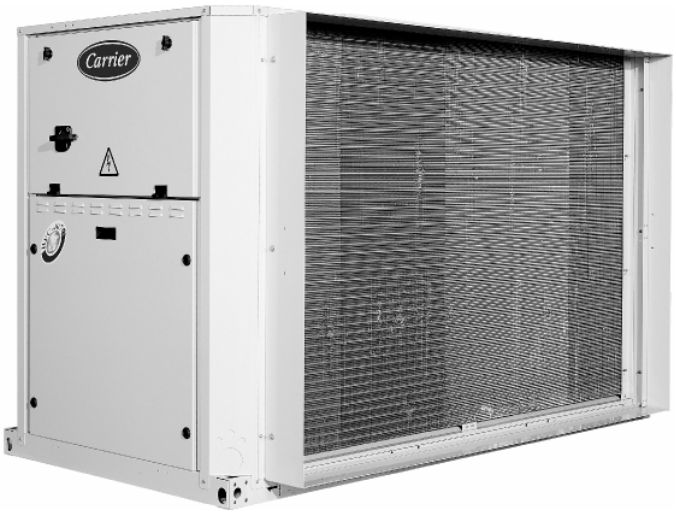
Ductable Liquid Chillers with Integrated Hydronic Module

AQUASNAP

PRO-DIALOG PLUS



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Quality Management System Approval

30RY "B"

Nominal cooling capacity 19-79 kW

The 30RY Aquasnap air-cooled liquid chillers are designed for indoor installation. A fan with available pressure permits connection of the suction and discharge lines to a duct system that can be equipped with sound attenuation. The 30RY units incorporate the latest technological innovations: scroll compressors, auto-adaptive microprocessor control and zero ODP refrigerant HFC-407C. Aquasnap includes a complete hydronic module as standard, limiting the installation to straightforward operations like connection of the power supply and the water supply and return piping.

Features

- Quiet axial fan with available pressure. Unlike a centrifugal fan this type of fan does not require any adjustment at installation, as the flow rate only slightly depends on the pressure losses in the duct system. As the fan is directly mounted on the motor, there is no belt to adjust and replace. At part load or low outdoor temperatures the fan automatically switches to the low speed.
- Integrated hydronic module for fast installation, incorporating all components necessary for the operation of the system: removable screen filter, water pump with high available pressure, expansion tank, water flow switch, safety valve, pressure gauges, and purge valves. A throttle valve allows adjustment of the water flow in accordance with the characteristics of the installation. As an option Aquasnap is available without hydronic module. In this case the chiller is equipped with a flow switch.
- Low-volume water loop: the auto-adaptive algorithm controls the water temperature and eliminates any risk of excessive compressor cycling. In the majority of comfort air conditioning applications a buffer tank is unnecessary.
- Quiet, vibration-free scroll compressors, known for their durability and reliability. The use of two compressors per circuit (from size 30RY 050) reduces the start-up current and the power consumption at part load.
- Refrigerant HFC-407C: a replacement for R-22 in air conditioning applications with small and medium capacities. Extensively tested by Carrier for several years, it offers the same reliability guarantees as, and slightly higher performances than R-22.
- Stainless steel, welded plate heat exchanger: maximises the thermodynamic characteristics of HFC-407C and offers very high performances as well as low water-side pressure drops.
- The refrigerant circuit is completely leak-proof for life. All pipes and refrigeration components are welded. Pressure sensors, mounted directly on the pipes, take the place of the pressure switches and their capillary tubes, a source of leaks in the past.
- Year-round operation: Aquasnap operates down to –10°C outside temperature without additional accessories. A control algorithm intelligently regulates the fan speed.

- Electrical connections are simplified, and the standard Aquasnap equipment includes a main disconnect switch, and a single entry point of the three-phase without neutral power supply to the whole unit.
- Perfect accessibility: the hinged door of the control box and removable panels permit easy access to all components.

PRO-DIALOG Plus control

PRO-DIALOG Plus is an advanced numeric control system that combines complex intelligence with great operating simplicity. PRO-DIALOG Plus constantly monitors all operating parameters and safety devices, precisely controlling compressors and fan in order to optimise energy consumption. The control also regulates the operation of the water pump.

A powerful control system

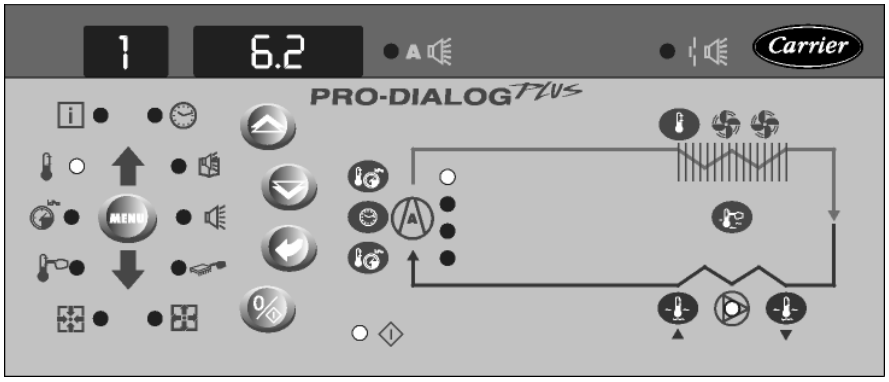
- The auto-adaptive Pro-Dialog Plus control guarantees total protection of the compressors. The system permanently checks the operating parameters and responds to avoid excessive cycling and maintain the ideal operating range for the compressor (temperatures and pressures out of range etc.). By taking corrective action before the fault occurs, the auto-adaptive control frequently prevents a shutdown of the chiller due to a fault condition.
- To optimise power consumption, PRO-DIALOG Plus automatically resets the chilled water temperature set point in accordance with the outdoor air temperature or the return water temperature or uses a second set point (example occupied/unoccupied).
- The auto-adaptive PRO-DIALOG Plus control continuously optimises the compressor operating times, based on the water loop inertia and thus avoids excessive cycling. In most comfort air conditioning applications this makes a buffer tank unnecessary.

Clear and easy-to-use control system

- The operator interface is clear and user-friendly: LEDs and two numerical displays ensure immediate verification of all unit operating data.
- Buttons conveniently positioned on a synoptic chiller diagram offer immediate display of the operating parameters: temperatures, pressures, set point, compressor run times etc.
- 10 menus offer direct access to all machine controls, including a history of possible faults, for rapid and complete chiller fault diagnosis.

Extended communications capabilities

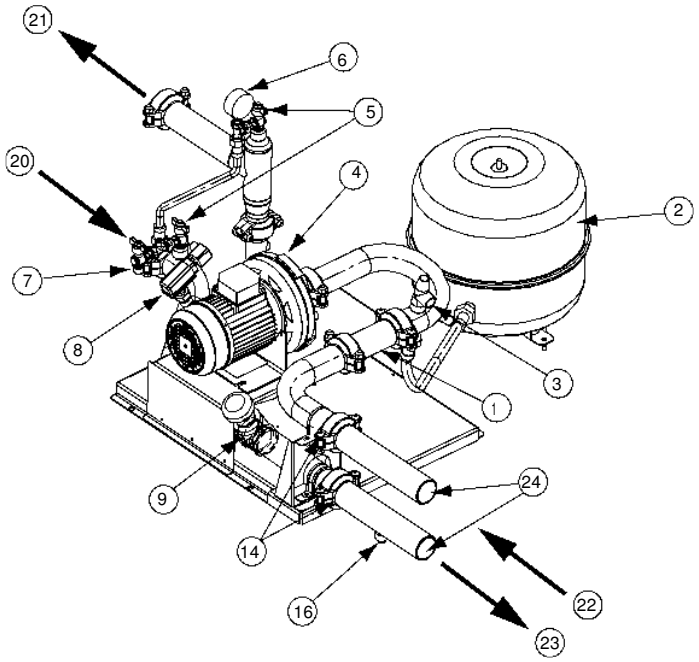
- PRO-DIALOG Plus allows remote control and monitoring of the chiller by wired connection: start/stop, cooling/ heating mode selection, power demand limit or selection of the second set point, customer interlock. The system permits remote signalling of any possible anomaly.
- The internal clock permits programming of:
  – chiller start/stop
  – operation at the second set-point (e.g. unoccupied room)
  – operation of the chiller with the fan at low speed to reduce the noise level.
- Master/slave control of two chillers operating in parallel with operating time equalisation.
- RS 485 serial port for remote chiller control via communications bus.



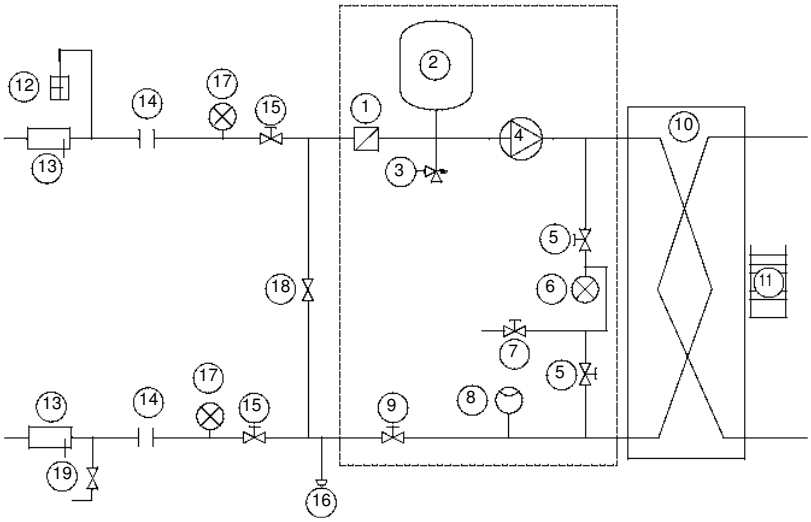
PRO-DIALOG Plus operator interface

Options and accessories

	Option	Accessory
Condenser anti-corrosion pre-treatment for light marine applications	X	
Condenser post-assembly corrosion treatment for heavy-duty rural, urban and industrial applications	X	
Electronic compressor starter for reduction of start-up current (30RY 040-080)	X	
Low-temperature unit for glycol leaving temperatures from 0°C to –10°C	X	
Unit without hydronic module	X	
Hydronic module with dual pump (30RY 040-080)	X	
Unit support with condensate recovery pan		X
Suction air filter, mounted on rails		X
Outside installation (30RY 040-080)	X	
Communications board with open protocol	X	X



Hydronic module (040 - 080)



Typical hydronic circuit diagram

Legend

Components of unit and hydronic module

1 Victaulic screen filter
2 Expansion tank
3 Safety valve
4 Available pressure pump
5 Purge valve and pressure gauge (see installation manual)
6 Pressure gauges to measure the heat exchanger pressure drop (to be isolated with valve No. 5 if not used)
7 System air vent
8 Flow switch
9 Flow control valve
10 Plate heat exchanger
11 Evaporation defrost heater

Installation components

12 Air vent
13 Thermometer sleeve
14 Flexible connection
15 Check valve
16 System water drain plug (on connection pipe supplied in the unit)
17 Pressure gauge
18 Freeze-up protection bypass valve (when valves No. 15 are closed during winter)
19 Charge valve
20 Plate heat exchanger water outlet
21 Plate heat exchanger water inlet
22 Water inlet
23 Water outlet
24 Customer connection sleeves for welded or screw connection (supplied)

..... Hydronic module (unit with hydronic module)

Note: Units without hydronic module are equipped with a flow switch and an internal piping heater.

Physical data

30RY		017	021	026	033	040	050	060	070	080
Nominal cooling capacity*	kW	18.6	23.1	25.8	31.7	39.4	50.0	58.0	67.0	79.0
Operating weight	kg									
with hydronic module, single pump		386	416	436	451	510	572	587	638	675
with hydronic module, dual pump		-	-	-	-	590	652	667	718	752
without hydronic module		361	391	411	426	486	548	563	614	649
Refrigerant charge R-407C	kg	6.6	6.3	7.45	7.85	9.75	11.1	11.8	13.3	17.0
Compressors		Hermetic scroll compressors, 48.3 r/s								
Quantity		1	1	1	1	1	2	2	2	2
No. of capacity steps		1	1	1	1	1	2	2	2	2
Minimum capacity	%	100	100	100	100	100	46	42	50	50
Control type		PRO-DIALOG Plus								
Condenser		Grooved copper tubes, aluminium fins								
Fan		Axial with available pressure								
Quantity		1	1	1	1	1	1	1	1	1
Available static pressure	Pa	100	100	100	100	150	150	150	150	150
Total air flow (high speed)	l/s	1940	1940	1940	2500	3890	3890	4720	5830	5830
Speed (high/low speed)	r/s	24/12	24/12	24/12	24/12	24/12	24/12	24/12	24/12	24/12
Evaporator		Direct-expansion welded plate heat exchanger								
Water volume	l	1.6	2.0	2.3	3.0	3.6	4.6	5.9	6.5	7.6
Max. water-side operating pressure										
Option without hydronic module	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000
Unit with hydronic module	kPa	250	250	250	250	300	300	300	300	300
Hydronic module										
Pump (centrifugal)		Single multicell pump, 48.3 r/s				Single composite monocell pump, 48.3 r/s				
Quantity		1	1	1	1	1	1	1	1	1
Expansion tank volume	l	8	8	8	8	12	12	12	12	12
Expansion tank pressure	kPa	50	50	50	50	100	100	100	100	100
Water connections (with and without hydronic module)		Threaded male gas connections				Victaulic (sleeves for welding or screw connections supplied)				
Diameter	in	1-1/4	1-1/4	1-1/4	1-1/4	2	2	2	2	2
Outside tube diameter	in	1-1/4	1-1/4	1-1/4	1-1/4	2	2	2	2	2
	mm	42.4	42.4	42.4	42.4	60.3	60.3	60.3	60.3	60.3

Legend

* Nominal conditions: evaporator entering/leaving temperature 12°C/7°C, outdoor air temperature 35°C.

Sound levels

30RY	017	021	026	033	040	050	060	070	080
Sound power, dB(A) 10^{-12} W	82	83	83	85	91	91	89	91	91
Sound power, dB(A) 10^{-12} W, low-speed fans	69	77	77	79	81	80	82	83	84

According to Eurovent 8/1 (derived from ISO standard 3744 or ISO 9614-1).

Electrical data

30RY (without hydronic module)		017	021	026	033	040	050	060	070	080
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*	kW	9.8	12.1	13.8	18.0	21.0	25.3	32.3	38.2	42.9
Nominal unit current draw**	A	13.1	16.2	18.6	23.3	28.8	35.6	45.7	52.1	59.4
Maximum unit current draw at 360 V***	A	17.0	21.3	24.5	31.2	37.8	46.5	59.5	67.8	77.5
Maximum unit current draw at 400 V****	A	15.5	19.3	22.2	28.3	34.5	42.3	54.3	62.1	70.7
Maximum start-up current										
Standard unit †	A	87.8	131.8	131.8	147.4	159.3	151.8	173.5	181.2	195.5
With electronic starter option ‡	A	-	-	-	-	97.3	99.8	115.5	123.2	133.5
Holding current for three-phase short circuits	kA	6	6	6	6	6	6	6	6	6

- Power input of the compressor(s) + fan at maximum unit operating conditions: entering/leaving water temperature = 15°C/10°C, maximum condensing temperature of 67.8°C and 400 V nominal voltage (values given on the unit name plate).

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

*** Maximum unit operating current at maximum unit power input and 360 V nominal voltage.

**** Maximum unit operating current at maximum unit power input and 400 V nominal voltage (values given on the unit name plate).

† 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) + fan current + 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) + fan current + reduced start-up current of the largest compressor).

Hydronic module		017	021	026	033	040	050	060	070	080
Single pump										
Shaft power	kW	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.1
Power input*	kW	0.75	0.75	0.75	0.75	1.1	1.1	1.1	1.1	1.4
Maximum current draw at 400 V**	A	2	2	2	2	2.1	2.1	2.1	2.1	3.1
Dual pump										
Shaft power	kW	-	-	-	-	2.2	2.2	2.2	2.2	2.2
Power input*	kW	-	-	-	-	2.7	2.7	2.7	2.7	2.7
Maximum current draw at 400 V**	A	-	-	-	-	4.7	4.7	4.7	4.7	4.7

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

* To obtain the maximum power input for a unit with hydronic module add the maximum unit power input from the top table to the pump power input (*) from the table above.

** To obtain the maximum unit operating current draw for a unit with hydronic module add the maximum unit current draw from the top table to the pump current draw from the table above.

Electrical data notes:

- 30RY units have a single power connection point.
- The control box includes the following standard features:
  - starter and motor protection devices for each compressor, the fan, the optional pump
  - 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 30RY units are designed and built to ensure conformance with these codes. The recommendations of European standard EN 60204-1 (corresponds to IEC 60204-1) (machine safety - electrical machine components - part 1: general regulations) are specifically taken into account, when designing the electrical equipment.

NOTES:

- Generally the recommendations of IEC 60364 are accepted as compliance with the requirements of the installation directives. Conformance with EN 60204 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.

1. The operating environment for the 30RY units is specified below:

a. 30RY 017-080 – indoor installation
- Environment* - Environment as classified in EN 60364 § 3:
- ambient temperature range: +5°C to +40°C, class AA4
- humidity range (non condensible)*:
- 50% rh at 40°C
- 90% rh 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* (personnel trained according to IEC 60364)

b. 30RY 040-080 – outdoor installation
Environment* - Environment as classified in EN 60721 (corresponds to IEC 60721):
- outdoor installation*
- ambient temperature range: -10°C to +46°C, class 4K3**
- altitude: ≤ 2000 m
- presence of hard solids, class 4S2** (no significant dust present)
- presence of corrosive and polluting substances, class 4C2 (negligible)
- vibration and shock, class 4M2

Competence of personnel, class BA4** (personnel trained according to IEC 60364)

2. Power supply frequency variation: ± 2 Hz.
3. The neutral (N) conductor must not be connected directly to the unit (if necessary use transformers)
4. Over-current protection of the power supply conductors is not provided with the unit.
5. The factory-installed disconnect switches/circuit breakers are of a type that is suitable to interrupt the power in accordance with EN60947-3 (corresponds to IEC 60947-3).
6. 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.

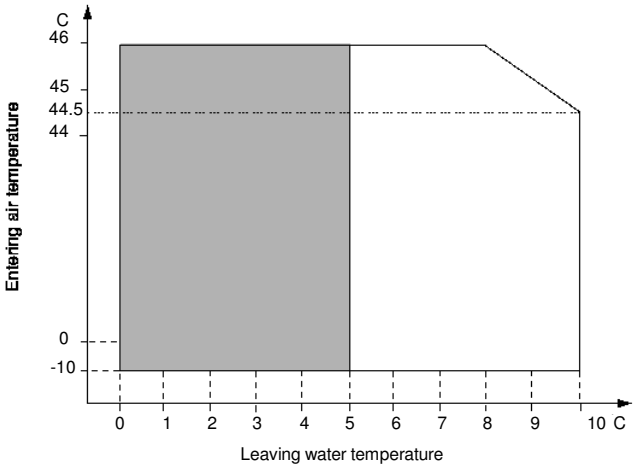
NOTE:
If particular aspects of an actual installation do not conform to the conditions described above, or if there are other conditions which should be considered, always contact your local Carrier representative.

* The required protection level for this class is IP21 B (according to reference document IEC 60529). All 30RY 017-080 units are protected to IP23C and fulfil this protection condition.

** The required protection level for this class is IP43BW (according to reference document IEC 60529). All 30RY 040-080 units are protected to IP45CW and fulfil this protection condition.

Operating limits

Operating range in cooling mode



Notes:

1. Evaporator Δt = 5 K
2. 30RY 017-033: Install the unit in a location that is frost-free. 30RY 040-080: The evaporator and the hydronic module are protected against frost down to -20°C.
3. Maximum air entering temperature at nominal static pressure of the fan.

Operating range with required anti-freeze solution and special Pro-Dialog control configuration

Evaporator water flow rate

30RY	Min. water flow (l/s)	Max. water flow*, l/s Single pump	Dual	Max. water flow*** (l/s)
017	0.58	1.7	0	1.7
021	0.7	1.8	0	1.9
026	0.81	1.9	0	2.2
033	1.1	2	0	3
040	1.2	3.5	4.4	3.7
050	1.19	4	5.2	4.6
060	1.46	4.4	6	5.8
070	1.66	4.6	6.4	6.4
080	1.92	5.5	6.8	7.3

* 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)

Maximum evaporator entering water temperature

30RY	At start-up, °C	At shutdown, °C
017 - 080	30	50

Fan

30RY	Min. available static pressure*		Nom. available static pressure		Max. available static pressure	
	Pressure Pa	Flow l/s	Pressure Pa	Flow l/s	Pressure Pa	Flow l/s
017-026	0	2500	100	1940	150	1530
033	0	2920	100	2500	200	1940
040-050	0	4580	150	3890	230	3330
060	0	5560	150	4720	230	4030
070-080	0	6810	150	5830	230	5280

* Operation without duct system

Maximum entering air temperature, °C

30RY	Air flow		
	Minimum	Nominal	Maximum
017-026	44	46	47.5
033	44	46	47
040-050	44.5	46	47
060	44.5	46	47
070-080	44.5	46	47

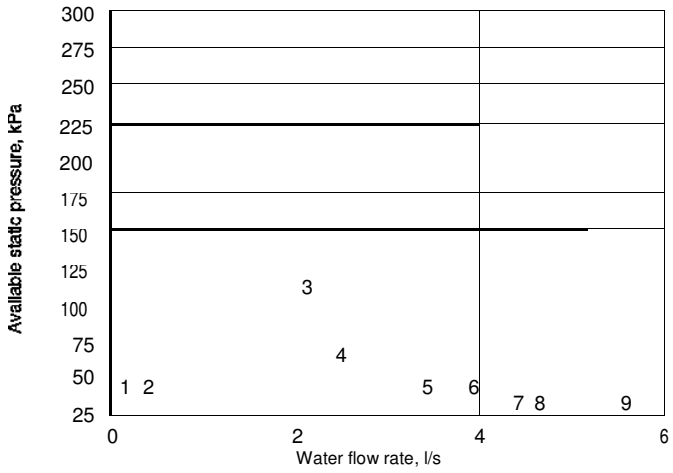
30RY	Cooling capacity		Power input	
	Min. flow	Max. flow*	Min. flow	Max. flow*
017-026	0.98	1.01	1.03	0.97
033	0.98	1.005	1.03	0.98
040-050	0.985	1.005	1.02	0.98
060	0.985	1.005	1.02	0.98
070-080	0.985	1.005	1.01	0.98

Performance correction factors

* Operation without duct system
Correction factor to be added to the performances published for nominal air flow.

Available static pressure for water-side installation

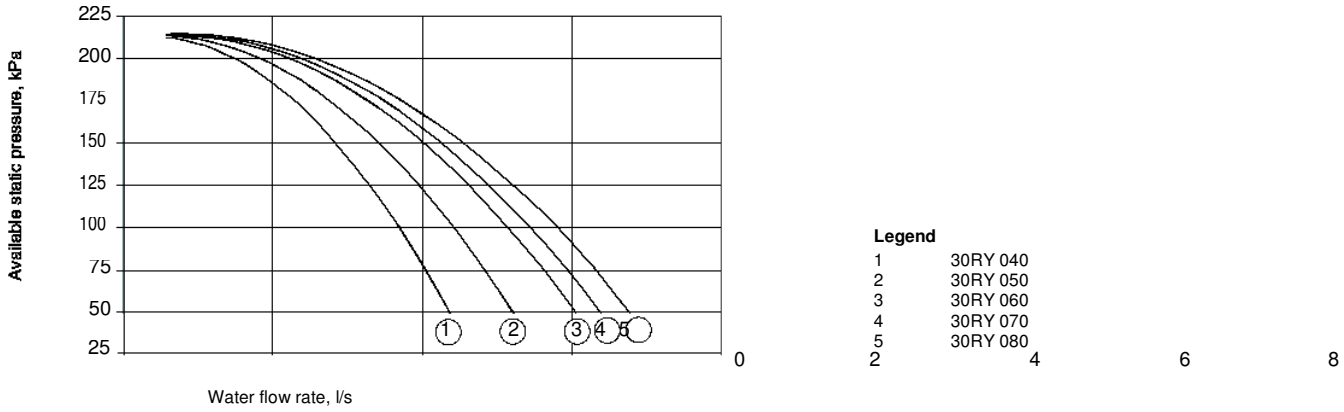
Single pump



Legend

1	30RY 017	6	30RY 050
2	30RY 021	7	30RY 060
3	30RY 026	8	30RY 070
4	30RY 033	9	30RY 080
5	30RY 040		

Dual pump



Legend

1	30RY 040
2	30RY 050
3	30RY 060
4	30RY 070
5	30RY 080

Water loop volume

Minimum water loop volume

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

Air conditioning application	N*
30RY 017 - 040	3.5
30RY 050 - 080	2.5

Industrial process cooling	
30RY 017 - 080	See note

Note:
For industrial process cooling applications, where high stability of the water temperature must be achieved, the values above must be increased.

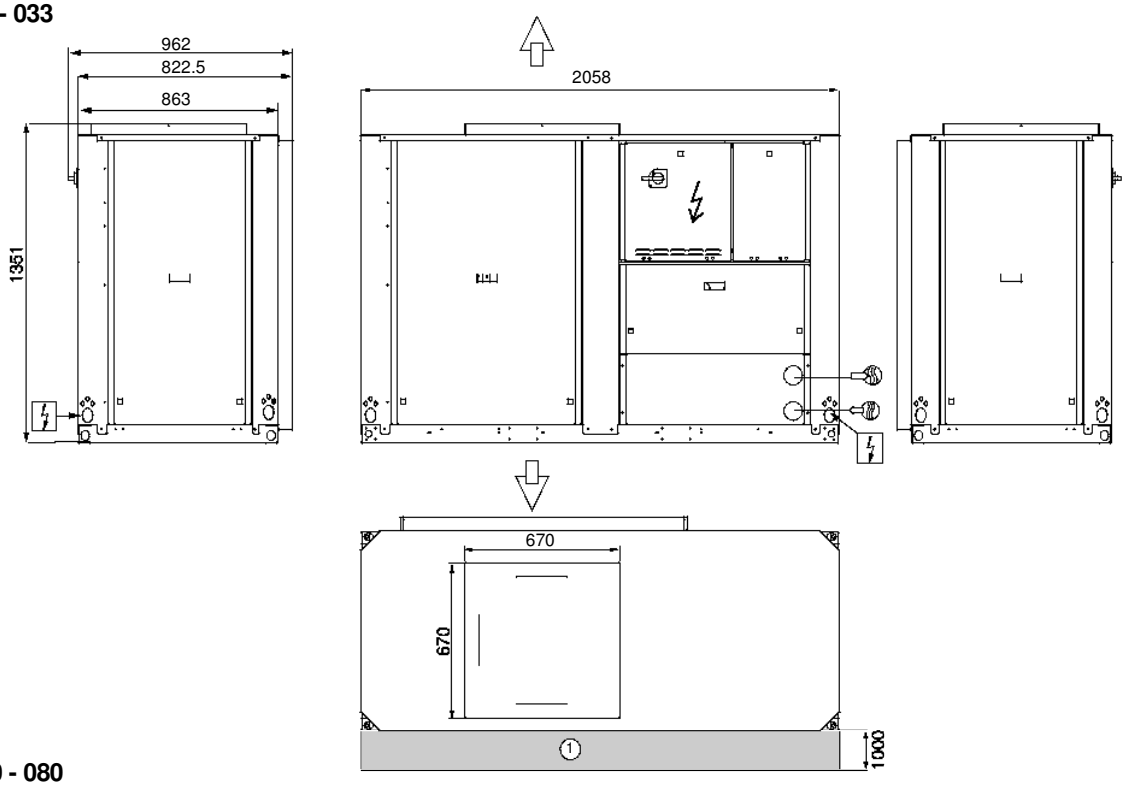
Maximum water loop volume

Units with hydronic module incorporate an expansion tank that limits the water loop volume. The table below gives the maximum loop volume for pure water or ethylene glycol with various concentrations.

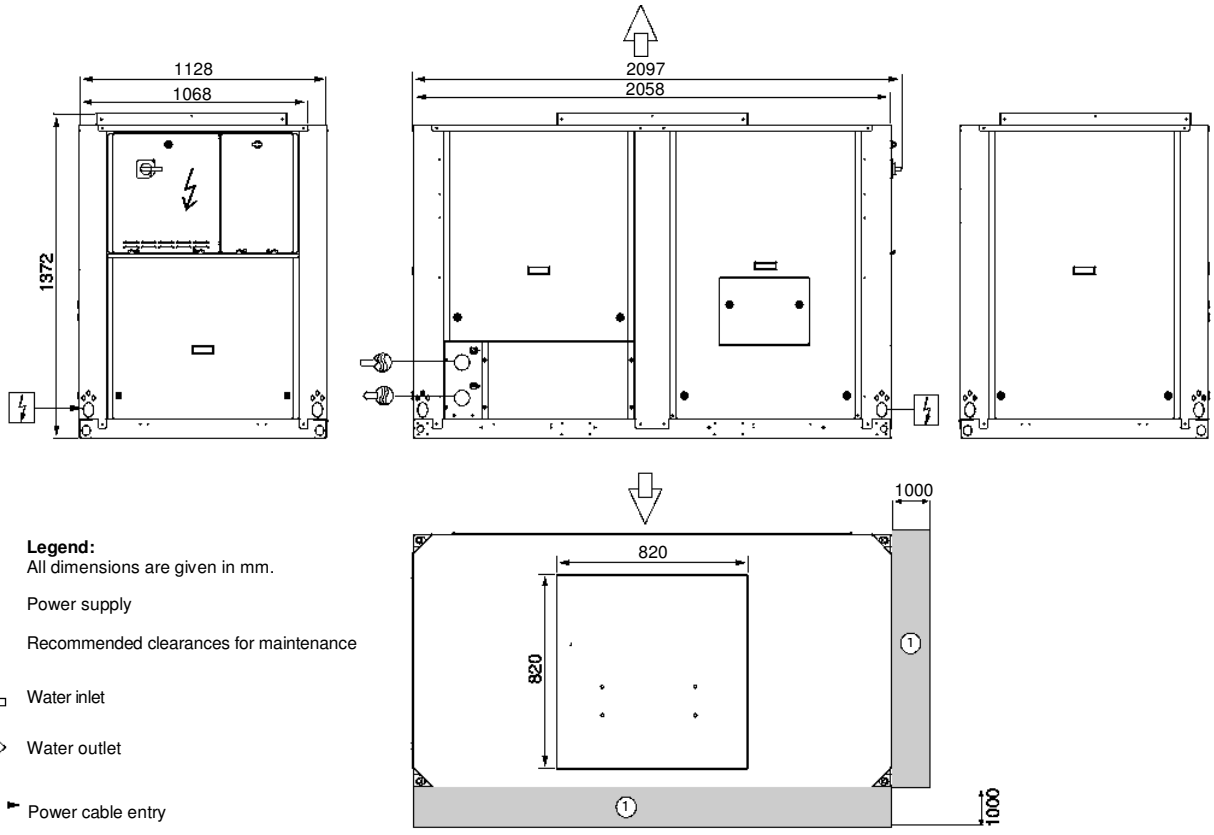
	30RY 017-033 (in litres)	30RY 040-080 (in litres)
Pure water	400	600
10% ethylene glycol	300	450
20% ethylene glycol	250	400
35% ethylene glycol	200	300

Dimensions/clearances

30RY 017- 033



30RY 040 - 080



Legend:
All dimensions are given in mm.

- Power supply
- Recommended clearances for maintenance
- Water inlet
- Water outlet
- Power cable entry
- Air inlet/outlet connection

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

30RY		Condenser entering air temperature, °C																																			
	LWT	25							30							35							40							45						
		CAP	COMP	UNIT	COOL	COOL	PRES (1)	PRES (2)	CAP	COMP	UNIT	COOL	COOL	PRES (1)	PRES (2)	CAP	COMP	UNIT	COOL	COOL	PRES (1)	PRES (2)	CAP	COMP	UNIT	COOL	COOL	PRES (1)	PRES (2)	CAP	COMP	UNIT	COOL	COOL	PRES (1)	PRES (2)
	°C	kW	kW	kW	l/s	kPa	kPa	kPa	kW	kW	kW	l/s	kPa	kPa	kPa	kW	kW	kW	l/s	kPa	kPa	kPa	kW	kW	kW	l/s	kPa	kPa	kPa	kW	kW	kW	l/s	kPa	kPa	kPa
017	5	18.5	4.76	5.76	0.83	36	219	219	18.6	5.26	6.29	0.89	33	226	226	17.6	5.87	6.87	0.84	30	235	235	16.3	6.5	7.5	0.78	26	244	244	14.8	7.19	8.19	0.71	22	254	254
021		24	6.57	7.57	1.15	37	194	194	22.9	7.23	8.23	1.09	34	204	204	21.6	7.95	8.95	1.03	30	215	215	20.2	8.73	9.73	0.97	26	226	226	18.7	9.56	10.6	0.9	23	237	237
026		27	7.13	8.13	1.29	34	179	179	25.8	7.92	8.92	1.23	31	190	190	24.3	8.8	9.8	1.16	27	202	202	22.6	9.76	10.8	1.08	23	216	216	20.7	10.8	11.8	0.99	19	230	230
033		34.8	9.63	11.1	1.66	34	123	123	32.3	10.5	12	1.55	30	146	146	29.8	11.5	13	1.43	26	168	168	27.3	12.6	14.1	1.3	22	189	189	24.8	13.8	15.3	1.18	18	208	208
040		41.1	11.4	13.3	1.96	29	138	187	39	12.5	14.4	1.86	26	141	190	36.9	13.8	15.7	1.76	23	145	193	34.9	15.1	17	1.67	21	148	195	32.9	16.6	18.5	1.57	18	151	198
050		52	13.5	15.4	2.51	29	130	183	49.7	14.9	16.8	2.37	26	135	187	46.9	16.5	18.4	2.24	23	140	191	44.1	18.1	20	2.11	21	144	194	41.4	19.8	21.7	1.98	18	148	197
060		61	17.1	20.5	2.92	25	127	185	58	18.8	22.2	2.76	22	132	189	54	20.6	24	2.6	20	138	192	51	22.5	25.9	2.44	18	143	196	47.8	24.5	27.9	2.28	15	147	199
070		71	20.2	25.7	3.37	28	114	178	67	22	27.5	3.2	25	121	183	63	24	29.5	3.02	22	127	187	60	26.1	31.6	2.85	20	133	191	56	28.4	33.9	2.68	18	139	194
080		83	22.4	27.9	3.96	30	138	169	79	24.6	30.1	3.76	27	147	174	74	27	32.5	3.55	24	156	180	70	29.5	35	3.35	21	164	185	66	32.2	37.7	3.14	19	171	189
017	6	20	4.77	5.77	0.96	38	215	215	19.2	5.31	6.31	0.92	35	222	222	18.1	5.89	6.89	0.87	32	231	231	16.8	6.53	7.53	0.8	28	240	240	15.4	7.22	8.22	0.73	24	250	250
021		24.8	6.64	7.64	1.18	39	187	187	23.6	7.31	8.31	1.13	36	198	198	22.3	8.03	9.03	1.07	32	208	208	21	8.81	9.81	1	28	220	220	19.5	9.64	10.6	0.93	24	231	231
026		27.8	7.15	8.15	1.33	36	171	171	26.6	7.95	8.95	1.27	33	183	183	25.1	8.84	9.84	1.2	29	196	196	23.3	9.81	10.8	1.12	25	210	210	21.3	10.9	11.9	1.02	21	225	225
033		35.5	9.8	11.3	1.7	35	116	116	33.1	10.6	12.1	1.58	31	139	139	30.8	11.6	13.1	1.47	27	160	160	28.4	12.7	14.2	1.36	23	181	181	26	13.9	15.4	1.24	20	200	200
040		42.4	11.6	13.5	2.03	31	135	185	40.3	12.7	14.6	1.92	28	139	188	38.1	13.9	15.8	1.82	25	143	191	36.1	15.3	17.2	1.72	22	146	194	34	16.7	18.6	1.63	20	149	196
050		54	13.7	15.6	2.59	31	127	181	51	15.1	17	2.45	28	132	185	48.4	16.7	18.6	2.31	25	137	189	45.6	18.3	20.2	2.18	22	142	192	42.8	20	21.9	2.05	20	146	196
060		63	17.3	20.7	3.02	27	123	182	60	19	22.4	2.85	24	129	186	56	20.8	24.2	2.69	21	135	190	53	22.8	26.2	2.52	19	140	194	49.4	24.8	28.2	2.36	16	145	197
070		73	20.4	25.9	3.47	29	109	175	69	22.3	27.8	3.3	26	117	180	65	24.3	29.8	3.12	24	124	184	62	26.4	31.9	2.95	21	130	189	58	28.8	34.3	2.77	19	136	192
080		85	22.7	28.2	4.08	32	133	165	81	25	30.5	3.87	28	142	171	77	27.3	32.8	3.66	25	151	177	72	29.9	35.4	3.45	23	160	182	68	32.6	38.1	3.23	20	168	187
017	7	20.5	4.78	5.78	0.98	39	211	211	19.7	5.32	6.32	0.94	37	218	218	18.6	5.91	6.91	0.89	33	226	226	17.4	6.55	7.55	0.83	29	236	236	15.9	7.25	8.25	0.76	25	247	247
021		25.5	6.71	7.71	1.22	42	180	180	24.4	7.38	8.38	1.16	38	191	191	23.1	8.11	9.11	1.1	34	202	202	21.7	8.88	9.88	1.04	30	214	214	20.2	9.72	10.7	0.96	26	226	226
026		28.7	7.17	8.17	1.37	38	164	164	27.4	7.98	8.98	1.31	35	176	176	25.8	8.88	9.88	1.23	31	189	189	24.1	9.86	10.9	1.15	27	204	204	22	10.9	11.9	1.05	22	220	220
033		36.2	9.96	11.5	1.73	36	110	110	33.9	10.8	12.3	1.62	32	131	131	31.7	11.7	13.2	1.51	29	152	152	29.4	12.8	14.3	1.41	25	172	172	27.2	14	15.5	1.3	22	190	190
040		43.7	11.7	13.6	2.09	33	132	182	41.5	12.9	14.8	1.98	29	137	186	39.4	14.1	16	1.88	26	141	189	37.2	15.5	17.4	1.78	24	144	192	35.2	16.9	18.8	1.68	21	148	195
050		56	13.9	15.8	2.66	33	124	179	53	15.3	17.2	2.53	30	129	183	50	16.9	18.8	2.39	27	135	187	47.1	18.5	20.4	2.25	24	139	191	44.2	20.2	22.1	2.11	21	144	194
060		65	17.6	21	3.11	29	119	180	62	19.3	22.7	2.94	26	128	184	58	21.1	24.5	2.77	23	132	188	55	23	26.4	2.6	20	138	192	51	25.1	28.5	2.44	18	143	196
070		75	20.7	26.2	3.58	31	104	172	71	22.6	28.1	3.4	28	112	177	67	24.6	30.1	3.22	25	120	182	64	26.8	32.3	3.04	23	127	186	60	29.1	34.6	2.86	20	133	190
080		88	23	28.5	4.19	33	127	162	83	25.3	30.8	3.98	30	137	168	79	27.7	33.2	3.76	27	147	174	74	30.2	35.7	3.55	24	156	180	70	33	38.5	3.33	21	164	185
017	8	21.1	4.79	5.79	1.01	41	206	206	20.2	5.34	6.34	0.97	38	214	214	19.2	5.93	6.93	0.92	35	222	222	17.9	6.58	7.58	0.86	31	232	232	16.5	7.28	8.28	0.79	27	243	243
021		26.3	6.78	7.78	1.26	44	173	173	25.1	7.45	8.45	1.2	41	184	184	23.8	8.18	9.18	1.14	36	196	196	22.4	8.96	9.96	1.07	32	208	208	20.9	9.8	10.8	1	28	221	221
026		29.5	7.18	8.18	1.41	41	155	155	28.2	8.01	9.01	1.35	37	168	168	26.6	8.91	9.91	1.27	33	183	183	24.8	9.91	10.9	1.18	28	198	198	22.7	11	12	1.08	24	215	215
033		36.8	10.1	11.6	1.76	37	103	103	34.7	10.9	12.4	1.66	34	124	124	32.6	11.9	13.4	1.56	30	144	144	30.5	12.9	14.4	1.46	27	163	163	28.4	14.1	15.6	1.36	23	181	181
040		45.1	11.8	13.7	2.15	35	130	180	42.8	13	14.9	2.05	31	134	184	40.6	14.3	16.2	1.94	28	139	187	38.4	15.6	17.5	1.84	25	142	191	36.3	17.1	19	1.73	22	146	194
050		57	14	15.9	2.74	35	120	176	54	15.5	17.4	2.6	32	126	181	51	17	18.9	2.46	28	132	185	48.5	18.7	20.6	2.32	25	137	189	45.6	20.5	22.4	2.18	22	142	192
060		67	17.8	21.2	3.2	30	115	177	63	19.5	22.9	3.03	27	122	182	60	21.4	24.8	2.86	24	129	186	56	23.3	26.7	2.69	21	135	190	53	25.4	28.8	2.52	19	140	194
070		77	21	26.5	3.69	33	99	169	73	22.9	28.4	3.5	30	108	174	69	24.9	30.4	3.32	27	116	179	66	27.1	32.6	3.13	24	123	184	62	29.4	34.9	2.95	21	130	188
080		90	23.4	28.9	4.31	35	121	158	86	25.6	31.1	4.09	32	132	165	81	28	33.5	3.87	28	142	171	76	30.6	36.1	3.65	25	152	177	72	33.3	38.8	3.43	22	161	183
017	10	22.1	4.81	5.81	1.06	45	197	197	21.3	5.37	6.37	1.02	42	205	205	20.2	5.97	6.97	0.97	38	213	213	19	6.63	7.63	0.91	34	223	223	17.6	7.34	8.34	0.84	30	235	235
021		27.8	6.92	7.92	1.33	50	158	158	26.6	7.6	8.6	1.27	45	170	170	25.3	8.33	9.33	1.21	41	183	183	23.8	9.12	10.1	1.14	37	196	196	22.3	9.96	11	1.06	32	209	209
026		31.2	7.22	8.22	1.49	46	138	138	29.8	8.06	9.06	1.42	42	153	153	28.1	8.99	9.99	1.34	37	169	169	26.2	10	11	1.25	32	186	186	23.9	11.1	12.1	1.14	26	206	206
033		38.2	10.5	12	1.82	40	89	89	36.3	11.2	12.7	1.74	36	108	108	34.5	12.1	13.6	1.65	33	126	126	32.6	13.1	14.6	1.56	30	144	144	30.8	14.3	15.8	1.47	27	160	160
040		47.7	12.1	14	2.28	39	124	175	45.4	13.3	15.2	2.17	35	129	180	43	14.8	16.5	2.06	32	134	184	40.8	16	17.9	1.95	28	138	187	38.5	17.5	19.4	1.84	25	142	190
050		61	14.4	16.3	2.9	39	113	171	58	15.9	17.8	2.75	35	120	176	55	17.4	19.3	2.61	32	126	180	51	19.1	21	2.46	28	132	185	48.5	20.9	22.8	2.32	25	137	189
060		71	18.3	21.7	3.39	34	107	171	67	20	23.4	3.21	30	115	177	63	21.9	25.3	3.03	27	122	182	60	23.9	27.3	2.85	24	129	186	56	26	29.4	2.68	21	135	191
070		82	21.6	27.1	3.9	37	89	162	78	23.4	28.9	3.71	33	98	168	74	25.5	31	3.51	30	107	174	70	27.7	33.2	3.32	27	115	179	66	30.1	35.6	3.13	24	123	184
080		95	24	29.5	4.53	39	110	151	90	26.2	31.7	4.31	35	121	158	85	28.7	34.2	4.08	32	133	165	81	31.3	36.8	3.85	28	143	172	-	-	-	-	-	-	-

Legend:

LWT Leaving water temperature
CAP kW Net cooling capacity
COMP kW Compressor power input
UNIT kW Unit power input (compressors, fan, control circuit)
COOL l/s Evaporator water flow rate
COOL kPa Evaporator pressure drop
PRES kPa (1) Available pressure at the unit outlet (unit with single-pump hydronic module)
PRES kPa (2) Available pressure at the unit outlet (unit with dual-pump hydronic module)

Full load correction factors for Eurovent laboratory test:

Net cooling capacity	1.000
Energy efficiency ratio	1.000
Evaporator pressure drop	1.000

Application data:

Standard units
Refrigerant: R-407C
Evaporator temperature rise: 5 K
Evaporator fluid: chilled water
Fouling factor: 0.44 x 10^{-4} (m^2 K)/W

Performances in accordance with EN 12055.

Guide specifications

Air-cooled liquid chillers for indoor installation
Nominal cooling capacity 19-79 kW
Carrier model number: 30RY

Part 1 - General

System description

- Air-cooled liquid chiller for indoor installation, equipped with scroll compressors, a fan with available pressure, auto-adaptive microprocessor control and operating with HFC-407C refrigerant which has no effect on the ozone layer.

Quality assurance

- 30RY units comply with requirements of European directives:
  - pressurised equipment directive (PED) 97/23/EC,
  - machinery directive 98/37/EC, modified,
  - low voltage directive 73/23/EEC, modified.
  - electromagnetic compatibility directive 89/336/EEC, modified

  and 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 5008 1-2,
  - electromagnetic immunity EN 50082-2.

30RY units have been designed and tested in a facility with a quality assurance system certified ISO 9001.
30RY units have been assembled in a facility with an environment management system certified ISO 14001.
The published performances have been certified by Eurovent and verified by independent laboratories.
All units undergo a run test before shipment.

Part 2 - Products

Equipment

Compressor

- Hermetic scroll compressor with only three moving parts, 2-pole electric motor, cooled by suction gas with overload protection through an internal thermostat and/or thermal relay. Oil level sight glass and polyolester synthetic oil charge.

Water heat exchanger

- Stainless steel plate heat exchanger with welded copper connections. Closed-cell thermal foam insulation, anti-freeze protection during operation by flow switch (standard on all versions).
- 30RY 017-033: the evaporator and the hydronic module are located in a technical compartment, isolated from the outside air. 30RY 040-080: the evaporator and the hydronic modules are protected against frost at shutdown down to –20°C by electric resistance heater.

Air heat exchanger/fan

- One vertical coil with slotted aluminium fins expanded into grooved copper tubes. Rigid connection collar for air inlet duct.
- Axial fan with available pressure and profiled airfoil blades for quiet operation. Three-phase, two-speed motor (24/12 r/s), insulation class F, protection category IP 55, overload protection by internal motor sensors. Vertical air flow with rigid connection collar for the air outlet duct.

Refrigerant circuit

- The circuit includes: liquid line valve, moisture sight glass, filter drier, thermostatic expansion device, pressure and temperature sensors, safety valve, manually reset high pressure switch, and a refrigerant charge of HFC-407C. All components of the refrigerant circuit are welded for total and lasting leak-tightness.

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, fan and water pump contactors, thermal relays and fan sensor relays, low-voltage control circuit transformer (24 V control circuit) and the Pro-Dialog control system.

  The whole unit is supplied by a single power connection point (three-phase supply without neutral).

Chassis/cabinet

- Chassis and cabinet made of galvanised sheet steel. Painted in oven-baked polyester powder paint in light grey colour (RAL 7035). Removable panels with 1/4 turn locks. Compressor, evaporator and hydronic module of sizes 30RY 017-033 are located in a technical compartment, isolated from the air flow.

Hydronic module

- Hydronic module, integrated into the chiller, including: removable screen filter, expansion tank, single centrifugal water pump (dual water pump optional for sizes 30RY 040-080) with three-phase motor, water flow switch, safety valve, set to 3 bar, flow control valve, pressure gauge and purges.
  Internal piping made of galvanised steel. Customer-side Victaulic connections with welding or screw connection sleeves.
  Protection against ice build-up down to -20°C by thermal insulation and water pump cycling.

  Note: Units without hydronic module (option): internal water piping protected against frost down to -10 C by electrical resistance heater.

Carrier Pro-Dialog Plus control system

Pro-Dialog Plus ensures the following functions:

Control

- Entering or leaving water temperature control by PID loop with compressor run time equalising. The system permanently adjusts the system inertia and ensures complete prevention of excessive compressor cycling. The chiller can safely operate with a low system water volume which often makes the use of a buffer tank unnecessary (see minimum water volume in this document).
- Head pressure control by auto-adaptive algorithm (fan speed).
- Water pump control (optional dual pump with automatic change-over for sizes 30RY 040-080).
- Control at the second set point (example: unoccupied room).
- Set point reset as a function of the air temperature or the difference between entering/leaving water temperature.

Safety

- The system checks the evolution of the parameters: temperatures, pressures ... 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
  - 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 water and ambient air temperatures, compressor suction/discharge pressures and temperatures, set point, operating time and number of compressor start-ups.
- Diagnosis and complete parameter set by selection of one of the following menus: information, temperatures, pressures, set points, input values, test, configuration, alarms, alarm history and operating log.

Remote management of the chiller

- Volt-free contact inputs permit:
  - Start/stop control
  - Selection of cooling mode (boiler start-up)
  - Integration of a customer safety device
  - Operation at the second set point* (example room unoccupied)
  - Maximum demand limit* (30RY 050-080)

  * One or the other
- Outputs are available for:
  - Start-up of a boiler (after shutdown of the chiller)
  - Signalling of a fault condition
- The internal clock permits programming of the following operations:
  - chiller start/stop
  - control at the second set point (e.g. unoccupied room)
  - fan at low speed to reduce the noise level (e.g. during the night)
- Master/slave control of two chillers operating in parallel with operating time equalisation.
- RS 485 serial port for remote chiller control via communications bus.

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