piping diameter	in																					
Circuit A		7/8	7/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8		
Circuit B		-	-	-	-	-	-	-	-	-	-	-	-	-	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8		
Outside liquid refrigerant return piping diameter	in																					
Circuit A		7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	7/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8		
Circuit B		-	-	-	-	-	-	-	-	-	-	-	-	7/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8		

* Standard EUROVENT conditions: evaporator entering/leaving water temperature = 12°C/7°C, condenser entering/leaving water temperature = 30°C/35°C.

** Standard EUROVENT conditions: evaporator entering/leaving water temperature = 12°C/7°C, saturated bubble point condensing temperature = 45°C, subcooling = 5 K.

† The RWA units only have a nitrogen holding charge

‡ With tubular sleeve, supplied with the unit, consisting of a Victaulic connection at one end and a plain section at the other end.

Electrical data

30RW/RWA (without hydronic module)		020	025	030	040	045	060	070	080	090	110	120	135	150	160	185	210	245	275	300	
Power circuit																					
Nominal power supply	V-ph-Hz	400-3-50																			
Voltage range	V	360-440																			
Control circuit supply		The control circuit is supplied via the unit-mounted transformer																			
Maximum unit power input 30RW and 30RWA*	kW	8.1	10.3	12.0	15.8	18.0	22.3	27.8	31.6	36.1	42.4	48.8	54.0	59.1	63.2	72.2	84.9	97.6	107.9	118.2	
Nominal unit current draw 30RW**	A	9.9	12.6	14.6	17.9	21.1	27.2	32.5	35.8	42.1	48.1	54.0	61.0	68.0	71.7	84.2	96.1	108.0	122.0	136.0	
Nominal unit current draw 30RWA***	A	10.4	13.3	15.5	19.1	22.4	28.8	34.5	38.1	44.8	51.4	58.0	64.7	71.4	76.3	89.6	102.8	116.0	129.4	142.8	
Maximum unit current draw 30RW and RWA†	A	13.7	17.6	20.5	25.9	30.2	38.0	46.3	51.8	60.5	69.2	78.0	99.9	96.0	120.1	120.9	138.5	156.0	174.0	192.0	
Maximum start-up current (standard unit without electronic starter) 30RW and 30RWA††	A	86.0	130.0	130.0	135.0	155.0	147.6	155.5	160.9	185.2	245.2	254.0	309.0	318.0	212.6	245.7	314.5	332.0	396.0	414.0	
Maximum start-up current (electronic starter option) 30RW and 30RWA‡	A	51.6	78.0	78.0	81.0	93.0	95.6	101.5	106.9	123.2	159.2	168.0	201.0	210.0	158.6	183.7	228.5	246.0	288.0	306.0	

* Power input of the compressor(s) at maximum unit operating conditions: entering/leaving evaporator water temperature = 15°C/10°C, maximum condensing temperature of 65°C, and 400 V nominal voltage.

** Nominal unit current draw at standard conditions: evaporator entering/leaving water temperature 12°C/7°C, condenser entering/leaving water temperature 30°C/35°C. The current values are given at 400 V nominal voltage.

*** Nominal unit current draw at standard conditions: evaporator entering/leaving water temperature 12°C/7°C, saturated condensing temperature (dew point) 45°C, subcooling 5 K. The current values are given at 400 V nominal voltage.

† Maximum unit operating current at maximum unit power input and 400 V.

†† Maximum instantaneous starting current at 400 V nominal voltage and with compressor in across-the-line start (maximum operating current of the smallest compressor(s) + locked rotor current of the largest compressor).

‡ Maximum instantaneous starting current at 400 V nominal voltage and with compressor with electronic starter (maximum operating current of the smallest compressor(s) + reduced start-up current of the largest compressor).

Evaporator hydronic module

30RW/RWA		020	025	030	040	045	060	070	080	090	110	120	135	150	160	185	210	245	275	300	
Single pump																					
Shaft power rating	kW	0.75	0.75	0.75	0.75	0.75	1.5	1.5	1.5	1.5	1.85	1.85	1.85	1.85	4	4	4	4	4	4	
Power input*	A	1.0	1.0	1.0	1.0	1.0	2.1	2.1	2.1	2.1	2.5	2.5	2.5	2.5	5	5	5	5	5	5	
Maximum current draw **	A	1.9	1.9	1.9	1.9	1.9	3.9	3.9	3.9	3.9	4.6	4.6	4.6	4.6	8.3	8.3	8.3	8.3	8.3	8.3	
Dual pump																					
Shaft power rating	kW	-	-	-	-	-	2.2	2.2	2.2	2.2	4	4	4	4	4	4	5.5	5.5	5.5	5.5	
Power input	kW	-	-	-	-	-	2.8	2.8	2.8	2.8	5.3	5.3	5.3	5.3	5.3	5.3	6.8	6.8	6.8	6.8	
Maximum current draw	A	-	-	-	-	-	4.7	4.7	4.7	4.7	8.7	8.7	8.7	8.7	8.7	8.7	11.6	11.6	11.6	11.6	

Condenser hydronic module

30RW/RWA		020	025	030	040	045	060	070	080	090	110	120	135	150	160	185	210	245	275	300	
Variable-speed single pump																					
Shaft power rating	kW	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	4	4	4	4	4	4	5.5	5.5	5.5	5.5	
Power input***	kW	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	5	5	5	5	5	5	6.7	6.7	6.7	6.7	
Maximum current draw†	A	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	8.3	8.3	8.3	8.3	8.3	8.3	11.5	11.5	11.5	11.5	
Variable-speed dual pump																					
Shaft power rating	kW	-	-	-	-	-	2.2	2.2	2.2	2.2	4	4	4	4	4	4	5.5	5.5	5.5	5.5	
Power input	kW	-	-	-	-	-	2.8	2.8	2.8	2.8	5.3	5.3	5.3	5.3	5.3	5.3	6.8	6.8	6.8	6.8	
Maximum current draw	A	-	-	-	-	-	4.7	4.7	4.7	4.7	8.7	8.7	8.7	8.7	8.7	8.7	11.6	11.6	11.6	11.6	

Notes

The water pump power input values given are for guidance only.

30RW units have an evaporator and a condenser pump. 30RWA only have an evaporator pump

- To obtain the maximum unit power input for a unit with hydronic kit add the evaporator (*) and condenser pump (***) power input to the maximum power input of the unit without hydronic module, given in the top table.

- To obtain the maximum unit current draw for a unit with hydronic kit add the evaporator (**) and condenser pump current (†) draw to the maximum current draw of the unit without hydronic module, given in the top table.

Electrical data notes:

Notes:

- 30RW and 30RWA 020-300 units have a single power connection point.
- The control box includes the following standard features:
 - the starter and motor protection devices for each compressor and the pumps
 - the control devices
- Field connections:
 - All connections to the system and the electrical installations must be in full accordance with all applicable local codes.
- The Carrier 30RW and 30RWA units are designed and built to ensure conformance with these codes. The recommendations of European standard EN 60204-1 (machine safety - electrical machine components - part 1: general regulations - corresponds to IEC 60204-1) are specifically taken into account, when designing the electrical unit equipment.

NOTES:

- Generally the recommendations of IEC 60364 are accepted as compliance with the requirements of the installation directives. Conformance with EN 60204-1 is the best means of ensuring compliance with the Machines Directive § 1.5.1.
 - Annex B of EN 60204-1 describes the electrical characteristics used for the operation of the machines.
- The operating environment for the 30RW and 30RWA chillers is specified below:
 - Environment* - Environment as classified in IEC 60364 § 3:
 - ambient temperature range: +5°C to +40°C, class AA4
 - humidity range (non-condensing)*:
 - 50% relative humidity at 40°C
 - 90% relative humidity at 20°C

- altitude: ≤2000 m
 - indoor installation*
 - presence of water: class AD2* (possibility of water droplets)
 - presence of hard solids, class AE2* (no significant dust present)
 - presence of corrosive and polluting substances, class AF1 (negligible)
 - vibration and shock, class AG2, AH2
 - competence of personnel, class BA4* (trained personnel - IEC 60364)
- Power supply frequency variation: ± 2 Hz.
 - The neutral (N) conductor must not be connected directly to the unit (if necessary use a transformer).
 - Over-current protection of the power supply conductors is not provided with the unit.
 - The factory-installed disconnect switch(es)/circuit breaker(s) is (are) of a type suitable for power interruption in accordance with EN 60947.
 - The units are designed for connection to TN networks (IEC 60364). For IT networks the earth connection must not be at the network earth. Provide a local earth, consult competent local organisations to complete the electrical installation.

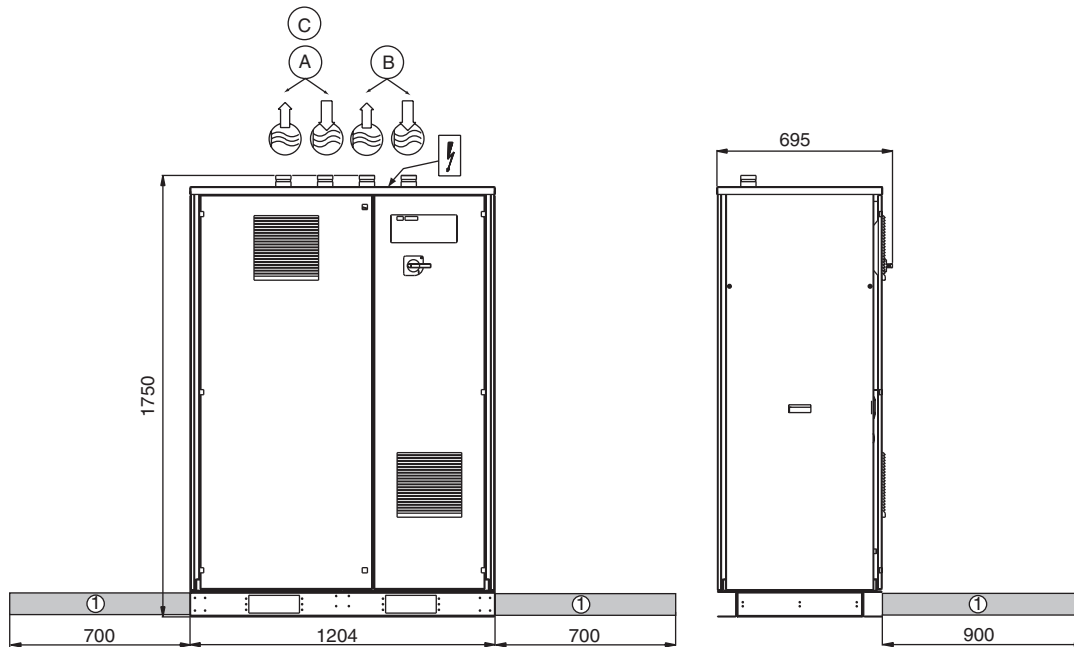
NOTE: If particular aspects of an actual installation do not conform to the conditions described above, or if there are other conditions which should be considered, always contact your local Carrier representative.

- * The protection level of the control boxes required to conform to this class is IP21B (according to reference document IEC 60529). All 30RW and 30RWA units with correctly installed casing panels fulfil this protection condition.

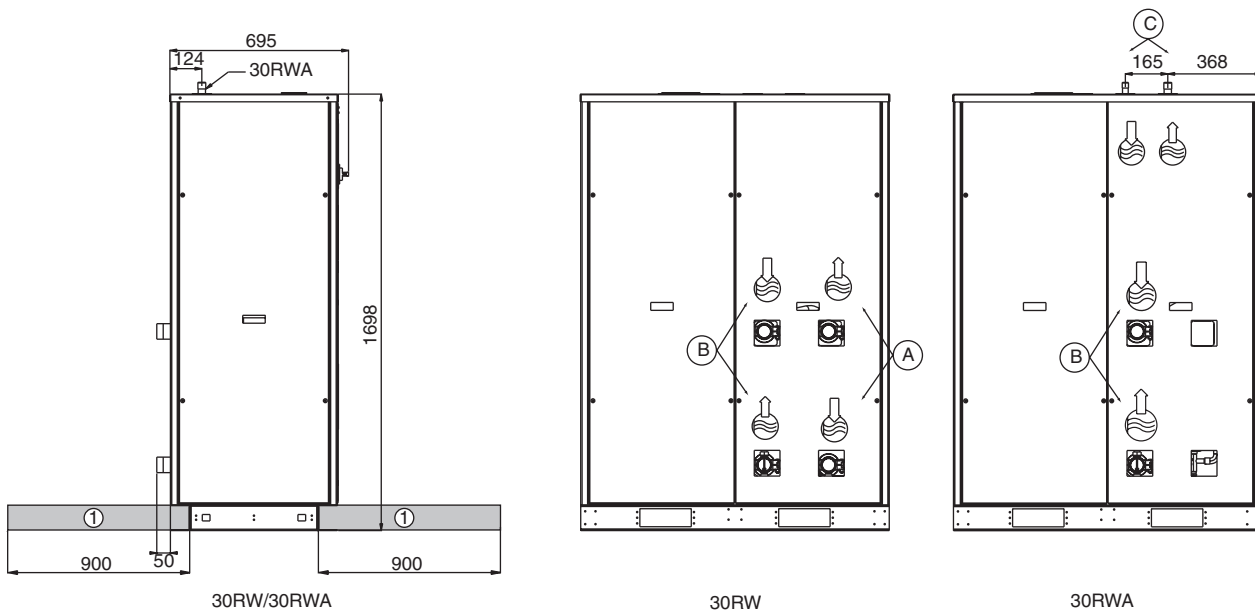
Dimensions/clearances

30RW/30RWA 020-045

30RW/30RWA 020-045 - unit without hydronic module (option 116E)






30RW/30RWA 020-045 – unit without hydronic module (option 116D)



	30RW 020-030	30RW 040-045
A	1-1/4" gas	2" gas
B	1-1/4" gas	2" gas

Legend:

All dimensions are given in mm.

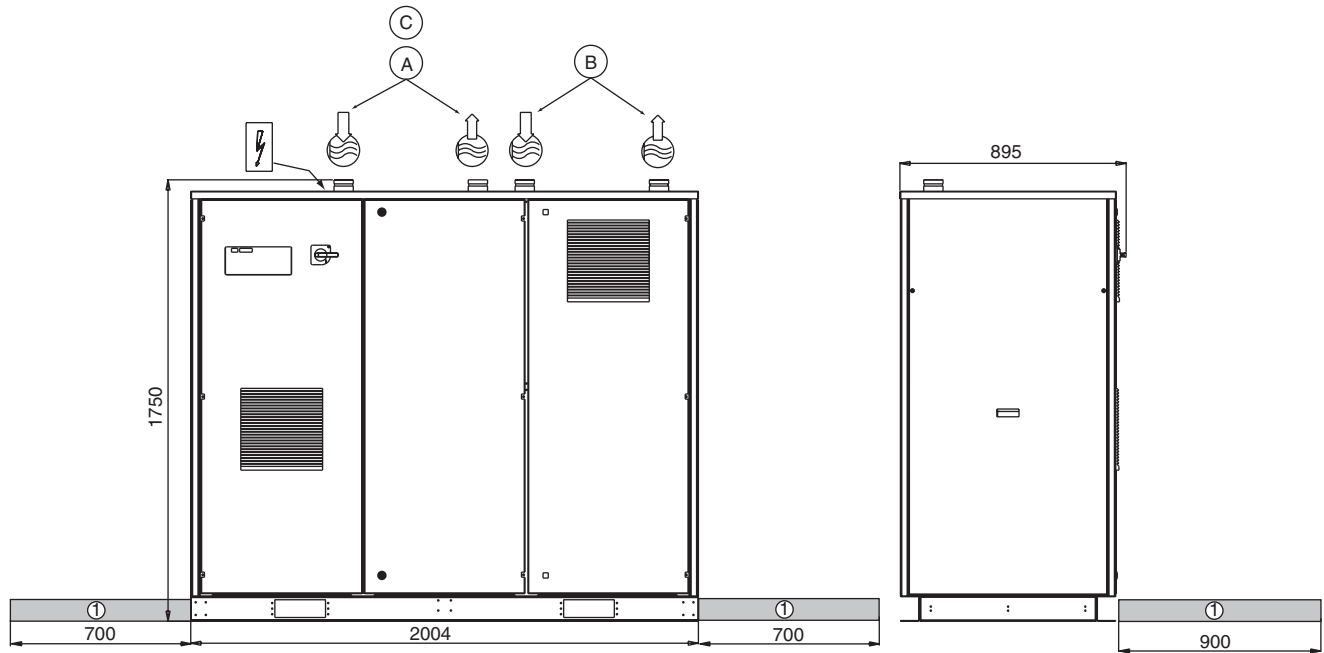
-  Water inlet
-  Water outlet
- A Condenser (water inlet/outlet for 30RW unit)
- B Evaporator
- C Refrigerant inlet/outlet (30RWA units only)
- ① Required clearances for maintenance
-  Power supply

NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings, available on request.

Dimensions/clearances

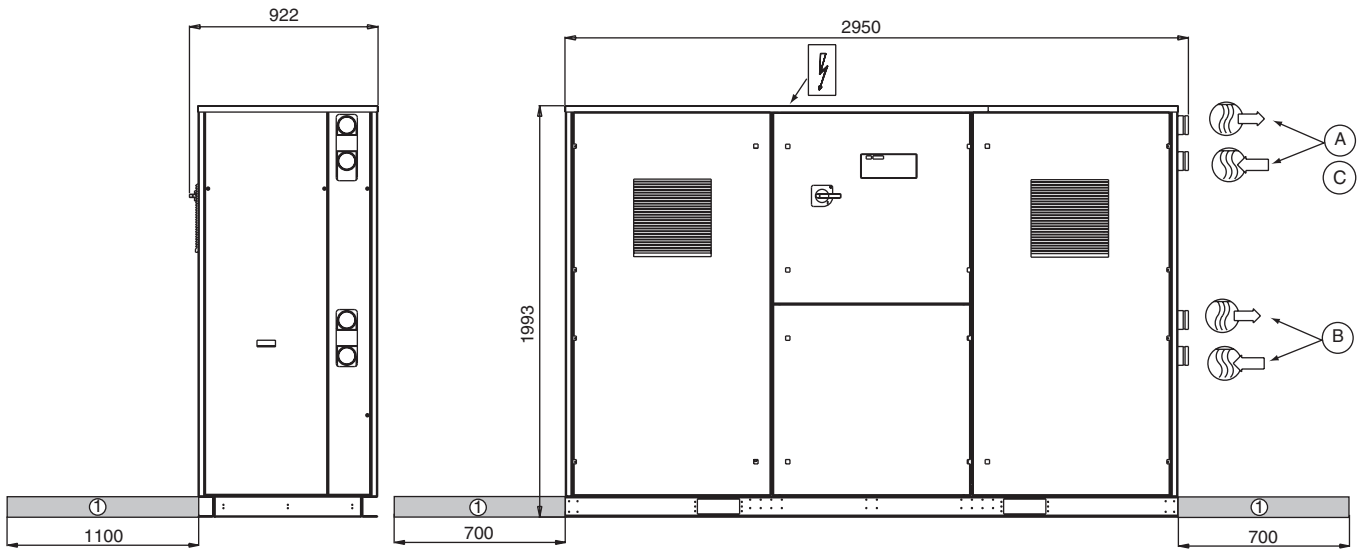
30RW/30RWA 060-150

30RW/30RWA 060-150 - unit without hydronic module (option 116D)

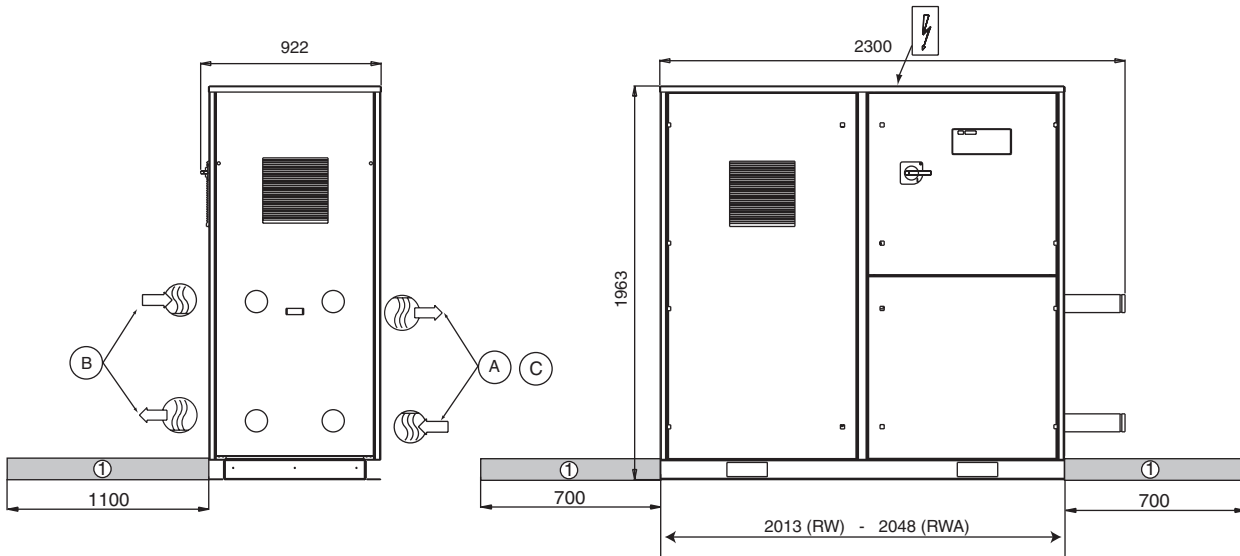


Dimensions/clearances

30RW/30RWA 160-300



30RW/RWA 160-300 – unit without hydronic module (option 116D)



Legend:

All dimensions are given in mm.



Water inlet



Water outlet

A

Condenser (water inlet/outlet for 30RW unit)

B

Evaporator

C

Refrigerant inlet/outlet (30RWA units only)

①

Required clearances for maintenance



Power supply

NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings, available on request.

Cooling capacities 30RW

30RW	Condenser entering water temperature °C																																	
	30				35				40				45																					
	CAP kW	COMP kW	COOL kPa	COND kPa	CAP kW	COMP kW	COOL kPa	COND kPa	CAP kW	COMP kW	COOL kPa	COND kPa	CAP kW	COMP kW	COOL kPa	COND kPa	PRES kPa	PRES kPa																
LM °C	020	5	18.8	4.99	0.9	34	137	1.13	50	188	17.6	5.59	0.84	30	142	1.11	48	190	16.4	6.25	0.78	26	146	1.08	46	192	15	7	0.72	23	150	1.05	44	195
	025	5	24.2	6.25	1.16	18	149	1.45	26	206	22.7	7.03	1.08	16	153	1.41	25	208	21.1	7.92	1.01	14	156	1.39	24	209	19.4	8.92	0.93	12	159	1.34	23	211
	030	5	27.9	7.25	1.33	23	141	1.67	34	193	26.2	8.18	1.25	20	145	1.63	32	196	24.3	9.23	1.16	18	149	1.59	31	198	22.4	10.4	1.07	15	153	1.55	29	200
	040	5	37	9.69	1.77	23	147	2.22	36	204	34.8	10.9	1.66	21	151	2.17	35	206	32.6	12.3	1.56	18	154	2.12	33	208	30.2	13.9	1.44	15	158	2.08	32	209
	045	5	42.2	11.4	2.09	18	148	2.54	30	207	39.6	12.8	1.89	17	152	2.48	29	209	36.7	14.3	1.76	14	156	2.42	27	211	33.7	16.1	1.61	12	160	2.35	26	213
	060	5	52	14	2.42	19	189	3.13	29	201	48.8	15.7	2.33	16	193	3.06	27	203	45.3	17.8	2.16	14	196	2.98	26	205	41.4	20	1.98	12	199	2.9	25	208
	070	5	65	17.1	3.13	19	182	3.91	29	186	62	19.2	2.94	16	187	3.82	28	190	57	21.7	2.74	14	191	3.74	26	192	53	24.5	2.53	12	195	3.65	25	195
	080	5	74	19.4	3.55	22	173	4.45	33	170	70	21.9	3.35	20	178	4.25	32	176	66	24.6	3.13	17	184	4.26	31	177	61	27.8	2.91	15	189	4.18	30	180
	090	5	84	22.7	4.03	25	161	5.08	39	148	79	25.5	3.78	22	169	4.95	37	153	73	32.7	3.51	19	176	4.82	35	159	67	32.2	3.22	16	183	4.69	33	164
	110	5	101	26.1	4.8	23	186	6	36	209	95	29.2	4.52	21	193	5.86	34	211	88	32.7	4.22	18	200	5.71	33	213	82	36.6	3.9	16	207	5.58	31	215
	120	5	114	30.7	5.47	25	171	6.87	39	200	108	34.2	5.14	22	181	6.71	37	203	101	38.2	4.81	20	189	6.55	35	206	93	42.7	4.46	17	198	6.41	34	208
	135	5	130	34.1	6.22	25	154	7.78	38	193	123	38.1	5.87	22	165	7.61	37	196	115	42.5	5.5	20	176	7.44	35	199	107	47.4	5.1	17	187	7.26	34	202
	150	5	139	37.4	6.66	23	145	8.37	36	190	132	41.8	6.3	21	157	8.21	35	193	124	46.7	5.9	18	169	8.03	33	196	115	52	5.48	16	180	7.85	32	199
	160	5	151	35.6	7.23	24	212	8.84	34	186	143	40	6.84	21	218	8.65	33	190	135	45	6.43	19	223	8.47	32	193	126	51	6	17	228	8.3	30	196
	185	5	171	42.7	8.15	26	202	10.1	39	166	161	47.9	7.68	23	209	9.85	37	171	150	54	7.17	21	216	9.61	35	176	138	60	6.61	18	223	9.36	34	181
	210	5	201	49.4	9.6	18	209	11.8	27	208	190	55	9.06	16	216	11.6	26	210	178	62	8.5	15	222	11.3	25	213	165	69	7.89	13	228	11	24	216
	245	5	230	57	11	23	189	13.6	35	188	217	64	10.4	21	198	13.3	33	192	204	71	9.74	19	207	13	32	196	190	79	9.07	16	215	12.7	31	199
	275	5	265	65	12.6	20	171	15.6	30	177	251	72	12	18	182	15.3	29	181	236	81	11.3	16	193	14.9	27	185	220	90	10.5	14	204	14.6	26	189
	300	5	290	71	13.8	24	149	17.1	36	157	275	80	13.2	21	162	16.8	34	161	259	89	12.4	19	176	16.4	33	166	242	99	11.6	17	189	16	32	171
	020	6	19.5	5	0.93	36	135	1.17	53	184	18.3	5.59	0.87	32	139	1.14	50	187	17	6.26	0.81	28	144	1.11	48	190	15.6	7.01	0.75	25	148	1.07	45	193
025	6	25.1	6.26	1.2	19	147	1.49	27	203	23.5	7.04	1.12	17	151	1.45	26	206	21.9	7.92	1.05	15	154	1.42	25	207	20.1	8.93	0.96	13	158	1.38	24	209	
030	6	28.3	7.25	1.38	24	138	1.72	36	190	27.1	8.18	1.3	22	142	1.68	34	192	25.2	9.23	1.21	19	147	1.63	32	195	23.2	10.4	1.11	16	152	1.59	31	198	
040	6	38.3	9.7	1.83	25	145	2.28	38	201	36.1	10.9	1.72	22	149	2.22	37	203	33.8	12.3	1.61	19	153	2.18	35	205	31.3	13.9	1.5	17	156	2.14	34	207	
045	6	43.7	11.4	2.09	20	146	2.62	32	204	41	12.8	1.96	18	150	2.55	30	207	38.1	14.4	1.82	15	154	2.48	29	209	34.9	16.1	1.67	13	158	2.41	27	212	
060	6	54	14	2.58	20	187	3.22	30	197	51	15.7	2.42	17	191	3.14	29	200	46.9	17.8	2.24	15	195	3.06	27	203	43	20	2.05	12	198	2.97	26	206	
070	6	68	17.1	3.24	20	180	4.02	31	182	64	19.3	3.04	18	184	3.93	29	186	59	21.7	2.84	15	189	3.84	28	189	55	24.5	2.62	13	193	3.75	27	192	
080	6	77	19.5	3.68	23	169	4.57	35	165	73	21.9	3.47	21	175	4.47	34	186	68	24.7	3.24	18	181	4.35	32	173	63	27.8	3.01	16	186	4.28	31	176	
090	6	87	22.8	4.18	27	156	5.22	41	141	82	25.6	3.92	24	165	5.09	39	147	76	28.7	3.64	21	173	4.97	37	153	70	32.3	3.34	17	181	4.81	35	159	
110	6	104	26.2	4.98	25	181	6.18	38	205	98	29.3	4.69	22	189	6.02	36	208	92	32.8	4.38	20	197	5.87	34	211	85	36.7	4.05	17	204	5.72	33	213	
120	6	119	30.8	5.66	27	166	7.07	41	197	112	34.3	5.33	24	175	6.9	39	200	104	38.3	4.98	21	185	6.73	37	203	97	42.9	4.62	18	194	6.58	36	205	
135	6	135	34.3	6.44	27	147	8	41	189	127	38.2	6.08	24	159	7.82	39	192	119	42.7	5.69	21	171	7.64	37	195	111	47.6	5.29	18	182	7.46	35	199	
150	6	144	37.6	6.89	25	137	8.61	38	185	136	42	6.52	22	149	8.44	36	188	128	46.9	6.11	20	162	8.25	35	192	119	52	5.67	17	175	8.05	33	195	
160	6	157	35.6	7.48	25	209	9.1	36	181	148	40	7.08	23	214	8.9	35	185	139	45.1	6.66	20	220	8.71	33	189	130	51	6.22	18	225	8.52	32	192	
185	6	177	42.8	8.44	28	197	10.4	41	160	166	48	7.95	25	205	10.1	39	165	155	54	7.43	22	212	9.87	37	171	143	61	6.85	19	220	9.6	35	176	
210	6	208	49.5	9.94	19	204	12.2	28	204	197	55	9.39	18	212	11.9	27	207	184	62	8.81	16	219	11.6	26	210	171	69	8.19	14	225	11.3	25	213	
245	6	238	57	11.4	25	183	14	37	183	225	64	10.8	23	193	13.6	35	187	211	71	10.1	20	202	13.3	34	191	197	79	9.41	18	211	13	32	195	
275	6	274	65	13.1	21	163	16	32	171	260	73	12.4	19	175	15.7	30	175	244	81	11.7	17	187	15.3	29	180	228	90	10.9	15	199	15	28	184	
300	6	300	71	14.3	25	139	17.6	38	150	285	80	13.6	23	154	17.2	36	155	268	89	12.8	20	168	16.9	35	160	252	99	12	18	183	16.5	33	165	
020	7	20.2	5	0.96	38	132	1.2	55	181	19	5.6	0.91	35	136	1.17	53	184	17.6	6.27	0.84	30	142	1.14	50	187	16.2	7.02	0.77	26	147	1.1	47	191	
025	7	25.9	6.26	1.24	20	145	1.53	29	201	24.4	7.04	1.17	18	149	1.49	27	203	22.7	7.93	1.08	16	153	1.45	26	206	20.9	8.93	1	13	156	1.41	25	208	
030	7	29.9	7.25	1.43	26	135	1.77	37	186	28.1	8.18	1.34	23	140	1.63	36	190	26.1	9.23	1.25	20	145	1.68	34	192	24	10.4	1.15	17	150	1.63	32	195	
040	7	39.7	9.72	1.9	27	142	2.35	41	198	37.4	10.9	1.79	24	146	2.29	39	201	35	12.3	1.67	21	151	2.24	37	203	32.5	13.9	1.55	18	155	2.19	35	205	
045	7	45.3	11.4	2.16	22	143	2.69	34	202	42.5	12.8	2.03	19	148	2.62	32	204	39.5	14.4	1.88	17	152	2.55	30	207	36.2	16.2	1.73	14	157	2.47	28	210	
060																																		

Cooling capacities 30RWA

30RWA		Compressor discharge pressure, kPa																													
		1243 (35°C/29,58°C**)				1433 (40°C/34,76°C**)				1643 (45°C/39,95°C**)				1873 (50°C/45,16°C**)				2126 (55°C/50,38°C**)													
		CAP	COMP	COOL	THR	CAP	COMP	COOL	THR	CAP	COMP	COOL	THR	CAP	COMP	COOL	THR	CAP	COMP	COOL	THR										
LM	°C	kW	l/s	kPa	kPa	kW	l/s	kPa	kPa	kW	l/s	kPa	kPa	kW	l/s	kPa	kPa	kW	l/s	kPa	kPa										
	5	20,7	4,01	0,99	40	130	24,5	19,8	4,47	0,95	37	133	24	18,8	4,99	0,9	34	137	23,5	17,7	5,56	0,84	30	141	22,9	16,5	6,21	0,79	27	145	22,4
020		26,6	5,03	1,27	21	144	31,4	25,4	5,61	1,21	19	147	30,5	24,1	6,28	1,15	17	150	30,1	22,9	7,04	1,08	16	153	29,4	21,2	7,9	1,01	14	156	28,7
025		30,8	5,79	1,47	27	133	36,3	29,4	6,47	1,4	25	137	35,8	27,9	7,25	1,33	23	141	34,8	26,2	8,14	1,25	20	145	34	24,5	9,16	1,17	18	149	33,2
030		41	7,64	1,96	29	139	48,3	39,2	8,53	1,87	26	143	47,3	37,3	9,54	1,78	24	147	46,4	35,2	10,7	1,68	21	150	45,4	33,1	12	1,58	19	154	44,5
040		47,3	8,84	2,26	24	139	56	45,2	9,86	2,16	22	143	55	42,9	11	2,05	20	147	52	37,8	13,8	1,8	17	151	52	37,8	13,8	1,8	15	155	51
045		58	10,8	2,79	23	182	69	56	12,1	2,67	21	185	67	53	13,5	2,53	19	188	66	49,9	15,2	2,38	17	192	64	46,5	17	2,22	15	195	63
060		73	13,4	3,48	23	173	86	70	15	3,32	21	177	84	66	16,8	3,15	19	182	82	62	18,8	2,98	17	186	80	58	21,1	2,79	15	190	78
070		83	15,3	3,95	27	161	97	79	17,1	3,77	25	166	95	75	19,1	3,59	22	172	93	71	21,4	3,39	20	177	91	67	24	3,18	18	182	89
080		95	17,7	4,52	31	145	111	90	19,7	4,32	28	152	109	86	22	4,1	26	159	107	81	24,6	3,87	23	166	104	76	27,6	3,61	20	174	102
090		111	21,2	5,3	28	172	131	106	23,5	5,06	26	178	128	101	26,1	4,81	23	186	125	95	29,1	4,53	21	193	123	89	32,4	4,25	18	200	120
110		127	24,7	6,09	31	152	151	122	27,3	5,81	28	161	148	116	30,2	5,52	26	170	144	109	33,5	5,21	23	179	141	102	37,2	4,89	20	187	138
120		143	27	6,85	30	132	169	138	30,1	6,58	28	142	166	131	33,5	6,28	25	153	163	124	37,3	5,94	23	163	160	117	41,4	5,59	20	174	156
135		152	29,2	7,28	28	123	180	147	32,9	7,02	26	132	178	141	36,7	6,72	24	143	176	134	40,9	6,38	21	154	172	126	45,5	6,01	19	166	169
150		161	30,5	7,69	26	206	190	154	34,1	7,34	24	211	186	146	38,2	6,98	22	216	182	138	42,8	6,59	20	221	179	130	48	6,19	18	226	175
160		185	35,4	8,83	30	190	218	177	39,4	8,44	28	197	214	168	44	8,02	25	204	210	158	49,3	7,55	23	211	205	148	55	7,05	20	217	200
185		215	42,3	10,3	21	200	255	205	46,9	9,81	19	206	250	195	52	9,32	17	213	245	184	58	8,79	16	219	239	172	65	8,22	14	225	234
210		246	49,3	11,8	27	177	293	235	54	11,2	24	185	287	223	60	10,7	22	194	280	210	67	10,1	20	203	274	197	74	9,43	18	211	268
245		284	54	13,6	23	154	335	273	60	13	21	164	330	260	67	12,4	19	175	324	246	75	11,8	17	186	317	232	83	11,1	15	196	310
275		309	59	14,8	27	130	365	298	66	14,2	25	141	361	285	74	13,6	23	153	355	271	82	12,9	21	166	349	255	91	12,2	19	179	342
300		21,5	4,01	1,03	43	127	25,3	20,5	4,47	0,98	39	131	24,8	19,5	4,99	0,93	36	135	24,2	18,3	5,56	0,88	32	139	23,6	17,1	6,21	0,82	29	143	23
020	6	27,6	5,02	1,32	22	141	32,4	26,4	5,61	1,26	20	145	31,7	25	6,28	1,19	19	148	31	23,5	7,03	1,12	17	151	30,2	22	7,89	1,05	15	154	29,5
025		31,9	5,78	1,52	29	130	37,4	30,5	6,46	1,46	27	134	36,6	28,9	7,24	1,38	24	138	35,8	27,2	8,13	1,3	22	142	34,2	25,4	9,15	1,21	19	147	34,1
030		42,5	7,65	2,03	31	136	49,8	40,6	8,54	1,94	28	140	48,7	38,6	9,54	1,85	25	144	47,7	36,5	10,7	1,74	23	148	46,7	34,3	12	1,64	20	152	45,7
040		49	8,85	2,34	26	136	57	46,8	9,86	2,24	23	140	56	44,5	11	2,13	21	144	55	41,9	12,3	2	19	148	54	39,2	13,8	1,87	16	153	52
045		61	10,8	2,89	25	179	71	58	12,1	2,77	23	182	69	55	13,5	2,62	20	186	68	52	15,2	2,47	18	190	66	48,3	17	2,31	16	193	64
060		75	13,4	3,6	25	169	88	72	15	3,44	22	174	86	68	16,8	3,27	20	179	84	65	18,8	3,09	18	183	82	60	21,1	2,89	16	188	81
070		86	15,3	4,09	29	156	100	82	17,1	3,91	26	162	98	78	19,1	3,72	24	168	96	74	21,4	3,51	21	174	94	69	24	3,3	19	180	92
080		98	17,7	4,68	33	139	115	94	19,7	4,47	30	146	111	89	22	4,25	28	154	110	84	24,6	4,01	25	162	107	78	27,6	3,74	22	170	105
090		115	21,2	5,49	30	166	135	110	23,5	5,24	28	173	132	104	26,2	4,98	25	181	129	98	29,1	4,7	22	188	126	92	32,5	4,4	20	196	123
110		132	24,7	6,31	33	144	156	126	27,4	6,02	30	154	152	120	30,3	5,72	27	164	149	113	33,6	5,41	25	173	145	106	37,3	5,07	22	182	142
120		148	27,1	7,09	32	124	174	143	30,2	6,81	30	134	171	136	33,6	6,5	27	145	168	129	37,4	6,16	25	156	164	121	41,6	5,79	22	168	161
135		158	29,3	7,54	29	113	186	152	33	7,27	27	123	183	146	36,8	6,96	25	134	181	138	41	6,61	23	147	177	130	45,6	6,22	20	159	174
150		167	30,6	7,96	28	201	196	159	34,1	7,61	26	207	192	151	38,2	7,23	24	212	188	143	42,8	6,84	21	218	184	134	48	6,42	19	223	180
160		191	35,4	9,15	32	185	225	183	39,4	8,75	30	192	221	174	44,1	8,31	27	199	216	164	49,3	7,83	24	207	211	153	55	7,31	21	214	205
185		223	42,4	10,6	22	194	263	213	47	10,2	20	201	258	202	52	9,66	18	208	252	191	58	9,11	17	215	246	179	65	8,53	15	222	240
210		255	49,4	12,2	28	169	302	243	55	11,6	26	179	295	231	60	11	24	188	289	218	67	10,4	21	198	282	205	74	9,79	19	206	276
245		294	54	14,1	24	145	346	282	60	13,5	23	156	340	269	67	12,9	21	167	333	255	75	12,2	19	179	326	240	83	11,5	16	190	319
275		320	59	15,3	29	119	376	309	66	14,7	27	131	371	295	74	14,1	25	144	366	281	82	13,4	22	157	359	264	91	12,6	20	171	351
300		22,3	4,01	1,06	45	123	26,1	21,3	4,47	1,02	42	127	25,5	20,2	4,99	0,97	38	132	24,9	19	5,57	0,91	34	136	24,3	17,8	6,21	0,85	31	141	23,7
025		28,6	5,02	1,37	24	139	33,3	27,3	5,61	1,3	22	142	32,6	25,9	6,27	1,24	20	146	31,9	24,4	7,03	1,17	18	149	31,1	22,8	7,89	1,09	16	153	30,3
030		33	5,77	1,58	31	126	38,5	31,5	6,45	1,51	28	131	37,7	29,9	7,23	1,43	26	135	36,8	28,2	8,12	1,35	23	140	35,9	26,3	9,13	1,26	20	145	35
040		44	7,65	2,1	33	133	51	42,1	8,54	2,01	30	137	50	40	9,55	1,91	27	141	49,1	37,8	10,7	1,81	24	146	48	35,5	12	1,7	22	150	46,9
045		51	8,85	2,42	27	133	59	48,5	9,87	2,32	25	137	58	46,1	11	2,2	23	141	57	43,5	12,3	2,08	20	146	55	40,6	13,8	1,94	18	151	54
060		63	10,8	3	27	176	73	60	12,1	2,86	24	180	71	57	13,5	2,72	22	184	70	54	15,1	2,56	19	188	68	50	17	2,39	17	191	66
070		78	13,4	3,73																											

Cooling capacities 30RWA (cont.)

30RWA		Compressor discharge pressure, kPa																											
		1243 (95°C/29,56°C**)					1433 (40°C/34,76°C**)					1643 (45°C/39,95°C**)					1873 (60°C/45,16°C**)					2126 (55°C/50,38°C**)							
LWT	°C	CAP	COMP	COOL	COOL	THR	CAP	COMP	COOL	COOL	THR	CAP	COMP	COOL	COOL	THR	CAP	COMP	COOL	COOL	THR	CAP	COMP	COOL	COOL	THR			
		kW	kW	kPa	kPa	kW	kW	kW	kPa	kPa	kW	kW	kW	kPa	kPa	kW	kW	kW	kPa	kPa	kW	kW	kW	kPa	kPa	kW	kW		
020	8	23.1	4.01	1.1	48	120	26.9	22.1	4.47	1.05	45	124	26.3	41	129	25.7	19.7	5.57	0.94	37	134	25	18.4	6.21	0.88	33	139	24.3	
025		29.6	5.02	1.41	25	136	34.3	28.3	5.6	1.35	23	140	33.6	1.28	143	32.8	25.3	7.02	1.21	19	147	32	23.6	7.88	1.13	17	151	31.1	
030		34.2	5.77	1.63	33	133	39.7	32.7	6.45	1.56	30	127	36.8	1.48	142	37.9	29.2	8.11	1.4	25	137	36.9	27.3	9.12	1.3	22	142	36	
040		45.6	7.66	2.18	35	129	53	43.6	8.54	2.08	32	134	52	1.98	138	51	39.2	10.7	1.87	26	143	49.4	36.8	12.1	1.76	23	147	48.2	
045		52	8.85	2.51	29	129	61	50	9.87	2.4	27	134	60	2.28	138	58	45	12.3	2.15	22	143	57	42.1	13.8	2.01	19	148	55	
060		65	10.8	3.1	28	173	75	62	12	2.97	26	177	74	2.82	23	181	56	15.1	2.65	21	185	70	52	17	2.48	18	189	68	
070		81	13.4	3.86	28	161	94	77	15.3	3.69	26	167	91	3.11	172	89	69	18.8	3.31	21	178	87	65	21.1	3.1	18	183	85	
080		92	15.3	4.38	33	146	106	88	17.1	4.19	30	153	104	3.99	27	160	102	21.4	3.77	25	167	99	74	24	3.54	22	173	97	
090		105	17.7	5.01	38	126	122	100	19.7	4.79	35	134	119	4.56	31	143	116	24.7	4.3	28	152	113	84	27.6	4.02	25	162	110	
110		123	21.3	5.88	35	153	143	118	23.6	5.82	32	161	140	5.35	29	170	137	29.2	5.05	26	179	133	99	32.6	4.73	23	188	130	
120		142	24.9	6.77	38	127	165	135	27.5	6.46	35	139	161	6.14	31	150	157	33.7	5.81	28	161	154	114	37.5	5.45	25	172	150	
135		159	27.2	7.6	37	104	185	153	30.4	7.3	34	116	182	6.97	31	128	178	38	6.6	28	141	174	130	41.8	6.22	25	154	170	
150		169	29.5	8.07	34	91	197	163	33.1	7.78	31	103	194	7.45	29	116	191	44.8	7.08	26	130	187	140	45.9	6.87	23	144	183	
160		179	30.6	8.54	32	192	208	171	34.2	8.16	29	198	203	7.76	27	205	199	48.4	7.34	24	211	194	144	48	6.9	22	217	190	
185		205	35.4	9.8	37	172	239	196	39.5	9.38	34	180	234	8.91	31	189	228	58.4	8.41	28	198	223	164	55	7.86	24	206	217	
210		239	42.5	11.4	25	182	279	228	47.2	10.9	23	190	273	10.4	21	188	267	70	9.79	19	206	260	192	65	9.17	17	214	254	
245		274	49.6	13.1	32	152	321	261	55	12.5	30	163	314	11.9	27	175	306	81	11.2	24	186	299	220	75	10.5	22	196	291	
275		315	54	15.1	28	124	367	303	61	14.5	26	137	360	13.8	24	150	353	84	13.1	21	163	345	258	84	13.2	19	177	337	
300		342	59	16.4	33	94	399	330	66	15.8	31	108	393	15.1	28	123	387	83	14.4	26	139	379	283	92	13.5	23	155	371	
020	10	24.8	4	1.18	55	112	28.6	23.7	4.46	1.13	51	117	27.9	4.98	1.07	46	122	21.2	5.57	1.01	42	128	19.8	6.22	0.95	37	133	25.7	
025		31.7	5	1.51	29	130	36.4	30.3	5.59	1.45	26	134	35.6	28.8	1.38	24	138	34.7	7.01	1.3	22	143	25.4	7.86	1.21	19	147	32.9	
030		36.6	5.75	1.75	37	115	42	35	6.43	1.67	34	120	41.1	33.2	1.59	31	126	40.1	8.08	1.5	28	131	39	29.3	9.09	1.4	25	137	37.9
040		48.8	7.67	2.33	41	121	56	46.7	8.56	2.23	37	126	55	44.4	9.56	2.12	34	132	53	2.01	30	137	52	39.5	12	1.89	27	142	51
045		56	8.85	2.68	34	121	64	54	9.87	2.57	31	126	63	51	11	2.44	28	132	62	2.3	25	137	60	45.1	13.8	2.16	22	143	58
060		69	10.7	3.32	33	166	80	66	12	3.18	30	171	78	63	13.4	3.02	27	175	76	2.85	24	180	74	56	16.9	2.66	21	185	72
070		86	13.4	4.13	32	152	99	83	15	3.95	30	158	97	79	16.7	3.76	27	165	95	3.55	24	171	92	70	21.1	3.33	21	177	90
080		98	15.4	4.69	37	134	113	94	17.1	4.49	34	142	110	89	19.1	4.27	31	150	108	4.04	28	158	105	80	24	3.8	25	166	102
090		112	17.7	5.36	43	111	129	107	19.7	5.13	39	121	126	102	22.1	4.88	36	131	123	4.61	32	142	120	90	27.6	4.31	28	152	116
110		132	21.3	6.3	39	138	152	126	23.7	6.02	36	148	149	120	26.3	5.73	33	158	145	5.41	29	168	141	106	32.7	5.08	26	178	137
120		152	25	7.25	43	108	175	145	27.6	6.93	39	121	171	138	30.6	6.59	36	134	167	6.23	32	147	163	123	37.7	5.86	29	159	158
135		170	27.4	8.13	42	81	196	163	30.5	7.81	39	95	192	156	34	7.46	35	109	188	7.08	32	124	184	139	42	6.66	29	139	179
150		180	29.7	8.62	38	67	209	174	33.3	8.32	36	80	206	167	37.3	7.97	33	95	202	7.58	30	111	198	150	46.2	7.15	27	128	194
160		191	30.7	9.14	36	181	220	183	34.2	8.74	33	188	216	174	36.2	8.32	30	196	210	7.87	28	203	205	155	48	7.4	25	210	200
185		219	35.4	10.5	41	158	253	210	39.5	10	38	167	248	200	44.1	9.55	35	177	242	9.01	31	187	235	176	55	8.43	28	197	229
210		256	42.6	12.2	29	168	296	245	47.3	11.7	26	178	290	233	53	11.1	24	187	283	10.5	32	196	275	206	65	9.85	19	206	268
245		293	49.8	14	37	133	341	280	55	13.4	34	146	333	267	61	12.7	31	159	324	12	28	172	316	237	75	11.3	25	184	308
275		337	55	16.1	32	100	389	324	61	15.5	29	115	362	309	68	14.8	27	130	374	14	24	146	365	276	84	13.2	22	161	356
300		366	59	17.5	37	66	422	353	67	16.9	35	81	417	338	75	16.2	32	98	409	15.4	29	117	401	304	92	14.5	26	136	391

Legend:
LWT - Leaving water temperature °C
CAP kW - Cooling capacity
COMP kW - Compressor power input
COOL l/s - Evaporator water flow rate
COOL kPa - Evaporator water pressure drop
COOL PRES kPa - Available pressure at the unit evaporator outlet (unit with single hydronic pump)
THR - Total heat rejection. $THR_{(kW)} = CAP_{(kW)} + COMP_{(kW)}$

* Saturated discharge temperature at the dew point
 ** Saturated discharge temperature at the bubble point

Application data:
 Standard units
 Refrigerant: R-407C
 Evaporator entering/leaving water temperature difference: 5 K
 Evaporator fluid: Chilled water
 Fouling factor: $0.44 \times 10^{-4} \text{ (m}^2\text{K)/W}$

Note: For the water pump power input (30RWA with hydronic module) please refer to the electrical data table.

Operating limits

Operating limits 30RW/RWA

30RW/30RWA	At start-up		At shut-down
Evaporator	Minimum, °C	Maximum, °C	Maximum, °C
Entering water temperature	7.5	30	50
	During operation		
Leaving water temperature	5 (note 1)	15	50

30RW	With hydronic module and variable-speed pump	
	At start-up and during operation	During operation
Condenser	Minimum	Maximum
Entering water temperature	-15	47 (note 3)
Leaving water temperature	-	52
Drycooler		
Entering air temperature	-20	(note 4)

30RW	Without hydronic module	
	At start-up and during operation	During operation
Condenser	Minimum	Maximum
Entering water temperature	20 (note 2)	47 (note 3)
Leaving water temperature	25	52
Drycooler		
Entering air temperature	(note 5)	(note 4)

30RWA	With variable-speed fan	
	At start-up and during operation	
Air-cooled condenser	Minimum	Maximum
Entering air temperature	-10	(note 6)
30RWA	With fixed-speed fan	
	At start-up and during operation	
Air-cooled condenser	Minimum	Maximum
Entering air temperature	0	(note 6)

Notes

- 30RW/30RWA units can operate from 4°C to 0°C without modification. In all cases the units must be configured for low leaving-water temperature, and use of antifreeze is required.
- 30RW units without hydronic module operating below 20°C entering condenser water temperature require the use of a three-way valve controlled from the 0-10 V analogue output of the PRO-DIALOG control.
- For a flow rate corresponding to a condenser Δt of 5 K.
- The maximum entering air temperature is based on the drycooler selection.
- The minimum entering air temperature range is between 15 and 20°C (without the use of three-way valves). Operation at -15°C ambient temperature is possible with the use of a three-way valve to maintain the required minimum condensing temperature (see note 2).
- The maximum entering air temperature is based on the remote condenser selection.

IMPORTANT: Maximum ambient temperatures. For storage and transport of 30RW units the minimum and maximum temperatures must not go beyond -20°C and 50°C. It is recommended that these temperatures are used for transport by container.

Evaporator water flow rate

30RW 30RWA	Evaporator water flow rate, l/s			
	Minimum flow rate	Maximum flow rate*		Maximum flow rate**
		Single pump	Dual pump	
020	0.3	1.7	-	1.7
025	0.4	2.5	-	3.1
030	0.5	2.5	-	3.1
040	0.7	3.4	-	3.7
045	0.8	3.8	-	4.7
060	0.9	5.7	5.6	5.9
070	1.2	6.2	6.1	7.3
080	1.4	6.4	6.2	8.0
090	1.5	6.6	6.3	8.4
110	1.8	8.3	11.7	10.3
120	2.2	8.5	12.4	11.4
135	2.4	8.8	13.1	12.8
150	2.7	9.0	13.7	14.3
160	2.7	14.2	14.2	15.9
185	3.1	14.5	14.5	17.0
210	3.8	17.4	22.0	24.0
245	4.4	17.4	22.0	24.0
275	5.0	18.1	23.3	29.1
300	5.5	18.1	23.3	29.1

* Maximum flow rate for an available pressure of 50 kPa (unit with hydronic module)

** Maximum flow rate for a pressure drop of 100 kPa in the plate heat exchanger (unit without hydronic module)

Condenser water flow rate

30RW	Condenser water flow rate, l/s		
	Minimum flow rate* at min. condenser capacity $\Delta t = 10$ K	Nominal condenser flow rate at Eurovent conditions	Maximum flow rate** at max. condenser capacity $\Delta t = 5$ K
020	0.5	1.2	1.4
025	0.7	1.5	1.8
030	0.8	1.7	2
040	1.0	2.3	2.7
045	1.2	2.7	3.1
060	1.4	3.3	3.8
070	1.8	4.1	4.8
080	2.1	4.7	5.5
090	2.3	5.4	6.2
110	2.8	6.4	7.4
120	3.3	7.3	8.5
135	3.6	8.3	9.5
150	4.0	9.1	10.3
160	4.2	9.4	10.9
185	4.7	10.8	12.5
210	5.7	12.7	14.6
245	6.5	14.5	16.8
275	7.3	16.6	19
300	8.0	18.2	20.5

* The minimum flow rate given is for units without hydronic module that have a fixed condenser flow rate.

Units with a hydronic module have a variable flow rate and no minimum fixed flow rate. The minimum flow rate is optimised by unit control in parallel with the drycooler fan stages for all operating conditions, especially at low outdoor temperature and low load conditions.

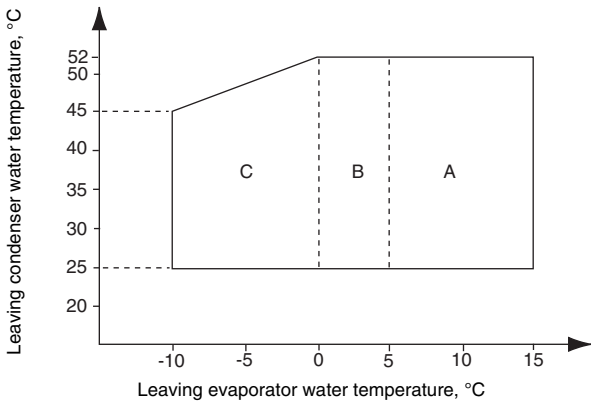
** The maximum flow rate given is for units without hydronic module that have a fixed condenser flow rate.

Units with a hydronic module have a variable flow rate.

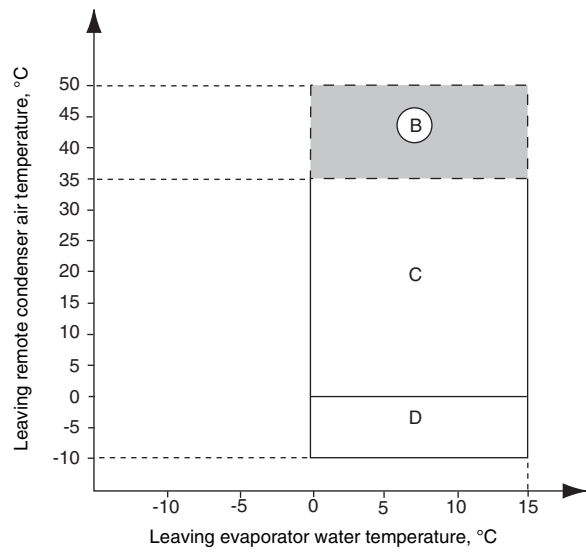
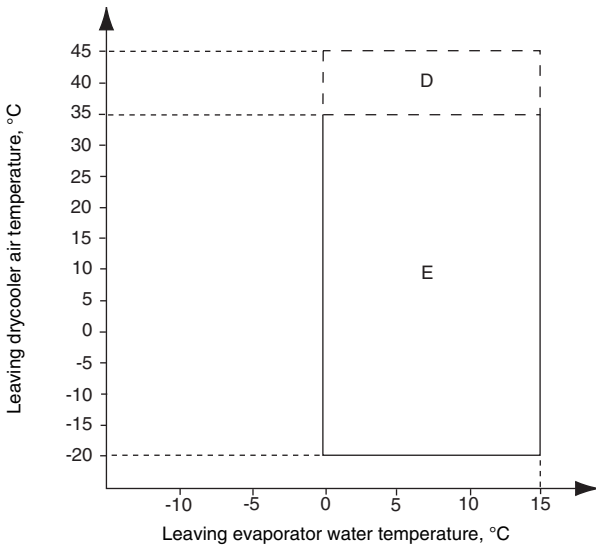
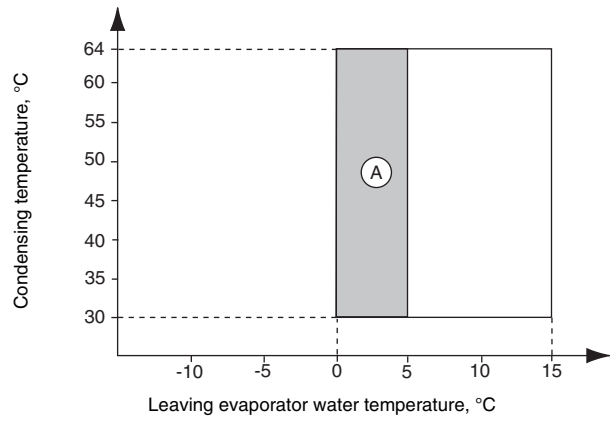
The maximum flow rate is optimised by unit control at all operating conditions, based on pump capacity, system pressure losses and outdoor temperature.

Operating range

30RW



30RWA



Notes 30RW

- 1 Evaporator and condenser $\Delta T = 5 \text{ K}$
- 2 For 30RW units without hydronic module with an entering condenser water temperature below 20°C a three-way valve is required to allow operation, while maintaining the correct condensing temperature.
- 3 For 30RW units equipped with a hydronic module the minimum entering water temperature is -15°C .
- 4 Maximum leaving condenser water temperature is 52°C (at full load)

- A Standard unit with without antifreeze solution
- B Standard unit operation with the anti-freeze solution required and control configuration for a leaving water temperature down to 0°C .
- C Standard unit operation with the anti-freeze solution required and control configuration for a leaving water temperature down to -10°C .
- D Operation at high air temperature is based on the drycooler selected.
- E Operation at low air temperature is possible down to -20°C with a drycooler.

Notes 30RWA

- 1 Evaporator $\Delta T = 5 \text{ K}$
- 2 Unit operation is limited by the maximum compressor condensing temperature of 64°C .

- A Standard unit operation with the anti-freeze solution required and special control configuration.
- B Operation at high air temperature is based on the condenser selected.
- C Operating range down to 0°C , if the air-cooled condenser is not equipped with a variable-speed head fan.
- D Extended operating range with variable-speed fan.

Water loop volume

Evaporator

1. Minimum volume

A minimum water volume is required for correct chiller operation. The minimum water loop volume can be calculated in accordance with the following formula:

Volume = CAP(kW) x N* = litres, where CAP is the cooling capacity at nominal operating conditions.

Air conditioning application	N*
30RW 020-045	3.5
30RW 060-300	2.5

Industrial process cooling

Certain industrial process applications may require high stability of the leaving water temperature levels. In this case the values above must be increased.

2. Maximum volume

Units with hydronic module incorporate an expansion tank sized for the maximum water loop volume.

The table below gives the maximum water loop volume (in litres) for pure water or ethylene glycol with various concentrations.

30RW/RWA	020-045	060-080	090-150	160-210	245-300
Pure water	673	1000	2080	2900	4162
10% ethylene glycol	487	730	1525	2135	3053
20% ethylene glycol	358	540	1120	1570	2236
35% ethylene glycol	290	430	910	1260	1800

Condenser

1. Minimum volume

The condenser water loop volume has no impact on the chiller operation

Note: For heat pump operation (unit control based on the hot-water temperature) the minimum condenser water loop volume must be calculated in accordance with the method used for the evaporator loop, replacing the cooling capacity with the heating capacity.

2. Maximum volume

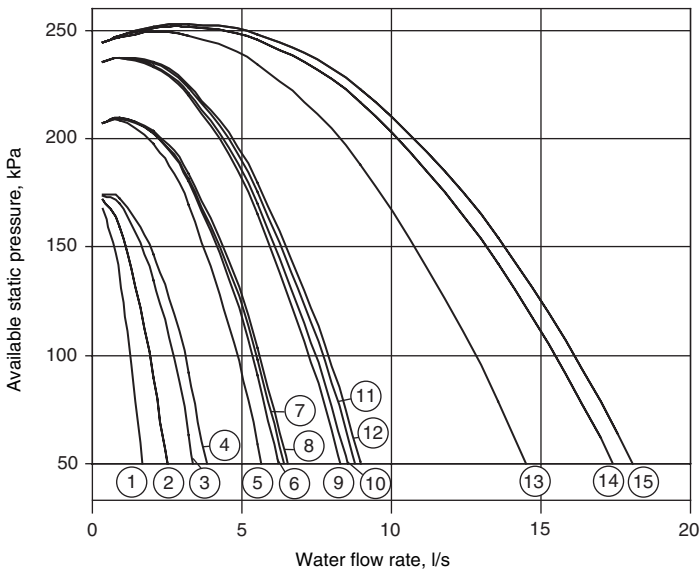
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The table below gives the maximum water loop volume (in litres) for pure water or ethylene glycol with various concentrations.

30RW/RWA	020-045	060-080	090-150	160-210	245-300
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10% ethylene glycol	487	730	1525	2135	3053
20% ethylene glycol	358	540	1120	1570	2236
35% ethylene glycol	290	430	910	1260	1800

Available static pressure, evaporator side 30RW/30RWA

Single pump

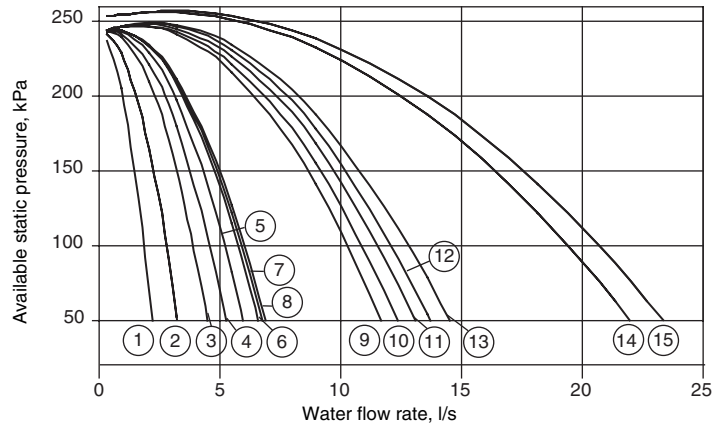


Legend

- | | |
|------------------------|-------------------------|
| 1 30RW / 30RWA 020 | 9 30RW / 30RWA 110 |
| 2 30RW / 30RWA 025-030 | 10 30RW / 30RWA 120 |
| 3 30RW / 30RWA 040 | 11 30RW / 30RWA 135 |
| 4 30RW / 30RWA 045 | 12 30RW / 30RWA 150 |
| 5 30RW / 30RWA 060 | 13 30RW / 30RWA 160-185 |
| 6 30RW / 30RWA 070 | 14 30RW / 30RWA 210-245 |
| 7 30RW / 30RWA 080 | 15 30RW / 30RWA 275-300 |
| 8 30RW / 30RWA 090 | |

Available static pressure, condenser side, 30RW

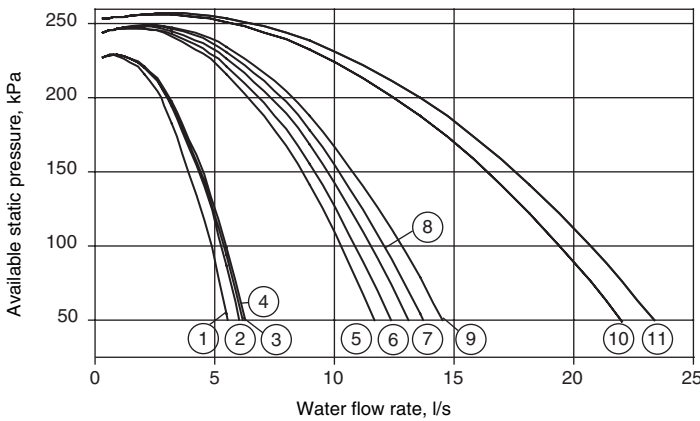
Single pump



Legend

- | | |
|----------------|-----------------|
| 1 30RW 020 | 9 30RW 110 |
| 2 30RW 025-030 | 10 30RW 120 |
| 3 30RW 040 | 11 30RW 135 |
| 4 30RW 045 | 12 30RW 150 |
| 5 30RW 060 | 13 30RW 160-185 |
| 6 30RW 070 | 14 30RW 210-245 |
| 7 30RW 080 | 15 30RW 275-300 |
| 8 30RW 090 | |

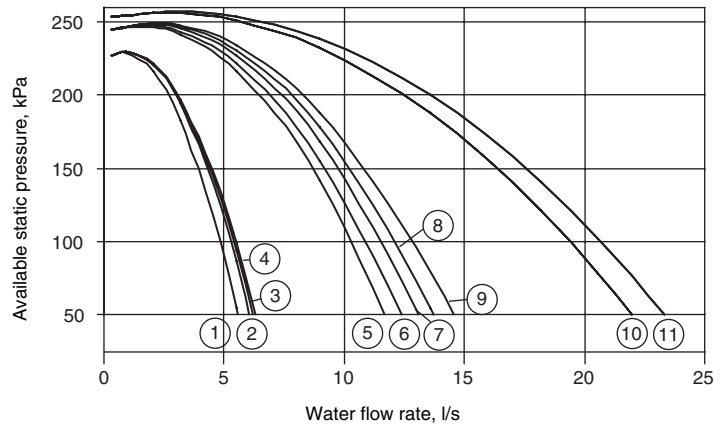
Dual pump



Legend

- | | |
|--------------------|-------------------------|
| 1 30RW / 30RWA 060 | 7 30RW / 30RWA 135 |
| 2 30RW / 30RWA 070 | 8 30RW / 30RWA 150 |
| 3 30RW / 30RWA 080 | 9 30RW / 30RWA 160-185 |
| 4 30RW / 30RWA 090 | 10 30RW / 30RWA 210-245 |
| 5 30RW / 30RWA 110 | 11 30RW / 30RWA 275-300 |
| 6 30RW / 30RWA 120 | |

Dual pump



Legend

- | | |
|------------|-----------------|
| 1 30RW 060 | 7 30RW 135 |
| 2 30RW 070 | 8 30RW 150 |
| 3 30RW 080 | 9 30RW 160-185 |
| 4 30RW 090 | 10 30RW 210-245 |
| 5 30RW 110 | 11 30RW 275-300 |
| 6 30RW 120 | |

Technical description

Guide specifications
Liquid chillers
Nominal cooling capacity range: 20 to 310 kW
Carrier model:
30RW water-cooled
30RWA condenserless

Part 1 - General

System description

- Water-cooled (30RW) or condenserless (30RWA) liquid chiller for indoor installation, equipped with scroll compressors, auto-adaptive microprocessor control and operating with HFC-407C refrigerant which has no effect on the ozone layer.

Quality assurance

- 30RW units comply with requirements of European directives:
 - machinery directive 98/37/CE, modified,
 - low voltage directive 73/23/EEC, modified,
 - electromagnetic compatibility directive 89/336/EEC, modifiedand with the applicable recommendations of European standards:
 - machine safety, electrical equipment in machines, general regulations: EN 60204-1,
 - radiated electromagnetic emissions: EN 50081-1,
 - conducted electromagnetic emissions: EN 50081-2,
 - electromagnetic immunity EN 50082-2.

30RW and 30RWA units have been designed and tested in a facility with a quality assurance system certified ISO 9001.

30RW and 30RWA units have been assembled in a facility with an environment management system certified ISO 14001.

All units undergo a run test before shipment (electrical test only for 30RWA units).

Part 2 – Product equipment

Compressors

- Hermetic scroll compressor with only three moving parts, 2-pole electric motor, cooled by suction gas. Overload protection through an internal thermostat. Polyolester synthetic oil charge, and oil level sight glass.

Evaporator

- Stainless steel plate heat exchanger with welded copper connections. From size 30RW 160 upwards the evaporator has two interlaced independent refrigerant circuits. Closed-cell thermal foam insulation.

Condenser (30RW only)

- Stainless steel plate heat exchanger with welded copper connections. From size 30RW 160 upwards the condenser has two interlaced independent refrigerant circuits.

Refrigerant circuit

- Each circuit includes: one or two compressors, liquid line valve, moisture sight glass, filter drier, thermostatic expansion device, high and low pressure transducers, manually reset high pressure switch, safety relief valve and HFC-407C refrigerant charge. The main components of the refrigerant circuit are welded.

Note: On 30RWA units the refrigerant circuit also includes a check valve on the discharge piping, a solenoid valve on the liquid piping, refrigerant piping and a nitrogen holding charge.

Control and power circuit control box

- The control box is accessible via a hinged door. It includes a main disconnect switch, fuses and circuit breakers, compressor and evaporator water pump contactors, thermal relays, low-voltage control circuit transformer (24 V control circuit) and the Pro-Dialog control system. The whole unit is supplied via a single power connection point (three-phase supply without neutral).
- Extraction fans protecting the electrical components against overheating.

Chassis/cabinet

- Chassis and cabinet made of galvanised sheet steel. Painted in oven-baked polyester powder paint in light grey colour (RAL 7035). Removable side and rear panels. Front access via hinged doors.

Evaporator hydronic module

- Integrated hydronic module, including: removable screen filter, expansion tank, single monocell centrifugal water pump (dual water pump optional from sizes 30RW 060 upwards) – three-phase motor with internal thermal protection, water flow switch, safety valve set to 4 bar, flow control valve, pressure gauge and purge valves. Internal piping made of galvanised steel. Thermal piping and water pump insulation to prevent condensation. Victaulic water connections at the top (30RW 020-150) or on the right-hand side (30RW 160-300) with welded connection sleeve.

*Note: Units without hydronic module (option): water flow switch installed as standard and water piping protected against condensation.
30RW 020-045 threaded gas water connections at the rear of the unit.*

Condenser hydronic module

- Integrated hydronic module, including: removable screen filter, expansion tank, single monocell centrifugal water pump (dual water pump optional from sizes 30RW 060 upwards) – three-phase motor with integrated frequency converter, safety valve set to 4 bar, pressure gauge and purge valves. Internal piping made of galvanised steel with thermal insulation. Victaulic water connections at the top (30RW 020-150) or on the right-hand side (30RW 160-300) with welded connection sleeve.

*Note: Units without hydronic module (option).
30RW 020-045 threaded gas water connections at the rear of the unit.*

Carrier Pro-Dialog Plus control system

Pro-Dialog Plus ensures the following functions:

Control

- Entering or leaving chilled or hot water (heat pump option) temperature control by PID loop with compressor run time and start-up equalising. The system permanently adjusts the system inertia and ensures complete protection against excessive compressor cycling.
- Head pressure control by auto-adaptive algorithm:
 - Control of the frequency converter, integrated into the condenser water pump
 - Activating a maximum of 8 fan stages with operating time equalising or fan speed control (with Carrier glycol cooler or air-cooled condenser)
 - Fan rotation speed control (with Carrier air-cooled condenser)
- Evaporator and condenser water pump control (optional dual pump with automatic change-over in case of a fault from size 30RW 060 upwards).
- Control at the second set point (example: unoccupied room).
- Leaving water temperature reset, based on the air temperature (with Carrier glycol cooler or air-cooled condenser) or the difference between entering/leaving water temperature.

Safety

- The system checks the evolution of the parameters (temperatures, pressures etc.), and responds to maintain the compressor within the operating range. If despite this one parameter exceeds its limit, an alert message is generated or the unit is shut down. The following faults cause the refrigerant circuit or the unit to be shut down:
 - Low suction pressure
 - High discharge pressure
 - Low suction temperature
 - Compressor, water pump overload
 - Reverse compressor rotation
 - Temperature sensor and pressure transducer fault
 - Board and loss of communication fault
 - Customer safety device tripping
 - Water heat exchanger anti-freeze protection
 - More than 50 alert or fault codes to facilitate fault detection

Operator interface

Includes status or fault LEDs, two numerical displays, a refrigerant system synoptic diagram and a command keyboard.

- Immediate display of parameters: entering/leaving chilled water temperature, compressor suction/discharge pressures and temperatures, set point, run times and number of compressor start-ups.
- Diagnosis and complete parameter set by selection of one of the following ten menus: information, temperatures, pressures, set points, input values, test, configuration, alarms, alarm history and run times.

Remote chiller management

Volt-free contact inputs permit:

- Start/stop control
- Selection of cooling or heat reclaim mode (override mode at high condensing temperature)
- Integration of a customer safety device
- Operation at the second set point* (example: room unoccupied)
- Maximum demand limit* (three limit levels from size 30RW 160 upwards)

* One or the other for 30RWA 020-160

- Outputs are available for:
 - Start-up of a boiler
 - Signalling of a general fault condition for each circuit.

Note: For units without hydronic module (option) a 0-10 V output is available to control a three-way valve or a variable-speed condenser water pump.

- The optional/accessory CCN Clock Board permits:
 - Control in master/slave configuration of two chillers operating in parallel.
 - Programming of operating time schedules (up to 8 periods per week)
 - Programming of operating time schedules for the second set point (up to 8 periods per week)
 - Definition of an operating time period with a reduced number of fans (for example during the night)
 - Definition of an operating time period with demand limitation.
 - Integration of the chiller into a building monitoring system (BMS): serial port RS 485.



Order No. 13430-20, 06.2003. Supersedes 13430-20, 05.2002.
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Quality Management System Approval

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