Cobolt Tor™ Series

Cobolt Tor™

Cobolt Tor™ XE

Cobolt Tor™ XS

Applications
LIBS

LIDAR

Laser Marking

Photoacoustics

MALDI-TOF

- Compact high performance air-cooled nanosecond pulsed lasers

- Wavelengths : 355 nm, 532 nm and 1064 nm

- < 5 ns pulse width

- Cobolt Tor™ : Free running or burst mode, up to 7 kHz

- Cobolt Tor™ XS : Ultra compact, triggerable, up to 1 kHz

- Cobolt Tor™ XE : Compact, triggerable, up to 1 kHz

The Cobolt Tor™ Series lasers are high performance Q-switched diode pumped lasers. The sophisticated cavity design of these lasers provides a unique combination of compact size and performance (short ns-pulses, high pulse repetition rates, exceptional pulse-to-pulse stability in a high-quality beam).
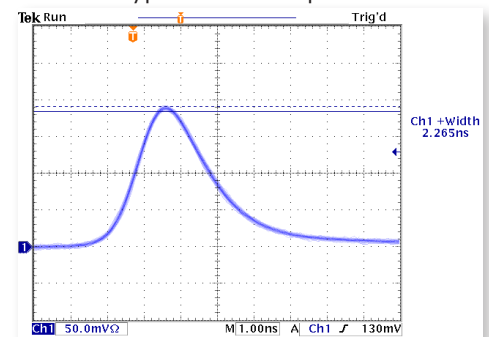
The Cobolt lasers are manufactured in Sweden by Cobolt AB, a part of HÜBNER Photonics. Using proprietary HTCure™ technology the lasers are packaged into a sealed laser head, offering an outstanding level of robustness and reliability, making these lasers highly suitable for OEM integration into demanding environments.

The combination of compact size, high level of robustness, and outstanding performance make the Cobolt Tor™ Series lasers are an ideal light sources for a large variety of industrial and scientific applications, including LIBS, LIDAR, marking, photo-acoustics, MALDI-TOF, micro-dissection, range-finding, and micro-machining.
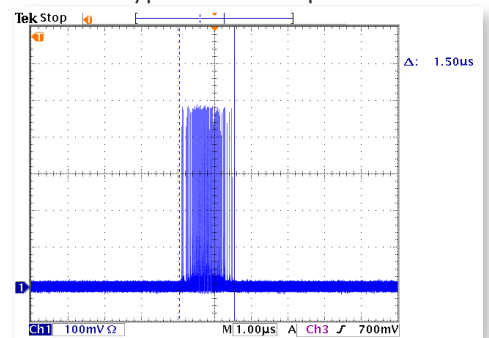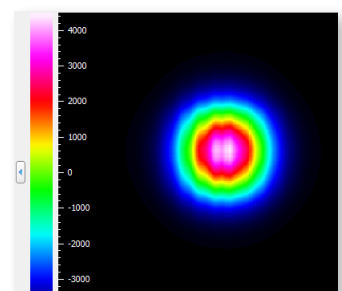
Typical Pulse Shape

Typical Jitter < 2 µs

Beam profile at exit - Tor XS 1064 nm

HÜBNER Photonics

Cobolt Tor™ Series

Optical Performance Specifications

	Cobolt Tor™			Cobolt Tor™ XS		Cobolt Tor™ XE	
Operation mode	Free running			Triggerable		Triggerable	
Trigger mode	None			Internal External Gated Pulse on Demand		Internal External Gated	
Wavelength in air (nm)	354.8 ± 0.3	532.1 ± 0.3	1064.2 ± 0.6	532.1 ± 0.3	1064.2 ± 0.6	532.1 ± 0.3	1064.2 ± 0.6
Pulse Energy (µJ)	18 ± 3	60 ± 5	160 ± 15	50 ± 5	100 ± 10	250 ± 25	500 ± 50
Peak Power (kW)	> 3	> 11	> 29	> 12	> 25	> 75	> 128
Repetition Rate (kHz)	7			Single pulse up to 1 kHz			
Pulse Width (ns)	3 ± 1		4 ± 1	2.5 ± 1.0		2 ± 1	2.5 ± 1.0
Pulse-to-Pulse Jitter (µs)	< 1			< 2			
Long-term stability (8 hrs ± 3°C)	< 3 %						
Spatial mode (TEM$_{00}$)	$M^2 < 1.3$	$M^2 < 1.15$	$M^2 < 1.3$	$M^2 < 1.15$	$M^2 < 1.3$	$M^2 < 1.15$	$M^2 < 1.3$
Divergence, full angle (mrad)	5 ± 2	8 ± 1	10 ± 1	6 ± 1	10 ± 1	5 ± 1	7 ± 1
Beam diameter at aperture (mm)	0.9 ± 0.3	1.0 ± 0.2	1.2 ± 0.3	0.4 ± 0.1	0.6 ± 0.1	0.4 ± 0.1	0.7 ± 0.1
Beam symmetry at aperture	> 0.65 : 1	> 0.85 : 1	> 0.90 : 1	> 0.85 : 1			
Polarization ratio (linear, vertical)	> 100:1						

1. Assuming a top hat profile, Peak Power (kW) = Pulse Energy (µJ) at bottom tolerance ÷ Pulse width (ns) at top tolerance

Operational Environment Specifications

	Cobolt Tor™	Cobolt Tor™ XS	Cobolt Tor™ XE
Power supply requirements	15 VDC, 6 A	12 VDC, 3 A	12 VDC, 6.67 A
Maximum laser head baseplate temperature	50 °C		
Ambient temperature, operation	10 - 40°C		
Ambient temperature, storage	-10 -> +60°C		
Humidity	0-90% RH non-condensing		
Ambient Air pressure	950-1050 mbar		
Laser Head heat sink thermal impedance at 40°C ambient	0.2 K/W	0.8 K/W	0.15 K/W
Maximum heat dissipation	< 63 W (typical 30W)	< 25 W	< 65 W (typical 55 W)
Warranty	12 months		

Model Number

WWWW-0X-71-YY -EEEE-CCCC

Wavelength

05 Tor and Tor XE
06 Tor XS

XE - Tor XE
XS - Tor XS

Pulse Energy

Configuration:
500 = Gen 5b Controller, RS-232, CE / CDRH
600 = Gen 5b Controller, RS-232, OEM
700 = Gen 5b Controller, USB, CE / CDRH
800 = Gen 5b Controller, USB, OEM
1100 = XE, XS, CE / CDRH compliant
1200 = XE, XS, OEM
xxxx = OEM customization

WARNING VISIBLE AND INVISIBLE LASER RADIATION!

Avoid exposure to beam. Class 3B Laser Product. Classified per IEC 60825-1:2014

Cobolt Tor™, 7 kHz
355 nm   50 µJ / 3-5 nm
Cobolt Tor™ XS, 1 kHz
532 nm   200 µJ / 1-4 ns
1064 nm   300 µJ / 1 - 4 ns
Cobotl Tor™ XE, 1 kHz
532 nm   0.5 mJ / 1 - 4 ns

WARNING VISIBLE AND INVISIBLE LASER RADIATION!

Avoid eye or skin exposure to direct or scattered radiation. Class 4 Laser Product. Classified per IEC 60825-1:2014

Cobolt Tor™, 7 kHz
532 nm   214 µJ / 3-5 ns
1064 nm   286 µJ / 3-5 ns
**Cobotl Tor™ XE, 1 kHz**
1064 nm   1.0 mJ / 1 - 4 ns

This device is sensitive to Elecrostatic Discharge (ESD).

Communication Interface

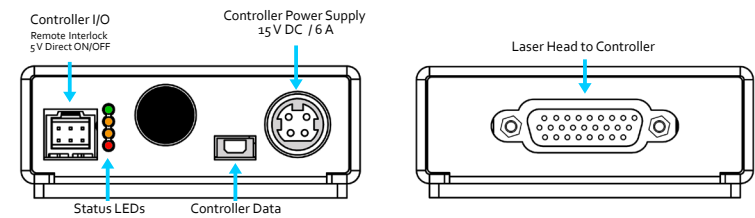|	Cobolt Tor™	Cobolt Tor™ XS	Cobolt Tor™ XE
Communication	USB or RS-232	USB and RS-232	
Standard Baudrate	115200		
Pulse monitor	SMA, 50 Ω	–––	SMB, 50 Ω

Cobolt Tor™ Series

Cobolt Tor™

The Cobolt Tor™ lasers are air-cooled high-performance free-running Q-switched diode-pumped lasers with the highest repetition rate in the Cobolt Tor™ Series. The Cobolt Tor™ lasers have two main operation modes, constant drive current, or constant pulse repetition rate. The pulse energy and repetition rate can be altered by adjusting the drive current of a laser. The lasers are equipped with a pulse-count feedback loop to ensure minimum drift in output power and repetition rate, and also to provide a pulse-trigger output signal for convenient synchronisation of detection systems.

Cobolt Tor™ lasers are ideal light sources for a large variety of industrial and scientific applications, including LIBS, micro-dissection, MALDI-TOF, range-finding, Raman-LIDAR and micro-machining.

Typical Pulse Train
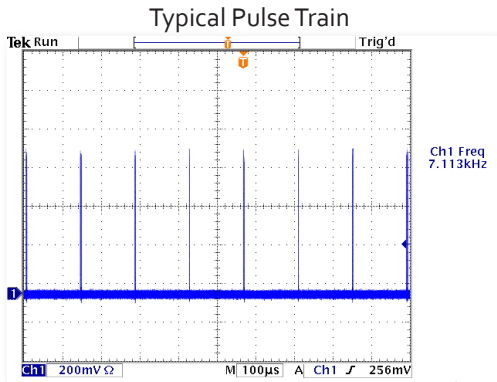
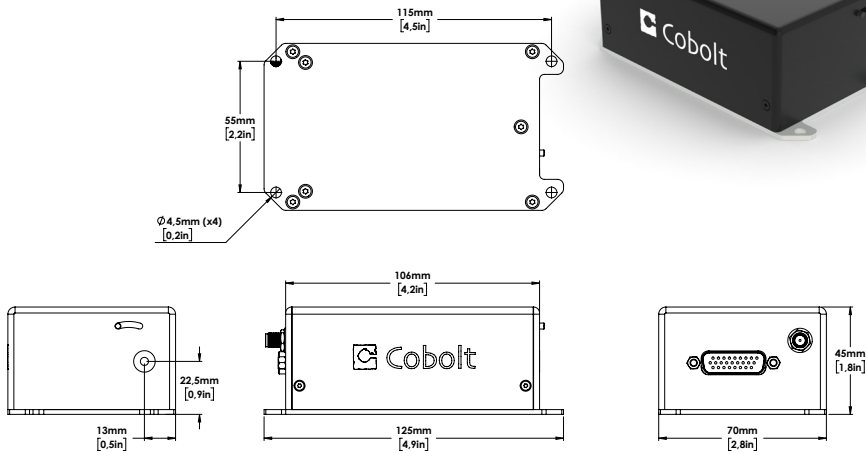## Electrical Interfaces - Cobolt Tor™

Molex 6 pin - Controller I/O

Pin	Function
1	Remote interlock
2	0 V – Ground
3	Direct On/Off (+5 V Input)
4	--
5	LED 1 (LASER ON)
6	LED 2 (ERROR)

Mechanical Specifications - Cobolt Tor™ Laser head and Controller

Laser Head


Controller
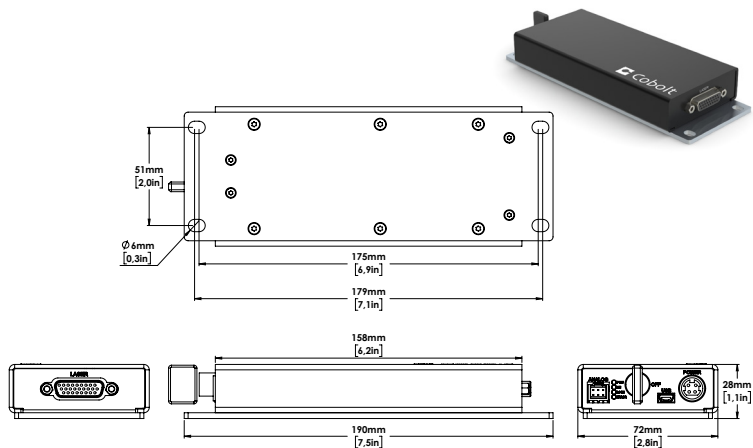
Cobolt Tor™ Series

Cobolt Tor™ XS

The Cobolt Tor™ XS lasers are high-performance triggerable Q-switched diode-pumped lasers that come in an ultra-compact design with fully integrated electronics. The advanced integrated drive electronics allows for control of the laser using either integrated functionalities or by using an external signal connected to the SMB connector on the backside of the laser. This makes it possible to trigger optical pulses on demand for various applications. The pulse properties remain constant at all repetition rates.

The combination of ultra-compact format, high level of robustness, high average power and pulse energy performance make the Cobolt Tor™ XS lasers ideal light sources for a large variety of industrial and scientific applications including LIDAR, hand-held LIBS and photoacoustic microscopy.
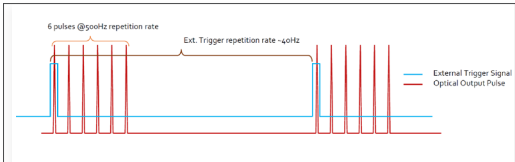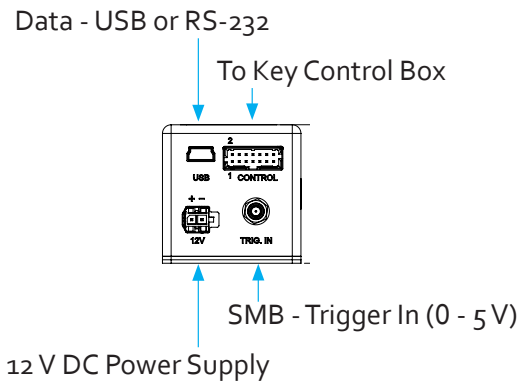

Pulse on Demand - 6 pulses per trigger event
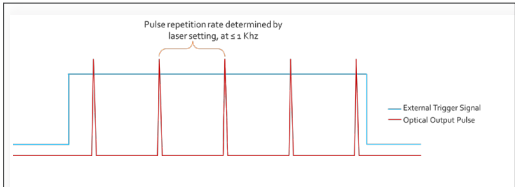
Gated burst, free running during trigger ON

## Electrical Interfaces - Cobolt Tor™ XS

Data - USB or RS-232

To Key Control Box

SMB - Trigger In (0 - 5 V)

12 V DC Power Supply

Molex 10 pin - To Key control box

Pin	Function
1	Interlock
2	GND
3	*GND*
4	RS-232 TX
5	RS-232 RX
6	LED 1 – Laser ON
7	LED 1 – Laser ON (redundant)
8	LED 2 – Error
9	Trigger input
10	GND
11	Key switch
12	Remote ON/OFF (+5 V Input)
13	GND
14	*Not used*

Mechanical Specifications - Cobolt Tor™ XS Laser head

Laser Head - Standard
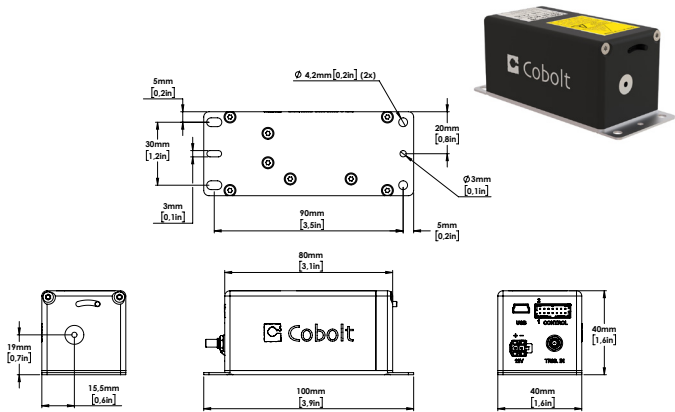
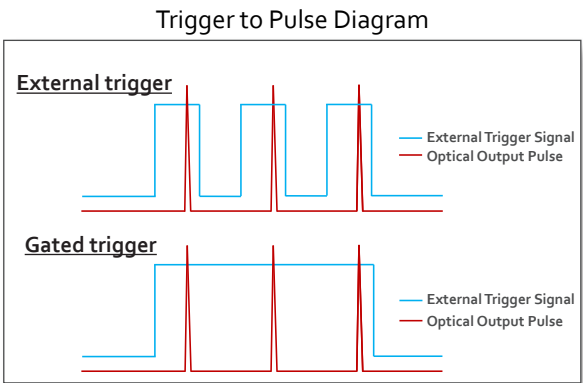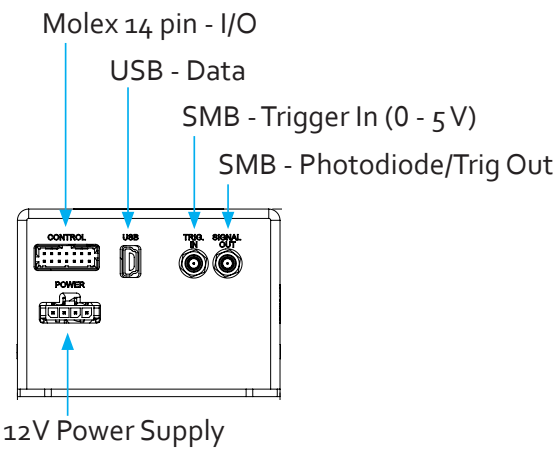### Key control box - CE/CDRH compliant systems
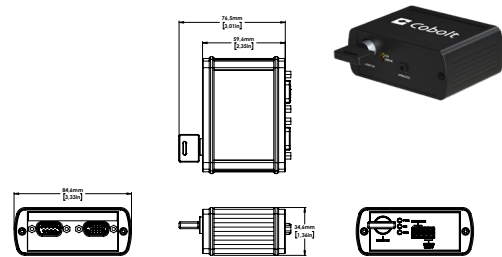
Cobolt Tor™ Series

Cobolt Tor™ XE

The Cobolt Tor™ XE lasers are air-cooled high-performance triggerable Q-switched diode-pumped lasers with the highest pulse energy within the Cobolt Tor™ Series. Drive electronics are integrated into the laser head and a variety of trigger modes are available: internal, external, and gated, which is a combination of both external and internal trigger sources. An external trigger pulse length is defined within a range of hundreds of microseconds (listed in the manual for external and gated modes) for convenient synchronisation with other equipment. An external trigger signal connected to the SMB or Molex connector marked "Trig In" on the backside of the laser. The laser is equipped with a pulse monitor to control the measured repetition rate of the laser.

The combination of compact format, high level of robustness, high average power and pulse energy performance make the Cobolt Tor™ XE lasers ideal light sources for a large variety of industrial and scientific applications, including LIBS, micro-dissection, MALDI-TOF, range-finding, Raman-LIDAR and micro-machining.

Trigger to Pulse Diagram

## Electrical Interfaces - Cobolt Tor™ XE

Molex 14 pin - I/O
USB - Data
SMB - Trigger In (0 - 5 V)
SMB - Photodiode/Trig Out
12V Power Supply

Molex 14 pin - To Key control box

Pin	Function
1	Remote interlock
2	0 V – Ground
3	*not used*
4	RS232 Tx
5	RS232 Rx
6	Laser ON LED (1)
7	Laser ON LED (2)
8	Error LED (2)
9	*not used*
10	*not used*
11	Key
12	Direct Input
13	Ground
14	Trigger In (0 - 5 V)

Mechanical Specifications - Cobolt Tor™ XE Laser Head

Laser Head - Standard
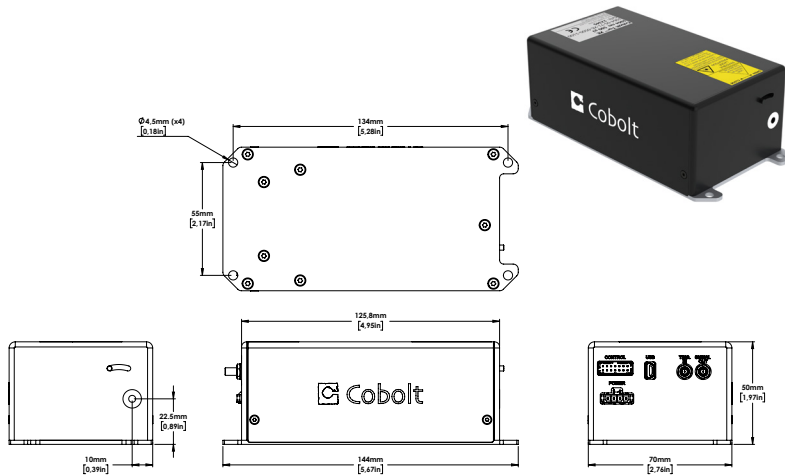
Key control box - CE/CDRH compliant systems
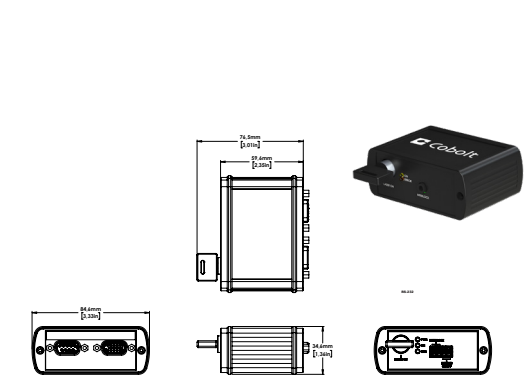
Cobolt Tor™ Series

Options and Accessories

- Laser head heatsink for passive cooling of Cobolt Tor™ XS : HS-07 12V

- Laser head heatsink with fans for Cobolt Tor™ : HS-04

- Laser head heatsink with fans for Cobolt Tor™ XE : HS-05

- TEC Plate for active baseplate temperature control

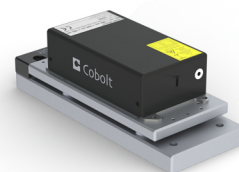For more information about Cobolt Options and Accessories visit : https://hubner-photonics.com/products/lasers/options-accessories/

Heatsink HS-07	*Heatsink with fans HS-04*	*Heatsink with fans HS-05*	*TEC-Plate for active baseplate temperature control*

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