



OG-V. Pulse Pickers with Adjustable Gate Open Time

- Compatible with Ti:S and Yb-doped 20-150 MHz ultrafast oscillators
- Suitable for building Ti:S or Yb ultrafast regenerative amplifiers
- Possible operating wavelengths from 200 to 2700 nm
- Possible gate width from 20 ns to 10 us
- Transmission >90%
- HV amplitude up to 10 kV
- Multifunctional control unit with adjustable delay generator
- USB control, Windows software+LabView driver



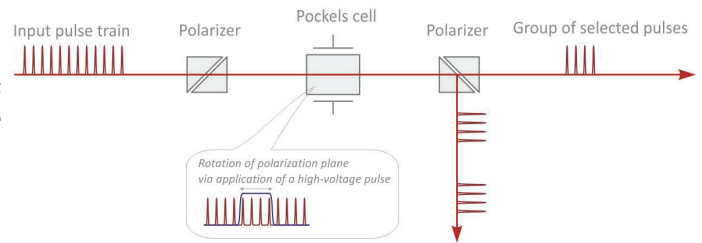
OG-V Pockels cell head with a built-in HV generator

Product overview

The following applications might be pointed out when using pulse pickers with adjustable transmission gate time with femtosecond and picosecond lasers:

- selection of groups of adjacent pulses (bursts) from a train of pulses;
- control of regenerative amplifier operation: injection of a seed pulse into a cavity and ejection of the amplified pulse out of the cavity;
- usage as optical shutters (fast optical modulators) and Q-switch cavity applications;
- selection of single laser pulses in case of high jitter in relation to electric trigger pulse.

Half-wave, adjustable gate, single-pulse layout



Optical setup of a pulse picker comprises two crossed polarizers with a Pockels cell placed in between. Pulse selection is performed with the use of the Pockels effect — a quasi-rectangular high-voltage electric pulse induces birefringence in the Pockels cell's optical crystal allowing precise rotation of the polarization plane of a certain laser pulse or a group of adjacent laser pulses depending on the duration of the high-voltage pulse (transmission window). Then this or these pulses may be separated from a train of consecutive pulses by using a polarizer.



Electronic control unit of a pulse selector is built using programmable logic components and contains such built-in modules as optical and electronic synchronization, trigger pulse generation, frequency division, multi-channel delay signal generation, high-voltage drivers. The unit allows for multiple usage scenarios given below for integration in various laser setups:

- external or internal trigger;
- synchronization to optical (built-in photodetector) or electric signal;
- two independent delay channel groups, each with its trigger and synchronization signals; spare channels may be used as general purpose delay channels for triggering other experimental equipment (e.g. oscilloscopes, pump lasers, streak-cameras etc.);
- additional control modes with triggering by edge/level of an external signal or via a built-in burst generator allow formation of various output pulse patterns;
- up to 4 synchronized Pockels cells may be driven by a single electronic control unit.



	OG-V-D	OG-V-B	OG-V-R/K
Electrooptic crystal	DKDP	BBO	RTP or KTP
Operational wavelength range (standard models)	510-540 nm / 700-1000 nm / 1000-1100 nm / 1250 nm	510-540 nm / 700-1000 nm / 1000-1100 nm / 1250 nm	1000-1100 nm / 1500-1600 nm / 1550+780 nm
Possible custom wave-lengths	340 to 1280 nm	200 to 2200 nm	1000 to 2700 nm
Minimum repetition rate of picked pulses	single-shot		
Maximum repetition rate of picked pulses (standard models)	1 kHz	1 kHz / 10 kHz / 50 kHz / 100 kHz	
Clear aperture	6 mm (up to 20 mm upon request)	2.5 mm (up to 5 mm upon request)	3.5 mm (up to 10 mm upon request)
HV pulse (gate) shape	quasi-rectangular		
HV pulse (gate) length (at level 10%)	20-500 ns, adjustable	20-3000 ns, adjustable (up to 10 us upon request)	
Rise time (at level 10-90%)	7 ns		
Contrast⁽¹⁾	>100:1 ⁽¹⁾	>1000:1	
Pockels cell voltage	up to 10 kV	up to 4 kV	
Optical scheme	half-wave (quarter-wave upon request)	half-wave/quarter-wave at $\lambda < 600$ nm; at $\lambda > 600$ nm - quarter-wave or half-wave with double crystal cell	half-wave (quarter-wave upon request)
Trigger	internal/external		
Complete system transmission at central wavelength	>85% (PC + two Glan-Taylor prisms, default package) >90% (PC + a Glan-Taylor and a Rochon prism, upon request) >98% (Pockels cell only)		
Input optical train repetition rate	2 MHz ... 150 MHz with internal or external trigger with optical or electric sync to input train; 1 Hz...2 MHz only with external trigger signal ⁽²⁾		
Sync source for internal trigger mode	optical/electric		
Additional control modes	by edge / by level / built-in burst generator with internal or external trigger		
Channel delay time	0...10 us (up to 1 ms upon request)		
Cooling	passive	passive at up to 3 kHz output rate, water-cooled ⁽³⁾ at 10 kHz and higher	

(1) - energy ratio of a picked and any non-picked pulse. The given contrast values are valid for adjacent pulses. Actual contrast with DKDP crystals is defined by piezoelectric ringing effect and depends on exact operational parameters. The contrast is better when the duration of HV pulse is shorter and HV pulse amplitude is lower.

(2) - when operating with 1 Hz...2 MHz input pulse train, an external trigger signal must be used. Such a signal must lead the optical pulse by 0.25-3 us, must be rigidly in sync with the pulse to be picked and must have jitter of less than 200 ps;

(3) - the HV generator unit requires cooling to support operating temperature below 35°C. Water cooling is required when operating at output frequency of 10 kHz and more (water flow 1 L/min, water temp. 20-22°C, tap or building-scale supply may be also be used if permitted). Heating power to be dissipated does not exceed 80 W even at the highest frequencies (a water chiller is not included and may be supplied separately).