

TopWave 229

TopWave 229

Industrial CW Laser for DUV Raman

The TopWave 229 represents the latest addition to the series of TOPTICA's industrial CW Deep-UV lasers. Based on the well-established TopWave DUV platform it provides 10mW of CW output power at a wavelength of 228.5 nm.

With its short wavelength and an ultra-narrow laser linewidth ($< 1 \text{ MHz} \triangleq < 4 \times 10^{-5} \text{ cm}^{-1}$), the TopWave 229 provides the key features to take on an important role as excitation source in the field of deep UV Raman and deep UV fluorescence spectroscopy.

Excitation below 250 nm is crucial for fluorescence-free Raman, as this avoids the overlap between the spectral regions of the Raman signal and the native fluorescence. Compared to fluorescence, the Raman effect is orders of magnitude weaker, so that even minimal fluorescence is sufficient to mask Raman emission.

Fluorescence spectroscopy also benefits from the 228.5 nm emission, because it allows the detection of molecules with fluorescence spectra in the range $\leq 270 \text{ nm}$, which can only be excited with shorter wavelength light.

As a CW laser system, the TopWave 229 offers another advantage: it avoids non-linear and saturations problems common with pulsed laser sources.

Designed for easy integration the compact TopWave 229 is a turnkey system which the user can control either via a touch panel at the control unit or using a PC GUI. Due to its high wall-plug efficiency, it is sufficient to operate the laser with conduction cooling.

Fully automated optimization routines for the internal opto-mechanics ensure comfortable, hands-off operation. In order to provide best reliability and consistent, diffraction limited beam quality ($M^2 < 1.3$), the complete UV beam path, is enclosed in a specially sealed compartment. In combination with a fully automated optics shifter it enables typical lifetimes of 10,000 hours, which is key for the use in any industrial application.

The TopWave 229 is an exciting new choice for deep UV spectroscopists looking for an easy to use and reliable laser that enables the user to focus on their application rather than worrying about the light source.



Applications

- DUV Raman
- DUV Native Fluorescence
- Protein detection
- Photoluminescence (PL)

Key Features

- 10 mW at 228.5 nm
- Narrow laser linewidth ($< 1 \text{ MHz} \triangleq < 4 \times 10^{-5} \text{ cm}^{-1}$)
- Ultra-stable, low noise CW operation
- Excellent lifetime (typ. $> 10,000 \text{ h}$)
- Consistent beam quality ($M^2 < 1.3$) over full lifetime
- Sealed doubling cavity (SUV) with automatic optics shifter
- High wall-plug efficiency. No chiller necessary
- User-friendly turnkey system

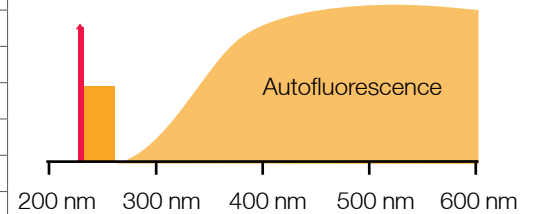


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Laser Specification	TopWave 229-010
Output power	10 mW
Wavelength	228.5 nm ± 0.5 nm
Linewidth	< 1 MHz
Beam waist diameter @ 1m (1/e ²)	0.4 mm ± 0.2 mm
Beam divergence (full-angle)	< 1.2 mrad
Ellipticity	0.9 - 1.1
Beam pointing stability ⁽¹⁾	< ± 5 μrad
Transverse Mode	TEM ₀₀
M ²	M ² x < 1.3, M ² y < 1.3
Polarization	linear, vertical < ± 3°
Polarization extinction ratio	> 200 : 1
Power stability	< 2 % over 8 h
RMS noise	< 1 % (10 Hz - 10 MHz)
Lifetime ⁽²⁾ (min. / typ.)	3,000 h / 10,000 h

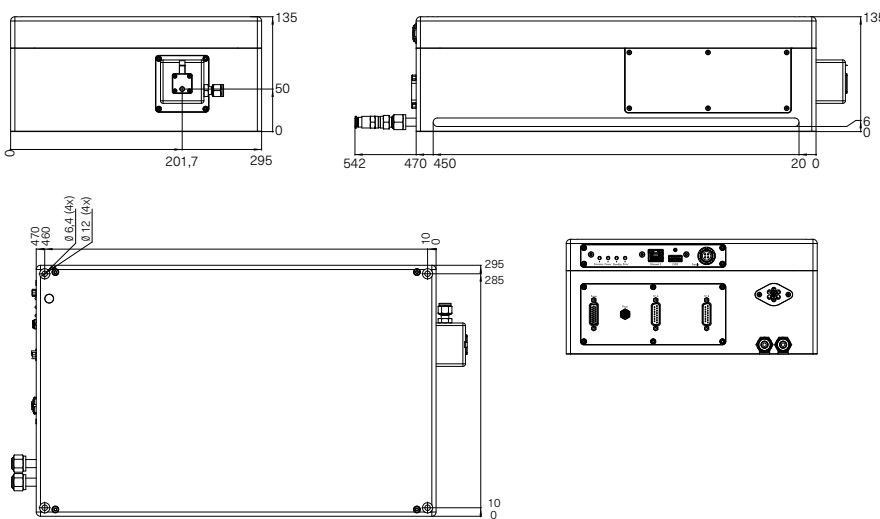
Utility and Environmental Specifications	
Laser head dimensions	135 x 295 x 470 mm ³ (H x W x D)
Control unit dimensions	154 x 378 x 448 mm ³ (H x W x D)
Umbilical length	2 m
Temperature range	
Operating	20 °C to 30 °C, stabilized to ± 1 °C, non-condensing
Storage & shipping	-10 to + 50 °C, non-condensing
Cooling requirements	
Laser head	Conduction ⁽³⁾
Control unit	Air-cooled
Line voltage	AC 100-240 V 50/60 Hz
Power consumption	< 250 W (typ. < 120 W)
Communication interface	Ethernet, USB



- ↑ Raman excitation at 229 nm
- > 5000 cm⁻¹ fluorescence free Raman shift range

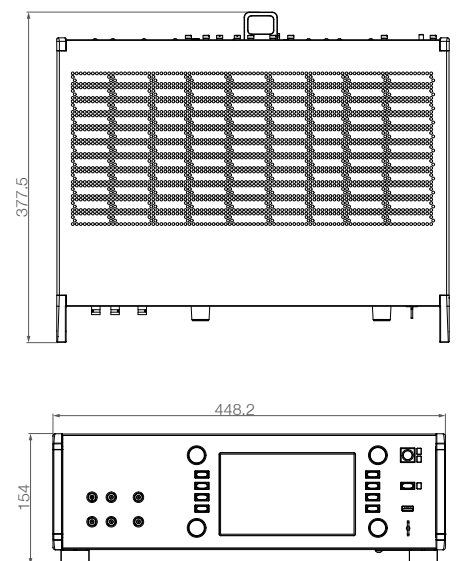
⁽¹⁾ Rms over 8h @ ambient temperature drift less than ± 1 k * Subject to change without notice
⁽²⁾ With optics shifts ⁽³⁾ Sufficient heat sink has to be provided. Optional cooling plate with closed loop chiller available upon request

TopWave laser head



All dimensions given in mm.

TopWave controller



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