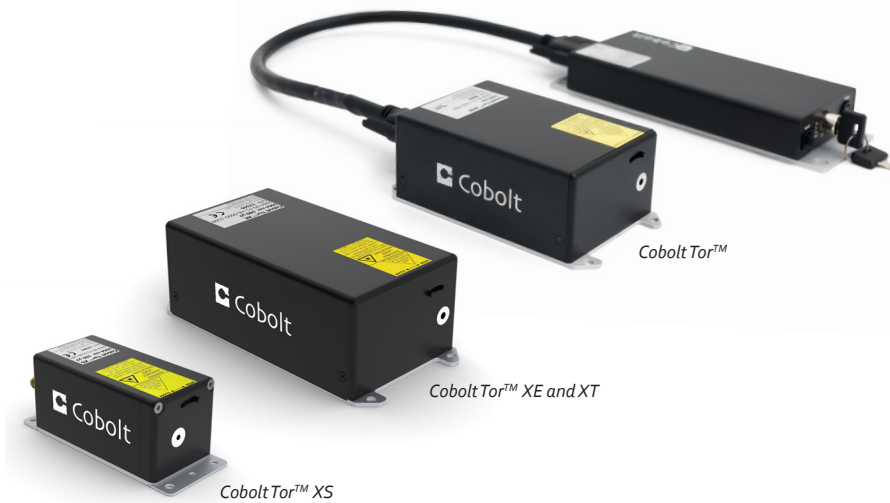


Cobolt Tor™ Series

High Performance | Triggerable | Q-Switched Lasers



- 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™ XT: Free running and triggerable, up to 50 kHz (Coming soon!)
- Cobolt Tor™ XS : Ultra compact, triggerable, up to 1 kHz
- Cobolt Tor™ XE : Compact, extended trigger capabilities, 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).

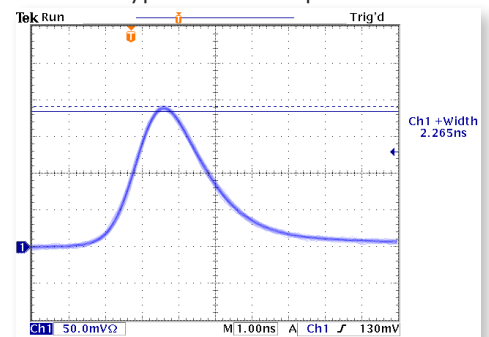
The Cobolt lasers are manufactured in Sweden by Cobolt AB, a part of HÜBNER Photonics. Using proprietary HTCure™ technology the lasers are packaged into a sealed laser head, offering an outstanding level of robustness and reliability, and making these lasers highly suitable for OEM integration into demanding environments.

The combination of compact size, high level of robustness, and outstanding performance make the Cobolt Tor™ Series lasers are 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.

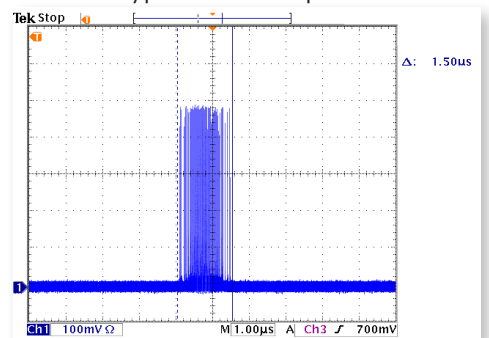
Applications

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

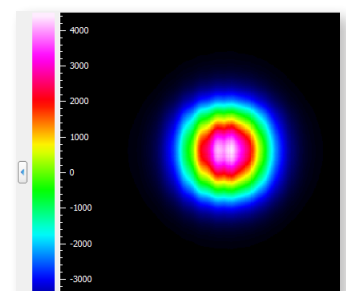
Typical Pulse Shape



Typical Jitter < 2 μs



Beam profile at exit - Tor XS 1064 nm



HÜBNER Photonics



Cobolt Tor™ Series

Optical Performance Specifications

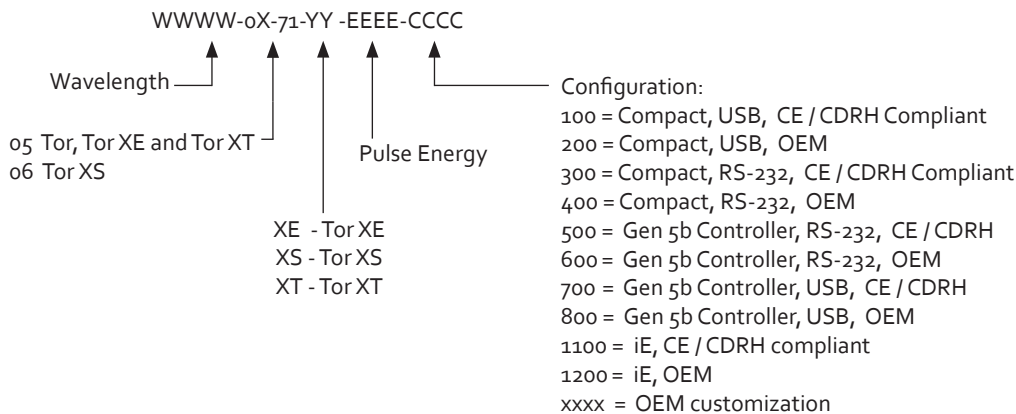
Operation mode	Cobolt Tor™			Cobolt Tor™ XT	Cobolt Tor™ XS		Cobolt Tor™ XE	
	Free running			Free running Triggerable	Triggerable		Triggerable	
Trigger mode	None			External SW control	External		Internal External Gated	
Wavelength in air (nm)	354.8 ± 0.3	532.1 ± 0.3	1064.2 ± 0.6	1064.2 ± 0.6	532.1 ± 0.3	1064.2 ± 0.6	532.1 ± 0.3	1064.2 ± 0.6
Pulse Energy (µJ)	18 ± 3	60 ± 5	160 ± 15	32 ± 5	50 ± 5	50 ± 5 100 ± 10	250 ± 25	500 ± 50
Peak Power (kW)	> 3	> 11	> 29	> 3	> 12	> 12 > 25	> 75	> 128
Repetition Rate (kHz)	7			50	Single pulse up to 1 kHz			
Pulse Width (ns)	4 ± 1			< 10	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	12 ± 1	6 ± 1	9 ± 1.5	5 ± 1	7 ± 1
Beam diameter at aperture (mm)	0.9 ± 0.3	1.0 ± 0.2	1.2 ± 0.3	1.2 ± 1.0	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	> 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 and XT
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



Communication Interface

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



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 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

Cobolt Tor™ XE, 1 kHz

1064 nm 1.0 mJ / 1-4 ns

Cobolt Tor™ XT, 50 kHz

1064 nm 100 µJ / 5-10 ns

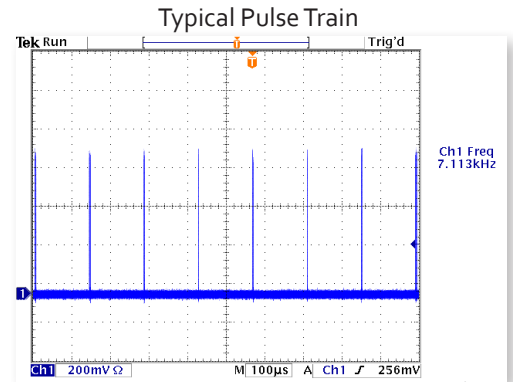
This device is sensitive to Electrostatic Discharge (ESD).

Cobolt Tor™ Series

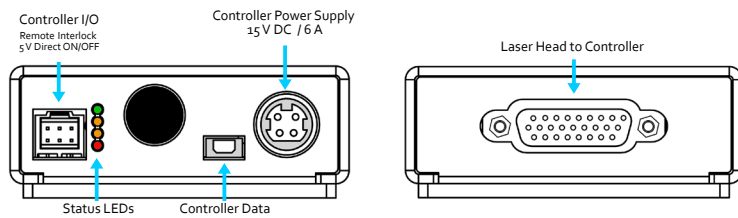
Cobolt Tor™

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™

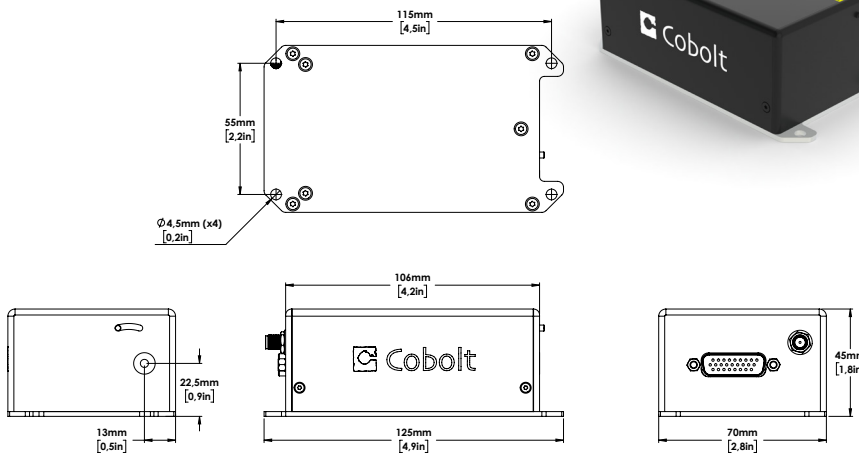


Molex 6 pin - Controller I/O

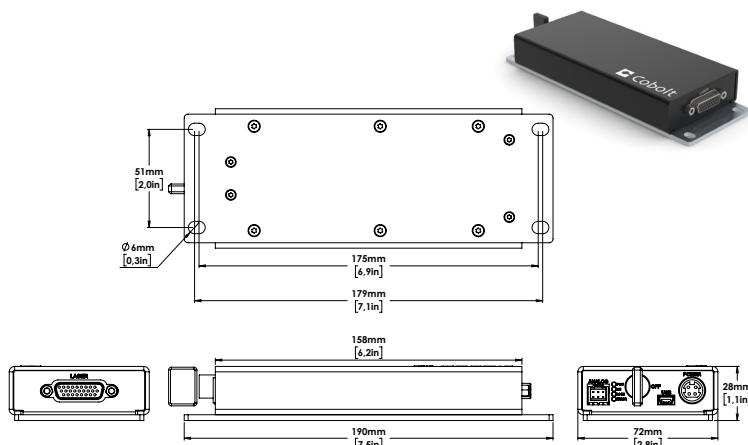
Pin	Function
1	Remote interlock
2	0 V – Ground
3	Direct On/Off (+5 V Input)
4	--
5	LED 1 (LASER ON)
6	LED 2 (ERROR)

Mechanical Specifications - Cobolt Tor™ Laser head and Controller

Laser Head



Controller



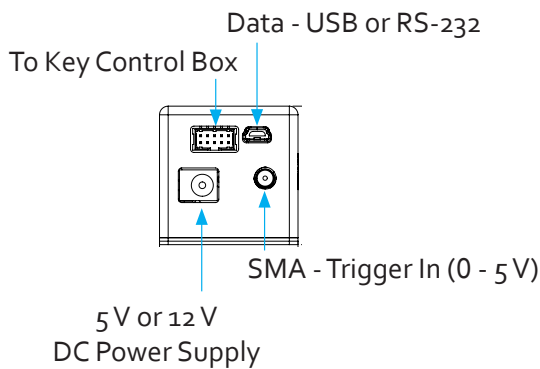
Cobolt Tor™ Series

Cobolt Tor™ XS

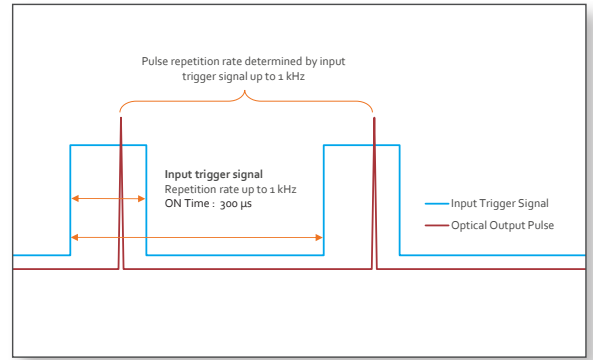
The Cobolt Tor™ XS lasers are air-cooled high-performance triggerable Q-switched diode-pumped lasers that come in an ultra-compact design with fully integrated electronics. Each optical pulse emitted by the laser is triggered by an external trigger signal connected to the SMA connector on the backside 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

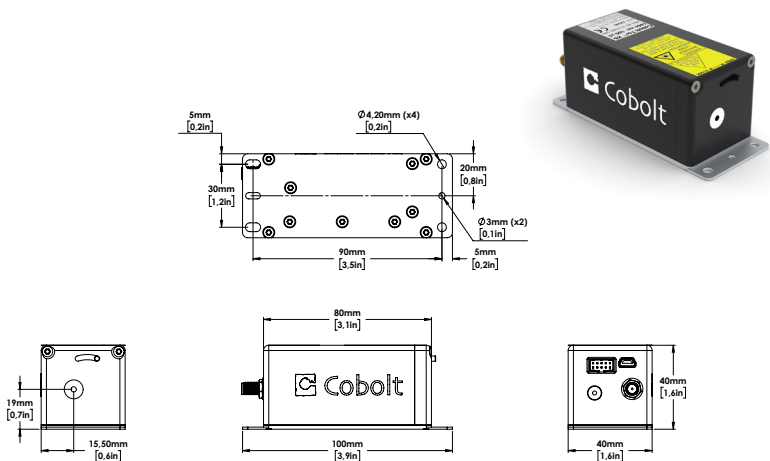


Molex 10 pin - To Key control box

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)

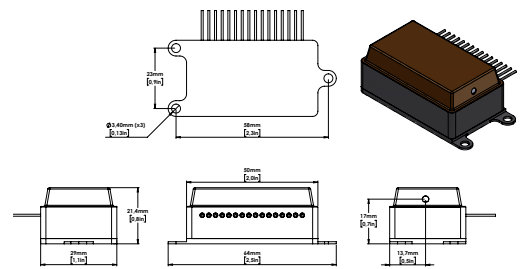
Mechanical Specifications - Cobolt Tor™ XS Laser head

Laser Head - Standard

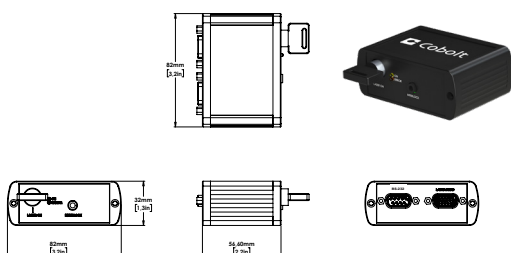


Laser Head - OEM Component

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



Key control box - CE/CDRH compliant systems



Cobolt Tor™ XS in component configuration

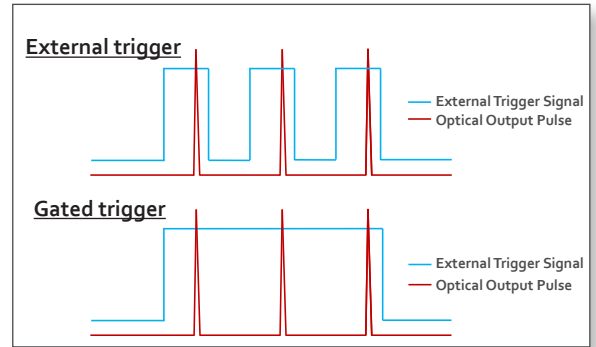
Cobolt Tor™ Series

Cobolt Tor™ XE

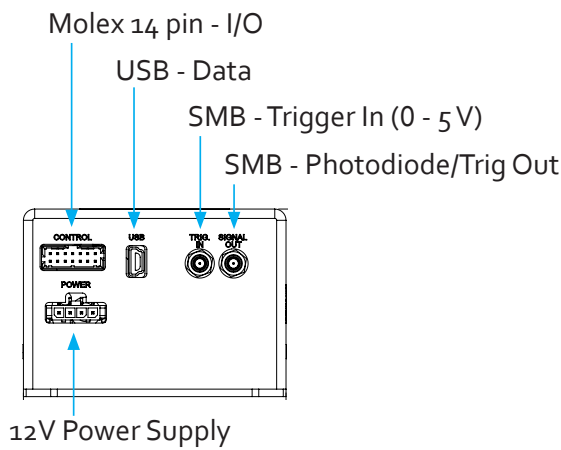
The Cobolt Tor™ XE lasers are air-cooled high-performance triggerable Q-switched diode-pumped lasers with the highest pulse energy within the Cobolt Tor™ Series. Drive electronics are integrated into the laser head and a variety of trigger modes are available: internal, external, and gated, which is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

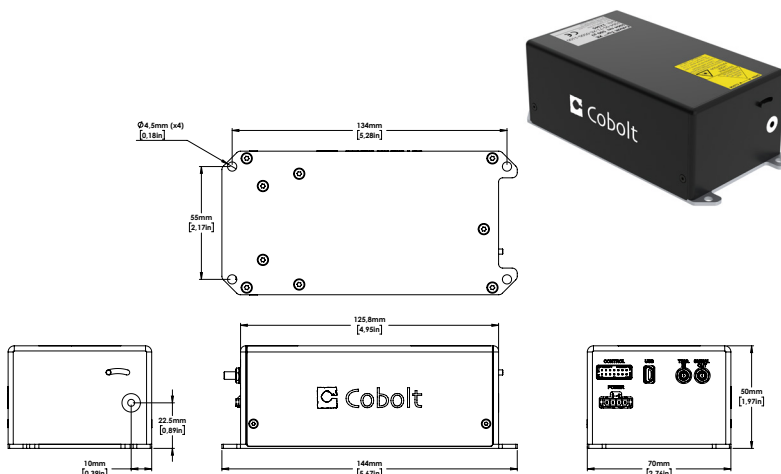


Molex 14 pin - To Key control box

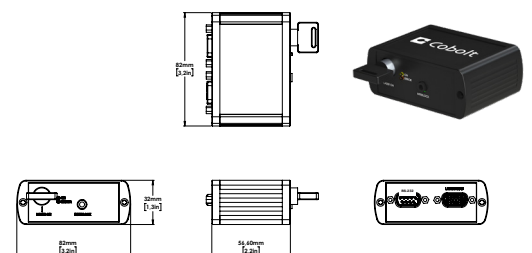
Pin	Function
1	Remote interlock
2	0 V – Ground
3	<i>not used</i>
4	RS232 Tx
5	RS232 Rx
6	Laser ON LED (1)
7	Laser ON LED (2)
8	Error LED (2)
9	<i>not used</i>
10	<i>not used</i>
11	Key
12	Direct Input
13	Ground
14	Trigger In (0 - 5 V)

Mechanical Specifications - Cobolt Tor™ XE Laser Head

Laser Head - Standard



Key control box - CE/CDRH compliant systems



Cobolt Tor™ Series

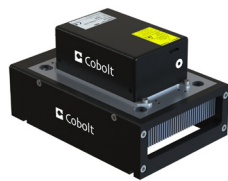
Options and Accessories

- Laser head heatsink for passive cooling of Cobolt Tor™ XS : HS-03
- Laser head heatsink with fans for Cobolt Tor™ : HS-04
- Laser head heatsink with fans for Cobolt Tor™ XE and XT : 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/>



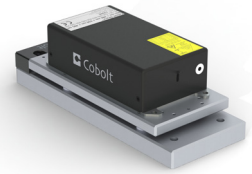
Passive Heatsink HS-03



Heatsink with fans HS-04



Heatsink with fans HS-05



TEC-Plate for active baseplate temperature control

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