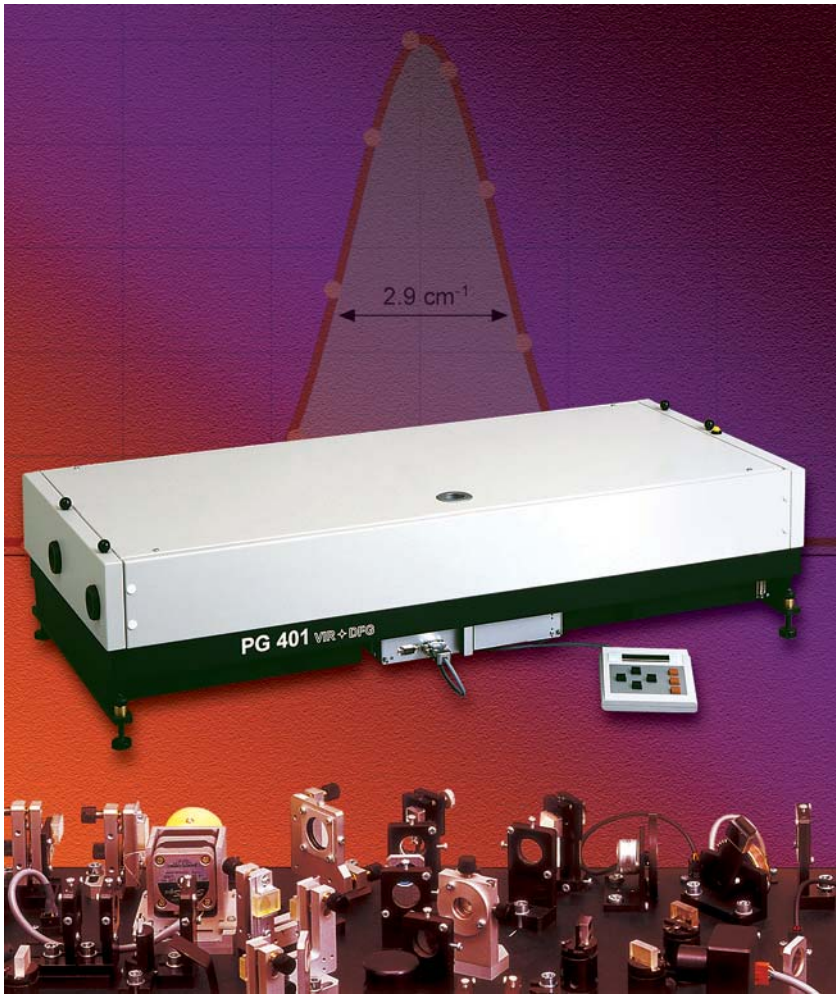
PG400 SERIES

Picosecond Tunable Optical Parametric Generators



PG400 series optical parametric generators (OPG) are an excellent choice for researchers who need picosecond tunable source from UV to mid IR. Due to the unique broad tunability range these devices are a very attractive and cost-efficient alternative to other tunable laser radiation sources.

computerized control unit rotate nonlinear crystals and diffraction grating. Precise nonlinear crystal temperature stabilization ensures long-term stability of output radiation. In order to protect nonlinear crystals from damage the pump pulse energy is monitored by built-in photodetectors and alerting sound signal.

Microprocessor based control system provides precisione automatic positioning of relevant components allowing hands-free operation.
To ensure exceptional reproducibility, accurate step motors driven by

For customer convenience system is controlled through its RS232 type PC interface with LabView drivers (included) or a user-friendly remote control pad. Both options allow easy control of the system settings.

FEATURES

- Unprecedented tuning range **0.21–16** µm
- Up to **15%** conversion efficiency
- **<6 cm^{-1}** linewidth in all tuning range
- **Simple** and **convenient** operation control
- **Solid-state** convenience
- **Remote** control via keypad
- **PC** control using RS232 and **LabView** drivers
- Compact size

APPLICATIONS

- Nonlinear optics
- Nonlinear spectroscopy: SFG, SH, CARS
- Pump-probe experiments
- Vibrational spectroscopy
- Laser-induced fluorescence
- Your application is welcome…

EKSPLA
An EKSMA Group Company

PG401 – UP TO 1 MJ PULSE ENERGY IN VIS

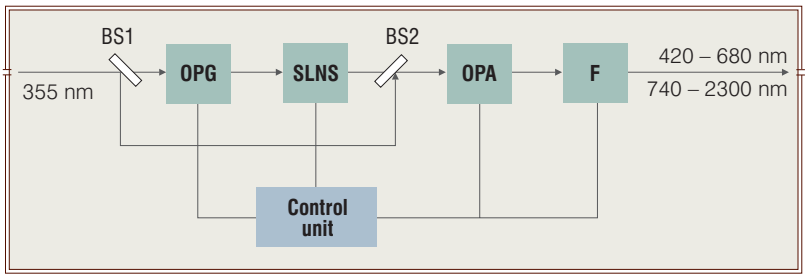
PG401 is the compact basic model of PG400 series. The unit includes:

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

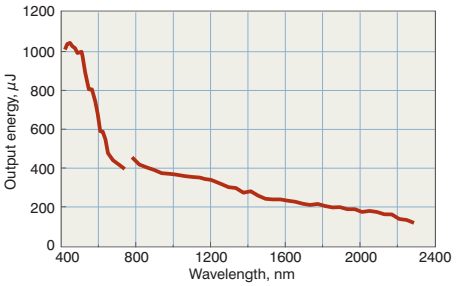
A single LBO crystal is used in both OPG and OPA stages pumped by a single pump pulse split at the input. The diffraction grating narrows the OPG output linewidth down to 6 cm^{-1}. Narrowed and spatially filtered pulse seeds the OPA and is amplified there. The signal and idler waves are separated by filters and share the same output port. Such advanced OPG and OPA's set-up ensures high conversion efficiency and good output beam spatial profile.

A microprocessor-based control unit provides hands-free OPG operation and exceptional output wavelength reproducibility. Precise temperature stabilization of the nonlinear crystals assures a long-term stability of the output parameters. A built-in pump pulse energy monitor alerts the user if the pump intensity approaches the preset value.

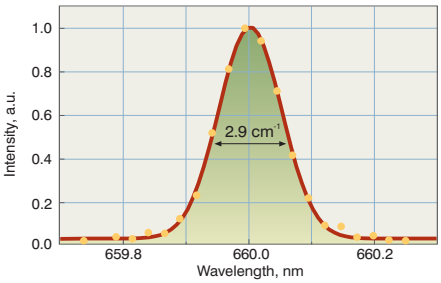
For budget customers model without SLNS is available (PG402).



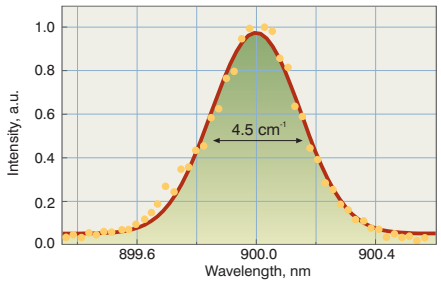
Signal and idler waves are separated by filters (F)



Typical PG401 tuning curve.
Pump energy: 10 mJ @ 355 nm.



Typical PG401 output linewidth at 660 nm.
Points correspond to experimental data, solid line – Gaussian fit.



Typical PG401 output linewidth at 900 nm.
Points correspond to experimental data, solid line – Gaussian fit.

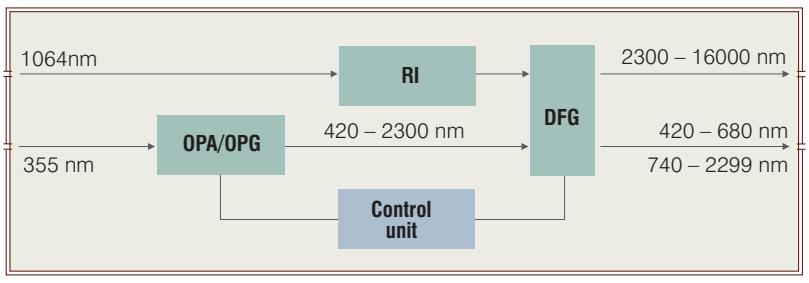
PG401/DFG – UNPRECEDENTED TUNING RANGE UP TO 16 μm

PG401/DFG model combines an OPG and difference frequency generator (DFG) into a single unit and features extremely wide wavelength coverage. Tuning range up to 10 μm is achieved by mixing the OPG idler wave at 1.19–1.98 μm with the 1064 nm beam of a picosecond Nd:YAG laser in AgGaS2 crystal. Good OPG output beam spatial profile and relay imaging (RI) of 1064 nm beam ensure high DFG conversion efficiency, providing up to > 300 μJ per pulse in the 2.3–5 μm range. The whole tuning range is covered without any set-up changes.

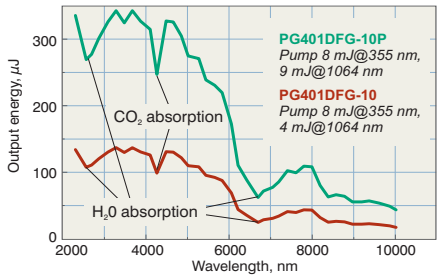
Two models with different output energy specifications are available: PG401DFG2-10 and PG401DFG2-10P.

With GaSe crystal the DFG tuning range can be extended up to 16 μm (up to 18 μm upon request).

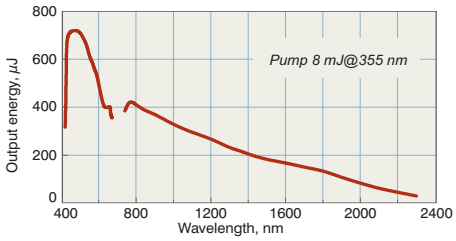
PG401 DFG output energy specifications comparing to PG401 are 20% less.



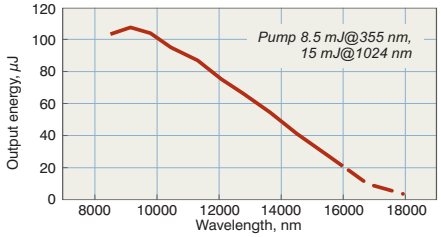
Functional layout of OPG/DFG



Typical tuning curves (mid IR)



Typical PG401DFG2-10 tuning curve (VIS-NIR)



Typical PG401DFG2-16 tuning curve with GaSe crystal

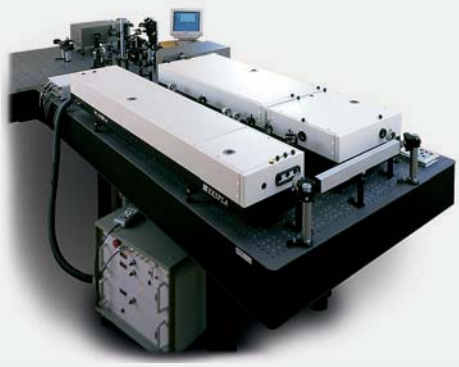
PG401SH – TUNING DOWN TO UV AT 210 nm

Many applications in chemistry, biology, biochemistry need tunable UV radiation. We offer model PG401SH with option of second harmonic of OPG radiation, which extends range of tunable radiation down to 210 nm.
Good beam shape of PG401 allows efficient up to 15% conversion of OPG radiation to second harmonic.
The SH unit is arranged in the same module. Movable mirror automatically directs OPG beam to SH unit, which consists of two BBO crystals and corresponding optics.

SFG SPECTROMETER

Powerful and versatile tool for in-situ investigation of surfaces and interfaces.

- Superb laser source stability for high signal/noise ratios
- Broad measurement range down to 625 cm^{-1}
- Better than 6 cm^{-1} spectral resolution
- Cost-effective picosecond system approach
- Complete PC controlled wavelength scan



PUMP LASER

Being a nonlinear optical device, a picosecond OPG provides the best output pulse to pulse repeatability if the intensity of the pump pulse is stable. The duration and energy stability of the pump laser are the key parameters for reliable operation of the OPG. EKSPLA picosecond mode-locked Nd:YAG lasers of PL2140 series fit the best for pumping PG400 series OPG/DFGs.

- Up to 110 mJ per pulse at 1064 nm
- Down to 30 ps pulse duration with Solid State Mode Locking *
- 10 or 20 Hz repetition rate
- Excellent pulse energy (< 1.5%) and duration (< 1.0%) stability
- < 0.1 ns jitter
- Second, third or fourth harmonic generator modules available
- PC interface with LabView drivers
- Remote control via keypad

* US patent No. 10/785219

RELATED PRODUCTS

PG411 – PICOSECOND OPG WITH NEAR TRANSFORM-LIMITED BANDWIDTH

A tunable wavelength laser systems for research requiring narrow bandwidth picosecond pulses.

- < 2 cm^{-1} bandwidth
- < 7 % (StDev) output energy stability
- High energy conversion efficiency

Innovative synchronously pumped picosecond optical parametric oscillator (SPOPO) and travelling wave optical parametric amplifier (OPA) configuration, featuring the efficient narrowing of the output linewidth in the OPO cavity and amplification of a single pulse in the OPA.

PG500

For applications, requiring high energy in near IR, PG500 series OPG/OPA are excellent and cost-efficient choice, as they require less powerful and accordingly less expensive pump lasers.

- **0.68–16 µm** tuning range
- **High** conversion efficiency in **near IR** range
- Pumped by **532 nm**
- **<6 cm^{-1}** linewidth in all tuning range

PG602

PG602 series optical parametric generators are good choice for applications requiring hands free wavelength tuning form UV to IR.

- From **300 nm to 2300 nm** tuning range
- Up to **15%** conversion efficiency
- Up to **1 mJ** output energy in UV-blue range
- Pumped by 266 nm

SPECIFICATIONS

MODEL	PG401	PG402	PG401SH	PG401 DFG2-10	PG401 DFG2-10P	PG401 DFG2-16
OPG SPECIFICATIONS						
Output wavelength tuning range, μm						
UV (SHS)			0.21–0.34			
SHI			0.37–0.42			
Signal	0.42–0.68	0.42–0.68	0.42–0.68	0.42–0.68	0.42–0.68	0.42–0.68
Idler	0.74–2.3	0.74–2.3	0.74–2.3	0.74–2.3	0.74–2.3	0.74–2.3
DFG				2.3–10	2.3–10	2.3–16 [1]
Max conversion efficiency, %	5–15 [2]	5–15 [2]	5–15 [2] [3]	5–15 [2]	5–15 [2]	5–15 [2]
Max conversion efficiency for DFG, %				3–5 [2]	3–5 [2]	3–5 [2]
Linewidth, cm^{-1}	<6	20–200 *(not narrowed)*	<6	<6	<6	<6
Scanning step, nm						
UV			0.1			
Signal	0.1	0.1	0.1	0.1	0.1	0.1
Idler	1	1	1	1	1	1
DFG				1	1	1
Beam size, mm	~ 4	~ 4	~ 4	~ 4	~ 4	~ 4
Beam size for DFG, mm				~ 6	~ 9	~ 9
Beam polarization						
UV (SH)			vertical			
Signal			horizontal			
Idler			horizontal			
DFG			horizontal			
PHYSICAL CHARACTERISTICS						
Size (W×H×L), mm	446×205×582	446×205×582	446×205×1022	446×205×1022	446×205×1022	446×205×1022
OPERATING REQUIREMENTS						
Room temperature, °C	15–30					
Voltage	100–240 VAC single phase, 50/60 Hz					
Powering, W	<60					
PUMP LASER REQUIREMENTS						
Energy mJ						
at 1064 nm	–	–	–	4–6	7–10	7–15
at 355 nm	7–12	7–12	7–12	7–12	7–12	7–12
Pulse duration, ps	20–40					
Beam polarization	vertical					
Beam size, mm	6–10					
Beam divergence, mrad	<0.5					
Beam spatial profile	homogeneous					

[1] *Can be extended to 18 μm*
[2] *Depending on pump laser*
[3] *SH 15% of IH*

Specifications are subject to changes without advance notice.

Requests for custom made products are welcome !

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