

ROOF-TOP - R407C

PACKAGED WATER TO AIR ROOF-TOP UNITS
WITH SCROLL COMPRESSORS



RTR.W 1662 3S.K



RTR...W.K – RTP...W.K Series

2 refrigerant circuits - Cooling capacities from 70 to 474 kW

The units of this range have been conceived to be extremely flexible and to offer a wide range of custom-made options.

They are direct expansion and packaged water to air units, suitable for outdoor and indoor installation and for water source systems, realized with two independent cooling circuits, designed for air conditioning of quite large areas, pre-arranged to be connected to the air distribution ducts.

They represent, therefore, both from the performance and the economical points of view, the ideal solution for the summer cooling and the winter heating of supermarkets, commercial centres, exhibition halls, restaurants, hospital, facilities of food production and conservation and laboratories, where a water source system is present.

The available versions are the following:

RTR...W.K only cooling

RTP...W.K cycle inversion heat pump

Depending on the different air treatment requests, the units can be realized in the following three configurations, better indicated in the following pages:

2S ... mixing of re-circulating and external air (2 dampers)

This configuration allows the mixing between the treated and the external air. There is an adjustable damper on the external air inlet for a correct mixing; the damper is pre-arranged for motorization. Usually this damper is ducted; on the contrary, it is possible, on demand, to supply a weatherproof protection. On the ambient air inlet there is a damper, also pre-arranged for motorization. The treated air flow is assured by the roof-top discharge fans, while the eventual exhaust from the ambient, so to avoid overpressure problems, must be provided externally to our unit.

3S ... mixing of re-circulating and fresh air and exhaust of the exceeding internal air through a suitable fan (3 dampers)

The version 3S is similar to the previous one, with an additional section and centrifugal fan, assuring the correct circulation of the inlet air. There is therefore no need to take out air from the ambient. The unit is provided with two dampers for the exhaust of the foul air and for the inlet of the fresh air, plus a third internal damper for the re-circulating air. The three dampers are co-ordinately hand controlled so to make possible the operation with all re-circulating air, with a mixing of re-circulating and external air or with all external air and total exhaust of the ambient air. The control of the dampers can be managed by an external signal

0-10V, or on demand, according to the thermo-hygrometric conditions (free-cooling operation).

TR ... all re-circulating air (no mixing between re-circulating and external air)

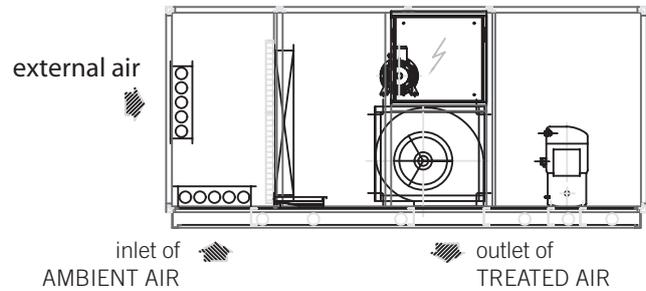
This is the basic version on which the 2S and 3S versions are based. The unit is pre-arranged for the air inlet directly from ambient.

Operating limits (standard unit):

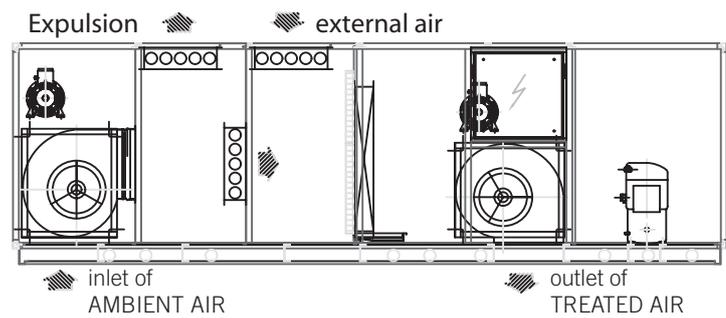
RTR.W - AIR from 20 to 42°C - WATER from 25 to 40°C

RTP.W - SUMMER: air from 20 to 42°C - WATER from 25 to 40°C; **WINTER :** AIR from 15 to -10°C - WATER from 5 to 17°C

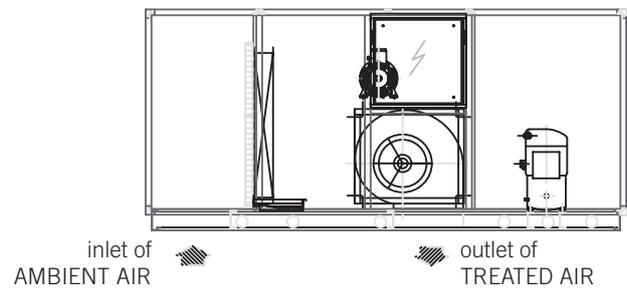
Version "2S"
 Operation with possibility of mixing both recirculating and external air through regulation dampers.



Version "3S"
 Operation with possibility of mixing and expulsion of recirculating air. Inlet fan section and regulation dampers.



Version "TR"
 Operation with all re-circulating air



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Main components:

Structure made of a base-frame in carbon steel profiles, protected against corrosion by an epoxy powder primer, kiln-polymerized, painted with polyester powder.

The structural frame is made in aluminium profiles and complete with aluminium panels; the internal sheet plates, between the different sections, are made of galvanized steel plate.

The external panels of the sections crossed by the treated air are of sandwich type with the internal surface in galvanized steel plate, insulated by a high-density foam polyurethane sheet. The parts of the base-frame and the internal steel plates licked by the treated air are thermally insulated with close-cell insulating material.

The external panels can be easily dismantled, so to allow the access to all the in-built components. The customer can access to the main components of the cooling circuits, to the air filters and to the electrical board through hinged doors and ¼ turn closures, so to make the maintenance operations easier.

High-efficiency scroll **compressor** (COP 3.37 under ARI conditions), with low sound level, internal heat protection, installed on rubber vibration dampers, supplied with crankcase heater when necessary.

Being 2 circuit units, in case of problem on one of the circuit, the 50% operation of the unit is anyway granted.

Air treatment coils made in copper pipes suitable for refrigerating liquids and high efficiency aluminium fins. There is a stainless steel drip pan for condensing coil.

Water cooled plate exchangers made in AISI 316L stainless steel, vacuum weld-brazed in oven with pure copper at 99,9%. In the case the exchangers should work as evaporators, they are thermally insulated with close-cell anti-condensing material.

Filtering section made of washable pleated filters in polyester with G4 metal frame (in conformity with EN779:2002 standard); the filtering cells are easily removable, through a hinged opening door, for the periodical cleaning and replacement operation.

Air discharge fan section with double-suction forward centrifugal fans, statically and dynamically balanced, installed on rubber-type vibration dampers. The fans are driven, through belt and pulley transmissions, by 4-pole tri-phase electrical motors on slides; the motor pulley is of variable diameter type. It is also provided with a device switching off the unit in case of accidental stop of the fan.

The units are realized with **two cooling circuits** to increase their reliability and to adjust the cooling capacity to the real requirements, keeping a high energy efficiency. Each circuit is made by a thermostatic expansion valve with external equalizer, liquid sight glass, safety valve, high and low pressure switches, high and low pressure gauges; in case of heat pump version, besides the above components, there are also a liquid receiver with shut-off valve, an additional thermostatic valve for winter operation, the 4-way valve for the cycle inversion and check valves on the liquid line.

Electrical board compliant to CE standard, complete with lock-door main switch, fuses for compressors, remote control switches, protection switches for the centrifugal fans motor, low tension auxiliary circuit and terminal board.

All units are provided with electronic **microprocessor** so to automatically manage all the functions of control, status alarm and diagnostics.

The units are supplied complete with R407C refrigerant charge and non-freezing oil.

Before delivery, all units are factory tested.

The units are made in conformity with the European standards in force (73/23/CE – Low tension Directive, 89/336/CE – Electromagnetic compatibility Directive, 97/23/CE – PED Directive and 8/37/CE – Machine Directive).

Accessories

1M-2M Centrifugal fans with higher available pressure: in case of ducts with high pressure drops, it is necessary to increase the available pressure to the inlet and outlet centrifugal fans, increasing the power of the electrical motor and consequently adjusting the transmission.

AF Clogged filters alarm: differential pressure switch detecting an excessive pressure drop on the air filters due to their dirtiness; the control system of the unit displays the problem, without anyway switching off the unit.

AFL Smoke alarm: in case of smoke, detected by an optical sensor, the unit is switched off and the eventual motorized dampers will be suitably positioned.

BC Hot water heating coil: coil with copper pipes, aluminium fins and copper manifolds, used for the winter heating. The coil is fed by external hot water through a suitable 3-way mixing valve, controlled by the microprocessor.

BC1 Water post-heating coil: coil with copper pipes, aluminium fins and copper manifolds, placed afterwards the evaporating coil; this coil is used to keep the air temperature within the requested value, when the evaporator is used to lower the value of the ambient relative humidity. The coil is fed by external hot water through a suitable 3-way mixing valve, controlled by the microprocessor.

BG Hot gas post-heating coil: coil with copper pipes, aluminium fins and copper manifolds; this coil is used to re-adjust the air temperature to the requested value, when the evaporator is used to lower the value of the ambient relative humidity. The coil is supplied by the hot gas coming out from the compressor, through a solenoid valve controlled by the microprocessor, therefore there is no need for external heating sources.

F Free cooling operation: on the base of the comparison between the internal and the external temperature, the microprocessor controls the motorized dampers, so to use, in the best way, the energy in the external air to satisfy the heating loads. In this way, the working time of the compressors and of the external fans is remarkably reduced and, as a consequence, also the electrical consumption. On demand, it is possible an enthalpy control of free-cooling, so to use the external air for controlling the internal relative humidity, when possible. In case the unit is also equipped with heat recovery, the standard version will be provided with 3 dampers. On demand, it is possible to supply a 5 damper version (to be selected on purpose).

F5 F5 Pleated filters: glass fibre washable pleated filters with F5 metal frame (in conformity with EN779:2002). The filters are placed at the inlet of the air treatment coil, instead of the standard G4 filters. On request, so not to have high pressure drops, it is possible to have G4 or F5 filtering cells with a thickness of 98 mm, instead of 48 mm as per standard units.

FT High-efficiency bag filters: Rigid bag filters with filtering efficiency F7 (in conformity with EN779:2002), complete with G4 pre-filters (in conformity with EN779:2002). The filters are placed at the inlet of the air treatment coil, so to assure a high filtering efficiency, without too high pressure drops. The length of the unit will increase of 500 mm.

H Humidifier: steam production equipment of immersed electrode type, installed inside the unit and controlled by the microprocessor on a ON/OFF basis, so to keep, when necessary, the value of the treated air relative humidity within the pre-set limits. The steam produced by this equipment is distributed in the air through a suitable diffuser.

IH RS 485 serial interface: electronic card allowing the connection of the unit to a supervision system, so to completely control it from a remote working station. On demand, it is possible to connect the unit to supervision systems with different communication protocols.

MP	Oversized microprocessor: compared to the standard microprocessor, it allows a multi-language display reading, a more detailed description of parameters, the possibility to manage up to 8 units, to manage non standard communication protocols, a better access to the program, to manage free-cooling units (already included in the units with option F).	RC	Cross-flow heat recovery: cross-flow static heat exchanger with aluminium plates, installed in a suitable section of the unit, so to partially allow the transfer to the fresh air of the heating load present in the exhaust air, increasing the energy efficiency of the unit. The exchanger has no moving components and therefore there is no energy consumption: the two air flows involved are hermetically divided and therefore there is no possibility of mixing. The condensing water is collected in drain pans in stainless steel and externally discharged. A by-pass damper is positioned side by side to the heat recovery. On demand, the heat recovery section can be realized in the 5 dampers version (please get in touch with our Sales Dept.)
MS	Motorized dampers: motor controlled by an external 0-10V signal, if not differently specified, when the standard version foresees manual dampers (already included in the units with option F).	RE	Electrical post-heating coil: electrical heaters of candle type with carbon steel fins, placed after the evaporating coil; the electrical heaters are used to re-adjust the air temperature to the requested value, when the evaporator is used to lower the relative humidity in the ambient. The coil is supplied by the electrical board of the units and it is controlled by the microprocessor on a several step basis.
MTB	Heating section with gas fired burner: additional in-built section, where one or more heating module of forced draft type are installed, each made of a gas fired burner and an air/smokes steel exchanger. This module will heat the air to be introduced in the ambient, allowing the air to lick the external surface of the firebox and the pipes of the exchanger. For the heat pump version this module can be used as an additional heating section or, for an only cooling unit, as an alternative to the heat pump itself. This section is realized in conformity with the regulations in force.	VP	Pressostatic valve: device for the regulation of the condensing pressure, through the control of the plate condenser water flow. In case of cooling operation, the automatic valve reduces the water flow when decreasing the condensing pressure, so to ensure suitable working conditions also at a water temperature lower than the nominal one. For the heat pump units, this option must be installed with VSW in by-pass
MTC	Heating section with boiler: additional in-built section, where one or more boilers of watertight condensing type are installed, producing hot water necessary to supply, through a close circuit, a heating coil. The water circuit is complete with circulator, non return and check valves. This section is realized in conformity with the regulations in force.	VS	Solenoid valve: electro-valve for the liquid refrigerant at the compressor's stop.
PA	Rubber-type vibration dampers: bell-shaped vibration dampers supports for insulating the unit (supplied in kit), made of base and bell in galvanized steel and natural rubber mixture.	VSW	Water solenoid valve: electro-valve stopping the water circulation on the plate exchanger, when the compressor switches off. In the case of heat pumps units provided with pressostatic valve (VP), it is necessary to order this option (so to by-pass the pressostatic valve in the winter operation).
PF	Water differential switch: it stops the compressor in the case the difference between the inlet and outlet water pressure from the plate exchanger is below a fixed value, indicating that the water flow is lower than the foreseen value		
PM	Spring-type vibration dampers: spring-type vibration dampers support, for insulating the unit (supplied in kit), mainly indicated for installation in difficult and aggressive environments. Made of two steel plates containing a suitable quantity of harmonic steel springs.		
PQ	Remote microprocessor: remote terminal, allowing to display the temperature and humidity values detected by probes, the alarm digital inputs, the outputs and the remote ON/OFF of the unit, to change and program of the parameters, the sound signal and the display of the present alarms.		
RA	Anti-freeze heating coil: electrical heating coil with thermostat to protect the plate exchanger from freezing, in case of compressors' stop in the period of low ambient temperatures		

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RTR.W - RTP...W K Technical data with refrigerant R407C

ONLY COOLING - MODEL	RTR.W	572 K	692 K	842 K	812 K	992 K	1102 K	1302 K	1292 K	1472 K	1662 K	1992 K	2322 K	2492 K	2802 K	3102 K	3662 K	
MODEL 2S - 3S																		
Total cooling capacity (1)	kW	70	84	103	99,1	115	138	159	159	174	211	251	290	321	365	399	474	
Sensible cooling capacity (1)	kW	40,6	50,2	62,2	57,5	69,8	81,2	92,4	93,7	102,6	129	150	168	186	212	228	271	
Total absorbed power (1)	kW	13,7	15,4	19,6	19,6	23,3	27,9	31,3	32,6	36,1	39,7	48,3	55,3	62,6	65,7	73,9	89	
Compr.absorbed current (1)	A	29	30	35	35	42	54	54	53	66	70	83	95	107	116	132	158	
MODEL 2S - 3S																		
Total cooling capacity (2)	kW	75,7	90,9	111	107	125	149	172	172	188	228	271	314	347	395	431	513	
Sensible cooling capacity (2)	kW	38	46,9	58,2	53,7	65,3	75,9	86,4	87,6	95,9	121	140	157	174	198	213	253	
Total absorbed power (2)	kW	14	15,9	20,2	20,2	24	28,7	32,2	33,5	37,2	40,8	49,7	56,9	64,4	67,6	76	92	
Compr.absorbed current (2)	A	30	31	36	36	43	55	55	55	68	72	86	98	110	120	136	163	
MODEL TR																		
Total cooling capacity (3)	kW	63,1	75,7	92,7	89,3	104	124	144	144	157	190	226	262	289	329	359	427	
Sensible cooling capacity (3)	kW	44,1	54,5	67,6	62,5	75,9	88,3	100	102	112	140	163	183	202	230	248	295	
Total absorbed power (3)	kW	13	14,7	18,7	18,7	22,2	26,6	29,8	31	34,4	37,8	46	52,7	59,6	62,6	70,4	85	
Compr.absorbed current (3)	A	28	29	33	33	41	52	52	51	63	67	80	92	103	112	127	152	
Compressors																		
Quantity	n	2 / sll						2 / sll-t		2 / sll-t								
Circuits	nr.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Max current	A	40	44	54	54	64	80	82	88	108	108	128	164	164	208	208	250	
Inrush current	A	143	149	194	194	230	183	266	193	248	244	294	348	348	428	428	498	
Capacity steps	%	2	2	2	2	2	4	2	4	4	4	4	4	4	4	4	4	
Refrigerant charge for each circuit (1-2-3)	kg	3	3	4	4	5	5	6	6	6	9	10	12	13	14	15	17	
Watercooled condenser 3)																		
Water flow	l/s	3,03	3,6	4,43	4,3	5,02	6,01	6,9	6,95	7,62	9,06	10,83	12,51	13,89	15,58	17,11	20,4	
Water flow	mc/h	10,9	13,0	15,9	15,5	18,1	21,6	24,8	25,0	27,4	32,6	39,0	45,0	50,0	56,1	61,6	73,4	
Pressure drop	kPa	50	70	59	56	62	55	60	60	60	79	75	81	74	75	68	62	
HEATING PUMP - MODEL																		
Heating capacity (4)	RTP.W	572	692	842	812	992	1102	1302	1292	1472	1662	1992	2322	2492	2802	3102	3662	
Total absorbed power (4)	kW	65,4	77,3	95,6	91,9	108	129	147,3	152	167	197	223	257	287	318	350	419	
Compr. absorbed current (4)	A	31	32	38	40	49	63	63	62	76	81	112	128	143	156	177	212	
Refrigerant charge for each circuit (4)	kg	7	7	8	7	8	9	10	13	13	16	17	27	28	21	22	24	
CENTRIFUGAL FANS ON TREATED AIR DISCHARGE																		
Quantity	n	1																
Standard air flow	mc/h	11.000	13.200	15.400	17.600	19.800	20.900	22.000	27.500	30.800	33.000	38.500	41.000	44.000	49.500	55.000	66.000	
Standard available pressure	Pa	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Rotation speed	rpm	564	637	715	584	645	671	715	556	598	659	434	465	490	528	479	548	
Input power	kW	2,2	3	4	4	5,5	5,5	7,5	7,5	11	11	11	11	15	15	18,5	30	
Absorbed current	A	5	7	9	9	12	12	15	15	22	22	22	22	29	29	40	57	
Motor Weight	kg	19,2	22,4	30,4	30,4	41,9	41,9	51	51	88,5	88,5	88,5	88,5	107	107	121	146	
Sound pressure level STD (5)	dB(A)	70	71	74	71	71	72	74	73	74	76	74	76	77	79	80	82	
Available pressure - opt. 1M	Pa	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
Rotation speed	rpm	667	726	792	676	727	749	788	618	659	689	490	549	538	576	522	581	
Input power	kW	2,2	3	5,5	4	5,5	7,5	7,5	7,5	11	11	11	15	15	18,5	18,5	30	
Absorbed current	A	5	7	12	9	12	15	15	15	22	22	22	29	29	40	40	57	
Motor Weight	kg	19,2	22,4	41,9	30,4	41,9	51	51	51	88,5	88,5	88,5	107	107	121	121	146	
Sound pressure level 1M (5)	dB(A)	70	71	74	71	72	73	74	73	75	76	74	76	77	79	80	83	
Available pressure - opt. 2M	Pa	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	
Rotation speed	rpm	773	813	876	758	801	821	856	686	697	770	546	574	590	622	562	619	
Input power	kW	3	4	5,5	5,5	7,5	7,5	11	11	11	15	15	15	15	18,5	22	37	
Absorbed current	A	7	9	12	12	15	15	22	22	22	29	29	29	29	40	42	69	
Motor Weight	kg	22,4	30,4	41,9	41,9	51	51	88,5	88,5	88,5	107	107	107	107	121	140	207	
Sound pressure level 2M (5)	dB(A)	70	72	74	72	72	73	75	73	75	76	75	76	78	80	80	83	
ELECTRICAL DATA																		
Standard available pressure																		
Max absorbed current	A	45	51	63	63	76	92	97	103	120	130	150	168	193	215	248	307	
Inrush current	A	148	156	203	203	242	195	281	208	238	270	316	352	377	435	468	555	
Available pressure 1M																		
Max absorbed current	A	45	51	66	63	76	95	97	103	113	130	150	175	193	226	248	307	
Inrush current	A	148	156	206	203	242	198	281	208	231	270	316	359	377	446	468	555	
Available pressure 2M																		
Max absorbed current	A	47	53	66	66	79	95	104	110	120	137	157	1755	193	226	250	319	
Inrush current	A	150	158	206	206	245	198	288	215	238	277	323	359	377	446	470	567	
Dimensions																		
Length vers. 2S and TR	mm	3.300	3.300	3.300	3.800	3.800	3.800	3.800	4.400	4.400	4.400	5.000	5.000	5.000	5.000	5.000	5.000	
Length vers. 3S	mm	4.900	4.900	4.900	5.700	5.700	5.700	5.700	6.800	6.800	6.800	8.300	8.300	8.300	8.300	8.300	8.300	
Width	mm	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.300	2.300	2.300	2.300	2.300	2.300	2.300	2.300	2.300	
Height	mm	1.675	1.675	1.675	1.750	1.750	1.750	1.750	2.100	2.100	2.100	2.500	2.500	2.500	2.500	2.500	2.500	
Weight RTR	kg	892	918	955	1.057	1.153	1.302	1.214	1.629	1.743	1.822	2.199	2.294	2.336	2.457	2.543	2.682	
Weight RTP	kg	940	968	1.006	1.109	1.210	1.367	1.275	1.721	1.841	1.924	2.308	2.448	2.491	2.578	2.668	2.814	
Power supply		400 V / 3ph / 50 Hz +T +N																

(1) Ambient air temperature 27°C / 50% R.H. - Condensing water 29/35°C; 30% fresh air

(2) Ambient air temperature 27°C / 50% R.H. - Condensing water 29/35°C; 50% fresh air

(3) Inlet air to the internal coil 27°C / 50% R.H. - Condensing water 29/35°C - External air 35°C

(4) Internal air temperature: 20°C - External air temperature: +5°C / 70% R.H.

(5) Average value estimated at 1 m from the unit (for versions 2S and TR) in free field in conformity to UNI EN 3746, with ducted air outlet fan