HED modules are highly precise and highly stable analog controlled high voltage power supplies with reversible output polarity. The HED series covers output voltages of up to 6 kV in a 3U/8HP cassette. A version in a compact metal box is available too (HMD series). The maximum output power is 12W. The HV output is brought out via a SHV 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). Output Polarity control as well as Inhibit, Kill Enable and remote ON inputs are provided. The patented resonant converter technology guarantees high efficiency and low EMI.

### FEATURES
- Precise high voltages up to 6kV at max. 12W
- Polarity electronically reversible
- Patented resonance converter technology
- Very low ripple and noise
- Very low EMI
- 3U/8HP cassette
- Modified versions available on request
- Made in Germany

<table>
<thead>
<tr>
<th>Output Voltage $V_{\text{NOM}}$</th>
<th>Output Current $I_{\text{NOM}}$</th>
<th>Model Control/Monitor Level: 5V</th>
<th>Model Control/Monitor Level: 10V **</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 200V *</td>
<td>10mA</td>
<td>HED-0.2R10-24-5-E</td>
<td>HED-0.2R10-24-10-E</td>
</tr>
<tr>
<td>0 - 500V</td>
<td>10mA</td>
<td>HED-0.5R10-24-5-E</td>
<td>HED-0.5R10-24-10-E</td>
</tr>
<tr>
<td>0 - 1 000V</td>
<td>10mA</td>
<td>HED-1R10-24-5-E</td>
<td>HED-1R10-24-10-E</td>
</tr>
<tr>
<td>0 - 1 500V</td>
<td>8mA</td>
<td>HED-1.5R8-24-5-E</td>
<td>HED-1.5R8-24-10-E</td>
</tr>
<tr>
<td>0 - 2 000V</td>
<td>6mA</td>
<td>HED-2R6-24-5-E</td>
<td>HED-2R6-24-10-E</td>
</tr>
<tr>
<td>0 - 3 000V</td>
<td>4mA</td>
<td>HED-3R4-24-5-E</td>
<td>HED-3R4-24-10-E</td>
</tr>
<tr>
<td>0 - 4 000V</td>
<td>3mA</td>
<td>HED-4R3-24-5-E</td>
<td>HED-4R3-24-10-E</td>
</tr>
<tr>
<td>0 - 5 000V</td>
<td>2mA</td>
<td>HED-5R2-24-5-E</td>
<td>HED-5R2-24-10-E</td>
</tr>
<tr>
<td>0 - 6 000V</td>
<td>1.5mA</td>
<td>HED-6R1.5-24-5-E</td>
<td>HED-6R1.5-24-10-E</td>
</tr>
</tbody>
</table>

### SPECIFICATIONS
- Input Supply Voltage $[V_{\text{IN}}]$: +24VDC ± 5% (max 0.8A)
- Output Current Limit: $[1.02 - 1.04] \times I_{\text{NOM}}$
- Output Current Limit Control: $0 - I_{\text{NOM}}$
- Line Regulation: $< 1 \times 10^{-5} \times V_{\text{NOM}} \; (\Delta V_{\text{OUT}} / \Delta V_{\text{IN}} \; \text{min to max supply voltage})$
- Load Regulation: $< 5 \times 10^{-5} \times V_{\text{NOM}} \; (\Delta V_{\text{OUT}} / \Delta R_{\text{LOAD}} \; \text{no load to rated load})$
- Temperature Coefficient: $5 \times 10^{-6}/K$
- Ripple: typ. $\leq 2\text{mVpp}$, max. 7mVPP
- Supply / Control Connector: DIN 41612 H15 male
- Output Connector: SHV [front panel]
- Control: analog control signals: VSET, ISET, VMON, IMON
- 5V control inputs: POL, ON, KILL_ENA, INH

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Reference Voltage (VREF): 5V [1mA] or 10V [1mA] (model dependent).
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): \( V_{\text{SET}} - 0 \) to \( V_{\text{REF}} \) results in \( V_{\text{OUT}} = 0 \) to \( V_{\text{NOM}} \pm 1\% \) (input impedance: 4.7M\( \Omega \))

Current Limit Setting (ISET): \( V_{\text{SET}} - 0 \) to \( V_{\text{REF}} \) results in \( I_{\text{OUT}} = 0 \) to \( I_{\text{NOM}} \pm 1\% \)
Connecting ISET to REF through a 10k\( \Omega \) resistor results in current limit = \( I_{\text{NOM}} \)

Voltage Monitor (VMON): \( V_{\text{OUT}} = 0 \) to \( V_{\text{NOM}} \) results in \( V_{\text{VMON}} = 0 \) to \( V_{\text{REF}} \pm 1\% \) (output impedance: 10k\( \Omega \)/100nF)

Current Monitor (IMON): \( I_{\text{OUT}} = 0 \) to \( I_{\text{NOM}} \) results in \( V_{\text{IMON}} = 0 \) to \( V_{\text{REF}} \pm 1\% \) (output impedance: 10k\( \Omega \)/100nF)

Polarity Control (POL): 5V level, switchable at \( V_{\text{OUT}} = 0 \)
High or open: \( V_{\text{OUT}} \) positive (red LED)
Low: \( V_{\text{OUT}} \) negative (green LED)
The polarity may only be reversed when the output voltage is 0V!
Typical switching sequence:
switch output off (ON -> High) -> wait 4s for ramp down / discharge
-> reverse polarity (POL) -> switch output on (ON -> Low)

Remote ON (ON) 5V level, active Low
Low: \( V_{\text{OUT}} \) according to \( V_{\text{SET}} \) or \( V_{\text{SET}} \) with ramp ca. \( V_{\text{NOM}}/4s \)
High or open: \( V_{\text{OUT}} = 0 \) with ramp ca. \( V_{\text{NOM}}/4s \)

Kill (KILL_ENA) 5V level, active High
High: \( V_{\text{OUT}} = 0 \) without ramp if signal INHIBIT is active
Restoring the output voltage is only possible after applying KILL_ENA or ON again
Low or open: \( V_{\text{OUT}} \) according to \( V_{\text{SET}} \) or \( V_{\text{SET}} \)

Inhibit (INH) 5V level, active Low
Low: \( V_{\text{OUT}} = 0 \)
High or open: \( V_{\text{OUT}} \) according to \( V_{\text{SET}} \) with ramp ca. \( V_{\text{NOM}} / 4s \)

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 \( I_{\text{NOM}} \)

Cooling:
Convection cooling; has to be sufficient under load conditions

Dimensions:
Euro cassette 3U x 8HP x 160mm

All voltages are referenced to GND
### ORDERING INFORMATION

|-----------------------|-----------------------|-----------------|---------------------|-----------------------------|---------------------------------|---------------------------------|

Example: HED-6R1.5-24-5-E (HED series, 6kV, reversible polarity, 1.5mA, 24V supply, 5V reference, polarity switching electronically)

- * Models with 200V output voltage range on request only. Minimum quantities may apply.
- ** Models with 10V control/monitor voltage level on request only. Minimum quantities may apply.

### Disclaimer

The information given in this data sheet is technical data, not assured product characteristics. It has been carefully checked and is believed to be accurate; however, no responsibility is assumed for inaccuracies. The user has to ensure by adequate tests that the product is suitable for his application regarding safety and technical aspects.

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### Safety Advice

Design, installation and inspection of machinery and devices carrying high voltage require accordingly trained and qualified personnel. Appropriate safety rules and directives must be complied with.

Improper handling of high voltage can mean severe injuries or death and may cause serious collateral damage!