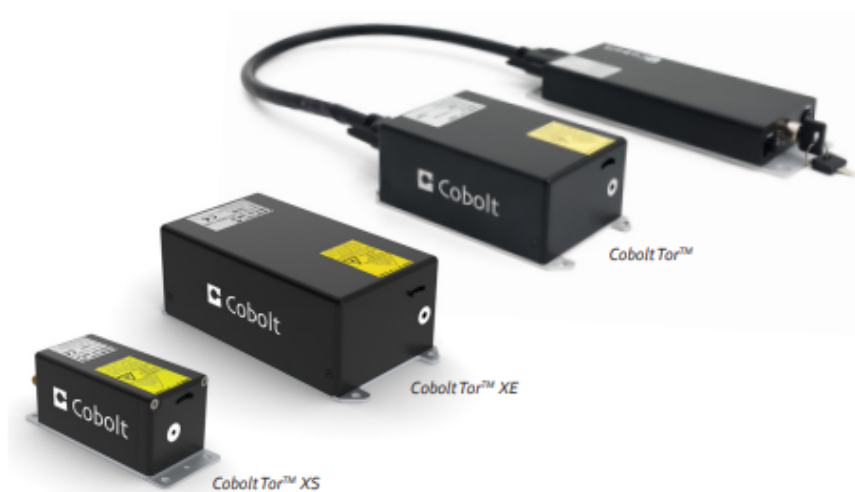


Cobolt Tor™ Series

High Performance | Triggerable | Q-Switched Lasers



- 小型で高性能なナノ秒パルスレーザー
- 波長：355 nm、532 nm、1064 nm
- パルス幅 5 ns未満
- Cobolt Tor™：フリーランまたはバーストモード、最大7 kHz
- Cobolt Tor™ XS：外部トリガ対応、最大1 kHz
- Cobolt Tor™ XE：コンパクト、外部トリガ対応、最大1 kHz

Cobolt Tor™シリーズは、高性能なQスイッチ式ダイオード励起レーザーです。高度な共振器設計により、小型で高い性能（優れたパルス間安定性、高品質なビーム）を両立しています。

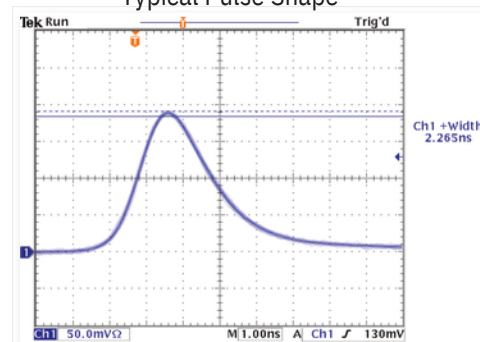
Coboltのレーザーは、HÜBNER Photonicsの一員であるCobolt AB（スウェーデン）によって製造されています。独自のHTCure™技術により、レーザーは密閉されたレーザーヘッドにパッケージングされ、優れた堅牢性と信頼性を実現。過酷な環境へのOEM組み込みにも適しています。

Cobolt Tor™シリーズは、LIBS、LiDAR、マーキング、光音響、MALDI-TOF、マイクロダイセクション、測距、微細加工など、幅広い産業・科学用途に最適な光源です。

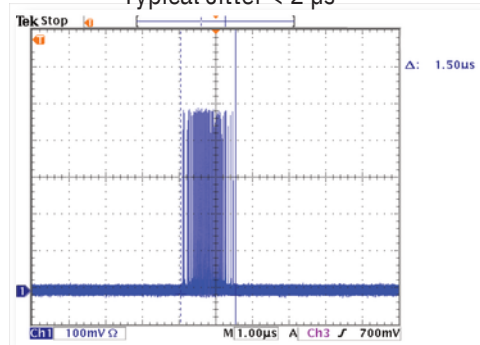
Applications

LIBS
LiDAR
マーキング
光音響
MALDI-TOF

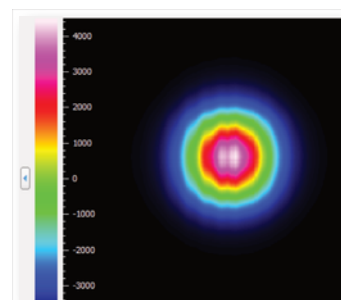
Typical Pulse Shape



Typical Jitter < 2 μs



Beam profile at exit - Tor XS 1064 nm



HÜBNER Photonics



Cobolt Tor™ Series

Optical Performance Specifications

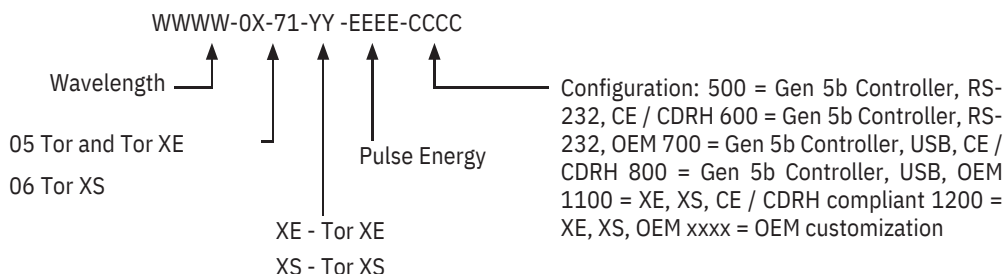
Operation mode	Cobolt Tor™			Cobolt Tor™ XS		Cobolt Tor™ XE	
	Free running			Triggerable		Triggerable	
Trigger mode	None			Internal External Gated Pulse on Demand		Internal External Gated	
Wavelength in air (nm)	354.8 ± 0.3	532.1 ± 0.3	1064.2 ± 0.6	532.1 ± 0.3	1064.2 ± 0.6	532.1 ± 0.3	1064.2 ± 0.6
Pulse 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 (TEM00)	M2 < 1.3	M² < 1.15	M2 < 1.3	M² < 1.15	M² < 1.3	M² < 1.15	M² < 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



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 W	--	SMB, 50 W



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 ns
Cobolt Tor™ XS, 1 kHz
532 nm 200 µJ / 1-4 ns
1064 nm 300 µJ / 1 - 4 ns
Cobolt Tor™ XE, 1 kHz
532 nm 0.5 mJ / 1 - 4 ns



WARNING VISIBLE AND INVISIBLE LASER RADIATION! Avoid eye or skin exposure to radiation. Class 4 Laser Product. Classified per IEC 60825-1:2014
Cobolt Tor™, 7 kHz



This device is sensitive to Electrostatic Discharge (ESD).

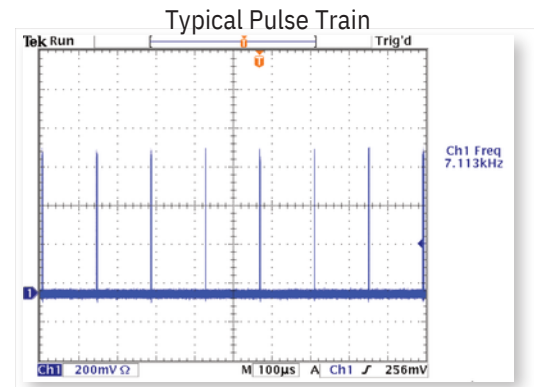
532 nm 214 µJ / 3-5 ns
1064 nm 286 µJ / 3-5 ns
Cobolt Tor™ XE, 1 kHz
1064 nm 1.0 mJ / 1 - 4 ns

Cobolt Tor™ Series

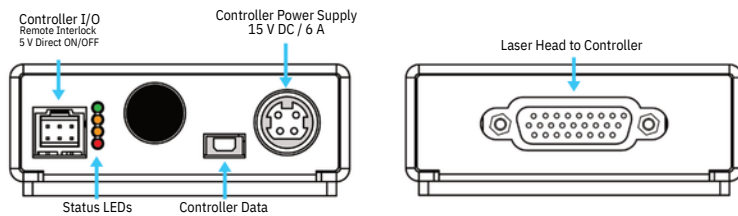
Cobolt Tor™

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.



Electrical Interfaces - Cobolt Tor™

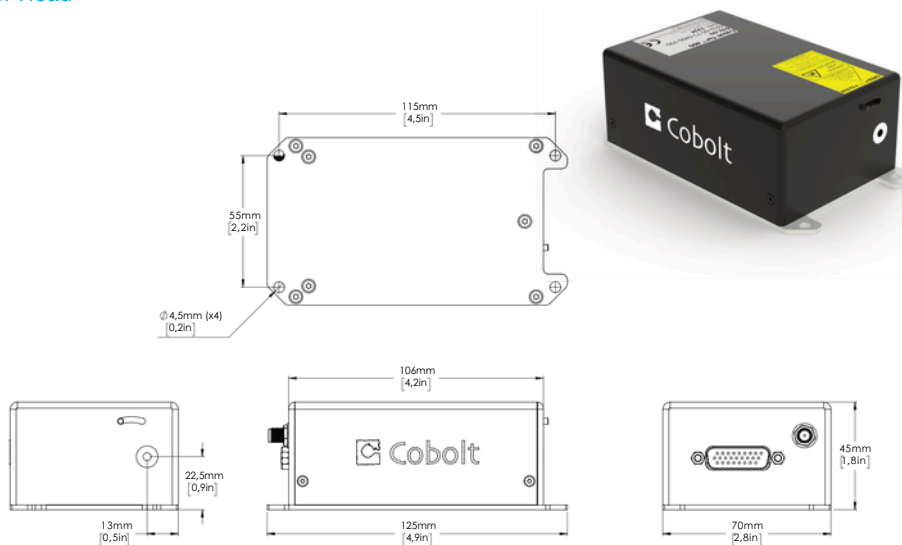


Molex 6 pin - Controller I/O

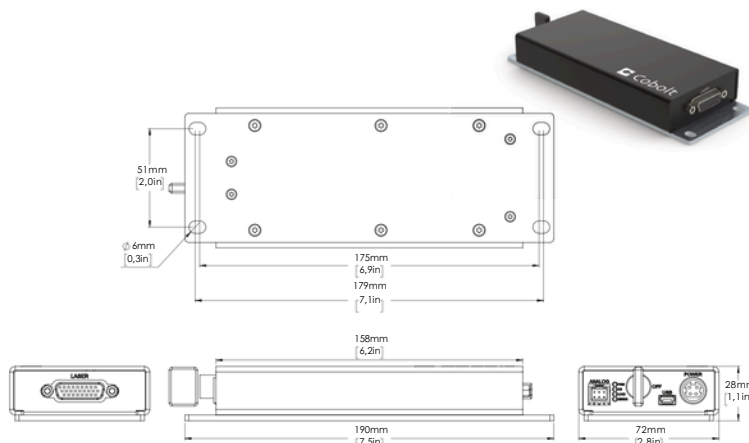
Pin	Function
1 2	Remote interlock
3 4	0 V – Ground
5 6	Direct On/Off (+5 V Input)
--	LED 1 (LASER ON)
--	LED 2 (ERROR)

Mechanical Specifications - Cobolt Tor™ Laser head and Controller

Laser Head



Controller

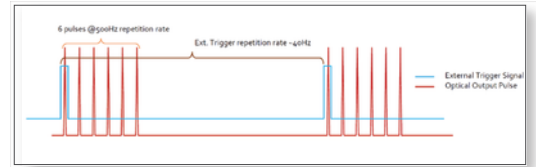


Cobolt Tor™ Series

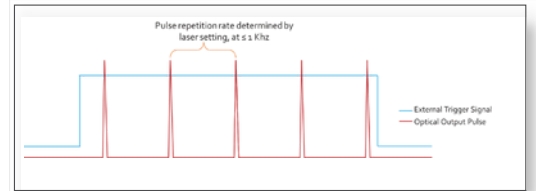
Cobolt Tor™ XS

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.

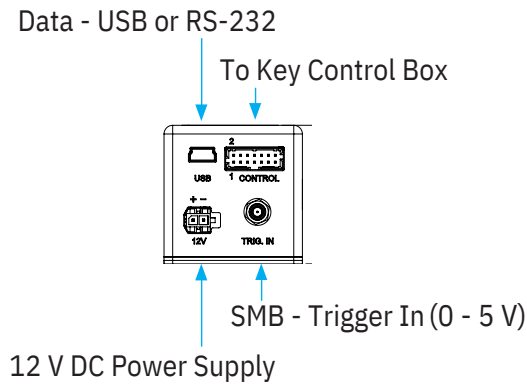


Pulse on Demand - 6 pulses per trigger event



Gated burst, free running during trigger ON

Electrical Interfaces - Cobolt Tor™ XS

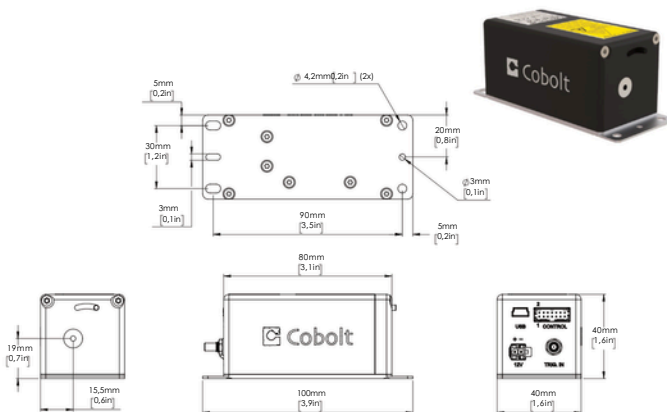


Molex 10 pin - To Key control box

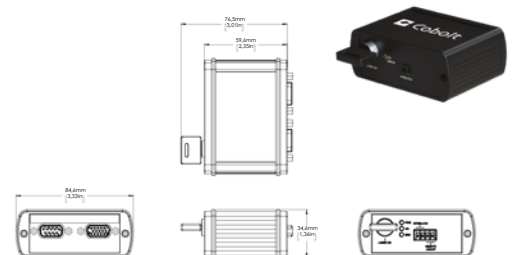
Pin	Function
1	Interlock
2	GND
3	GND
4	RS-232 TX
5	RS-232 RX
6	LED 1 – Laser ON
7	LED 1 – Laser ON (redundant)
8	LED 2 – Error
9	Trigger input
10	GND
11	Key switch
12	Remote ON/OFF (+5 V Input)
13	GND
14	Not used

Mechanical Specifications - Cobolt Tor™ XS Laser head

Laser Head - Standard



Key control box - CE/CDRH compliant systems

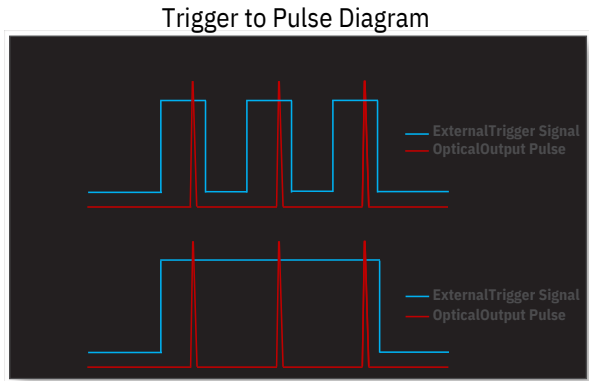


Cobolt Tor™ Series

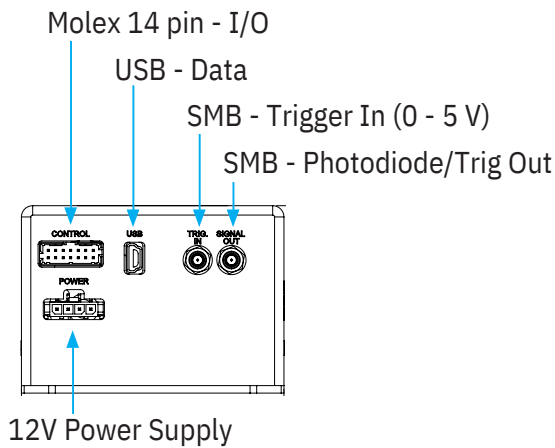
Cobolt Tor™ XE

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.



Electrical Interfaces - Cobolt Tor™ XE

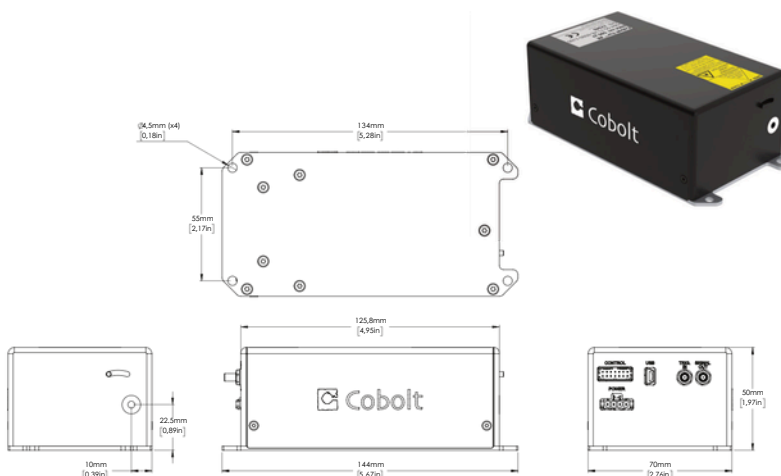


Molex 14 pin - To Key control box

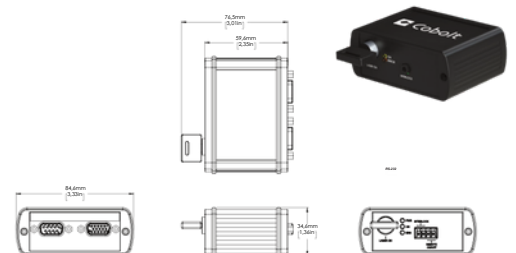
Pin	Function
1	Remote interlock
2	0 V – Ground
3	<i>not used</i>
4	RS232 Tx
5	RS232 Rx
6	Laser ON LED (1)
7	Laser ON LED (2)
8	Error LED (2)
9	<i>not used</i>
10	<i>not used</i>
11	Key
12	Direct Input
13	Ground
14	Trigger In (0 - 5 V)

Mechanical Specifications - Cobolt Tor™ XE Laser Head

Laser Head - Standard



Key control box - CE/CDRH compliant systems



Cobolt Tor™ Series

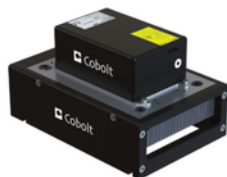
Options and Accessories

- 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/>



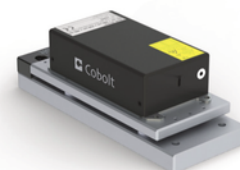
Heatsink HS-07



Heatsink with fans HS-04



Heatsink with fans HS-05



TEC-Plate for active baseplate temperature control

Our Locations

Cobolt AB , a part of HÜBNER Photonics (Sales in Norway, Sweden, Finland and Denmark)

Solna, Sweden
Phone: +46 8 545 912 30
Fax: 8 545 912 31
E-mail: info@coboltlasers.com

HÜBNER Photonics GmbH (Sales in Germany, Switzerland and Austria)

Kassel, Germany
Phone: +49 561 994 060-0
Fax: +49 6561 994 060-13
E-mail: info.de@hubner-photonics.com

HÜBNER Photonics Inc. (Sales in USA, Canada and Mexico)

San Jose, California, USA
Phone: +1 (408) 708 4351
+1 (408) 490 2774
Fax:
E-mail: info.usa@hubner-photonics.com

HA Photonics Pty Ltd (Sales in UK and Ireland)

London
United Kingdom
Phone: +44 7359 440 871
E-mail: info.uk@hubner-photonics.com

VALO Innovations, a part of HÜBNER Photonics (VALO Sales and Service)

Hannover, Germany
Phone: +49 511 260 390 70
E-mail: info.valo@hubner-photonics.com