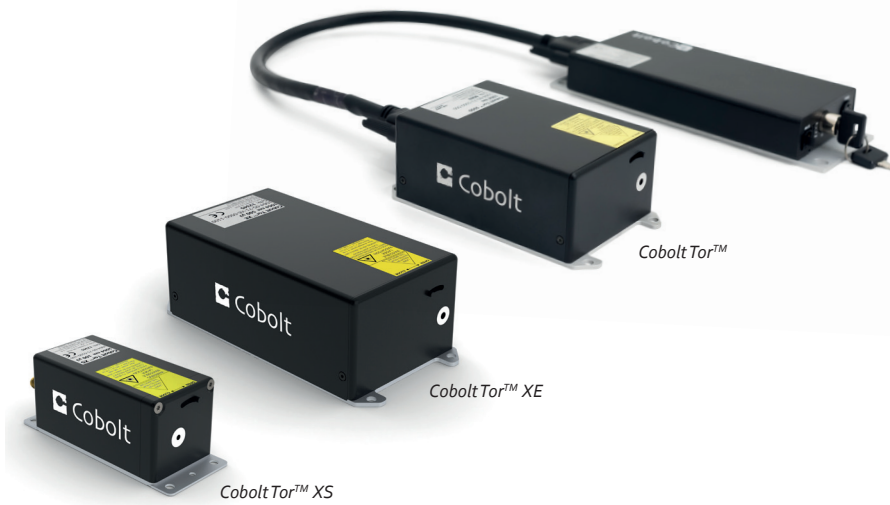


# Cobolt Tor™ Series

High Performance | Triggerable | Q-Switched Lasers



- High performance 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 : Externally and internally triggerable, 500 μJ at 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 high pulse repetition rates, short pulse lengths and exceptional pulse-to-pulse stability in a high quality TEM<sub>00</sub> beam.

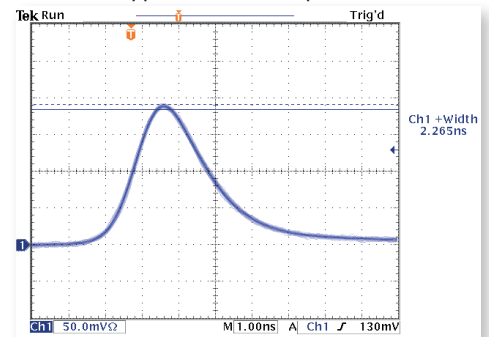
The lasers are manufactured using Cobolt's proprietary HTCure™ technology and packaged into a sealed laser head, offering an outstanding level of robustness and reliability and making these lasers highly suitable for OEM integration into demanding environments. The laser settings can be controlled using the Cobolt Monitor software (available for download on [hubner-photonics.com](http://hubner-photonics.com)) or by using commands listed in the manual.

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

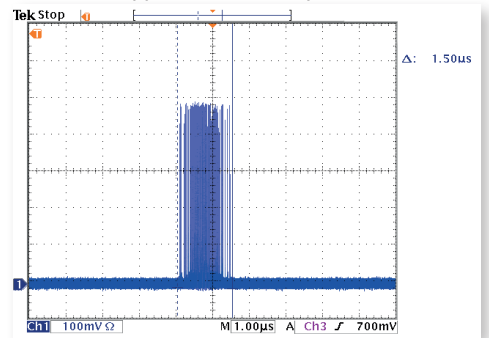
## Applications

- LIBS
- MALDI-TOF
- Laser Marking
- LIDAR
- Photoacoustics

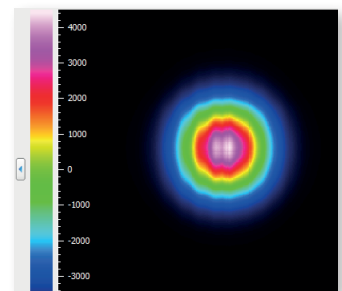
Typical Pulse Shape



Typical Jitter < 2 μs



Beam profile at exit - Tor XS 1064 nm



# Cobolt Tor™ Series

## Optical Performance Specifications

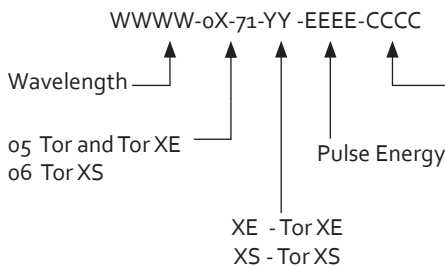
	Cobolt Tor™			Cobolt Tor™XS		Cobolt Tor™XE
Operation mode	Free running			Triggerable		Triggerable
Trigger mode	None			External		Internal, External, Gated
Wavelength in air (nm)	354.8 ± 0.3	532.1 ± 0.3	1064.2 ± 0.6	532.1 ± 0.3	1064.2 ± 0.6	1064.2 ± 0.6
Pulse Energy (µJ)	18 ± 3	60 ± 5	160 ± 15	50 ± 5	50 ± 5 100 ± 10	500 ± 50
Peak Power (kW)	> 3	> 11	> 29	> 12	> 12 > 25	> 128
Repetition Rate (kHz)	7			Single pulse up to 1 kHz		
Pulse Width (ns)	4 ± 1			2.5 ± 1.0		
Pulse-to-Pulse Jitter (µs)	< 1			< 2		
Long-term stability (8 hrs ± 3°C)	< 3 %					
Spatial mode (TEM <sub>00</sub> )	M <sup>2</sup> < 1.3					
Divergence, full angle (mrad)	5 ± 2	8 ± 1	10 ± 1	6 ± 1	9 ± 1.5	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	0.7 ± 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	5 VDC, 5 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	0.67 K/W	0.15 K/W
Maximum heat dissipation	< 63 W (typical 30W)	< 15 W	< 65 W (typical 55 W)
Warranty	12 months		

## Model Number



### Configuration:

100 = Compact, USB, CE / CDRH Compliant  
 200 = Compact, USB, OEM  
 300 = Compact, RS-232, CE / CDRH Compliant  
 400 = Compact, RS-232, OEM

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 = iE, CE / CDRH compliant  
 1200 = iE, OEM  
 xxxx = OEM customization



WARNING VISIBLE AND INVISIBLE LASER RADIATION!

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



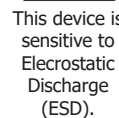
Cobolt Tor™  
 Wvl MaxPulse  
 355 nm 50 µJ / 3-5 nm



Cobolt Tor™ XS, 1 kHz  
 532 nm 200 µJ / 1-4 ns  
 1064 nm 300 µJ / 1 - 4 ns



Avoid eye or skin exposure to direct or scattered radiation  
 Class 4 Laser Product



Classified per IEC 60825-1:2014  
 Cobolt Tor™, 7 kHz  
 Wvl Max.Pulse  
 532 nm 214 µJ / 3-5 ns  
 1064 nm 286 µJ / 3-5 ns



Cobolt Tor™ XE, 1 kHz  
 Wvl Max.Pulse  
 1064 nm 1.0 mJ / 1 - 4 ns

## Communication Interface

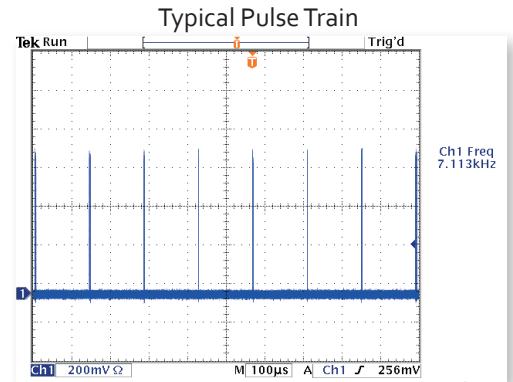
	Cobolt Tor™	Cobolt Tor™XS	Cobolt Tor™XE
Communication	USB or RS-232		USB and RS-232
Standard Baudrate	115200		
Pulse monitor	SMA, 50 Ω	---	SMB, 50 Ω

# Cobolt Tor™ Series

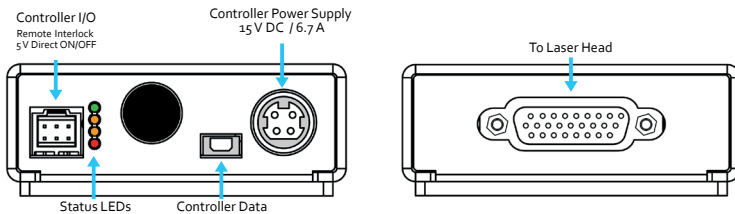
## Cobolt Tor™

The Cobolt Tor™ lasers are 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 feed-back loop to ensure minimum drift in output power and repetition rate, and also 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.



## Electrical Interfaces - Cobolt Tor™

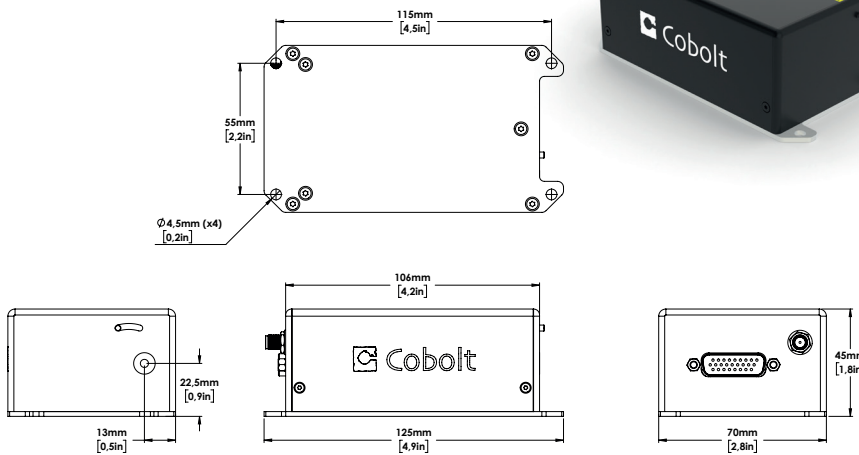


### Molex 6 pin - Controller I/O

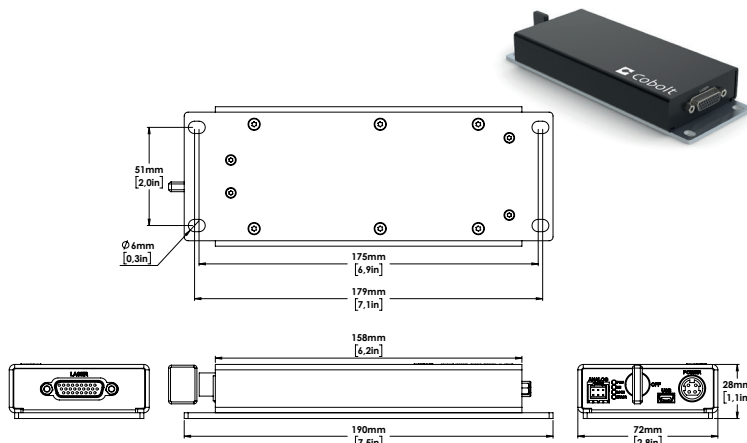
Pin	Function
1	Remote interlock
2	0 V – Ground
3	Direct On/Off (+5 V Input)
4	--
5	LED 1 (LASER ON)
6	LED 2 (ERROR)

## Mechanical Specifications - Cobolt Tor™ Laser head and Controller

### Laser Head



### Controller



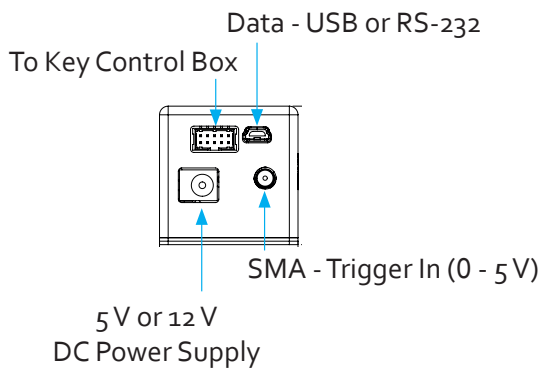
# Cobolt Tor™ Series

## Cobolt Tor™ XS

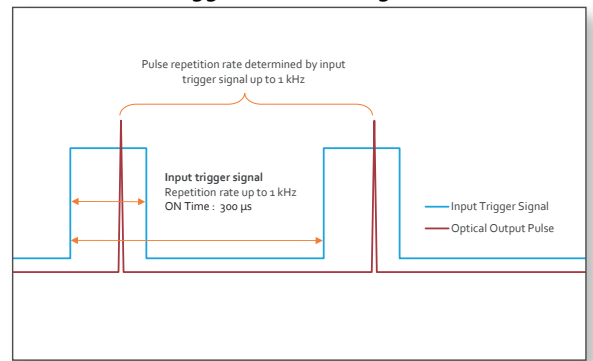
The Cobolt Tor™ XS lasers are high-performance triggerable Q-switched diode-pumped lasers that come in an ultra-compact design with fully integrated electronics. Each optical pulse emitted by the laser is triggered by an external trigger signal connected to the SMA connector on the backside of the laser. The repetition rate of the laser is controlled by the trigger signal. 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, especially LIDAR, hand-held LIBS and photoacoustic microscopy.

### Electrical Interfaces - Cobolt Tor™ XS



### Trigger to Pulse Diagram

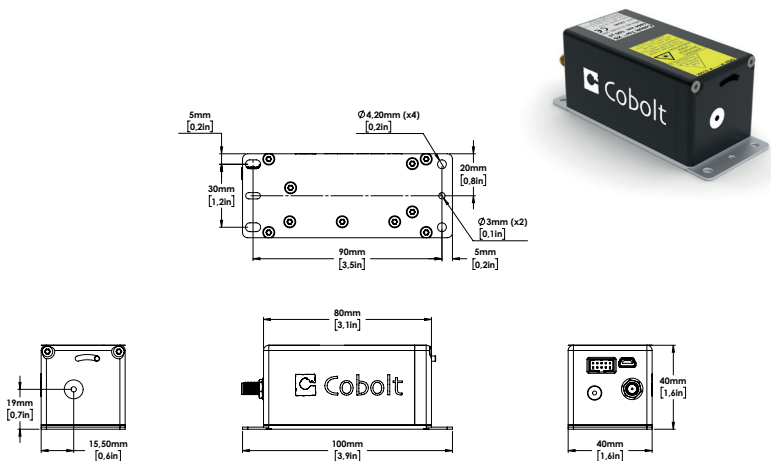


### Molex 10 pin - To Key control box

Pin	Function
1	Remote interlock
2	0 V – Ground
3	Direct On/Off (+5 V Input) – OEM Only
4	Key Switch
5	LED 1A (Laser On)
6	LED 2 (Error)
7	LED 1B (Laser On - Redundant)
8	Not used (test)
9	Not used (Ground)
10	Not used (Ground)

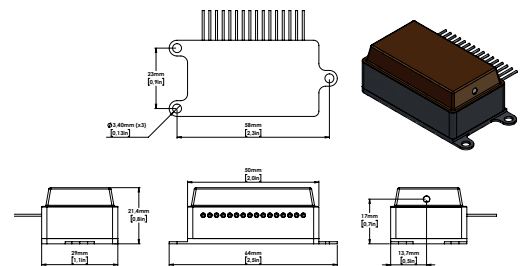
### Mechanical Specifications - Cobolt Tor™ XS Laser head

#### Laser Head - Standard

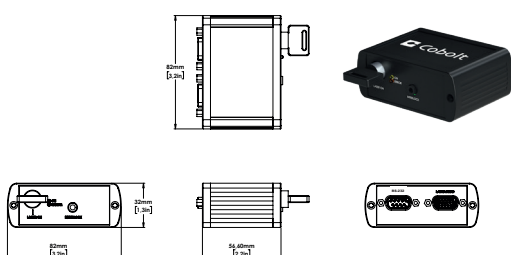


#### Laser Head - OEM Component

Laser head available in component format with drive electronics delivered separately.



#### Key control box - CE/CDRH compliant systems



Cobolt Tor™ XS in component configuration

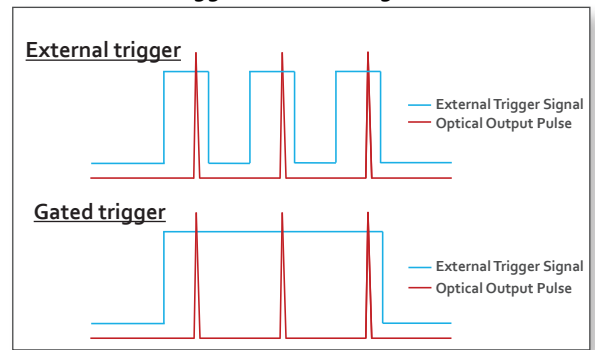
# Cobolt Tor™ Series

## Cobolt Tor™ XE

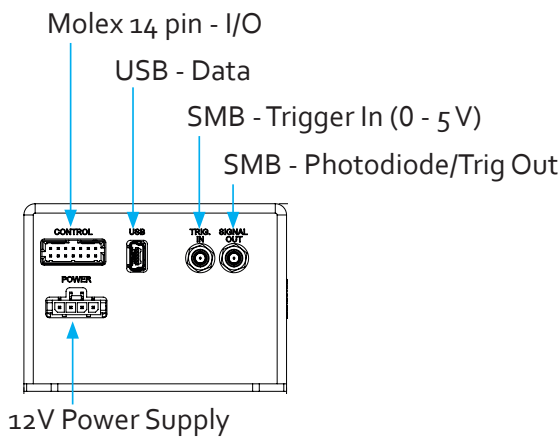
The Cobolt Tor™ XE lasers are high-performance triggerable Q-switched diode-pumped lasers with the highest pulse energy within the Cobolt Tor™ Series. Drive electronics are integrated into the laser head and a variety of trigger modes are available: internal, external, and gated, which is a combination 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

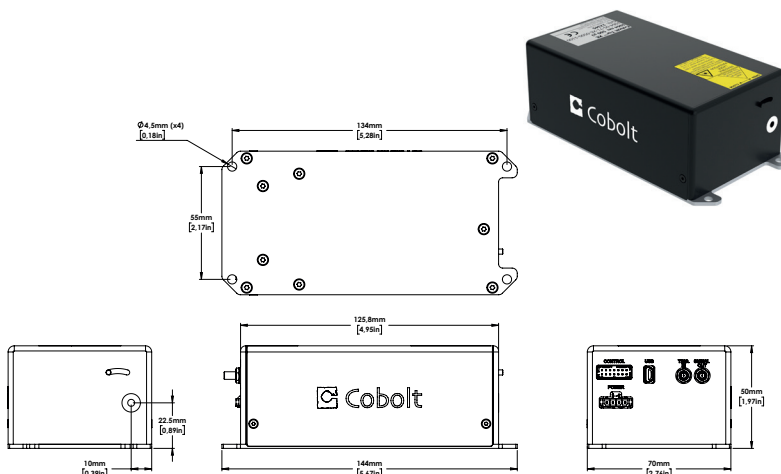


Molex 14 pin - To Key control box

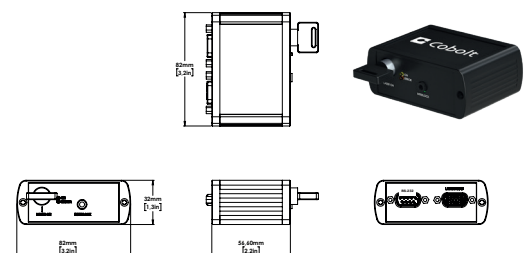
Pin	Function
1	Remote interlock
2	0V – Ground
3	not used
4	RS232 Tx
5	RS232 Rx
6	Laser ON LED (1)
7	Laser ON LED (2)
8	Error LED (2)
9	not used
10	not used
11	Key
12	Direct Input
13	Ground
14	Trigger In (0 - 5 V)

## Mechanical Specifications - Cobolt Tor™ XE Laser Head

### Laser Head - Standard



### Key control box - CE/CDRH compliant systems



# Cobolt Tor™ Series

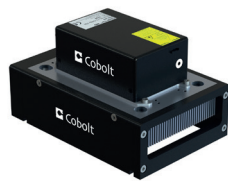
## Options and Accessories

- Laser head heatsink with fans for Cobolt Tor™ XS : HS-03
- 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

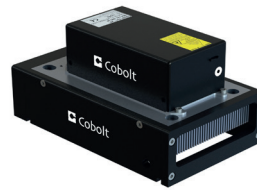
For more information about Cobolt Options and Accessories visit : <https://hubner-photonics.com/products/lasers/options-accessories/>



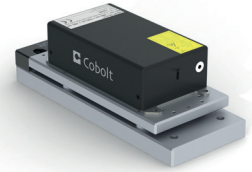
Heatsink with fans HS-03



Heatsink with fans HS-04



Heatsink with fans HS-05



TEC-Plate for active baseplate temperature control

## Our Locations

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