Q-smart 450 & 850
Compact pulsed Nd:YAG lasers

■ Compact, easy to use, Plug & Play
■ Complete flexibility
■ Automatic adjustments, no need to align.

APPLICATIONS
Q-smart series, the ideal lasers for:
■ LIBS
■ LIDAR
■ Flash Photolysis
■ Ablation
■ PLD
■ Spectroscopy
■ OPO pumping
■ PIV
■ Photo acoustic imaging, etc.

www.quantel-laser.com
Q-smart
Operates in any configuration, any environment for all your applications

MAIN FEATURES
- LIGHT AND COMPACT LASER WITH QUICK CONNECT CABLES
- PLUG & PLAY HARMONICS FROM 1064 TO 213 nm
- INTELLIGENT AUTOTUNING OF HARMONICS
- SINGLE DOUBLER FOR HIGHEST ENERGY AT 532 & 355 nm
- SINGLE LONGITUDINAL MODE OPTION (SLM)
- BEAM ATTENUATOR MODULE (BAM)
- INTUITIVE TOUCH SCREEN INTERFACE
- 100 MILLION SHOT LAMP LIFETIME GUARANTEE

EASY TO USE
- INTUITIVE LASER OPERATION
  Operating the Q-smart requires no specific knowledge nor training.
- FAST LASER SET UP (LESS THAN 5 MINUTES)
  - Quick connect coolant lines and I/O cables
  - Uses less than 4 liters of distilled water for the closed air/water cooling loop
  - Installs quickly on any optical table with 3 mounting clamps
  - Universal Line Voltage.
- INTELLIGENT AUTOTUNING OF HARMONICS
  Automatic tuning and phase matching of all harmonics for optimal energy output.
- INTUITIVE CONTROL
  Laser can be controlled using either the touch screen interface or computer based software.

EASY TO MAINTAIN
- LAMP CHANGE REQUIRES NO LASER REALIGNMENT
  The flashlamps are fixed on the upper, removable part of the ceramic pumping cavity and are easily removed by hand. The operation is quick to perform and requires no special skills.
- IN LINE DEIONIZED WATER CARTRIDGE

COMPACT AND PORTABLE
- SMALL, COMPACT AND PORTABLE POWER SUPPLY (27 kg)
- QUICK CONNECT CABLES
  Easy disconnection of the laser head.

FLEXIBLE
- PLUG AND PLAY HARMONIC GENERATORS
  Switch easily between all wavelengths from 1064 nm to 213 nm.
- INTERCHANGEABILITY OF POWER SUPPLIES
  The universal power supply can control any Q-smart 450 and Q-smart 850 laser heads with its unique auto-recognition feature.
- INTERNAL/EXTERNAL SYNCHRONIZATION
  Available for either the flashlamps or Q-switch trigger through TTL pulses.
- ADJUSTABLE Q-SWITCH OUT SIGNALS
  +/- 500 ns for a flexible synchronization to an external device (camera, spectrometer).
- REMOTE CONTROL OF THE LASER VIA ETHERNET

Intercovamex H2 multi technique deposition system configured with a Q-smart 450 for Pulsed Laser Deposition (PLD)
**STABLE**

*MECHANICAL STABILITY*

The compact thermally stabilized monolithic structure provides incomparable alignment stability, even under difficult environmental conditions, such as temperature variations, transport and vibration.

*THERMAL STABILITY*

The Q-smart is built around a temperature controlled, lightweight metal housing. The Pockels cell and all optical components operate at constant temperature. The crystals are mounted in a sealed temperature-regulated housing to ensure long term energy stability. The Q-smart can operate in any orientation, including vertical and even upside down!

**HIGH BEAM QUALITY AND ENERGY**

*EXCELLENT BEAM QUALITY AND POINTING STABILITY*

The Q-smart uses an unstable resonator, with a variable reflectivity output mirror producing a near Gaussian beam profile. With its thermo-regulated laser head and small size, the Q-smart's pointing stability is less than 40 µrad.

*HIGH PUMPING EFFICIENCY*

The rod and the lamps are placed in a diffusely reflecting, close coupled ceramic cavity, ensuring the best possible energy transfer.

*HIGHEST ENERGY AT BOTH 532 & 355 nm*

Achieve the highest energy conversion at both 532 and 355 nm using a single doubling crystal: with automatic recognition of the harmonics and energy optimization protocols.

**REALIBLE**

*A UNIQUE EXPERIENCE*

With over 4 decades of experience, Quantel only uses the highest quality optics and electronics to manufacture the best lasers available, anywhere!

*2-YEAR FULL WARRANTY*

Optics are rigorously inspected by Quantel’s Quality Assurance Department and protected from dust by Q-smart’s protected structure. This allows Quantel to offer a 24-month guarantee, including optics for normal use. Q-smart’s quality and reliability make it a laser system adapted for all types of use: scientific research, medical equipment, industrial applications, industrial instrumentation, OEM integration and many others.

*LONG FLASHLAMP LIFETIME*

Quantel’s Quality Assurance Department controls and guarantees the flashlamp supplied to ensure 100 Million shots flashlamp life time.

**DIMENSIONS**

1. Laser Head  
   - Weight: 7 kg [15.4 lbs]  
   - Dimensions: 526 mm [20.7’’], 123 mm [4.84’’], 125 mm [4.92’’], 99 mm [3.9’’]

2. Harmonic generator  
   - Weight: 2.1 kg [4.63 lbs]  
   - Dimensions: 59.8 mm [2.32’’], 43 mm [1.69’’]

3. Power supply  
   - Weight: 27 kg [59.5 lbs]  
   - Dimensions: 513 mm [20.18’’], 283 mm [11.14’’], 507 mm [19.95’’]

4. Q-touch  
   - Weight: 800 g [1.76 lbs]  
   - Dimensions: 220 mm [8.66’’], 124 mm [4.88’’]

**Denotes features only available from QUANTEL**
FOR FREQUENCY DOUBLING

<table>
<thead>
<tr>
<th>Q-smart</th>
<th>$2\omega$</th>
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<tr>
<td></td>
<td>1064 and 532 nm</td>
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</table>

- **Without dichroic**: 532 nm
- **Standard version with dichroics and beam dump**: 532 nm
- **Without beam dump**: 1064 nm

FOR FREQUENCY TRIPLING

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<th>Q-smart</th>
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<td>1064, 532 and 355 nm</td>
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</table>

- **Without dichroic**: 355 nm
- **Standard version with dichroics and beam dump**: 355 nm
- **Without beam dump**: 1064 + 532 nm

FOR FREQUENCY QUADRUPLING

<table>
<thead>
<tr>
<th>Q-smart</th>
<th>$4\omega$</th>
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<tr>
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<td>1064, 532 and 266 nm</td>
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</table>

- **Without dichroic**: 266 nm
- **Standard version with dichroics and beam dump**: 266 nm
- **Without beam dump**: 1064 + 532 nm

FOR FREQUENCY QUINTUPLING

<table>
<thead>
<tr>
<th>Q-smart</th>
<th>$5\omega$</th>
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<tbody>
<tr>
<td></td>
<td>213 nm</td>
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</table>

- **Standard version with dichroics and beam dump**: 213 nm

- **2ω, 3ω, 4ω AND 5ω AND WAVELENGTH SEPARATION**
  Quantel offers a range of plug and play harmonic generators to frequency double, triple, quadruple or quintuple the Q-smart’s output. The harmonics are assembled into compact, thermally regulated modules which include nonlinear crystals to ensure maximum conversion efficiency and stability. These modules are delivered with an external removable set of dichroic mirrors to separate the various wavelengths. Auto tuning ensures there is no need to manually tune the crystals for maximum energy. Auto phase matching can be launched on the Q-touch or computer software.

- **BAM (BEAM ATTENUATOR MODULE)**
  Laser intensity beam attenuator module fits into the same mechanical module as the harmonic generators.

- **SLM OPTION (SINGLE LONGITUDINAL MODE)**
  This option, available on both the Q-smart 450 & 850, reduces the laser’s spectral bandwidth to < 0.005 cm⁻¹, increases the coherence length and provides a smooth temporal profile, free of modulation. SLM option is upgradable on site.

- **DYE LASER PUMPING**
  Superior beam quality allows for maximum conversion efficiency in dye laser pumping. Quantel builds the most compact tunable packages in the laser industry (see TDL+).

- **MULTIMODE RESONATOR**
  The multimode resonator option provides a flat top beam profile and added flexibility in term of output energy and repetition rate.

- **MULTIPULSE CONFIGURATION**
  Recombination of two independent Q-smart 850 oscillators into a Twins laser is available at any wavelength from 1064 down to 266 nm.
# Q-SMART SPECIFICATIONS

<table>
<thead>
<tr>
<th>Feature</th>
<th>Q-smart 450</th>
<th>Q-smart 850</th>
</tr>
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<tbody>
<tr>
<td>Repetition rate (Hz)</td>
<td>10</td>
<td>10-SLM(1) 20</td>
</tr>
<tr>
<td>Pulsed energy (mJ)(2)</td>
<td>1064 nm 450</td>
<td>370</td>
</tr>
<tr>
<td>532 nm 220</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>355 nm 130</td>
<td>75</td>
<td>120</td>
</tr>
<tr>
<td>266 nm 60</td>
<td>35</td>
<td>50</td>
</tr>
<tr>
<td>213 nm 10</td>
<td>-</td>
<td>8</td>
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<tr>
<td>Energy stability (%) (3)</td>
<td>1064 nm ± 2 (0.6)</td>
<td>± 2 (0.6)</td>
</tr>
<tr>
<td>532 nm ± 4 (1.3)</td>
<td>± 4 (1.3)</td>
<td></td>
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<tr>
<td>355 nm ± 6 (2)</td>
<td>± 6 (2)</td>
<td></td>
</tr>
<tr>
<td>266 nm ± 8 (2.6)</td>
<td>± 8 (2.6)</td>
<td></td>
</tr>
<tr>
<td>213 nm ± 12 (4)</td>
<td>± 12 (4)</td>
<td></td>
</tr>
<tr>
<td>Power drift (%) (4)</td>
<td>1064 nm ± 3</td>
<td>± 3</td>
</tr>
<tr>
<td>532 nm ± 5</td>
<td>± 5</td>
<td></td>
</tr>
<tr>
<td>355 nm ± 5</td>
<td>± 5</td>
<td></td>
</tr>
<tr>
<td>266 nm ± 10</td>
<td>± 10</td>
<td></td>
</tr>
<tr>
<td>213 nm ± 14</td>
<td>± 14</td>
<td></td>
</tr>
<tr>
<td>Pulse duration (ns)(5)</td>
<td>1064 nm - 6</td>
<td>- 6</td>
</tr>
<tr>
<td>532 nm - 5</td>
<td>- 5</td>
<td></td>
</tr>
<tr>
<td>355 nm - 5</td>
<td>- 5</td>
<td></td>
</tr>
<tr>
<td>266 nm - 5</td>
<td>- 5</td>
<td></td>
</tr>
<tr>
<td>213 nm - 5</td>
<td>- 5</td>
<td></td>
</tr>
<tr>
<td>Pointing stability (µrad)(6)</td>
<td>All wavelengths &lt; 40</td>
<td>&lt; 40</td>
</tr>
<tr>
<td>Jitter (ns)(7)</td>
<td>1064 nm ± 0.5</td>
<td>± 1</td>
</tr>
<tr>
<td>532 nm ± 0.5</td>
<td>± 1</td>
<td></td>
</tr>
<tr>
<td>355 nm ± 0.5</td>
<td>± 1</td>
<td></td>
</tr>
<tr>
<td>266 nm ± 0.5</td>
<td>± 1</td>
<td></td>
</tr>
<tr>
<td>213 nm ± 0.5</td>
<td>± 1</td>
<td></td>
</tr>
<tr>
<td>Focusability (times Diffraction Limit)(8)</td>
<td>MP @1064 nm ≤ 2</td>
<td>≤ 2</td>
</tr>
<tr>
<td>Linewidth (cm⁻¹)(9)</td>
<td>1064 nm ≤ 0.7</td>
<td>≤ 0.005</td>
</tr>
<tr>
<td>532 nm ≤ 0.7</td>
<td>≤ 0.005</td>
<td></td>
</tr>
<tr>
<td>355 nm ≤ 0.7</td>
<td>≤ 0.005</td>
<td></td>
</tr>
<tr>
<td>266 nm ≤ 0.7</td>
<td>≤ 0.005</td>
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<tr>
<td>Spatial profile @ 1064 nm(10)</td>
<td>Near Field(13) &gt; 0.70</td>
<td>&gt; 0.70</td>
</tr>
<tr>
<td>Far Field(13) &gt; 0.95</td>
<td>&gt; 0.90</td>
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<tr>
<td>Polarization</td>
<td>Horizontal 1064 nm, 355 nm, 266 nm</td>
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<tr>
<td>Vertical 532 nm, 213 nm</td>
<td></td>
<td></td>
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<tr>
<td>Temperature</td>
<td>Operating 18 / 28 °C</td>
<td></td>
</tr>
<tr>
<td>Storage(13) -10 / 50 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flashlamps lifetime</td>
<td>&gt; 100 million shots</td>
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</tr>
<tr>
<td>Service requirements</td>
<td>100-240 VAC / 50-60 Hz / Single phase</td>
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</tr>
<tr>
<td>Cable length</td>
<td>3 m (10 feet)</td>
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</tbody>
</table>

(1) SLM: Upgradable on site • (2) Measured with a calibrated energy meter • (3) Peak to peak, 100% of the shots (RMS) • (4) Over 8 hours, without readjustment of phase-matching, 18°C < T < 28°C • (5) FWHM, fast photodiode and 1GHz scope • (6) Measured by SPIRICON LBA FWB RMS, on 200 pulses at the focal plane of a 2m focus lens • (7) With respect to Q-Switch trigger, measured at half width at 500 accumulated shots for 99% of shots • (8) At 1/e² of the peak, by SPIRICON LBA FWB (9) FWHM measured by a grating spectrometer with a <0.045 cm⁻¹ resolution • (10) Full angle, at 1/e² of the peak • (11) At the output of the laser • (12) Least square fit to Gaussian (perfect fit=1) • (13) At 1 m from laser output • (14) At focal plane of a 2 m focus lens • (15) System drained and flushed with EGW

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The Quantel Group

Founded in 1970, the Quantel group has established itself over the last twenty years as one of the world’s leading specialists in laser technology for scientific (laboratories and universities), industrial (material processing, process analysis, marking) and medical (ophthalmology) applications.

With design and manufacturing facilities in France and the US, and a strong world-wide sales and service network, the Quantel Group serves a global customer base.

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