

pulseSelect

Repetition Rate Reduction for Mode-locked Lasers with a Pulse Picker

Pulse Picking with pulseSelect

- pulseSelect is an acousto-optical pulse picker, developed for the special demands of femtosecond laser technology. Pulse distortion is minimized by a low dispersive design and the use of reflective optics. High repetition rates and high contrast rates are achieved by using acousto-optical elements.
- The pulse repetition rate can be reduced by an adjustable internal frequency divider or by external triggering. Low division ratios down to $f_{\text{REP}}/2$ are possible. pulseSelect has an integrated RF power limitation and protection circuit to prevent modulator damage. For highest stability the phase of the RF carrier frequency is locked to the repetition rate of the laser in use.



At a Glance

- Low dispersion design suitable for ultra-short pulses (fs/ps) down to < 20 fs
- Division ratio continuously variable between $f_{\text{REP}}/2 \dots f_{\text{REP}}/260,000$
- Synchronized to laser seed with internal trigger
- Single-shot up to 3 MHz with external TTL trigger
- External trigger-gate mode

pulseSelect Single & Dual

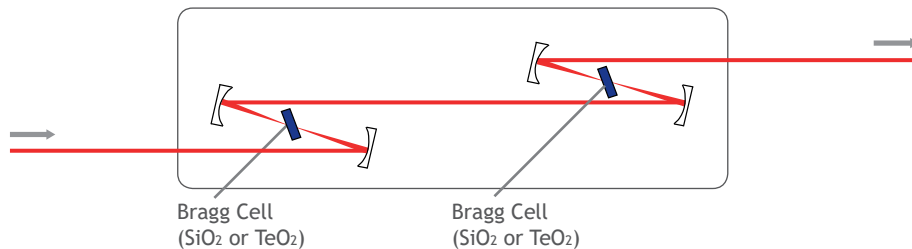
Single pulseSelect

- The Single pulseSelect consists of an optical module and control electronics. A Bragg cell represents the most important part of the optics, which selects individual pulses from the laser beam due to the acousto-optical effect. Focusing mirror, collimator mirror and a beam stop for the zero-order beam complete the setup. The driver electronics supplies the modulated RF signal for the Bragg cell with a carrier frequency that corresponds to the multiple of the laser repetition rate.

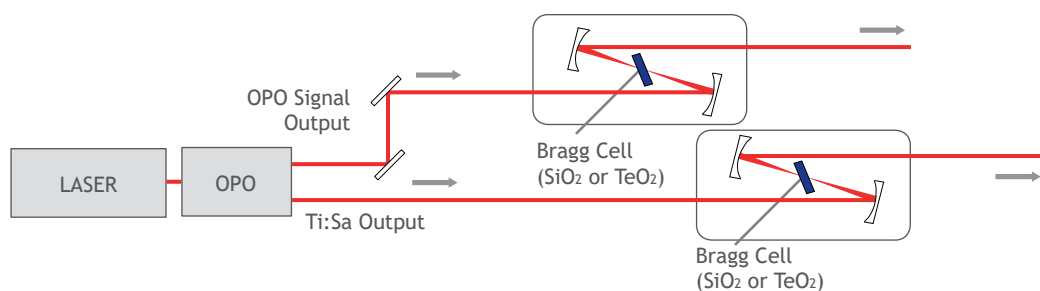
Dual pulseSelect

- Dual pulseSelect is available in two variants, Serial and Parallel. The Serial variant offers an improved contrast ratio of over 6000:1. The Parallel version allows the simultaneous picking of pulses from two synchronized laser sources.

Dual pulseSelect Serial: This version is designed to allow for highest contrast ratio of above 6000:1 by placing two Bragg cells. Both are synchronized to one common clock (in serial configuration; i.e. one beam through two Bragg cells).



Dual pulseSelect Parallel: This variant is designed for simultaneous picking of pulses from two synchronized laser sources. The system is equipped with two synchronized Bragg cells. Independent picking settings are possible for both Bragg cells.



* Sample input configuration (laser, OPO, and beam routing not included)

pulseSelect (Single)

Specifications

Versions

	Broadband	High-Power	High-Power Dualband
Wavelength Ranges (Other ranges on request)	500 ... 1600 nm	680 ... 1080 nm	340 ... 540 nm + 680 ... 1080 nm
Bragg-Cell Material	SiO ₂ or TeO ₂ SiO ₂ accepts higher laser power, TeO ₂ gives a higher diffraction efficiency	SiO ₂	SiO ₂
Max. Laser Input Power (P _{AV})*	2 W (SiO ₂), 0.5 W (TeO ₂)	5 W	5 W

Specifications

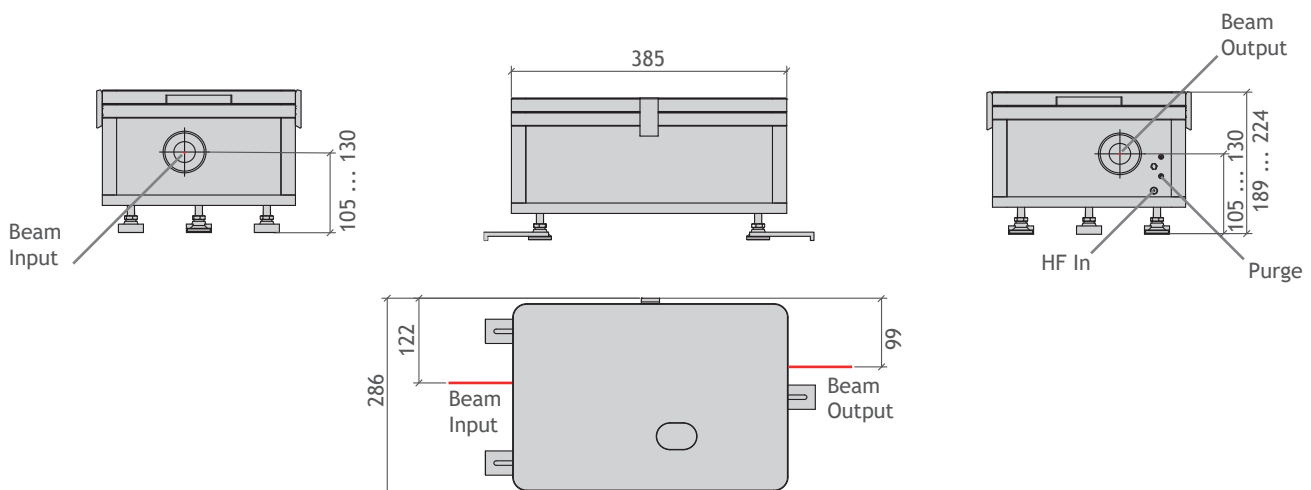
Division Ratio	$f_{REP}/2 \dots f_{REP}/260,000$
Diffraction Efficiency**	> 60 % (TeO ₂) at 800 nm, $f_{REP}/20$; ~ 25 % (TeO ₂) at 800 nm, $f_{REP}/2$ > 50 % (SiO ₂) at 800 nm, $f_{REP}/20$; ~ 10 % (SiO ₂) at 800 nm, $f_{REP}/2$
Contrast Ratio	> 500 : 1 for non-adjacent pulses, > 75 : 1 for main pulse to adjacent pulses (at 800 nm, $f_{REP}/20$)
Input Frequency (f _{REP})	72 ... 81 MHz, to be specified with 0.5 MHz accuracy at time of order
Input Frequency Extended (Option)	35 ... 90 MHz
External Trigger (TTL)	Single shot up to 3 MHz
Input Polarization	Horizontal, Polarization rotator available as option

* These values depend on a certain system configuration, e.g. laser spot diameter, or mirror coating

** Ratio of the diffracted pulse energy to the pulse energy incident into Bragg cell

Dimensions

Control Box	167 mm x 180 mm x 312 mm (W x H x D)
Optical Head	286 mm x 189 ... 224 mm x 385 mm (W x H x D)



pulseSelect (Dual)

Specifications

pulseSelect (Dual)

	Broadband	High-Power	High-Power Dualband
Wavelength Ranges (Other ranges on request)	500 ... 1600 nm	680 ... 1080 nm	340 ... 540 nm + 680 ... 1080 nm
Bragg-Cell Material	SiO ₂ or TeO ₂ SiO ₂ accepts higher laser power, TeO ₂ gives a higher diffraction efficiency	SiO ₂	SiO ₂
Max. Laser Input Power (P _{AV})*	2 W (SiO ₂), 0.5 W (TeO ₂)	5 W	5 W

Contrast and Diffraction Efficiency

	Serial	Parallel
Contrast Ratio	> 6000 : 1 for main pulse to adjacent pulses (at 800 nm, f _{REP} /20)	> 500 : 1 for non-adjacent pulses; > 75 : 1 for main pulse to adjacent pulses (at 800 nm, f _{REP} /20)
Diffraction Efficiency**	~ 25 % (SiO ₂) at 800 nm, f _{REP} /20 ~ 10 % (SiO ₂) at 800 nm, f _{REP} /2 ~ 36 % (TeO ₂) at 800 nm, f _{REP} /20 ~ 25 % (TeO ₂) at 800 nm, f _{REP} /2	> 50 % (SiO ₂) at 800 nm, f _{REP} /20 ~ 10 % (SiO ₂) at 800 nm, f _{REP} /2 > 60 % (TeO ₂) at 800 nm, f _{REP} /20 ~ 25 % (TeO ₂) at 800 nm, f _{REP} /2

Serial and Parallel Version

Division Ratio	f _{REP} /2 ... f _{REP} /260,000
Input Frequency	72 ... 81 MHz
	Input frequency to be specified with an accuracy of 0.5 MHz at the time of order
Input Frequency Extended (Option)	35 ... 90 MHz
External Trigger (TTL)	Single shot up to 3 MHz
Input Polarization	Horizontal, Polarization rotator available as option

* These values depend on a certain system configuration, e.g. laser spot diameter, or mirror coating.

** Ratio of the diffracted pulse energy to the pulse energy incident into Bragg cell.

Dimensions

Control Box	267 mm x 180 mm x 312 mm (W x H x D)
Optical Head (Serial Version)	390 mm x 189 mm ... 224 mm x 580 mm (W x H x D)
Optical Head (Parallel Version)	Two units, each: 286 mm x 189 mm ... 224 mm x 385 mm (W x H x D)

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