	Specification	Symbol	Condition / Comment		FSWP 51-02	FSWP 71-02	FSWP 91-01	Unit
ABSOLUTE MAXIMUM RATINGS	Maximum Operating Voltage	$V_{O(max)}$	I_{off} < 50 µADC, T_{case} = 70°C		5400	7200	9000	VDC
	Maximum Isolation Voltage	V_I	Between HV switch and control input / GND	Standard & option GCF, ILC		30		
				Devices with option DLC		15		kVDC
	Max. Housing Insulation Voltage	V_{INS}	Between switch and housing surface, 3 minutes			50		kVDC
	Maximum Turn-On Peak Current	$I_{P(max)}$	T_{case} = 25°C	t_p< 200 µs, duty cycle <1%	25	20	15	ADC
	Maximum Continuous Load Current **Note:** The bracket values* apply for the case, that both switch paths are used at a duty cycle of 50%.	I_L	T_{case} = 25°C T_{flange} = 25°C T_{inlet} = 25°C	Standard devices	0.36 (0.52)*	0.35 (0.5)*	0.27 (0.39)*	
				Devices with cooling option GCF	1.17 (1.64)*	1.12 (1.58)*	0.87 (1.22)*	
				Devices with cooling option ILC	1.35 (1.90)*	1.29 (1.83)*	1 (1.41)*	
				Devices with cooling option DLC	3.69 (5.22)*	3.54 (5)*	2.74 (3.87)*	ADC
	Max. Continuous Power Dissipation	$P_{d(max)}$	T_{case} = 25°C T_{flange} = 25°C T_{inlet} = 25°C	Standard devices		15		
				Devices with cooling option GCF		150		
				Devices with cooling option ILC		200		
				Devices with cooling option DLC		1500		Watt
	Linear Derating		Above 25°C	Standard devices		0.33		
				Devices with cooling option GCF		3.33		
				Devices with cooling option ILC		4.44		
				Devices with cooling option DLC		33.3		W/K
	Operating Temperature Range	T_O				-40...70		°C
	Storage Temperature Range	T_S				-40…90		°C
ELECTRICAL CHARACTERISTICS	Permissible Operating Voltage Range	V_O			0 - 5400	0 - 7200	0 - 9000	VDC
	Typical Breakdown Voltage	V_{br}	**NOTE:** V_{br} is a test parameter for quality control purposes only. Not applicable in normal operation!	I_{off} > 0.5 mA	5900	8900	9900	VDC
	Typical HV Quiescent Current	I_{off}	From internal safety discharge resistors. @0.8xV_O			20		µADC
	Typical Output Impedance (with standard damping resistors)	R_{stat}	T_{case} = 25°C, T_{flange} = 25°C,	0.1 x $I_{P(max)}$	40	45	60	
			T_{fin} = 25°C, T_{inlet} = 25°C	1.0 x $I_{P(max)}$	55	60	100	Ohm
	Typical Propagation Delay Time	$t_{d(on)}$	Resistive load, 0.1 x $I_{P(max)}$, 0.8 x $V_{O(max)}$, 50-50%			120		ns
	Typical Output Pulse Jitter	t_j	Impedance matched input, V_{aux} / V_{ctrl} = 5.00 VDC			100		ps
	Typical Transition Time (Output Pulse Rise & Fall Time)	t_r / t_f (10-90%)	The rise and fall times can be can be customized by the options PRT and PFT.	0.8x$V_{O(max)}$, C_L= 10pF	6	8	10	
				0.8x$V_{O(max)}$, C_L= 47pF	11	13	16	ns
	Typical di/dt of Output Current	di/dt	Capacitive load 1nF, output wiring < 10 cm (< 4 inch)		5	5	4	A/ns
	Internal HV Buffer Capacitance	C_B	3 seconds discharge time after disconnection of the HV			40		nF
	Maximum Output Pulse Width	$t_{pw(max)}$				Infinitely		
	Minimum Output Pulse Width	$t_{pw(min)}$	Impedance matched control input			50		ns
	Max. Continuous Switching Frequency	$f_{(max)}$	V_{aux} = 5.00 VDC T_{case} = 25°C T_{flange} = 25°C T_{inlet} = 25°C	Standard devices, normal mode		50	**Note**: Repetition rates above 50 kHz require a dual auxiliary power supply with +15/+120 V and a output power of approx. 63 mW / kHz.	
				Standard devices in HFS mode		150		
				HFS mode / options GCF, ILC		300		
				HFS mode / option DLC		3000		kHz
	Maximum Burst Frequency	$f_{b(max)}$				6		MHz
	Maximum Number of Pulses / Burst	N	@ $f_{b(max)}$,			10		Pulses
	Coupling Capacitance	C_C	HV side against control side	Standard devices & option DLC		6		
				Devices with options GCF / ILC		25		pF
	Natural Capacitance	C_N	Between switch poles		12	12	20	pF
	Control Voltage Range	V_{ctrl}	The V_{ctrl} has no impact on the output pulse shape.			2-10		
	Auxiliary Supply Voltage Range	V_{aux}	The V_{aux} is not required in HFS mode.			4.5 – 5.5		VDC
	Auxiliary Supply Current	I_{aux}	V_{aux} = 5.00 VDC, T_{case} = 25°C	0.1 x $f_{(max)}$		150		
				@ $f_{(max)}$		600		mADC
	HFS Supply Supply Voltage V1	$V_{HFS(V1)}$	± 3%, current consumption 0.4 mA / kHz			15		VDC
	HFS Supply Supply Voltage V2	$V_{HFS(V2)}$	± 3%, current consumption 0.3 mA / kHz			120		VDC
	Intrinsic Diode Forward Voltage	V_F	T_{case} = 25°C, I_F =10 A			5		VDC
	Diode Reverse Recovery Time	t_{rrc}	I_F =10A			<250		ns
HOUSING	Dimensions		Standard housing			175 x 80 x 45		
			Devices with option GCF or ILC			175 x 80 x 55		
			Devices with option DLC			175 x 80 x 70		mm^3
	Weight		Standard housing			700		
			Devices with option GCF			1800		
			Devices with option ILC			1050		
			Devices with option DLC			1100		g

FUNCTIONS	Control Signal Input:	LEMO 4-pole (pin 1). TTL compatible with 100 Ohm termination. Schmitt-Trigger characteristics. Control voltage 2-10 V (3...5 V for lowest jitter).
	Inhibit Signal Input:	LEMO 4- pole (pin 2). TTL compatible, Schmitt-Trigger characteristics for the connection of external safety circuits. L = switch inhibited.
	Fault Signal Output:	LEMO 4-pole (pin 3). Short circuit proof TTL output. Indicating switch and driver over-heat, over-frequency, low auxiliary or low HFS voltage. L = fault.
	5V Auxiliary Supply:	LEMO 4-pole (pin 4 / shielding = return). The 5 V aux. power supply is used for rep rates up to 50 kHz. Above 50 kHz the HFS input must be used.
	HFS Supply Input:	LEMO 3-pole. Rep rates >50 kHz requires additional driver supply voltages (pin1=GND, pin2=15V, pin3 =120V). The 5V supply can be disconnected.
	Monitor Signal Output:	SMC socket for scope connection via the included adapter cable. The HV output pulse is capacitively detected and the division (1000:1) is adjustable.
	LED Indicators:	GREEN: "Auxiliary Power Good and switch B / ON". YELLOW: "Switch A / ON". RED: "Fault, switch A / OFF and switch B / ON"
	HV Power Supply Input:	SHV-NIM socket. Plug is included in supply. **DANGER-HIGH VOLTAGE!** Please consider the internal buffer capacitor discharge time of 3 seconds!
	HV Pulse Output:	Screw terminal at the front side of unit. Return / GND at the bottom side. Output connectors can be customized. Please consult Behlke.

OPTIONS	**Option UL94**	Flame Retardant Casting Resin. Casting resin according to UL-94-V0. Minimum order quantity required. Option UL94 refers to the casting resin only. The housing mantle is always made as UL94-V0.
	Option GCF	Grounded cooling flange. HV switch is mounted on a massive copper plate in insulation.. Coupling capacitance (ground capacitance) is increased by approx. 50%. For medium power applications.
	Option ILC	Indirect liquid cooling. HV switch is mounted on a heat exchanger made of ceramics. For use with water. Demineralized water is recommended for less ground capacitance. Medium power applications.
	Option DLC	Direct liquid cooling. Internal cooling channel arround the power semiconductors. Highly efficient cooling for extremely high power dissipation with non-conductive coolants such as GALDEN HT-135.
	Option PRT-xx	Customized output pulse rise time. The rise time is determined by the internal series damping resistor R_{S1} and the capacitive load C_L. Please specify your capacitive load C_L and the demanded rise time.
	Option PFT-xx	Customized output pulse fall time. The fall time is determined by the internal series damping resistor R_{S2} and the capacitive load C_L. Please specify your capacitive load C_L and the demanded fall time.
	Option NEG	Pulser configured for negative voltages. Pulsers with selectable polarity and floating pulsers are also available. Please consult Behlke.
	Accessory HFSP-35	HFS dual driver supply for the HFS mode. 15/125 VDC, 35 Watt for max. 550 kHz repetition rate. 19" system casette, 107x133x170 mm (21WUx3HU). Please indicate mains voltage (115 or 230V).
	Accessory HFSP-140	HFS dual driver supply for the HFS mode. 15/125 VDC, 140 Watt for max. 2.2 MHz repetition rate. 19" system casette, 107x133x262 mm (21WUx6HU). Please indicate mains voltage (115 or 230V).