PRELIMINARY

PT401 SERIES

Single Housing UV–VIS–NIR Tunable Picosecond Laser System

PT401 series laser systems integrate a picosecond optical parametric oscillator (OPO) and a pump laser in a single compact housing. Mounting the components on the same frame provides a robust solution. It makes laser installation shorter, improves long-term stability, and reduces maintenance costs.

Fast and fully automatic wavelength tuning is achieved by advanced microprocessor control. The wavelength tuning elements are mounted on precise closed-loop micro-stepping motors. The temperatures of the nonlinear crystals are controlled by precise thermo-controllers. No additional manual adjustment of the laser system is needed.

For customer convenience, the laser can be operated from a master device or a personal computer using various interfaces. Depending on the system configuration, control is available via the USB interface (REST API over RNDIS or VCP with ASCII commands), the RS-232 interface (ASCII commands), the LAN interface (REST API), or from the remote control pad with a backlit display that remains easy to read even while wearing laser safety glasses.

FEATURES

- *Tuning range **210 – 2300 nm***
- ***Hands-free tuning**: motorized for the entire tuning range*
- *Linewidth **<4 cm^{-1}***
- *Repetition rate **1000 Hz**, optionally 100 Hz*
- ***Air cooled** – external water supply is not required*
- *Beam direction stability in the entire tuning range*
- ***Single housing**: integrates a pump laser and OPO in a single housing*
- *PC control via USB, RS232 interface, LAN interface*
- *Fast wavelength scan (sweep)*

APPLICATIONS

- *Time resolved fluorescence (including streak camera measurements)*
- *Pump-probe spectroscopy*
- *Nonlinear spectroscopy*
- *Other spectroscopic and nonlinear optics applications*

PT401 series features

Model	Features
PT401	Provides a **narrowband radiation** with a linewidth <4 cm^{-1}. Tuning range 210 – 2300 nm. Repetition rate 1000 Hz, optionally 100 Hz.

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SPECIFICATIONS [1]

Model	PT401	PT401-SH-SF
OPA SPECIFICATIONS		
Output wavelenth tuning range		
SH, SF	–	210–409 nm
Signal	410–709 nm	
Idler	710–2300 nm	
Output pulse energy [2]		
SH, SF [3]	–	> 45 µJ
Signal [4]	> 200 µJ	
Idler [5]	> 60 µJ	
Pulse repetition rate	1000 Hz	
Linewidth	< 4 cm^{-1}	< 6 cm^{-1}
Typical pulse duration [6]	~ 20 ps	
Tuning resolution	< 0.5 cm^{-1}	
Typical beam size [7]	~2.3 mm	
Beam divergence [8]	< 2 mrad	
Beam pointing stability	≤ 100 µrad rms	
Beam polarization		
SH, SF		horizontal
Signal	horizontal	
Idler	vertical	
Wavelength sweep	available	
Optical pulse jitter		
Internal triggering regime [9]	< 50 ps (StdDev.) in respect to TRIG1 OUT pulse	
External triggering regime [10]	~3 ns (StdDev.) in respect to SYNC IN pulse	
TRIG1 OUT pulse delay	Positive pulse with controllable delay. Pulse width ~100 ns. Default delay – ~250 µs before optical pulse up to 10 ms.	
PHYSICAL CHARACTERISTICS		
Laser unit size (W × L × H)	~ 508 × 1030 × 244 mm	
Power supply size (W × L × H)	450 × 450 × 140 mm	
OPERATING REQUIREMENTS		
Room temperature	22 ± 2 °C	
Relative humidity	20–80 % (non-condensing)	
Power requirements	100–240 V AC single phase, 47–63 Hz	
Power consumption	< 0.5 kW	
Cooling	air cooled	
Cleanness of the room	not worse than ISO Class 9	

1) Due to continuous improvement, all specifications are subject to change without notice. Parameters marked typical are not specifications. They are indications of typical performance and will vary with each unit we manufacture. Unless stated otherwise, all specifications are measured at 450 nm for PT401 units for basic system without options.

2) Pulse energies are specified at selected wavelengths. See typical tuning curves for pulse energies at other wavelengths.

3) Measured at 260 nm.

4) Measured at 450 nm.

5) Measured at 1000 nm.

6) Estimated assuming 30 ps at 1064 nm pump pulse. Pulse duration varies depending on wavelength and pump energy.

7) Beam diameter at the $1/e^2$ level. Can vary depending on the wavelength.

8) Beam divergence measured at FWHM.

9) < 10 ps jitter is provided with PRETRIG option.

10) TRIG1 OUT lead or delay can be adjusted with 0.25 ns steps in specified range.

Communication module interfaces

Interface	Description
USB *	REST API over RNDIS
RS232	ASCII commands
LAN	REST API

* Default, other option: ASCII commands over virtual serial port

OPTIONS

▶ Option 100 Hz

Pulse repetition rate 100 Hz.
Energy increasing 2 times to compare with system 1000 Hz repetition rate.

▶ Options DUV

– Tuning range 192 – 209.95 nm
– Beam polarization: vertical

TUNING CURVES

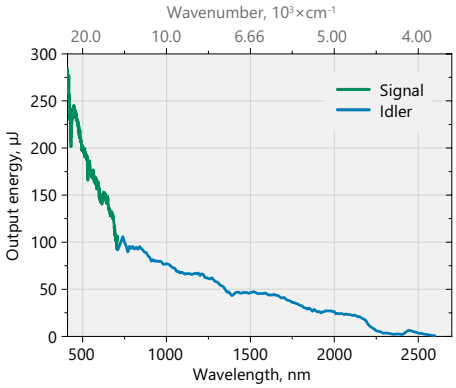

Fig. 1. Typical PT401 tuning curves in signal (410 – 709 nm), idler (710 – 2300 nm)

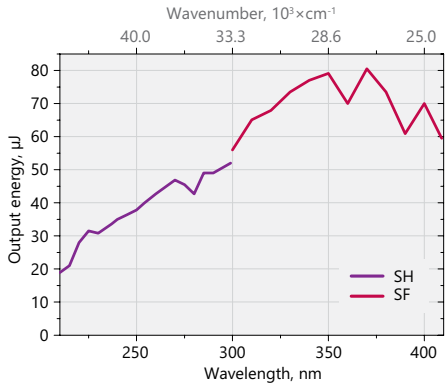

Fig 2. Typical PT401 tuning curves in SH (210 – 300 nm), SF (300 – 409 nm) ranges

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