HEC Series

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0.5kV - 30kV; 12W
REGULATED, HIGHLY STABLE
HIGH VOLTAGE POWER SUPPLIES

FEATURES

- Precise high voltages up to 30kV at max. 12W
- Patented resonance converter technology
- Very low ripple and noise
- Very low EMI
- Inhibit, Kill Enable and ON inputs
- Hardware limits for voltage and current
- 3U cassette
- Modified versions available on request
- Made in Germany

The HEC modules are highly stable, analog controlled high voltage power supplies with fixed output polarity. The HEC series covers output voltages of up to 30kV in a 3U cassette. A version in a compact metal box is available too (HMC series). The maximum output power is 12W.
The HV output is brought out via an HV connector. The supply and control voltages are connected via an H15 connector. Analog I/O is provided for remote monitoring and control of output voltage and current by means of analog control voltages or potentiometers (internal reference voltage).
Inhibit, Kill Enable and ON inputs as well as voltage and current limits are provided.
The patented resonant converter technology guarantees high efficiency and low EMI.

Output Voltage V_{NOM}	Max. Output Current I_{NOM}	Model	Internal Capacitance Nominal	Damping Resistor	Discharge Resistor	Ripple / Noise *1 @f>10Hz typ.
0 – 500V	20mA	**HEC-0.5x20-24-#**	620nF	0.05kΩ	55MΩ	10mV$_{PP}$
0 – 1000V	10mA	**HEC-1x10-24-#**	250nF	0.1kΩ	55MΩ	20mV$_{PP}$
0 – 1500V	8mA	**HEC-1.5x8-24-#**	120nF	0.1kΩ	55MΩ	30mV$_{PP}$
0 – 2000V	6mA	**HEC-2x6-24-#**	65nF	0.1kΩ	55MΩ	40mV$_{PP}$
0 – 3000V	4mA	**HEC-3x4-24-#**	42nF	0.1kΩ	55MΩ	60mV$_{PP}$
0 – 4000V	3mA	**HEC-4x3-24-#**	30nF	0.2kΩ	500MΩ	80mV$_{PP}$
0 – 5000V	2mA	**HEC-5x2-24-#**	30nF	0.7kΩ	500MΩ	100mV$_{PP}$
0 – 7000V	1.5mA	**HEC-7x1.5-24-#**	5nF	0.7kΩ	500MΩ	150mV$_{PP}$
0 – 10000V	1mA	**HEC-10x1-24-#**	14nF	13kΩ	660MΩ	500mV$_{PP}$
0 – 15000V	0.6mA	**HEC-15x0.6-24-#**	3.5nF	13kΩ	660MΩ	750mV$_{PP}$
0 – 20000V	0.5mA	**HEC-20x0.5-24-#**	3nF	13kΩ	660MΩ	1000mV$_{PP}$
0 – 30000V	0.3mA	**HEC-30x0.3-24-#**	1.7nF	20kΩ	660MΩ	1500mV$_{PP}$

x: output voltage polarity designator: "**P**" or "**N**" for positive or negative respectively
#: set/monitor voltage range designator: "**5**" or "**10**" for 0-5V or 0-10V respectively

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▪ SPECIFICATIONS

Input Supply Voltage (V_{IN}):	$24V_{DC}$ ± 5%	
Input Supply Current *2:	50mA max.	(@ V_{OUT} = 0)
	800mA max.	(@ V_{OUT} = V_{NOM}, max load)
Line Regulation *1:	< $1 * 10^{-4} * V_{NOM}$	(ΔV_{OUT} / ΔV_{IN} min to max supply voltage)
Load Regulation *1:	< $2 * 10^{-4} * V_{NOM}$	(ΔV_{OUT} / ΔR_{LOAD} no load to rated load)
Temperature Coefficient:	⩽ 100ppm/K	
Supply / Control Connector:	DIN 41612 H15 male	
Output Connector:	0.5kV – 7kV models:	SHV
	10kV models:	HB11
	15kV – 20kV models:	HB21
	30kV models:	HB31
Control:	analog control signals: VSET, ISET, VMON, IMON	
	5V control inputs: INH, KILL_ENA, ON	
Reference Voltage (REF):	option "**5**":	V_{REF} = 5.0V (max 1mA)
	option "**10**":	V_{REF} = 10.0V (max 1mA)
	This reference voltage is intended for external potentiometers to program the output voltage and/or current (connect wipers to VSET, ISET respectively)	
Voltage Setting (VSET):	V_{VSET} = 0 to V_{REF} results in V_{OUT} = 0 to V_{NOM} ±1%	(input impedance: 1MΩ)
Current Limit Setting (ISET):	V_{ISET} = 0 to V_{REF} results in I_{LIMIT} = 0 to I_{NOM} ±1%	
	Open input results in I_{LIMIT} = I_{NOM}	
	The output current is not limited to I_{NOM} internally	
	V_{ISET} must not exceed V_{REF} !	
Voltage Monitor (VMON):	V_{OUT} = 0 to V_{NOM} results in V_{VMON} = 0 to V_{REF} ±1%	(output impedance: 10kΩ)
Current Monitor (IMON):	I_{OUT} = 0 to I_{NOM} results in V_{IMON} = 0 to V_{REF} ±1%	(output impedance: 10kΩ)
Inhibit (INH):	5V level, active Low	
	Low:	V_{OUT} = 0
	High or open:	V_{OUT} according to V_{VSET} with ramp ca. V_{NOM} / 4s
Kill Enable (KILL_ENA):	5V level, active High	(10kΩ pulldown)
	High:	V_{OUT} = 0 without ramp as soon as signal INH becomes active
		The output voltage stays off as long as KILL_ENA = High
	Low or open:	V_{OUT} according to V_{VSET} or V_{ISET}
HV On (ON):	5V level, active Low	
	High or open:	V_{OUT} = 0 with ramp if signal INH is active or I_{OUT} > I_{LIMIT}
		The output voltage stays off as long as KILL_ENA = High
	Low:	V_{OUT} according to V_{VSET} or V_{ISET}
Protection:	Overload, arc and output short circuit.	
	Only one short circuit or arc event per second allowed!	
	In case of higher arc/S.C. frequency the RMS output current must be limited to I_{NOM}	
Temperature Range:	Operating:	0°C to +50°C
	Storage:	-20°C to +60°C
Humidity:	⩽ 70%	
Dimensions:	see table	

Notes:
All voltages are referenced to GND

*1 at 2% * V_{NOM} < V_{OUT} ⩽ V_{NOM}; I_{SET} ⩾ 4% * I_{NOM}

*2 at full rated output voltage, rated load, 25°C, after 1h warm up

▪ ORDERING INFORMATION

HEC	-	30	P	0.3	-	24	-	5
Base Part Designation		Output Voltage [kV_{DC}]	Output Polarity	Output Current [mA]		Input Supply Voltage [V_{DC}]		Set/Monitor Voltage Range [V_{DC}]

Example: HEC-30P0.3-24-5 (HEC series, 30kV, positive, 0.3mA, 24V supply, 5V reference)

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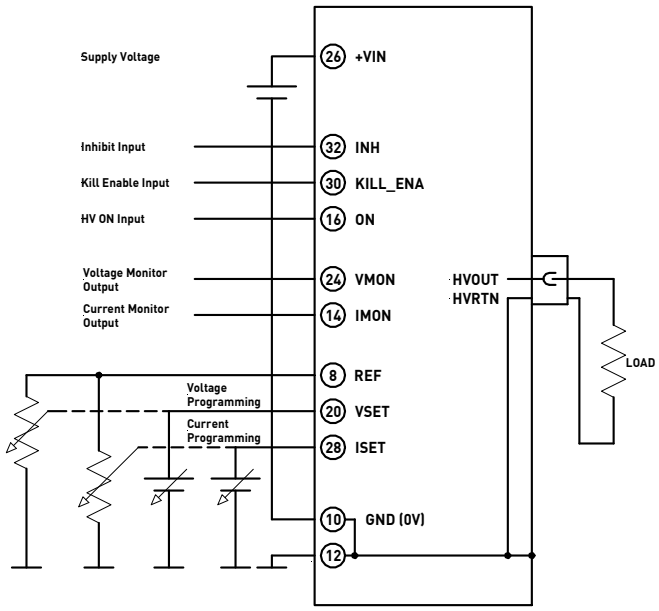
CONNECTION DIAGRAM



PIN FUNCTION DESCRIPTIONS

Pin No.	Designation	Function
8	REF	Reference Voltage Output
10	GND (0V)	Power 0V (connected to pin 12)
12	GND	Signal GND (connected to pin 10)
14	IMON	Current Monitor Output
16	ON	HV ON Input
20	VSET	Voltage Programming Input
24	VMON	Voltage Monitor Output
26	+VIN	Input Supply Voltage
28	ISET	Current Programming Input
30	KILL_ENA	Kill Enable Input
32	INH	Inhibit Input

GND and HVRTN are internally connected.
The case is connected to GND.

DIMENSIONS

	Height	Width	Overall Depth
500V-7kV models	3U (128.7)	8HP (40.3)	190
10kV-30kV models	3U (128.7)	12HP (60.7)	190

Dimensions in mm

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