Cobolt Optogenetics Laser Solution

Cobolt offers a range of high performance, reliable and user friendly laser assemblies specially tailored for advanced Optogenetics research. The laser assemblies have been developed in close collaboration with leading Optogenetics research laboratories and offer experiment-ready solutions for configurable solutions for channelrhodopsin activation and halorhodopsin inhibition.

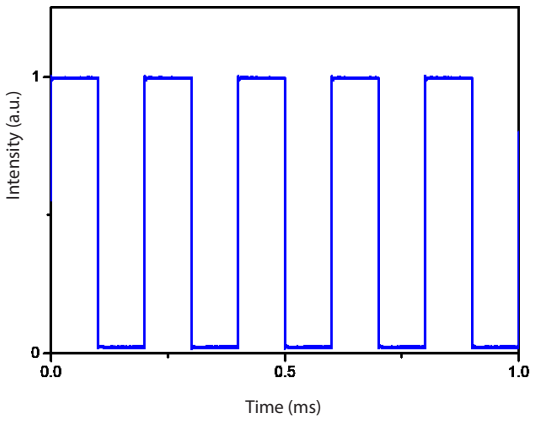
Cobolt's Optogenetics solutions include single-line lasers with stable and efficient coupling into multi-mode fibers, two lasers on one platform launched into one common fiber coupler or two lasers sitting side by side launched into one fiber each, suitable for 2-into-1 coupling using e.g. fused fibers. The lasers are available at various wavelengths matching the sensitivity peaks of the commonly used rhodopsins, with adjustable optical output power up to over 100 mW and fast high aspect ratio modulation with perfect pulse control.

Each configuration starts with a highly reliable and very stable Cobolt laser. The Cobolt 06-01 Series lasers are ultra-compact plug & play modulatable lasers that can be directly modulated and feature precision electronics. The Cobolt 06-MLD 473 nm is the preferred laser for optogenetics. The Cobolt 04-01 Series of diode-pumped solid-state (DPSS) lasers enables laser excitation at wavelengths not available in the Cobolt 06-01 Series lasers, for example 594 nm.

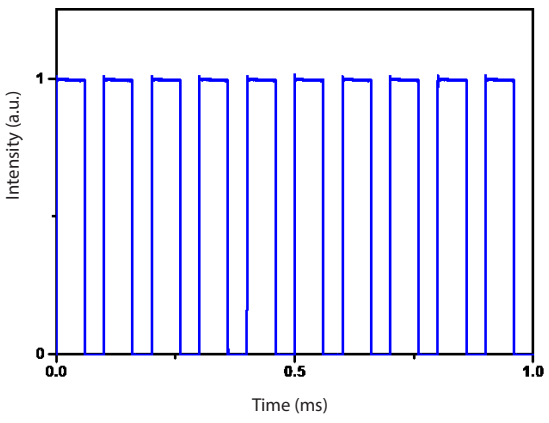
Configurations described in this document include single lasers or two lasers combined into a single multi-mode fiber (MM), lasers with or without intensity modulation capability and stand-alone lasers or assemblies with fiber couplers. To each fiber-coupled system, a MM fiber (with 50-200µm core diameter) of your choice can be easily attached.

All packages offer full control over the pulse generation, perfect pulse-to-pulse stability, high extinction ratio and fiber coupling efficiencies of > 80%.

Typical laser pulse train with sub-microsecond pulses



Pulse graph of a Cobolt Mambo™ 594nm laser with AOM modulation.



Pulse graph of a Cobolt 06-MLD 473nm laser with direct modulation.

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Cobolt Optogenetics Product Configuration table including the most preferred wavelengths

Configuration	Wavelengths [1,2,3]	Modulation	Fiber Coupling
2 in 1 Laser & Fiber combiner with Cobolt 06-01 Series + Cobolt Modulated DPSS laser	473 + 594 nm	up to 3 MHz	Yes
2 in 1 Laser & Fiber combiner with two Cobolt 06-01 Series lasers	473 + 561 nm 473 + 638 nm	up to 10 kHz up to 150 MHz	Yes
Single Cobolt 06-01 Series laser and Fiber coupler	473 nm 561 nm 638 nm	up to 150 MHz up to 10 kHz up to 150 MHz	Yes
Single Cobolt Modulated DPSS laser (with integrated AOM) & Fiber coupler	594 nm	up to 3 MHz	Yes
Single Cobolt 04-01 Series laser with shutter modulation & Fiber coupler	594 nm	up to 125 Hz	Yes

1. Wavelengths available range in Cobolt 06-01 Series package: 405, 445, 473, 488, 532, 561, 638 nm
2. Wavelengths available in Cobolt 04-01 Series package: 457, 473, 491, 515, 532, 561 nm
3. Wavelengths available in Cobolt Modulated DPSS laser package: 594 nm

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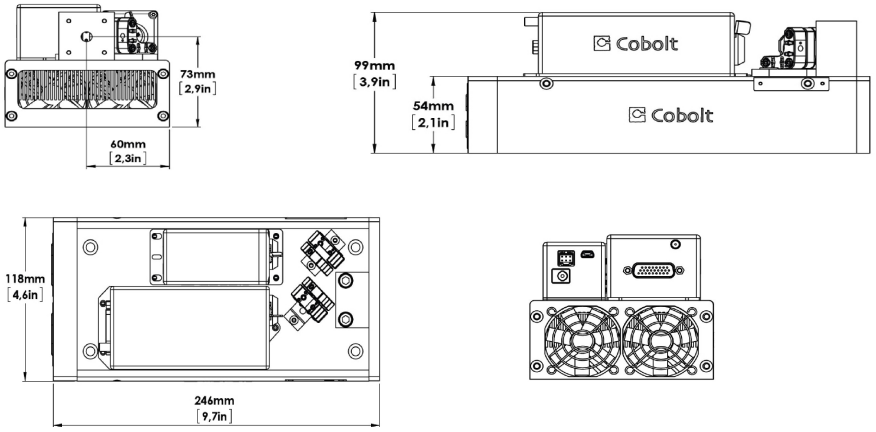
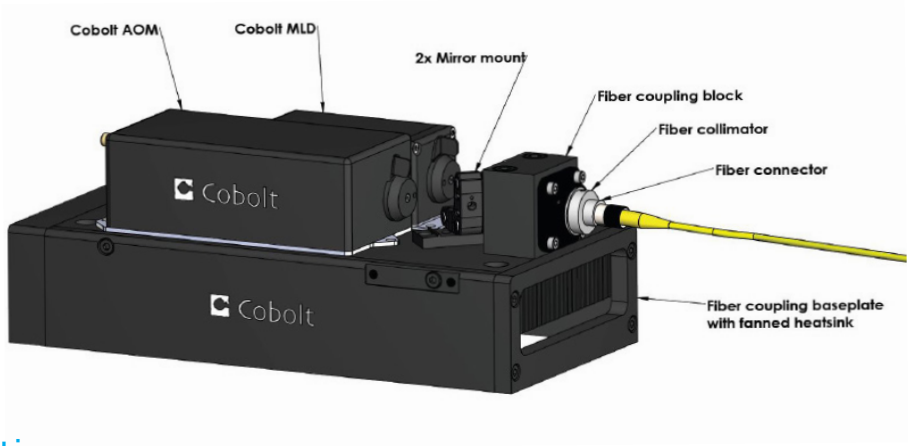
2-in-1 Laser and Fiber combiner (473 nm+ 594 nm)





System description

Art. nr	Part name	Description
90327	0594-04-05-0080-700/800	Cobolt Modulated DPSS laser 594 nm with integrated AOM: Output power up to 80mW into fiber, up to 3 MHz modulation
90311	0473-06-01-0100-100/200	Cobolt 06-MLD 473nm laser*: Output power up to 100mW into fiber, up to 150 MHz modulation**
90340	Optogenetics platform	Heat sink & Mounting mechanics for fiber coupler
80041 (FC/PC) 80042 (SMA)	Fiber manipulator collimator & connector	Schäfter + Kirchhoff mounting adapter, collimator and connector (FC/PC or SMA) for coupling into multi-mode fibers 50/100/200 µm. Coupling efficiency >80%. Note: fiber not included

* Other wavelengths available: 405, 445, 488, 515, 532, 561 638 and 660 nm
** Input modulation signal req.: TTL 0-5V (to female SMA connector)

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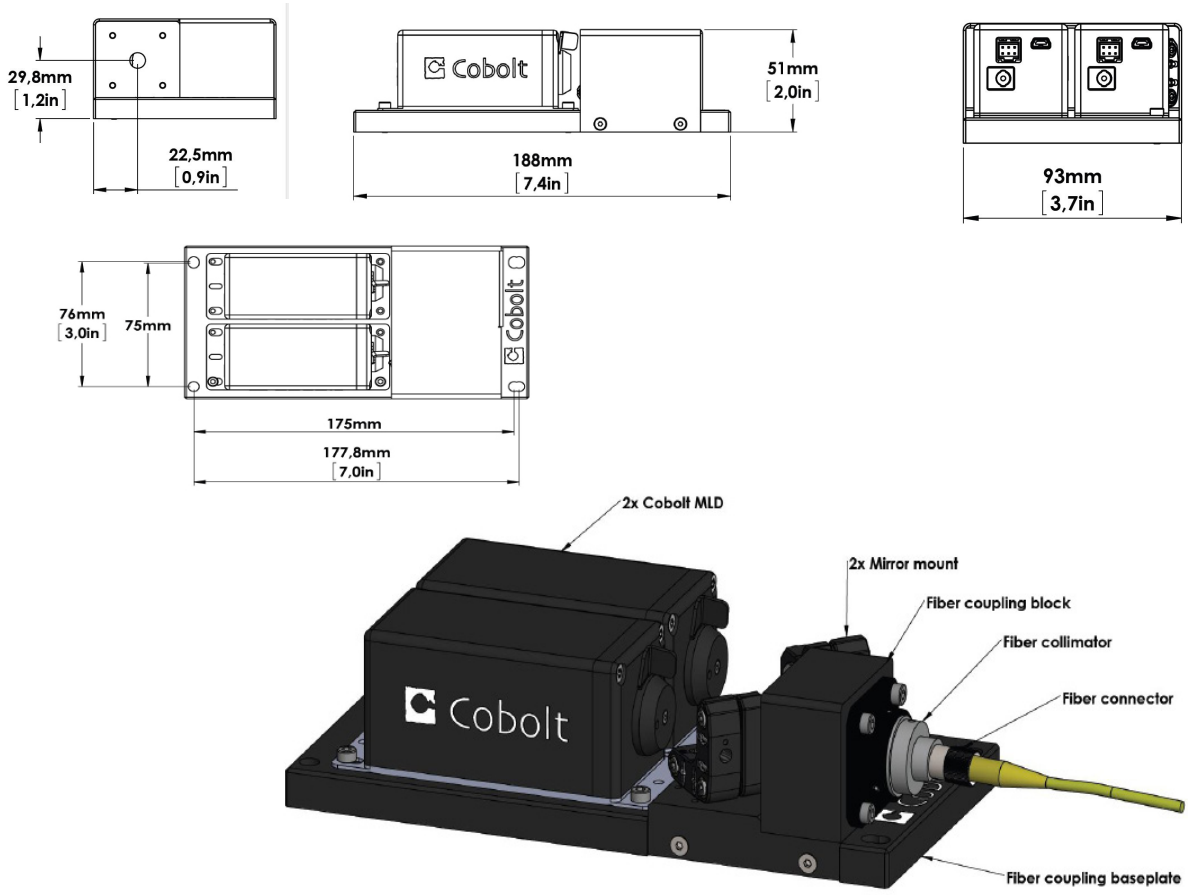
2-in-1 Laser and Fiber combiner (473 nm+561 / 638 nm)



System description

Art. nr	Part name	Description
90311	0473-06-01-0100-100/200	Cobolt 06-MLD 473nm laser*: Output power up to 100mW into fiber, up to 150 MHz modulation
90331 or 90352	0561-06-91-0100-100/200 0638-06-01-0140-100/200	Cobolt 06-DPL 561 nm*: Output power up to 100 mW into fiber, up to 10 kHz modulation** Cobolt 06-MLD 638 nm*: Output power up to 140mW into fiber, up to 150 MHz modulation**
90341	Optogenetics platform	Heat sink & Mounting mechanics for fiber coupler
80042	Fiber collimator & connector	Schäfter + Kirchhoff mounting adapter, collimator and SMA connector*** for coupling into multi-mode fibers 50/100/200 µm. Coupling efficiency >80%. Note: fiber not included

* Other wavelengths available.: 405, 445, 488, 515, 532, 561, 638 and 660 nm
** Input modulation signal req.: TTL 0-5V (to female SMA connector)
*** FC/PC connector available upon request

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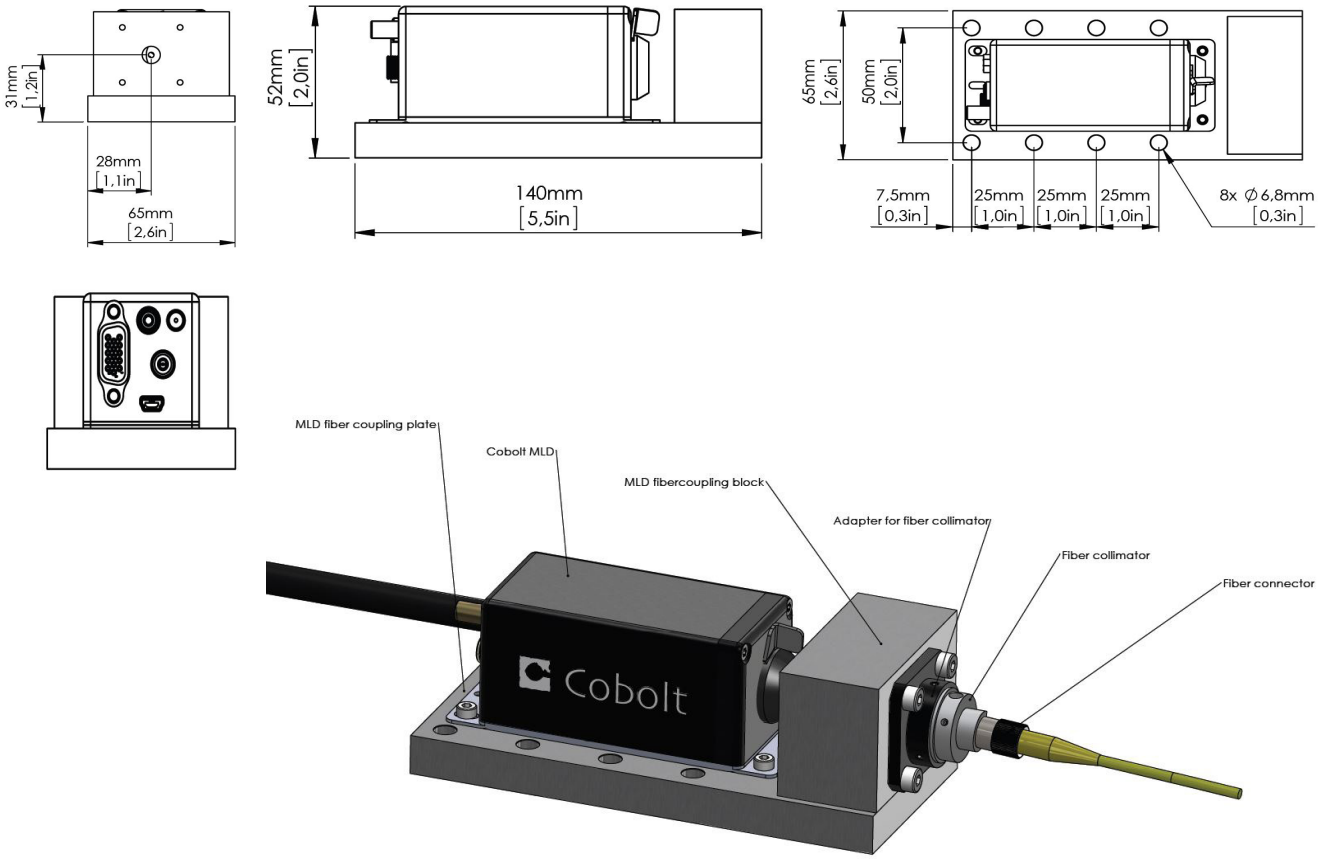
Single Cobolt 06-01 Series laser & Fiber coupler



System description

Art nr:	Part name	Description
90311	0473-06-01-0100-100/200	Cobolt 06-MLD 473nm laser:* Output power up to 100 mW into fiber, up to 150 MHz modulation**
11160	FIC-05	Mounting plate for fiber coupler
80042	Fiber coupler S+K MM 405-594	Schäfter + Kirchhoff mounting adapter, collimator and connector (FC/PC or SMA) for coupling into multi-mode fibers 50/100/200 µm. Coupling efficiency >80%. Note: fiber not included

* Other available wavelengths; 405, 445, 488, 515, 532, 561 638 and 660 nm
** Input modulation signal req.: TTL 0-5V (to female SMA connector)

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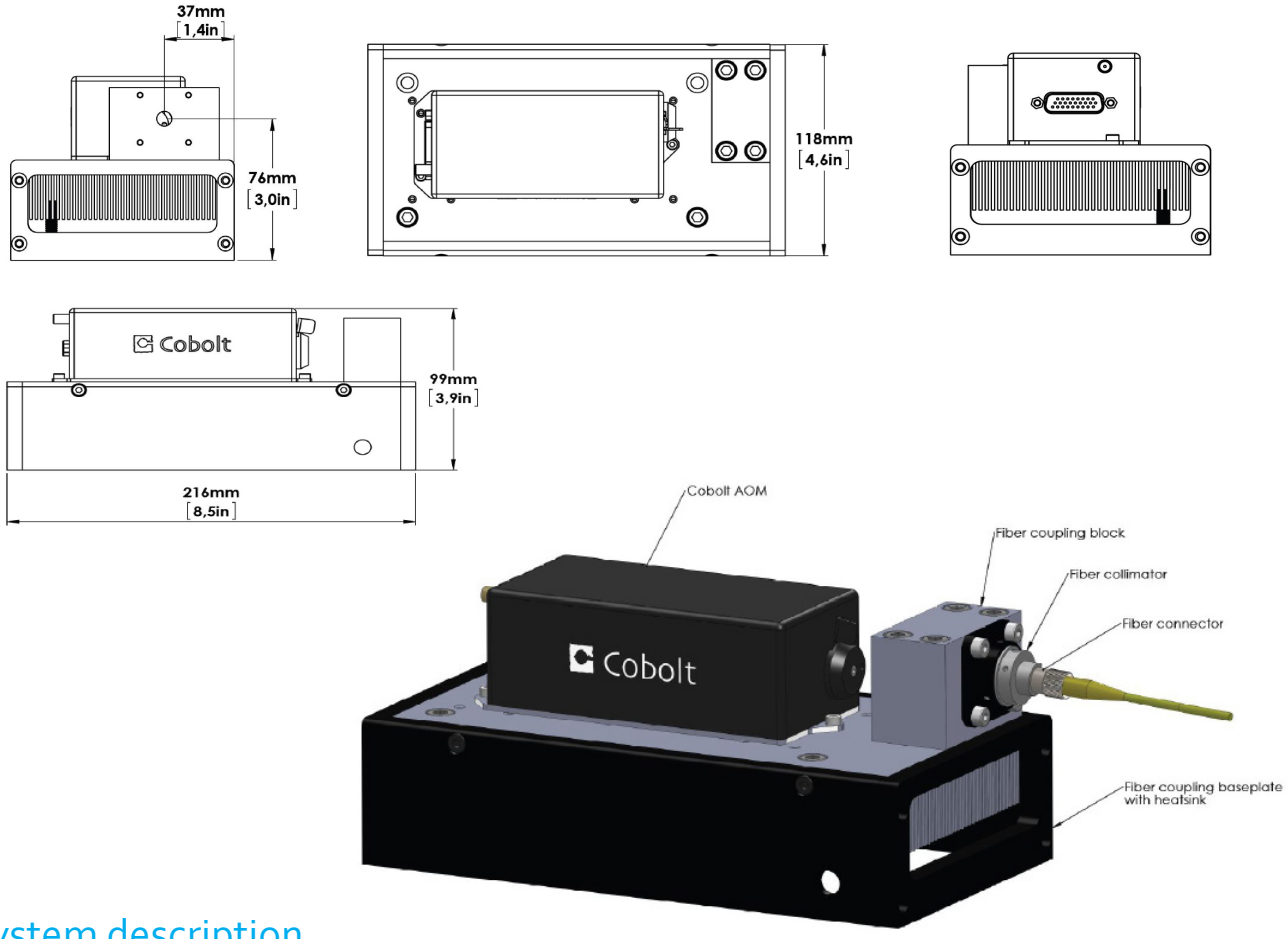
Single Cobolt Modulated DPSS laser with integrated AOM & Fiber coupler



System description

Art nr:	Part name	Description
90291	0594-04-05-0080-700/800	Cobolt Modulated DPSS laser 594 nm with integrated AOM: Output power up to 80mW into fiber, up to 3 MHz modulation*
10959	FIC-04	Heat sink & Mounting mechanics for fiber coupling
80042	Fiber coupler S+K MM 405-594	Schäfter + Kirchhoff mounting adapter, collimator and connector (FC/PC or SMA) for coupling into multi-mode fibers 50/100/200 µm. Coupling efficiency >80%. Note: fiber not included

*Input modulation signal req.: 3-5V=On, 0-2V=OFF (to femal D-Sub 7W2)

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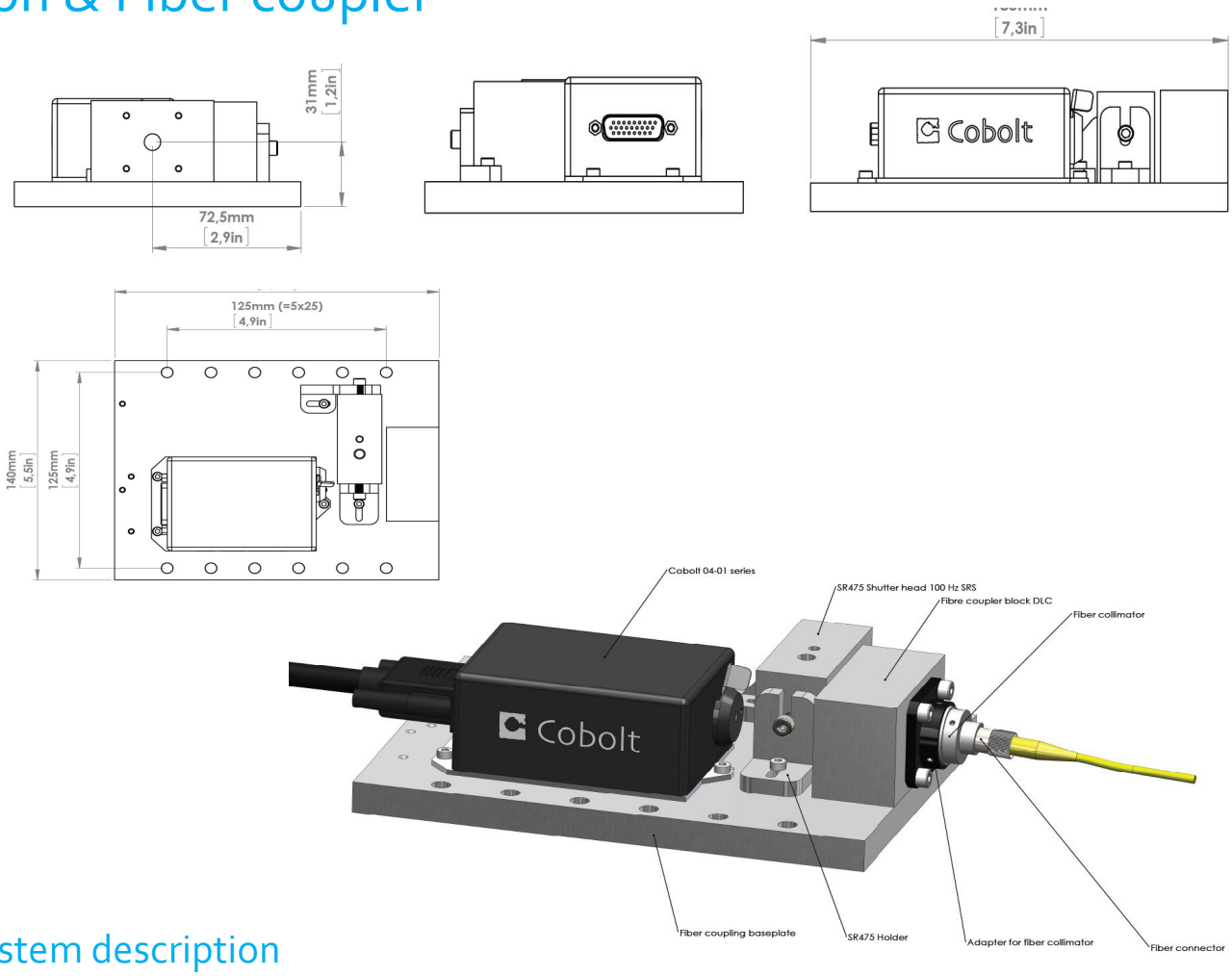
Single Cobolt 04-01 Series laser with shutter Modulation & Fiber coupler



System description

Art nr:	Part name	Description
90291	0594-04-01-0100-xxx	Cobolt 04-01 Series 594nm laser* with output power up to 100mW
10981	FIC-03	Heat sink & Mounting plate for fiber coupler
11136+11137	Shutter head + holder for shutter head	SRS 125 Hz optical shutter Modulation from 0 to 125 Hz**, Rise/Fall rime <350 µs, Exctinction ratio 1:inf.
80042	Fiber coupler S+K MM 405-594	Schäfter + Kirchhoff mounting adapter, collimator and connector (FC/PC or SMA) for coupling into multi-mode fibers 50/100/200 µm. Coupling efficiency >80%. Note: fiber not included

* Other available wavelengths; 457, 473, 491, 515, 532, 561 nm
** Input modulation signal req.: TTL 0-5 V

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