Plasma Power Supplies

from DC to UNIPOLAR to BIPOLAR
Series Overview

PLASMA TEC

The PLASMA TEC-Series primary switched-mode power supplies were specially developed for plasma processes in the range 400-800V. J. Schneider offers three different device models provides within this new generation of water-cooled power supplies. The series is characterized by an extremely low output power, a sophisticated flexible adjustable arc management, and high power density.

The power supplies are available with output power of 5kW, 10kW, 15kW or 20kW and can be connected in parallel to increase output power to 150kW. They are ideal for vacuum coating processes of fine optical glass, solar cells, architectural glass, or flat panel displays.

The PLASMA TEC DCp alternatively provides a pure DC voltage or a unipolar pulsed output voltage in the range of 400-800V. In the unipolar pulse mode, the device delivers a fixed output frequency of 76 kHz and the duty range is adjustable from 7% to 88%.

The PLASMA TEC AC supplies an AC voltage of 600-2000Vav fixed at an output frequency of 38.5 kHz. Again, the duty range can be adjusted from 12.5% to 100%.

The PLASMA TEC, which is extremely flexible adjustable, and capable all operating modes of a pure DC operation via a unipolar pulsed operation up to bipolar pulsed operation, virtually combines all functions in one device.

In the unipolar pulse mode, the output frequency is 76 kHz, in the bipolar pulse mode 38 kHz and the duty range can be set from 7% to 88%. In the bipolar pulse mode, the number of positive and negative pulses can be altered from 0 to 255 pulses, with the voltage level of the positive and negative pulses identical. Due to its highly flexible setting options, the PLASMA TEC is particularly suited not only for in industrial processes but also can also be used in special laboratory facilities for layer development.

PARALLEL SWITCHED OR SYNCHRONIZED MODES
CONTROL
For control the devices have an analog / digital interface and an RS232 interface as standard equipment. The RS232 interface can be operated in two modes - terminal mode and PLC mode.
In terminal mode, the display characters on the control side can be interpreted, with a terminal program, e.g. Windows Hyper Terminal.
In the PLC mode, a number of bytes sent over the interface, which must be interpreted by a PLC for example. To control the power supply a corresponding byte sequence with predefined content must be sent to the power supply.
Optionally, the devices can also be equipped with an integrated control panel or a field bus (CAN, Profibus).

CONTROL PARAMETERS
Up to five sets of parameters can be stored in the power supply. This allows the user to easily and quickly change the power supply to different processes. These parameter sets can be retrieved or reloaded each time at startup. The following individual parameters can be are stored in a single set:

- ARC-feed time
- ARC-break time
- ARC-threshold
- Arc-hysteresis
- Ignition voltage threshold
- Ignition voltage hysteresis
- Output pulse width
- Number of positive pulses
- Number of negative pulses
- Time for timeout polling
- Parallel Status
- Number of parallel units
- Output mode
- User interface
- RS232-set values for voltage, current and power
- Start in the terminal or PLC mode
- Start with ABAUD detection
- User password
## SELECTION TABLE

<table>
<thead>
<tr>
<th>Output voltage (positive or negative):</th>
<th>PLASMA TEC DCp</th>
<th>PLASMA TEC AC</th>
<th>PLASMA TEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>400-800V DC</td>
<td>ü</td>
<td>ü</td>
<td>ü</td>
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<tbody>
<tr>
<td>400-800V CAv</td>
<td>ü</td>
<td>ü</td>
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<tr>
<th>Output frequency:</th>
<th>PLASMA TEC AC</th>
<th>PLASMA TEC AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>fixed 76kHz</td>
<td>ü</td>
<td>ü</td>
</tr>
</tbody>
</table>

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<tr>
<th>Output voltage (positive = negative):</th>
<th>PLASMA TEC</th>
<th>PLASMA TEC AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLASMA TEC 400 - 800V</td>
<td>ü</td>
<td>ü</td>
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<th>Output frequency:</th>
<th>PLASMA TEC</th>
<th>PLASMA TEC AC</th>
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</thead>
<tbody>
<tr>
<td>PLASMA TEC fixed 38kHz</td>
<td>ü</td>
<td>ü</td>
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<tr>
<th>Output frequency:</th>
<th>PLASMA TEC AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLASMA TEC fixed 38.5kHz</td>
<td>ü</td>
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<th>Output voltage (positive = negative):</th>
<th>PLASMA TEC</th>
<th>PLASMA TEC AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLASMA TEC 600 - 2000V</td>
<td>ü</td>
<td>ü</td>
</tr>
</tbody>
</table>

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<th>Output frequency:</th>
<th>PLASMA TEC</th>
<th>PLASMA TEC AC</th>
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<tbody>
<tr>
<td>PLASMA TEC 7,6% to 88%</td>
<td>ü</td>
<td>ü</td>
</tr>
</tbody>
</table>

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<tr>
<th>Pulse ratio (positive to negative):</th>
<th>PLASMA TEC</th>
<th>PLASMA TEC AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLASMA TEC 1:255 up to 255:1</td>
<td>ü</td>
<td>ü</td>
</tr>
</tbody>
</table>

| Water cooling:                       | ü          | ü             | ü          |

| Interfaces                           | ü          | ü             | ü          |
|--------------------------------------|------------|---------------|
| analog / digital                      | ü          | ü             |
| RS232                                 | ü          |
| Fieldbus                              | ü          |
| integrated control panel (Touch Panel)| O          | O             | O          |

| Parallel switched or synchronized mode| ü          | ü             |

| Arc-recognition                      | ü          | ü             | ü          |
|--------------------------------------|------------|---------------|
| adjustable voltage threshold         | ü          | ü             |
| adjustable via dU / dt               | ü          |
| adjustable via dl / dt               | ü          | ü             |

= Standard  O = Option
The PLASMA TEC DC pulsed DC power supply provides a DC output voltage from 400 to 800V. Individual modules are available with an output power of 10kW and 20kW. Both options can coupled in parallel using fiber optics are to increase power to 150kW. The devices can be set via the integrated analog / digital interface or RS232 interface. Optionally, an integrated control panel or field bus is available.

**SPECIFICATIONS**

**Input:**

- Input voltage: 400Vac ± 10%
- Input power:
  - 10kW max. 20A
  - 20kW max. 40A

**Output:**

- Output power:
  - 10kW at 400 to 800V
  - 20kW at 400 to 800V
- Output voltage:
  - ±400 - ±800V DC
- Ignition voltage: ±1400V
- Output current:
  - 10kW: 25A at 800V
  - 20kW: 50A at 400V

**Output controls:**

- Control of voltage, current, power
- Arc detection <1μsec
- Arc threshold adjustable 0-800V
- Arc injection time adjustable 0-100μsec
- Arc pause time adjustable 0-1000μsec
- Arc Energy: 10kW <3mJ at 800V
  - 20kW <6mJ at 800V

**Cooling system:**

- Water cooling: yes
- Temperature: 5° C min, 35° C max non condensing
- Water flow rate: 4 l/min., > 3.5bar <6bar
- Water connector: 10mm

**Power Connections:**

- Input: 3-pin Han modular (Harting)
- Output: Lapp-Epic HB16 with 2 GES-HV-Modules
- Output cable: 2 x RG213/U

**Dimensions (H x W x D):**

- 10kW: 3HeX19”x600mm (695mm incl. plug)
- 20kW: 3HeX19”x600mm (695mm incl. plug)

**Protection:**

- IP 54

**CE Marking:**

- DIN VDE 0160 / EN50178
- Emissions: EN55011 Group 2, Class A
- Immunity: EN 61000-6-2

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<table>
<thead>
<tr>
<th>MAXIMUM RATING</th>
<th>MODULE NUMBER</th>
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<tbody>
<tr>
<td>V</td>
<td>A</td>
</tr>
<tr>
<td>400-800</td>
<td>25 – 12.5</td>
</tr>
<tr>
<td>400-800</td>
<td>50 – 25.0</td>
</tr>
</tbody>
</table>
The primary switched-mode **PLASMA TEC AC** power supply delivers an AC output voltage from 400 to 2000V at an output frequency of 38.5 kHz. Individual modules are available with an output power of 10kW or 15kW. The duty cycle can be adjusted via the RS232 interface from 0-100%. The devices can be set via the integrated analog / digital interface or RS232 interface. Optionally, an integrated control panel, or field bus are available.

**SPECIFICATIONS:**

**Input:**
- Input voltage: 400Vac ±10%
- 50 or 60Hz, three phase
- Input current: 10kW: max. 20A
  15kW: max. 30A

**Output:**
- Output power: 10kW at 600 to 2000V
  15kW at 600 to 2000V
- Output voltage:
  - 600 - 1000V AC (1st tap)
  - 840 – 1400V AC (2nd tap)
  - 1200 – 2000V AC (3rd tap)
- Ignition voltage: ±2500V
- Output frequency: 38.5kHz
- Output current:
  - 10kW: 5A at 2000V
  - 16A at 600V
  - 15kW: 7.5A at 2000V
  - 25A at 600V

**Output controls:**
- Control of voltage, current, power
- Arc detection: <1μsec
- Arc threshold: 0-100% adjustable for each tap
- Arc injection time adjustable: 0-100μsec
- Arc pause time adjustable: 0-1000μsec
- Arc Energy: 10kW <3mJ at 2000V
  15kW <3mJ at 2000V
- Duty cycle: 12.5% - 100% adjustable

**Cooling system:**
- Water Cooling: yes
- Temperature: 5°C min, 35°C max.
- non condensing
- Water flow rate: 4 l/min, >3.5bar <6bar
- Water connector: 10mm

**Power connections:**
- Input: 3-pin modular Han (Harting)
- Output: Lapp Epic HB16 with two GES-HV modules
- Output cable: 1 x RG213/U

**Dimensions (H x W x D):**
- 10kW: 3HEx19”x600mm (695mm incl. plug)
- 15kW: 3HEx19”x600mm (695mm incl. plug)

**Protection:**
- IP 54

**CE Marking:**
- DIN VDE 0160 / EN50178
- Emission: EN55011 Group 2, Class A
- Immunity: EN 61000-6-2

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<tr>
<td>$V_N$</td>
<td>$A_N$</td>
</tr>
<tr>
<td>600-2000</td>
<td>16.6 – 5.0</td>
</tr>
<tr>
<td>600-2000</td>
<td>25.0 – 7.5</td>
</tr>
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</table>
The primary switched-mode PLASMA TEC power supply delivers either a DC, unipolar or bipolar pulsed output voltage of 400 to 800V. In the unipolar pulse mode, the unit delivers an output frequency of 76 kHz, in bipolar pulsed operation 38kHz. The duty cycle can be adjusted via the RS232 interface. The pulse duration is selectable from 1μsec to 11.5μsec, corresponding to a duty cycle of 7.6% to 88%. The positive and negative pulses have the same voltage level. The number of positive and negative pulses is selectable via RS232 interface. To increase the power up to 15 devices can be connected in parallel.

**SPECIFICATIONS**

**Input:**
- Input voltage: 400Vac ±10%
- Input current: max. 20A

**Output:**
- Output power: 10kW at 400 to 800V
- Output voltage: ±400 - ±800V DC or Pulse
- Ignition voltage: ±1400V
- Output frequency: unipolar 76kHz, bipolar 38kHz
- Output current: DC-operation 12.5A at 800V, ±9.6Aav at 800Vav, Pulse-operation 25A at 400V, ±19.2Aav at 400Vav

**Output controls:**
- Control of: Voltage, current, power
- Arc detection: <1μsec
- Arc threshold adjustable from 0-800V
- Arc injection time of 0- 100μsec adjustable
- Arc pause time adjustable from 0-1000μsec
- Arc energy: <3mJ at 800V
- Setting the Pulse:
  - positive pulses: 0-255 in steps of 1
  - negative pulses: 0-255 in steps of 1
  - Duty cycle from 1μsec up to 11.5 μsec from 7.6% to 88%

**Cooling system:**
- Water cooling: yes
- Temperature: 5°C min., 35°C max.
- non condensing
- Water flow rate: 4 l/min., > 3.5bar < 6bar
- Water connection: 10mm

**Power connections:**
- Input: 3-pin Han modular (Harting)
- Output: Lapp-Epic HB16 with 2 GES-HV-modules
- Output cable: 2 x RG213/U

**Dimensions (H x W x D):**
3HE x 19" x 600mm (695mm incl. plug)

**Protection:**
- IP 54

**CE Marking:**
- DIN VDE 0160 / EN50178
- Emission: EN55011 Group 2, Class A
- Immunity: EN 61000-6-2

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<tr>
<td>Vav</td>
<td>Aav</td>
</tr>
<tr>
<td>400-800</td>
<td>19.25 – 9.6</td>
</tr>
<tr>
<td>400-800</td>
<td>38.5 – 19.25</td>
</tr>
</tbody>
</table>
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