

# Pulse pickers for Yb, Nd, and Ti:Sapphire lasers



Pulse pickers are optical devices that work as high-speed optical gates. Electro-optic pulse pickers are based on the Pockels effect, which enables the rapid control of polarization of light pulses by applying a carefully timed, fast high-voltage signal to a birefringent crystal.

## Applications

- Extraction of single laser pulses from a pulse train
- Lowering pulse repetition rate of mode-locked lasers
- Seeding and cavity dumping in regenerative amplifiers
- Q-switching
- Pulse cleaning in chirped pulse amplification
- Pulse slicing
- Micromachining and material processing
- Time-resolved spectroscopy and imaging

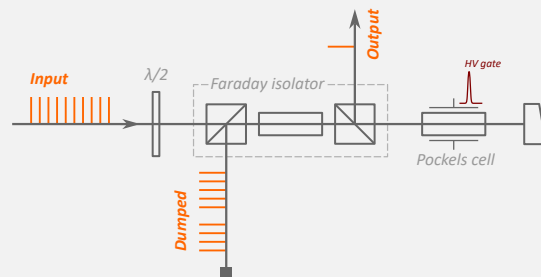
## Advantages

- Single-box optical head with complete prealigned optical scheme
- Built-in Faraday isolator to prevent mode-locking breakdown
- Adjustable to any input polarization (half-wave plate included)
- 4-channel delay generator with locking and timing electronics
- Compatible with most commercial mode-locked laser oscillators
- Optional core version with a Pockels cell and built-in high-voltage driver for OEM integration

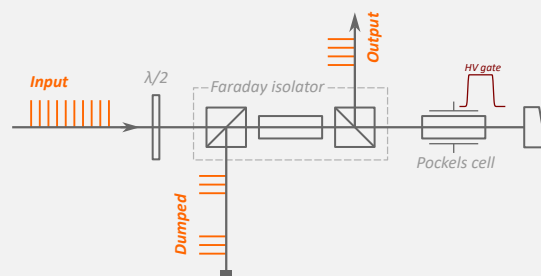
## Specifications

|                                      | PP-S                                                                                | PP-A                                                               |
|--------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Gate window                          | Short bell-shaped, fixed                                                            | Quasi-rectangular, adjustable                                      |
| Maximum output repetition rate       | 1, 2, 4, 10, 200 kHz<br>(up to 1 MHz upon request)                                  | 1, 10, 200 kHz<br>(up to 1 MHz upon request)                       |
| Rise/Fall time<br>(at 10/90% levels) | <4 ns for 2/4 kHz<br><5 ns for 1/10 kHz<br><12 ns for 200 kHz                       | <5 ns for 1/10 kHz<br><12 ns for 200 kHz                           |
| Gate window width<br>(FWHM)          | <8 ns for 2/4 kHz, fixed<br><15 ns for 1/10 kHz, fixed<br><25 ns for 200 kHz, fixed | 20 ns .. 1 $\mu$ s for 1/10 kHz<br>100 ns .. 2 $\mu$ s for 200 kHz |
| EO crystal                           | DKDP / BBO                                                                          | BBO                                                                |
| Optical scheme                       | Quarter-wave                                                                        |                                                                    |
| Wavelength                           | 800 nm, 1030 nm, 1064 nm                                                            |                                                                    |
| Clear aperture                       | 2.5, 3.5 mm for BBO<br>4.5 mm for DKDP<br>6, 8 mm for DKDP without Faraday isolator |                                                                    |
| Contrast ratio                       | >700:1 for DKDP<br>>800:1 for BBO                                                   |                                                                    |
| Input polarization                   | Linear, arbitrary                                                                   |                                                                    |
| Output polarization                  | Linear, vertical                                                                    |                                                                    |
| Transmission                         | >85% for complete setup<br>>98% for Pockels cell only                               |                                                                    |
| Optical isolation                    | >30 dB                                                                              |                                                                    |
| Cooling                              | Passive at 1/2/4 kHz<br>Water cooling at >10 kHz                                    |                                                                    |
| Input train repetition rate          | 30 .. 100 MHz                                                                       |                                                                    |
| Triggering                           | Internal / External / Manual                                                        |                                                                    |
| Delay resolution                     | 250 ps, 4 independent channels                                                      |                                                                    |

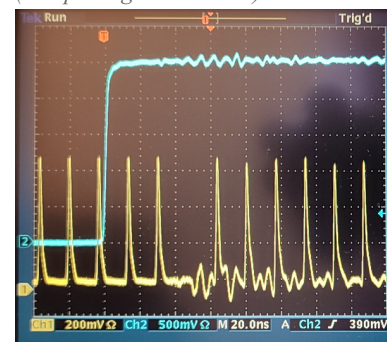
PP-S series pulse pickers are designed to extract individual laser pulses from a high-frequency laser train.



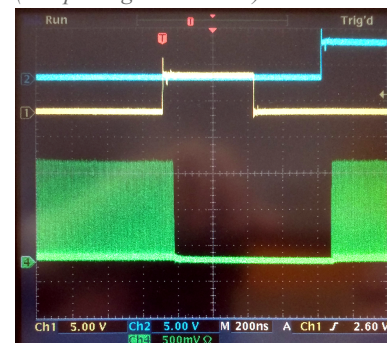
PP-A series pulse pickers generate a quasi-rectangular optical gate window of adjustable width to control femtosecond regenerative amplifiers or Q-switched lasers, or to form bursts of laser pulses.



Single pulse extracted with PP-S  
(dumped signal is shown)



$\mu$ s-width gate created with PP-A  
(dumped signal is shown)

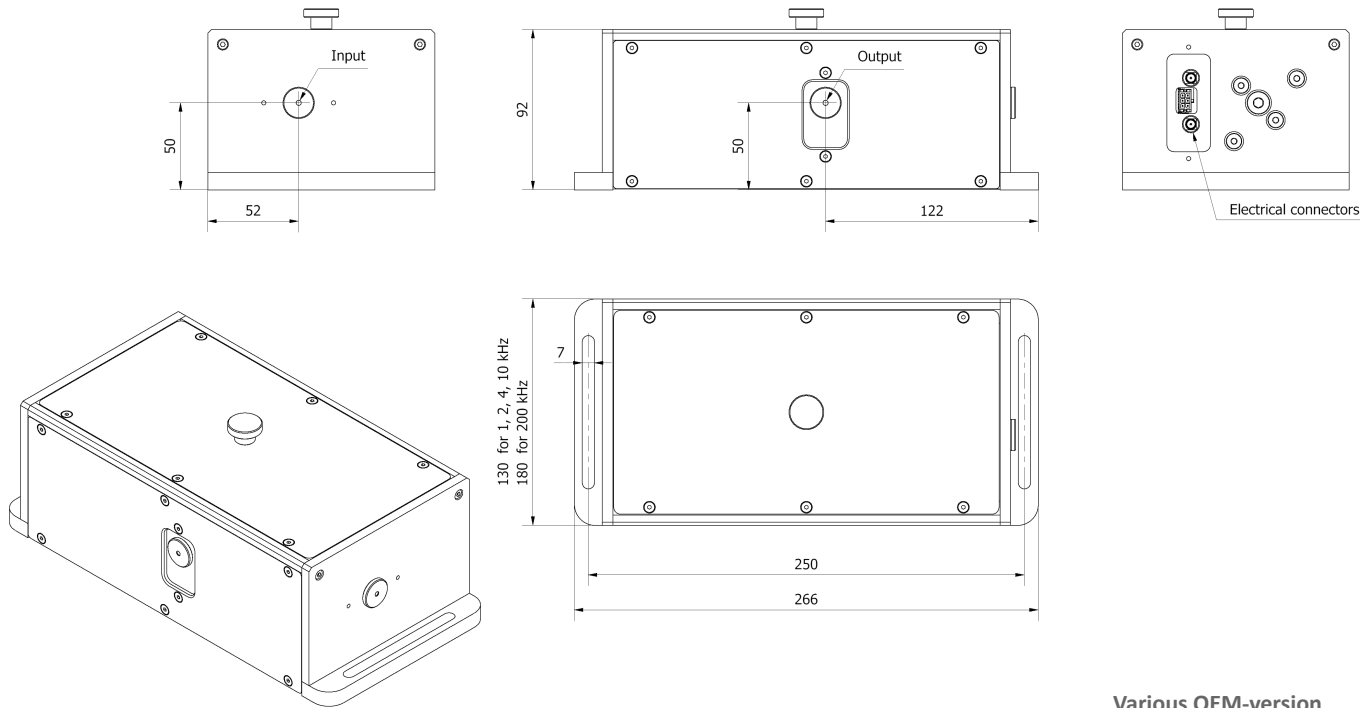


Available configurations

|                           | Turnkey configuration                                         | OEM configuration                                                                                    |
|---------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Features and applications | Ready-to-use plug-and-play system for scientific applications | Cost-effective solution for OEM integration. Small footprint to fit the unit into your laser cavity. |
| Optical part              | Full pre-aligned single-box optical head                      | Pockels cell unit with built-in high-voltage driver                                                  |
| Control electronics       | Delay generator with locking and timing electronics           |                                                                                                      |
| Max repetition rates      | All pulse repetition rates                                    | 1, 2, 4, 10 kHz                                                                                      |

Dimensional drawing of the optical head in Turnkey configuration

Dimensions are in mm



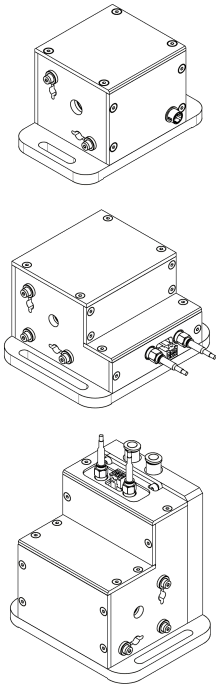
Models and codes

PP-S-B-Q-1030nm-2kHz-3.5mm-OEM

|                                     |                                                                                                                                           |                                                                              |                                                                     |                                               |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------|
| 1 Model prefix:<br>PP: Pulse picker | 2 Shape of the gate:<br>S: Short fixed bell-shaped gate to pick single laser pulses<br>A: Quasi-rectangular gate with adjustable duration | 3 Electro-optic crystal:<br>B: BBO<br>D: DKDP<br>B2: Double-crystal BBO cell | 4 Optical scheme:<br>Q: Quarter-wave<br>H: Half-wave (upon request) | 5 Wavelength:<br>800 nm<br>1030 nm<br>1064 nm |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------|

|                                                                                         |                                                                                                       |                                                                                                                                             |                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6 Maximum output pulse repetition rate:<br>1 kHz<br>2 kHz<br>4 kHz<br>10 kHz<br>200 kHz | 7 Clear aperture:<br>2.5mm (BBO crystal 3×3 mm)<br>3.5mm (BBO crystal 4×4 mm)<br>4.5mm (DKDP crystal) | 8 Configuration:<br>Turnkey: Single-box optical head with complete pre-aligned setup<br>OEM: Pockels cell with built-in high voltage driver | Customization upon request<br>• Other wavelengths<br>• Higher pulse repetition rates up to 1 MHz<br>• Half-wave configurations<br>• Larger apertures<br>• Two-pulse models<br>• Triangle-shaped gates<br>• Custom mechanical designs |
|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Various OEM-version Pockels cell units



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