Pockels Cell Drivers

Laser Diode Drivers

Flashlamp Drivers

Cooling Units

Pump Chambers

Crystal Ovens

EKSPLA

Laser Electronics

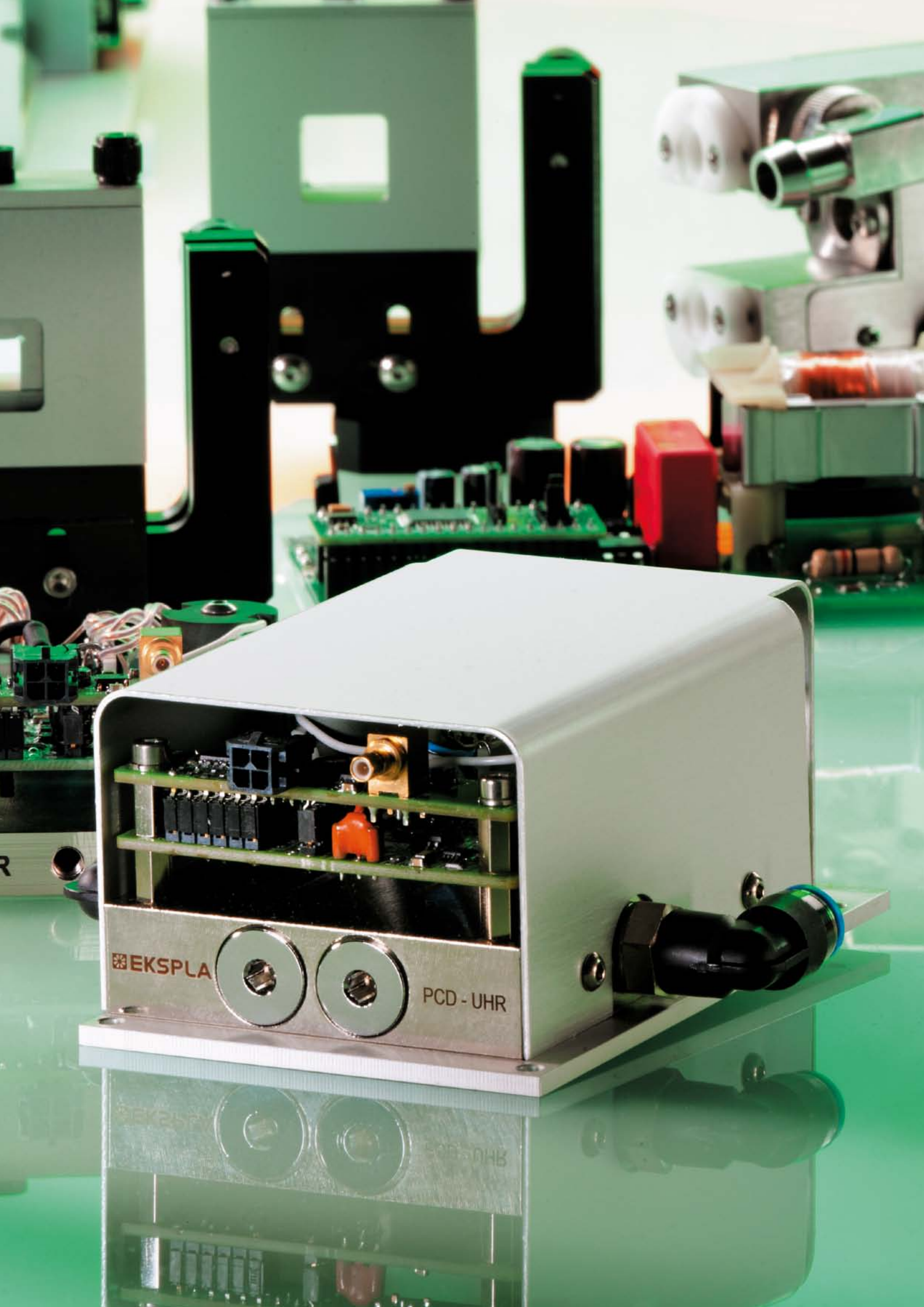
2016

EKSPLA

EKSPLA is manufacturer of optoelectronics, lasers and laser systems for basic research and industrial applications. Employing 30 years experience and close partnership with scientific comunity, EKSPLA is focused on design and manufacturing of advanced products. Know-how in laser physics and fast high voltage electronics as well as high power electronics are one of the core competences of EKSPLA. Dedicated R&D team enables to customize and supply products according to the specific OEM requirements.
In house design and manufacturing ensures operative development and manufacturing of the new products. Products are available from several standard units for R&D applications to series customized solutions for OEM (Original Equipment Manufacturers).

Cover photo: Flashlamp drivers and cooling units set-up for high energy laser systems.

Revision 160411


EKSPLA
PCD - UHR

Contents

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Drivers for Pockels Cells

PCD-UHR SERIES OEM CAVITY DUMPER DRIVERS

Fig. 1. OEM version of PCD-UHR series Pockels cell driver

Fig. 2. Encased version of PCD-UHR series Pockels cell driver

FEATURES

- Fast HV rise/fall time <4–8 ns
- HV pulse amplitude up to 3.6 kV
- Pulse repetition rate up to 3.5 MHz
- Output pulse jitter <50 ps if trigger pulse rise time < 0.5 ns

PCD-UHR series Pockels cell drivers are designed for wide range of applications and operating modes. Repetition rate can be up to 500 kHz for standard range of drivers, up to 1 MHz enhanced and up to 3.5 MHz high rate. Standard range of possible pulse durations is from 100 ns to 5 µs. It can be extended to infinity using pulse regeneration technique. Connection diagram can be PUSH-PULL configuration using stand-alone driver, as well as FULL BRIDGE using two drivers for one Pockels cell. FULL BRIDGE configuration gives such advantages as repetition rate doubling to reach up to 7 MHz rate, pulse duration shortening down to zero or voltage doubling on pockels cell. Contact EKSPLA for more information and suggestions for Pockels cell driving solutions you need.

Most of PCD-UHR series units are available in two versions: „open frame" which is ideal for OEM manufacturers incorporating drivers in their own systems and encased in aluminum housings. Encasing of Pockels cell driver in aluminum housing solves two problems: shields both humans and electronics from high voltage impact from operating Pockels cell driver, and protects driver itself from potentially harmful external contact – ensuring safe operation and driver longevity. The housed option is especially handy for researchers and custom product manufacturers who use these drivers during their own systems build-up.

PCD-UHRS modification has possibility to shorten output pulse duration down to 15 ns. Following they can be used for single pulse selection in pulse picker applications for high repetition rate lasers.

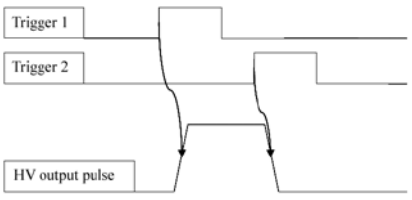

Fig. 3. Control timing charts for two-pulses controlled drivers

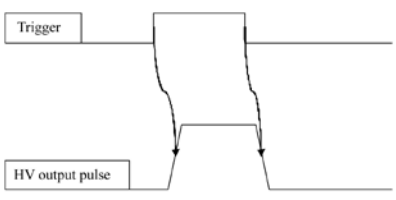

Fig. 4. Control timing charts for single pulse controlled drivers

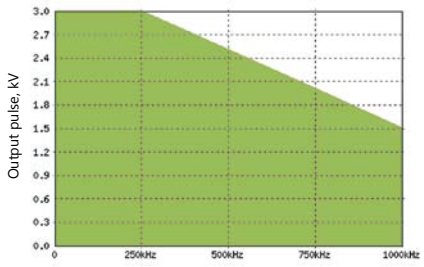

Fig. 5. Operating possibility chart for PCD-UHR standard and enhanced rate drivers. You may easy choose version of customized driver for inquiry within green area of chart

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GENERAL SPECIFICATIONS TABLE FOR PCD-UHR SERIES DRIVERS [1)]

Driver model	PCD-UHR series	PCD-UHRS series
Maximal HV rated voltage (for testing only)	3.8 kV	
Maximal HV operating voltage	<90 % from rated voltage	
HV pulse rise time	< 4–8 ns *(Fig. 7)*	
HV pulse fall time	< 4–8 ns *(Fig. 8)*	
HV pulse duration for single driver	100–5000 ns	15–5000 ns
Max HV pulse duration for full-bridge configuration	0–5000 ns	N/A
Maximal HV pulse repetition rate	3.5 MHz	600 kHz
External triggering pulse duration requirement	>100 ns	>10 ns
External triggering pulse amplitude requirement	3.5–5 V (50 Ω load)	
External triggering pulse rise & fall time	< 20 ns	< 5 ns
Maximal length of leads to Pockels cell	10 cm	
Control diagram options:		
– single triggering pulse control	*Fig. 4*	
– two trigger pulses control	*Fig. 3*	
HV pulse delay, typical	45 ns	30 ns
External powering requirements:		
– high voltage supply	depends on modification	
– low voltage DC supply	12±0.5 V, <150 mA 14–25 V, <150 mA, on request	24±1 V, <150 mA

[1)] *Specifications are given for Pockels cell with capacity <6 pF. Not all combinations of parameters can be possible at the same time. Specifications are subject to changes without advance notice.*

Driver needs to be mounted on the heatsink (excluding water cooled versions). Heat sink temperature needs to be lower than 35 °C (95 °F) in all regimes of operation.

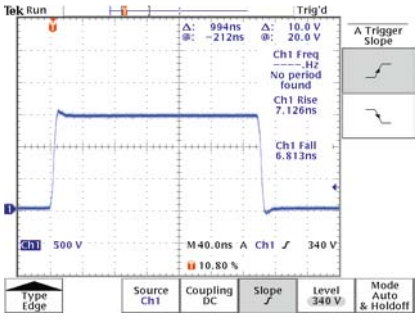


Fig. 6. Typical output pulse shape

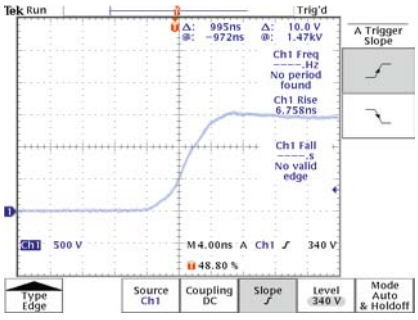


Fig. 7. Typical rising front of output pulse in detail

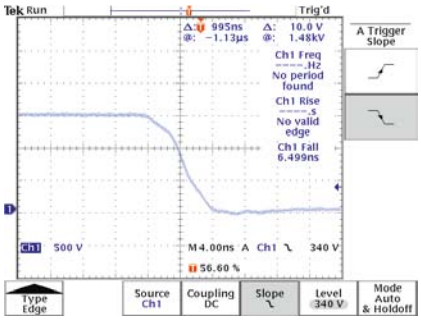
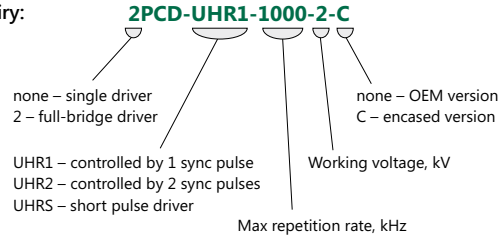


Fig. 8. Typical falling front of output pulse in detail

Ordering / Part number information

Please indicate following points by inquiry:

- Voltage
- Repetition rate
- Pulse duration (range)
- Capacitance of Pockels cell
- 24 V / 12 V option
- OEM / encased



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OEM VERSION

CONFIGURATION EXAMPLES OF OEM VERSION OF PCD-UHR SERIES DRIVERS

P/N of driver	PCD-UHR1-50-3.6 PCD-UHR2-50-3.6	PCD-UHR1-400-1.5 PCD-UHR2-400-1.5	PCD-UHR1-250-3.6 PCD-UHR2-250-3.6	PCD-UHR1-250-2.5 PCD-UHR2-250-2.5	PCD-UHR1-500-2.6 PCD-UHR2-500-2.6	PCD-UHR1-1000-1.8 PCD-UHR2-1000-1.8
Maximal HV rated voltage	3.8 kV	1.6 kV	3.7 kV	2.6 kV	2.7 kV	2 kV
Maximal HV operating voltage	3.6 kV	1.5 kV	3.6 kV	2.5 kV	2.6 kV	1.8 kV
Maximal HV repetition rate	50 kHz	400 kHz	250 kHz	250 kHz	500 kHz	1000 kHz
Pulse duration	100–5000 ns					
HV pulse rise time, typical	<7 ns	<5.5 ns	<7 ns	<6 ns	<6.5 ns	<6 ns
HV pulse fall time, typical	<7 ns	<5.5 ns	<7 ns	<6 ns	<6.5 ns	<6 ns
Output polarity	positive					
HV power consumption	<20 W	<20 W	<75 W	<40 W	<90 W	<80 W
12V/24V power consumption	1 W	5.5 W	4 W	4.5 W	6 W	9 W
Dimensions	see *Fig. 12*		see *Fig. 11*			
Cooling	conductive		conductive or water			

Driver needs to be mounted on the heatsink (excluding water cooled versions).
Heat sink temperature needs to be lower than 35 °C (95 °F) in all regimes of operation.
Please specify working voltage and required tuning range by ordering.
HV output voltage to Pockels cell is equal to HV power supply voltage.

Fig. 9. OEM version of PCD-UHR series driver with general purpose pad

Fig. 10. OEM version of PCD-UHR series driver with conductive pad. Suitable for repetition rate up to 50 kHz

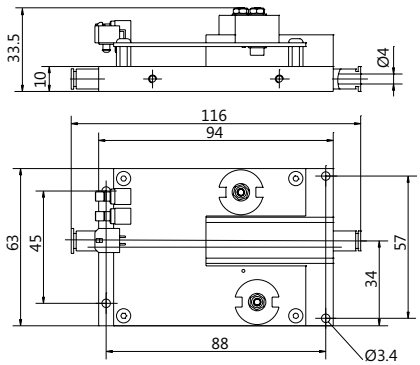

Fig. 11. Outline drawing of PCD-UHR series driver with general purpose pad

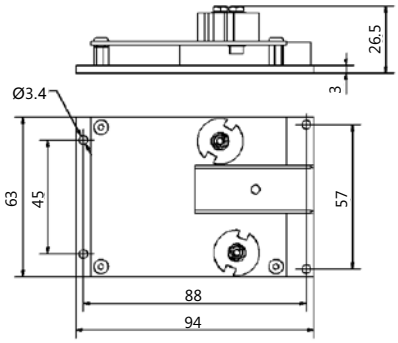

Fig. 12. Outline drawing of PCD-UHR series drivers with conductive pad

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SPECIFIC FEATURES OF PCD-UHRS DRIVERS

- Short circuit protection at driver output
- Driver pad overheat sensor stops operation when overheated
- Overheat optocoupled output signal
- Switchable single pulse and two pulses control operation modes
- LED for error indication (overheat and short circuit)

OEM SHORT-PULSE VERSION

CONFIGURATION EXAMPLES OF OEM VERSION OF PCD-UHRS SERIES SHORT-PULSE DRIVERS

P/N of driver	PCD-UHRS-50-3.6	PCD-UHRS-400-1.5	PCD-UHRS-250-3.6	PCD-UHRS-250-2.5	PCD-UHRS-600-2.5	PCD-UHRS-600-1.8
Maximal HV rated voltage	3.8 kV	1.6 kV	3.7 kV	2.6 kV	2.6 kV	2 kV
Maximal HV operating voltage	3.6 kV	1.5 kV	3.6 kV	2.5 kV	2.5 kV	1.8 kV
Maximal HV repetition rate	50 kHz	400 kHz	250 kHz	250 kHz	600 kHz	600 kHz
Pulse duration	15–5000 ns	15–620 ns	15–1250 ns	15–1000 ns	15-400 ns	15-400 ns
HV pulse rise time, typical	<7 ns	<5.5 ns	<7 ns	<6 ns	<6.5 ns	<6 ns
HV pulse fall time, typical	<7 ns	<5.5 ns	<7 ns	<6 ns	<6.5 ns	<6 ns
Output polarity	positive					
HV power consumption	<20 W	<20 W	<75 W	<40 W	<100 W	<35 W
12V/24V power consumption	1 W	5.5 W	4 W	4.5 W	7 W	7 W
Dimensions	see *Fig. 14*			see *Fig. 15*		
Cooling	conductive			conductive or water		

Driver needs to be mounted on the heatsink (excluding water cooled versions).
Heat sink temperature needs to be lower than 35 °C (95 °F) in all regimes of operation.
Please specify working voltage and required tuning range by ordering.
HV output voltage to Pockels cell is equal to HV power supply voltage.

Fig. 13. OEM version of PCD-UHRS series driver with general purpose pad

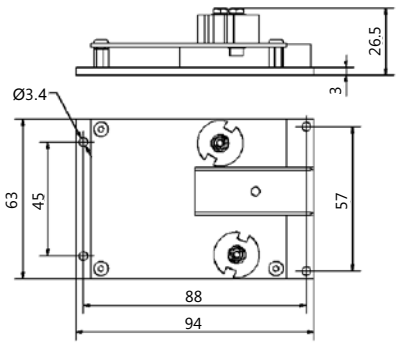

Fig. 14. Outline drawing of PCD-UHRS series drivers with conductive pad

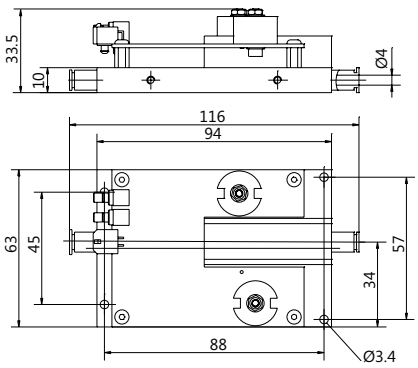

Fig. 15. Outline drawing of PCD-UHRS series driver with general purpose pad

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ENCASED SHORT-PULSE VERSION

CONFIGURATION EXAMPLES OF ENCASED VERSION OF PCD-UHRS SERIES SHORT-PULSE DRIVERS

P/N of driver	PCD-UHRS-250-3.6-C	PCD-UHRS-250-2.5-C	PCD-UHRS-600-2.5-C
Maximal HV rated voltage	3.7 kV	2.6 kV	2.6 kV
Maximal HV operating voltage	3.6 kV	2.5 kV	2.5 kV
Maximal HV repetition rate	250 kHz	250 kHz	600 kHz
Pulse duration	15–1250 ns	15–1000 ns	15-400 ns
HV pulse rise time, typical	<7 ns	<6 ns	<6.5 ns
HV pulse fall time, typical	<7 ns	<6 ns	<6.5 ns
Output polarity		positive	
HV power consumption	<75 W	<40 W	<100 W
12V/24V power consumption	4 W	4.5 W	7 W
Dimensions		see *Fig. 17*	
Cooling		water	

Heat sink temperature needs to be lower than 35 °C (95 °F) in all regimes of operation.
Please specify working voltage and required tuning range by ordering.
HV output voltage to Pockels cell is equal to HV power supply voltage.

Fig. 16. Encased version of driver PCD-UHRS

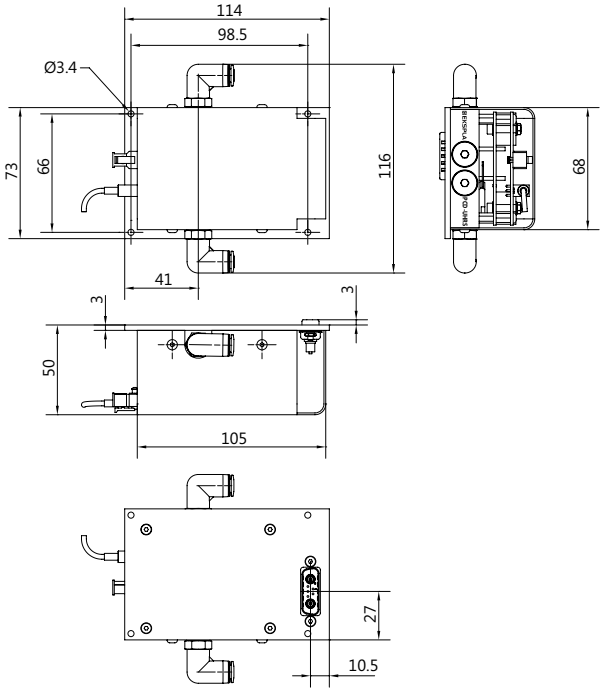

Fig. 17. Outline drawing of encased version of driver PCD-UHRS

ENCASED VERSION (unipolar drivers)

CONFIGURATION EXAMPLES OF ENCASED VERSION OF PCD-UHR SERIES DRIVERS

P/N of driver	PCD-UHR1-250-3.6-C PCD-UHR2-250-3.6-C	PCD-UHR1-250-2.5-C PCD-UHR2-250-2.5-C	PCD-UHR1-500-2.6-C PCD-UHR2-500-2.6-C	PCD-UHR1-1000-1.8-C PCD-UHR2-1000-1.8-C
Maximal HV rated voltage	3.7 kV	2.6 kV	2.7 kV	2 kV
Maximal HV operating voltage	3.6 kV	2.5 kV	2.6 kV	1.8 kV
Maximal HV repetition rate	250 kHz	250 kHz	500 kHz	1000 kHz
Pulse duration	100–5000 ns			
HV pulse rise time, typical	<7 ns	<6 ns	<6.5 ns	<6 ns
HV pulse fall time, typical	<7 ns	<6 ns	<6.5 ns	<6 ns
Output polarity	positive			
HV power consumption	<75 W	<40 W	<90 W	<80 W
12V/24V power consumption	4 W	4.5 W	6 W	9 W
Dimensions	see *Fig. 19*			
Cooling	water			

Heat sink temperature needs to be lower than 35 °C (95 °F) in all regimes of operation.
HV output voltage to Pockels cell is equal to HV power supply voltage.
Please specify working voltage and required tuning range by ordering.

Fig. 18. Encased version of driver
PCD-UHR models PCD-UHRx-200-xx, PCD-UHRx-250-xx,
PCD-UHRx-500-xx, PCD-UHRx-1000-1.8

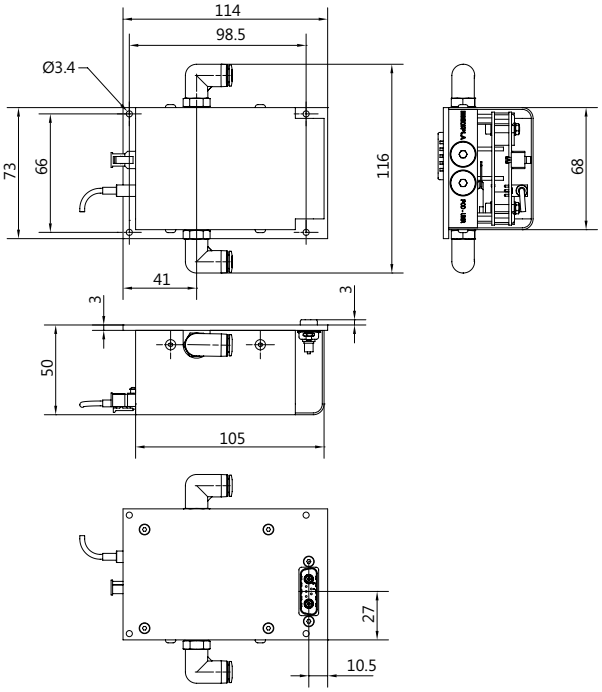

Fig. 19. Outline drawing of encased version of driver
PCD-UHR models PCD-UHRx-200-xx, PCD-UHRx-250-xx,
PCD-UHRx-500-xx, PCD-UHRx-1000-1.8

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ENCASED VERSION (bipolar drivers)

CONFIGURATION EXAMPLES OF ENCASED VERSION OF PCD-UHR SERIES BIPOLAR DRIVERS

P/N of driver	PCD-UHR1-1000-2.9-C PCD-UHR2-1000-2.9-C	PCD-UHR1-350-4-C PCD-UHR2-350-4-C	PCD-UHR1-300-4.6-C PCD-UHR2-300-4.6-C	PCD-UHR1-250-5.2-C PCD-UHR2-250-5.2-C
Maximal HV rated voltage	3.0 kV	4.2 kV	4.8 kV	5.3 kV
Maximal HV operating voltage	2.9 kV	4.0 kV	4.6 kV	5.2 kV
Maximal HV repetition rate	1000 kHz	350 kHz	300 kHz	250 kHz
Pulse duration	100–5000 ns			
HV pulse rise time, typical	<7.5 ns	<7.5 ns	<8.0 ns	<8.5 ns
HV pulse fall time, typical	<7.5 ns	<7.5 ns	<8.0 ns	<8.5 ns
Output polarity	bipolar			
HV power consumption *	<120 W	<100 W	<100 W	<100 W
12 V / 24 V power consumption	9 W			
Dimensions	see *Fig. 21*			
Cooling	conductive or water			

Driver needs to be mounted on the heatsink (excluding water cooled versions).
Heat sink temperature needs to be lower than 35 °C (95 °F) in all regimes of operation.
HV output voltage to Pockels cell is equal to HV power supply voltage i.e. sum of positive and negative HV values.
Please specify working voltage and required tuning range by ordering.

** Bipolar HV power supply HV2x60Wm is specifically designed for these drivers.*

Fig. 20. Encased version of driver PCD-UHR models PCD-UHRx-1000-XX, PCD-UHRx-350-XX, PCD-UHRx-300-XX, PCD-UHRx-250-XX. Water cooled version

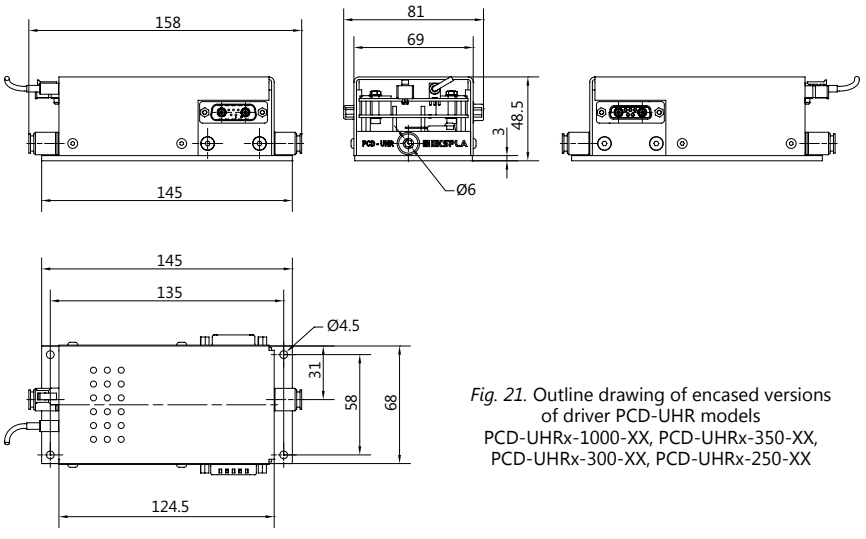

Fig. 21. Outline drawing of encased versions of driver PCD-UHR models PCD-UHRx-1000-XX, PCD-UHRx-350-XX, PCD-UHRx-300-XX, PCD-UHRx-250-XX

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FULL-BRIDGE VERSION

CONFIGURATION EXAMPLES OF FULL-BRIDGE CONFIGURATION DRIVERS

P/N of FULL-BRIDGE driver	2PCD-UHR1-1000-2.4-C 2PCD-UHR2-1000-2.4-C	2PCD-UHR1-2000-1.6-C 2PCD-UHR2-2000-1.6-C
Base driver	PCD-UHR1-500-2.5 PCD-UHR2-500-2.5	PCD-UHR1-1000-1.8 PCD-UHR2-1000-1.8
Maximal HV operating voltage	2.4 kV	1.6 kV
Maximal HV repetition rate	1000 kHz	2000 kHz
HV pulse duration range	0–5000 ns	
HV pulse rise time	<6.5 ns	<6 ns
HV pulse fall time	<6.5 ns	<6 ns
Maximal capacitance of Pockel's cell	<6 pF	
HV power consumption	<160 W *	
Case	see *Fig. 25*	
Cooling	water	

Heat sink temperature needs to be lower than 35 °C (95 °F) in all regimes of operation.
HV output voltage pulse to Pockels cell appears as diference of pulses OUT1 and OUT2 and is lower as HV power supply voltage.
Contact Ekspla for technical details based on your request.

** Two HV power supplies HV80Wm are recommended*

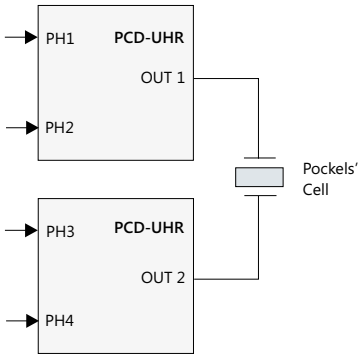

Fig. 22. Diagram of Pockels cell full-bridge connection to driver

Fig. 23. External view of full-bridge driver

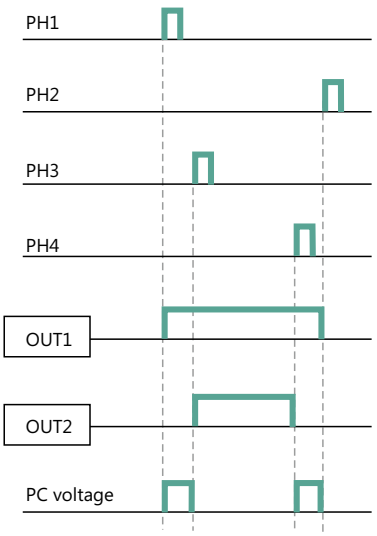

Fig. 24. Principle of 4-phase control of FULL-BRIDGE driver configuration.

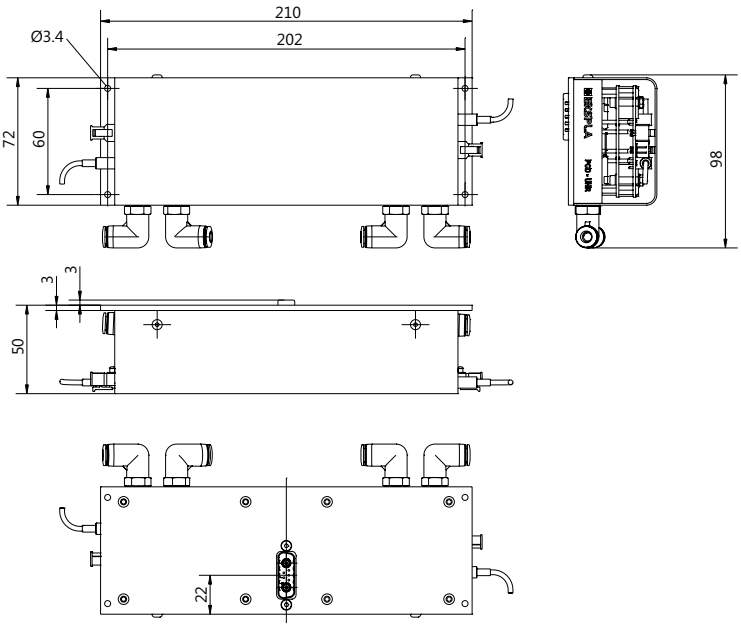

Fig. 25. Outline drawing of case for full-bridge drivers

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PCD-UHV SERIES OEM POCKELS CELL DRIVER

PCD-UHV driver mounted
with HV power supply ***HV05Wm***

FEATURES

- HV pulse amplitude up to 5.6 kV
- HV repetition rate up to 10 kHz
- HV pulse duration down to 15 ns
- HV pulse amplitude doubling layout
- Easy integration with HV power supply
- Switchable one/two trigger pulses control mode

SPECIFICATIONS

OPERATION REGIME	4.2 kV mode	5.6 kV mode
High voltage (HV) pulse amplitude to cell	4.2 kV	5.6 kV
Output polarity	bipolar	
HV pulse rise time, typical	7 ns	8 ns
HV pulse fall time, typical	7 ns	8 ns
HV pulse duration	30–3000 ns	
Maximal HV pulse repetition rate	10 kHz	5 kHz
External triggering pulse amplitude requirement	3.5–5 V (50 Ω load)	
External triggering pulse rise & fall time	< 5 ns	
HV pulse delay	30 ns	
External powering requirements:		
HV power supply *	≤ 2.1 kV, 5W	≤ 2.8 kV, 5 W
low voltage DC supply, switchable	15–25 V, 150 mA or 12 V, 220 mA (0.5 A inrush current)	
Dimensions (L × W × H):		
driver board	135 × 65 × 25 mm	
driver board mounted with HV05Wm power supply	135 × 65 × 55 mm	

** Typical voltage control limits for HV05Wm are 1.8 to 2.8 kV. Other limits are available on your request.*

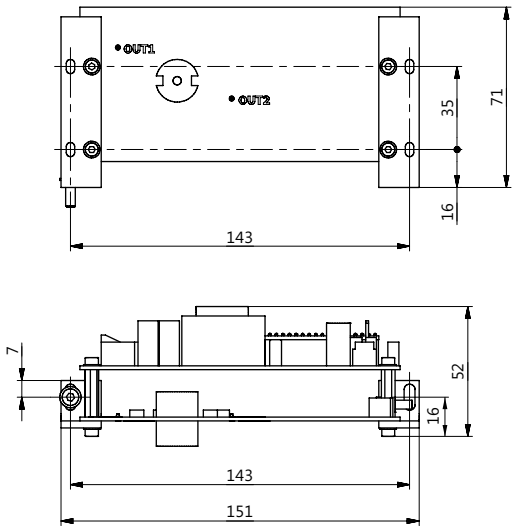

Fig. 1. Outline drawing of PCD-UHV

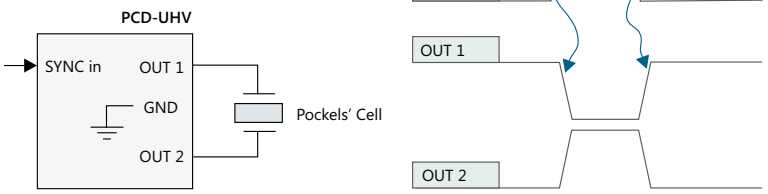

Fig. 2. Diagram of Pockels' cell connection to driver and timing charts for one-pulse control mode

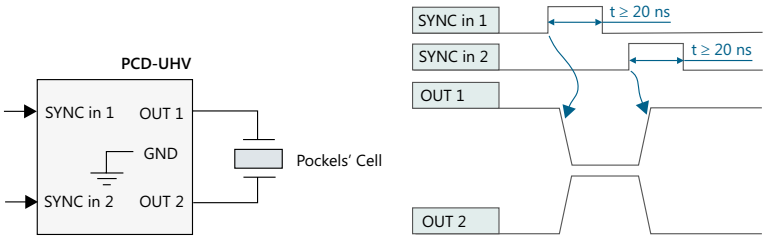

Fig. 3. Diagram of Pockels' cell connection to driver and timing charts for two pulses control mode

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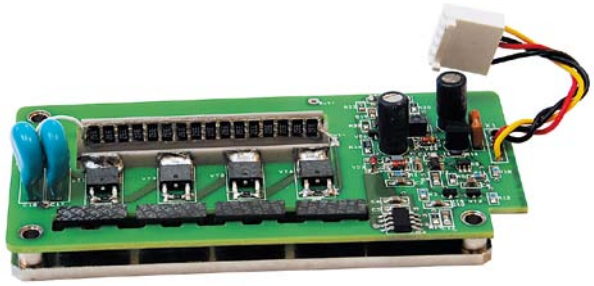
PCD-PHR SERIES HIGH REPETITION RATE POCKELS CELL DRIVER



PCD-PHR has been designed for use in mode-locked lasers for cavity dumping or for Q-switching of solid-state nanosecond lasers. Fast HV (less than 7 ns) edge ensures excellent pre- and post-pulse contrast.

Ability to operate at high pulse repetition rates makes this driver perfect fit for most of diode-pumped nanosecond lasers. For pulse repetition rates up to 10 kHz heatsink is not required. For high repetition rates the driver should be attached to the heatsink with thermal resistance of at least 0.4 °C/W for room temperature (25 °C) operation.

The driver should be mounted into dielectric box (not provided) providing electrical insulation. Low voltage power supply is required to internal triggering circuit, while tuning of HV power supply voltage.

FEATURES

- Pulse repetition rate up to 100 kHz
- Fast HV rise time <7 ns for 4 kV pulse
- HV pulse amplitude up to 4 kV

SPECIFICATIONS

Maximum high voltage (HV) pulse amplitude	4.0 kV
Polarity	Positive
HV pulse rise time	< 7 ns
HV pulse fall time	~2 µs [1]
HV pulse duration	180 ns [1]
Maximum HV pulse repetition rate	100 kHz
HV pulse jitter	< 0.5 ns
External triggering pulse duration requirement	100–1000 ns
External triggering pulse amplitude requirement	3–5 V (50 Ω)
External triggering pulse rise & fall time	< 10 ns
HV pulse delay	35–40 ns
External powering requirements:	
high voltage supply	0–4.0 kV, 9 mA max [2]
low voltage DC supply	9–24 V, 500 mA max [2]
Operating temperature	0–35 [3] °C
Size	104 × 52 × 25 mm

[1] *Typical value.*
[2] *Test conditions: PRR= 100 kHz, C= 6 pF, U= 4 kV.*
[3] *Heatsink temperature should be bellow 35 °C at 100 kHz pulse repetition rate.*

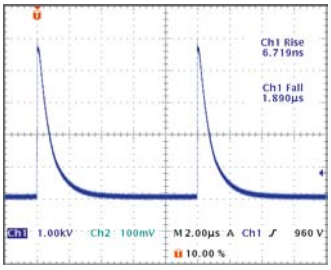


Fig. 1. Oscillogram of PCD-PHR driver operation

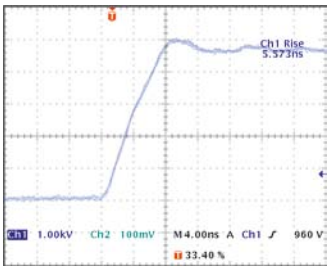


Fig. 2. Fast edge of HV pulse in detail

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PCD-P SERIES CAVITY DUMPER DRIVER

PCD-P has been designed for use in mode-locked lasers for cavity dumping or for cavity Q-switching of solid-state nanosecond lasers. Fast HV (less than 7 ns) edge ensures excellent pre- and post-pulse contrast.

Two versions are available: PCD-PI and PCD-PII.

SPECIFICATIONS

Model	PCD-PI	PCD-PII
Maximum high voltage (HV) pulse amplitude	4.2 kV	5.2 kV
HV pulse fall time	< 7 ns	< 9 ns
HV pulse rise time	~0.1 ms	
HV pulse duration	from 5 to 100 µs [1)]	
Maximum HV pulse repetition rate	3 kHz	2.5 kHz
Jitter	< 0.5 ns	
External triggering pulse duration requirement	100 – 1000 ns	
External triggering pulse amplitude requirement	3 – 5 V (50 Ω)	
External triggering pulse rise & fall time	< 20 ns	
HV pulse delay	35 – 40 ns	
External powering requirements:		
high voltage supply	4.4 kV, 0.2 mA max	5.5 kV, 0.2 mA max
low voltage DC supply	24 – 28 V, 50 mA max	
Size	100 × 50 × 40 mm	

[1)] *According to customers request*

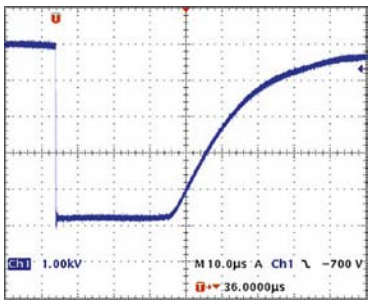

Fig. 1. Oscillogram of PCD-P driver operation: whole HV pulse

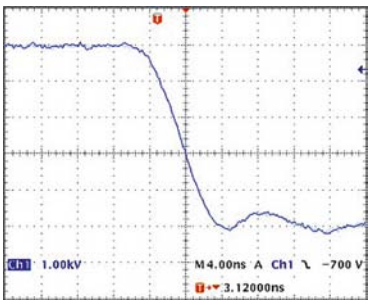

Fig. 2. Oscillogram of PCD-P driver operation: HV pulse fall

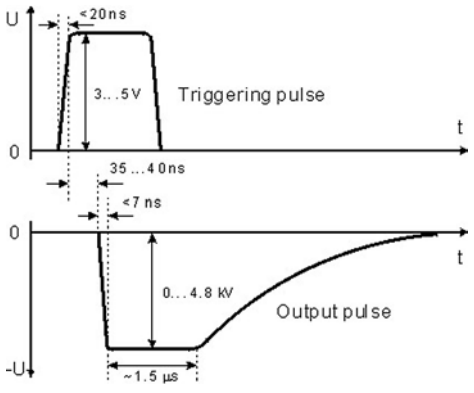

Fig. 3. Time diagram of PCD-P cavity dumping driver

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PCD-N-2 SERIES OEM POCKELS CELL DRIVER

PCD-N-2 is designed for Q-switching of nanosecond lasers without use of phase retardation plate. High voltage is applied to Pockels cell in order to inhibit oscillation. Pockels cell is opened by negative polarity pulse allowing laser to radiate.

Working voltage on Pockel's cell is equal to sum of values U1 and U2 (*Fig. 1*).

SPECIFICATIONS

Maximum high voltage to cell (HV) pulse amplitude (U1 + U2)	5 kV
U1 value *(Fig 1)*	equal to HV powering voltage
U2 value *(Fig 1)*	equal to 0.25×U1 (optionally 0 V)
HV pulse fall time (a)	< 15 ns
HV pulse rise time, typical (b)	60 µs
HV pulse duration, typical (c)	300 µs [1)]
HV pulse repetition rate	≤ 250 Hz
HV pulse delay (d)	40 ns
External triggering pulse duration requirement	100–1200 µs
External triggering pulse amplitude requirement	3–5 V (50 Ω)
External triggering pulse rise & fall time	< 20 ns
Board dimensions	92 × 70 × 22 mm [2)]
Dia 3.2 mm mounting holes location	84 × 62 mm
External powering requirements:	
DC supply	12–24 V, max 200 mA
HV supply	4 kV, 1 mA

[1)] *Can be modified to 1200 µs for lower repetition rates.*
[2)] *Keep safety distance at least 5 mm from any side of board to other conductive parts.*

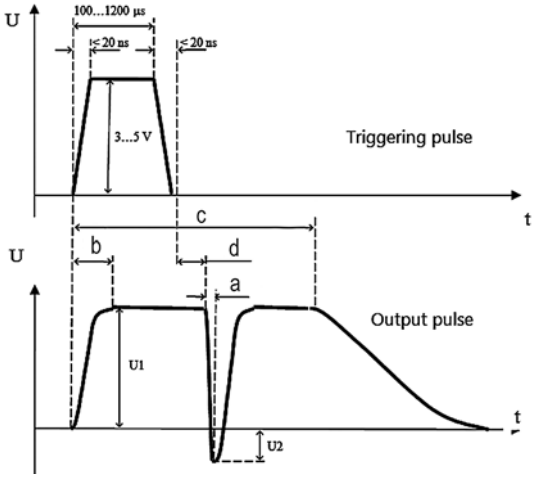

Fig. 1. Time diagram of PCD-N-2 driver

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OEM HV POWER SUPPLIES FOR POCKELS CELL DRIVERS

Fig.1. HV40Wm power supply

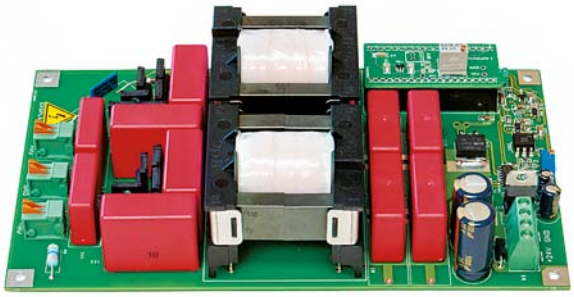

Fig.2. HV120Wm, HV2x60Wm power supply

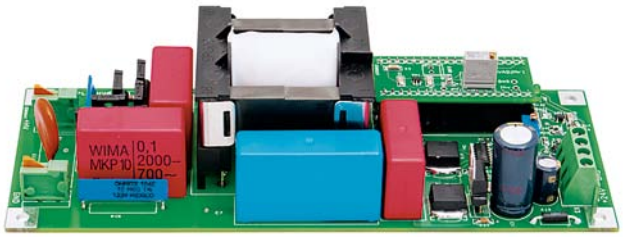

Fig.3. HV80Wm power supply

Power supply HVxxWm series is designed for powering pockels cell driver with appropriate power and voltage requirement. Due to its performance and reliable design, HVxxWm is good choice for OEM customers.

Table below shows basic specifications of HV power supplies. Particularly "Maximal output high voltage" row gives reference of maximal achievable voltage for particular model limited by design. For specific driver this limitation is different. E.g. for the driver PCD-UHR1-1000-1.8 voltage control limits are made from 0.8 kV to 1.8 kV tipically.

SPECIFICATIONS

Model	HV05Wm	HV40Wm	HV80Wm	HV120Wm	HV2x60Wm
Maximal output high voltage [1]	4 kV	4 kV	4 kV	4 kV	+2 kV; -2 kV
Voltage control limits	-1 kV from maximal value				
Maximal output power at maximal output voltage	5 W	40 W	80 W	120 W	2×60 W
Output voltage control options [2]	CAN interface [3], internal trimmer				
External powering	24 V DC, <15 W [4]	24 V DC, <50 W	24 V DC, <90 W	24 V DC, <150 W	24 V DC, <150 W
Dimensions (L × W × H)	135 × 70 × 30 mm	160 × 70 × 40 mm	175 × 70 × 45 mm	175 × 110 × 45 mm	175 × 110 × 45 mm
Mounting holes Ø3.4 mm location	125 × 35 mm	150 × 60 mm	165 × 60 mm	165 × 100 mm	165 × 100 mm

[1] *Matching to pockels driver voltage requirement is advisable by ordering.*
[2] *Needs to be indicated by ordering.*
[3] *Requires USB-CAN converter for computer control that sold separately.*
[4] *Optionally 12 V DC, <15 W.*

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HIGH VOLTAGE POWER SUPPLY PS4012 FOR POCKELS CELL DRIVERS

FEATURES

- HV power supply and low voltage 24 V DC power supply in one box
- Tailored for use in laboratories
- HV tuning by multi-turn knob
- 3½ LCD display for voltage monitoring
- Various versions for different power requirement

Desktop HV power supply PS4012 is designed for powering Pockels cell drivers. It features internal HV power supply as well as low voltage 24 V DC power supply in one case. That approach gives possibility for convenient powering in your laboratory any Pockels cell driver manufactured by Ekspla. Different pockels cell drivers needs different voltage and power. Line of HV power supplies meets that requirement by choosing best suitable modification from table. HV adjustment is made by multi-turn knob on front panel.

SPECIFICATIONS

Model	PS4012-05	PS4012-40	PS4012-80	PS4012-120	PS4012-150	PS4012-2×60
Maximal output high voltage	4 kV [1]	4 kV [1]	4 kV [1]	3.6 kV [1]	4 kV [1]	±3.5 kV [2]
Maximal output power at maximal output voltage [3]	5 W	40 W	80 W	120 W	150 W	2×60 W
Voltage control imits	40% U_{max} to U_{max}					
24 V DC remaining power for external needs (including PCD)	190 W	150 W	100 W	60 W	20 W	60 W
Mains voltage	90 to 264 V AC, 47–63 Hz					
Dimensions (W×L×H)	260 × 280 × 100 mm					
Weight	2.7 kg					

[1] *Options 1.8 kV, 2.5 kV, 3.6 kV, 4.0 kV are available.*
[2] *Option ±2 kV is available.*
[3] *Maximal power is proportionally lower by tuning to lower HV output.*

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Laser Diode Drivers

CW MODE LASER DIODE DRIVERS

FEATURES

- Best suited for OEM applications
- Power factor correction
- High reliability
- ROHS compliant
- Cost efficient

Laser diode drivers are designed for powering single diode as well as laser diode arrays. LDD series diode drivers has been designed as OEM product with easy integration. They have all protective features for reliable and safe long term operation. Embedded fan protects device from overheating and eliminate needs for additional cooling.

SPECIFICATIONS

Model		LDD-40-4	LDD-60-4	LDD-80-4
Maximal output	Operating mode		CW	
	Current	40 A	60 A	80 A
	Voltage range		1.1–4.8 V	
	Power	120 W	270 W	320 W *
Output current parameters	Rise/fall time		<100 ms	
	Regulation		<0.5%	
	Ripple		<0.5%	
	Measuring accuracy		±2%	
Auxiliary output			+12 V 0.5 A	
Powering	Voltage	88–264 V AC		24 V DC
	Input frequency	47–63 Hz		–
	Inrush current	20 A at 100 V; 40 A at 200 V		–
	PFC	Meets EN6100-3-2		–
Operating conditions	Temperature		0 to 40 °C	
	Humidity, non condensing		< 90%	
Size *(see drawing)*		190 × 180 × 70 mm		209 × 75 × 76 mm
Standards conformity	Safety	UL60950-1,CSA22.2 No.60950-1, EN60950-1, EN50178		–
	Immunity	IEC61000-4-2(Level 2,3), -3(Level 3), -4(Level 3), -5(Level 3,4), -6(Level 3), -8(Level 4), -11		–

** More power is available on request*

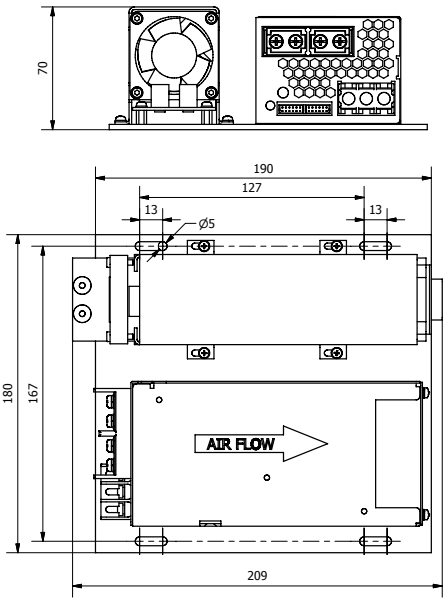

Fig 1. Mounting dimensions of LDD-60-4 driver

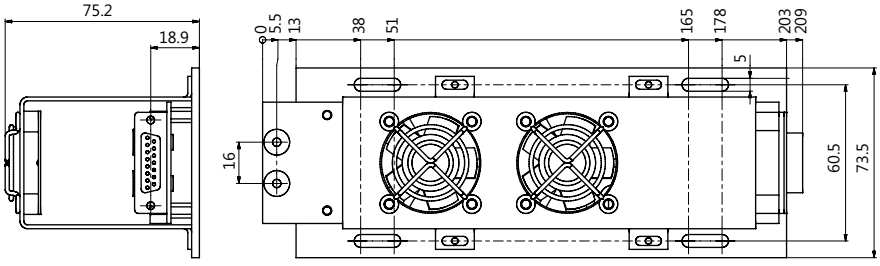

Fig 2. Mounting dimensions of LDD-80-4 driver

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LDD-40-4

LDD-60-4

LDD-80-4

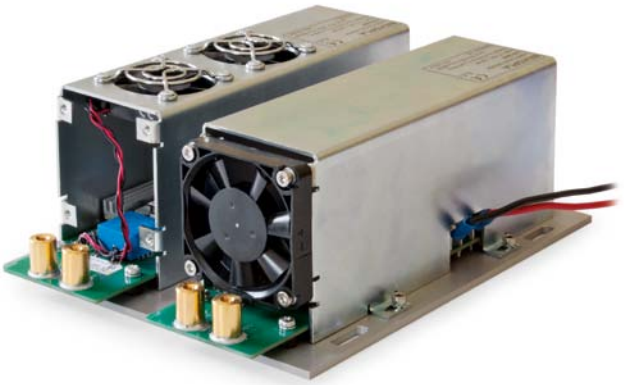

Fig 3. Example of possible customizations of laser diode drivers

DESCRIPTION OF CONTROL SIGNALS OF LDD SERIES DRIVERS

Connector type: 15 pin D-SUB female

Pin	Pin Name and function	Description
1	Enable +5 to +15 V, Low=OFF=0 V	The Enable function turns the output section of the power supply ON and OFF. When the power supply is enabled, current is delivered to load as programmed via $I_{program}$(+), Pin 7. Rise times resulting from Enable are approximately 100 msec
2	Current OK output	Delivers low level on attempt to set current via Current program input higher as set limit by internal trimmer. Useful if connected diode has maximal rated current which is lower as maximal driver output current
3	Interlock	The Interlock function can be connected to external interlock switches such as door or overtemp switches
4	GND	Interface return
5	Voltage monitor 0–5 V	Monitor output for direct measuring of diode voltage
6	Current monitor 0–10V = 0–I_{outmax}	The output current of the supply can be monitored by Current monitor output
7	Current program 0–10V = 0–I_{outmax}	The power supply output current is set by applying a 0–10 V analog signal to Current program input
8	NC	
9	GND	Interface return
10, 11	+5 V 0.5 A output	Auxiliary +5V power supply for user
12, 13	NC	
14	+12 V 0.5 A output	Auxiliary +12V power supply for user
15	GND	Interface return

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CHARGER 03
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Laser Power Supplies

PRINCIPLE OF OPERATION OF PS5000 SERIES FLASHLAMP DRIVERS

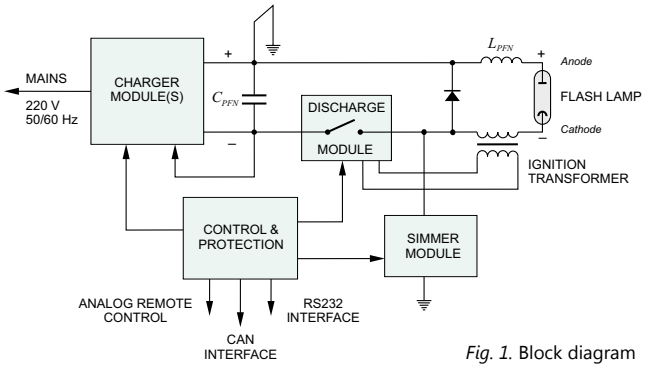

Fig. 1. Block diagram

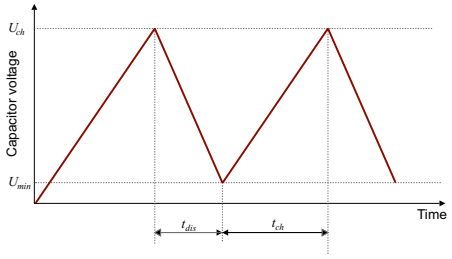

Fig. 2. Voltage waveform on capacitor C_{PFN}

The block diagram of PS5000 series power supplies is shown in *Fig. 1*.

As can be seen from voltage waveforms *(Fig. 2)*, two periods of operation can be distinguished.

During the first period, t_{ch}, the capacitor C_{PFN} is charged to pre-set voltage U_{ch}. During the second period of time t_{dis} energy stored in capacitor is discharged trough flashlamp. At the end of discharge pulse the voltage on capacitors drops to U_{min} value.

The charger module charges the capacitor bank with constant current. The instant output power of the charger reaches the maximal value P_{peak} when the capacitor bank voltage is in proximity of U_{ch}. Peak output power of the charger depends on charger module design and is specified at 1.7 kJ/s for a single module. By paralleling charger modules, the peak charger output can be increased to 6.8 kJ/s and more.

The discharge module is based either on SCR producing a fixed pulsewidth pulse or IGBT switch producing variable pulsewidth output. Discharge time is constant, t_{dis} = 5 ms, for fixed pulsewidth models and equals to the output pulse duration for variable pulsewidth models.

The simmer module is used to keep a low power discharge during the period of time between main discharge pulses.

The control and protection module provides protection against overvolt, overheat, short circuit and flashlamp damage as well as an interface for remote control.

FIXED PULSEWIDTH OUTPUT

The pulse duration of fixed pulsewidth flashlamp drivers is determined by parameters of PFN. Contact EKSPLA for determination of values of PFN components subject to required pulse energy and duration and flashlamp type.

The discharge switch is based on SCR and all energy stored in capacitor bank is discharged trough the flashlamp.

The average power delivered to the flashlamp can be expressed as

$$P_{avg} = \frac{N \cdot P_{peak}}{2}\left(1 - f_{PRR} \cdot t_{dis}\right) \qquad (1)$$

where N is number of charging modules, t_{dis} is discharge time equal to 5 ms, f_{PRR} – pulse repetition rate.

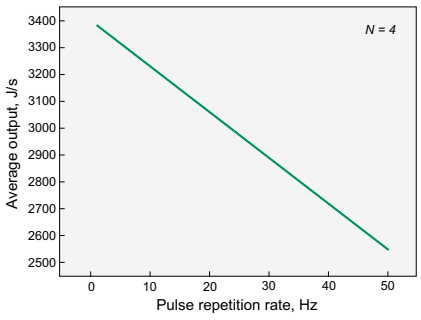

Fig. 3. Fixed pulsewidth driver average output power versus pulse repetition rate

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VARIABLE PULSEWIDTH OUTPUT

The pulse duration of variable pulsewidth driver is controlled by electronic switch, based on IGBT transistor. The pulse shape is close to rectangular as can be seen from *Fig. 4*.

The average power delivered to the flashlamp can be expressed as

$$P_{avg} = N \cdot P_{peak} \cdot \left(1 - \frac{\Delta U}{2 \cdot U_{ch}}\right) \cdot \left(1 - t_{dis} \cdot f_{PRR}\right)$$

There are few other factors limiting average power, though. Since the capacitor bank is only partially discharged during the pulse, to avoid damage of electronic components the voltage drop during discharge period of time should be less than 20%, i.e. $\Delta U/U_{ch} < 0.2$, which in turn places limitation for maximum pulse energy:

$$E_{pulse} < \left(1 - \left(1 - \frac{\Delta U}{U_{ch}}\right)^2\right) \cdot E_C$$

where E_C is energy stored in capacitor bank, E_{pulse} is pulse energy.

The maximum possible pulse energy is 480 J for C_{PFN} = 13.2 mF version and 960 J for C_{PFN} = 26.4 mF one.

On the other hand, the energy E_{pulse} delivered to the flashlamp depends on the pulse duration and flashlamp impedance parameter K_0:

$$K_0 = 1.28 \cdot \frac{l}{d} \cdot \left(\frac{p}{x}\right)^{0.2},$$

where l is arc length, d is bore diameter, p is fill pressure in Torr, and x is a constant, 450 for xenon filled flashlamps and 800 for krypton filled flashlamps.

For given pulse duration and flashlamp impedance parameter, the energy delivered to the flashlamp can be found from *Fig. 6*.

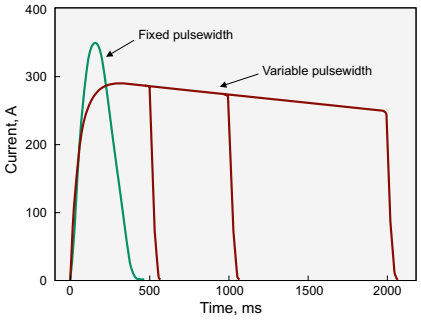

Fig. 4. Output pulse shape for fixed and variable pulsewidth drivers

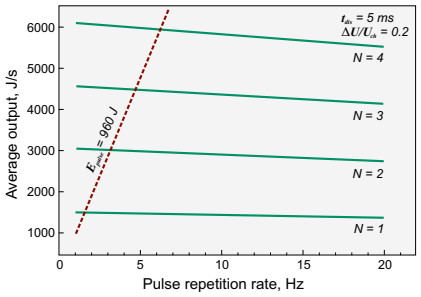

Fig. 5. Average power versus pulse repetition rate for variable pulsewidth drivers

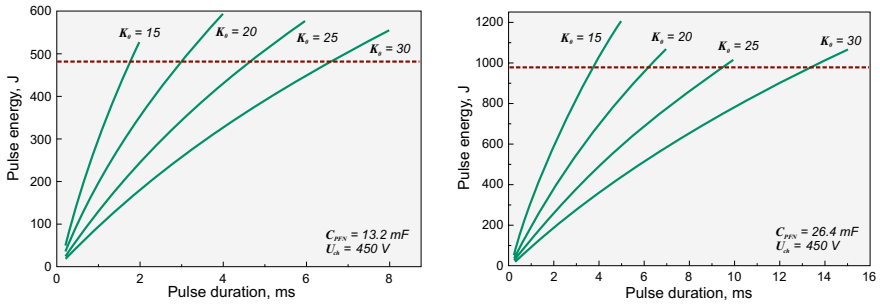

Fig. 6. Pulse energy versus pulse duration for variable pulsewidth drivers

REMOTE CONTROL & SEAMLESS INTEGRATION

Microprocessor based control allows seamless integration of the driver into sophisticated laser systems. The charge voltage, repetition rate, pulse duration can be controlled remotely trough analog or digital (RS-232 and CAN) interfaces. In addition, digital interfaces allow monitoring of status and error messages.

The discharge pulse can be triggered from external pulse generator facilitating synchronisation of several units.

The driver can be easily integrated with EKSPLA cooling units (like PS1245CO and PS1222CO). Up to 6 units can be mounted into up to 25U height 19" racks providing powerful yet compact laser pumping cabinets.

Standard range includes racks of 9U, 12U, 16U, 20U, 25U, 34U height.

Flashlamp driver PS5053 and cooling unit PS1222CO mounted into a 9U rack

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GUIDE ON OUTPUT CURRENT SHAPES USED IN DIFFERENT POWER SUPPLIES

COMPARISON TABLE OF FLASHLAMP POWER SUPPLIES

Model	Output current	Configuration	Simmer
PS5050	Shape № 1	1 channel	Yes
PS5053	Shape № 1	2 independent channels	Yes
PS5140 series	Shape № 1	1 charging unit & 1 – 10 synchronous discharging channels	N/A
PS5021	Shape № 2	1 channel	Yes
PS5022	Shape № 3	1 channel	Yes

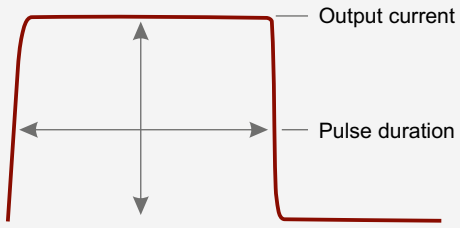
Output Current Shape № 3

FEATURES

- Tunable output pulse duration from 200 µs to 200 ms or even more
- High discharge energy during short discharge time
- Output insensitive to lamp type
- Stabilized output current value can be tuned from 40 A to 80 A (160 A)
- Used in model PS5022

APPLICATIONS

- Pulsed lighting and particularly IPL
- Solar simulation
- Laser pumping



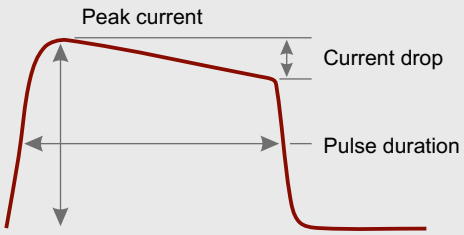
Output Current Shape № 2

FEATURES

- Tunable output pulse duration 300 µs to 2...5 ms
- Output is very sensitive to lamp type
- Maximal peak current can reach values of 600, 1200, 1800 A (options)
- Used in model PS5021

APPLICATIONS

- Laser pumping
- Pulsed lighting



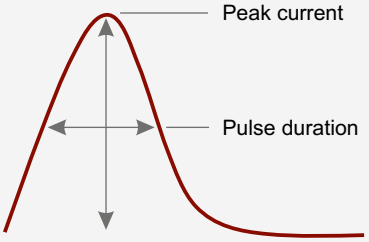
Output Current Shape № 1

FEATURES

- Fixed output pulse duration ≤500 µs typical
- High discharge energy during short discharge time
- Output sensitive to lamp type
- Peak current value can reach several kA
- Used in models PS5050, PS5053, PS5140

APPLICATIONS

- Laser pumping
- Pulsed lighting if high UV level is desirable



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VARIABLE PULSE DURATION FLASHLAMP DRIVER PS5021

FEATURES

- Built-in serial ignition circuit
- Built-in simmer power supply
- Internal/external triggering
- Remote control through CAN/RS-232 interface

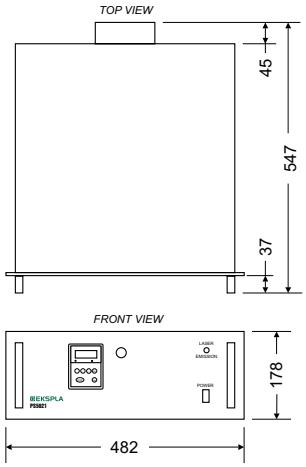

Fig. 1. Physical dimensions

Ordering / Part number information

Please indicate following points by inquiry:

- Flash lamp type (bore diameter, gap length, gas type and pressure)
- Maximal pulse energy
- Pulse duration tuning range
- Maximal pulse repetition rate

PS5021-1-13200-20-4.5

Model
Number of charging modules
PFN capacitance, C_{PFN}, in µF
PFN inductance, L_{PFN}, in µH
Charge voltage, in hundreds of Volts

Specifications in table are given as reference. We always suggest to optimize power supply by customer's usage conditions.

PS5021 flashlamp driver is designed for pumping of variable or long pulsewidth solid-state lasers. It features variable pumping pulse in 0.5–2 ms range and output voltage of up to 450 V. Custom versions can achieve tens of milliseconds pulse duration.

Excellent pulse-to-pulse voltage stability. The charger is based on resonant inverter topology which is most efficient way to charge capacitive loads. Innovative design of charger circuit allows to charge capacitor bank with an excellent precision of 0.2%.

Built-in serial ignition circuit. The driver features a built-in serial ignition circuit. It greatly simplifies the design of laser head since external triggering circuit is not required anymore. The simmer module provides up to 900 V striking voltage. The flashlamp is ignited by 16 kV pulse of approximately 1 µs duration, applied to the flashlamp cathode. The ignition circuit reliably ignites flashlamps with up to 200 mm arc length.

Remote control. Microprocessor-based control allows seamless integration of the driver into sophisticated laser systems. The charge voltage, repetition rate and pulse duration can be controlled remotely through RS-232 and/or CAN interface. In addition, the interface allows monitoring of status and error messages. The discharge pulse can be triggered from external pulse generator facilitating synchronisation of several units.

Built-in simmer power supply. The simmer power supply improves pulse-to-pulse stability and flashlamp lifetime. It is a constant current source producing 600 mA current at up to 300 V output voltage. Other current values are available optionally. Linear xenon flashlamps of 4–6 mm bore diameter and arc length of more than 200 mm are reliably simmered.

Modular design. The output parameters of power supply can be easily modified to meet customer needs subject to active lasing material, average output power or pulse energy. The average output power of the driver can be scaled up by paralleling several charger modules. Up to four modules with resulting 6.8 kJ/s peak charging rate can be fitted into a single 19" body.

Seamless integration. The driver can be easily integrated with EKSPLA cooling units of PS1222, PS1223 and PS1245 series. Up to 6 units can be mounted into up to 25U height 19" racks providing powerful yet compact laser pumping cabinets.

GENERAL SPECIFICATIONS

Number of independent outputs		1	
Number of charging modules	1	2	3
Max. average output power P_{avg} at 10 Hz PRR [1]	1.3 kJ/s	2.6 kJ/s	4.0 kJ/s
Standard charging voltage U_{ch}		350 V, 450 V, 500 V	
Pulse duration		variable	
Max pulse repetition rate		250 Hz	
Pulse to pulse voltage stability		0.2 %	
Resolution		1 V	
Ignition pulse voltage		16 kV	
Ignition pulse duration		> 1000 ns	
Simmer current options		0.6 A; 1.2 A; tunable 0.1 - 1 A	
Simmer voltage		< 300 V	
Striking voltage		< 900 V	
Protection features		overvolt, overheat, flashlamp breakdown, interlock	
Error report		no simmer current, no charge, HV connectors	
Remote control		RS-232 / CAN (CANopen on request)	
Standard C_{PFN} value		13200 or 26400 µF	
Mains		single phase 230 V (-10%, +6%) or 3-phase 380 V (-10%, +6%) [2]	
Power consumption, average	1.8 kW	3.2 kW	4.5 kW
Power consumption, peak	2 kW	4 kW	6 kW
Operation conditions			
Ambient temperature		from 0 to +40 °C	
Humidity		from 10 to 90 % non-condensing	

[1] *See Fig. 5 on page 3 for other repetition rates.*

[2] *3-phase 200 V or 208 V mains are optional.*

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STABILIZED CURRENT FLASHLAMP DRIVER PS5022

FEATURES

- Stabilized output current
- Built-in serial ignition circuit
- Built-in simmer power supply
- Internal/external triggering
- Remote control through CAN/RS-232 interface

PS5022 power supply (flashlamp driver) is designed for xenon or krypton flashlamp driving with square pulse of stabilized current. Application can include flash lamp pumping of lasers, various kinds of pulsed lighting, particularly IPL for medicine and cosmetics, solar simulation, light source for spectroscopy... Output pulse duration can be easy tuned in range from few hundreds of microseconds to tens or hundreds of milliseconds or even optionally CW mode.
Built-in serial ignition circuit. The driver features a built-in serial ignition circuit. It greatly simplifies the design of laser head since external triggering circuit is not required anymore. The simmer module provides up to 900 V striking voltage. The flashlamp is ignited by 16 kV pulse of approximately 1 µs duration, applied to the flashlamp cathode. The ignition circuit reliably ignites flashlamps with up to 200 mm arc length.

Power supply contains capacitor charger, serial ignition network, simmer power supply, discharge current stabilizer and processor control board. It is not as sensitive to specifications of used flashlamp as other PS50xx models.
Control functions are accessible from front panel controls or remotely via RS232 or CAN interface. CAN-USB converter can be obtained for easy CAN interface access by personal computer. Set of BNC connectors on rear panel gives real-time lamp discharge control feature by external triggering pulses.
Burst mode is available by external triggering of power supply. Pulses to lamp are synchronous to sync in pulses and has duration and current as previously set from control panel of power supply or any interface of remote control.

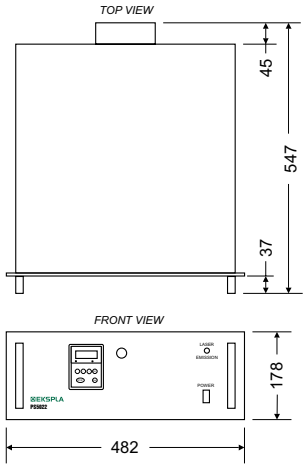


Fig. 1. Physical dimensions

GENERAL SPECIFICATIONS

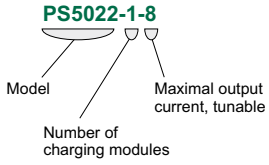
Model	PS5022-1-8	PS5022-2-8	PS5022-1-16	PS5022-2-16
Number of independent output channels	1			
Max average output power	1.3 kJ/s	2.6 kJ/s	1.3 kJ/s	2.6 kJ/s
Maximal output current, tuneable	80 A	80 A	160 A	160 A
Output current instability $(I_{max}-I_{min})/(I_{max}+I_{min})$	<4%			
Pulse duration	0.1...200 ms			
Pulse repetition rate, tuneable (INT/EXT triggering)	maximal value depends on pulse current, duration and charging rate option			
Standard charging voltage for main capacitor	450 V			
Simmer current options	0.6 A; 1.2 A; tunable 0.1 - 1 A			
Striking voltage	900 V			
Triggering modes	internal / external			
Sync input pulse requirement	≥10 µs; ≥10 V			
Sync. output pulse specifications	≥10 µs; ≥10 V			
Control	Front control panel			
Remote control	RS232, CAN			
Protection features	overvolt, overheat, flashlamp breakdown, interlock			
Error report	no simmer current, no charge, hv connectors			
Mains	1-phase, 230 V -10%/+6%, 50/60 Hz 3-phase, 400 V -10%/+6%, 50/60 Hz			
Average power consumption	1.8 kW	3.2 kW	1.8 kW	3.2 kW
Efficiency of charging modules	> 0.9			
Dimensions	19"×7" front panel, 460(D)×440(W) mm case			
Weight	up to 25 kg			

Specifications in table are given as reference. We always suggest to optimize power supply by customer's usage conditions.

Ordering / Part number information

Please indicate following points by inquiry:

- Flash lamp type (bore diameter, gap length, gas type and pressure)
- Maximal pulse energy
- Pulse duration
- Maximal pulse repetition rate



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FLASHLAMP DRIVER PS5050 FOR PULSED LASERS

PS5050 model flashlamp driver is designed for flashlamp-pumped lasers and establishes itself as an updated version of PS5010 driver. PS5050 features microprocessor control and back illuminated LCD display where all output parameters of power supply are conveniently displayed. Flashlamp driver comprises one or several charging modules, a discharge and simmer module and a control circuit. Such design allows the unit to be operated with the utmost ease and convenience. The unit is fitted into a 19" standard housing and may be comfortably mounted in your power supply stands. The unit is manufactured in conformity with EN61010 and EN55011 standards. Driver can be remotely controlled through RS-232 and CAN (Controller Area Network) interface.

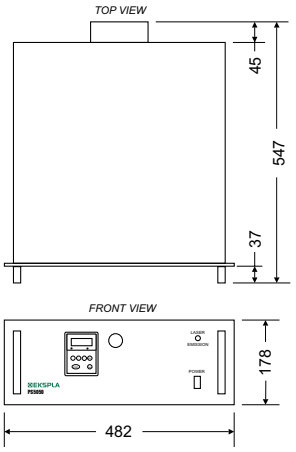

Fig. 1. Physical dimensions

FEATURES

- Output power up to 3.2 kJ/s
- Output voltage accuracy better than ±0.1 %
- Output voltage up to 2000 V
- Pulse repetition rate up to 150 Hz
- Built-in serial ignition circuit
- Built-in simmer power supply
- Internal/external triggering
- LCD display
- RS232/CAN interface for remote control
- Single phase mains

Customised flashlamp drivers are available upon request.

Depending on customer needs, we can produce flashlamp drivers with specific average charging power, output voltage, pulse duration, repetition rate values or/and specific application areas.

GENERAL SPECIFICATIONS

Number of independent outputs	1			
Number of charging modules	1	2	3	4
Max. average output power P_{avg} at 10 Hz PRR [1, 2]	0.8 kJ/s	1.6 kJ/s	2.4 kJ/s	3.2 kJ/s
Max charging voltage U_{ch}	1000–2500 V [3]			
Pulse duration	fixed			
Max pulse repetition rate	< 150 Hz			
Pulse to pulse stability	0.1 %			
Load regulation	0.1 %			
Resolution	1 V			
Ignition pulse voltage	16 kV [4]			
Ignition pulse duration	> 1000 ns			
Simmer current options	0.6 A; 1.2 A; tunable 0.1–1 A			
Simmer voltage	< 300 V			
Striking voltage	< 900 V			
Protection features	overvolt, overheat, flashlamp breakdown, interlock			
Error report	no simmer current, no charge, HV connectors			
Remote control	RS-232 / CAN (CANopen on request)			
Maximum C_{PFN} value	< 240 µF			
Mains	single phase 230 V (-10%, +6%) or 3-phase 380 V (-10%, +6%) [5]			
Power consumption, average	1.8 kW	3.2 kW	4.5 kW	5.8 kW
Power consumption, peak	2 kW	4 kW	6 kW	8 kW
Operation conditions				
Ambient temperature	from 0 to +40 °C			
Humidity	from 10 to 90 % non-condensing			

[1] *For parallel operation of four charging modules*
[2] *See Fig. 3 for other pulse repetition rates*
[3] *Inquire for other voltages*
[4] *Optional 30 kV*
[5] *3-phase 200 V or 208 V mains are optional*

Specifications in table are given as reference.
We always suggest to optimize power supply by customer's usage conditions.

Fig. 2. Front panel controls of PS5050 flashlamp driver

Fig. 3. Average output power versus pulse repetition rate

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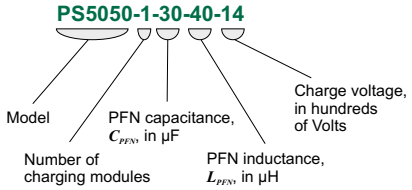
Ordering / Part number information

Please indicate following points by inquiry:

- Flash lamp type (bore diameter, gap length, gas type and pressure)
- Maximal pulse energy
- Pulse duration
- Maximal pulse repetition rate



CONFIGURATION EXAMPLES OF PS5050 SERIES POWER SUPPLIES

Ordering code	Discharge energy	Repetition rate	Maximal charging rate	Voltage	Flashlamp recommended	PFN specifications		
						Capacitance	Inductance	Pulse duration FWHM, typical
	J	Hz	J/s	V		μF	μH	μs
PS5050-1-30-60-16	38.4	10	384	1600	2×5×45; 450 Torr	30	60	89
PS5050-2-30-60-16	38.4	20	768	1600	2×5×58; 450 Torr	30	60	89
PS5050-2-60-100-16	76.8	10	768	1600	2×5×58; 450 Torr	60	100	163
PS5050-2-80-180-19	144.4	10	1444	1900	2×5×75; 450 Torr	80	180	264
PS5050-3-60-100-16	76.8	20	1536	1600	2×5×58; 450 Torr	60	100	163
PS5050-3-80-60-14	78.4	20	1568	1400	5×90; 450 Torr	80	60	146
PS5050-3-80-60-11	48.4	30	1452	1100	5×90; 450 Torr	80	60	152
PS5050-3-100-80-10	50	30	1500	1000	5×90; 450 Torr	100	80	197
PS5050-4-30-60-16	38.4	50	1920	1600	2×5×58; 450 Torr	30	60	89

Contact Ekspla if your requirements are different as in this table. We will consult you and make suggestion best matching your requirements.

TWO-CHANNEL FLASHLAMP DRIVER PS5053 FOR PULSED LASERS

FEATURES

- Output voltage up to 2000 V
- Single unit for oscillator-amplifier systems
- Built-in serial ignition circuit
- Built-in simmer power supply
- Internal/external triggering
- Output voltage accuracy ±0.1 %
- RS232/CAN interface for remote control
- Single phase mains

Flashlamp driver PS5053 is designed for flashlamp-pumped lasers and presents a two-channel device consisting of two capacitor charging, simmer/trigger and pulse forming modules and control circuit. It is excellent choice for oscillator-amplifier laser systems.

This model is an updated version of flashlamp driver PS5012. PS5053 features microprocessor control and back illuminated LCD display where all output parameters of power supply are conveniently displayed. Driver can be remotely controlled through RS-232 and CAN (Controller Area Network) interface.

Fig. 1. Flashlamp driver PS5053 and cooling unit PS1222CO mounted into a 9U rack

Fig. 2. Average output power versus pulse repetition rate

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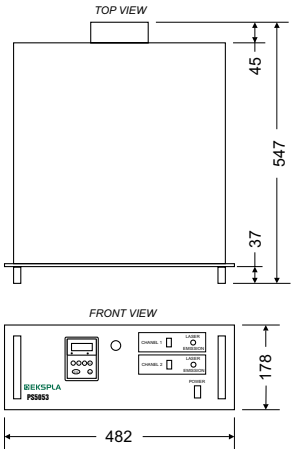
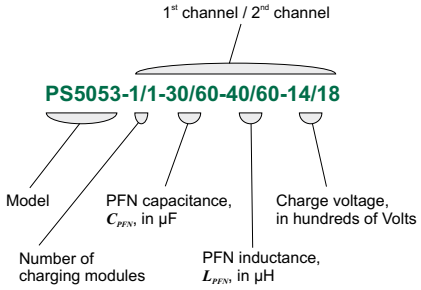


Fig. 3. Physical dimensions

Ordering / Part number information

Please indicate following points by inquiry:

- Flash lamp type (bore diameter, gap length, gas type and pressure)
- Maximal pulse energy
- Pulse duration
- Maximal pulse repetition rate



GENERAL SPECIFICATIONS

Number of independent outputs		2	
Number of charging modules for first and second channels	1+1	1+2	1+3 or 2+2
Max. average output power P_{avg} at 10 Hz PRR [1, 2]	1.6 kJ/s	2.4 kJ/s	3.2 kJ/s
Max charging voltage U_{ch}		1000–2500 V [3]	
Pulse duration		fixed	
Max pulse repetition rate		< 150 Hz	
Pulse to pulse stability		0.1 %	
Load regulation		0.1 %	
Linearity		0.2 %	
Resolution		1 V	
Ignition pulse voltage		16 kV [4]	
Ignition pulse duration		> 1000 ns	
Simmer current options		0.6 A; 1.2 A; tunable 0.1–1 A	
Simmer voltage		< 300 V	
Striking voltage		< 900 V	
Protection features		overvolt, overheat, flashlap breakdown, interlock	
Error report		no simmer current, no charge, HV connectors	
Remote control		RS-232 / CAN (CANopen on request)	
Maximum C_{PFN} value		< 240 µF [1]	
Mains		single phase 230 V (-10%, +6%) or 3-phase 380 V (-10%, +6%) [5]	
Power consumption, average	3.2 kW	4.5 kW	5.8 kW
Power consumption, peak	4 kW	6 kW	8 kW
Operation conditions			
Ambient temperature		from 0 to +40 °C	
Humidity		from 10 to 90 % non-condensing	

[1] Total for both channels
[2] See Fig. 2 for other pulse repetition rates
[3] Inquire for other voltages
[4] Optional 30 kV
[5] 3-phase 200 V or 208 V mains are optional

Specifications in table are given as reference.
We always suggest to optimize power supply by customer's usage conditions.

CONFIGURATION EXAMPLES OF PS5053 SERIES POWER SUPPLIES

Ordering code	Channel	Discharge energy	Repetition rate	Maximal charging rate	Maximal voltage	Flashlamp recommended	PFN specifications			Mains
							Capacitance	Inductance	Pulse duration FWHM, typical	
		J	Hz	J/s	V		µF	µH	µs	
PS5053-1/1-60/60-100/100-17/17	No 1	86.7	10	867	1700	2×5×58; 450 Torr	60	100	163	1-phase 230V
	No 2	86.7	10	867	1700		60	100	163	
PS5053-1/1-80/80-60/60-13/13	No 1	67.6	10	676	1300	5×90; 450 Torr	80	60	146	1-phase 230V
	No 2	67.6	10	676	1300		80	60	146	
PS5053-1/2-40/60-100/130-10/20	No 1	20	10	200	1000	5×45; 450 Torr	40	100	133	1-phase 230V
	No 2	120	10	1200	2000	2×5×75; 450 Torr	60	130	194	
PS5053-1/2-60/60-70/70-12/18	No 1	43.2	10	432	1200	5×90; 450 Torr	60	70	136	1-phase 230V
	No 2	97.2	10	972	1800	2×5×58; 450 Torr	60	70	136	
PS5053-1/2-80/60-60/100-12/18	No 1	57.6	10	576	1200	5×90; 450 Torr	80	60	152	1-phase 230V
	No 2	97.2	10	972	1800	2×5×58; 450 Torr	60	100	163	
PS5053-2/2-40/40-100/100-25/25	No 1	125	10	1250	2500	2×5×90; 450 Torr	40	100	139	3-phase 400V
	No 2	125	10	1250	2500		40	100	139	
PS5053-2/2-40/40-40/40-11/11	No 1	24.2	50	1210	1100	5×90; 450 Torr	40	40	84	3-phase 400V
	No 2	24.2	50	1210	1100		40	40	84	
PS5053-2/2-60/60-100/100-15/15	No 1	67.5	20	1350	1500	2×5×58; 450 Torr	60	100	163	3-phase 400V
	No 2	67.5	20	1350	1500		60	100	163	

Contact Ekspla if your requirements are different as in this table. We will consult you and make suggestion best matching your requirements.

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FLASHLAMP DRIVER PS5140 SERIES FOR HIGH ENERGY SYSTEMS

PS5140 model flashlamp driver is designed for single or multi-lamp pumping of high energy pump chambers usually based on phosphate glass rods. This is highly-customizable power supply containing one or two channel charging unit PS5140K and required quantity of one or two channel discharging units PS5140I. Each discharging channel is suited to drive one lamp. PS5140 has as many discharge channels as pump chamber has flashlamps. All discharging channels works synchronically. Description of PS5140 given here is only as one example of possibilities to built high energy powering system and it can be flexibly changed any time by ordering. All set of charging and discharging units can be mounted to 19" standard racks (sold separately).

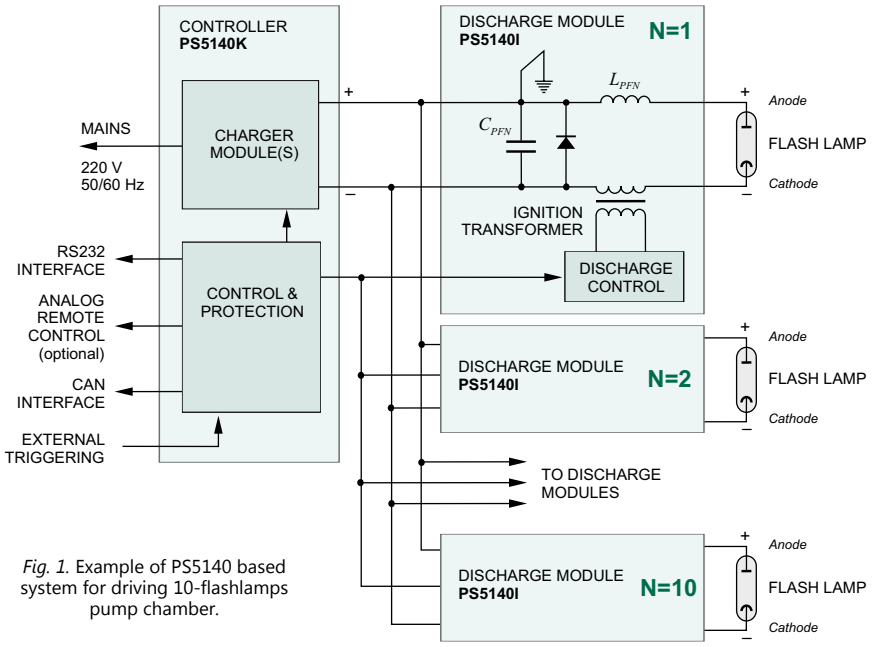

Fig. 1. Example of PS5140 based system for driving 10-flashlamps pump chamber.

FEATURES

- Up to 10 and more discharging channels with one charging channel
- Output voltage up to 3000 V
- Output voltage regulation better than ±0.3%
- Up to two discharge channels per one 19" case
- LCD display and menu user interface
- Built-in serial ignition circuit
- Internal/external triggering
- RS232/CAN computer interface

APPLICATIONS

- Glass amplifier pumping
- Intense pulsed lighting (IPL)

Fig. 2. Set of rack mounted PS5144K and PS5144I units

GENERAL SPECIFICATIONS *

Charging unit **PS514xK**				
Number of independent outputs	1 (2 as option)			
Number of charging modules	1	2	3	4
Max. average output power P_{avg}	0.8 kJ/s	1.6 kJ/s	2.4 kJ/s	3.2 kJ/s
Internal capacitor at output	10 µF			
Max capacitor bank charging voltage U_{ch}	3000 V			
Load voltage regulation	0.1 %			
Pulse to pulse stability	0.1 %			
Voltage linearity	0.2 %			
Protection features	overvolt, overheat, interlock			
Remote control	RS232 / CAN (CANopen as option)			
Triggering mode	internal/external			
Mains	Single phase, 230 V (-10%, +6%), 47–63 Hz			
Power consumption, average	< 1.8 kW	< 3.2 kW	< 4.5 kW	< 5.8 kW
Power consumption, peak	2 kW	4 kW	6 kW	8 kW
Dimensions	19"×7" front panel, 547(D) × 440(W) mm case			
Operation conditions				
Ambient temperature	0 to 40 °C			
Humidity	up to 90 %, non-condensing			

Discharging unit **PS514xI**	
Number of independent outputs	2 (1 as option)
Maximal capacitors bank voltage	3000 V
Maximal capacitors bank capacity at 3 kV	600 µF
Output pulse energy at 3000 V	2700 J
Typical repetition rate	<1 Hz
Ignition pulse amplitude	30 kV
Triggering mode	controlled by charging unit
Simmer	N/A
Mains	N/A
Dimensions	19"×10.5" front panel, 547(D) × 440(W) mm case
Operation conditions	
Ambient temperature	0 to 40 °C
Humidity	up to 90 %, non-condensing

* *Specifications are provided for illustrational purposes only. Please contact EKSPLA for quotation, tailored for Your requirements.*

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Laser Cooling Units

LASER COOLING UNIT PS1245CO

FEATURES

- Water-air cooling
- Deionizer and particle filter included
- Provides interlock signal on error
- Manual temperature setting on front panel
- Front panel indicators:
  – Coolant/set temperature;
  – Low coolant level;
  – Overheat;
  – No Flow
- 19" standard case

Cooling unit PS1245CO is designed for flashlamp-pumped lasers and provides effective heat removal and high stability of laser rod temperature. This enables long term operation of your laser at maximum efficiency. Unit is assembled in 19" chase and may be used completing the powering group of laser systems. Also it can be mounted into the 19" rack.

Operation of cooling unit is based on water-to-air heat exchange. Deionised or distilled water of 1-20 µS/cm conductivity is used in laser loop of cooling unit.

Temperature stability of coolant is maintained by electronic circuit. Stabilization temperature is set by 10-turn potentiometer within 25-45 °C (another range is available according to customers requests).

Indication of coolant and set temperature, coolant level, overheat and pressure absence in laser loop is provided on front panel of cooling unit.

Blocking and protection circuitry in case of overheating, pressure absence or when coolant level is out of low limits sends interrupt signal to interlock connector to which protection circuitry of laser powering might be connected. Coolant pump will be stopped in case of pressure absence or coolant level is out of limits.

Deionisation and filtration of coolant eliminates a build up on the flashlamp, reduces servicing need and allows laser operation at maximum efficiency in day-to-day use.

SPECIFICATIONS

Model	PS1245CO-0.5	PS1245CO-1.0	PS1245CO-1.5	PS1245CO-2.0
Recommended cooling capacity [1)]	500 W	1000 W	1500 W	2000 W
To laser temperature regulation	±1 °C (analog proportional control)			
Range of temperature	25–50 °C			
Coolant reservoir capacity	4 dm^3			
Maximum coolant pump pressure	3.0 bar			
Water pumping capacity	Up to 7 l/min			
Coolant	distilled or deionised water with 1–20 µS/cm conductivity			
Mains	single phase, 180–250 V, 50/60 Hz			
Power consumption	≤ 230 W			
Size	19" × 7U front panel, 507 mm × 442 mm case			
Weight	15 kg			

[1)] Power capacity possible to dissipate when temperature difference between water and ambient is 10°C.

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LASER COOLING UNIT PS1222CO

FEATURES

- Water-to-water cooling unit
- Deionizer and particle filter included
- Provides interlock signal on error
- Manual temperature setting on front panel
- Coolant temperature indication
- Water filtration and deionisation
- Noiseless operation
- 19″ × 4U case
- 17–35°C temperature range

Cooling unit PS1222CO is designed for flashlamp-pumped lasers and provides effective heat removal and high stability of laser rod temperature. This enables long term operation of your laser at maximum efficiency. Unit is assembled in 19″ chase and may be used completing the powering group of laser systems.
Also it can be mounted into the 19″ rack.

Operation of cooling unit is based on water-to-water heat exchange. Deionised or distilled water of 1-20 µS/cm conductivity is used in laser loop of cooling unit.

Temperature stability of coolant is maintained by electronic circuit. Stabilization temperature is set by 10-turn potentiometer within 17-35 °C (another range is available according to customers requests).

Indication of coolant and set temperature, coolant level (low/high), overheat and pressure absence in laser loop is provided on front panel of cooling unit. Purity low LED indicate condition of deonisation cartridge.

Blocking and protection circuitry in case of overheating, pressure absence or coolant level is out of high/low limits sends interrupt signal to interlock connector to which protection circuitry of laser powering might be connected. Coolant pump will be stopped in case of pressure absence or coolant level is out of limits.

Deionisation and filtration of coolant eliminates a build up on the flashlamp, reduces servicing need and allows laser operation at maximum efficiency in day-to-day use.

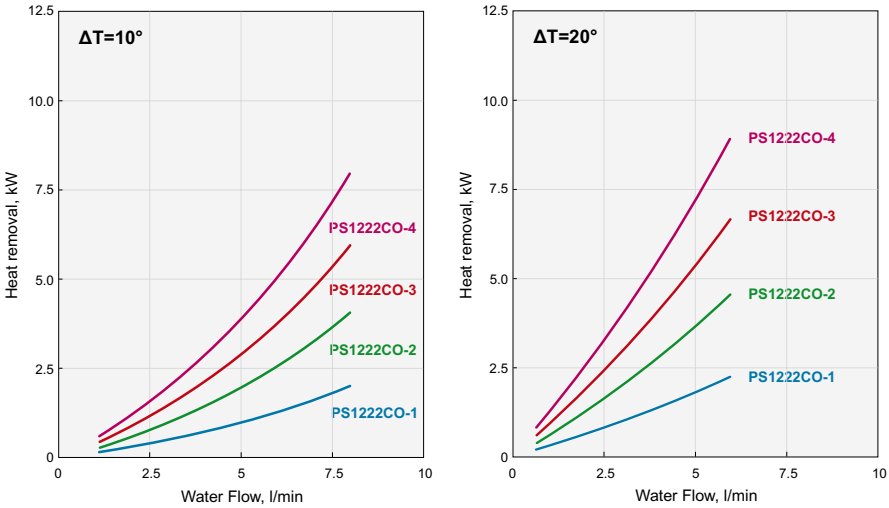

Fig. 1. Cooling capacity

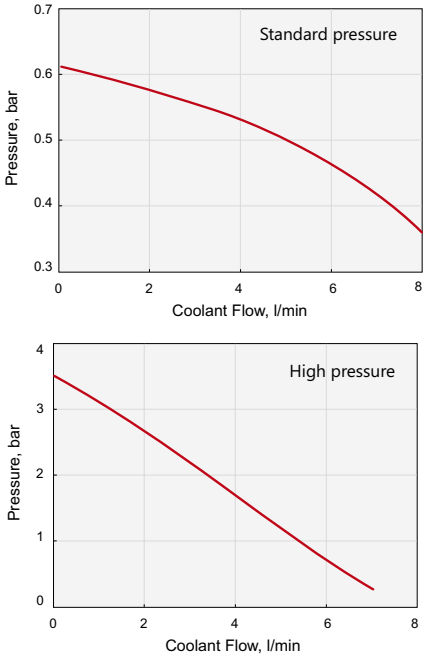

Fig. 2. Pumping capacity with standard and high pressure pump

SPECIFICATIONS

Model	PS1222CO-1	PS1222CO-2	PS1222CO-3	PS1222CO-4
Recommended cooling capacity [1]	1000 W	2000 W	3000 W	4000 W
To laser temperature regulation	±0.2 °C	±0.2 °C	±0.3 °C	±0.3 °C
Stabilization temperature range	17–35 °C			
Coolant reservoir capacity	3.5 dm^3			
Max pressure of pump	0.6 bar (3.0 bar optional)			
Coolant	distilled or deonised water with 1–20 µS/cm conductivity			
Mains	single phase, 180–250 V, 50/60 Hz			
Power consumption	130 W			
Water supply pressure	1 to 8 bar			
Size	19″ × 4U front panel, 460 mm (D) × 440 mm (W) case			
Weight (without coolant)	20 kg			

[1] *Power capacity possible to dissipate when temperature difference between coolant to laser and tap water is 10°C.*

Specifications are subject to changes without advance notice.

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LASER COOLING UNIT PS1223CO

FEATURES

- Water-to-water cooling unit in 19″ rack mount stainless steel case
- Cooling capacity 0–5 kW (at temperature difference 10 °C)
- PID controller based temperature regulation in range 15–35 °C, better than 0.1 °C stability
- Smooth supply water flow regulation by proportional valve
- Controlled deionizer maintains constant coolant conductivity (preset in range 1..100 uS/cm)
- Easy replaceable particle filter, accessed from front panel
- Coolant pressure can be reduced using Bypass valve
- Graphic display
- Overheat, overpressure, low flow, low coolant level warnings and error stop, error indication by LED, beeper, display, interlock connector, remote control interfaces
- Optional heater with programmable power in range 0..1 kW speeds up temperature settling at startup
- Optional USB, Ethernet interface for installation adjustment and remote control
- Optional RS232, RS485, CAN interfaces

Cooling unit PS1223CO is second generation of water-to-water cooling units designed for flashlamp-pumped lasers. Microcontroller operated PS1223CO has better performance than PS1222CO while maintaining full backward compatibility.

PID controller smoothly regulates water flow thru heat exchanger maintaining high stability of output temperature in a wide range of removed heat (*Fig. 1*).

4 digital thermometers measure temperature of coolant at output, return, tank and water supply. Coolant flow, pressure, tank water level and conductivity are also measured. Using this data microcontroller stabilizes output temperature, estimates removed heat, generates early warnings and errors. All data can be accessed by any of interface: USB, Ethernet or optional RS232, RS485, CAN. Test and adjustment utility program for Windows is included (for use with USB interface).

Coolant flow and output pressure can be adjusted manually using bypass valve, located inside unit and accessible when front panel is open (*Fig. 2*).

Maximum heat removal capability of the PS1223CO depends on temperature difference between coolant output temperature and supply water temperature (*Fig. 3*)

SPECIFICATIONS

Cooling capacity at dT=10 °C* :	
for PS1223CO-3	0–3 kW
for PS1223CO-5	0–5 kW
Output temperature regulation	±0.1 °C, (typ. ±0.05 °C)
Stabilization Temperature range	15–35 °C
Coolant flow range	1–6 l/min
Maximum output pressure with bypass valve closed, zero flow	3.0 Bar
Coolant	deionized or distilled water
Coolant reservoir capacity	3.5 l
Maintained coolant conductivity	1..100 µS/cm
Required Water supply pressure	1-8 bar
Required Water drain pressure	<0.3 bar
Mains	single phase 180–250 V, 50/60 Hz
Power consumption (without heater)	<200 W
Size	19″ 4U, depth 500 mm max.
Weight	<20 kg

** Cooling capacity is limited by Supply water consumption.*

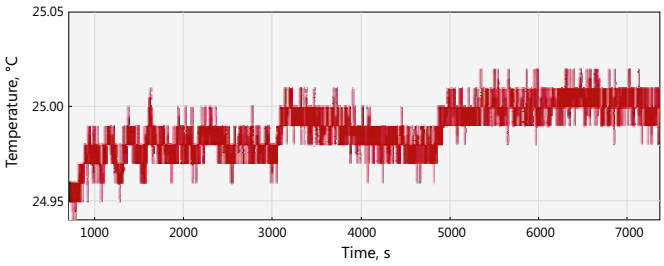

Fig. 1. Output temperature stability

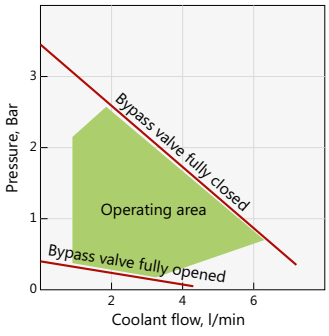

Fig. 2. Coolant pressure and flow – operating limits (preliminary data)

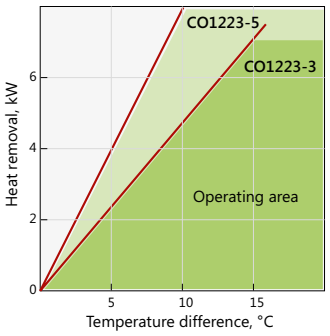

Fig. 3. Heat removal capability (preliminary data)

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Pump Chambers

EKSPLA manufactures high efficiency pump chambers for pumping of various active elements (Er:YAG, Er: YLF, Nd:Glass, Nd:KGW, Nd:YAG, Nd:YLF, Nd:YVO, Yb:YAG, etc.). Uniform rod pumping is provided by close diffuse reflector design.

DFM PUMP CHAMBER

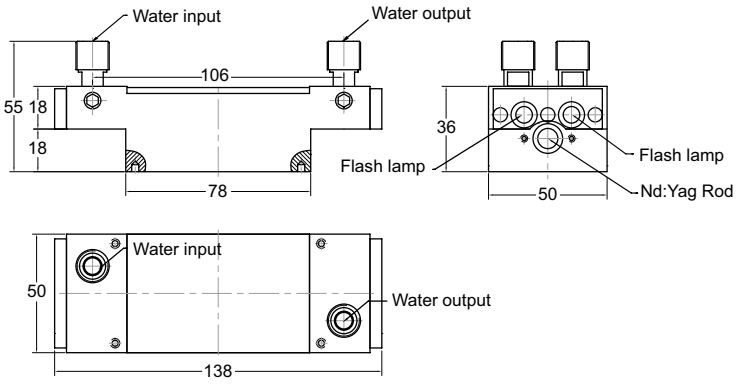
FEATURES

- Two FL type flashlamps for active element pumping
- O-ring type seals for flashlamps and active element
- Close coupling design for high pumping efficiency
- Diffuse high efficiency ceramics reflectors
- Active element – flashlamp sequential cooling scheme
- Sm-glass plate for removal of UV radiation
- Connectors for high voltage wires included
- Connectors for water hoses (9 (ID) × 12(OD)) included
- Typical efficiency (for 6 ns pulses at 1064 nm) approx. 1%

SPECIFICATIONS

Model	DFM-58-8	DFM-58-10
Active element dimensions	Ø8 × 85(min) mm	Ø10 × 85(min) mm

Specifications are subject to changes without advance notice.



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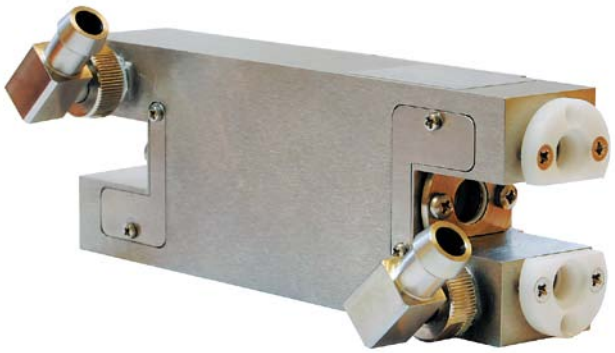
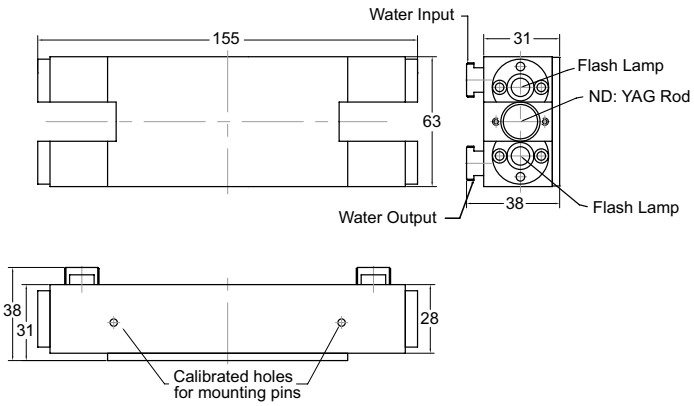
TM3 PUMP CHAMBER





FEATURES

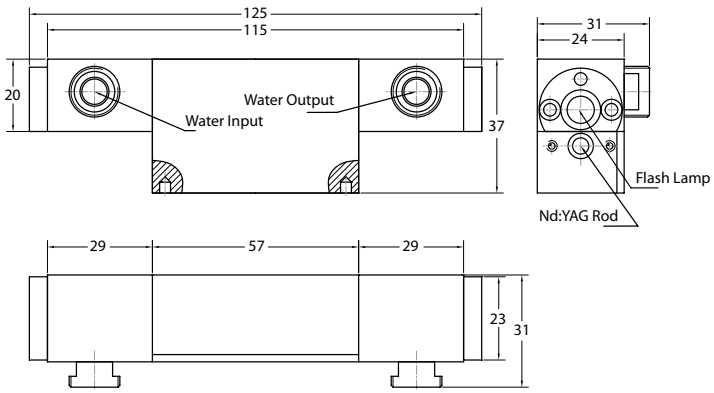
- Two FL type flashlamps for active element pumping
- O-ring type seals for flashlamps and active element
- Close coupling design for high pumping efficiency
- Diffuse high efficiency ceramics reflectors
- Active element – flashlamp sequential cooling scheme
- Sm-glass plate for removal of UV radiation
- Connectors for high voltage wires included
- Connectors for water hoses (9 (ID) × 12(OD)) included
- Typical efficiency (for 6 ns pulses at 1064 nm) approx. 0.7%

SPECIFICATIONS

Active element dimensions	
TM-3-75-6.3	Ø6.3 × 100 mm
TM-3-75-8	Ø8 × 100 mm
TM-3-75-10	Ø10 × 100 mm
TM-3-75-12	Ø12 × 100 mm

Specifications are subject to changes without advance notice.

MA1 PUMP CHAMBER



FEATURES

- One FL type flashlamp for active element pumping
- O-ring type seals for flashlamp and active element
- Close coupling design for high pumping efficiency
- Diffuse high efficiency ceramics reflectors
- Active element – flashlamp sequential cooling scheme
- Sm-glass plate for removal of UV radiation
- Connectors for high voltage wires included
- Connectors for water hoses (9 (ID) × 12(OD)) included

SPECIFICATIONS

Model	MA-1-45	MA-1-58	MA-1-75
Active element dimensions	Ø3 × 65 mm Ø4 × 65 mm	Ø4 × 85 mm Ø5 × 85 mm Ø6 × 85 mm	Ø4 × 100 mm Ø5 × 100 mm Ø6 × 100 mm

Specifications are subject to changes without advance notice.

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NL301 PUMP CHAMBER

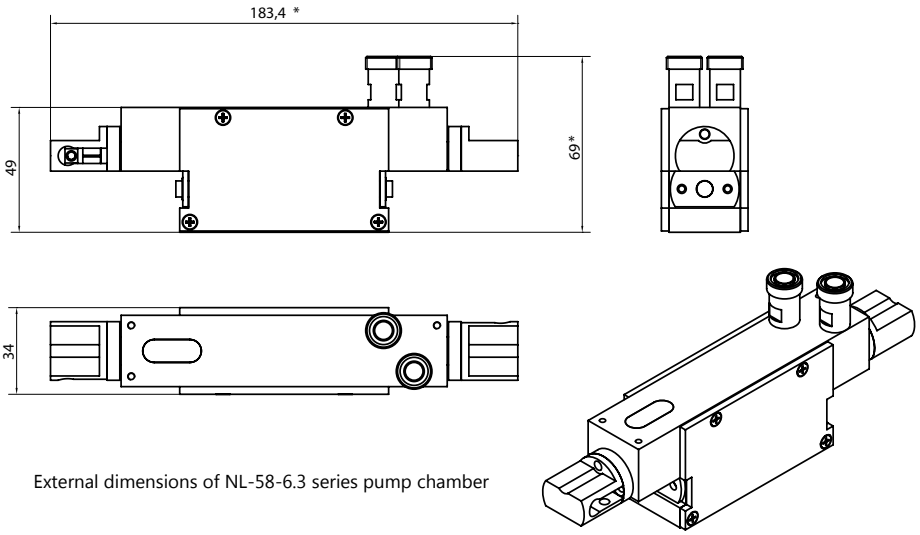
FEATURES

- One FL type flashlamp for active element pumping
- O-ring type seals for flashlamp and active element
- Close coupling design for high pumping efficiency
- Diffuse high efficiency ceramics reflectors
- Active element – flashlamp sequential cooling scheme
- Sm-glass plate for removal of UV radiation
- Connectors for high voltage wires included
- Connectors for water hoses (9 (ID) × 12(OD)) included
- Typical efficiency (for 6 ns pulses at 1064 nm) approx. 1%

SPECIFICATIONS

Model	NL301-58-4	NL301-58-6.3
Active element dimensions	Ø4 × 85 mm	Ø6.3 × 85 mm

Specifications are subject to changes without advance notice.



External dimensions of NL-58-6.3 series pump chamber

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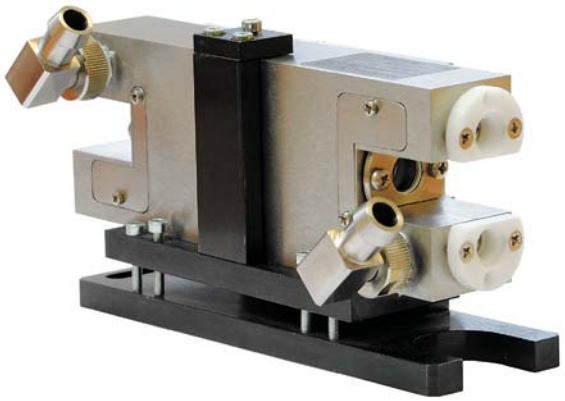
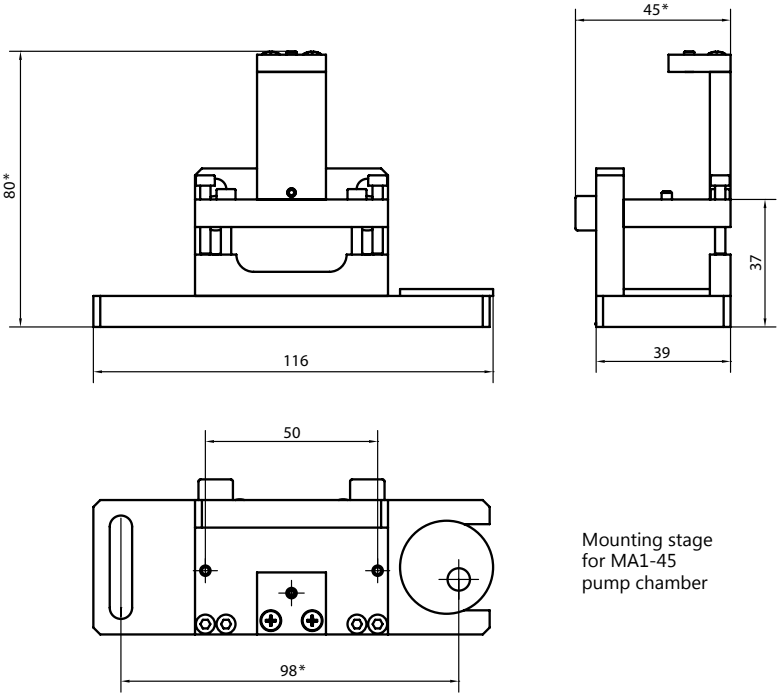
MOUNTING STAGE FOR PUMP CHAMBERS

Mounting stage for pump chamber



Mounting stage with mounted TM-2-75 pump chamber

Each type of pump chamber can be mounted on suitable stage. Examples of stages for MA1-45 , TM-2-75 and TM-3-75 chambers are shown. Inquire for different types of stages.



Mounting stage for MA1-45 pump chamber

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MA SERIES PUMP CHAMBERS FOR Nd:YAG ACTIVE ELEMENTS

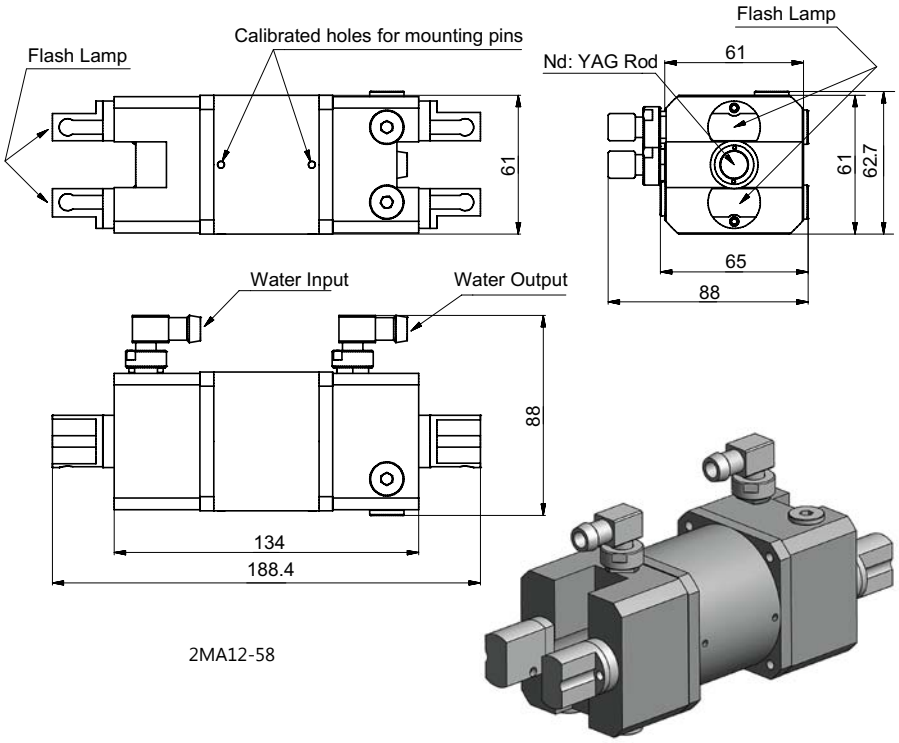
FEATURES

- FL-58 type flashlamps (5×58mm) for active element pumping
- O-ring type seals for flashlamp and active element
- Close coupling design for high pumping efficiency
- Diffuse high efficiency ceramics reflectors
- Active element – flashlamp sequential cooling scheme
- Sm-glass filter for removal of UV radiation
- Connectors for high voltage wires included
- Connectors for water hoses (9 (ID)×12(OD)) included
- Typical stored energy 1% of pump

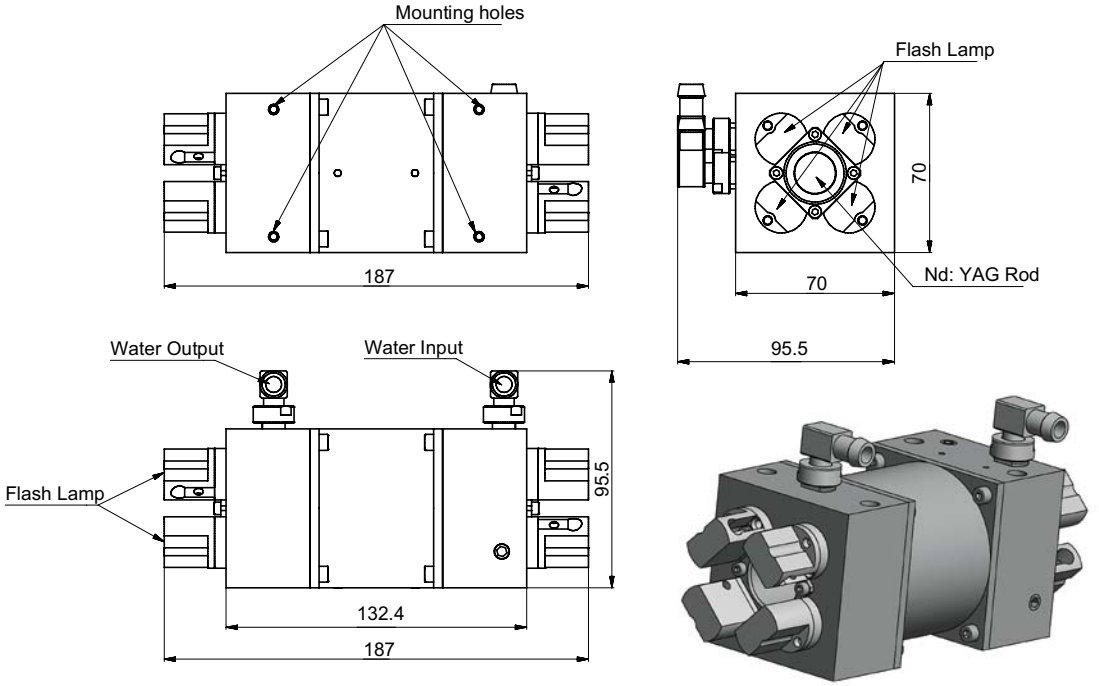
SPECIFICATIONS

Model	2MA12-58	4MA18-58	4MA25-58
Active element dimensions	Ø12.2 × 85 mm	Ø18.2 × 85 mm	Ø25.2 × 85 mm
Quantity of Flashlamps (Ø5 × 58 mm)	2	4	4

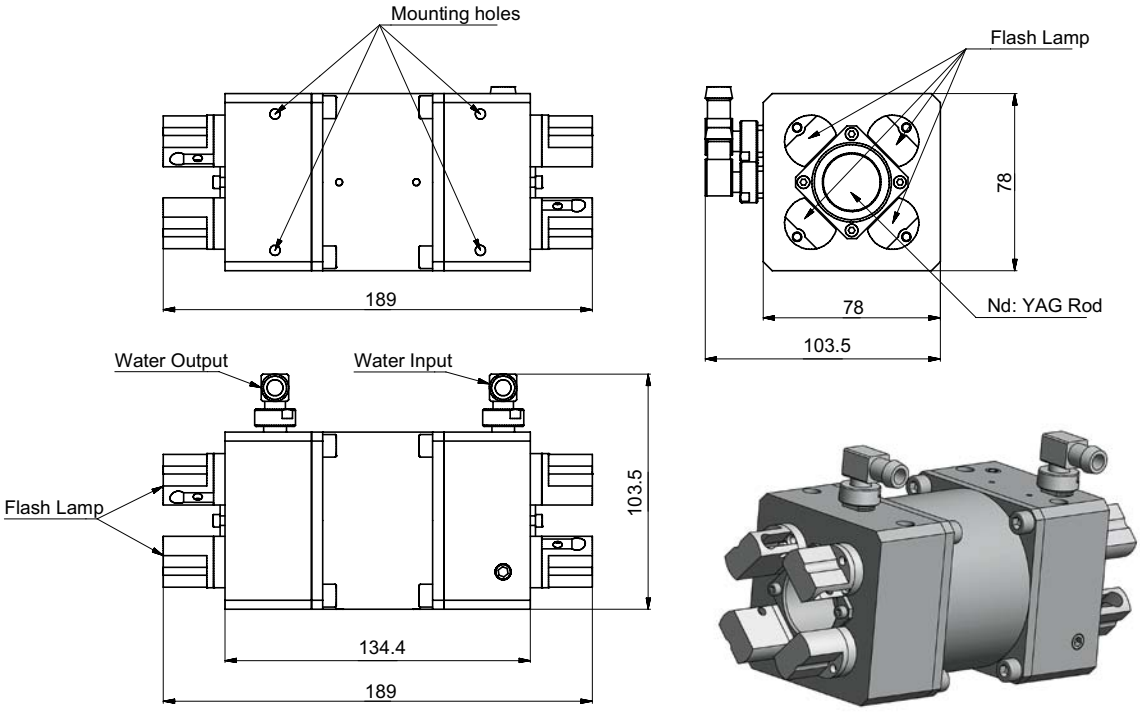
Specifications are subject to changes without advance notice.



2MA12-58



4MA18-58



4MA25-58

MA SERIES PUMP CHAMBERS FOR HIGH ENERGY GLASS AMPLIFIERS

Four lamp version of pump chamber for 40 × 300 rod size (type MA40-4).

MA series pump chambers for Nd:Glass rods are presented in table below. Customized versions can vary in rod sizes and quantity of flash lamps. PS5140 series power supplies are recommended for driving.

SPECIFICATIONS

Parameter	MA40-6	MA60-10
Rod size (diameter × length)	40×300 mm	60×300 mm
Type of flashlamp (bore × gap length)	16×250 mm	
Quantity of flashlamps	6	10
Recommended pumping energy (all lamps)	13000 J	22000 J
Beam height	180 mm	
Footprint size (including cable connections)	180×550 mm	
Chamber height (including mounting pad)	255 mm	265 mm

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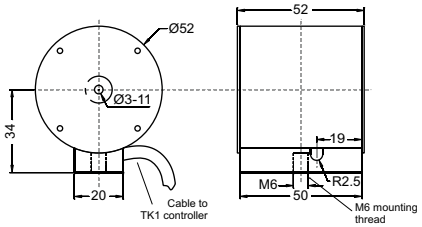
Ovens for Nonlinear Crystals

TEMPERATURE CONTROLLER TK1 WITH OVEN KK1



TK1 and KK1 dimensions

TK1 and KK1 is high temperature set (up to 200 °C) consisting of thermocontroller TK1 and crystal oven KK1. TK1 has two independent outputs and can control two KK1 ovens simultaneously. Trough RS232 computer interface it can be controlled from PC. Current temperature is shown on LED display.

The nonlinear crystal is mounted into adapter before insertion into oven KK1. Such design facilitates handling and replacement of the crystal. The non-linear crystal can be sealed with fused silica windows in order to provide extra protection. The standard adapters are 15, 30 and 50 mm length with apertures of 3×3, 4×4, 5×5, 6×6 mm size. Customized adapters for crystals up to 12×12 mm size are available. In addition, adapters for Brewster-cut and PPLN crystals are available too.

SPECIFICATIONS

Model	TK1+KK1-30	TK1+KK1-50
Quantity of ovens possible to connect to one controller TK1	2	1
Temperature tuning range	RT-200 °C	
Maximum crystals dimensions	12×12×30 mm	12×12×50 mm
Sealing (optional)	FS windows	
Accuracy	± 0.5 °C	
Long-term stability	± 0.1 °C	
Resolution	0.1 °C	
Powering requirements	90 – 264 V, 47 – 66 Hz	
Power consumption	45 W	
Sensor type	PT1000	
Output connector	DB9	
Serial interface	RS232 (DB 9)	
Dimensions, Dia×D	Ø52×52 mm	Ø52×72 mm

Specifications are subject to changes without advance notice.

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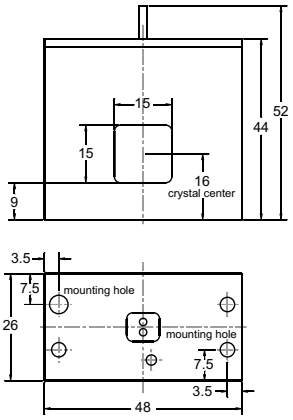
NONLINEAR CRYSTALS OVEN TK3



TK3 dimensions

TK3 is compact oven with build-in thermocontroller for temperature up to 60 °C. It is ideal for larger aperture crystals like KD*P. The crystals with up to 15 x 15 mm dimensions can be mounted. TK3L model can fit crystals with up to 30 mm length.

Each oven is made exactly for specified crystal, so it cannot be used for different size crystals.

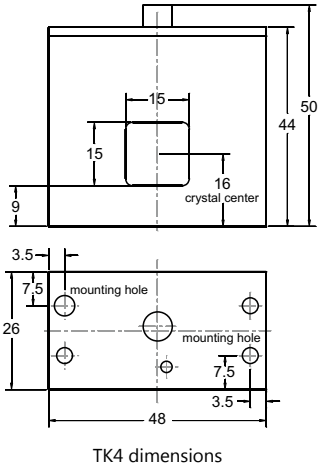
SPECIFICATIONS

Model	TK3	TK3L
Temperature tuning range near preset	± 5 °C	
Maximum crystals dimensions	15×15×20 mm	15×15×30 mm
Preset temperature	30 – 60 (80) °C	
Long-term stability	± 0.2 °C	
Powering requirements	12 – 15 V DC	
Power consumption	6 W	
Sensor type	NTC Thermo resistor	
Output connector	Molex 2 pin	
Dimensions, W×H×D	48×44×26 mm	48×44×36 mm

Specifications are subject to changes without advance notice.

On request we can manufacture ovens for crystals with aperture up to 60×60 mm or even larger.

NONLINEAR CRYSTALS OVEN TK4



TK4 dimensions

TK4 oven has identical mechanical design as TK3. The pre-set temperature can be adjusted in ±5°C range by the help of potentiometer. The current temperature is not indicated.

In addition, TK4 has “temperature ready” output signal, changing state when pre-set temperature is reached. TK4XL model can fit crystals with up to 50 mm length.

SPECIFICATIONS

Model	TK4	TK4L	TK4XL
Temperature tuning range near preset	± 5 °C		
Maximum crystals dimensions	15×15×20 mm	15×15×30 mm	15×15×50 mm
Preset temperature	30 – 60 (80) °C		
Long-term stability	± 0.2 °C		
Temperature OK output signal	Present		
Powering requirements	12 – 15 V DC		
Power consumption	6 W	6 W	9 W
Sensor type	NTC Thermo resistor		
Output connector	Binder 719, 3 pin		
Dimensions, W×H×D	48×44×26 mm	48×50×36 mm	48×50×56 mm

Specifications are subject to changes without advance notice.

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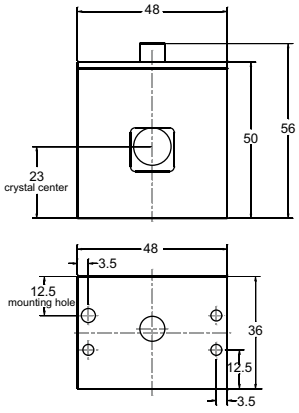
NONLINEAR CRYSTALS OVEN TK7



TK7 dimensions

TK7 is compact oven with build-in thermocontroller for temperature up to 60 °C. TK7 oven provides more crystal mounting options in comparison to TK3 or TK4. Like in KK1, each crystal is mounted into adapter before insertion in oven. TK7 and KK1 crystal adapters are compatible. Maximum crystal size for this model is 12×12 mm and the length of the crystal – 30 mm.

The pre-set temperature can be adjusted in ±5°C range with the help of potentiometer. The current temperature is not indicated. TK7 has "temperature ready" signal, changing state when pre-set temperature is reached. For additional protection of crystal surfaces from the dust or other contamination, we offer TK7W model – windowed version of TK7 oven.

SPECIFICATIONS

Model	TK7	TK7L
Temperature tuning range near preset	± 5 °C	
Maximum crystals dimensions	12×12×15 mm	12×12×30 mm
Sealing (optional)	FS windows	
Preset temperature	30 – 60 (80) °C	
Long-term stability	± 0.2 °C	
Temperature OK output signal	Present	
Powering requirements	12 – 15 V DC	
Power consumption	6 W	
Sensor type	NTC Thermo resistor	
Output connector	Binder 719, 3 pin	
Dimensions, W×H×D	48×50×44 mm	48×50×56 mm

Specifications are subject to changes without advance notice,

MOUNTS FOR CRYSTALS OVENS

Mount H1 for fine tuning of TK3, TK4 or TK7 angle is available.
The tuning range is ± 2.5°.

H2 type mount can fit two TK3, TK4 or TK7 type ovens and is ideal for holding second and third or fourth harmonics generators.

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Other EKSPLA products

HIGH ENERGY MODE-LOCKED PICOSECOND LASERS

PL series solid state picosecond Nd:YAG lasers are the basic-research-industry-leading source of high energy picosecond pulses for R&D applications. They have excellent output parameters, are reliable and still remain simple and convenient to use.

NANOSECOND Q-SWITCHED Nd:YAG LASERS

Electro-optically Q-switched nanosecond Nd:YAG lasers feature compact size, stable output characteristics and high pulse energy. Their simple and proven design allows offering of models for both regular and novel research and industrial needs.

OPTICAL PARAMETRIC GENERATORS OPO/OPA/OPG

High conversion efficiency and wide wavelength tunability from UV to IR are distinguishing features of EKSPLA parametric systems. Offering hands-free operation and good long-term stability, tunable parametric systems made by EKSPLA are an excellent choice for various R&D applications.

NANOSECOND TUNABLE LASER SYSTEM

NT series tunable laser system comprises a nanosecond optical parametric oscillator and Q-switched pump laser in a single housing. The system features high conversion efficiency, hands-free wavelength tuning from UV to IR, easy maintenance and separate output for pump laser beam.

DIODE PUMPED LASERS

Short pulse duration, compact and robust design as well as turn-key operation makes diode pumped lasers an excellent choice for many scientific and OEM applications.

SPECTROMETERS

EKSPLA is the leading manufacturer of SFG spectrometers. Deep knowledge combined with long term experience in laser spectroscopy enables to design and manufacture systems for various needs. EKSPLA product portfolio includes SFG spectrometers, THZ spectrometers and other systems for science and technology.

CUSTOM SYSTEMS

From single component to complete system – designed and produced according to customer requirements. Since its foundation EKSPLA has established a strong position in design and manufacturing of custom laser systems and components. Separate products as well as complete systems answer diverse science and technology needs like chemistry, biology and material processing.

INDUSTRIAL DPSS LASERS

Picosecond mode-locked as well as nanosecond q-switched solid state diode pumped lasers are designed to be a versatile tool for variety industrial material processing applications. Rugged body made from the machined aluminum and sealed cavity ensures stable and reliable operation in diverse conditions.

Short pulse duration, innovative design as well as cost-effective operation makes DPSS lasers an excellent choice for wide range of micromachining and other material processing applications.

ULTRAFAST FIBER LASERS

The new LightWire series ultrafast fiber lasers feature turn-key operation, monolithic all-in-fiber design and require no maintenance making it a preferred alternative to the solid state counterparts in the industrial settings and multidisciplinary research laboratories. Different versions, featuring femtosecond and picosecond pulse durations are available.

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Ordering Information

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Ordering

Orders may be placed by mail, fax or e-mail.
All orders are object of General Sales Conditions, which can be found on **www.ekspla.com**.
Mail orders should be sent to:

EKSPLA, UAB
Savanoriu Av. 237
LT-02300 Vilnius
Lithuania
Phone: +370 5 264 96 29
Fax: +370 5 264 18 09
E-mail: sales@ekspla.com

Ask for quotation online at www.ekspla.com.

Certicate of Origin

All items shown in this catalogue are of Lithuanian Origin (EU). Certificate of Origin is available under request.

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Why EKSPLA?

- Know-how in laser technology and nonlinear optics
- In house design and manufacturing
- Close partnership with scientific community
- Network of photonics companies in Vilnius
- ISO 9001 certified

EKSPLA

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