

Pockels Cell Drivers & HV Power Supplies

PCD & HV SERIES

PCD-UHR-I-250-5.2-C

Pockels cell drivers, also known as fast HV switches, are designed to load and unload capacitance of Pockels cells which serve as an integral part of electro optic modulators (EOM's) used for pulse picking, mode-locking, cavity dumping and q-switching of solid state lasers. Ekspla's Pockels cell drivers are optimal for BBO, RTP, KD*P, KTP, LiNbO₃, CdTe Pockels cells.

Our Pockels cell drivers can provide high voltage output pulses up to 9.8 kV, repetition rates up to 6 MHz, electrical pulse rise times as short as 5.5 ns, minimal pulse durations as low as 0 ns and maximal pulse durations

with no limit. All specifications are measured at 6 pF load.

Ekspla's Pockels cell drivers require HV supply input typically equal to driver's HV output (the only exception is PCD-FAM series drivers that allow to modulate the amplitude of each individual driver's output pulse by analog voltage input). We provide complimentary HV power supplies for each Pockels cell driver version. For high-volume OEM customers we also tailor our Pockels cell drivers by removing excessive components to make sure products are optimal parameter, cost and size wise.

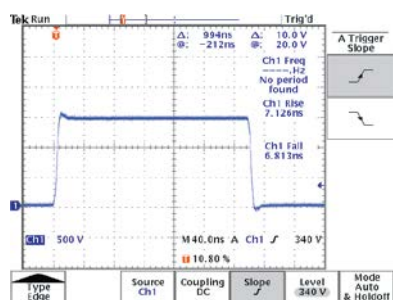
FEATURES

- ▶ HV repetition rates up to **6 MHz**
- ▶ HV output pulse amplitude up to **9.8 kV**
- ▶ Electrical HV rise / fall times typically as low as **5.5 ns** at 6pF load
- ▶ HV pulse durations **from 0 ns to infinity**
- ▶ Amplitude modulation of independent HV output pulses
- ▶ Designed for **BBO, RTP, KD*P, KTP, LiNbO₃, CdTe** Pockels cells
- ▶ Complimentary HV power supplies for each driver version
- ▶ Drivers can be tailored to precisely meet OEM customer's needs
- ▶ Fast turnaround times between inquiry, prototyping and high-volume manufacturing stages.

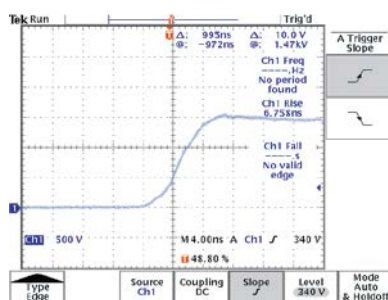
APPLICATIONS

EKSPLA's Pockels cell drivers are optimal for pulse picking, mode-locking, cavity dumping and q-switching of the solid state femtosecond, picosecond and nanosecond lasers. Most popular fields of applications are:

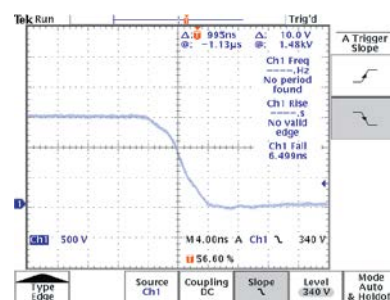
- ▶ Industrial lasers
micromachining, welding and cutting
- ▶ Medical lasers
ophthalmology, dermatology and surgery
- ▶ Scientific lasers
fusion research, spectroscopy, and high-energy physics

PERFORMANCE

Typical output pulse shape



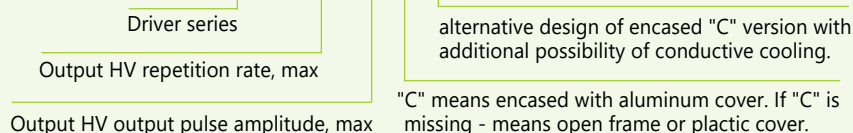
Typical rising front of output pulse in detail



Typical falling front of output pulse in detail

MODEL CODING
SCHEME

PCD-UHR-2000-1.5-C-Option1

GENERAL SPECIFICATIONS ¹⁾

Model	PCD-UHR series	2PCD-UHR series	PCD-UHRS series	PCD-UHV series	PCD-FAM series
OUTPUT SPECIFICATIONS					
HV ¹⁾ pulse amplitude, max ²⁾	7.2 kV	3.4 kV	3.6 kV	9.8 kV	2.5 kV
HV repetition rate (without burst), max	3 MHz	6 MHz	1 MHz	10 kHz	500 kHz
HV repetition rate (in burst mode), max	4.8 MHz	–	4.8 MHz	–	
HV pulse rise / fall times, min ³⁾ at 6 pF load	< 5.5 ns	< 6 ns	< 5.5 ns	< 6 ns	< 26 / 13 ns
HV pulse duration, min	100 ns	0 ns	25 ns	30 ns	70 ns
HV pulse duration extension to infinity using pulse regeneration technique	YES	NO			
Modulation of an individual HV pulse amplitude	NO				YES
Minimum pause between HV pulses	100 ns		25 ns	100 ns	
HV pulse delay	25 – 30 ns, depends on model ⁴⁾	30 – 45 ns, depends on model	30 ns	30 ns	45 ns
HV pulse jitter	< 100 ps				
INPUT SPECIFICATIONS					
Power supply requirements (power stage)	U _{HV PS in} (V) = U _{driver out}				U _{HV PS in} (V) = 2.65 – 2.7 kV
	P _{PS} in (W) according to section "Model selection table"				
Power supply requirements (control stage)	24 V				
Amount of External triggering input pulses	1 or 2				
Triggering pulse duration requirement (for two-pulses triggering mode only)	> 20 ns				
Triggering pulse amplitude requirement	3.5 – 5 V (50 Ω input)				
Triggering pulse rise & fall time requirement	< 10 ns		< 5 ns	< 10 ns	
Modulation voltage range	–				0.1 – 4.9 V
PHYSICAL CHARACTERISTICS					
Dimensions	according to section "Drawings"				
OPERATING REQUIREMENTS					
Capacitance of load (Pockels cell)	typically ≤ 6 pF. If higher, please consult with Ekspla				
Length of leads to load (Pockels cell), max	10 cm				
Cooling method	conductive, water or no cooling. According to section "Model selection table"				
Operating ambient temperature	≤ 35°C				
Operating baseplate temperature	≤ 35°C				
ACCESSORIES					
HV output pins	2 pc. of pins for HV wires included by default. HV wires between driver and a Pockels cell not included				
HV input cables	included by default				
Control cables	included by default				
HV power supply	complimentary HV power supplies available according to section "HV power supplies"				
CAN-USB adapter (for HV power supply)	Ekspla's CAN-USB adapter is required at evaluation stage if communication via CAN interface is needed				

¹⁾ Due to continuous improvement, all specifications are subject to change without notice. Parameters marked typical are not specifications. They are indications of typical performance and will vary with each unit we manufacture.

²⁾ High voltage.

³⁾ Maximal limit. Not all maximal limits can be reached simultaneously.

⁴⁾ Minimal limit.

MODEL SELECTION TABLE ¹⁾

Model	HV repetition rate, max ²⁾	HV output pulse amplitude, max	Electrical HV pulse rise / fall times, typical ³⁾	HV pulse duration range, min – max ⁴⁾	HV power consumption, max ³⁾	Cooling method	Dimensions (L×W×H)
PCD-UHR SERIES							
PCD-UHR-50-3.6	50 kHz	3.6 kV	< 7 ns	100–5000 ns	20 W	Conductive	94×63×31 mm
PCD-UHR-50-3.6-C						Water	114×73×50 mm
PCD-UHR-50-3.6-C-Option1						Conductive or water	116×68×42 mm
PCD-UHR-250-2.6	250 kHz	2.6 kV	< 6 ns	100–3900 ns	40 W	Conductive or water	116×63×38 mm
PCD-UHR-250-2.6-C						Water	114×73×50 mm
PCD-UHR-250-2.6-C-Option1						Conductive or water	116×68×42 mm
PCD-UHR-250-3.6	250 kHz	3.6 kV	< 7 ns	100–3900 ns	75 W	Conductive or water	116×63×38 mm
PCD-UHR-250-3.6-C						Water	114×73×50 mm
PCD-UHR-250-3.6-C-Option1						Conductive or water	116×68×42 mm
PCD-UHR-400-1.5	400 kHz	1.5 kV	< 5.5 ns	100–2400 ns	20 W	Conductive or water	116×63×38 mm
PCD-UHR-400-1.5-C						Water	114×73×50 mm
PCD-UHR-400-1.5-C-Option1						Conductive or water	116×68×42 mm
PCD-UHR-500-2.6	500 kHz	2.6 kV	< 6.5 ns	100–1900 ns	90 W	Conductive or water	116×63×38 mm
PCD-UHR-500-2.6-C						Water	114×73×50 mm
PCD-UHR-500-2.6-C-Option1						Conductive or water	116×68×42 mm
PCD-UHR-1000-1.8	1 MHz	1.8 kV	< 6 ns	100–900 ns	80 W	Conductive or water	116×63×38 mm
PCD-UHR-1000-1.8-C						Water	114×73×50 mm
PCD-UHR-1000-1.8-C-Option1						Conductive or water	116×68×42 mm
PCD-UHR-2000-1.5	2 MHz	1.5 kV	< 7 ns	100–400 ns	120 W	Conductive or water	116×63×38 mm
PCD-UHR-2000-1.5-C						Water	114×73×50 mm
PCD-UHR-2000-1.5-C-Option1						Conductive or water	116×68×42 mm
PCD-UHR-I-250-5.2-C	250 kHz	5.2 kV	< 8.5 ns	100–5000 ns	100 W	Conductive or water	158×49×81 mm
PCD-UHR-I-300-4.6-C	300 kHz	4.6 kV	< 8 ns	100–5000 ns	100 W	Conductive or water	158×49×81 mm
PCD-UHR-I-350-4-C	350 kHz	4 kV	< 7.5 ns	100–5000 ns	100 W	Conductive or water	158×49×81 mm
PCD-UHR-I-1000-3.0-C	1 MHz	3 kV	< 7.5 ns	100–5000 ns	120 W	Conductive or water	158×49×81 mm
PCD-UHR-II-150-7.0	150 kHz	7 kV	< 9.5 ns	100–5000 ns	110 W	Conductive	148×74×33 mm
PCD-UHR-II-250-7.0-C	250 kHz	7 kV	< 9.5 ns	100–5000 ns	200 W	Conductive or water	172×77×51 mm
PCD-UHR-II-1000-3.8-C	1 MHz	3.8 kV	< 6 ns	100–5000 ns	230 W	Conductive or water	172×77×51 mm
PCD-UHR-II-1000-4.0-C	1 MHz	4 kV	< 9.5 ns	100–5000 ns	210 W	Conductive or water	172×77×51 mm
PCD-UHR-III-500-7.2-C	500 kHz	7.2 kV	< 8 ns	100–1900 ns	400 W	Water	220×87×98 mm
PCD-UHR-III-2000-3.4-C	2 MHz	3.4 kV	< 8.5 ns	100–400 ns	360 W	Water	220×87×98 mm
PCD-UHR-III-2500-3.1-C	2.5 MHz	3.1 kV	< 9.5 ns	100–300 ns	360 W	Water	220×87×98 mm
PCD-UHR-III-3000-2.6-C	3 MHz	2.6 kV	< 8.5 ns	100–233 ns	325 W	Water	220×87×98 mm

¹⁾ Due to continuous improvement, all specifications are subject to change without notice.²⁾ Without burst.³⁾ At 6 pF load.⁴⁾ Without extension to infinity.

Model	HV repetition rate, max ²⁾	HV output pulse amplitude, max	Electrical HV pulse rise / fall times, typical ³⁾	HV pulse duration range, min–max ⁴⁾	HV power consumption, max ³⁾	Cooling method	Dimensions (L×W×H)
2PCD-UHR SERIES							
2PCD-UHR-500-3.4-C	500 kHz	3.4 kV	< 7 ns	0–1900 ns	150 W	Water	210×98×53 mm
2PCD-UHR-1000-2.4-C	1 MHz	2.4 kV	< 6.5 ns	0–900 ns	180 W	Water	210×98×53 mm
2PCD-UHR-2000-1.6-C	2 MHz	1.6 kV	< 6 ns	0–400 ns	130 W	Water	210×98×53 mm
2PCD-UHR-II-300-3.4	300 kHz	3.4 kV	< 7 ns	0–1556 ns	110 W	Conductive	148×74×33 mm
2PCD-UHR-II-500-3.4-C	500 kHz	3.4 kV	< 7 ns	0–900 ns	200 W	Conductive or water	172×77×51 mm
2PCD-UHR-II-1000-2.5-C	1 MHz	2.5 kV	< 7 ns	0–400 ns	170 W	Conductive or water	172×77×51 mm
2PCD-UHR-II-2000-1.8-C	2 MHz	1.8 kV	< 7 ns	0–150 ns	210 W	Conductive or water	172×77×51 mm
2PCD-UHR-II-2000-1.5-C	2 MHz	1.5 kV	< 6 ns	100–900 ns	215 W	Conductive or water	172×77×51 mm
2PCD-UHR-III-4000-1.7-C	4 Mhz	1.7 kV	< 10.5 ns	100–300 ns	360 W	Water	220×87×98 mm
2PCD-UHR-III-6000-1.3-C	6 MHz	1.3 kV	< 9 ns	100–233 ns	350 W	Water	220×87×98 mm
PCD-UHRS SERIES							
PCD-UHRS-50-3.6	50 kHz	3.6 kV	< 7 ns	25–5000 ns	20 W	Conductive	94×63×31 mm
PCD-UHRS-50-3.6-C						Water	114×73×50 mm
PCD-UHRS-50-3.6-C-Option1						Conductive or water	116×68×42 mm
PCD-UHRS-250-3.6	250 kHz	3.6 kV	< 7 ns	25–1000 ns	75 W	Conductive or water	116×63×38 mm
PCD-UHRS-250-3.6-C						Water	114×73×50 mm
PCD-UHRS-250-3.6-C-Option1						Conductive or water	116×68×42 mm
PCD-UHRS-250-2.6	250 kHz	2.6 kV	< 6 ns	25–1000 ns	40 W	Conductive or water	116×63×38 mm
PCD-UHRS-400-1.5	400 kHz	1.5 kV	< 5.5 ns	25–625 ns	20 W	Conductive or water	116×63×38 mm
PCD-UHRS-500-2.6	500 kHz	2.6 kV	< 6.5 ns	25–500 ns	90 W	Conductive or water	116×63×38 mm
PCD-UHRS-500-2.6-C						Water	114×73×50 mm
PCD-UHRS-500-2.6-C-Option1						Conductive or water	116×68×42 mm
PCD-UHRS-1000-1.8	1 MHz	1.8 kV	< 6 ns	25–250 ns	80 W	Conductive or water	116×63×38 mm
PCD-UHRS-1000-1.8-C						Water	114×73×50 mm
PCD-UHRS-1000-1.8-C-Option1						Conductive or water	116×68×42 mm
PCD-UHV SERIES							
PCD-UHV-4.2	10 kHz	4.2 kV	< 6 ns	30–3000 ns	5 W	Not needed	140×60×29 mm
PCD-UHV-4.2-C							192×81×75 mm
PCD-UHV-5.5	5 kHz	5.5 kV	< 7 ns	30–3000 ns	5 W	Not needed	140×60×29 mm
PCD-UHV-5.5-C							192×81×75 mm
PCD-UHV10-8.6	3 kHz	8.6 kV	< 10.5 ns / < 9.5 ns	35–2000 ns	5 W	Not needed	140×75×29 mm
PCD-UHV10-8.6-C							192×81×75 mm
PCD-UHV10-9.8	2.5 kHz	9.8 kV	< 12 ns / < 10.5 ns	35–2000 ns	5 W	Not needed	140×75×29 mm
PCD-UHV10-9.8-C							192×81×75 mm
PCD-FAM SERIES							
PCD-FAM-250-2.5-C	250 kHz	2.5 kV	< 26 ns / < 13 ns	70–3000 ns	60 W	Conductive or water	139×69×57 mm
PCD-FAM-500-2.5-C	500 kHz	2.5 kV	< 26 ns / < 13 ns	70–1000 ns	120 W	Conductive or water	139×69×57 mm

¹⁾ Due to continuous improvement, all specifications are subject to change without notice.

²⁾ Without burst.

³⁾ At 6 pF load.

⁴⁾ Without extension to infinity.

HV POWER SUPPLIES SPECIFICATIONS ¹⁾

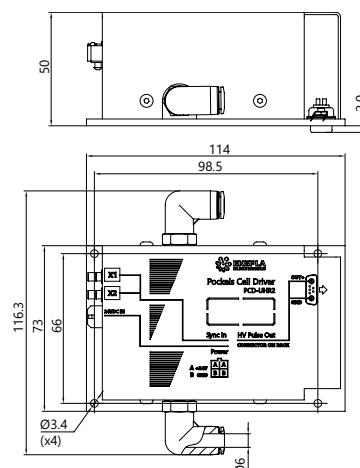
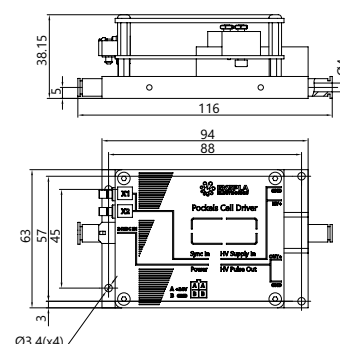
Model	Output power, max	High voltage output options, max	Dimensions (L × W × H)	
ENCASED HV POWER SUPPLY				
HV-200	200 W	1.8, 2.6, 3.6, 4.0 kV	200 × 119 × 76 mm	Input voltage: 48 V Output voltage (main): U _{out range} (kV) = 0 – U _{out max} Output voltage (auxiliary): 24 V Control options: CAN, RS232, trimmer or analog (optional)
HV-400	400 W			
HV-2x200	2 × 200 W	±1.5, ±2.0, ±2.6, ±3.6 kV	52 × 80 × 58 mm	Input voltage: 24 V Output voltage range: U _{out range} (kV) = 0.4×U _{out max} – U _{out max} Control options: CAN, trimmer or analog (optional)
HV-170	170 W	1.8, 2.6, 3.6 kV		
HV-2x85	2 × 85 W	±1.5, ±1.8 kV		
OPEN FRAME (PCB) HV POWER SUPPLY				
HV05Wm	5 W	1.8, 2.8, 4.0, 4.4, 5.0 kV	135 × 45 × 27 mm	Input voltage: 24 V Output voltage range: U _{out range} (kV) = 0.4×U _{out max} – U _{out max} Control options: CAN, trimmer or analog (optional)
HV05Wm-CAN ²⁾				
HV40Wm	40 W	1.3, 1.8, 2.5, 3.6, 4.0 kV	160 × 70 × 35 mm	
HV40Wm-CAN				
HV80Wm	80 W	1.8, 2.6, 3.1, 3.6, 4.0 kV	175 × 70 × 45 mm	
HV80Wm-CAN				
HV120Wm	120 W	1.8, 2.6, 3.1, 3.6 kV	175 × 110 × 42 mm	
HV120Wm-CAN				
HV2x60Wm	2 × 60 W	±1.4, ±2.0, ±2.6, ±3.6 kV	175 × 110 × 42 mm	
HV2x60Wm-CAN				

¹⁾ Due to continuous improvement, all specifications are subject to change without notice. Parameters marked typical are not specifications. They are indications of typical performance and will vary with each unit we manufacture.

²⁾ For CAN communication at evaluation stage Ekspla's CAN-USB adapter is required.

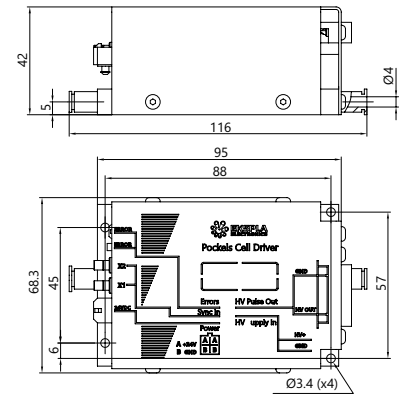
DRAWINGS & IMAGES
OF POCKELS CELL DRIVERS

PCD-UHR-50-3.6
PCD-UHR-250-2.6
PCD-UHR-250-3.6
PCD-UHR-400-1.5
PCD-UHR-500-2.6
PCD-UHR-1000-1.8
PCD-UHR-2000-1.5

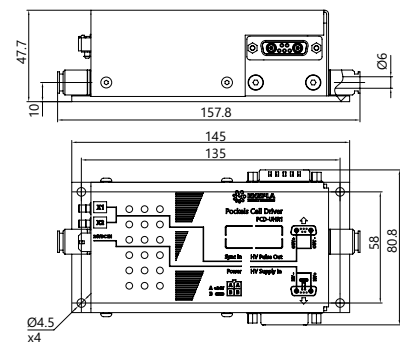


PCD-UHR-50-3.6-C
PCD-UHR-250-2.6-C
PCD-UHR-250-3.6-C
PCD-UHR-400-1.5-C
PCD-UHR-500-2.6-C
PCD-UHR-1000-1.8-C
PCD-UHR-2000-1.5-C

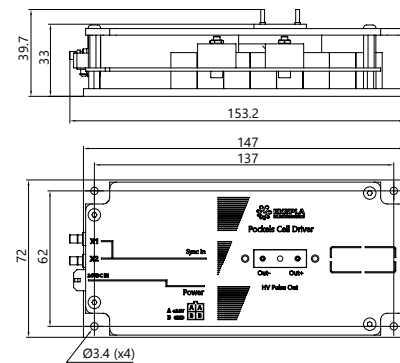
PCD-UHR-50-3.6-C-Option1
PCD-UHR-250-2.6-C-Option1
PCD-UHR-250-3.6-C-Option1
PCD-UHR-400-1.5-C-Option1
PCD-UHR-500-2.6-C-Option1
PCD-UHR-1000-1.8-C-Option1
PCD-UHR-2000-1.5-C-Option1



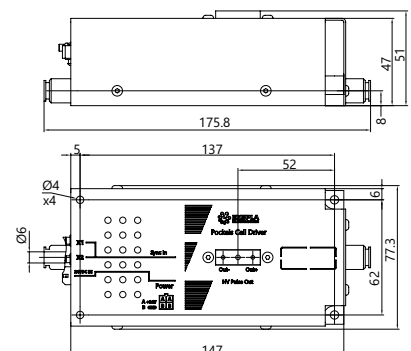
PCD-UHR-I-250-5.2-C
PCD-UHR-I-300-4.6-C
PCD-UHR-I-350-4-C
PCD-UHR-I-1000-3.0-C



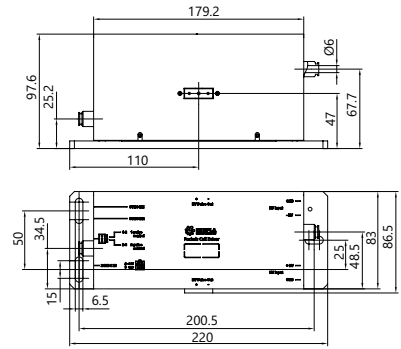
PCD-UHR-II-150-7.0
2PCD-UHR-II-300-3.4



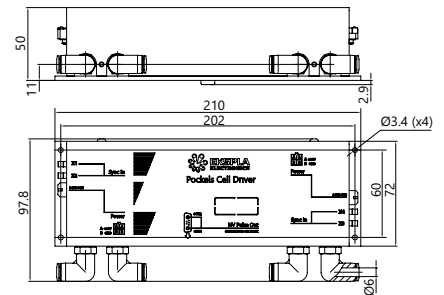
PCD-UHR-II-250-7.0-C
PCD-UHR-II-1000-3.8-C
PCD-UHR-II-1000-4.0-C
2PCD-UHR-II-500-3.4-C
2PCD-UHR-II-1000-2.5-C
2PCD-UHR-II-2000-1.8-C
2PCD-UHR-II-2000-1.5-C



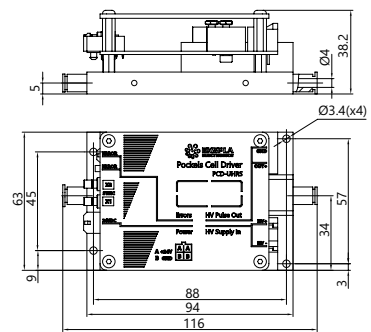
PCD-UHR-III-500-7.2-C
PCD-UHR-III-2000-3.4-C
PCD-UHR-III-2500-3.1-C
PCD-UHR-III-3000-2.6-C
2PCD-UHR-III-4000-1.7-C
2PCD-UHR-III-6000-1.3-C



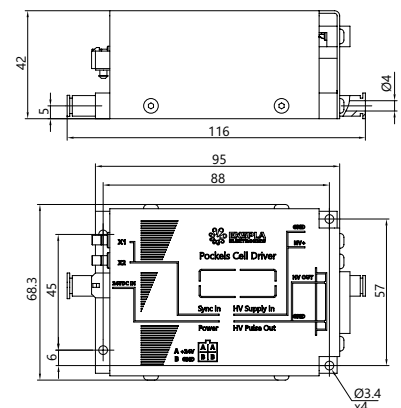
2PCD-UHR-500-3.4-C
2PCD-UHR-1000-2.4-C
2PCD-UHR-2000-1.6-C



PCD-UHRS-50-3.6
PCD-UHRS-250-3.6
PCD-UHRS-250-2.6
PCD-UHRS-400-1.5
PCD-UHRS-500-2.6
PCD-UHRS-1000-1.8



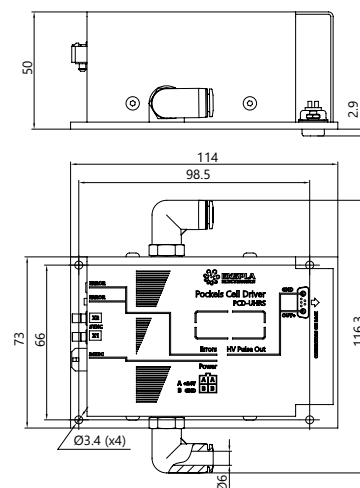
PCD-UHRS-50-3.6-C-Option1
PCD-UHRS-250-3.6-C-Option1
PCD-UHRS-500-2.6-C-Option1
PCD-UHRS-1000-1.8-C-Option1



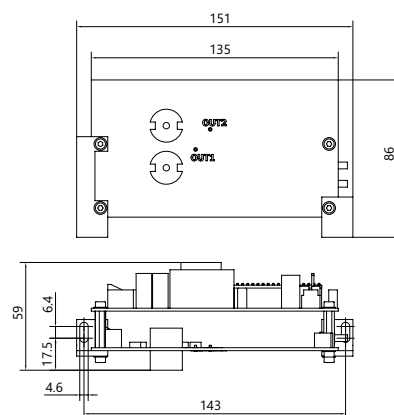
POCKELS CELL DRIVERS

PCD & HV SERIES

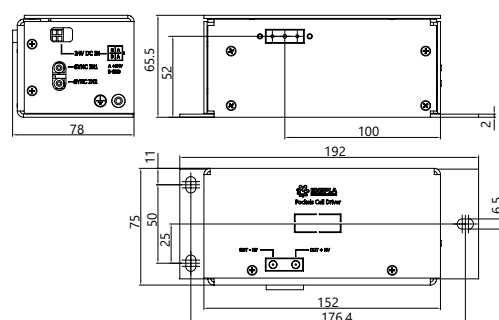
PCD-UHRS-50-3.6-C
PCD-UHRS-250-3.6-C
PCD-UHRS-500-2.6-C
PCD-UHRS-1000-1.8-C



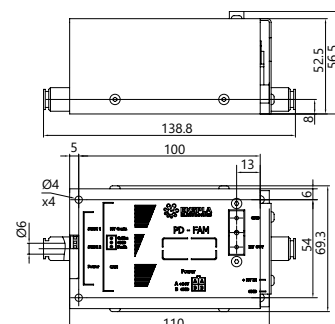
PCD-UHV-4.2
PCD-UHV-5.5
PCD-UHV10-8.6
PCD-UHV10-9.8



PCD-UHV-4.2-C
PCD-UHV-5.5-C
PCD-UHV10-8.6-C
PCD-UHV10-9.8-C

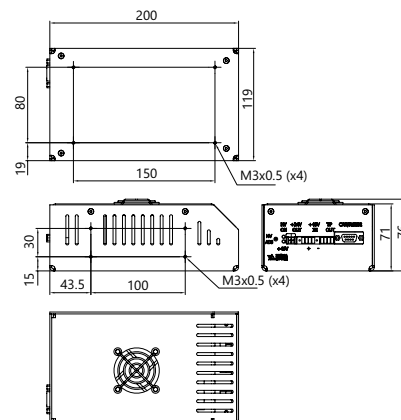


PCD-FAM-250-2.5-C
PCD-FAM-500-2.5-C

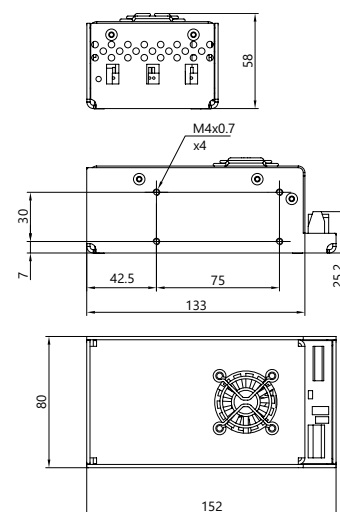


DRAWINGS & IMAGES OF HV POWER SUPPLIES

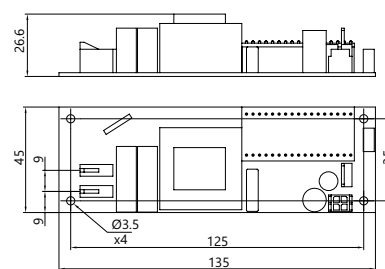
HV-200
HV-400
HV-2x200



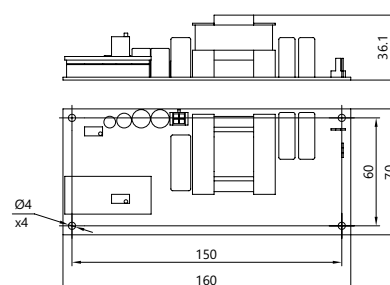
HV-170
HV-2x85



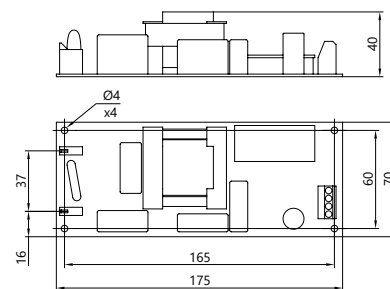
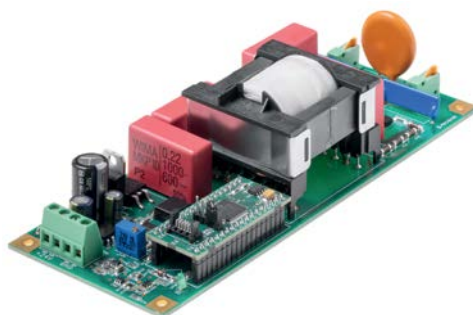
HV05Wm
HV05Wm-CAN



HV40Wm
HV40Wm-CAN



HV80Wm
HV80Wm-CAN



HV120Wm
HV120Wm-CAN
HV2x60Wm
HV2x60Wm-CAN

