MICROPROCESSOR

The microprocessor controller manages and optimizes all components and functions of the QBE chillers (QBE002 excluded, which has an electronic thermostat).
It also:

- Adjusts the water temperature at the evaporator outlet;
- Turns the pump on and off with suitable delay suitable for the compressor;
- Controls the compressor on and off cycles depending on the water temperature and simultaneously ensures the minimum operating times to protect the compressor;
- Measures and displays the water temperature;
- Prevents the evaporator freezing

The integrated display, with icons, provides a complete visualisation of the parameters of the machine' s operation and any alarm conditions.

ALARM CONTROL

- It has the following alarm messages:
  - o high and low refrigerant pressure switch;
  - o Water differential pressure switch (QBE008 ÷ QBE025 models);
  - o Level switch
  - o Thermal electric motors protections (only QBE008 ÷ QBE025);
  - o Temperature failure probe;
  - o Anti-Freeze

REFRIGERANT

The entire range is developed with R407C refrigerant, which has a high thermodynamic range with allows optimum performance of the refrigerant circuit.

CHECKS AND TESTING

Each QBE unit is subject to an end-of-line full load testing; During the test phase the following checks are performed:

- Correct component assembly
- pressurisation of the cooling circuit and leak detection using a helium leak detector
- pressurisation of the hydraulic circuit
- electrical tests according to the EN60204 standard
- check of correct protection and safety operation
- check of correct electronic controller operation
- performance and electrical data measurement

EASY MAINTENANCE

The QBE range has been designed and built to facilitate easy inspection and maintenance.
The hoods are easily removable, offering immediate access to the parts of the system. The clear arrangement of the components, the simple composition of the refrigerant and hydraulic circuit and the electrical system's cable numbering, assist the user during service and maintenance.

THE NEW SERIES OF QBE UNITS HAS A HOT GAS BYPASS VALVE FOR "PRECISE" CONTROL OF WATER OUTLET TEMPERATURE

The QBE range is provided with a precise adjustment system for the outlet water temperature (± 1K), using a hot gas bypass valve. This can cope with extremely variable thermal loads and ensures a constancy of the chilled water temperature.

ACCESSORIES AND OPTIONS AVAILABLE - STANDARD EQUIPMENT AND OPTIONAL COMPONENTS

QBE MODEL	002	003÷007	008÷025
Atmospheric pressure hydraulic circuit with non-ferrous materials	●	●	●
Hydraulic pressurized circuit with non-ferrous materials	X	o	o
Calibrated water bypass	●	●	●
Pump	●	●	●
Pump head P2	●	X	●
Pump head P3	X	●	o
Pump head P5	X	o	o
Without pump	X	o	o
Atmospheric pressure tank, "cold" (machine output)	●	●	●
Atmospheric pressure tank, "hot" (machine input)	X	X	o
Atmospheric pressure tank, "cold" (machine output) -- without pump	X	o	o
Pressure tank, "cold" (machine output) (1)	X	o	o
Pressure tank, "hot" (machine input) (1)	X	o	o
Pressure tank, "cold" (machine output) -- without pump (1)	X	o	o
Pressure tank, "hot" (machine input) -- without pump (1)	X	o	o
Pressurised tank "cold"-, with non return valve and double pump	X	X	o
Collection tank with additional connections (3)	X	o	o
Without tank (1)	X	o	o
Pressure hydraulic circuit with non-ferrous materials (1)	X	o	o
Water differential pressure switch (4)	X	o	●
Water-level sensor	●	●	●
Heating element for compressor	X	o	o
High-pressure switch	●	●	●
Low-pressure switch	X	o	●
Phase-sequence control relay	X	X	●
Ready for outdoor installation	X	o	●
Stainless steel air filters	X	X	●
Wheels	o	o	o
Adjustable feet	●	●	X
Control with thermostat	●	X	X
Parametric microprocessor control	X	●	●
Thermostatic valve	X	●	●
Refrigerant gauges	X	o	●
Water manometer (2)	●	●	●
Condenser control (fan on-off)	X	●	●
Continuous adjustment of fan speed (low air temperature kit)	X	X	o

Key terms: **X** not available, ● standard; O optional; * Contact our company;

(1) Possible option only for units equipped with plate evaporator
(2) water pressure gauge which is included on all units which have a pump
(3) Additional connections included on all units with a pressure tank
(4) Water pressure gauge included on all units equipped with plate evaporator

FRIULAIR Chillers

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MADE IN ITALY

FRIULAIR Chillers

QBE

AIR-COOLED WATER CHILLERS WITH AXIAL FANS, ROTARY AND SCROLL COMPRESSORS FROM 3 KW TO 25 KW

FRIULAIR Chillers

The new range of QBE chillers has been designed specifically to meet industrial requirements and provide accurate control of the chilled water temperature with the absolute reliability of continuous operation (with the option of hot bypass valve). It is particularly suitable for process cooling during the moulding and extrusion of plastic, laser cutting, precision engineering, pharmaceutical and food industry etc…

The range consists of 12 models with cooling capacities from 3-25 kW and is designed for outdoor installation (QBE002 excluded and QBE003 ÷ 007 optional). All units are equipped with:

- Hermetic rotary or scroll compressors,
- Ecological refrigerant R407C;
- Microprocessor controller (electronic thermostat for QBE002);
- Atmospheric pressure tank;
- Water pump

STRUCTURE AND MAINTENANCE

The unit frame and panels are externally powder coated steel, making QBE suitable for external and weather-proof installations (degree of protection to IP44 as standard only on QBE008-025 models). All fasteners are stainless steel or electro-galvanized. The panels are easily removed, allowing access inside the unit for maintenance and repair. The clear arrangement of the components, the simple composition of the refrigerant and hydraulic circuit and the electrical system's cable numbering, assist the users normal operation. All models are equipped with lifting hooks. The QBE008 ÷ 025 models are equipped with lifting holes on the base.
Wheels for all models are available on request and allow for easy movement of the machine even when unpacked.

COOLING CIRCUIT

Manufactured from high quality materials by skilled personnel according to strict procedures of brazing, and conforms to Directive 97/23.
It comprises of:

- rotary (QBE002 ÷ 012 models) or scroll (QBE014 ÷ 025 models) compressor;
- Copper Coaxial evaporator made from AISI 316 stainless steel brazed plate;
- Micro channel condenser in aluminium with epoxy coating;
- Filter dryer;
- Flow sight glass with moisture indicator (QBE008 ÷ 025 models);
- External equalisation thermostatic expansion valve (except QBE002 model); The thermostatic expansion valve regulates the injection of liquid refrigerant into the evaporator. The injection is a response to the refrigeration requirements. The range of thermostatic valves are designed for specific applications and are connected to the circuit via bi-metal brazing
- High pressure switch with manual reset;
- Low pressure switch to semi-automatic reset (QBE008 ÷ 025 models);
- High and low pressure gauges (QBE008 ÷ 025 models);
- Pressure connections for checks and maintenance.

HYDRAULIC CIRCUIT

Composed of:

- Atmospheric pressure collection tank, thermally insulated manufactured from ABS (QBE002-007) and PVC (QBE008-25;
- Water pipes in copper and PVC
- Electric pump, thermally insulated, made with non-ferrous materials (steel, brass or plastic material, mechanical seals NBR or EPDM depending on the model);
- Calibrated water bypass (prevents incidents caused by the erroneous closure of the stop valves);
- Water differential pressure switch (QBE008 ÷ 025 models);
- Water manometer;
- Drain valve;
- Filling unit.

All models in the QBE range have, as standard, the hydraulic circuit made from non-ferrous materials, which is necessary for industrial applications.
All units in the range can be used with mixtures of water and ethylene glycol up to 30%.

TECHNICAL DETAILS

COMPRESSORS

Hermetic, rotary and scroll representing the highest level of technology in this product range.
They are extremely reliable, efficient and widely used in the air conditioning sector. The scroll compressor is known for its quietness, the almost total absence of vibration and having no problems with liquid return. The compressors are mounted on rubber shock absorbers to further reduce noise. They are also protected by an electronic device which controls the sequence of phases (only in three-phase models), to avoid the possibility of reversed rotation.

FANS

Axial, 4-pole, with sickle-shaped blades directly coupled to external rotor motors. They are equipped with internal thermal protection.

CONDENSER

This compact and efficient, aluminium micro-channel condenser enables a more compact design, better performance and lighter units. This type of condenser, allows a significant reduction in refrigerant costs (-30% compared to units with traditional condensers).
All QBE's condensers are protected by an epoxy coating that ensures a high degree of resistance to corrosion even in aggressive environments.
The aluminium structure makes these condensers free from galvanic corrosion risks. On the QBE008 model, the condenser is protected by a stainless steel air filter and is easily removable and washable.

EVAPORATOR

For the QBE002 ÷ 007 models the evaporator is a coaxial type made of copper, which is effective reliable even when dealing with contaminated fluids. For the remaining models (QBE008-QBE025) the evaporator is made from brazed plate AISI 316 stainless steel. They are compact, with a highly efficient heat exchange between refrigerant and the fluid to be cooled. The antifreeze function of the electronic controller continuously measures the water temperature at the evaporator outlet to prevent the evaporator freezing.
For QBE008 ÷ QBE025 models, a differential pressure switch protects the evaporator from a lack of water flow.

ELECTRICAL PANEL

Manufactured according to the EN 60204 standard, the cabinet is made of galvanized steel with a polyester powder coated surface. It includes: main switch with door-lock (QBE008 ÷ 025) (which prevents access to the panel when it is under voltage) and watertight door to access the electronic control. The cables inside the cabinet are numbered.

TECHNICAL DATA QBE

Model		002[3]	003	004	005	006[2]	007[2]	008[5]	009[5]	012	014	020	025	005 3Ph	006 3Ph	007 3Ph
Cooling capacity [1]	[kW]	2,55	2,74	3,51	4,28	5,21	6,21	8,16	10,11	12,73	16,22	21,02	23,11	5,23	6,08	7,01
Compressors power input [1]	[kW]	0,48	0,49	0,71	0,86	1,22	1,76	1,49	2,09	2,81	2,54	3,76	4,87	1,22	1,71	2,29
Total power input [1] [2]	[kW]	0,79[5]	0,99	1,21	1,36	1,72[2]	2,26[2]	2,80[5]	3,40[5]	4,12	4,32	5,99	7,10	1,73	2,21	2,80
Total absorbed current [1] [2]	[A]	4,44[5]	5,38	6,45	7,22	9,01[2]	11,31[2]	5,97[5]	6,88[5]	8,19	8,14	10,97	12,90	5,55	6,15	7,35
EER (pump excluded) [1]	–	4,16	4,43	4,19	4,32	3,85	3,29	4,53	4,21	4,09	4,89	4,63	4,09	3,86	3,30	2,89
Water flow [1]	[l/ h]	438	471	604	736	897	1068	1404	1739	2190	2790	3615	3975	900	1046	1206
Available pressure [1]	[kPa]	146	287	261	248	215	181	235	210	222	188	217	199	215	185	153
Maximum power input (total) [2] [3]	[kW]	1,3[5]	1,5	1,8	2,0	2,5[2]	3,0[2]	3,8[5]	4,9[5]	5,8	6,8	8,6	10,0	2,4	3,0	3,7
Maximum absorbed current (total) [2] [3]	[A]	6,6[5]	7,5	9,1	10,4	12,6[2]	14,4[2]	7,7[5]	9,5[5]	10,8	12,1	15,9	17,5	6,4	7,3	8,7
Starting current [2] [3]	[A]	21,3[5]	22,1	26,1	34,2	39,2[2]	55,2[2]	34,2[5]	42,2[5]	44,2	62,7	78,3	89,3	22,9	18,9	25,9
Fan power	[kW]	0,13	0,13	0,13	0,13	0,13	0,13	0,31	0,31	0,31	0,78	0,78	0,78	0,14	0,14	0,14
Fan current	[A]	0,65	0,65	0,65	0,65	0,65	0,65	1,20	1,20	1,20	1,70	1,70	1,70	0,38	0,38	0,38
Number of fans	[#]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P3 Pump power input	[kW]	0,18[5]	0,37	0,37	0,37	0,37[2]	0,37[2]	1,00[5]	1,00[5]	1,00	1,00	1,45	1,45	0,37	0,37	0,37
P3 Pump absorbed current	[A]	1,60[5]	2,50	2,50	2,50	2,50[2]	2,50[2]	2,00[5]	2,00[5]	2,00	2,00	2,60	2,60	2,50	2,50	2,50
Power supply	[V/Ph/Hz]	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
IP protection degree	–	IP40	IP40	IP40	IP40	IP40	IP40	IP44	IP44	IP44	IP44	IP44	IP44	IP44	IP44	IP44
Refrigerant	–	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C
Compressor type	–	Rotary	Rotary	Rotary	Rotary	Rotary	Rotary	Rotary	Rotary	Scroll	Scroll	Scroll	Scroll	Reciprocating	Reciprocating	Reciprocating
Evaporator type	–	Coaxial	Coaxial	Coaxial	Coaxial	Coaxial	Coaxial	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Coaxial	Coaxial	Coaxial
Condenser type	–	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel
N° of compressors	[#]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
N° of refrigerant circuits	[#]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Air flow	[m³/h]	2.200	2.200	2.200	2.500	2.500	2.500	4.800	4.800	5.000	5.500	5.500	5.500	2.500	2.500	2.500
Sound pressure level [4]	[dbA]	46	46	46	46	46	46	49	49	49	49	49	49	46	46	46
Water connections diameter	[inch]	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1"	1"	1"	1"	1"	1"	1/2"	1/2"	1/2"
Width	[mm]	718	718	718	718	718	718	1004	1004	1004	1004	1004	1004	718	718	718
Depth	[mm]	678	678	678	678	678	678	753	753	753	753	753	753	678	678	678
Height	[mm]	668	668	668	668	668	668	1257	1257	1257	1257	1257	1257	668	668	668
Weight	[kg]	82	85	88	92	95	100	235	240	245	255	255	255	92	95	100
Tank capacity - Option	[dm3]	25	25	25	25	25	25	90	90	90	90	90	90	25	25	25
P3 Pump power input - Option	[kW]							1,60	1,60	1,60	1,60	0,75	0,75			
P3 Pump absorbed current - Option	[A]							1,90	1,90	1,90	1,90	2,50	2,50			
P5 Pump power input - Option	[kW]		0,55	0,55	0,55	0,55	0,55	0,75	0,75	0,75	0,75	0,90	0,90	0,55	0,55	0,55
P5 Pump absorbed current - Option	[A]		6,20	6,20	6,20	6,20	6,20	2,50	2,50	2,50	2,50	2,60	2,60	6,20	6,20	6,20

(1)Data referred to following conditions: water temperature in/out: 20/15°C - ambient air temperature: 25°C – (2) Data referred to unit with pump P3 – (3) Data related to most heavy condition allowed by safety devices fitted on the unit – (4) Referred at 10 m and at an height of 1,5 m in free field – (5) Data referred to unit with pump P2 – (6) Maximum room temperature 45 °C – (7) Maximum inlet temperature 30 °C. – (8) Minimum water outlet temperature - 10 °C (with 30% ethylene glycol) at 5°C according to the model. Friulair S.r.l. reserves the right to make technical changes without prior notice, errors and omissions excepted.