

OPIPHOTONICS

HIGH-POWER LASER DIODES



BrighteX Line
Fiber coupled
laser diodes



BrightboX Line
Laser diode
systems

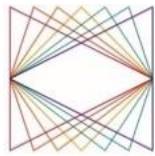


High-Power
Laser Switch
and Coupler



High-Power
Laser Collimator
and Optics

HIGH-POWER LASER BEAM DELIVERY SYSTEMS



LASER BEAM SWITCH

TIME OR ENERGY SHARING



©2017 OPI Photonics S.R.L. All rights reserved.

OPI Photonics S.R.L. reserves the right to make changes to this document at any time without prior notice.

OPI Photonics S.R.L.

<i>Registered Office</i>	<i>Operational Headquarters</i>
Via Conte Rosso 3 10121 Torino, Italy	Via Giovanni Schiaparelli 14 10148 Torino, Italy

Phone: +39 011 297 44 76
E-mail: info@opiphotonics.com
Web: www.opiphotonics.com

1 General overview

Application

- Material processing
- Industrial field

Input sources

- Fiber laser
- Direct diode laser

Features

- Up to 10 kW
- Up to 4 output ports
- Time or energy sharing

Functionality

- OPI laser beam switch allows sharing a single laser source with multiple working cells, increasing the productivity.

2 Specifications:

2.1 Fiber laser sources

	Parameter	Unit	Typical
Optical characteristics	Maximum power	kW	8
	Wavelength range	nm	1030÷1090
	Maximum NA	-	0.18 or 0.2
	Lens material	-	High-Quality Fused Silica
	Typical power loss	%	<5

2.2 Direct diode laser sources

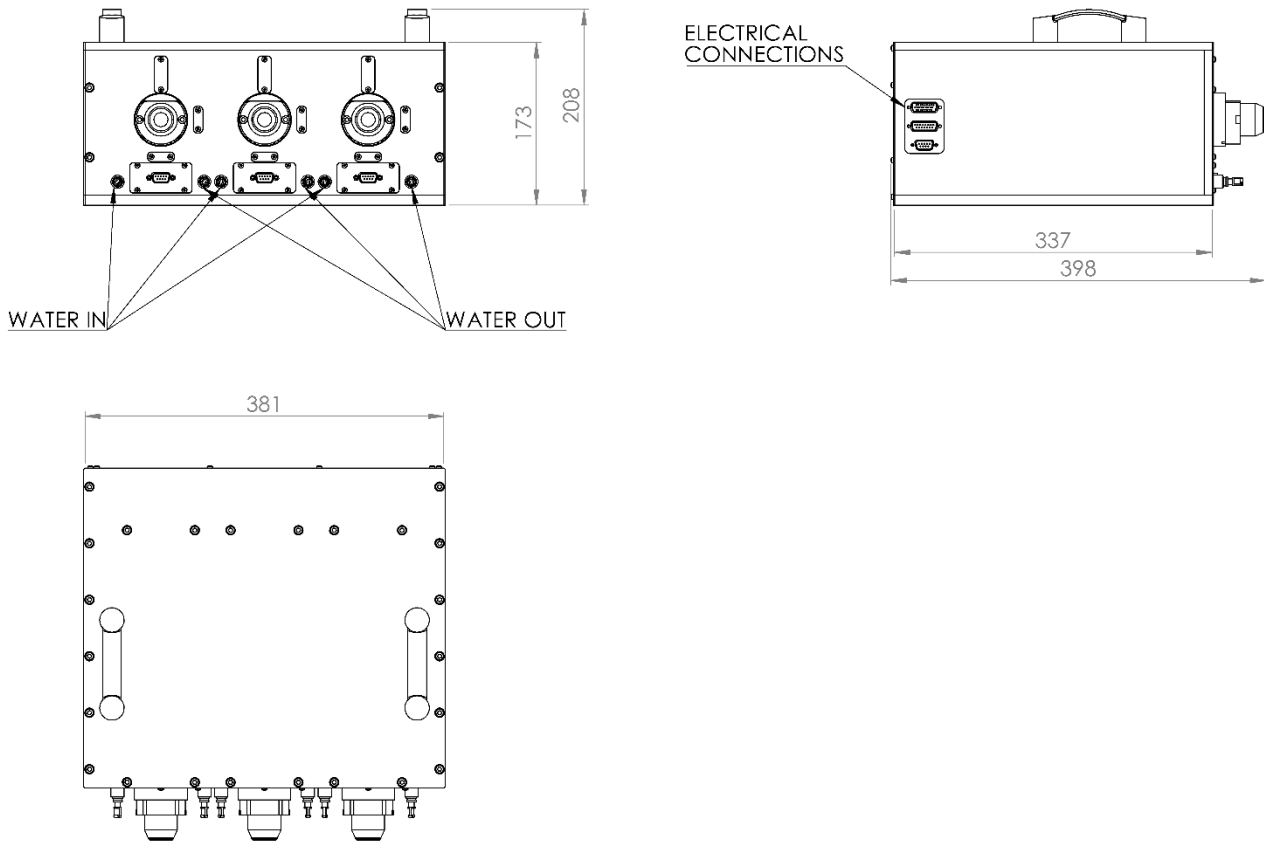
	Parameter	Unit	Typical
Optical characteristics	Maximum power	kW	10
	Wavelength range	nm	800÷1100
	Maximum NA	-	0.22
	Lens material	-	High-Quality Fused Silica
	Typical power loss	%	<5

2.3 General specifications

	Parameter	Unit	Typical
Electrical characteristics	Power supply	V	24
	Switching time	ms	250
	Interlock safety range	kΩ	0.4÷12
	Waterflood sensors range	V	0÷24
	Output signals range	V	0÷24
Maximum ratings	Operating temperature	°C	10÷50
	Relative humidity	%	<80
	Storage temperature	°C	-20÷70
	Maximum ambient variation*	°C	±10
Cooling requirements	Minimum water flow	l/min	1
	Typical water flow	l/min	2
	Maximum pressure	bar	3
	Water temperature	°C	20÷30 (above dew point)
	Water quality	-	Tap or demineralized water
	Water pipe ID/OD	mm	4/6

* If the temperature changes more than $\pm 10^{\circ}\text{C}$ during operation, within the specified operating temperature, the switch could need a re-alignment.

3 Technical drawings



All dimensions are in millimetres.

4 Electrical connections

4.1 Servomotor controller I/O connector:

The servomotor controller I/O connector (CN1) is a 26 ways male d-sub with the following pinout:

Pin	Signal	Function	Pin	Signal	Function
1	COM+	Input: 24V for controller I/O interface	14	OUT0	Output: index 0 of motor position
2	COM-	Input: 0V for controller I/O interface	15	OUT1	Output: index 1 of motor position
3	IN0	Input: index 0 of step position	16	OUT2	Output: index 2 of motor position
4	IN1	Input: index 1 of step position	17	OUT3	Output: index 3 of motor position
5	IN2	Input: index 2 of step position	18	OUT4	Output: index 4 of motor position
6	IN3	Input: index 3 of step position	19	OUT5	Output: index 5 of motor position
7	IN4	Input: index 4 of step position	20	BUSY	Output: motor in motion
8	IN5	Input: index 5 of step position	21	AREA	Output: motor in target area
9	SETUP	Input: homing procedure command	22	SETON	Output: motor in homing position
10	HOLD	Input: motor hold command	23	INP	Output: motor in target position
11	DRIVE	Input: motor start motion command	24	SVRE	Output: servo power ready
12	RESET	Input: error reset command	25	ESTOP ¹	Output: emergency stop
13	SVON	Input: servo power on command	26	ALARM ¹	Output: alarm

¹ The "ALARM" and "ESTOP" are negative-true logic output



4.2 Switch interface connector:

The switch interface connector (CN2) is a 15 ways male d-sub with the following pinout:

Pin	Signal	Function
1	Fiber_OK	Output: processing fiber interlock integrity detected
2	Mirror_ON	Output: mirror in position, output A enabled
3	Mirror_OFF	Output: mirror not in position, output B enabled
4	Water_Alarm	Output: water leakage not detected
5	T1_Alarm	Output signal: temperature 1 fault not detected
6	T2_Alarm	Output signal: temperature 2 fault not detected
7	T3_Alarm	Output signal: temperature 3 fault not detected
8	T4_Alarm	Output signal: temperature 4 fault not detected
9	Enable	Input: general safety board on command
10	24V	Input: 24V for power supplying
11	24V	
12	0V	Input: 0V for power supplying
13	0V	
14	Spare	-
15	Spare	-

4.3 Servomotor power supply and emergency connector:

The servomotor power supply and emergency connector (CN3) is a 9 ways male d-sub with the following pinout:

Pin	Signal	Function
1	0V	Input: 0V for controller and motor power supplying
2	M24V	Input: 24V for motor power supplying
3	C24V	Input: 24V for controller power supplying
4	EMG ²	Input: emergency signal (24V emergency off)
5	BK_RLS	Input: lock release (24V lock off)
6	Spare	-
7	Spare	-
8	Spare	-
9	Spare	-

BK_RLS signal is present only in some type of linear actuators and only on customer specific request.

4.4 Power supply suggestion:

To prevent any interaction between the motor power supply and the parallel I/O common signals, use two independent 24V power supplies. In the case of the emergency, switch off only the motor power to avoid the controller software reinitialization.

Power supply consumption and DC stability:

- Motor: 24 V, 3 A (10 A Peak) DC voltage stability 15%.
- Controller: 24V, 1 A DC voltage stability 10% and ripple 5%.

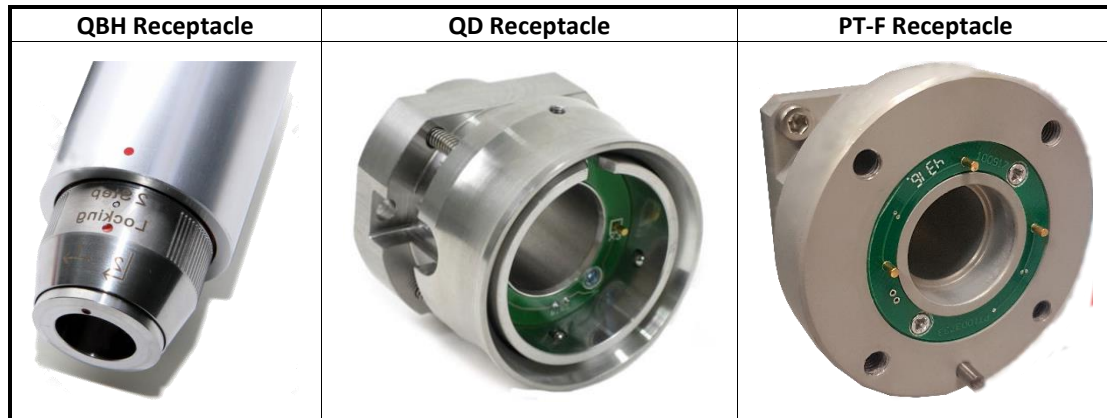
² The “ESTOP” and “BK_RLS” are negative-true logic input

5 Optical configurations

	Magnification factor	Maximum NA	Collimating lens focal length (mm)	Focusing lens focal length (mm)
Fiber Laser	0.8	0.18	60	50
	1	0.18	60	60
	1.2	0.2	50	60
	2	0.2	50	100
Direct Diode Laser	1	0.22	60	60
	1.2	0.22	50	60
	2	0.22	50	100

6 Receptacle configurations

The laser beam switch can be equipped with several types of fiber receptacle, starting from the most diffuse QBH and QD coming to the new PT-F. One example of each receptacle is shown in the table below.



7 Customization

The laser beam switch for fiber and direct diode lasers is conceived as a standard product with some possible customizations.

Minor customizations are available on the standard part numbers and involve the following items and are tracked by the "OO" suffix in the extended part number:

- CANbus communication protocol
- Fiber scattering sensor
- Servomotor controller I/O managing board
- Differentiated magnification factors for each output
- Differentiated output receptacle types for each output

Major customizations will change the components used inside the device:

- Magnification factor ("X" field of the extended part number)
- Maximum numerical aperture ("Y" field of the extended part number)
- Input receptacle ("Z" field of the extended part number)
- Output receptacles ("A" field of the extended part number)
- Wavelength range ("B" field of the extended part number)
- Cooling system ("C" field of the extended part number)

Major customization is possible only on specific request and after feasibility evaluation.

8 Ordering information

Extended part number: SWC-X-Y-Z-A-B-C-OO

Part number data:

- Magnification factor – X:
 - 0.8
 - 1.0
 - 1.2
 - 2.0
- Maximum Numerical Aperture – Y:
 - 0.18
 - 0.2
 - 0.22
- Input and output receptacles – Z – A:
 - Q – QBH
 - D – QD
 - F – PT-F
- Wavelength range – B:
 - FL – Fiber Laser
 - DL – Direct Diode Laser
- Cooling system – C:
 - A – Air (newer version under development)
 - W – Water

SUMMARY

9 Summary

1	General overview.....	3
2	Specifications:.....	3
2.1	Fiber laser sources.....	3
2.2	Direct diode laser sources	3
2.3	General specifications	3
3	Technical drawings	4
4	Electrical connections.....	4
4.1	Servomotor controller I/O connector:.....	4
4.2	Switch interface connector:	5
4.3	Servomotor power supply and emergency connector:.....	5
4.4	Power supply suggestion:.....	5
5	Optical configurations	6
6	Receptacle configurations	6
7	Customization.....	7
8	Ordering information.....	7
9	Summary.....	8