

PURESTREAM

QBE-TWIN CIRCUIT LASER CHILLERS



BY FRIULAIR



LASER CHILLER SOLUTIONS

Chillers from 12 to 33 kW with double hydraulic circuit

PROCESS COOLING FOR LASER CUTTING MACHINES

QBE-TWIN CIRCUIT LASER CHILLERS

OVERVIEW

The QBE laser series is specifically designed to meet the application requirements of the laser industry. This model offers precise control of the water temperatures over long operational periods for both external load points. Dual pumps with 2 separate temperature set points.

The refrigeration circuit is designed to operate precisely to maintain outlet water temperature ($\pm 0.5\text{ C}^\circ$) utilizing electronic hot gas bypass technology to manage changes in thermal load on the source circuit.

The water temperature dedicated to the optics cooling is managed by a 3-way valve that guarantees a precise control of the outlet water temperature with a tolerance of $\pm 1\text{ K}$.

QBE laser series units have been designed with the smallest footprint possible and are equipped with wheels for a easy positioning. The hydraulic connections are located below in the rear side and are equipped with shut-off valves.

The frame and the cabinet cover material is powder coated steel. All fasteners are either made of stainless steel or electro-galvanized.

The unit has been designed so that all parts, particularly those requiring maintenance and cleaning, are easy to access and assure a safe environment for the operator.

Each QBE laser unit provides the user with a digital input for remote on/off, a digital output for remote signalling of the general alarm, an Ethernet port with an integrated web server for remote monitoring.

This specialized unit can stay switched on to meet the minimum water temperature required (setpoint) on the source and optical branches in partial/total absence of thermal load depending on the features of the system. The user can switch off the unit with the remote on/off contact or, on the display during the partial / total absence of thermal load for energy saving purposes.

Each QBE laser unit is available in two power supplies, 400/3/50 or 460/3/60, depending on the user's network and application requirements. A transformer can be supplied for voltages other than listed.



REFRIGERATION CIRCUIT

COMPRESSOR

The QBE laser series employ scroll compressors. (01)

Scroll compressors are the robust and efficient workhorses of the process cooling market. A quiet and reliable performer, it is adapted to accept and absorb liquid refrigerant slugging often found in non standard operations.

The compressor is mounted on rubber anti-vibration blocks to reduce noise even further.

EVAPORATOR

The evaporator (02) is a compact and efficient stainless-steel brazed plate type. The electronic anti-freeze control keeps the evaporator's outlet water temperature under control to prevent icing. A differential pressure switch protects the evaporator against a lack of water flow.

CONDENSER

The condenser (03) is a microchannel aluminium type which guarantees a greater exchange surface than the traditional copper tube condenser and minimizes the refrigerant charge required (between 30-35 lower than a traditional condenser). The full aluminium structure prevents any risk of galvanic corrosion. Aluminum filters (04) protect the condenser and could be easily removed for service and cleaning.

The condenser is protected with an epoxy coating, which boasts a high corrosion resistance in aggressive atmospheres.

FAN(S)

The fans (05) of the QBE laser range are composed of a 4-pole motor and external sickle-shaped blade rotor. They are equipped with a protection grid and internal heat protection with automatic reset. In addition, QBE laser units have a continuous fan speed control system able to satisfy the load demanded by the user, while ensuring optimal performances under the required conditions.

HOT GAS BYPASS VALVE

The electronic hot gas bypass (06) valve modulates the machine cooling capacity while ensuring unit constant operation. This valve allows a precise control of the chilled water temperature (± 0.5 K) during operation over long periods with varying load requirements.

THERMOSTATIC EXPANSION VALVE (07)

It moderates the flow of the refrigerant in order to keep constant the superheating of the evaporator outlet gas.

HYDRAULIC CIRCUIT

The hydraulic circuit consists on completely non ferrous materials (brass, stainless steel, pvc, EPDM, bronze) and is made up of :

(08) an atmospheric water tank in PVC with a level sensor and the related visual indicator, along with a drain valve placed in the rear part;

(09) a pump for hydraulic circuit dedicated to cooling the laser source, equipped with a calibrated water by-pass and a water gauge;

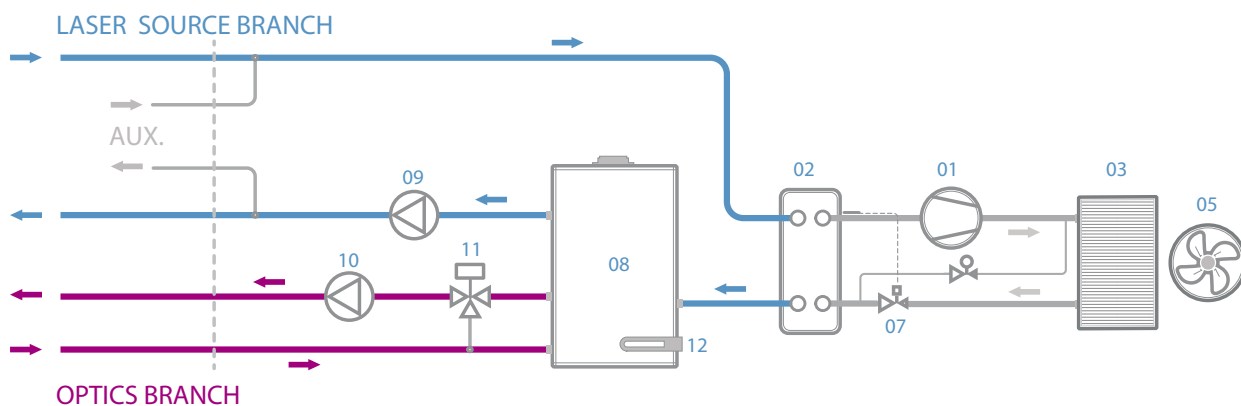
(10) a pump for hydraulic circuit dedicated to cooling the source side, equipped with a calibrated water by-pass and a water gauge;

(11) a 3-way mixing valve with actuator to accurately manage the optics water temperature; allows an accuracy of ± 1 K on the outlet water temperature;

(12) a pre-heating resistor installed inside the tank;

(13) shut-off valves in the hydraulic connections.

Furthermore, the water by-passes allow the pressure adjustment of the water supplied by the hydraulic circuit.



ELECTRONIC CONTROLLER

QBE laser chillers are equipped with a single controller managing all the functions of the chiller as listed below:

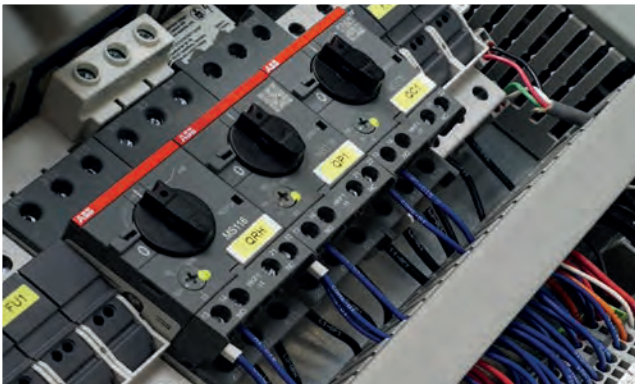
- compressor operation to ensure a constant outlet water temperature;
- pumps operation;
- correct functioning of the variable speed fan;
- operation of the resistor immersed in the tank which guarantees a temperature maintenance when the machine is switched off;
- management of the electronic by-pass valve to ensure the accuracy of the water leaving the main branch (laser source);
- management of the 3-way valve to control the water temperature of the secondary branch (optics);
- alarms management to ensure a correct operation within the machine working limits and to prevent dangerous conditions;
- unit ready confirmation when the following conditions are met simultaneously:
 - electrically powered unit;
 - source branch water temperature within the expected range;
 - water flow rate on the optics branch.



DIAGNOSIS (MONITORING)

The electronic controller manages the following alarms:

- high and low refrigerant pressure switches / transducers;
- low water level inside the tank;
- insufficient water flow to the evaporator;
- temperature probes failure;
- antifreeze alarm;
- maximum fluid temperature alarm;
- reverse phase relay;
- compressor, pump, fan(s) motor protection alarm;
- high compressor outlet temperature;
- laser source branch temperature accuracy;
- low optics branch flow rate.



INTEGRATED WEB SERVER



ELECTRICAL PANEL

The electrical control panel is manufactured in accordance with EN 60204-1. It is equipped with a main disconnect switch with door lock disconnecter that prevents the user access when the control panel is powered and anti-UV window to extend the LCD life. It includes:

- compressor thermomagnetic protection;
- fan thermomagnetic protection;
- pumps thermomagnetic protection (both source and optic lines);
- electronic microprocessor controller to control and manage the unit, equipped with communication port RS485 and Ethernet with an integrated web server;
- correct phase sequence rotation device (it prevents the reverse rotation of the motors);
- transformer for the auxiliary voltage necessary to power supply the electronic controller and to manage all thermal loads;
- the external cables and the internal wires are identified to facilitate the use and service.

In the terminal strip a remote ON/OFF operation and a general alarm contact are available.

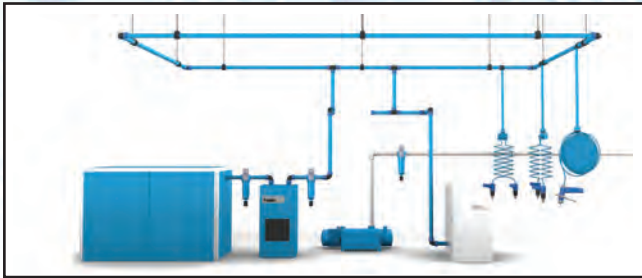
QBE LASER SERIES		QBE012 - R	QBE023 - R	QBE033 - R
Air temperature	[°C]	32	32	32
Evaporator inlet water temperature	[°C]	26	26	26
Evaporator outlet water temperature	[°C]	21	21	21
Ethylene glycol percentage	---	0%	0%	0%
Cooling capacity	[kW]	12.28	25.55	34.73
Compressors power input	[kW]	3.20	5.88	7.10
Total power input	[kW]	5.00	9.34	11.56
Total absorbed current	[A]	9.25	13.95	18.92
Energy efficiency (pumps excluded)	EER/COP	3.65	3.72	3.82
Water flow (laser source)	[l/h]	2112	4395	5974
Available pressure (laser source)*	[kPa]	443	302	413
Water flow (optics)	[l/h]	600	600	600
Available pressure (optics) *	[kPa]	580	580	580
Maximum power input (total)	[kW]	5.66	11.97	15.25
Maximum absorbed current (total)	[A]	10.90	18.38	23.09
Starting current	[A]	43.89	76.79	105.21
Fan power	[kW]	0.17	1.00	1.00
Fan current	[A]	1.80	1.42	1.42
Fans quantity	[#]	1	1	2
Pump power input (laser source)	[kW]	0.9	1.72	1.72
Pump absorbed current (laser source)	[A]	1.53	2.81	2.81
Pump power input (optics)	[kW]	0.74	0.74	0.74
Pump absorbed current (optics)	[A]	1.56	1.56	1.56
Power supply	[V/Ph/Hz]	460/3/60	460/3/60	460/3/60
IP protection degree	---	IP44	IP44	IP 44
Refrigerant	---	R407C	R407C	R410A
Compressor type	---	Scroll		
Evaporator type	---	Brazen plates		
Condenser type	---	Micro channel		
Compressor quantity	[#]	1	1	1
Refrigeration circuit quantity	[#]	1	1	1
Air flow	[m3/h]	3.700	8.900	16.300
Sound pressure level at 10 m in free field	[dba]	51	52	55
Water connections size Source / E.C.P. / Optics all male NPT	[inch]	1 1/4" - 3/4" - 1/2"	1"1/4 - 3/4" - 1/2"	1 1/2" - 3/4" - 1/2"
Tank capacity	[dm3]	100	100	100
Width	[mm]	760	760	930
Depth	[mm]	780	780	1.570
Height	[mm]	1.800	1.800	1.510
Weight (approx.)	[kg]	300	315	380

*max. head at 26/21@32 conditions, adjustable by hydraulic bypass, which is supplied as standard on the source and optics sides. Please get in touch with us for further information.

Other Products Available from CAG Technologies



Compressed Air, Gas Vacuum Purification
Condensate Processing



Aluminum Pipe
Distribution Systems



Gas Generators

