FRIGO TURBO FL: 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: 280 ÷ 1840 kW

HIGHEFFICIENCY RC Hi-Tech
INVERTER RC Hi-Tech
ACLASS RC Hi-Tech
LOWNOISE RC Hi-Tech

FRIGO TURBO FL

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

rcgroupairconditioning

A CLASS · INVERTER · OIL FREE · R134a · FLOODED

MAIN FEATURES
- Water cooled liquid chiller in A class energy efficiency.
- 11 models, 2 versions available, for a wide selection opportunity.
- Average step of 150kW.
- EER up to 5,23.
- ESEER up to 8,88.
- Oil-free centrifugal compressors with magnetic levitation bearings.
- Inverter driven.
- R134a Refrigerant charge.
- 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.
- Eurovent Certification.

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

rcgroup.it
1 9 6 3 2 0 1 3
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 R134a refrigerant.
  The term “oil-free” refers to the total absence of lubricating oil within the compressor.
- Magnetic levitation bearings.
- Manometric compression ratio: 1.5 ÷ 5.0
- Stepless capacity control trough integrated inverter.
- High efficiency permanent-magnet synchronous motor with integrated Soft-Start system (starting current limited to 5A).
- Power factor motor cosφ > 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 R134a 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 R134a 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 280 T1 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.
- 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.
- R134a refrigerant charge.

ELECTRICALPANEL

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.

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 (optional accessory).
  - Main components hour-meter.
  - Recording of the last 24 occurred alarms.
  - Non-volatile “Flash” memory for data storage.
  - Menu with protection password.

OPTIONAL ACCESSORIES

FRIGO TURBO FL	280 T1	380 T1	460 T1	560 T2	760 T2	840 T3	920 T2	1140 T3	1380 T3	1520 T4	1840 T4
172 - Rubber support (kit)	●	●	●	●	●	●	●	●	●	●	●
611 - Noise absorption cap	●	●	●	●	●	●	●	●	●	●	●
Service valve on compressor group suction	●	●	●	●	●	●	●	●	●	●	●
1003 - Analogic flowmeter	●	●	●	●	●	●	●	●	●	●	●
1005 - Power supply analyzer	●	●	●	●	●	●	●	●	●	●	●
1009 - Multimeter kit	●	●	●	●	●	●	●	●	●	●	●
Refrigerant gas leak detector	●	●	●	●	●	●	●	●	●	●	●
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 FL (*)

	FRIGO TURBO FL		280 T1	380 T1	460 T1	560 T2	760 T2	840 T3	920 T2	1140 T3
STANDARD	Cooling capacity (1)	kW	280	380	460	560	760	840	920	1140
	Unit power input	kW	55,4	75,2	90,7	110,9	149,3	166,3	178,6	218,0
	Evaporator water flow rate	m³/h	48,2	65,4	79,1	96,3	131,0	144,0	158,0	196,0
	Evaporator pressure drop	kPa	32	29	27	31	27	32	57	35
	Condenser water flow rate	m³/h	57,5	78,0	94,3	115,0	156,0	172,0	188,0	232,0
	Condenser pressure drop	kPa	13	22	21	26	20	39	33	40
	Compressors		centrifugal	centrifugal	centrifugal	centrifugal	centrifugal	centrifugal	centrifugal	centrifugal
	Quantity	n.	1	1	1	2	2	3	2	3
	Capacity control (**)	%	25…100%	25…100%	27…100%	12…100%	12…100%	8…100%	13…100%	8…100%
	Refrigerant		R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a
	Total refrigerant charge (optional excluded)	kg	108	95	105	162	230	270	250	380
	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	141,7	220,5	178,5	283,5	441,0	425,2	357,0	661,5
	Unit starting current (LRA)	A	5	5	5	10	10	15	15	15
	EER (1)	kW/kW	5,05	5,05	5,07	5,05	5,09	5,05	5,15	5,23
	ESEER		8,45	8,46	8,63	8,70	8,88	8,53	8,59	8,72
	Sound power level [Lw] (2)	dB(A)	87,5	87,9	89,7	89,7	89,9	90,7	91,8	91,6
	Average sound pressure level [Lpm] (3)	dB(A)	69,5	69,9	71,7	71,5	71,7	71,6	73,1	72,5
	Net weight	kg	1800	1871	2111	2573	2939	3771	3077	4628
	Hydraulic connections									
	Evaporator IN/OUT - OD (4)	Ø mm	114,3	114,3	168,3	168,3	168,3	168,3	168,3	219,1
	Condenser IN/OUT - OD (4)	Ø mm	139,7	139,7	139,7	139,7	168,3	168,3	168,3	168,3

	FRIGO TURBO FL		1380 T3	1520 T4	1840 T4
STANDARD	Cooling capacity (1)	kW	1380	1520	1840
	Unit power input	kW	269,5	290,6	358,0
	Evaporator water flow rate	m³/h	237,0	261,0	316,0
	Evaporator pressure drop	kPa	39	29	36
	Condenser water flow rate	m³/h	282,0	310,0	376,0
	Condenser pressure drop	kPa	50	50	50
	Compressors		centrifugal	centrifugal	centrifugal
	Quantity	n.	3	4	4
	Capacity control (**)	%	9…100%	6…100%	6…100%
	Refrigerant		R134a	R134a	R134a
	Total refrigerant charge (optional excluded)	kg	410	410	450
	Gas circuits	n.	1	1	1
	Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50
	Max unit operating current (FLA)	A	535,5	882,0	714,0
	Unit starting current (LRA)	A	15	20	20
	EER (1)	kW/kW	5,12	5,23	5,14
	ESEER		8,57	8,78	8,73
	Sound power level [Lw] (2)	dB(A)	92,2	92,5	94,0
	Average sound pressure level [Lpm] (3)	dB(A)	73,1	73,1	74,6
	Net weight	kg	4749	5787	6674
	Hydraulic connections				
	Evaporator IN/OUT - OD (4)	Ø mm	219,1	219,1	219,1
	Condenser IN/OUT - OD (4)	Ø mm	168,3	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 0,043 m²°K/kW.
2. Sound power level [Lw] according to ISO EN 9614 - 2
3. Average sound pressure level [L_{Pm}] 1m far according to ISO EN 3744.
4. Hydraulic connection with grooved end, supplied as standard with flexible joint and adapter pipe.

(*) Technical data refer to units equipped with 2-passes condenser.
(**) Referred to condenser water inlet temperature 18°C.

DIMENSIONS (mm)

FRIGO TURBO FL	a	b	c
280 T1	3027	1360	1770
380 T1	3027	1360	1770
460 T1	3027	1360	1770
560 T2	3027	1360	1929
760 T2	3097	1360	1929
840 T3	4444	1400	2059
920 T2	3820	1360	2009
1140 T3	4444	1400	2059
1380 T3	4444	1400	2059
1520 T4	4935	1400	2090
1840 T4	4980	1400	2090