

# Pockels Cells

Pockels cell is used to change the polarization state of laser light when high voltage is applied to it. The key element of Pockels cell is electro-optical crystal, which produces or changes birefringence induced by the electric field. Induced birefringence or refractive index modification in the material by electric field is called electro-optic effect or Pockels

effect. Electro-optic effect is observed only in non-centrosymmetric crystals.

Typical applications of Pockels cells are Q-switching of laser cavity, laser cavity dumping, pulse picking, light coupling into and from regenerative amplifier, continuous wave laser beam chopping.

## PCK

## KTP POCKELS CELLS



PCK4

PCK series KTP Pockels cells developed at EKSMA Optics are based on specially grown high resistivity KTP crystals. KTP crystals have better optical homogeneity and higher damage threshold comparing to RTP crystals. The outstanding feature is possibility to operate KTP Pockels cells at high duty cycles or even to keep at high voltage for the longer time.

### FEATURES

- > More than twice smaller HV requirement comparing to double BBO Pockels cells
- > Operates at high duty cycles
- > Very low piezo-electric resonances
- > Standard apertures: 4x4, 6x6 and 8x8 mm

### APPLICATIONS

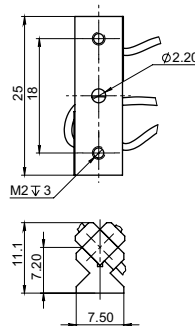
- > Q-switching for high repetition rate lasers 1 kHz – 1 MHz
- > Pulse picking of high repetition rate lasers

### SPECIFICATIONS

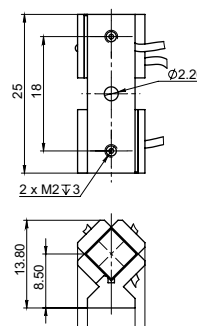
MODEL	PCK4	PCK4-O	PCK6	PCK6-O	PCK8-O
Clear aperture diameter, mm	3.5		5.5		7.5
Crystal size (WxHxL), mm	4x4x10		6x6x10		8x8x10
Quantity of crystals	2		2		2
Half-wave voltage (@ 1064 nm), kV DC	<1.8		<2.5		<3.6
Capacitance, pF	4		<6		<8
Optical transmission, %	> 98				
Contrast ratio	>1:500				
Cell size, mm	Ø25.4x42.2	25x11.1x7.5	Ø25.4x42.2	25x13.8x10.6	25x16.6x13.4



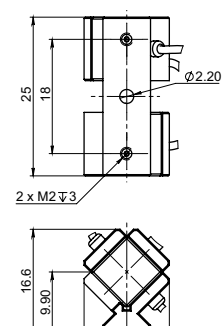
PCK6-O



PCK4-O



PCK6-O



PCK8-O

**PC • D-compact • D-mini**

**KD\*P POCKELS CELLS**



D-compact/12



D-compact/9



PC12SR

KD\*P (DKDP) is one of the electro-optical crystals used for Pockels cells. The most popular application of KD\*P (DKDP) crystal based Pockels cell is Q-switching of laser cavity. DKDP Pockels cell can be used for lasers emitting in the range of 400 – 1100 nm. High energy and short output pulse formation during Q-switching of laser cavity process is realized with KD\*P (DKDP) Pockels cell in the most of commercially available flashlamp pumped Nd:YAG and Ruby lasers, low repetition rate DPSS lasers like Nd:YAG, Nd:KGW, Nd:YLF, Nd:Glass and other lasers. Electro-optical KD\*P (DKDP) crystals produced by EKSMA Optics have high damage threshold dielectric AR coatings (LIDT > 10 J/cm<sup>2</sup>, 10 ns, 10 Hz, 1064 nm), feature long lifetime without degradation of the coatings and show reliable operation with pulsed high energy lasers.

PC12SR, PC20SR, D-compact and Mini series DKDP Pockels cells have AR-coated protective windows on both ends. Windows can be flat or wedged or in non-parallel, laser beam shift compensating configuration to eliminate etalon effects in the Pockels cell and laser cavity.

The rectangular shape PC5S, PC5D and PC10S DKDP Pockels cells are provided without protective windows and typically are used in hermetically sealed lasers.

DKDP Pockels cells provided with properly matched high voltage Pockels cell drivers allow the customers to expect the best results in their application.

EKSMA Optics offers wide range of HV drivers for the Pockels cells and power supplies for the drivers which are presented in the next chapter of this catalogue.

**FEATURES**

- Low absorption and high deuteration material
- High damage threshold dielectric AR coatings for different laser wavelengths
- Customized Pockels cells available upon request

**APPLICATIONS**

- Q-switching of flashlamp pumped high energy and low repetition rate diode pumped lasers
- Pulse picking
- Laser cavity dumping



PC10S



PC5D



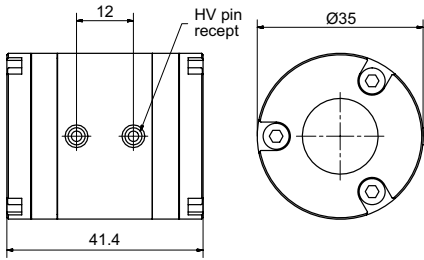
D-mini/9

**SPECIFICATIONS**

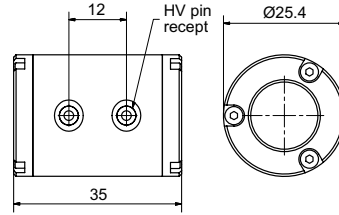
MODEL	PC20SR	PC12SR	D-compact/12	D-compact/9	D-mini/9	D-mini/8	PC10S	PC5S	PC5D
Clear aperture, mm	Ø 18	Ø 11	Ø 11	Ø 8	Ø 8	Ø 7	9.5 × 9.5	4.5 × 4.5	4.5 × 4.5
Quantity of crystals	1	1	1	1	1	1	1	1	2
λ/4 @ 1064 nm voltage, kV DC	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 2.5	< 3.4	< 3.4	< 1.7
Capacitance, pF	< 10	6	6	6	6	3	4	1.5	3
Optical transmission	>97 % at 1064 nm								
LIDT of AR coatings	> 1 GW/cm <sup>2</sup> (10 J/cm <sup>2</sup> ), 1064 nm, 10 Hz, 10 ns								
Contrast ratio	> 1:2000	> 1:2000	> 1:2000	> 1:2000	> 1:2000	> 1:2000	> 1:2000	> 1:2000	> 1:1000
Cell size, mm	Ø35×51	Ø35×41.4	Ø25.4×39	Ø25.4×35	Ø19×25.4	Ø19×19	22×18×33	18×14×25	23×16×52

*Specifications are subject to change without advance notice.*

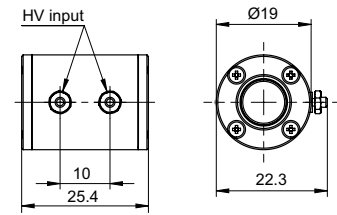
POCKELS  
CELLS



Outline drawing of PC12SR

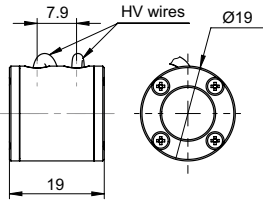


Outline drawing of D-compact/9

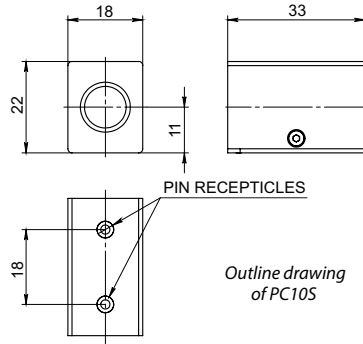


Outline drawing of D-mini/9

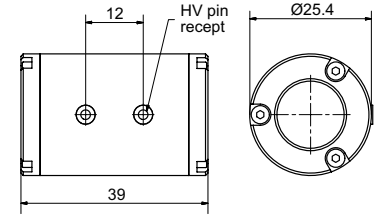
DRIVERS  
FOR POCKELS CELLS



Outline drawing of D-mini/8



Outline drawing of PC105



Outline drawing of D-compact/12

HV POWER SUPPLIES  
FOR PC DRIVERS

LASER DIODE  
DRIVERS

SYNCHRONIZATION  
MODULES FOR LASERS

PULSE PICKING  
SYSTEMS

OVS FOR  
NONLINEAR CRYSTALS

RELATED  
PRODUCTS

PM1 mounting stage  
for Pockels cells  
of Ø25.4 mm  
See page 8



HPR mounting stage for Pockels cells of Ø35 mm  
See page 8



**PCB**

**BBO POCKELS CELLS**

POCKELS CELLS

DRIVERS FOR POCKELS CELLS

HV POWER SUPPLIES FOR PC DRIVERS

LASER DIODE DRIVERS

SYNCHRONIZATION MODULES FOR LASERS

PULSE PICKING SYSTEMS

Ovens for Nonlinear Crystals



PCB4D



PCB4S

BBO based Pockels cells can be useful at wavelengths from the UV to more than 2  $\mu\text{m}$ . Low piezoelectric ringing makes these Pockels cells attractive for the control of high-power and high pulse repetition rate lasers. Fast switching electronic drivers properly matched to the cell are available for Q-switching, cavity dumping and other applications.

Pockels cells of PCB series are transverse field devices. Low electro-optical coefficient of BBO results in high operating voltages. The quarter-wave voltage is proportional to the ratio of electrode spacing and crystal length. As a result, smaller aperture devices have lower quarter-wave, however even for 2.5 mm aperture devices the quarter-wave voltage is as high as 4 kV @ 1064 nm.

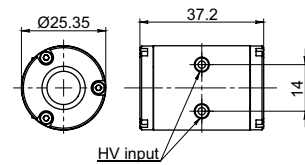
Double crystal design is employed to reduce required voltages and to allow operation in half-wave mode with fast switching times.

**FEATURES**

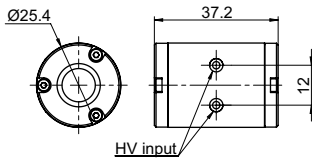
- > Minimal piezoelectric ringing
- > Very low absorption and suitability for high power laser applications
- > Reliable design for operation up to 2 MHz HV pulse repetition rate
- > Broad transmission rate from 200 to 2000 nm

**APPLICATIONS**

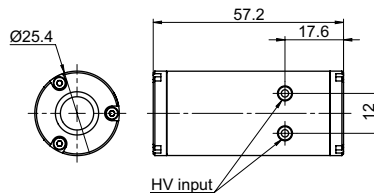
- > High repetition rate Q-switching
- > Pulse picking at up to 2 MHz rate
- > Laser cavity dumping
- > Pulses coupling into and from regenerative amplifier



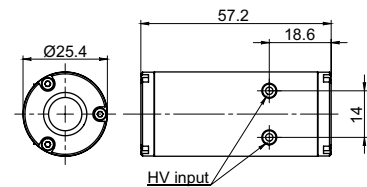
PCB6.3S outline drawing



PCB3S, PCB4S outline drawing



PCB3D, PCB4D outline drawing



PCB6.3D outline drawing

**SPECIFICATIONS**

MODEL	PCB3S	PCB3D	PCB4S	PCB4D	PCB6.3S	PCB6.3D	PCB8D
Clear aperture diameter, mm	2.5		3.5		5.8		7
Quantity of crystals	1	2	1	2	1	2	2
$\lambda/4$ voltage (@ 1064 nm), kV DC	<3.5	<1.8	<4.6	<2.3	<7.5	<3.8	<4.6
Capacitance, pF	4	6	3	6	6	<8	<8
Optical transmission, %	> 98	>98	>98	>97	>98	>98	>98
Contrast ratio <sup>1)</sup>	>1:1000	>1:500	>1:1000	>1:500	>1:1000	>1:500	>1:500
Dimensions, mm	$\varnothing 25.4 \times 37.2$	$\varnothing 25.4 \times 57.2$	$\varnothing 25.4 \times 37.2$	$\varnothing 25.4 \times 57.2$	$\varnothing 25.4 \times 42.2$	$\varnothing 25.4 \times 57.2$	$\varnothing 35 \times 64$

<sup>1)</sup> Measured by crossed polarizers method.

All crystals are coated AR/AR @ 1064 nm.  
Other antireflection coatings are available on request.  
Damage threshold >5 J/cm<sup>2</sup> for 10 ns pulses at 1064 nm.

Specifications are subject to changes without advance notice.

**RELATED PRODUCTS**

PM1 mounting stage for Pockels cells of  $\varnothing 25.4$  mm

See page 8

