PGx01 SERIES

High Energy Broadly Tunable OPA

FEATURES

- *Ultra-wide spectral range from **193** to **2300 nm***
- *High peak power (**>50 MW**) ideal for non-linear spectroscopy applications*
- *Narrow linewidth **<6 cm^{-1}** (for UV < 9 cm^{-1})*
- *Motorized hands-free tuning in 193–2300 nm*
- *PC control*
- *Remote control via keypad*

APPLICATIONS

- *Nonlinear spectroscopy: vibrational-SFG, surface-SH, Z-scan*
- *Pump-probe experiments*
- *Laser-induced fluorescence (LIF)*
- *Other laser spectroscopy applications*

Travelling Wave Optical Parametric Generators (TWOPG) are an excellent choice for researchers who need an ultra-fast tunable coherent light source from UV to mid IR.

Design

The units can be divided into several functional modules:

- optical parametric generator (OPG);
- diffraction grating based linewidth narrowing system (LNS);
- optical parametric amplifier (OPA);
- electronic control unit.

The purpose of the OPG module is to generate parametric superfluorescence (PS). Spectral properties of the PS are determined by the properties of a nonlinear crystal and usually vary with the generated wavelength. In order to produce narrowband radiation, the output from OPG is narrowed by LNS down to 6 cm^{-1} and then used to seed OPA.

Output wavelength tuning is achieved by changing the angle of the nonlinear crystal(s) and grating. To ensure exceptional wavelength reproducibility, computerized control unit driven precise stepper motors rotate the nonlinear crystals and diffraction grating. Nonlinear crystal temperature stabilization ensures long-term stability of the output radiation wavelength.

In order to protect nonlinear crystals from damage, the pump pulse energy is monitored by built-in photodetectors, and the control unit produces an alert signal when pump pulse energy exceeds the preset value.

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.

Available models

Model	Features
PG401	Model has a tuning range from 420 to 2300 nm and is optimized for providing highest pulse energy in the visible part of the spectrum. The wide tuning range makes PG401 units suitable for many spectroscopy application.

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SPECIFICATIONS [1]

Model	PG401	PG401-SH	PG401-DUV
Tuning range			
DUV	–		193 – 209.95 nm
SH	–	210 – 340, 370 – 419 nm	–
Signal	420 – 680 nm	–	
Idler	740 – 2 300 nm	–	
DFG	–		
Output pulse energy [2]	> 1000 µJ at 450 nm	> 100 µJ at 300 nm	> 50 µJ at 200 nm
Linewidth	< 6 cm^{-1}	< 9 cm^{-1}	
Max pulse repetition rate	50 Hz		
Scanning step			
Signal	0.1 nm	–	
Idler	1 nm	–	
Typical beam size [3]	~4 mm	~3 mm	
Beam divergence [4]	< 2 mrad		
Beam polarization	–	vertical	
Signal	horizontal	–	
Idler	horizontal	–	
Typical pulse duration	~20 ps		
PUMP LASER REQUIREMENTS			
Pump energy			
at 355 nm	10 mJ		
at 532 nm	–		
at 1064 nm	–		2 mJ
Recommended pump source [5]	PL2231-50-TH, PL2251A-TH		
Beam divergence	< 0.5 mrad		
Beam profile	homogeneous, without hot spots, Gaussian fit >90 %		
Pulse duration [6]	29 ± 5 ps		
PHYSICAL CHARACTERISTICS			
Size (W x L x H)	456 × 633 × 244 mm	456 × 1031 × 249 ± 3 mm	
OPERATING REQUIREMENTS			
Room temperature	15 – 30 °C		
Power requirements	100 – 240 V AC single phase, 47 – 63 Hz		
Power consumption	< 100 W		

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 PG401 units, and 300 nm for PG401SH units and for basic system without options.

2) See tuning curves for typical pulse energies at other wavelengths. Higher energies are available, please contact EKSPLA for more details.

3) Beam diameter is measured at the $1/e^2$ level.

4) Full angle measured at the FWHM point.

5) If a pump laser other than PL2250 or PL2230 is used, measured beam profile data should be presented when ordering.

6) Should be specified if non-EKSPLA pump laser is used.

Communication interface	Description
USB*	REST API over RNDIS
RS232	ASCII commands
LAN	REST API

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

CUSTOMIZED FOR SPECIFIC REQUIREMENTS

Please note that these products are custom solutions tailored for specific applications or specific requirements.

Interested? Tell us more about your needs and we will be happy to provide you with tailored solution.

Gap free tuning extension for PG401:

- Gap-free tuning range 410 – 709, 710 – 2300 nm
- Linewidth < 18 cm^{-1}

TUNING CURVES

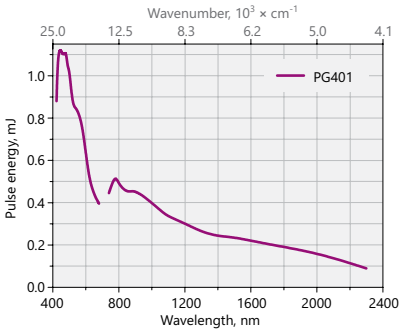

Fig 1. Typical PG401 model tuning curve *Pump energy: 10 mJ at 355 nm*

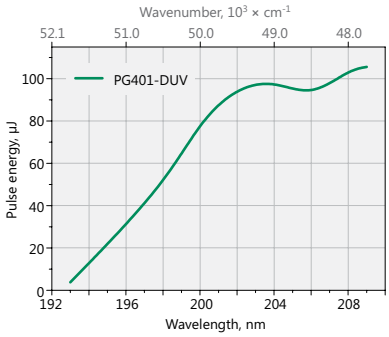

Fig 2. Typical PG401-DUV model tuning curve

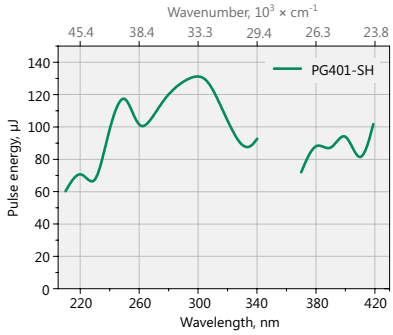

Fig 3. Typical PG401-SH model tuning curve. *Pump energy: 10 mJ at 355 nm*

OUTLINE DRAWINGS

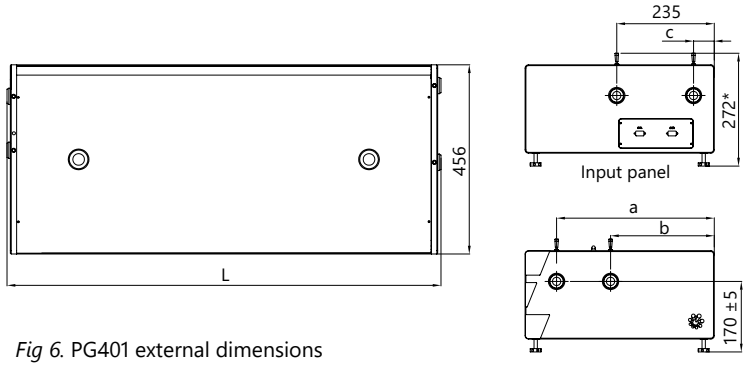

Fig 6. PG401 external dimensions

OUTPUTS PORTS

Model	L, mm	a, mm	b, mm	c, mm	Port 1	Port 2
PG401	633	380	×	×	420–680 nm, 740–2300 nm	–
PG401-SH	838	380	×	×	210–340 nm, 370–419.9 nm, 420–680 nm, 740–2300 nm	–
PG401-SH/DUV	1026	380	250	50	210–340 nm, 370–419 nm, 420–680 nm, 740–2300 nm	192–209.95 nm

RECOMMENDED UNITS ARRANGEMENT ON OPTICAL TABLE

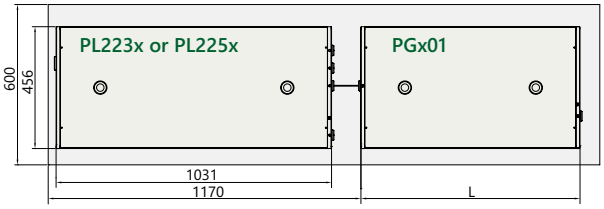

Fig 4. Arrangement of pump laser and PGx01 unit on optical table

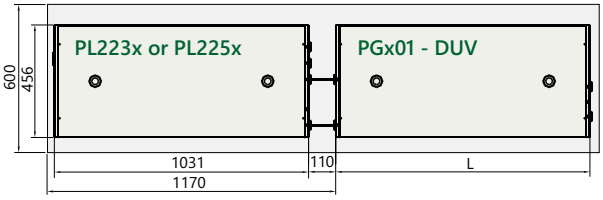

Fig 5. Arrangement of pump laser and PGx01-DUV unit on optical table

ORDERING INFORMATION

PG401-DUV

Model
PG4xx → 355 nm pump

01 → travelling wave, narrowed linewidth
02 → travelling wave, not narrowed
11 → synchronous pumping, narrowed

Optional tuning range extension
DUV → 193–209.95 nm
SH → 210-340 nm & 370-420 nm

Note: Laser must be connected to the mains electricity all the time. If there will be no mains electricity for longer that 1 hour then laser (system) needs warm up for a few hours before switching on.