



Pulsed Nd : YAG lasers systems

# YG 900 & YG 980





pulsed Nd : YAG lasers



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asers in the YG 980 and  
YG900 series represent the

latest evolution in the modular  
systems which have made QUANTEL  
a success since 1970.

Reliability, quality and innovation are  
the key words which have guided  
QUANTEL's research and development  
teams.

The various laser  
models - Nd:YAG  
Q-switched (YG980  
series) and mode-

locked mode (YG900 series) -  
generate high energy, high average  
power, high stability and optimum  
beam quality. Numerous options  
enable these sources to be adapted  
to individual user requirements.

( YG 980  
and  
YG 900 are

for  
synonyms



## 1- Modularity

All lasers in the YG980 and YG900 series are manufactured from basic mechanical, optical and opto-electronic elements (such as pumping chambers, Q-Switch assembly...) whose reliability and production quality are the fruit of QUANTEL experience. Several configurations are proposed according to the required specifications. This modularity is the best means of adapting to the user's requirements, with options easily added to upgrade the system. Modifications to the laser source are of course easily carried out on the user's premises.

The electric modules are interchangeable and are mounted in standard 19" racks.

MPS : oscillator control module, including the laser control and user interface computer card, high voltage power supply and a discharge network. All electronic cards used are connected on slots and can easily be replaced.

APS: amplifier control module, similar to the MPS but without user interface.

MD: module specific to the YG900 series, it contains the acousto-optical modulator and pulse selection controls.

CG and CGS: water/water cooling units, the CGS offers high temperature stability ( $\pm 0.1^\circ\text{C}$ ) and was especially designed for the SLM option (single longitudinal mode).

## 2- Stability

The exceptional mechanical stability is obtained by using an optical bench made from an original aluminium casting with computer-optimised structure. The optical resonator is made from carbon fibre with floating attachment to absorb differential expansion. This structure allows the laser to be used without realignment over a large temperature range.

The reflecting mirrors are mounted on adjustable supports with Invar setting screws.

The choice of materials, the quality of production for mechanical parts and the assembly procedures are also important points which ensure long term compliance with specifications.

## 3 - Pumping efficiency

The close coupling pumping cavities use a powder of very high diffusing power providing



homogeneous pumping of the Nd:YAG rod. Laminar flow cooling reduces thermal stress on the rod and ensures long flashlamp lifetime.

The design quality of the laser heads confers high gain whilst reducing thermal stress to a minimum.

Each laser head is connected to the power supplies by shielded cables and a connector equipped with a safety system to prevent any possible danger when changing the flashlamp. The cooling circuit is treated against electrolysis.

## 4 - Beam Quality and Energy

To obtain both high energy and high beam quality, the YG980 series (Q-switched lasers) use an unstable single mode resonator with variable reflectivity coupling mirror (Super-Gaussian) and birefringence compensation device between oscillator and amplifier.

The optical resonator in the YG900 series (mode-locked laser) delivers a TEM<sub>00</sub> mode which, amplified in single or double passage, produces a high quality beam at picosecond pulse rate.

The beam qualities obtained give high conversion efficiency for harmonic generation.

## 5 - Simplicity of use

The electronic power modules are controlled by RS232 either from a remote control terminal or a PC. The control terminal provides access to all laser parameters (shot counter, time counter) lamp voltages, Pockels cell control, Q-switch delay, oscillator/amplifier delay/harmonic generator phase matching, etc...).

Software is proposed for control by external microcomputer.

## 6 - Reliability

The high quality of the optical components and the care taken with the design of QUANTEL lasers lead to high reliability without the need for protective tubes and complex gas flows.

## 7 - Long flashlamp lifetime

Quantel quality department checks and guarantees the flashlamps. The power supply has an auxiliary generator delivering a simmer current which increases flashlamp lifetime (typically 50 million shots).

(In standard version, the repetition rates for lasers in the YG980 and YG900 series are 10, 20, 30 or 50 Hz. For other specifications, please contact Quantel sales department or your local representative.)



# Options:

## YG980 series

**Long pulses** : YG980 lasers can be modified to operate in free-running mode and deliver pulses of duration greater than one hundredth of a microsecond.

**Intracavity etalon** : this option increases the laser's spectral resolution ( $< 0.1 \text{ cm}^{-1}$ ).

**Longitudinal single mode** : injection in the oscillator cavity of a diode-pumped continuous laser allows operation at maximum spectral resolution (limited by Fourier transform). The pulse then displays no temporal structure.

## YG900 series

**Active-Active Q-switching** : easily synchronised 300 ps pulses can be obtained through the use of a Pockels cell coupled to the acousto-optical modulator.

**Etalons selected by rotation** : 4 etalons serving as coupling mirrors are mounted on a spindle to provide a choice of 4 pulse durations (35, 50, 100 and 200 ps).

## YG980 and YG900 series

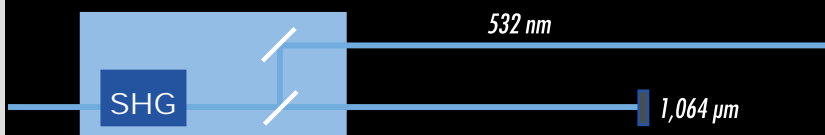
**D, T, Q and harmonics separators** : Quantel offers a range of harmonics generators for both laser series, to double, triple and quadruple the fundamental frequency. The crystals are set in sealed temperature-regulated housing. Phase matching for the second and third harmonic is obtained through simple motorised mechanical setting and controlled by the remote terminal. The fourth harmonic crystal is thermally phased matched.

**Dichroic mirror assemblies** are used to separate the various wavelengths according to various configurations. Switching from the second to the third harmonic (or the fourth) is motorised and controlled by the remote terminal.

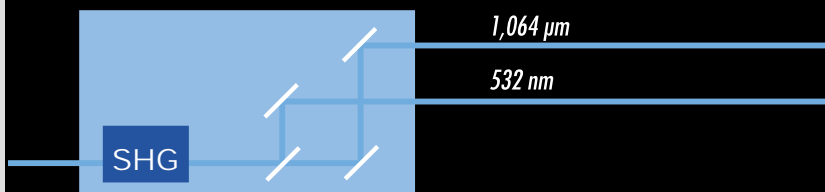
**Fifth harmonic**: Frequency quintupling (213 nm) is obtained by mixing the fundamental and the fourth harmonic in a BBO crystal. This option is mounted on an additional bench.

**Laser alignment**: a visible laser allows the user to align the infrared beam.

### D<sub>1</sub>/D<sub>3</sub>



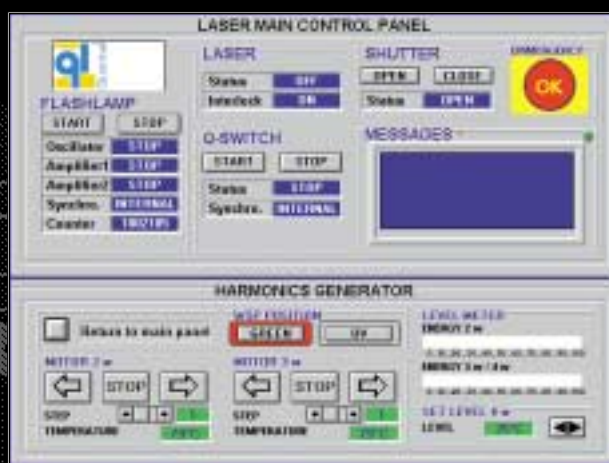
### D<sub>2</sub>/D<sub>4</sub>



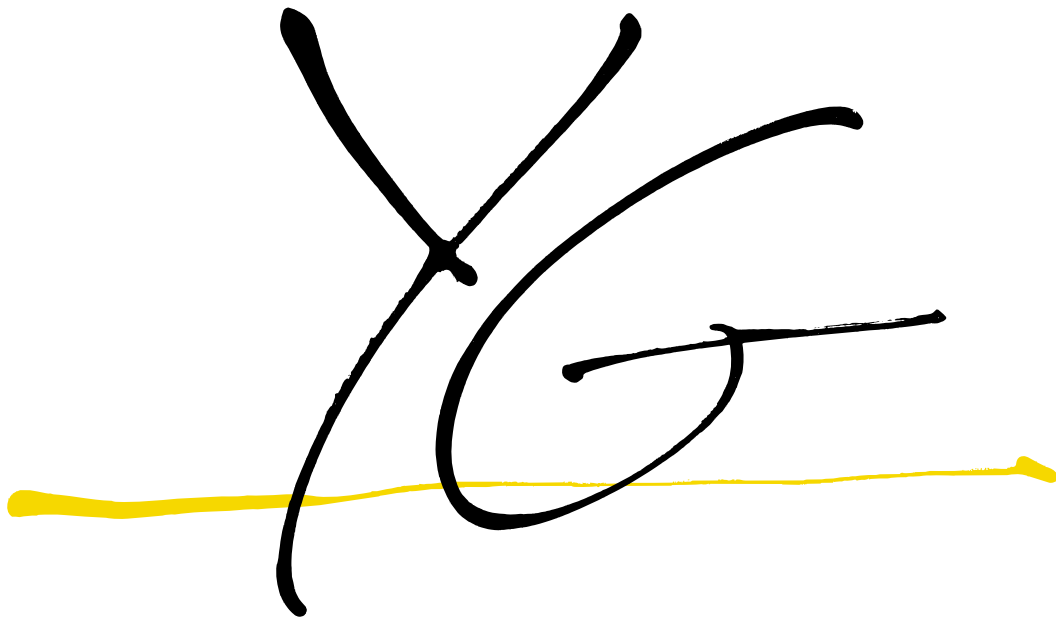
### T<sub>1</sub>



### Q<sub>1</sub>



▲ Software control panel



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**YG 900 & YG 980**



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**VISIBLE AND INVISIBLE LASER RADIATION  
AVOID EYE OR SKIN TO DIRECT  
OR SCATTERED RADIATION.**

**CLASS 4 LASER RADIATION PRODUCT**

Max. Average Power : 40 W  
Max. Energy/pulse : 2J  
Pulse duration : < 10ns  
Emitted Wavelength : 213/1064nm