Hive Series

VERSATILE, PRECISION REGULATED HIGH VOLTAGE POWER SUPPLIES

FEATURES

- Precise high voltages up to 30kV at 60W/80W
- Positive or negative polarity
- Output voltage and current control
- Internal reference voltage
- Stable output voltage
- Low ripple and noise
- Low EMI
- Capacitor charger option (-C)
- ARC management option (-ARC)
- Patented resonance converter technology
- 3U/12HP cassette
- Modified versions available on request
- Made in Germany

HEE modules are versatile, precise and stable analog controlled high voltage power supplies. The HEE series covers output voltages of up to 30kV (the >10kV models are preliminary) in a 3U/12HP cassette. A version in a compact metal box is available too (HME series). The maximum output power is 60W, and 80W on selected models.

The HV output is brought out via SHV, HB11, HB21 or HB31 connectors, depending on the output voltage. 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 remote ON inputs are provided.

The HEE modules can be equipped as capacitor charger with very low output voltage overshoot (option C). The patented resonant converter technology guarantees high efficiency and low EMI.

| Output Voltage \n| Max. Output Current | Model | Ripple / Noise @f>10Hz max. | Output Connector |
|---------------------|--------|-----------------------------|----------------|
| \n\n| VNOM | INOM | Positive Polarity Output | Negative Polarity Output | |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| 0 – 500V | 120mA | HEE-0.5P120-24-# | HEE-0.5N120-24-# | 0.25Vpp * \n| 0 – 1 000V | 60mA | HEE-1P60-24-# | HEE-1N60-24-# | 0.5Vpp * \n| 0 – 1 500V | 40mA | HEE-1.5P40-24-# | HEE-1.5N40-24-# | 0.75Vpp * \n| 0 – 2 000V | 30mA | HEE-2P30-24-# | HEE-2N30-24-# | 1Vpp * \n| 0 – 2 000V | 40mA | HEE-2P40-24-# | HEE-2N40-24-# | 1.5Vpp * \n| 0 – 3 000V | 20mA | HEE-3P20-24-# | HEE-3N20-24-# | 1.5Vpp * \n| 0 – 4 000V | 15mA | HEE-4P15-24-# | HEE-4N15-24-# | 2Vpp * \n| 0 – 5 000V | 12mA | HEE-5P12-24-# | HEE-5N12-24-# | 2.5Vpp * \n| 0 – 6 000V | 10mA | HEE-6P10-24-# | HEE-6N10-24-# | 3Vpp * \n| 0 – 8 000V | 7mA | HEE-8P7-24-# | HEE-8N7-24-# | 4Vpp \n| 0 – 10 000V | 6mA | HEE-10P6-24-# | HEE-10N6-24-# | 5Vpp \n| 0 – 15 000V | 4mA | HEE-15P4-24-# | HEE-15N4-24-# | 300Vpp \n| 0 – 20 000V | 3mA | HEE-20P3-24-# | HEE-20N3-24-# | 400Vpp \n| 0 – 30 000V | 2mA | HEE-30P2-24-# | HEE-30N2-24-# | 600Vpp |

#: set/monitor voltage range designator: “5” for 0-5V. “10” for 0-10V on request (minimum order quantity applies).
*: available with reduced ripple on request (minimum order quantity applies).

Standard models shown in bold. Minimum order quantity applies for non-standard models.
### SPECIFICATIONS

- **Input Supply Voltage (VIN):** +24VDC ± 5% (max 3.5A - 60W models, max. 4.5A - 80W models)
- **Output Current Limit:** (1.02 - 1.04) \* INOM
- **Line Regulation:** < 1 \* 10⁻⁴ \* VNOM (min to max supply voltage)
- **Load Regulation:** < 2 \* 10⁻⁴ \* VNOM (no load to rated load)
- **Temperature Coefficient:** 2 \* 10⁻⁴/K
- **C-Charger Repeat Accuracy:** < 2 \* 10⁻² \* VNOM
- **Supply / Control Connector:** DIN 41612 H15 male
- **Control:** analog control signals: VSET, ISET, VMON, IMON
  5V control inputs: HV_ON, KILL_ENA, INHIBIT
- **Reference Voltage (VREF):** 5.0V (max. 1mA); 10.0V (max. 1mA) optionally for -10 models.
  This reference voltage is intended for external potentiometers to program the output voltage and/or current (connect wiper to VSET, ISET)
- **Voltage Setting (VSET):** VSET - 0 to VREF results in VOUT = 0 to VNOM ±1%
- **Current Limit Setting (ISET):** VSET - 0 to VREF results in IOUT = 0 to INOM ±1%
- **Voltage Monitor (VMON):** VOUT = 0 to VNOM results in VVMON = 0 to VREF
- **Current Monitor (IMON):** IOUT = 0 to INOM results in VIMON = 0 to VREF
- **Remote ON (HV_ON):** 5V level, active Low
  High or open: VOUT according to VSET with ramp ca. VNOM/4s
- **Kill (KILL_ENA):** 5V level, active High
  High: VOUT = 0 without ramp if signal INHIBIT is active
  Restoring the output voltage is only possible after applying INHIBIT or HV_ON again
  Low or open: VOUT according to VSET
- **Inhibit (INH):** 5V level, active Low
  Low: VOUT off
  High or open: VOUT according to VSET
- **Protection:** Overload, arc, output short circuit, over-voltage, over-temperature.
  **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 INOM
- **Cooling:** Convection cooling; has to be sufficient under load conditions
- **Dimensions:** Euro cassette 3U x 12HP x 160mm

All voltages are referenced to GND
**CONNECTION DIAGRAM**

- Supply Voltage
- Remote On Input
- Kill Enable Input
- Voltage Monitor Output
- Current Monitor Output

**PIN FUNCTION DESCRIPTIONS**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Designation</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>GND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>8</td>
<td>REF</td>
<td>Reference Voltage Output</td>
</tr>
<tr>
<td>10, 12</td>
<td>PWR_0V</td>
<td>Supply Voltage Ground</td>
</tr>
<tr>
<td>14</td>
<td>IMON</td>
<td>Current Monitor Output</td>
</tr>
<tr>
<td>16</td>
<td>HV_ON</td>
<td>Remote On Input</td>
</tr>
<tr>
<td>20</td>
<td>VSET</td>
<td>Voltage Programming Input</td>
</tr>
<tr>
<td>24</td>
<td>VMON</td>
<td>Voltage Monitor Output</td>
</tr>
<tr>
<td>26</td>
<td>PWR_+V</td>
<td>Input Supply Voltage</td>
</tr>
<tr>
<td>28</td>
<td>ISET</td>
<td>Current Programming Input</td>
</tr>
<tr>
<td>30</td>
<td>KILL_ENA</td>
<td>Kill Enable Input</td>
</tr>
<tr>
<td>32</td>
<td>INHIBIT</td>
<td>Inhibit Input</td>
</tr>
</tbody>
</table>

GND, PWR_0V and HVRTN are internally connected; the case is connected to GND.

**OPTIONS**

- C  capacitor charger with very low output voltage overshoot

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Base Part Designation</th>
<th>Output Voltage [kV DC]</th>
<th>Output Polarity</th>
<th>Output Current [mA]</th>
<th>Input Supply Voltage [V DC]</th>
<th>Set/Monitor Voltage Range [V DC]</th>
<th>Options (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEE-2P30-24-5</td>
<td>2</td>
<td>positive</td>
<td>30</td>
<td>24</td>
<td>5</td>
<td>C</td>
</tr>
<tr>
<td>HEE-2P30-24-5-C</td>
<td>2</td>
<td>positive</td>
<td>30</td>
<td>24</td>
<td>5</td>
<td>C</td>
</tr>
</tbody>
</table>

Examples: HEE-2P30-24-5 [HEE series, 2kV, positive polarity, 30mA, 24V supply, 5V reference]

HEE-2P30-24-5-C [HEE series, 2kV, positive polarity, 30mA, 24V supply, 5V reference, capacitor charger option]

**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!