

FRIGO TURBO FLG: Packaged water cooled liquid chillers in “A” class energy efficiency for indoor installation, equipped with oil-free centrifugal compressors with magnetic levitation bearings, flooded evaporator and shell and tube condenser.
Cooling Capacity: 250 ÷ 1240 kW



NEW PRODUCT
RC Hi-Tech

HIGH EFFICIENCY
RC Hi-Tech

INVERTER
RC Hi-Tech

A CLASS
RC Hi-Tech

LOW NOISE
RC Hi-Tech

LOW GWP
RC Hi-Tech

GO GREEN
solutions

FRIGO TURBO FLG

rcgroupairconditioning



MAIN FEATURES

- Water cooled liquid chiller in A class energy efficiency.
- 14 models available for a wide selection opportunity.
- Average step of 75 kW.
- EER up to 5,41.
- ESEER up to 9,10.
- Oil-free centrifugal compressors with magnetic levitation bearings.
- Inverter driven.
- HFO1234ze refrigerant charge, LOW GWP, GWP < 6.
- Single refrigerant circuit.
- Electronic expansion valve.
- Shell and tube condenser.
- Flooded evaporator.
- Suitable for indoor installation.

MAIN BENEFITS

- Up to four centrifugal compressors with magnetic levitation bearings on the refrigerant circuit for an high efficiency.
- No need of power factor correction.
- Minimum starting current (LRA)
- High EER and ESEER. A Class energy efficiency.
- Quiet operation.
- Microprocessor control system with 7" touch screen display.
- Version with 4-passes condenser for a higher energy efficiency.
- Extremely easily of maintenance.
- Complete set of components dedicated to the safety of the unity.

INDOOR INSTALLATION

The machines are designed for indoor installation.

MAGNETIC LEVITATION CENTRIFUGAL COMPRESSOR

The TURBO FL liquid chillers are equipped with two-stage centrifugal compressor with variable speed, which is able to follow punctually plant demands, obtaining values of energy efficiency ratio (EER) growing in a narrowing of the cooling load. The compressors of the TURBO FL liquid chillers are equipped with magnetic levitation oil-free bearings which compared to traditional ball bearings, completely eliminate all the maintenance procedures of lubrication.

A CLASS ENERGY EFFICIENCY

The best and most accurate components applied to the chillers.

WORKING LIMITS IN COOLING MODE

Chilled water outlet temperature: 4÷18°C
Condenser outlet water temperature: 20÷52°C

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1963 2013
fifty cool years

COMPONENTS

FRAMEWORK

- Base and self supporting frame in steel plate with protective surfaces treatment in compliance with UNI ISO 9227/ASTMB117 and ISO 7253, and painted with epoxy powders.
- Colour: RAL 9002

COMPRESSORS

- Twin-turbine centrifugal compressor, oil-free type, optimized for HFO1234ze refrigerant.
The term "oil-free" refers to the total absence of lubricating oil within the compressor.
- Magnetic levitation bearings.
- Manometric compression ratio: $1.5 \div 5.0$
- Stepless capacity control through integrated inverter.
- High efficiency permanent-magnet synchronous motor with integrated Soft-Start system (starting current limited to 5A).
- Power factor $\cos\phi > 0.9$ for a large part of the operating range
- Motor and electronic power section cooling by liquid refrigerant injection into the integrated cooling circuit.
- Electric motor thermal protection via internal winding temperature sensors.
- Electronic integrated control for operation and alarms status.
- Sensor on refrigerant discharge for temperature monitoring.
- Inner sensors for electronic components and inverter temperature control.
- Security system to protect the crankshaft and magnetic bearings in the event of failure of power supply.
- Degree of protection: IP54.

EVAPORATOR

- Flooded shell and tube evaporator, optimized for HFO1234ze refrigerant.
- Version two passes, characterized by low pressure losses on the water side.
- Water tubes with a helical rifled internal surface.
- Integrated liquid drop separator.
- Shell, header, tube sheets made of carbon steel, tubes in Cu.
- Anticondensate insulation made of polyurethane.
- Large liquid level indicator.
- Temperature sensors on water inlet and outlet.
- Water flow switch for water flow control on water outlet towards the plant, not installed but supplied in kit.
- Hydraulic connections with grooved end supplied as standard with flexible joint and adapter pipe to be welded.

CONDENSER

- Shell and tube 2-passes condenser optimized for HFO1234ze refrigerant.
 - Machine type P4: 4-passes condenser.
- Shell, header, tube sheets made of carbon steel, tubes in Cu.
- Temperature sensors on condenser water inlet and outlet.
- Hydraulic connections with grooved end supplied as standard with flexible joint and adapter pipe to be welded.
From model 250 T1 P4 to model 560 T2 included the connections are supplied in mounting kit. Installation to be made by the customer.

REFRIGERANT CIRCUIT

- Components for each refrigerant circuit:
 - Capacitive level sensor connected to the driver of the expansion valve.
 - Electronic expansion valve that allows high performance and system efficiency and for the refrigerant level control in the evaporator.
 - Electronic by-pass valve for compressor start.
 - Non return valve on by-pass line for compressor start.
 - Economizer for models 310 T1E, 620 T2E, 930 T3E, 1240 T4E.
- The system includes:
- Copper brazed plate type with cover plates, plates and connections in AISI 316 stainless steel.
 - Anticondensate insulation made of polyurethane.
 - Intermediate electronic expansion valve.
 - Sight glass.
 - Filter dryer on liquid line.
 - Service valve on liquid line.
 - Service valve on gas suction and discharge.
 - Non return valve on gas suction.
 - Safety valve on low pressure side.
 - Safety valve on high pressure side.
 - Pressure transducers with indication, control and protection functions, on low and high refrigerant pressure.
 - High pressure safety switch with manual reset.
 - Refrigerant circuit with copper tubing with anticondensate insulation of the suction line.
 - Plastic capillary hoses for pressure sensors connection.
 - HFO1234ze refrigerant charge.

ELECTRICAL PANEL

In accordance with EN60204-1 norms, suitable for indoor installation, complete with:

- Main switch with door lock safety.
- Fuses for compressors.
- Contactors for compressors.
- Transformer for auxiliary circuit and microprocessor supply.
- Panel with machine controls.
- Power supply 400/3/50.
- Refrigerant gas leak detector. Supplied in kit.

CONTROL SYSTEM

- Microprocessor system with "Touch Screen" graphic display for control and monitor of operating and alarms status. The system includes:
 - Voltage free contact for remote general alarm.
 - Voltage free contact for external alarm. The inlet is associable with refrigerant gas leak detector.
 - Main components hour-meter.
 - Recording of the last 24 occurred alarms.
 - Non-volatile "Flash" memory for data storage.
 - Menu with protection password.

IMPORTANT

HFO1234ze refrigerant is mildly flammable. For indoor installations is important to foresee: proper ventilation; a refrigerant gas leak detector (supplied as standard, in kit); pipes connected to the safety valves outlets in order to exhaust vapours outside (not supplied, at customer care).

OPTIONAL ACCESSORIES

FRIGO TURBO FLG	250 T1	280 T1	310 T1E	400 T2	400 T2	500 T2	560 T2	620 T2E	750 T3	840 T3	930 T3E
VERSIONE	P4				P4	P4			P4		
172 - Rubber support (kit)	•	•	•	•	•	•	•	•	•	•	•
611 - Noise absorption cap	•	•	•	•	•	•	•	•	•	•	•
Service valve on compressor group suction	•	•	•	•	•	•	•	•	•	•	•
1003 - Analogic flowmeter	•	•	•	•	•	•	•	•	•	•	•
1005 - Power supply analyzer	•	•	•	•	•	•	•	•	•	•	•
1009 - Multimeter kit	•	•	•	•	•	•	•	•	•	•	•
943 - Data Logger	•	•	•	•	•	•	•	•	•	•	•
923 - RC-Com MBUS/JBUS Serial board	•	•	•	•	•	•	•	•	•	•	•
926 - LON Serial board	•	•	•	•	•	•	•	•	•	•	•
931 - BACnet Ethernet - SNMP - TCP/IP Serial board	•	•	•	•	•	•	•	•	•	•	•
932 - BACnet MS/TP Serial board	•	•	•	•	•	•	•	•	•	•	•
942 - Serial card for GSM Modem	•	•	•	•	•	•	•	•	•	•	•
962 - Kit modem GSM	•	•	•	•	•	•	•	•	•	•	•
957 - Plantwatch without modem	•	•	•	•	•	•	•	•	•	•	•
930 - Remote graphic terminal kit	•	•	•	•	•	•	•	•	•	•	•
889 - Master plant SEQUENCER	•	•	•	•	•	•	•	•	•	•	•
RC CLOUD PLATFORM	•	•	•	•	•	•	•	•	•	•	•

FRIGO TURBO FLG	1000 T4	1120 T4	1240 T4E
VERSIONE	P4		
172 - Rubber support (kit)	•	•	•
611 - Noise absorption cap	•	•	•
Service valve on compressor group suction	•	•	•
1003 - Analogic flowmeter	•	•	•
1005 - Power supply analyzer	•	•	•
1009 - Multimeter kit	•	•	•
943 - Data Logger	•	•	•
923 - RC-Com MBUS/JBUS Serial board	•	•	•
926 - LON Serial board	•	•	•
931 - BACnet Ethernet - SNMP - TCP/IP Serial board	•	•	•
932 - BACnet MS/TP Serial board	•	•	•
942 - Serial card for GSM Modem	•	•	•
962 - Kit modem GSM	•	•	•
957 - Plantwatch without modem	•	•	•
930 - Remote graphic terminal kit	•	•	•
889 - Master plant SEQUENCER	•	•	•
RC CLOUD PLATFORM	•	•	•

• available accessory; - not available accessory

TECHNICAL DATA FRIGO TURBO FLG

FRIGO TURBO FLG		250 T1 P4	280 T1	310 T1E	400 T2	400 T2 P4	500 T2 P4	560 T2	620 T2E	
STANDARD	Cooling capacity (1)	kW	250	280	310	400	400	500	560	620
	Unit power input	kW	44,6	52,5	57,2	73,6	73,0	90,2	104,6	114,8
	Evaporator water flow rate	m³/h	43,0	48,2	53,3	68,8	68,8	86,0	96,3	106,6
	Evaporator pressure drop	kPa	24	30	37	37	37	26	33	40
	Condenser water flow rate	m³/h	31,7	57,2	63,2	81,5	50,9	63,4	114,3	126,4
	Condenser pressure drop	kPa	49	21	18	24	73	75	24	18
	Compressors		centrifugal	centrifugal	centrifugal	centrifugal	centrifugal	centrifugal	centrifugal	centrifugal
	Quantity	n.	1	1	1	2	2	2	2	2
	Capacity control (**)	%	25%...100%	25%...100%	25%...100%	25%...100%	25%...100%	12%...100%	12%...100%	12%...100%
	Refrigerant		HFO1234ze	HFO1234ze	HFO1234ze	HFO1234ze	HFO1234ze	HFO1234ze	HFO1234ze	HFO1234ze
	Total refrigerant charge (optional excluded)	kg	167	166	164	152	156	188	183	197
	Gas circuits	n.	1	1	1	1	1	1	1	1
	Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
	Max unit operating current (FLA)	A	157,5	157,5	157,5	315,0	315,0	315,0	315,0	315,0
	Unit starting current (LRA)	A	5	5	5	5	5	5	5	5
	EER (1)	kW/kW	5,41	5,17	5,24	5,26	5,25	5,34	5,20	5,24
	ESEER		8,56	8,29	8,52	8,13	8,46	8,87	8,88	8,94
	Sound power level [Lw] (2)	dB(A)	87,9	87,9	87,9	89,9	89,9	89,9	89,9	89,9
	Average sound pressure level [Lpm] (3)	dB(A)	69,6	69,6	69,6	71,4	71,4	71,4	71,4	71,3
	Net weight	kg	2066	2065	2209	2700	2636	2949	3141	3526
	Hydraulic connections									
	Evaporator IN/OUT - OD (4)	Ø mm	114,3	114,3	114,3	168,3	168,3	168,3	168,3	168,3
	Condenser IN/OUT - OD (4)	Ø mm	88,9	114,3	114,3	114,3	88,9	114,3	139,7	168,3

FRIGO TURBO FLG		750 T3 P4	840 T3	930 T3E	1000 T4 P4	1120 T4	1240 T4E		
STANDARD	Cooling capacity (1)	kW	750	840	930	1000	1120	1240	
	Unit power input	kW	133,6	158,4	170,1	177,8	208,5	226,7	
	Evaporator water flow rate	m³/h	129,0	144,5	160,0	172,0	192,6	213,3	
	Evaporator pressure drop	kPa	29	37	45	36	45	55	
	Condenser water flow rate	m³/h	95,0	171,7	189,2	126,6	228,5	252,3	
	Condenser pressure drop	kPa	74	21	17	77	44	36	
	Compressors		centrifugal	centrifugal	centrifugal	centrifugal	centrifugal	centrifugal	
	Quantity	n.	3	3	3	4	4	4	
	Capacity control (**)	%	8%...100%	8%...100%	13%...100%	8%...100%	8%...100%	9%...100%	
	Refrigerant		HFO1234ze	HFO1234ze	HFO1234ze	HFO1234ze	HFO1234ze	HFO1234ze	
	Total refrigerant charge (optional excluded)	kg	322	314	328	436	412	430	
	Gas circuits	n.	1	1	1	1	1	1	
	Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	
	Max unit operating current (FLA)	A	472,5	472,5	472,5	630,0	630,0	630,0	
	Unit starting current (LRA)	A	5	5	5	5	5	5	
	EER (1)	kW/kW	5,41	5,16	5,31	5,41	5,17	5,25	
	ESEER		9,10	8,92	8,92	8,89	8,65	8,70	
	Sound power level [Lw] (2)	dB(A)	91,6	91,6	91,6	92,5	92,5	92,5	
	Average sound pressure level [Lpm] (3)	dB(A)	72,8	72,8	72,8	73,3	73,3	73,3	
	Net weight	kg	4425	4730	5211	6195	6376	6964	
	Hydraulic connections								
	Evaporator IN/OUT - OD (4)	Ø mm	168,3	168,3	168,3	219,1	219,1	219,1	
	Condenser IN/OUT - OD (4)	Ø mm	139,7	168,3	168,3	139,7	168,3	168,3	

1. Referred to chilled water temperature 12/7°C – 0% glycol solution; water temperature to the condenser 30/35°C. Fouling factor of the exchangers 0,018 m²K/kW.
 2. Sound power level [Lw] according to ISO EN 9614 - 2
 3. Average sound pressure level [Lp_m] 1m far according to ISO EN 3744.
 4. Hydraulic connection with grooved end, supplied as standard with flexible joint and adapter pipe.
- (**) Referred to condenser water inlet temperature 18°C.

DIMENSIONS (mm)

FRIGO TURBO FL			
	a	b	c
250 T1 P4	3465	1360	1770
280 T1	3465	1360	1770
310 T1E	3465	1360	1770
400 T2	3465	1360	1929
400 T2 P4	3465	1360	1929
500 T2 P4	3505	1360	1929
560 T2	3505	1360	1929
620 T2E	3685	1360	1929
750 T3 P4	3770	1360	2059
840 T3	3770	1360	2059
930 T3E	3770	1400	2059
1000 T4 P4	4520	1400	2090
1120 T4	4520	1360	2090
1240 T4E	4520	1360	2090

