

COBALT FC

Chiller with integrated Free Cooling air/water 327÷1186



General

Chiller with integrated Free Cooling air/water with semi-hermetic screw compressors and tube bundle evaporator.

Configurations

DS: Desuperheater

LN: Low sound level

Optional pump-/tank module

Quick facts

- High energy efficiency
- Wide configurability
- Electronic expansion valve as standard

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TECHNICAL FEATURES

COBALT FC Free Cooling water chiller

The FREE COOLING units answer the growing requirements for energy saving, as conceived to reduce working costs of the chiller machines operating for more or less long periods during the year, at low room temperatures.

A key feature of the Free Cooling unit is certainly the control system which enables to use the free resource constituted by the outside air to the maximum, minimising the energy consumed by the compression system.

Privileging the energy saving, the control activated the suitable functioning condition depending on the detection carried out by the temperature probes on the outside air and reference water.

In fact, the Free Cooling coil is located as standard to the cooling circuit evaporator and a servo-controlled three-way valve enables the by-pass of the same coil when its efficiency is too low due to a high external temperature. Vice-versa, whenever the climatic conditions allow it, the Free Cooling coil enables to cool the secondary fluid using the external air, thus reducing the use of the compressors.

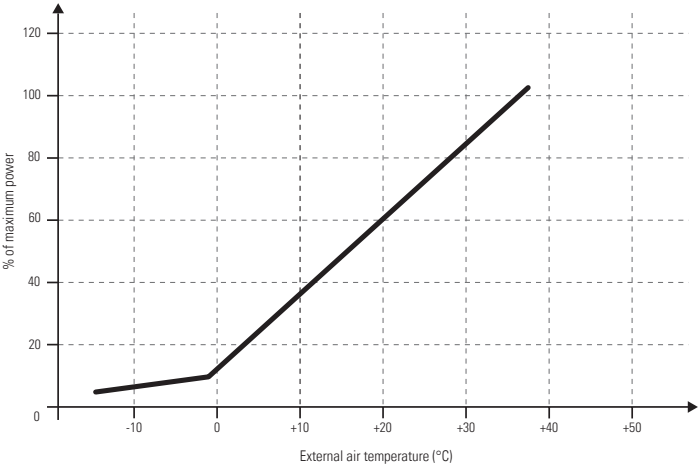
In this way, when room temperature decreases so does the power absorbed, until only the fans are used.

FUNCTIONING

The graph shows the flow of the absorbed power depending on the temperature of the outside air, maintaining the cooling capacity of the unit constant.

The condensation control necessary during the simultaneous functioning of the cooling machine and the free cooling happens through the partialisation of the condensing coil carried out automatically from the control, depending on the condensation pressure.

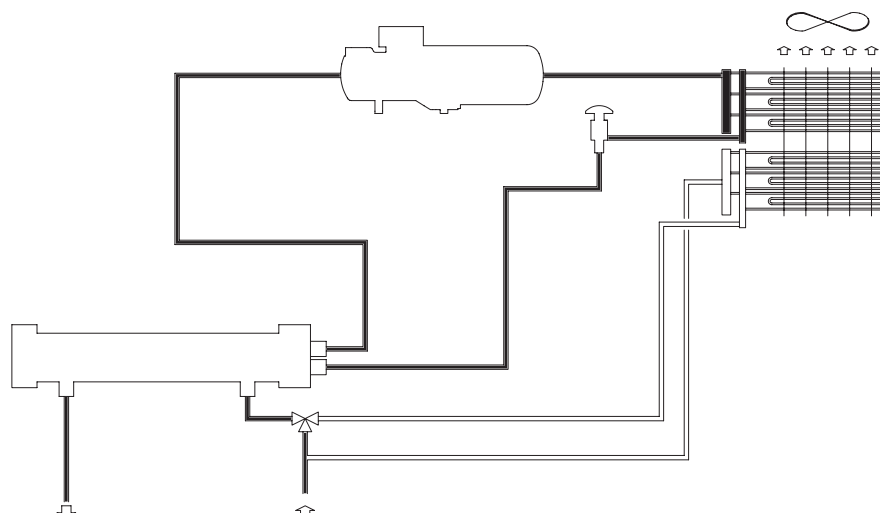
FREE COOLING UNIT ABSORBED POWER



FC CIRCUIT DIAGRAM

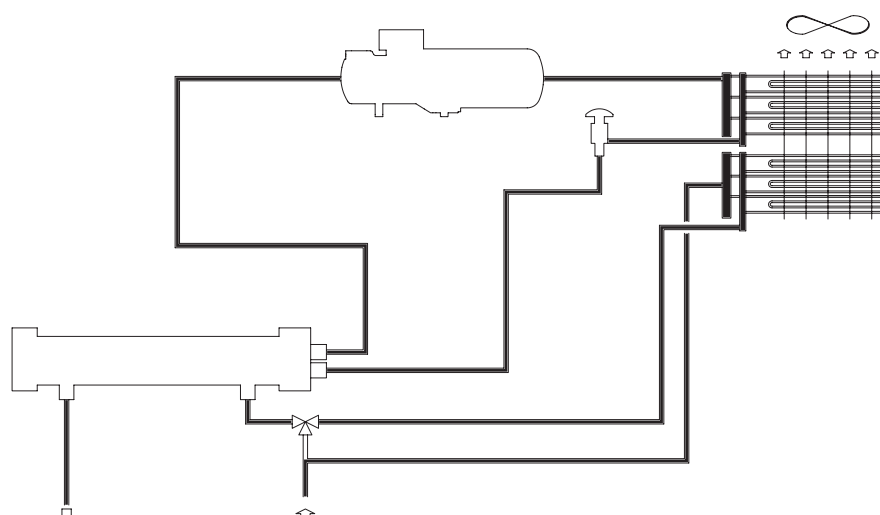
SUMMER

The cooling power is generated by the compressors; in fact, the room temperature is higher than the temperature of the return water and glycol solution from the plant. The free-cooling coil remains inactive. The functioning is that of a classic compression chiller.



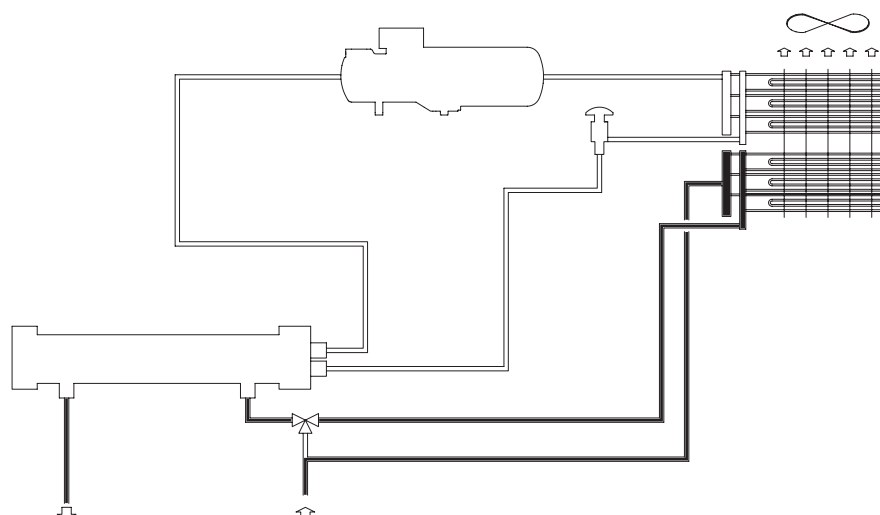
MID-SEASON

The cooling system in free cooling acts together with the mechanical cooling system. The free cooling intervenes automatically when the temperature of the external air is lower than the temperature of the return water and glycol solution from the plant. The solution is partially cooled in the free cooling coil thanks to the external air; the remaining cooling power to be supplied is mechanically obtained by choking the compressors and realising a constantly consistent energy saving when the temperature of the external air decreases.



WINTER

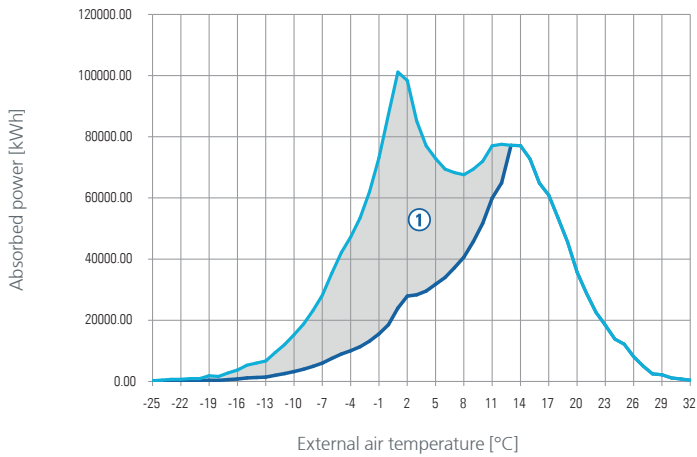
In relation to the load conditions, an external air temperature below which the cooling unit functions exclusively in free-cooling mode will be reached: The solution is cooled inside the free cooling coil; the compressors are switched off and the fans function to guarantee the flow of the external air through the free-cooling coils.



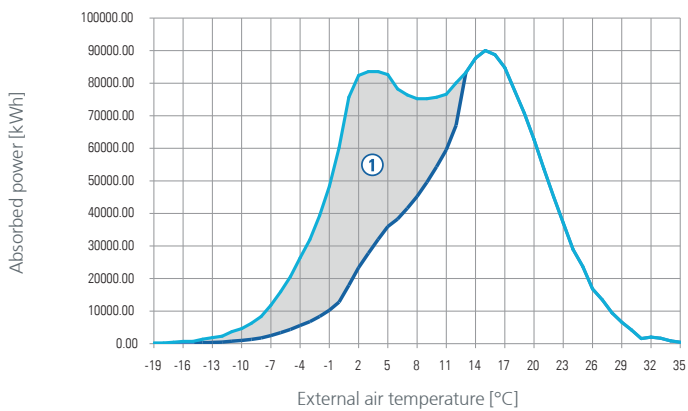
ENERGY ANALYSIS

Reported below are graphs indicating the saving for different cities, in terms of absorbed energy, which is obtained thanks to a COBALT FC compared to the corresponding standard unit, supposing that the cold request is constant all year round. Such energy saving can be easily monetised depending on the electricity costs of the country in which the machine operates; as the investment costs recovery is, in most cases, obtained within the year (at the conditions indicated), the economical saving of the subsequent years is automatically translated in net saving for the investor. It emerges from the graphs that for cities with a cold climate, there is a significant reduction of energy consumption; the latter however remains high in countries with a more traditionally mild climate. To determine the investment payback, the energy costs of the country where the machine is installed is associated to such item.

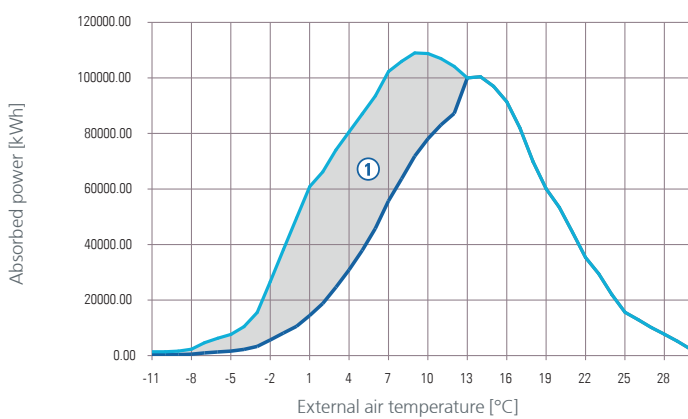
STOCKHOLM ① Energy Saving 43%



BERLIN ① Energy Saving 32%

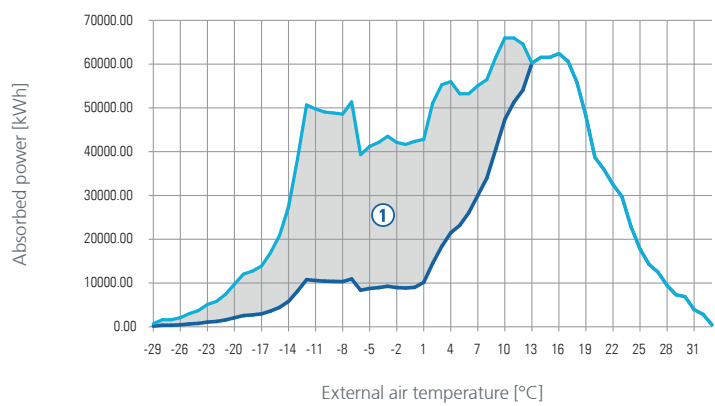


PARIS ① Energy Saving 30%

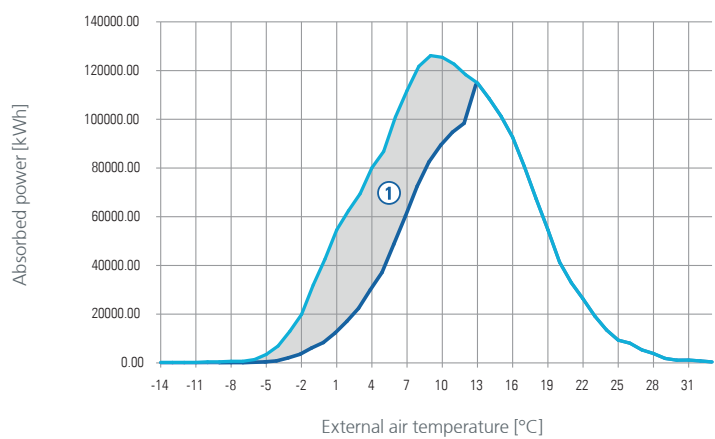


ENERGY ANALYSIS

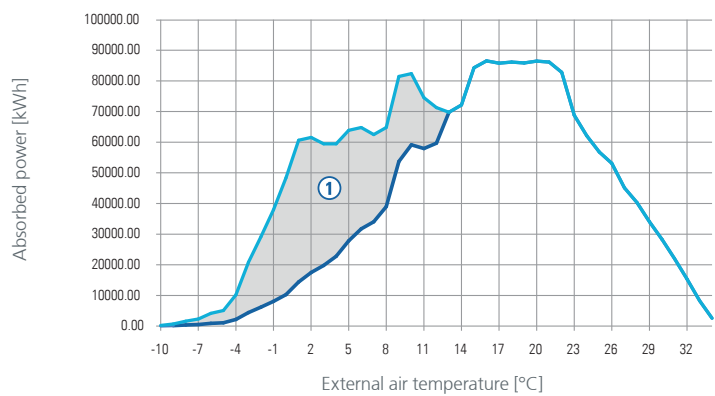
MOSCOW ① Energy Saving 44%



LONDON ① Energy Saving 29%



MILAN ① Energy Saving 23%



STRUCTURE

Holding frame module realised in galvanised sheet steel and painted with polyester powders RAL 7035 at 180°C, which confer high resistance to atmospheric agents. Stainless steel bolts and screws.

Both condensing and water coils are equipped with protections against bumps thanks to a painted steel grid.

COMPRESSORS

Single screw semihermetic with continuous partialisation from 50% to 100% of the load, which enables to maximise the energy yield of the unit in every functioning condition. Start-up and switch off of the machine happen with a partialisation of 25 %.

The compressor is equipped with a carter heater, ensured lubrication from the pressure difference between flow and intake, independent cooling circuits.

The motor has an electronic integral protection with temperature sensors directly inserted inside the windings and on the flow piping. Start-up "star-triangle" type.

CONDENSERS

Made of finned core coils with copper pipes and high efficiency aluminium fins. The position of the coils enables to reduce the unit dimensions and, at the same time, increase the air intake surface, leaving wide space to position the components of the cooling and hydraulic circuits.

In case of two compressors, the condensing sections of the two circuits work autonomously.

ELECTRIC FANS

Of axial type, with sickle blade and conveyor, studied to optimise efficiency and reduce sound emission, directly coupled to 6 poles three phase electric motor, with thermal protection (internal klixon). The protection degree of the motor is IP 54.

The fan includes the accident-prevention protection grid (UNI EN294).

EVAPORATOR

Coating and dry expansion tube bundle.

Optimised for use with R134a, allows improving the unit COP, containing cooling load and overall sizes.

Insulated with a closed cell expanded material coating and equipped with a temperature probe for the anti-freeze protection of every exchanger.

REFRIGERANT CIRCUIT

Includes: compressor flow cock, liquid cock, load inlet, liquid indicator, solid cartridge dehydrator filter, electronic expansion valve, liquid receiver, pressure transducer for reading (from control) of high and low pressure values and evaporation and condensation temperatures, high and low pressure pressure switches and safety valve.

From size 66.2 upwards equipped with economiser (braze welded plate exchanger) with relative thermostatic valve, solenoid valve on the by-pass line (cooling liquid).

FREE COOLING COILS

Made of finned core coils with copper pipes and high efficiency aluminium fins. Equipped with valves for air vent.

THREE-WAY VALVE

The servo-controlled three-way valve opens or closed the flow to the water coil, depending on the signal coming from control.

HYDRAULIC CIRCUIT

Includes: expansion tank, water outlet cock and air vent, safety valve; servo-controlled three-way valve which opens and closes the flow to the water coil, depending on the signal received from control.

ELECTRIC CONTROL BOARD

The board includes

- Main isolating switch;
- Fuses to protect the auxiliary and power circuits;
- Compressors remote control switches;
- Fans remote control switches;
- Microprocessor to control the following functions;
- Water temperature adjustment, with control of outgoing water;
- Anti-freeze protection;
- Compressors timing;
- Compressors start-up sequence automatic rotation;
- Alarms signal;
- Alarms reset;
- Partialisation;
- Alarm cumulative contact for remote signal;
- Forcing of partialisation for pressure limit;
- Registration of alarms history;
- Condensation pressure control;
- Free Cooling function with three-way valve control and fans' start-up - stop

Display of:

- Temperature of the outlet water;
- Set temperature and differentials set-point;
- Description of the alarms;
- Counter functioning and number of unit, compressors and pumps (if present) start-ups;
- High and low pressure, and relative condensation and evaporation temperatures.
- Electric power supply [V/f/Hz]: 400/3/50 5%

CHECKS AND SAFETY DEVICES

- High pressure double pressure switch with manual re-insertion for every compressor;
- High pressure safety with automatic re-insertion at limited interventions managed by control;
- Low pressure safety with automatic re-insertion at limited interventions managed by control;
- High pressure safety valve;
- Water side safety valve;
- Anti-free probe at evaporator output;

- Cooled water temperature control probe (located at system flow);
- With mechanical blade flow meter;
- Compressors and fans over-temperature protection
- Compressor cooling device with injection of liquid when necessary.

INSPECTION

The units are inspected in the factory and supplied complete with oil and refrigerant fluid.

VERSIONS

COBALT FC /ST 2PS:

unit with tank and pumps

The unit, as well as the components of the COBALT FC version, includes:

insulated storage tank, two circulation pumps, (one in standby) with timed automatic commutation and in case of damage. Expansion tanks, check valve, shutter.

The ST version is available with three other possible settings:

- ST 1PS: with 1 pump and tank;
- ST 1P: with 1 pump without tank;
- ST 2P: with 2 pumps without tank;

COBALT FC /LN:

low noise unit

As well as the components of the COBALT FC version, the unit has a completely sound insulated compressors compartment. Sound-absorbing material used together with sound impeding material.

COBALT /DS:

unit with desuperheaters

As well as the components of the corresponding basic version, on every refrigerant circuit the unit has a recovery heat exchanger of 20% of condensation heat, placed in series with the condensing coil. The heat exchanger is the braze-welded plate type or shell and tube. To maximise the use of the accessory, coupling with the fan rev. regulator is recommended.

ACCESSORIES

REFRIGERANT CIRCUIT ACCESSORIES

- Condensation pressure control using rev regulator (the step condensation control through coil partialisation is however present);
- Double set point; (high/low temperature) with one electronic thermostatic valve. The unit evaporator is sized depending on the high temperature functioning. The set point change can be carried out from keyboard and digital input, in this case it must be specified when ordering;
- High and low pressure manometer available for all models (the intake and flow pressures can be detected from the control display also in standard machine setting);
- Compressors intake cocks;
- Liquid line solenoid valve.

ELECTRIC ACCESSORIES

- Fan speed regulator (excluded in FC mode);
- RS485, Modbus, LonWorks, Bacnet, Ethernet, SNMP, FTP, HTTP serial interface;
- Power factor correction of the nominal functioning conditions on external unit in IP 55 (electric power supply under the responsibility of the installer directly from the main line);
- Remote user terminal (in addition to standard one);
- Variable set point with remote signal (0-1V, 0-1 OV, 0-20mA, 4-20mA);
- R  l   PSM management with one or two pumps;
- Electronic soft-starter;
- Absorbed current limit.
- Automatic circuit breakers;
- Maximum and minimum voltage relay;
- Power supply 415/3/50
- SLAT;
- EC fans;
- Automatic circuit breakers for compressors and fans;
- SMARTLINK.

VARIOUS ACCESSORIES

- Spring rubber anti-vibration mounts;
- Louvered coil in pre-painted aluminium;
- Louvered coil with passivation treatment of the aluminium and polyurethane base cover. Treatment consists in a double layer of which the first is a passivation of the aluminium with primer function, and the second is a polyurethane base superficial covering layer. The product is highly resistant to corrosion and to basically all environmental situations. From installations in nautical environments to rural environments, from industrial areas to urban areas;
- Hail-protection of the finned core;
- Special pallet/slide for container shipment;

DOUBLE SET-POINT

From the microprocessor, a double set in functioning in chiller mode can be set. Example set 1:(12/7   C), set 2:(0/-5   C). The set point change can be carried out from keyboard or digital input; in any case, the two values must always be included within the unit functioning limits.

EC FANS

Units can be coupled to the innovative direct current EC axial fans with electronically commutated brushless motor.

These motors with permanent magnets rotor ensure a high level of efficiency for all work conditions and allow to obtain a 15% saving per fan.

Moreover, through a 0-10V analogical signal sent to every fan, the microprocessor allows to control the condensation through continuous air flow regulations on variation of the outdoor air temperature and a consequent sound emission reduction

"BRINE KIT" ACCESSORY

It is applied if the evaporator output temperature is included

within +3°C and -8°C. It consists in a higher thermal insulation of the exchanger and piping, a specific calibration of the low pressure switches and of the anti-freeze alarm, and dimensioning check of the mechanical thermostatic valve.

If it is not included in the set-up, the “Check condensation” accessory must be added.

COBALT FC - TECHNICAL DATA

Unit size			33.2	39.2	41.2	46.2	51.2	60.2	66.2
Cooling (Gross values)									
Nominal cooling capacity	(1)	kW	327	386	406	452	499	569	662
Total power input for cooling	(1),(2)	kW	104	120	132	136	162	197	210
EER	(1)		3,14	3,22	3,08	3,34	3,09	2,89	3,15
Cooling (EN 14511 values)									
Nominal cooling capacity	(1),(8)	kW	325	384	404	449	497	565	658
EER	(1),(8)		3,05	3,14	3,00	3,24	3,03	2,83	3,08
Free-Cooling									
Nominal cooling capacity	(3)	kW	273	333	340	399	413	421	510
Pressure drop on free-cooling coil	(3)	kW	135	142	146	104	81	108	115
TFT - Total Free-cooling Temperature		°C	2,76	3,24	2,91	3,35	2,63	0,97	1,72
Compressors									
Type						Screw			
Quantity / Circuits		n°/n°	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2
Capacity steps		n°				Continuous			
Total oil charge		kg	28	32	32	32	31	36	36
Fans									
Type						Axial			
Quantity		n°	6	8	8	10	10	10	12
Air flow		m ³ /h	124.000	160.000	160.000	200.000	200.000	200.000	242.000
Evaporator									
Type						Tube bundle			
Quantity			1	1	1	1	1	1	1
Water flow		l/h	62.094	73.298	77.095	85.830	94.755	108.048	125.707
Total load losses	(7)	kPa	135	142	146	104	81	108	115
Hydraulic module									
External available pressure	(6),(7)	kPa	173	159	200	200	181	217	190
Tank capacity	(6)	l	-	-	-	750	750	750	750
Expansion vessel		l	25	25	25	25	25	25	25
Sound level									
Sound power value (standard unit)	(4)	dB(A)	95	96	96	97	98	99	100
Sound pressure value (standard unit)	(5)	dB(A)	63	64	64	64	65	66	67
Sound power value (LN version)	(4)	dB(A)	90	90	90	91	92	92	93
Sound pressure value (LN version)	(5)	dB(A)	58	58	58	58	59	59	60
Basic unit size and weights									
Length		mm	4.265	4.763	4.763	5.765	5.765	5.765	6.763
Width		mm	2.284	2.284	2.284	2.284	2.284	2.284	2.284
Height		mm	2.402	2.402	2.402	2.402	2.402	2.402	2.402
Operating weight		kg	3.671	4.176	4.186	4.964	5.106	5.431	5.919

(1) Ambient air temperature 30°C; evaporator inlet/outlet water temperature 10-15 °C

(2) Total power input is sum of compressors and fans power input

(3) Ambient air temperature 5°C; evaporator inlet fluid temperature 15 °C; Glycol at 30%

(4) Sound power values calculate in compliance with ISO 3744

(5) Sound pressure levels refer to 10 meters from unit in free field at nominal working conditions, compliant to ISO 3744

(6) ST 2PS version

(7) With free-cooling active

(8) Values conform to EN 14511-3:2011

COBALT FC - TECHNICAL DATA

Unit size			74.2	81.2	87.2	98.2	104.2	113.2	123.2
Cooling (Gross values)									
Nominal cooling capacity	(1)	kW	706	787	847	974	1031	1103	1186
Total power input for cooling	(1),(2)	kW	241	256	288	291	318	363	378
EER	(1)		2,93	3,08	2,95	3,35	3,24	3,04	3,14
Cooling (EN 14511 values)									
Nominal cooling capacity	(1),(8)	kW	701	782	842	969	1026	1096	1178
EER	(1),(8)		2,85	3,00	2,88	3,28	3,17	2,97	3,05
Free-Cooling									
Nominal cooling capacity	(3)	kW	520	603	612	778	786	796	847
Pressure drop on free-cooling coil	(3)	kW	137	151	148	113	124	149	130
TFT - Total Free-cooling Temperature		°C	1,06	1,66	0,81	2,26	1,67	0,91	0,45
Compressors									
Type						Screw			
Quantity / Circuits		n°/n°	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2
Capacity steps		n°				Continuous			
Total oil charge		kg	40	43	46	46	56	56	56
Fans									
Type						Axial			
Quantity		n°	12	14	14	16	16	16	20
Air flow		m3/h	242.000	284.000	284.000	330.000	330.000	330.000	400.000
Evaporator									
Type						Tube bundle			
Quantity			1	1	1	1	1	1	1
Water flow		l/h	134.063	149.444	160.837	184.953	195.777	209.449	225.210
Total load losses	(7)	kPa	137	151	148	113	124	149	130
Hydraulic module									
External available pressure	(6),(7)	kPa	152	174	169	183	210	171	171
Tank capacity	(6)	l	750	900	900	900	900	900	900
Expansion vassel		l	25	25	25	25	25	25	25
Sound level									
Sound power value (standard unit)	(4)	dB(A)	100	101	102	102	102	103	103
Sound pressure value (standard unit)	(5)	dB(A)	67	68	69	69	69	70	70
Sound power value (LN version)	(4)	dB(A)	94	95	96	96	97	97	98
Sound pressure value (LN version)	(5)	dB(A)	61	62	63	63	64	64	65
Basic unit size and weights									
Length		mm	6.763	7.763	7.763	9.265	9.265	9.265	11.145
Width		mm	2.284	2.284	2.284	2.284	2.284	2.284	2.284
Height		mm	2.402	2.402	2.402	2.402	2.402	2.402	2.402
Operating weigh		kg	5.880	6.732	6.888	7.503	7.631	7.828	9.793

(1)Ambient air temperature 30°C; evaporator inlet/outlet water temperature 10-15 °C

(2)Total power input is sum of compressors and fans power input

(3)Ambient air temperature 5°C; evaporator inlet fluid temperature 15 °C; Glycol at 30%

(4)Sound power values calculate in compliance with ISO 3744

(5)Sound pressure levels refer to 10 meters from unit in free field at nominal working conditions, compliant to ISO 3744

(6)ST 2PS version

(7)With free-cooling active

(8)Values conform to EN 14511-3:2011

COBALT FC - ELECTRIC DATA

Unit size			33.2	39.2	41.2	46.2	51.2
Maximum absorbed power		kW	138,4 (146)	160,0 (171)	171,0 (186)	184,6 (200)	208,7 (220)
Full load current		A	233,2 (249)	270,4 (293)	288,6 (319)	313,0 (343)	352,4 (375)
Maximum starting current		A	296,5 (312)	360,4 (383)	369,5 (400)	418,0 (448)	428,7 (451)
Fan motor nominal power		n° x kW	6 x 2,0	8 x 2,0	8 x 2,0	10 x 2,0	10 x 2,0
Fan motor nominal current		n° x A	6 x 4,3	8 x 4,3	8 x 4,3	10 x 4,3	10 x 4,3
Pump motor nominal power		kW	7,5	11,0	15,0	15,0	11,0
Pump motor nominal current		A	15,8	22,5	30,4	30,4	22,5
Power supply		V/ph/Hz	400/3N~/50				
Control power supply		V/ph/Hz	230/1~/50				

Unit size			60.2	66.2	74.2	81.2	87.2
Maximum absorbed power		kW	243,6 (259)	247,6 (266)	270,0 (289)	296,4 (318)	318,8 (337)
Full load current		A	409,8 (440)	418,4 (456)	455,0 (492)	500,4 (542)	537,2 (574)
Maximum starting current		A	508,4 (539)	517,0 (554)	535,3 (572)	728,9 (771)	765,7 (803)
Fan motor nominal power		n° x kW	10 x 2,0	12 x 2,0	12 x 2,0	14 x 2,0	14 x 2,0
Fan motor nominal current		n° x A	10 x 4,3	12 x 4,3	12 x 4,3	14 x 4,3	14 x 4,3
Pump motor nominal power		kW	15,0	18,5	18,5	22,0	18,5
Pump motor nominal current		A	30,4	37,1	37,1	42,0	37,1
Power supply		V/ph/Hz	400/3N~/50				
Control power supply		V/ph/Hz	230/1~/50				

Unit size			98.2	104.2	113.2	123.2
Maximum absorbed power		kW	347,0 (369)	371,2 (401)	408,4 (438)	432,6 (463)
Full load current		A	585,6 (628)	625,4 (679)	686,0 (740)	729,8 (784)
Maximum starting current		A	774,3 (816)	814,1 (868)	875,4 (929)	952,9 (1.007)
Fan motor nominal power		n° x kW	16 x 2,0	16 x 2,0	16 x 2,0	20 x 2,0
Fan motor nominal current		n° x A	16 x 4,3	16 x 4,3	16 x 4,3	20 x 4,3
Pump motor nominal power		kW	22,0	30,0	30,0	30,0
Pump motor nominal current		A	42,0	54,0	54,0	54,0
Power supply		V/ph/Hz	400/3N~/50			
Control power supply		V/ph/Hz	230/1~/50			

(1) Mains power supply to allow unit operation

(2) Maximum current before safety cut-outs stop the unit. This value is never exceeded and must be used to size the electrical supply cables and relevant safety devices (refer to electrical wiring diagram supplied with the unit)

(3) Values in brackets refer to ST version units (units with storage tank and pumps or units with exclusively pumps)

(4) Maximum current before safety cut-outs stop the unit. This value is never exceeded and must be used to size the electrical supply cables and relevant safety devices (refer to electrical wiring diagram supplied with the unit)

COBALT FC - COOLING CAPACITIES *

Model	To	External air temperature [°C]											
	[°C]	25			30			35			37		
		Pf	Pe	TFT	Pf	Pe	TFT	Pf	Pe	TFT	Pf	Pe	TFT
33.2	5	304,1	78,3	-1,6	287,4	85,9	-1,1	269,3	95,3	-0,6	261,7	99,6	-0,4
	6	309,9	79,1	-0,8	292,7	86,9	-0,3	274,3	96,5	0,2	266,5	100,8	0,5
	7	316,8	80,2	0,0	299,3	88,2	0,5	280,4	97,8	1,1	272,4	102,2	1,3
	8	325,0	81,5	0,8	307,0	89,7	1,3	287,6	99,5	1,9	279,5	104,0	2,1
	9	334,6	83,1	1,5	316,0	91,4	2,1	296,1	101,5	2,6	287,7	106,0	2,9
	10	345,5	84,9	2,2	326,3	93,5	2,8	305,8	103,8	3,4	297,2	108,4	3,6
	11	358	87	2,8	338	96	3,4	317	106	4,0	308	111	4,3
	12	371	89	3,4	351	98	4,0	329	109	4,7	320	114	4,9
39.2	5	358,4	88,3	-1,2	338,3	96,8	-0,7	316,6	107,2	-0,2	307,5	111,9	0,0
	6	365,8	89,3	-0,4	345,2	98,0	0,1	323,0	108,5	0,6	313,7	113,3	0,8
	7	374,5	90,6	0,5	353,3	99,5	0,9	330,6	110,2	1,5	321,1	115,0	1,7
	8	384,5	92,2	1,2	362,8	101,2	1,7	339,5	112,1	2,3	329,7	117,0	2,5
	9	396,0	93,9	2,0	373,6	103,2	2,5	349,6	114,3	3,1	339,5	119,3	3,3
	10	408,8	95,9	2,7	385,7	105,5	3,2	361,0	116,9	3,8	350,6	122,0	4,1
	11	423	98	3,4	399	108	3,9	374	120	4,5	363	125	4,8
	12	439	101	4,0	414	111	4,6	388	123	5,2	377	128	5,5
41.2	5	379,2	98,5	-1,6	357,2	108,3	-1,1	333,5	120,2	-0,5	323,5	125,6	-0,3
	6	386,7	99,7	-0,7	364,3	109,7	-0,2	340,0	121,8	0,4	329,8	127,2	0,6
	7	395,7	101,3	0,1	372,6	111,4	0,6	347,8	123,7	1,2	337,4	129,2	1,4
	8	406,0	103,0	0,9	382,3	113,5	1,4	356,9	125,9	2,0	346,2	131,5	2,2
	9	417,8	105,1	1,6	393,4	115,8	2,2	367,3	128,6	2,8	356,3	134,2	3,0
	10	431,1	107,5	2,3	405,9	118,5	2,9	379,0	131,6	3,5	367,7	137,4	3,8
	11	446	110	3,0	420	122	3,6	392	135	4,2	380	141	4,5
	12	462	113	3,6	435	125	4,3	406	139	4,9	394	145	5,2
46.2	5	419,2	99,1	-1,1	396,2	108,3	-0,7	371,3	119,7	-0,2	360,8	124,9	-0,1
	6	427,6	100,2	-0,2	404,3	109,6	0,2	379,1	121,2	0,6	368,4	126,4	0,8
	7	437,6	101,6	0,6	413,8	111,2	1,0	388,1	122,9	1,5	377,3	128,3	1,7
	8	449,3	103,1	1,4	425,0	113,0	1,9	398,7	125,0	2,3	387,6	130,4	2,5
	9	462,8	105,0	2,2	437,8	115,1	2,6	410,8	127,4	3,1	399,4	132,9	3,3
	10	478,3	107,1	2,9	452,5	117,6	3,4	424,6	130,1	3,9	412,9	135,8	4,1
	11	496	110	3,5	469	120	4,0	440	133	4,6	428	139	4,8
	12	515	112	4,1	487	124	4,7	457	137	5,3	445	143	5,5
51.2	5	465,3	119,6	-1,8	438,2	131,4	-1,3	408,8	145,6	-0,8	396,3	152,1	-0,6
	6	474,4	121,0	-0,9	446,8	133,1	-0,4	417,0	147,6	0,1	404,4	154,1	0,3
	7	485,2	122,8	-0,1	457,1	135,2	0,4	426,7	149,9	0,9	413,9	156,6	1,2
	8	497,8	125,0	0,6	469,0	137,6	1,2	438,0	152,7	1,7	424,9	159,4	2,0
	9	512,4	127,5	1,4	482,8	140,5	1,9	450,9	155,9	2,5	437,4	162,8	2,8
	10	529,1	130,4	2,0	498,5	143,8	2,6	465,6	159,6	3,3	451,7	166,6	3,5
	11	548	134	2,6	516	148	3,3	482	164	3,9	468	171	4,2
	12	569	138	3,2	536	152	3,9	500	169	4,6	485	176	4,9
60.2	5	528,3	145,7	-3,2	496,6	160,7	-2,6	462,1	178,7	-1,9	447,6	186,7	-1,6
	6	539,1	147,8	-2,4	506,9	163,1	-1,8	472,0	181,4	-1,1	457,2	189,6	-0,8
	7	552,0	150,4	-1,7	519,2	166,1	-1,0	483,6	184,7	-0,3	468,5	193,1	0,0
	8	567,3	153,4	-1,0	533,6	169,6	-0,3	497,1	188,7	0,4	481,7	197,1	0,7
	9	585,1	157,1	-0,4	550,4	173,7	0,4	512,8	193,3	1,1	496,9	201,9	1,5
	10	605,5	161,5	0,2	569,5	178,6	1,0	530,5	198,6	1,8	514,1	207,5	2,1
	11	628	167	0,7	591	184	1,5	550	205	2,4	533	214	2,7
	12	654	172	1,0	614	191	2,0	572	212	2,9	554	221	3,3
66.2	5	606,9	150,6	-2,4	585,6	173,2	-2,1	559,9	200,8	-1,7	548,3	213,2	-1,5
	6	617,8	152,3	-1,6	596,0	175,2	-1,2	569,6	203,3	-0,8	557,7	215,9	-0,6
	7	631,1	154,4	-0,8	608,6	177,7	-0,4	581,6	206,3	0,0	569,4	219,1	0,2
	8	646,8	156,9	0,0	623,6	180,8	0,3	595,9	210,1	0,8	583,4	223,1	1,0
	9	665,1	159,8	0,7	641,2	184,5	1,1	612,7	214,5	1,5	599,9	227,9	1,7
	10	686,0	163,3	1,3	661,3	188,8	1,7	632,0	219,7	2,2	618,8	233,5	2,4
	11	709	167	1,9	684	194	2,3	654	226	2,8	640	240	3,1
	12	735	172	2,5	709	199	2,9	678	232	3,4	664	247	3,7
	13	764	177	3,0	737	206	3,4	704	240	4,0	690	255	4,2

All data refers to the base versions

Pf: cooling power [kW] - Pe: electric power absorbed by compressors [kW] - TFT: total free-cooling temperature [°C] - To: tevaportor output water temperature [°C]

* with 30% ethylene glycol

COBALT FC - COOLING CAPACITIES *

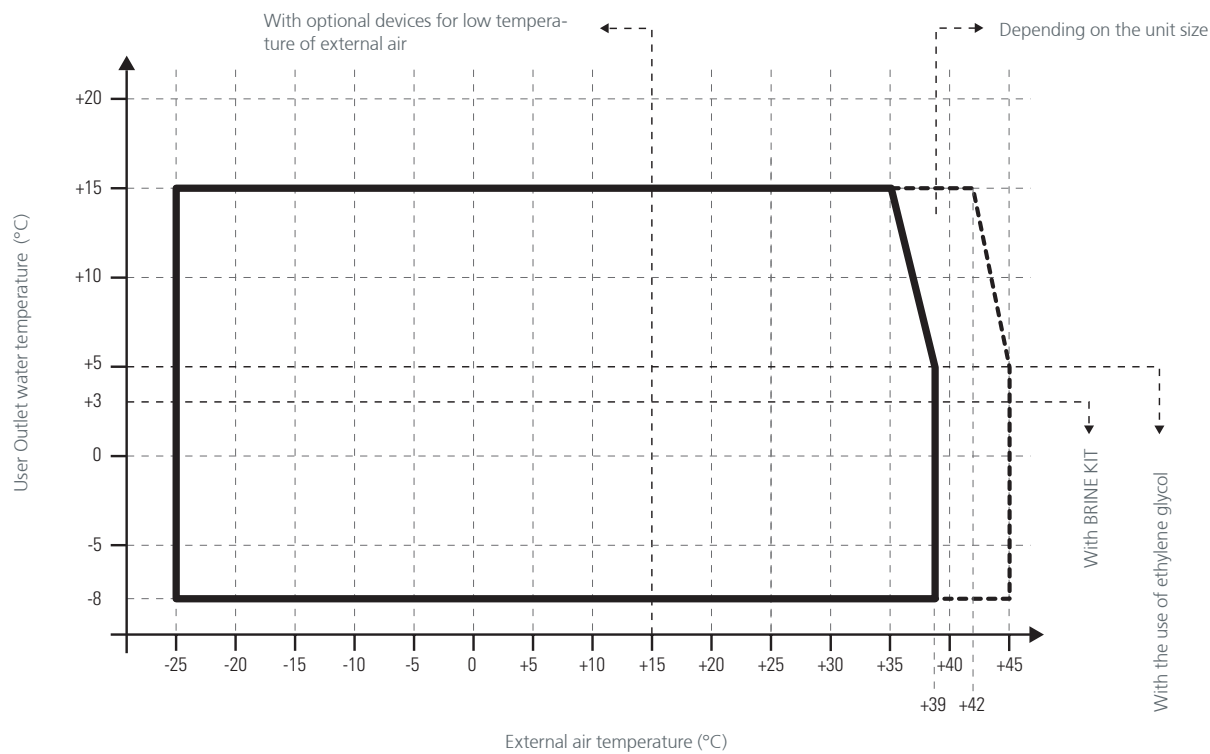
Model	To	External air temperature [°C]											
	[°C]	25			30			35			37		
		Pf	Pe	TFT	Pf	Pe	TFT	Pf	Pe	TFT	Pf	Pe	TFT
74.2	5	654,4	173,3	-3,1	629,1	200,1	-2,7	598,7	232,2	-2,2	585,0	246,4	-2,0
	6	665,4	175,3	-2,3	639,3	202,5	-1,9	608,1	235,1	-1,4	594,1	249,5	-1,1
	7	678,8	177,8	-1,5	651,9	205,5	-1,1	619,9	238,7	-0,5	605,6	253,3	-0,3
	8	695,0	180,9	-0,7	667,3	209,3	-0,3	634,4	243,2	0,2	619,7	258,1	0,5
	9	714,0	184,6	-0,1	685,4	213,8	0,4	651,6	248,6	1,0	636,5	264,0	1,2
	10	735,9	189,0	0,6	706,4	219,2	1,1	671,6	255,1	1,6	656,1	270,9	1,9
	11	761	194	1,1	730	225	1,7	694	263	2,3	678	279	2,5
	12	788	200	1,6	757	233	2,2	720	271	2,8	703	288	3,1
81.2	5	714,5	181,7	-2,4	688,2	209,1	-2,0	656,5	242,5	-1,6	642,2	257,4	-1,4
	6	732,8	184,7	-1,6	705,6	212,8	-1,2	673,1	247,0	-0,8	658,5	262,2	-0,6
	7	752,1	187,9	-0,9	724,2	216,8	-0,5	690,8	251,8	0,0	675,8	267,5	0,2
	8	772,6	191,5	-0,1	743,9	221,1	0,2	709,5	257,1	0,7	694,1	273,1	0,9
	9	794,3	195,2	0,6	764,6	225,8	1,0	729,3	262,7	1,4	713,4	279,1	1,7
	10	817,0	199,3	1,2	786,4	230,8	1,7	750,0	268,7	2,2	733,8	285,6	2,4
	11	841	204	1,9	809	236	2,3	772	275	2,9	755	292	3,1
	12	866	208	2,6	833	242	3,0	794	282	3,5	777	300	3,8
87.2	5	773,1	205,0	-3,2	742,6	236,7	-2,8	706,1	274,9	-2,3	689,6	291,9	-2,0
	6	792,7	208,7	-2,4	761,2	241,2	-2,0	723,7	280,4	-1,5	706,8	297,8	-1,3
	7	813,4	212,7	-1,7	781,1	246,1	-1,3	742,5	286,3	-0,7	725,1	304,1	-0,5
	8	835,3	217,1	-1,0	802,0	251,5	-0,6	762,3	292,6	0,0	744,5	310,9	0,2
	9	858,4	221,8	-0,3	824,0	257,2	0,1	783,2	299,5	0,7	764,9	318,2	0,9
	10	882,6	226,8	0,3	847,1	263,3	0,8	805,1	306,8	1,4	786,3	326,0	1,7
	11	908	232	0,9	871	270	1,5	828	315	2,1	809	334	2,3
	12	934	238	1,6	897	277	2,1	852	323	2,7	832	343	3,0
98.2	5	896,4	211,4	-1,9	866,1	242,3	-1,6	829,5	280,7	-1,2	812,9	298,1	-1,1
	6	911,9	213,5	-1,1	880,8	244,9	-0,8	843,4	283,9	-0,4	826,5	301,5	-0,2
	7	930,7	216,2	-0,3	898,8	248,2	0,1	860,5	287,8	0,5	843,2	305,7	0,6
	8	953,2	219,5	0,5	920,3	252,2	0,8	881,1	292,6	1,2	863,4	310,9	1,4
	9	979,6	223,3	1,2	945,7	256,9	1,6	905,4	298,4	2,0	887,3	317,1	2,2
	10	1009,9	227,9	1,9	975,0	262,5	2,3	933,5	305,2	2,7	914,9	324,4	2,9
	11	1044	233	2,5	1008	269	2,9	965	313	3,4	946	333	3,6
	12	1083	239	3,1	1045	276	3,5	1001	322	4,0	981	342	4,2
104.2	5	950,0	231,1	-2,5	916,1	265,8	-2,1	875,1	308,4	-1,7	856,6	327,6	-1,5
	6	966,6	233,7	-1,7	931,8	269,0	-1,3	889,9	312,2	-0,9	871,0	331,7	-0,7
	7	986,7	236,9	-0,9	950,8	272,9	-0,5	908,0	316,9	0,0	888,7	336,7	0,2
	8	1010,5	240,8	-0,1	973,6	277,6	0,3	929,7	322,6	0,7	909,9	342,8	1,0
	9	1038,3	245,4	0,6	1000,3	283,3	1,0	955,1	329,4	1,5	934,8	350,1	1,7
	10	1070,2	250,8	1,2	1031,0	289,9	1,7	984,4	337,4	2,2	963,6	358,7	2,4
	11	1106	257	1,9	1066	298	2,3	1018	347	2,8	996	369	3,1
	12	1146	264	2,4	1104	306	2,9	1054	357	3,4	1032	380	3,7
113.2	5	1024,1	264,7	-3,3	984,1	305,8	-2,8	936,2	355,3	-2,3	914,6	377,4	-2,1
	6	1040,0	267,7	-2,4	999,0	309,3	-2,0	950,0	359,5	-1,5	928,0	381,8	-1,2
	7	1060,1	271,5	-1,6	1018,0	314,0	-1,2	967,9	365,0	-0,7	945,4	387,7	-0,4
	8	1084,9	276,3	-0,9	1041,6	319,8	-0,4	990,1	372,0	0,1	967,0	395,1	0,4
	9	1114,6	282,2	-0,2	1069,9	327,0	0,3	1016,9	380,5	0,8	993,2	404,3	1,1
	10	1149,1	289,2	0,4	1102,9	335,5	0,9	1048,3	390,7	1,5	1024,0	415,2	1,8
	11	1189	297	1,0	1141	346	1,5	1084	403	2,1	1059	428	2,4
	12	1233	307	1,5	1183	357	2,0	1124	417	2,7	1098	443	3,0
123.2	5	1098,1	272,7	-3,6	1057,7	314,1	-3,2	1009,0	364,6	-2,7	987,1	387,2	-2,5
	6	1115,3	275,6	-2,8	1073,8	317,5	-2,4	1024,0	368,7	-1,9	1001,6	391,6	-1,6
	7	1137,1	279,2	-2,0	1094,5	322,0	-1,6	1043,5	374,0	-1,0	1020,6	397,3	-0,8
	8	1163,9	283,8	-1,3	1120,0	327,6	-0,8	1067,8	380,7	-0,3	1044,3	404,4	-0,1
	9	1196,0	289,4	-0,6	1150,8	334,4	-0,2	1097,1	388,9	0,4	1073,0	413,3	0,7
	10	1233,5	296,1	-0,1	1186,8	342,6	0,4	1131,4	398,8	1,0	1106,7	423,9	1,3
	11	1276	304	0,4	1228	352	1,0	1171	410	1,6	1145	436	1,9
	12	1324	313	0,8	1274	363	1,4	1215	424	2,1	1189	451	2,4
	13	1377	324	1,2	1325	376	1,8	1264	439	2,5	1236	467	2,9

All data refers to the base versions

Pf: cooling power [kW] - Pe: electric power absorbed by compressors [kW] - TFT: total free-cooling temperature [°C] - To: tevaportator output water temperature [°C]

* with 30% ethylene glycol

COBALT FC - OPERATING LIMITS COOLING



THE HEAT DROP OF THE WATER FOR ALL VERSIONS MUST BE BETWEEN: min:4 °C max: 7°C

SOUND LEVELS - COBALT FC

Model	OCTAVE BAND [dB]																Total [dB(A)]	
	63 Hz		125 Hz		250 Hz		500 Hz		1000 Hz		2000 Hz		4000 Hz		8000 Hz		Lw	Lp
33.2	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	95	63
39.2	79	47	78	46	83	51	84	52	91	59	90	58	86	54	78	46	96	64
41.2	79	47	78	46	84	52	85	53	92	60	91	59	87	55	80	48	96	64
46.2	80	48	78	46	84	52	85	53	92	60	91	59	87	55	80	48	96	64
46.2	80	47	79	46	85	52	86	53	93	60	92	59	88	55	81	48	97	64
51.2	82	49	80	47	86	53	86	53	94	61	93	60	88	55	81	48	98	65
60.2	83	50	82	49	87	54	86	53	96	63	93	60	88	55	79	46	99	66
66.2	84	51	82	49	88	55	88	55	96	63	95	62	90	57	82	49	100	67
74.2	84	51	82	49	88	55	87	54	97	64	95	62	90	57	82	49	100	67
81.2	85	52	83	50	89	56	88	55	98	65	96	63	91	58	82	49	101	68
87.2	86	53	84	51	90	57	89	56	99	66	96	63	91	58	83	50	102	69
98.2	86	53	84	51	90	57	89	56	99	66	96	63	92	59	83	50	102	69
104.2	86	53	84	51	90	57	89	56	99	66	96	63	91	58	83	50	102	69
113.2	87	54	85	52	91	58	90	57	100	67	97	64	92	59	84	51	103	70
123.2	87	54	85	52	91	58	90	57	100	67	98	65	93	60	84	51	103	70

SOUND LEVELS - COBALT FC /LN

Model	OCTAVE BAND [dB]																Total [dB(A)]	
	63 Hz		125 Hz		250 Hz		500 Hz		1000 Hz		2000 Hz		4000 Hz		8000 Hz		Lw	Lp
33.2	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	90	58
39.2	75	43	73	41	78	46	79	47	86	54	85	53	81	49	74	42	90	58
39.2	74	42	73	41	78	46	79	47	85	53	85	53	81	49	75	43	90	58
41.2	74	42	73	41	78	46	79	47	86	54	85	53	81	49	75	43	90	58
46.2	75	42	74	41	79	46	80	47	86	53	86	53	82	49	76	43	91	58
51.2	77	44	75	42	80	47	81	48	88	55	87	54	82	49	76	43	92	59
60.2	77	44	76	43	81	48	80	47	88	55	86	53	82	49	74	41	92	59
66.2	78	45	76	43	81	48	81	48	89	56	88	55	83	50	76	43	93	60
74.2	79	46	77	44	82	49	82	49	90	57	88	55	84	51	77	44	94	61
81.2	80	47	78	45	83	50	83	50	91	58	89	56	85	52	77	44	95	62
87.2	81	48	79	46	84	51	84	51	92	59	90	57	86	53	78	45	96	63
98.2	81	48	79	46	84	51	84	51	92	59	90	57	86	53	78	45	96	63
104.2	82	49	80	47	85	52	85	52	93	60	91	58	87	54	79	46	97	64
113.2	82	49	80	47	85	52	85	52	93	60	91	58	87	54	79	46	97	64
123.2	82	49	81	48	86	53	86	53	94	61	92	59	88	55	80	47	98	65

Lw: sound power values in free field calculated in compliance with ISO 3744; nominal conditions.

Lp: sound pressure levels refer to 10 meters from unit in free field at nominal working conditions, compliant to ISO 3744..

INSTALLATIONS RECOMMENDATIONS

LOCATION

Strictly allow clearances as indicated in the catalogue.

Please check that there isn't any obstructions on the suction of the finned coil and on the discharge of the fans

Locate the unit in order to be compatible with environmental requirements (sound level, integration into the site, etc.).

ELECTRICAL CONNECTIONS

Check the wiring diagram enclosed with the unit, in which are always present all the instructions necessary to the electrical connections.

Supply the unit at least 12 hours before start-up, in order to turn crankcase heaters on. Do not disconnect electrical supply during temporary stop periods (i.e. weekends).

Before opening the main switch, stop the unit by acting on the suitable running switches or, if lacking, on the remote control.

Before servicing the inner components, disconnect electrical supply by opening the main switch.

The electric supply line must be equipped with an automatic circuit breaker (to be provided by the installer).

HYDRAULIC CONNECTIONS

Carefully vent the system, with pump turned off, by acting on the vent valves. This procedure is fundamental: little air bubbles can freeze the evaporator causing the general failure of the system.

Drain the system during seasonal stops (winter time) or use proper mixtures with low freezing point. In case of temporary stop periods an electric heater should be installed on the evaporator and hydraulic circuit.

Install the hydraulic circuit including all the components indicated in the recommended hydraulic circuit diagrams (expansion vessel, flow switch, strainer, storage tank, vent valves, shut off valves, flexible connections, etc.).

Connect the flow switch, which is furnished on all units, not fitted. Follow the instructions enclosed with the units.

START UP AND MAINTENANCE OPERATIONS

Strictly follow what reported in use and maintenance manual. All these operations must be carried on by trained personnel only.

