Technibel
UNE AVANCE DANS L'AIR DU TEMPS

TECHNICAL INSTRUCTIONS

PHRF - CHGF
20 to 85 kW
AIR TO WATER
HEAT PUMP AND CHILLER

Complete built-in hydraulic equipment

February 2013

10 12 203 - GB - 01

MARKING CE

This product marked CE conforms to the essential requirements of the Directives:
- Low voltage no. 2006/95/EC.
- Electromagnetic Compatibility no. 2004/108/EC.

SUMMARY

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APPLIANCES FILLED WITH R 410 A

R 410 A

- R 410 A is a high-pressure refrigerant (+ 50% in relation to R 22 and R 407 C).
- The compressors approved for operation with this fluid are filled beforehand with polyvinyl ether oil.

MAINTENANCE INSTRUCTIONS

1 - Never add oil to the appliance; the compressor is filled with polyvinyl ether (PVE) oil, a special oil which cannot tolerate the presence of other oils.

2 - The instruments used for:
- Filling,
- Pressure measurements,
- Emptying under vacuum,
- Recovering the fluid,

must be compatible and only used for the R 410 A fluid.
Note: the pressure taps of the refrigerating circuit are 5/16 SAE (1/2 - 20 - UNF).

3 - In the case of a new charge:
- The charge **must** be undertaken in liquid phase.
- Use a balance and a dip pipe type R 410 A cylinder.
- Charge the weight of R 410 A as per the value indicated on the unit's identification plate.

4 - In case of leakage, do not complete the charge: recover the remaining refrigerant for recycling and perform a total charge.
Recovery, recycling or the destruction of the fluid must be done in compliance with the laws in force in the country concerned.

5 - If the refrigerant circuit is opened, you must:
- Avoid ambient air from entering the circuit.
- Replace or install a drier.
- Perform the "vacuum operation" at a minimum level of **0.3 mbar (static)**.

6 - Do not release R 410 A fluid into the atmosphere. This fluid is a fluorinated greenhouse gases, covered by the Kyoto Protocol with a Global Warming Potential (GWP) = 1975 - (CE Directive 842 / 2006).

1 - RANGE

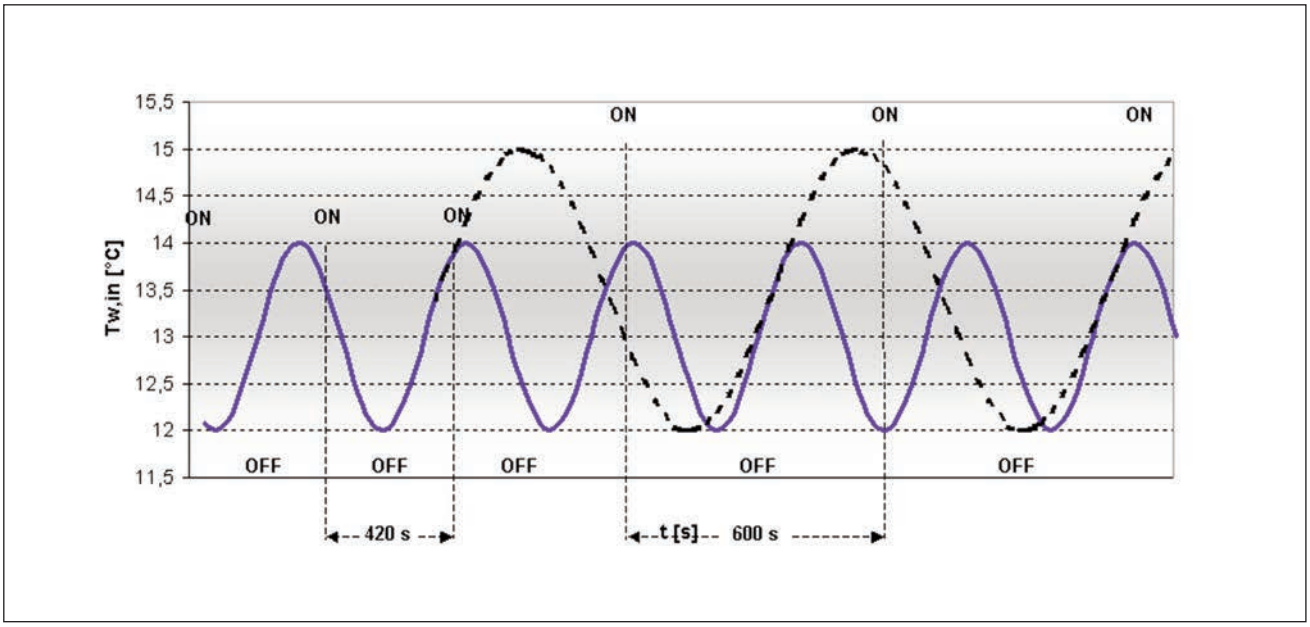
The water chillers and heat pumps of the "**AQUASET-T**" series are engineered and designed to be installed outdoors usually for light-duty tertiary industry and commercial applications.
The range uses the R 410 A refrigerant which ensures high performance while guaranteeing reduced power consumption. It includes 16 models in the chiller or heat pump version with cooling capacities between 20 and 76 kW and heating capacities between 23 and 85 kW.

1.1 - OPERATING LIMITS

- The fin type heat exchangers have been optimised for R 410 A refrigerant and are fitted with copper tubes of Ø 8 mm thereby guaranteeing improved heat exchange and low noise operation of the fans.
- The increased exchange surfaces of the heat exchangers allow for chilled water production at an outside air temperature of 47°C. The average energy efficiency ratio in summer is 2.95 (EER) and 3.25 in winter (COP) which relates to the Eurovent Energy Efficiency Class **A**.

1.2 - "AUTO-TUNE" CONTROL

- The electronic control automatically tunes the operating value according to the outside temperature in order to reduce consumption and extend the operating range.
- The auto-tune function limits the number of compressor starts which also extends the service life.



2 - TECHNICAL CHARACTERISTICS

2.1 - STRUCTURE

- Structure made of galvanised sheet metal which is painted (RAL 9002) both eye-catching and resistant to corrosive agents.
- The fully enclosed compressor compartment can be accessed on 3 sides by easily removable panels for easy maintenance and inspection.

2.2 - TAILOR-MADE HYDRAULIC KIT

- High pressure pump available (provided for use with glycol maximum 35%) and fitted with internal thermal protection.
- Expansion vessel included (check whether this is sufficient according to the installation).
- Safety valve.
- Fill valve.
- Automatic air bleeder valve.
- Water differential pressure switch and water outlet temperature sensor acting as anti-freeze thermostat.
- Y-type mechanical filter protecting the evaporator provided (to be mounted on water inlet).

2.3 - COOLING CIRCUIT

- Scroll type compressor.
- Stainless steel plate-type heat exchanger, optimised for use with R 410 A.
- Copper tube fin coil Ø 8 mm and aluminium fins, large exchange surface.
- Filter dryer.
- Liquid line sight glass with moisture indicator.
- Thermostatic pressure reducer with external pressure equalisation.
- Cycle reversing valve (PHRF).
- Bottle of liquid (PHRF).
- High and low pressure switchs.
- Schrader control and service valves available.
- High and low pressure gauges (accessory).

2.4 - MOTOR AND FAN ASSEMBLY

- Electric fan equipped with external rotor motor with 6 or 8 poles, directly coupled to the axial fan, fitted with internal thermal protection on the windings, safety grid and special support structure.
- The fan is housed in an enclosure the profile of which is designed to optimise airflow performance.
- The use of fin-type heat exchangers with copper tubes of Ø 8 mm allows for reduction of headloss the air end and makes the units considerably low noise.
- Condensation pressure control to constantly and automatically control fan speed and limit noise levels even further during the night and under partial load.

2.5 - FINNED COIL

- Made of copper tubes of Ø 8 mm with aluminium fins and oversized exchange surface.
- These specially designed heat exchangers accelerate the defrosting phase in the heat pump versions thereby ensuring high performance in terms of efficiency across the cycle.

2.6 - ELECTRONIC CONTROL BY MICROPROCESSOR

- The electronic controller ensures full management of units and is easily accessed via a polycarbonate flap with IP65 index of protection.
- The auto-tune logic also allows for the unit to run with a small volume of water in the circuit.
- Outside air temperature reading is provided to automatically change the adjustment value to match the external load conditions or to maintain the unit running including in the winter and very cold weather.

- **Main functions**:
  - Water temperature control (inlet / outlet).
  - Defrosting control.
  - Fan speed control.
  - Alarm management.
  - Dynamic adjustment value control according to outside air temperature.
- **Controlled devices:**
  - Compressor.
  - Fans.
  - Cycle reversing valve (PHRF).
  - Water circulation pump.
  - Anti-freeze heating elements.
  - Alarm indicator relays.
  - Current limiter on start.
  - Phase controller.
  - Low temperature kit.
  - Condensation pressure control.

2.7 - ELECTRIC PANEL

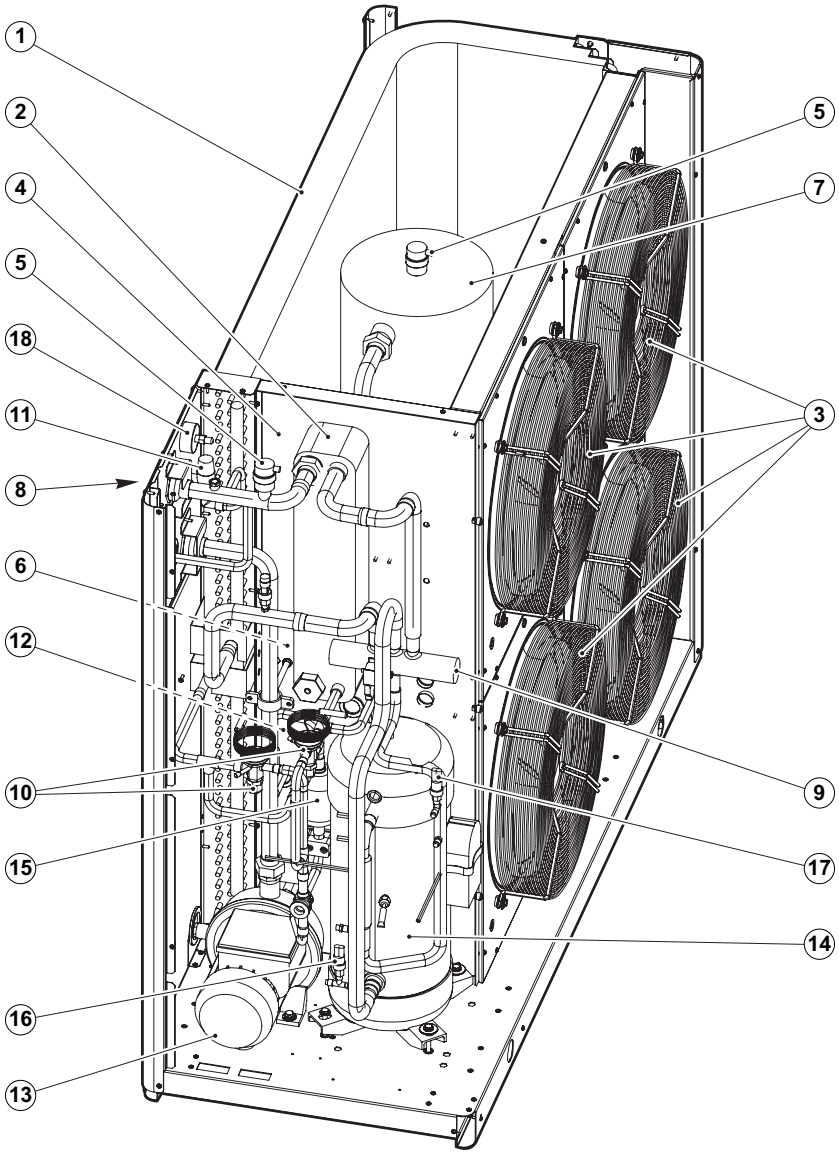
- Electric panel made and wired as per the Low voltage directive 2006/95/EC, the electromagnetic compatibility directive n° 2004/108/EC and the relative applicable standards.

2.8 - ACCESSORIES AVAILABLE

- High and low pressure gauges.
- Vibration dampers.
- Flexible hoses Ø 1”1/4.
- Simplified remote control - On / Off - Hot / Cold.
- Remote keyboard / display.
- RS485 communication interface.

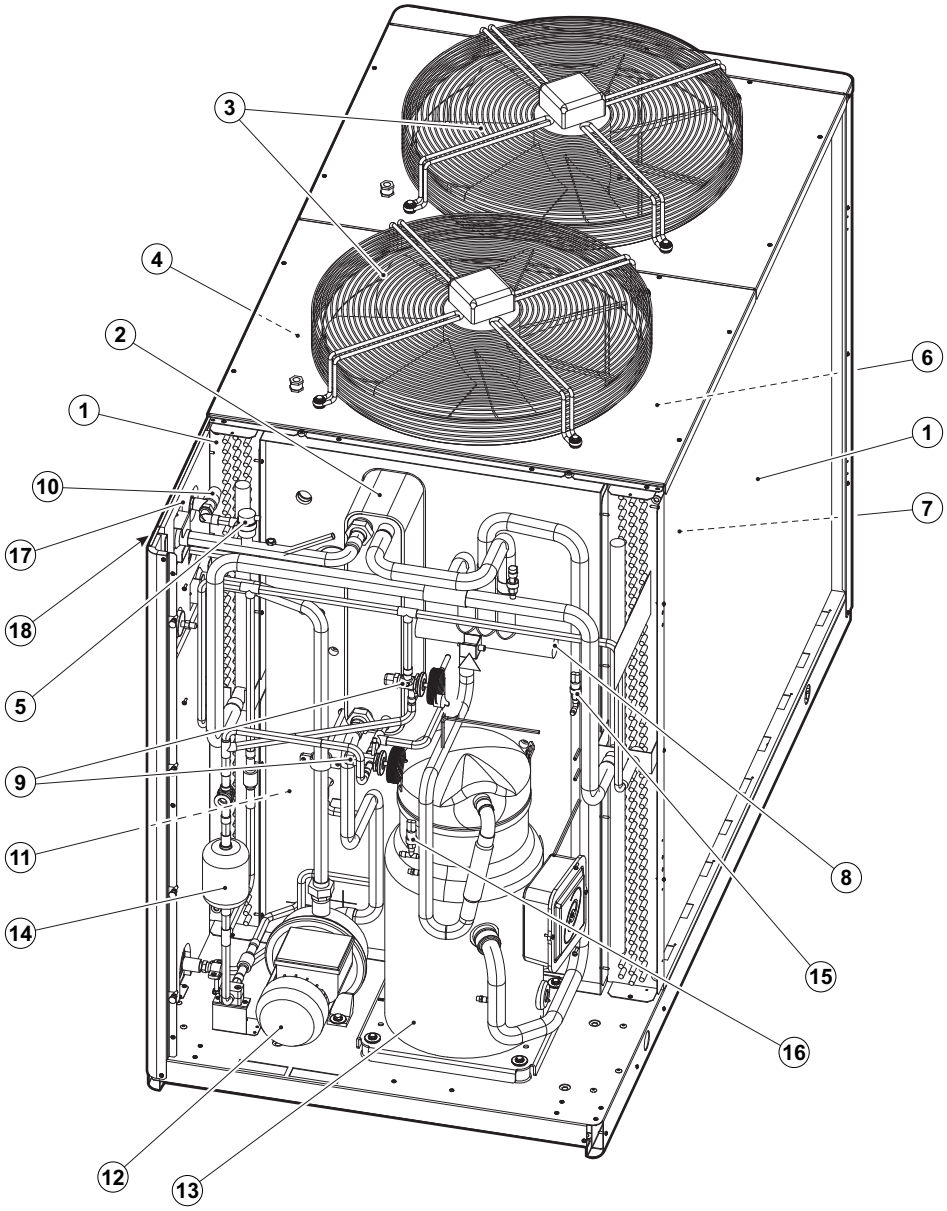
3 - DESCRIPTION OF COMPONENTS

3.1 - CHGF 20-24 / PHRF 23-27



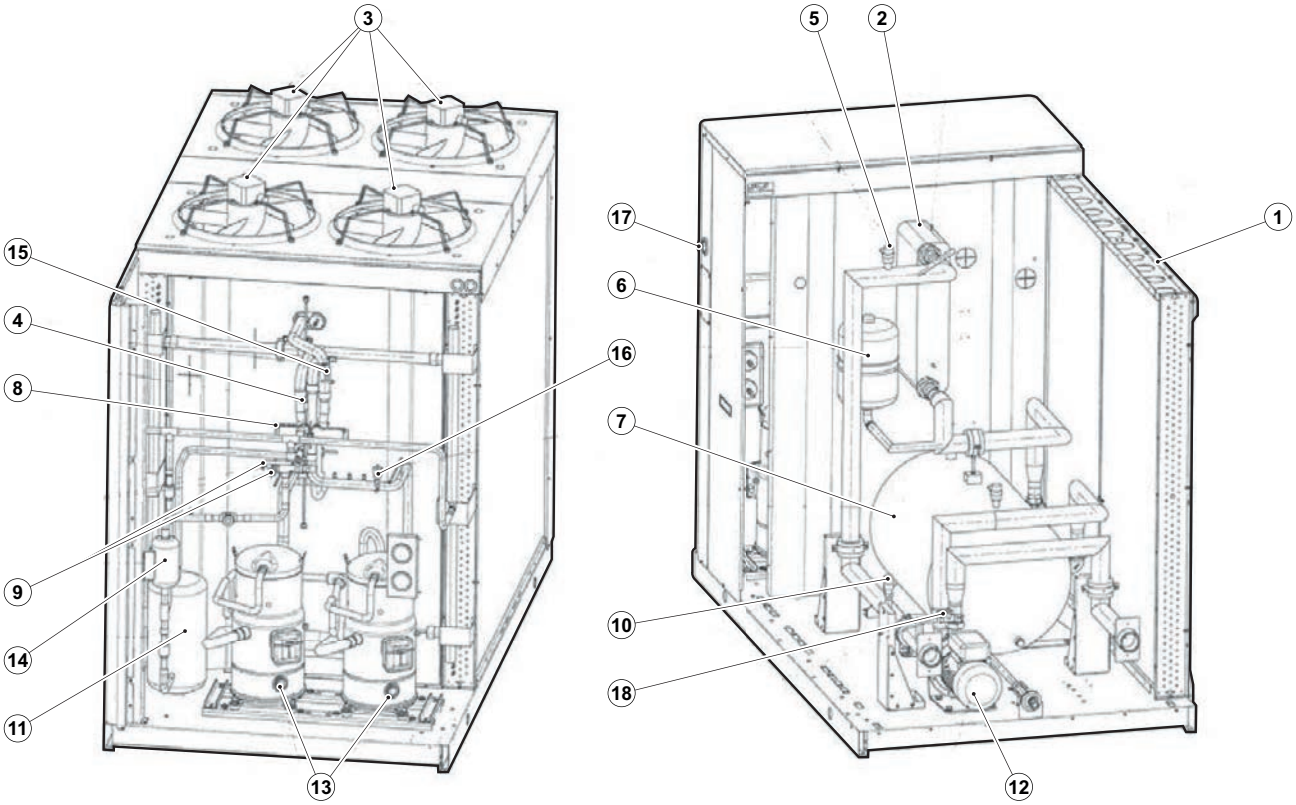
1 - R 410 A air source heat exchanger.
2 - R 410 A water source heat exchanger.
3 - Axial fans.
4 - Water differential pressure switch.
5 - Automatic air bleeder valve.
6 - Expansion vessel.
7 - Buffer tank.
8 - Fill point.
9 - 4-way valve (PHRF).
10 - Pressure reducers.
11 - Safety valve.
12 - Liquid recovery device.
13 - Circulation pump.
14 - Compressor.
15 - Filter dryer.
16 - Low pressure switch and pressure tap.
17 - High pressure switch and pressure tap.
18 - Water pressure gauge.

3.2 - CHGF 28-40 / PHRF 32-46



1 - R 410 A air source heat exchanger.
2 - R 410 A water source heat exchanger.
3 - Axial fans.
4 - Water differential pressure switch.
5 - Automatic air bleeder valve.
6 - Expansion vessel.
7 - Buffer tank.
8 - 4-way valve (PHRF).
9 - Pressure reducers.
10 - Safety valve.
11 - Liquid recovery device.
12 - Circulation pump.
13 - Compressor.
14 - Filter dryer .
15 - Low pressure switch and pressure tap.
16 - High pressure switch and pressure tap.
17 - Water pressure gauge.
1**8** - Fill point.

3.3 - CHGF 55-76 / PHRF 60-85



1 - R 410 A air source heat exchanger.
2 - R 410 A water source heat exchanger.
3 - Axial fans.
4 - Water differential pressure switch.
5 - Automatic air bleeder valve.
6 - Expansion vessel.
7 - Buffer tank.
8 - 4-way valve (PHRF).
9 - Pressure reducers.
10 - Safety valve.
11 - Liquid recovery device.
12 - Circulation pump.
13 - Compressor.
14 - Filter dryer .
15 - Low pressure switch and pressure tap.
16 - High pressure switch and pressure tap.
17 - Water pressure gauge.
18 - Fill point.

4 - NOMINAL TECHNICAL DATA

CHGF model		20	24	28	32	40	55	70	76
Power supply	V-Ph-Hz	400-3N-50							
Cooling capacity (EN 14511)	kW	19.95	24.19	28.60	32.00	40.26	55.37	70.63	76.94
EER (EN 14511)		2.66	2.87	3.16	3.05	3.06	2.95	2.94	2.76
Power consumption (EN 14511)	kW	7.49	8.42	9.05	10.5	13.14	18.79	24.04	27.92
Maximum power consumption	kW	13.6	14.5	18.3	18.9	22.4	27	32.3	39.4
Maximum input current	A	21.7	24	28.6	32.4	36.4	48	57	69
Starting current ****	A	68	103	87	108	108	117	136	154
Number of compressors / circuit		1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	2 / 1	2 / 1	2 / 1
Refrigerant charge	kg	4.23	5.8	7.5	7.5	10.8	12,8	16,3	16,3
Low / high pressure switch	bar	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42
Number of axial fans		4	4	2	2	2	4	4	4
Air flow rate	m^3/h	9,990	9,307	16,276	16,276	15,776	24,930	24,354	24,354
Water flow rate	L/h	3,373	4,094	4,833	5,421	6,823	9,391	12,006	13,089
Diameter of hydraulic couplings	Inch	1.25	1.25	1.25	1.25	1.25	2	2	2
Water headloss	kPa	51	49	40	51	43	56	55	64
Pressure head available	kPa	123	116	143	126	119	138	128	114
Water capacity excluding option	Litres	4	4	6	6	6	7	11	12
Expansion vessel	Litres	5	5	8	8	8	8	8	8
Tank capacity	Litres	50	50	125	125	125	125	125	125
Height	mm	1,300	1,300	1,485	1,485	1,485	1,735	1,735	1,735
Length	mm	1,565	1,565	1,990	1,990	1,990	2,091	2,091	2,091
Depth	mm	600	600	950	950	950	1,183	1,183	1,183
Sound power	dB(A)	71	72	73	73	75	81	81	81
Sound pressure at 10 metres	dB(A)	43	44	45	45	47	53	53	53
Weight packed *	kg	274	288	405	429	489	645	692	786
Net weight (excluding packaging) *	kg	259	273	383	407	467	633	680	774
Minimum water capacity of system **	Litres	70	85	100	110	140	190	245	265
Maximum water capacity of system ***	Litres	145	145	231	231	231	231	231	231

(*) Weight for model with pump and tank.

(**) If the water volume of the system is below the minimum, a buffer tank must be installed.

(***) If the water volume of the system is above the maximum, an additional expansion vessel is required.

(****) Starting current accounting for the electronic starter (current limiter).

- Cooling capacity: outside air temperature 35°C, water temperature 12°C - 7°C.
- Sound pressure level measured in compliance with the standards ISO 3741 - ISO 3744 and EN 29614-1
- Sound pressure measured at a distance of 10 metres and 1.5 metres from the ground in free field conditions (fan end).
- The maximum power consumption is the power consumption of the mains power supply required for the unit to operate.
- The maximum input current is the current level at which the internal protective devices of the unit are tripped. It is the maximum allowable current per unit. This value must never be exceeded and must be used to size the line.

PHRF model		23	27	32	40	46	60	77	85
Power supply	V-Ph-Hz	400-3N-50							
Cooling capacity (EN 14511)	kW	19.55	23.68	27.99	34.84	39.46	54.27	69.25	75.41
EER (EN 14511)		2.61	2.83	3.09	2.94	3	2.89	2.88	2.7
Cold power consumption (EN 14511)	kW	7.49	8.38	9.06	11.86	13.14	18.8	24.05	27.93
Heating capacity (EN 14511)	kW	22.57	26.83	30.80	38.67	44.07	59.12	75.67	83.97
COP (EN 14511)		3	3.2	3.24	3.23	3.27	3.11	3.17	3.08
Hot power consumption (EN 14511)	kW	7.52	8.38	9.52	11.97	13.47	18.98	23.87	27.23
Maximum power consumption	kW	13.60	14.50	18.30	21.80	22.40	27	32.30	39.40
Maximum input current	A	21.7	24	28.6	35.2	36.4	48	57	69
Starting current ****	A	68	103	87	108	108	117	136	154
Number of compressors / circuit		1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	2 / 1	2 / 1	2 / 1
Refrigerant charge	kg	4.23	5.80	7.50	7.80	10.80	12.80	16.30	16.30
Low / high pressure switch	bar	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42
Number of axial fans		4	4	2	2	2	4	4	4
Air flow rate	m^3/h	9,990	9,307	16,276	16,276	15,776	24,930	24,354	24,354
Water flow rate, cold only	L/h	3,373	4,094	4,833	6,021	6,823	9,202	11,782	12,831
Heat pump water flow rate	L/h	3,949	4,670	5,396	6,756	7,769	10,303	13,244	14,579
Diameter of hydraulic couplings	Inch	1.25	1.25	1.25	1.25	1.25	2	2	2
Water headloss (cold only)	kPa	51	49	40	41	43	56	55	64
Water headloss (heating)	kPa	69	62	49	50	54	60	59	71
Pressure head available (cold only)	kPa	123	116	143	130	119	138	128	114
Pressure head available (heating)	kPa	97	95	128	113	99	130	110	100
Water capacity excluding option	Litres	4	4	5.5	5.5	5.5	7	11	12
Expansion vessel	Litres	5	5	8	8	8	8	8	8
Tank capacity	Litres	50	50	125	125	125	125	125	125
Height	mm	1,300	1,300	1,485	1,485	1,485	1,735	1,735	1,735
Length	mm	1,565	1,565	1,990	1,990	1,990	2,091	2,091	2,091
Depth	mm	600	600	950	950	950	1,183	1,183	1,183
Sound power	dB(A)	71	72	73	73	75	81	81	81
Sound pressure at 10 metres	dB(A)	43	44	45	45	47	53	53	53
Weight packed *	kg	283	295	406	466	495	660	702	792
Net weight (excluding packaging) *	kg	268	280	384	444	473	648	690	780
Minimum water capacity of system **	Litres	105	125	140	175	205	270	345	380
Maximum water capacity of system ***	Litres	145	145	231	231	231	231	231	231

(*) Weight for model with pump and tank.

(**) If the water volume of the system is below the minimum, a buffer tank must be installed.

(***) If the water volume of the system is above the maximum, an additional expansion vessel is required.

(****) Starting current accounting for the electronic starter (current limiter).

- Cooling capacity: outside air temperature 35°C, water temperature 12°C - 7°C.
- Heating capacity: outside air temperature 7°C (dry bulb) and 6.2°C (wet bulb) water temperature 40°C - 45°C.
- Sound pressure level measured in compliance with the standards ISO 3741 - ISO 3744 and EN 29614-1
- Sound pressure measured at a distance of 10 metres and 1.5 metres from the ground in free field conditions (fan end).
- The maximum power consumption is the power consumption of the mains power supply required for the unit to operate.
- The maximum input current is the current level at which the internal protective devices of the unit are tripped. It is the maximum allowable current per unit. This value must never be exceeded and must be used to size the line.

5 - PERFORMANCE

5.1 - CHGF CAPACITIES IN COLD MODE

- **Tbs_1** Outside air temperature (dry bulb).
- **Tw in / out** Water inlet / outlet temperature.
- **PF** Cooling capacity.
- **PA** Power consumption.

EN14511	Tbs_1		20°C			25°C			30°C			35°C			40°C			45°C		
	Tw in	Tw out	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR
	°C	°C	kW	kW		kW	kW		kW	kW		kW	kW		kW	kW		kW	kW	
CHGF 20	10	5	21.75	5.68	3.83	20.75	6.16	3.37	19.75	6.75	2.93	18.85	7.40	2.55	17.95	8.14	2.21	17.05	8.99	1.90
	11	6	22.45	5.68	3.95	21.35	6.19	3.45	20.35	6.79	3.00	19.35	7.45	2.60	18.45	8.18	2.26	17.55	9.03	1.94
	12	7	23.15	5.70	4.06	22.05	6.21	3.55	20.95	6.82	3.07	19.95	7.49	2.66	18.95	8.25	2.30	18.15	9.07	2.00
	13	8	23.85	5.72	4.17	22.85	6.24	3.66	21.55	6.85	3.15	20.55	7.53	2.73	19.55	8.29	2.36	18.65	9.14	2.04
	14	9	24.55	5.75	4.27	23.35	6.27	3.72	22.25	6.89	3.23	21.15	7.56	2.80	20.15	8.36	2.41	19.15	9.21	2.08
	15	10	25.15	5.78	4.35	24.05	6.31	3.81	22.95	6.92	3.32	21.75	7.64	2.85	20.65	8.40	2.46	19.65	9.27	2.12
	16	11	25.95	5.81	4.47	24.75	6.34	3.90	23.55	6.96	3.38	22.45	7.67	2.93	21.25	8.46	2.51	20.25	9.30	2.18
	17	12	26.75	5.85	4.57	25.45	6.40	3.98	24.25	7.02	3.45	23.05	7.71	2.99	21.95	8.50	2.58	20.85	9.36	2.23
CHGF 24	10	5	26.49	6.53	4.06	25.29	7.05	3.59	24.09	7.65	3.15	22.79	8.29	2.75	21.29	9.05	2.35	19.69	9.92	1.98
	11	6	27.29	6.58	4.15	26.09	7.11	3.67	24.79	7.70	3.22	23.49	8.37	2.81	21.89	9.12	2.40	20.39	9.95	2.05
	12	7	28.19	6.64	4.25	26.99	7.17	3.76	25.59	7.76	3.30	24.19	8.42	2.87	22.59	9.16	2.47	20.89	10.02	2.08
	13	8	29.09	6.71	4.34	27.79	7.24	3.84	26.39	7.82	3.37	24.89	8.49	2.93	23.29	9.23	2.52	21.59	10.06	2.15
	14	9	29.99	6.77	4.43	28.59	7.31	3.91	27.19	7.90	3.44	25.69	8.54	3.01	23.99	9.29	2.58	22.19	10.13	2.19
	15	10	30.99	6.83	4.54	29.59	7.37	4.01	28.09	7.96	3.53	26.39	8.62	3.06	24.69	9.34	2.64	22.89	10.18	2.25
	16	11	31.89	6.89	4.63	30.49	7.43	4.10	28.89	8.04	3.59	27.19	8.67	3.14	25.39	9.41	2.70	23.49	10.24	2.29
	17	12	32.89	6.96	4.73	31.39	7.50	4.19	29.69	8.10	3.67	27.99	8.75	3.20	26.19	9.48	2.76	24.19	10.31	2.35
CHGF 28	10	5	31.40	6.98	4.50	29.90	7.58	3.94	28.40	8.22	3.45	26.80	8.94	3.00	25.10	9.76	2.57	23.40	10.70	2.19
	11	6	32.40	7.04	4.60	30.90	7.63	4.05	29.30	8.28	3.54	27.70	9.00	3.08	26.00	9.81	2.65	24.10	10.70	2.25
	12	7	33.40	7.08	4.72	31.90	7.68	4.15	30.30	8.34	3.63	28.60	9.05	3.16	26.80	9.86	2.72	24.90	10.80	2.31
	13	8	34.50	7.13	4.84	32.90	7.72	4.26	31.30	8.37	3.74	29.50	9.10	3.24	27.70	9.91	2.80	25.70	10.80	2.38
	14	9	35.60	7.17	4.97	33.90	7.78	4.36	32.20	8.43	3.82	30.40	9.16	3.32	28.50	9.97	2.86	26.50	10.90	2.43
	15	10	36.60	7.23	5.06	35.00	7.82	4.48	33.20	8.49	3.91	31.30	9.21	3.40	29.40	10.02	2.93	27.30	10.90	2.50
	16	11	37.80	7.27	5.20	36.10	7.87	4.59	34.20	8.54	4.00	32.30	9.27	3.48	30.30	10.07	3.01	28.20	11.00	2.56
	17	12	38.90	7.32	5.31	37.10	7.93	4.68	35.20	8.60	4.09	33.30	9.32	3.57	31.20	10.14	3.08	29.00	11.00	2.64
CHGF 32	10	5	35.00	8.04	4.35	33.40	8.73	3.83	31.80	9.50	3.35	30.10	10.34	2.91	28.20	11.30	2.50	26.20	12.40	2.11
	11	6	36.00	8.09	4.45	34.50	8.79	3.92	32.80	9.56	3.43	31.00	10.40	2.98	29.10	11.40	2.55	27.00	12.40	2.18
	12	7	37.10	8.14	4.56	35.50	8.83	4.02	33.80	9.59	3.52	32.00	10.50	3.05	30.00	11.40	2.63	27.80	12.50	2.22
	13	8	38.30	8.20	4.67	36.70	8.89	4.13	34.90	9.65	3.62	33.00	10.50	3.14	30.90	11.50	2.69	28.70	12.60	2.28
	14	9	39.40	8.23	4.79	37.70	8.95	4.21	35.90	9.72	3.69	33.90	10.60	3.20	31.80	11.50	2.77	29.60	12.60	2.35
	15	10	40.60	8.29	4.90	38.80	9.01	4.31	37.00	9.78	3.78	34.90	10.70	3.26	32.80	11.60	2.83	30.50	12.70	2.40
	16	11	41.80	8.35	5.01	40.00	9.07	4.41	38.10	9.84	3.87	36.00	10.70	3.36	33.80	11.70	2.89	31.40	12.80	2.45
	17	12	43.10	8.40	5.13	41.20	10.01	4.12	39.20	9.90	3.96	37.10	10.80	3.44	34.80	11.80	2.95	32.40	12.80	2.53
CHGF 40	10	5	44.46	9.87	4.50	42.26	10.84	3.90	40.06	11.84	3.38	37.66	13.04	2.89	35.16	14.34	2.45	32.46	15.84	2.05
	11	6	45.76	9.93	4.61	43.66	10.84	4.03	41.36	11.84	3.49	38.96	13.04	2.99	36.36	14.34	2.54	33.56	15.84	2.12
	12	7	47.26	10.00	4.73	45.06	10.94	4.12	42.66	11.94	3.57	40.26	13.14	3.06	37.46	14.44	2.59	34.66	15.94	2.17
	13	8	48.76	10.04	4.86	46.46	10.94	4.25	43.96	12.04	3.65	41.46	13.24	3.13	38.66	14.54	2.66	35.76	15.94	2.24
	14	9	50.26	10.09	4.98	47.86	11.04	4.34	45.36	12.14	3.74	42.76	13.24	3.23	39.96	14.54	2.75	36.86	16.04	2.30
	15	10	51.76	10.16	5.09	49.36	11.14	4.43	46.76	12.14	3.85	44.06	13.34	3.30	41.16	14.64	2.81	38.06	16.14	2.36
	16	11	53.36	10.22	5.22	50.76	11.24	4.52	48.26	12.24	3.94	45.36	13.44	3.38	42.36	14.74	2.87	39.26	16.14	2.43
	17	12	54.96	10.29	5.34	52.36	11.24	4.66	49.66	12.34	4.02	46.76	13.44	3.48	43.66	14.84	2.94	40.36	16.24	2.49

5.1 - CHGF capacities in cold mode (contd.)

- **Tbs_1** Outside air temperature (dry bulb).
- **Tw in / out** Water inlet / outlet temperature.
- **PF** Cooling capacity.
- **PA** Power consumption.

EN14511	Tbs_1		20°C			25°C			30°C			35°C			40°C			45°C		
	Tw in	Tw out	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR
	°C	°C	kW	kW		kW	kW		kW	kW		kW	kW		kW	kW		kW	kW	
CHGF 55	10	5	60.77	14.49	4.19	58.17	15.69	3.71	55.17	16.99	3.25	52.17	18.59	2.81	48.97	20.29	2.41	45.57	22.19	2.05
	11	6	62.67	14.59	4.30	59.87	15.79	3.79	56.97	17.19	3.31	53.67	18.69	2.87	50.47	20.39	2.48	46.87	22.39	2.09
	12	7	64.47	14.69	4.39	61.67	15.89	3.88	58.57	17.29	3.39	55.37	18.79	2.95	51.87	20.49	2.53	48.27	22.39	2.16
	13	8	66.47	14.69	4.52	63.47	15.99	3.97	60.27	17.39	3.47	57.07	18.89	3.02	53.47	20.69	2.58	49.77	22.59	2.20
	14	9	68.47	14.79	4.63	65.27	16.09	4.06	62.07	17.49	3.55	58.67	18.99	3.09	55.07	20.79	2.65	51.17	22.69	2.26
	15	10	70.37	14.89	4.73	67.07	16.19	4.14	63.97	17.59	3.64	60.27	19.09	3.16	56.67	20.89	2.71	52.67	22.79	2.31
	16	11	72.17	15.09	4.78	69.07	16.29	4.24	65.67	17.69	3.71	61.97	19.19	3.23	58.17	20.99	2.77	54.27	22.89	2.37
	17	12	74.47	15.19	4.90	71.07	16.39	4.34	67.47	17.79	3.79	63.67	19.39	3.28	59.87	21.09	2.84	55.77	22.99	2.43
CHGF 70	10	5	78.13	18.04	4.33	74.53	19.74	3.78	70.93	21.64	3.28	66.63	23.74	2.81	62.24	26.24	2.37	57.44	29.04	1.98
	11	6	80.33	18.14	4.43	76.73	19.84	3.87	72.93	21.74	3.35	68.73	23.94	2.87	64.03	26.34	2.43	59.14	29.14	2.03
	12	7	82.53	18.34	4.50	79.03	20.04	3.94	74.93	21.84	3.43	70.63	24.04	2.94	65.93	26.44	2.49	60.94	29.24	2.08
	13	8	85.13	18.44	4.62	81.23	20.14	4.03	77.13	22.04	3.50	72.63	24.14	3.01	67.83	26.64	2.55	62.64	29.34	2.13
	14	9	87.43	18.64	4.69	83.43	20.24	4.12	79.33	22.14	3.58	74.53	24.34	3.06	69.63	26.74	2.60	64.33	29.54	2.18
	15	10	89.82	18.74	4.79	86.03	20.44	4.21	81.53	22.34	3.65	76.73	24.44	3.14	71.63	26.84	2.67	66.03	29.64	2.23
	16	11	92.62	18.94	4.89	88.33	20.64	4.28	83.63	22.54	3.71	78.93	24.64	3.20	73.63	27.04	2.72	68.03	29.84	2.28
	17	12	95.02	19.04	4.99	90.62	20.74	4.37	86.03	22.64	3.80	81.03	24.74	3.28	75.63	27.24	2.78	69.93	29.94	2.34
CHGF 76	10	5	85.64	20.92	4.09	81.64	22.82	3.58	77.04	25.12	3.07	72.54	27.62	2.63	67.54	30.42	2.22	62.24	33.72	1.85
	11	6	88.34	21.02	4.20	83.94	23.02	3.65	79.54	25.22	3.15	74.74	27.72	2.70	69.64	30.62	2.27	64.14	33.82	1.90
	12	7	90.84	21.12	4.30	86.34	23.12	3.73	81.84	25.32	3.23	76.94	27.92	2.76	71.74	30.72	2.34	66.04	33.92	1.95
	13	8	93.24	21.32	4.37	89.04	23.32	3.82	84.14	25.52	3.30	79.14	28.02	2.82	73.84	30.82	2.40	67.94	34.02	2.00
	14	9	96.24	21.42	4.49	91.44	23.42	3.90	86.74	25.72	3.37	81.24	28.22	2.88	75.84	31.02	2.44	69.94	34.12	2.05
	15	10	98.84	21.52	4.59	93.84	23.62	3.97	89.14	25.82	3.45	83.74	28.32	2.96	77.94	31.22	2.50	72.04	34.22	2.11
	16	11	101.44	21.72	4.67	96.94	23.72	4.09	91.44	26.02	3.51	86.24	28.52	3.02	80.24	31.32	2.56	74.04	34.32	2.16
	17	12	104.54	21.92	4.77	99.44	23.92	4.16	93.94	26.12	3.60	88.44	28.72	3.08	82.44	31.62	2.61	76.24	34.52	2.21

5.2 - PHRF CAPACITIES IN COLD MODE

- **Tbs_1** Outside air temperature (dry bulb).
- **Tw in / out** Water inlet / outlet temperature.
- **PF** Cooling capacity.
- **PA** Power consumption.

EN14511	Tbs_1		20°C			25°C			30°C			35°C			40°C			45°C		
	Tw in	Tw out	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR
	°C	°C	kW	kW		kW	kW		kW	kW		kW	kW		kW	kW		kW	kW	
PHRF 23	10	5	21.35	5.68	3.76	20.35	6.16	3.30	19.35	6.75	2.87	18.45	7.40	2.49	17.55	8.14	2.16	16.75	8.99	1.86
	11	6	21.95	5.68	3.86	20.95	6.19	3.38	19.95	6.79	2.94	18.95	7.45	2.54	18.15	8.18	2.22	17.25	9.03	1.91
	12	7	22.65	5.70	3.97	21.55	6.21	3.47	20.55	6.82	3.01	19.55	7.49	2.61	18.65	8.25	2.26	17.75	9.07	1.96
	13	8	23.35	5.72	4.08	22.25	6.24	3.57	21.15	6.85	3.09	20.15	7.53	2.68	19.15	8.29	2.31	18.25	9.14	2.00
	14	9	24.05	5.75	4.18	22.95	6.27	3.66	21.75	6.89	3.16	20.75	7.56	2.74	19.75	8.36	2.36	18.75	9.21	2.04
	15	10	24.75	5.78	4.28	23.65	6.31	3.75	22.45	6.92	3.24	21.35	7.64	2.79	20.25	8.40	2.41	19.25	9.27	2.08
	16	11	25.45	5.81	4.38	24.25	6.34	3.82	23.15	6.96	3.33	21.95	7.67	2.86	20.85	8.46	2.46	19.85	9.30	2.13
	17	12	26.25	5.85	4.49	24.95	6.40	3.90	23.75	7.02	3.38	22.65	7.71	2.94	21.45	8.50	2.52	20.45	9.36	2.18
PHRF 27	10	5	25.88	6.49	3.99	24.78	7.01	3.53	23.58	7.61	3.10	22.28	8.25	2.70	20.88	9.01	2.32	19.28	9.88	1.95
	11	6	26.68	6.54	4.08	25.58	7.07	3.62	24.28	7.66	3.17	22.98	8.38	2.74	21.48	9.08	2.37	19.98	9.91	2.02
	12	7	27.58	6.60	4.18	26.48	7.13	3.71	25.08	7.72	3.25	23.68	8.38	2.83	22.18	9.12	2.43	20.48	9.98	2.05
	13	8	28.48	6.67	4.27	27.28	7.20	3.79	25.88	7.78	3.33	24.38	8.45	2.89	22.88	9.19	2.49	21.18	10.02	2.11
	14	9	29.38	6.73	4.37	28.08	7.27	3.86	26.68	7.86	3.39	25.18	8.50	2.96	23.48	9.25	2.54	21.78	10.09	2.16
	15	10	30.28	6.79	4.46	28.98	7.33	3.95	27.48	7.92	3.47	25.88	8.58	3.02	24.18	9.30	2.60	22.38	10.14	2.21
	16	11	31.28	6.85	4.57	29.88	7.39	4.04	28.28	8.00	3.54	26.68	8.63	3.09	24.88	9.37	2.66	23.08	10.20	2.26
	17	12	32.18	6.92	4.65	30.68	7.46	4.11	29.08	8.06	3.61	27.38	8.71	3.14	25.58	9.44	2.71	23.68	10.27	2.31
PHRF 32	10	5	30.79	6.99	4.40	29.29	7.59	3.86	27.89	8.23	3.39	26.29	8.95	2.94	24.69	9.77	2.53	22.89	10.71	2.14
	11	6	31.69	7.05	4.50	30.29	7.64	3.96	28.79	8.29	3.47	27.19	9.01	3.02	25.49	9.82	2.60	23.59	10.71	2.20
	12	7	32.79	7.09	4.62	31.29	7.69	4.07	29.69	8.35	3.56	27.99	9.06	3.09	26.29	9.87	2.66	24.39	10.81	2.26
	13	8	33.79	7.14	4.73	32.29	7.73	4.18	30.59	8.38	3.65	28.89	9.11	3.17	27.09	9.92	2.73	25.19	10.81	2.33
	14	9	34.89	7.18	4.86	33.19	7.79	4.26	31.59	8.44	3.74	29.79	9.17	3.25	27.89	9.98	2.79	25.99	10.91	2.38
	15	10	35.89	7.24	4.96	34.29	7.83	4.38	32.49	8.50	3.82	30.69	9.22	3.33	28.79	10.03	2.87	26.79	10.91	2.46
	16	11	37.09	7.28	5.09	35.39	7.88	4.49	33.49	8.55	3.92	31.69	9.28	3.41	29.69	10.08	2.95	27.59	11.01	2.51
	17	12	38.19	7.33	5.21	36.39	7.94	4.58	34.49	8.61	4.01	32.59	9.33	3.49	30.59	10.15	3.01	28.39	11.01	2.58
PHRF 40	10	5	38.44	8.96	4.29	36.74	9.76	3.76	34.84	10.66	3.27	32.74	11.76	2.78	30.54	12.96	2.36	28.14	14.26	1.97
	11	6	39.74	9.03	4.40	37.94	9.84	3.86	35.94	10.76	3.34	33.84	11.76	2.88	31.44	12.96	2.43	29.04	14.36	2.02
	12	7	40.94	9.08	4.51	39.14	9.89	3.96	37.04	10.86	3.41	34.84	11.86	2.94	32.44	13.06	2.48	29.94	14.36	2.08
	13	8	42.24	9.16	4.61	40.24	9.97	4.04	38.14	10.86	3.51	35.54	11.96	2.97	33.54	13.06	2.57	30.84	14.46	2.13
	14	9	43.54	9.24	4.71	41.54	10.04	4.14	39.34	10.96	3.59	37.04	11.96	3.10	34.54	13.16	2.62	31.74	14.56	2.18
	15	10	44.74	9.32	4.80	42.74	10.12	4.22	40.54	11.06	3.67	38.14	12.06	3.16	35.54	13.26	2.68	32.74	14.56	2.25
	16	11	46.14	9.40	4.91	44.04	10.19	4.32	41.74	11.16	3.74	39.24	12.16	3.23	36.64	13.36	2.74	33.74	14.66	2.30
	17	12	47.44	9.48	5.00	45.34	10.27	4.41	42.94	11.16	3.85	40.44	12.26	3.30	37.64	13.36	2.82	34.74	14.76	2.35
PHRF 46	10	5	43.56	9.87	4.41	41.46	10.84	3.82	39.26	11.84	3.32	36.96	13.04	2.83	34.46	14.34	2.40	31.86	15.84	2.01
	11	6	44.86	9.93	4.52	42.76	10.84	3.94	40.56	11.84	3.43	38.16	13.04	2.93	35.66	14.34	2.49	32.86	15.84	2.07
	12	7	46.36	10.00	4.64	44.16	10.94	4.04	41.86	11.94	3.51	39.46	13.14	3.00	36.76	14.44	2.55	33.96	15.94	2.13
	13	8	47.76	10.04	4.76	45.56	10.94	4.16	43.16	12.04	3.58	40.66	13.24	3.07	37.86	14.54	2.60	35.06	15.94	2.20
	14	9	49.26	10.09	4.88	46.96	11.04	4.25	44.46	12.14	3.66	41.96	13.24	3.17	39.16	14.54	2.69	36.16	16.04	2.25
	15	10	50.76	10.16	5.00	48.36	11.14	4.34	48.36	12.14	3.98	43.16	13.34	3.24	40.36	14.64	2.76	37.26	16.14	2.31
	16	11	52.36	10.22	5.12	49.76	11.24	4.43	47.26	12.24	3.86	44.56	13.44	3.32	41.56	14.74	2.82	38.46	16.14	2.38
	17	12	53.86	10.29	5.23	51.36	11.24	4.57	48.66	12.34	3.94	45.86	13.44	3.41	42.76	14.84	2.88	39.56	16.24	2.44

5.2 - PHRF capacities in cold mode (contd.)

- **Tbs_1** Outside air temperature (dry bulb).
- **Tw in / out** Water inlet / outlet temperature.
- **PF** Cooling capacity.
- **PA** Power consumption.

EN14511	Tbs_1		20°C			25°C			30°C			35°C			40°C			45°C		
	Tw in	Tw out	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR	PF	PA	ERR
	°C	°C	kW	kW		kW	kW		kW	kW		kW	kW		kW	kW		kW	kW	
PHRF 60	10	5	59.56	14.50	4.11	57.01	15.70	3.63	54.07	17.00	3.18	51.13	18.60	2.75	48.00	20.30	2.36	44.66	22.20	2.01
	11	6	61.42	14.60	4.21	58.68	15.80	3.71	55.84	17.20	3.25	52.60	18.70	2.81	49.47	20.40	2.42	45.94	22.40	2.05
	12	7	63.19	14.70	4.30	60.44	15.90	3.80	57.40	17.30	3.32	54.27	18.80	2.89	50.84	20.50	2.48	47.31	22.40	2.11
	13	8	65.15	14.70	4.43	62.21	16.00	3.89	59.07	17.40	3.39	55.93	18.90	2.96	52.41	20.70	2.53	48.78	22.60	2.16
	14	9	67.11	14.80	4.53	63.97	16.10	3.97	60.83	17.50	3.48	57.50	19.00	3.03	53.97	20.80	2.59	50.15	22.70	2.21
	15	10	68.97	14.90	4.63	65.73	16.20	4.06	62.70	17.60	3.56	59.07	19.10	3.09	55.54	20.90	2.66	51.62	22.80	2.26
	16	11	70.73	15.10	4.68	67.69	16.30	4.15	64.36	17.70	3.64	60.74	19.20	3.16	57.01	21.00	2.71	53.19	22.90	2.32
	17	12	72.99	15.20	4.80	69.65	16.40	4.25	66.13	17.80	3.71	62.40	19.40	3.22	58.68	21.10	2.78	54.66	23.00	2.38
PHRF 77	10	5	76.60	18.05	4.24	73.08	19.75	3.70	69.55	21.65	3.21	65.33	23.75	2.75	61.02	26.25	2.32	56.32	29.05	1.94
	11	6	78.76	18.15	4.34	75.23	19.85	3.79	71.51	21.75	3.29	67.39	23.95	2.81	62.79	26.35	2.38	57.98	29.15	1.99
	12	7	80.92	18.35	4.41	77.49	20.05	3.86	73.47	21.85	3.36	69.25	24.05	2.88	64.65	26.45	2.44	59.75	29.25	2.04
	13	8	83.46	18.45	4.52	79.64	20.15	3.95	75.62	22.05	3.43	71.21	24.15	2.95	66.51	26.65	2.50	61.41	29.35	2.09
	14	9	85.72	18.65	4.60	81.80	20.25	4.04	77.78	22.15	3.51	73.08	24.35	3.00	68.27	26.75	2.55	63.08	29.55	2.13
	15	10	88.07	18.75	4.70	84.35	20.45	4.12	79.94	22.35	3.58	75.23	24.45	3.08	70.23	26.85	2.62	64.75	29.65	2.18
	16	11	90.81	18.95	4.79	86.60	20.65	4.19	81.99	22.55	3.64	77.39	24.65	3.14	72.19	27.05	2.67	66.71	29.85	2.23
	17	12	93.17	19.05	4.89	88.85	20.75	4.28	84.35	22.65	3.72	79.45	24.75	3.21	74.15	27.25	2.72	68.57	29.95	2.29
PHRF 85	10	5	83.93	20.93	4.01	80.01	22.83	3.50	75.51	25.13	3.00	71.10	27.63	2.57	66.20	30.43	2.18	61.00	33.73	1.81
	11	6	86.58	21.03	4.12	82.27	23.03	3.57	77.96	25.23	3.09	73.25	27.73	2.64	68.25	30.63	2.23	62.86	33.83	1.86
	12	7	89.03	21.13	4.21	84.62	23.13	3.66	80.21	25.33	3.17	75.41	27.93	2.70	70.31	30.73	2.29	64.73	33.93	1.91
	13	8	91.38	21.33	4.28	87.27	23.33	3.74	82.46	25.53	3.23	77.56	28.03	2.77	72.37	30.83	2.35	66.59	34.03	1.96
	14	9	94.32	21.43	4.40	89.62	23.43	3.82	85.01	25.73	3.30	79.62	28.23	2.82	74.33	31.03	2.40	68.55	34.13	2.01
	15	10	96.87	21.53	4.50	91.97	23.63	3.89	87.36	25.83	3.38	82.07	28.33	2.90	76.39	31.23	2.45	70.61	34.23	2.06
	16	11	99.42	21.73	4.58	95.01	23.73	4.00	89.62	26.03	3.44	84.52	28.53	2.96	78.64	31.33	2.51	72.57	34.33	2.11
	17	12	102.46	21.93	4.67	97.46	23.93	4.07	92.07	26.13	3.52	86.68	28.73	3.02	80.80	31.63	2.55	74.72	34.53	2.16

5.3 - PHRF CAPACITIES IN HOT MODE

- **Tbs_1** Outside air temperature (dry bulb).
- **Tw in / out** Water inlet / outlet temperature.
- **PT** Heating capacity.
- **PA** Power consumption.

EN14511	Tbs_1		-10°C			-7°C			-5°C			0°C			7°C			15°C			20°C		
	Tw in	Tw out	PT	PA	COP	PT	PA	COP	PT	PA	COP	PT	PA	COP	PT	PA	COP	PT	PA	COP	PT	PA	COP
	°C	°C	kW	kW		kW	kW		kW	kW		kW	kW		kW	kW		kW	kW		kW	kW	
PHRF 23	25	30	16.97	7.08	2.40	17.81	6.82	2.61	18.37	6.65	2.76	20.07	6.30	3.19	23.17	5.97	3.88	27.77	5.79	4.80	30.07	5.77	5.21
	30	35	16.57	7.14	2.32	17.41	6.97	2.50	17.97	6.86	2.62	19.87	6.60	3.01	22.77	6.40	3.56	27.27	6.30	4.33	30.07	6.29	4.78
	35	40	16.27	7.30	2.23	17.17	7.21	2.38	17.77	7.15	2.49	19.67	7.00	2.81	22.57	6.92	3.26	27.07	6.90	3.92	29.57	6.91	4.28
	40	45	16.07	7.57	2.12	17.03	7.56	2.25	17.67	7.55	2.34	19.67	7.51	2.62	22.57	7.52	3.00	26.77	7.59	3.53	29.17	7.61	3.83
	45	50	16.07	7.93	2.03	17.09	8.00	2.14	17.77	8.05	2.21	19.77	8.13	2.43	22.67	8.24	2.75	26.57	8.34	3.19	28.97	8.39	3.45
PHRF 27	25	30	17.13	6.16	2.78	18.81	6.21	3.03	19.93	6.24	3.19	22.53	6.33	3.56	27.73	6.49	4.27	32.53	8.45	3.85	38.03	6.80	5.59
	30	35	17.23	6.69	2.58	18.91	6.76	2.80	20.03	6.80	2.95	22.53	6.89	3.27	27.43	7.05	3.89	33.63	7.25	4.64	37.13	7.36	5.04
	35	40	17.23	7.29	2.36	18.85	7.36	2.56	19.93	7.41	2.69	22.43	7.50	2.99	27.03	7.66	3.53	32.93	8.20	4.02	36.63	7.99	4.58
	40	45	17.33	7.95	2.18	18.89	8.04	2.35	19.93	8.10	2.46	22.33	8.22	2.72	26.83	8.38	3.20	32.73	8.34	3.92	35.73	8.66	4.13
	45	50	17.43	8.71	2.00	18.87	8.82	2.14	19.83	8.90	2.23	22.73	9.08	2.50	26.33	9.20	2.86	31.53	9.32	3.38	34.73	9.42	3.69
PHRF 32	25	30	19.80	6.88	2.88	21.84	6.96	3.14	23.20	7.02	3.30	26.70	7.15	3.73	32.50	7.34	4.43	40.00	7.52	5.32	44.20	7.61	5.81
	30	35	19.60	7.50	2.61	21.58	7.60	2.84	22.90	7.66	2.99	26.30	7.77	3.38	32.10	7.98	4.02	38.90	8.18	4.76	43.00	8.27	5.20
	35	40	19.50	8.20	2.38	21.30	8.28	2.57	22.50	8.34	2.70	25.90	8.49	3.05	31.50	8.68	3.63	37.80	8.88	4.26	41.80	8.97	4.66
	40	45	19.30	8.96	2.15	21.10	9.07	2.33	22.30	9.15	2.44	25.50	9.31	2.74	30.80	9.52	3.24	36.90	9.67	3.82	40.60	9.77	4.16
	45	50	19.30	9.82	1.97	20.92	9.96	2.10	22.00	10.06	2.19	25.20	10.27	2.45	30.10	10.40	2.89	35.80	10.60	3.38	39.30	10.60	3.71
PHRF 40	25	30	25.57	8.62	2.97	28.03	8.69	3.22	29.67	8.74	3.39	34.47	8.82	3.91	40.57	8.96	4.53	49.97	9.16	5.46	55.47	9.28	5.98
	30	35	25.87	9.51	2.72	28.03	9.56	2.93	29.47	9.59	3.07	33.97	9.69	3.51	39.97	9.79	4.08	49.07	9.96	4.93	54.37	10.11	5.38
	35	40	25.67	10.47	2.45	27.83	10.53	2.64	29.27	10.57	2.77	33.47	10.67	3.14	39.17	10.77	3.64	47.97	10.97	4.37	52.97	11.07	4.79
	40	45	25.47	11.57	2.20	27.63	11.63	2.38	29.07	11.67	2.49	33.17	11.77	2.82	38.67	11.97	3.23	47.47	11.97	3.97	52.07	12.07	4.31
	45	50	25.37	12.77	1.99	27.47	12.89	2.13	28.87	12.97	2.23	32.77	13.07	2.51	37.87	13.17	2.88	46.17	13.27	3.48	50.57	13.27	3.81
PHRF 46	25	30	29.77	10.12	2.94	32.53	10.10	3.22	34.37	10.09	3.41	38.57	10.12	3.81	46.77	10.16	4.60	57.67	10.29	5.60	63.47	10.28	6.17
	30	35	29.27	11.17	2.62	31.85	11.17	2.85	33.57	11.17	3.01	37.77	11.17	3.38	45.77	11.17	4.10	56.07	11.27	4.98	61.87	11.27	5.49
	35	40	28.87	12.27	2.35	31.51	12.27	2.57	33.27	12.27	2.71	37.37	12.27	3.05	44.87	12.27	3.66	54.67	12.27	4.46	60.17	12.27	4.90
	40	45	28.57	13.57	2.11	31.09	13.57	2.29	32.77	13.57	2.41	36.77	13.57	2.71	44.07	13.47	3.27	53.27	13.57	3.93	58.67	13.57	4.32
	45	50	28.37	14.97	1.90	30.83	14.97	2.06	32.47	14.97	2.17	36.47	14.97	2.44	43.37	14.97	2.90	51.97	14.87	3.49	57.57	14.87	3.87
PHRF 60	25	30	38.82	13.88	2.80	42.84	14.00	3.06	45.52	14.08	3.23	51.52	14.38	3.58	62.72	14.68	4.27	76.72	15.08	5.09	85.92	15.28	5.62
	30	35	38.42	15.08	2.55	42.26	15.26	2.77	44.82	15.38	2.91	50.62	15.58	3.25	61.62	15.98	3.86	76.22	16.38	4.65	83.72	16.48	5.08
	35	40	38.12	16.48	2.31	41.72	16.66	2.50	44.12	16.78	2.63	51.32	17.08	3.00	60.32	17.38	3.47	74.12	17.78	4.17	81.72	17.98	4.55
	40	45	37.82	17.88	2.12	41.36	18.12	2.28	43.72	18.28	2.39	50.42	18.68	2.70	59.12	18.98	3.11	72.32	19.38	3.73	79.62	19.48	4.09
	45	50	37.92	19.68	1.93	41.22	19.92	2.07	43.42	20.08	2.16	49.82	20.48	2.43	57.82	20.78	2.78	70.32	21.18	3.32	76.92	21.28	3.61
PHRF 77	25	30	50.27	17.33	2.90	53.87	17.47	3.08	56.27	17.57	3.20	65.97	17.77	3.71	79.97	18.07	4.43	96.47	18.37	5.25	106.17	18.67	5.69
	30	35	49.97	19.13	2.61	53.51	19.21	2.78	55.87	19.27	2.90	65.07	19.47	3.34	78.67	19.67	4.00	93.97	21.67	4.34	104.07	20.27	5.13
	35	40	49.67	20.93	2.37	53.15	21.07	2.52	55.47	21.17	2.62	64.07	21.37	3.00	77.27	21.67	3.57	91.47	23.27	3.93	101.77	22.17	4.59
	40	45	49.37	23.03	2.14	52.85	23.23	2.27	55.17	23.37	2.36	63.47	23.57	2.69	75.67	23.87	3.17	90.47	24.07	3.76	100.17	24.27	4.13
	45	50	49.17	25.43	1.93	53.37	25.73	2.07	56.17	25.93	2.17	62.47	26.17	2.39	73.97	26.37	2.81	88.87	26.47	3.36	97.37	26.57	3.66
PHRF 85	25	30	56.47	20.53	2.75	60.25	20.47	2.94	62.77	20.43	3.07	73.07	20.53	3.56	88.17	20.63	4.27	101.97	27.13	3.76	117.87	20.83	5.66
	30	35	55.47	22.63	2.45	59.31	22.57	2.63	61.87	22.53	2.75	71.67	22.53	3.18	86.47	22.63	3.82	100.17	28.53	3.51	115.47	22.83	5.06
	35	40	55.07	24.83	2.22	58.73	24.77	2.37	61.17	24.73	2.47	70.97	24.73	2.87	85.47	24.83	3.44	98.27	30.03	3.27	112.37	24.93	4.51
	40	45	54.47	27.33	1.99	58.13	27.33	2.13	60.57	27.33	2.22	69.87	27.33	2.56	83.97	27.23	3.08	100.47	28.23	3.56	109.77	27.33	4.02
	45	50	54.07	30.13	1.79	57.79	30.13	1.92	60.27	30.13	2.00	69.27	30.13	2.30	82.27	30.13	2.73	97.77	30.53	3.20	108.47	30.03	3.61

6 - SOUND LEVELS

- **LpA** Overall A-weighted sound pressure measured at 10 metres from the ground with directivity factor equal to 2.
- **Lw** Sound pressure level per octave band, not weighted.
- **LwA** Overall A-weighted sound pressure level.

Model	Lw							Lw A	Lp A
	125 Hz	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	Overall	Overall
	dB	dB	dB	dB	dB	dB	dB	dB (A)	dB (A)
CHGF 20	76.6	70.3	69.7	65.6	58.4	53.4	49.6	71	43
CHGF 24	77.5	71.1	70.5	66.5	59.2	54.2	50.5	72	44
CHGF 28	78.4	72.1	71.5	67.4	60.2	55.2	51.5	73	45
CHGF 32	78.4	72.1	71.5	67.4	60.2	55.2	51.5	73	45
CHGF 40	80.4	74	73.4	69.4	62.1	57.2	53.4	75	47
CHGF 55	79.7	83.5	77.5	76.9	70	63.7	62.2	81	53
CHGF 70	79.7	83.5	77.5	76.9	70	63.7	62.2	81	53
CHGF 76	79.7	83.5	77.5	76.9	70	63.7	62.2	81	53
PHRF 23	76.6	70.3	69.7	65.6	58.4	53.4	49.6	71	43
PHRF 27	77.5	71.1	70.5	66.5	59.2	54.2	50.5	72	44
PHRF 32	78.4	72.1	71.5	67.4	60.2	55.2	51.5	73	45
PHRF 40	78.8	72.4	71.8	67.8	60.5	55.6	51.8	73	45
PHRF 46	80.4	74	73.4	69.4	62.1	57.2	53.4	75	47
PHRF 60	79.7	83.5	77.5	76.9	70	63.7	62.2	81	53
PHRF 77	79.7	83.5	77.5	76.9	70	63.7	62.2	81	53
PHRF 85	79.7	83.5	77.5	76.9	70	63.7	62.2	81	53

7 - OPERATING LIMITS

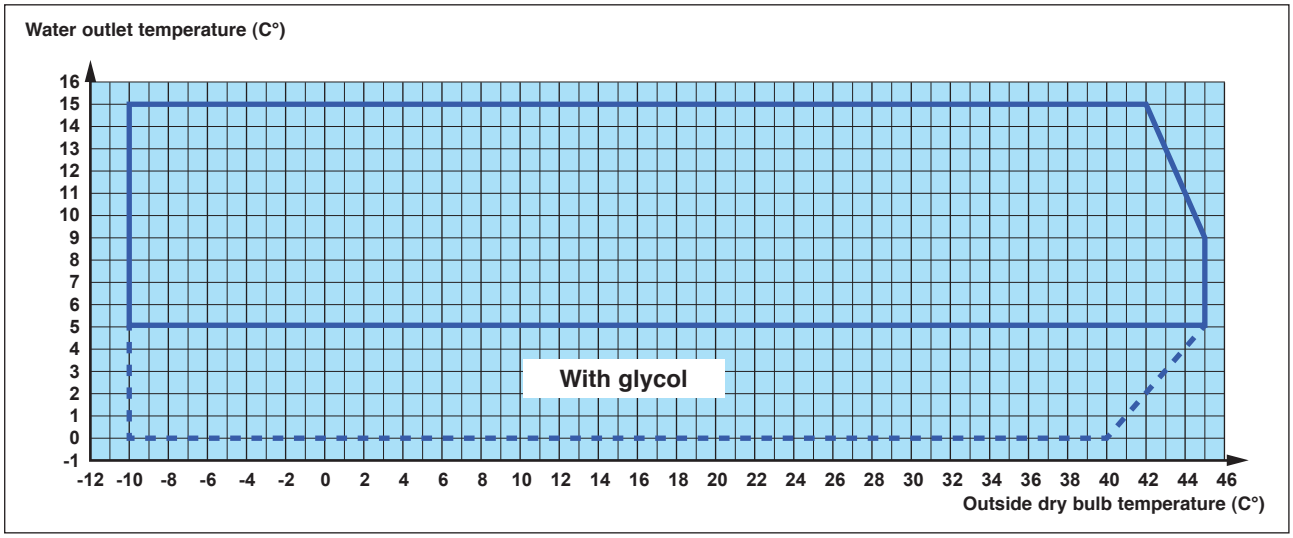
The following graphs show the continuous operating limits according to the water outlet temperature of the unit and the outside air temperature.

Caution:

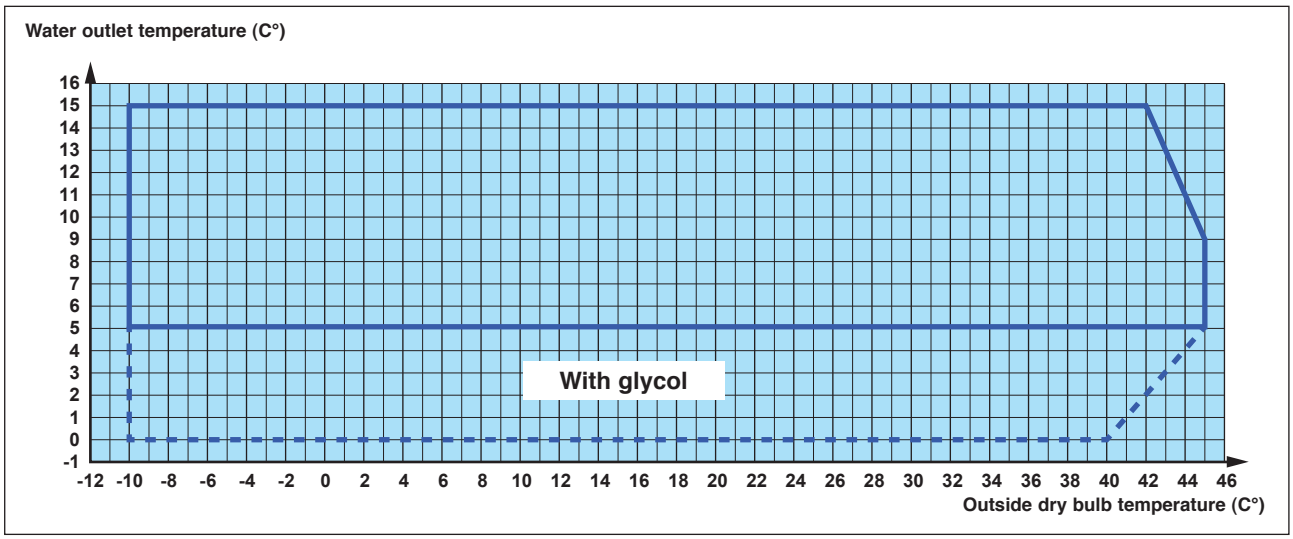
The units are designed to operate when the water and air temperatures are below the limits laid down. The unit may incur irreparable damage beyond these limits.

7.1 - OPERATING LIMITS IN CHILLER OPERATING MODE

CHGV 20/76

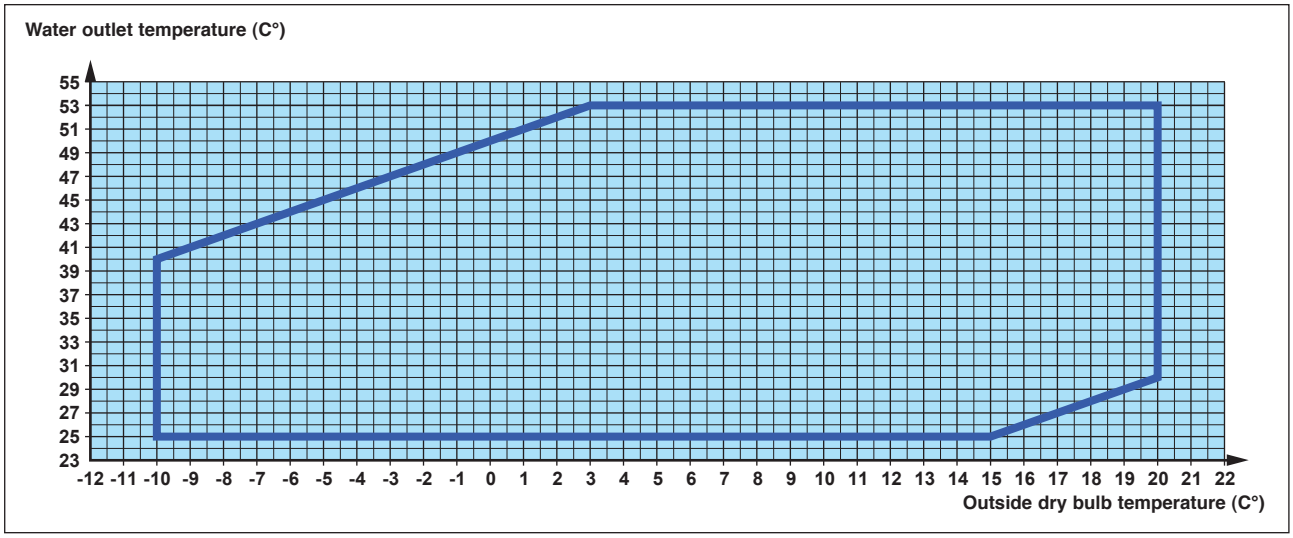


PHRF 23/85



7.2 - OPERATING LIMITS IN HEAT PUMP MODE

PHRF 23/85



8 - CALCULATION FACTORS

8.1 - VARIATION IN OPERATING PARAMETERS WITH ΔT DIFFERENCE OF 5°C

- Once the performance of the unit relating to the outlet water temperature desired is found, multiply it by the following correction coefficients:

DT_w Difference in temperature between water inlet and outlet.

$C_{PF/PT}$ Cooling / heating capacity correction coefficient.

C_{PA} Power consumption correction coefficient.

C_{Qw} Water flow rate correction coefficient.

C_{Dpw1} Headloss correction coefficient.

DT_w	$C_{PF/PT}$	C_{PA}	C_{Qw}	C_{Dpw1}
3	0.975	1	1.63	2.64
4	0.99	1	1.24	1.53
5	1	1	1	1
6	1.015	1	0.85	0.72
7	1.03	1	0.74	0.54
8	1.04	1	0.65	0.42

8.2 - GLYCOL MIXTURE

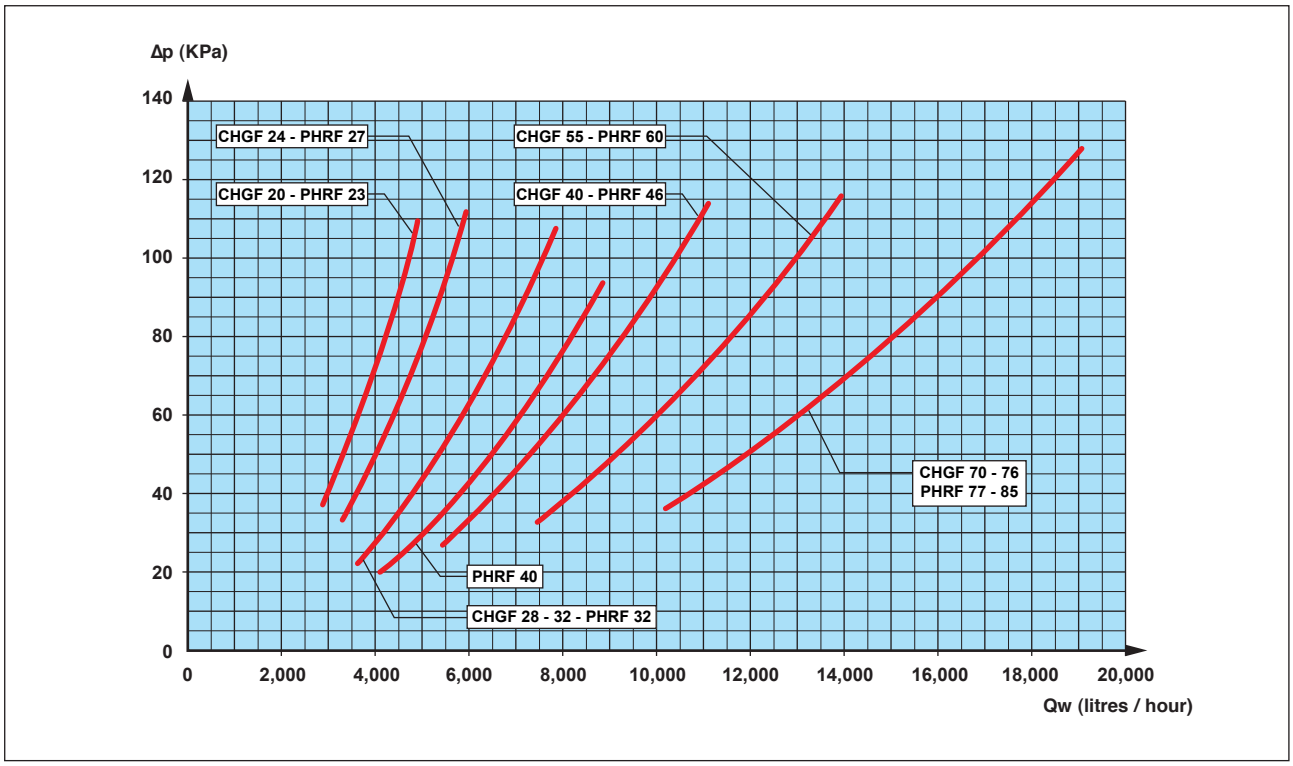
- From the minimum temperature of the water produced, calculate the percentage of glycol and the correction coefficient from the following table:

Percentage of glycol	**0%**	**10%**	**20%**	**30%**
Minimum temperature of water produced	5°C	2°C	0°C	_
Mixture gel temperature	0°C	- 4°C	- 14°C	- 18°C
Output power correction factor	1	0.998	0.994	_
Water flow rate correction factor	1	1.047	1.094	_
Headloss correction factor	1	1.157	1.352	_

9 - HEADLOSSES

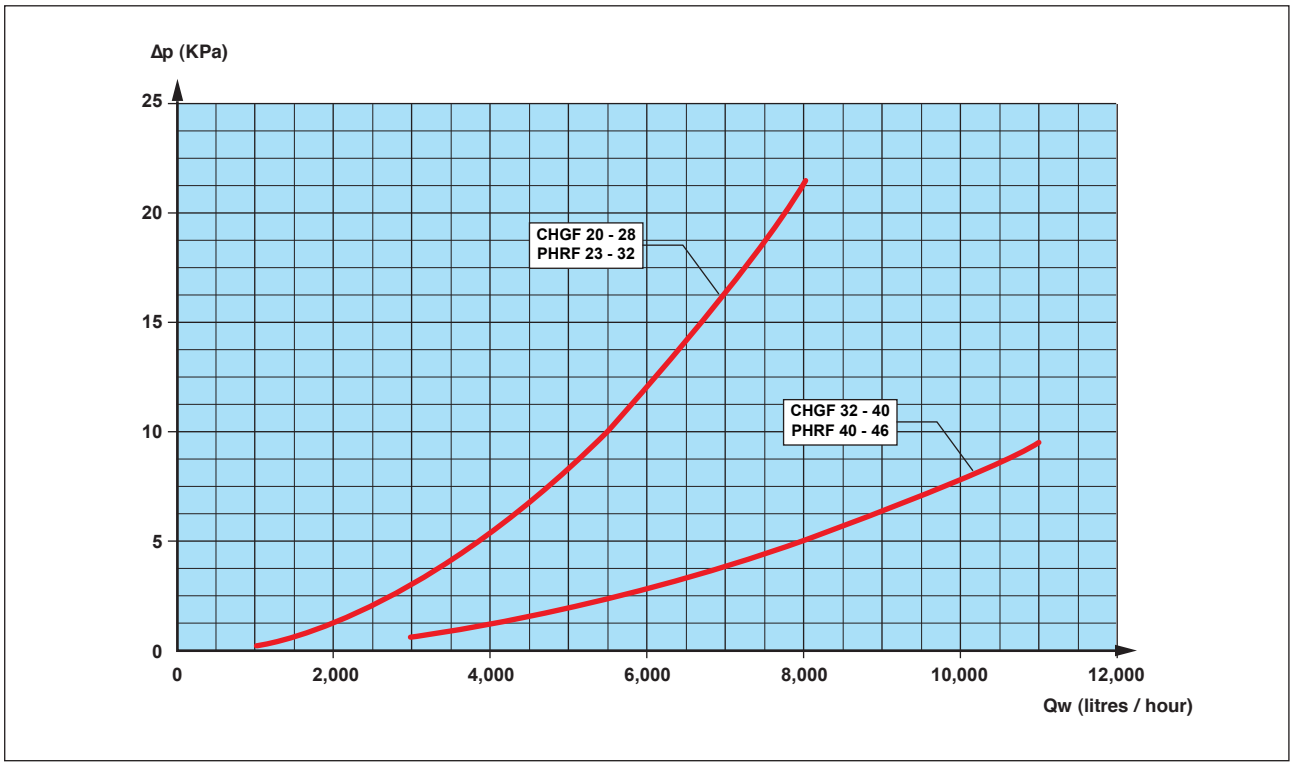
9.1 - HEADLOSSES WATER END

• The following diagrams provide the headlosses of the evaporator (Δp) according to the water flow rate (Qw), for a temperature of 10°C:



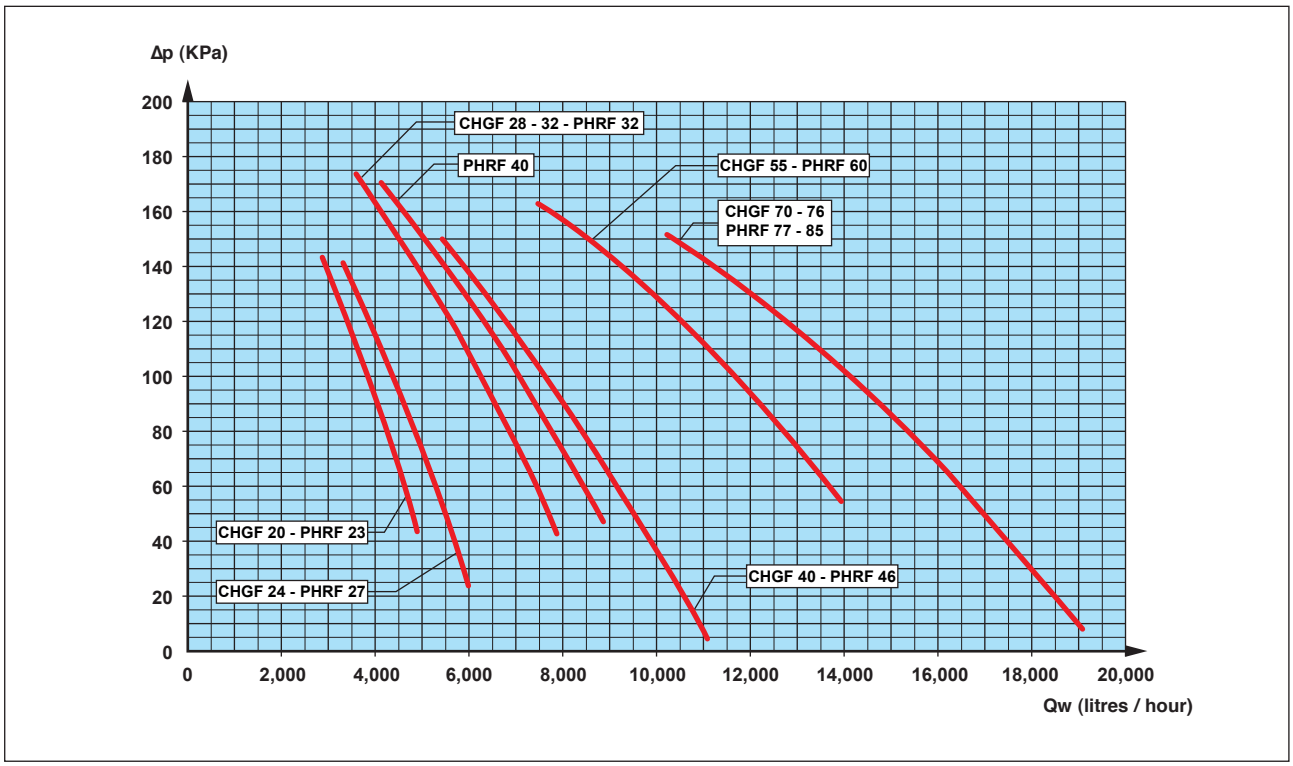
9.2 - Y FILTER HEADLOSSES

• The following diagrams provide the Y filter headlosses (Δp) according to the water flow rate (Qw), for a temperature of 10°C:



9.3 - PRESSURE HEAD AVAILABLE

- The following diagram provides the pressure head available of the units (Pu) according to the water flow rate (Qw), for a temperature of 10°C, less headlosses of the unit. The Y filter headlosses are not taken into account:

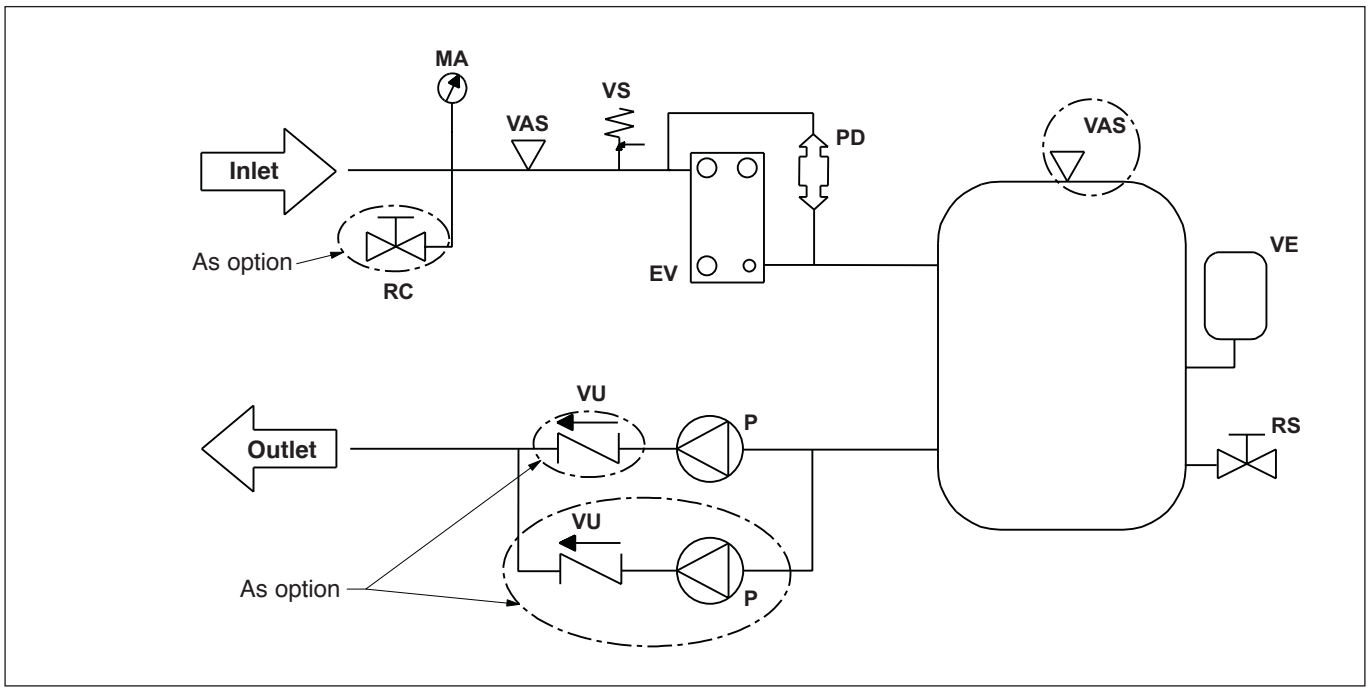


10 - HYDRAULIC CIRCUIT DIAGRAM

EVAPORATOR, PUMP AND TANK

Legend:

VS Safety valve.
EV Evaporator.
PD Differential pressure switch.
MA Water pressure gauge.
VAS Air bleeder valve.
VE Expansion vessel.
P Pump.
RS Drain valve.
RC Water charge valve.
VU Unidirectional valve.



11 - ELECTRICAL DATA

CHGF model		20	24	28	32	40	55	70	76
Maximum power consumption	kW	13.6	14.5	18.3	18.9	22.4	27	32.3	39.4
Maximum input current	A	21.7	24	28.6	32.4	36.4	48	57	69
Starting current (*)	A	68	103	87	108	108	117	136	154
Fan motor power rating	kW	0.135	0.135	0.320	0.320	0.320	0.400	0.400	0.400
Fan current rating	A	0.64	0.64	1.75	1.75	1.75	1.80	1.80	1.80
Pump power rating	kW	0.37	0.37	0.55	0.55	0.55	1.30	1.30	1.30
Pump current rating	A	2	2	3	3	3	5.90	5.90	5.90
Power supply	V-Ph-Hz	400 - 3N - 50							
Auxiliary power supply	V-Ph-Hz	230 - 1 - 50							
Power cable cross section	mm^2	6	10	10	10	10	16	25	35
Protection rating	A	25	32	32	40	40	50	63	80

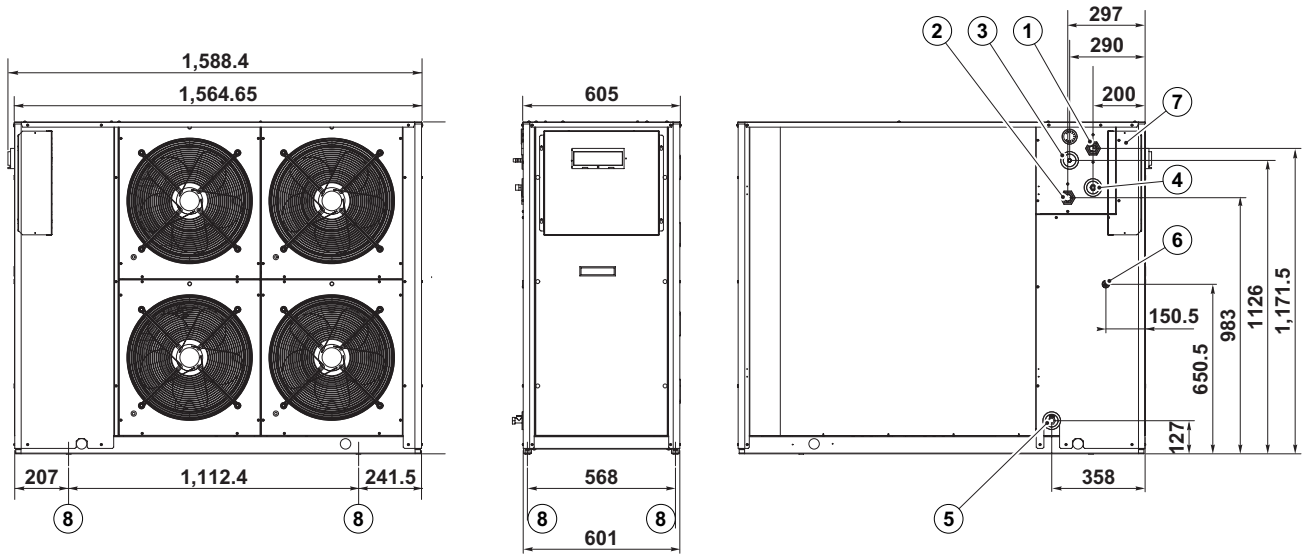
PHRF model		23	27	32	40	46	60	77	85
Maximum power consumption	kW	13.6	14.5	18.3	21.8	22.4	27	32.3	39.4
Maximum input current	A	21.7	24	28.6	35.2	36.4	48	57	69
Starting current (*)	A	68	103	87	108	108	117	136	154
Fan motor power rating	kW	0.135	0.135	0.320	0.320	0.320	0.400	0.400	0.400
Fan current rating	A	0.64	0.64	1.75	1.75	1.75	1.80	1.80	1.80
Pump power rating	kW	0.37	0.37	0.55	0.55	0.55	1.30	1.30	1.30
Pump current rating	A	2	2	3	3	3	5.90	5.90	5.90
Power supply	V-Ph-Hz	400 - 3N - 50							
Auxiliary power supply	V-Ph-Hz	230 - 1 - 50							
Power cable cross section	mm^2	6	10	10	10	10	16	25	35
Protection rating	A	25	32	32	40	40	50	63	80

- The maximum power consumption is the power consumption of the mains power supply required for the unit to operate.
- The maximum input current is the current level at which the internal protective devices of the unit are tripped. This value is the maximum allowable current on the unit.
- It must never be exceeded and must be used to size the power line and corresponding protective devices (refer to the wiring diagram supplied with the units).

(*) The starting currents indicated take the electronic starter into account.

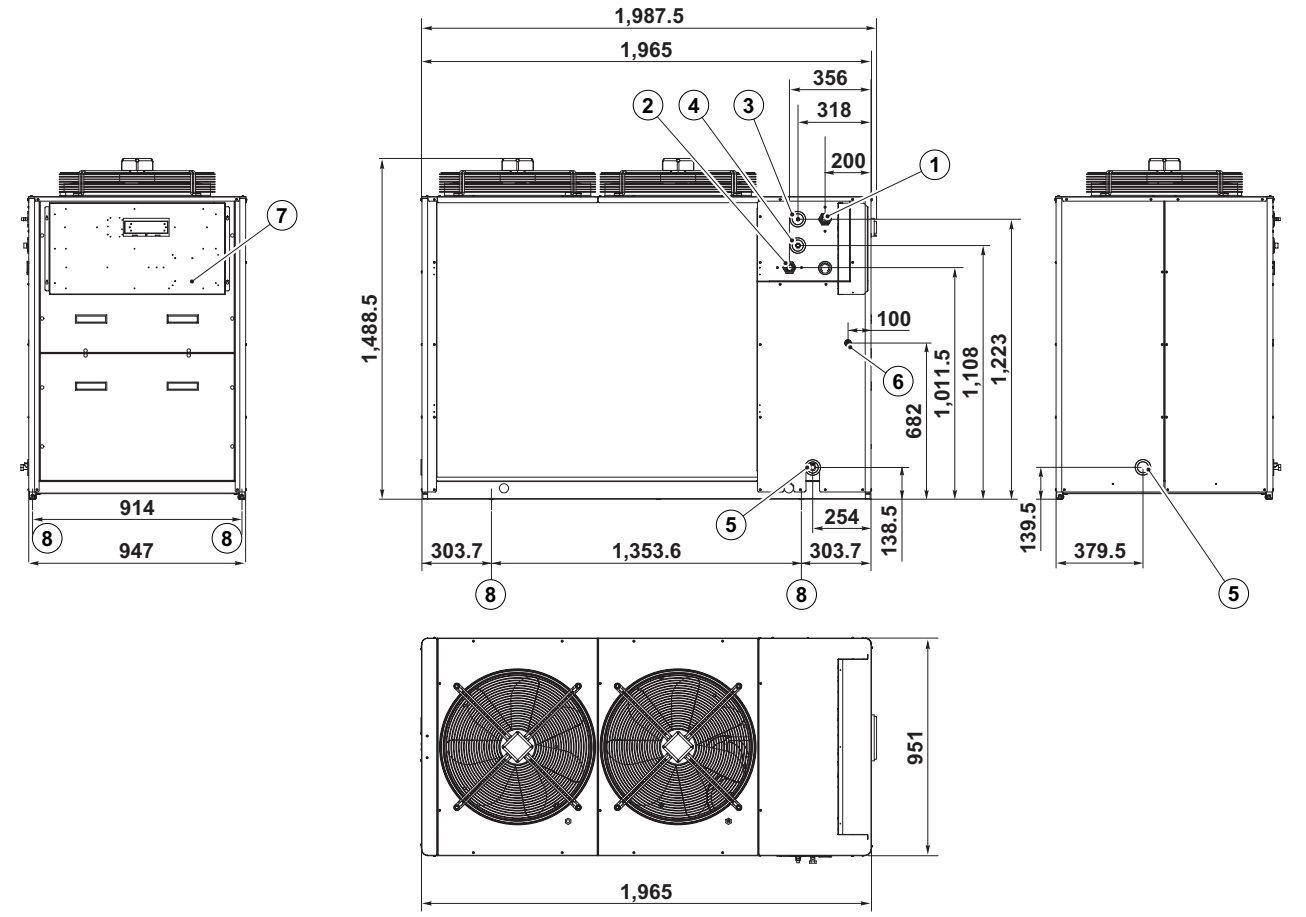
12 - OVERALL DIMENSIONS

12.1 - CHGF 20-24 / PHRF 23-27



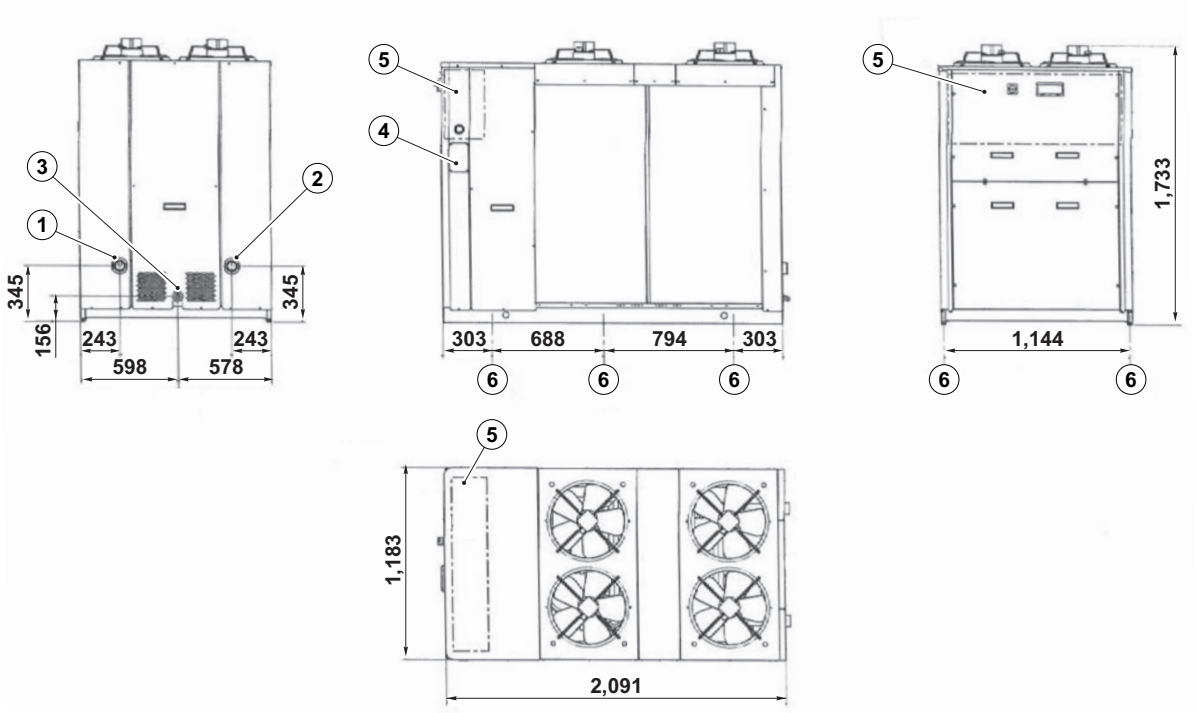
1 - Water inlet, female 1”1/4.
2 - Water outlet, female 1”1/4.
3 - Safety valve discharge.
4 - Water supply, female 1/2”.
5 - Water drain, female 1/2”.
6 - Power supply.
7 - Electric panel.
8 - Bearing point.

12.2 - CHGF 28-40 / PHRF 32-46



1 - Water inlet, female 1”1/4.
2 - Water outlet, female 1”1/4.
3 - Safety valve discharge.
4 - Water supply, female 1/2”.
5 - Water drain, female 1/2”.
6 - Power supply.
7 - Electric panel.
8 - Bearing point.

12.3 - CHGF 55-76 / PHRF 60-85

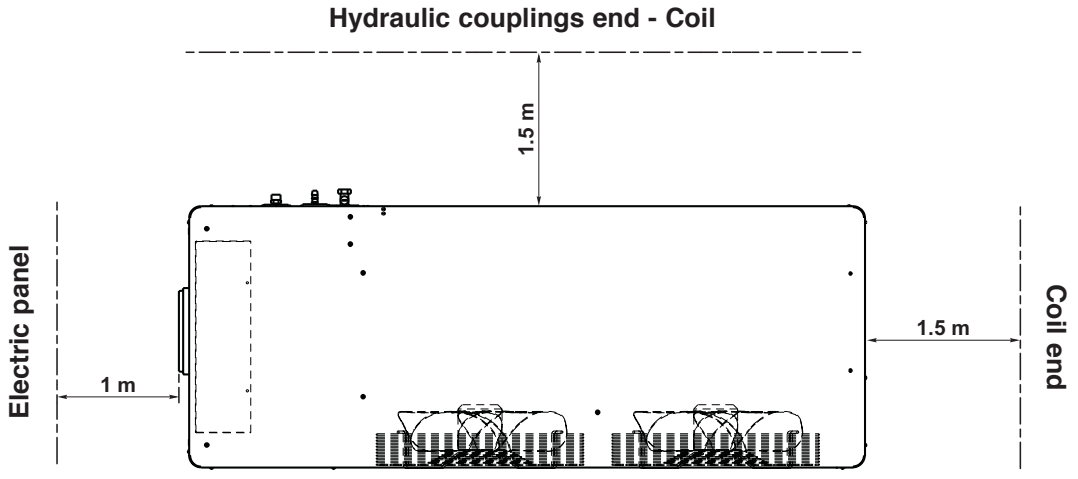


1 - Water inlet, female 2".
2 - Water outlet, female 2".
3 - Water supply, female 1/2".
4 - Power supply.
5 - Electric panel.
6 - Bearing point.

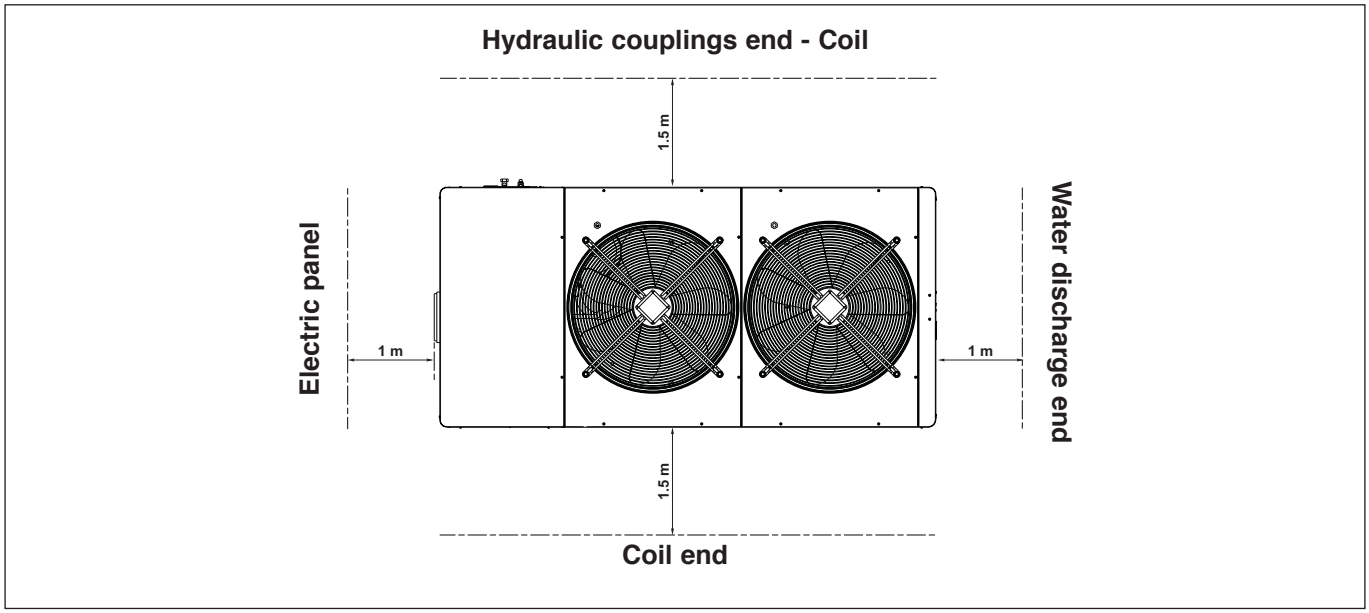
13 - SPACE REQUIRED FOR INSTALLATION

To guarantee correct operation of the unit and the required space for maintenance operations, make sure the minimum installation spaces shown in the following figures are adhered to.
There should be no obstacle at the air outlet of the fans.
Avoid any hot air recirculation between the air blowing and suction of the equipment.
For all cases where only one of the previous conditions was not adhered to, contact the manufacturer in order to conduct a check for reliability.

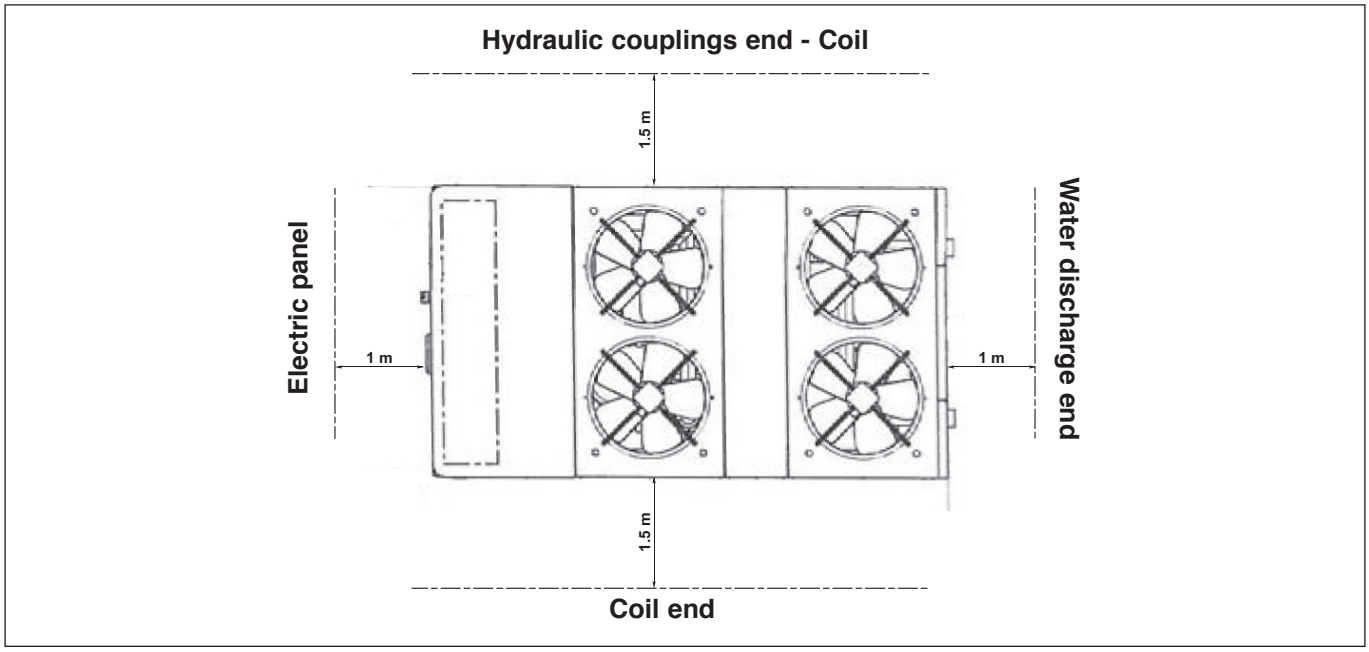
13.1 - CLEARANCE FOR CHGF 20-24 / PHRF 23-27



13.2 - CLEARANCE FOR CHGF 28-40 / PHRF 32-46



13.3 - CLEARANCE FOR CHGF 55-76 / PHRF 60-85



Due to our policy of continuous development, our products are liable to modification without notice.

Technibel

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