AC/DC Medical Power Supply

• Open frame power supply with pin connector
• Certification according to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP
• Low leakage current <75 µA rated for BF applications
• Risk management process according to ISO 14971 incl. risk management file
• Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3
• EMC compliance to IEC 60601-1-2 ed. 4
• Protection class I and II prepared
• Operating up to 5000 m altitude
• Ready to meet ErP directive, <0.15 W no load power consumption
• 5-year product warranty

The TPP 40A Series of 40 Watt AC/DC power supplies feature a reinforced double I/O isolation system according to latest medical safety standards IEC/-EN/ES 60601-1 3rd edition for 2 x MOPP up to 5000 m altitude. The leakage current is below 75 µA what makes the units suitable for BF (body floating) applications.

The excellent efficiency of up to 92% allows a high power density for the standard 2.0” x 3.0” packaging format. The full load operating temperature range is –40°C to +70°C while it goes up to 85°C with 50% load derating. The EMC characteristic complies to IEC 60601-1-2 ed.4 and is dedicated for applications in industrial and domestic fields. High reliability is provided by use of industrial quality grade components and an excellent thermal management. It makes the products an ideal solution for medical devices and for demanding safety and space critical applications.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TPP 40-105A-J</td>
<td>5 VDC [4.5 - 5.5 VDC]</td>
<td>8'000 mA</td>
<td>90 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPP 40-112A-J</td>
<td>12 VDC [10.8 - 13.2 VDC]</td>
<td>3'340 mA</td>
<td>92 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPP 40-124A-J</td>
<td>24 VDC [21.6 - 26.4 VDC]</td>
<td>1'670 mA</td>
<td>92 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPP 40-148A-J</td>
<td>48 VDC [43.2 - 52.8 VDC]</td>
<td>840 mA</td>
<td>93 %</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Other output models are available on request.
### Input Specifications

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Operational Range:</th>
<th>85 - 264 VAC (Full Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rated Range:</td>
<td>100 - 240 VAC (Full Range)</td>
</tr>
<tr>
<td>- AC Range</td>
<td>Polarity:</td>
<td>+DC: L / −DC: N</td>
</tr>
<tr>
<td>- DC Range</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Frequency</th>
<th>47 - 63 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Current</td>
<td>500 mA max.</td>
</tr>
<tr>
<td></td>
<td>1'000 mA max.</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>150 mW max. (Ready to meet ErP directive)</td>
</tr>
<tr>
<td>Input Inrush Current</td>
<td>60 A max.</td>
</tr>
<tr>
<td>Input Protection</td>
<td>T 3.15 A / 250 VAC [Internal Fuse in L &amp; N]</td>
</tr>
<tr>
<td>Recommended Input Fuse</td>
<td>(The need of an external fuse has to be assessed in the final application)</td>
</tr>
</tbody>
</table>

### Output Specifications

<table>
<thead>
<tr>
<th>Output Voltage Adjustment</th>
<th>±10% (By trim potentiometer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Set Accuracy</td>
<td>±1% max.</td>
</tr>
<tr>
<td>Regulation</td>
<td>- Input Variation (Vmin - Vmax)</td>
</tr>
<tr>
<td></td>
<td>0.2% max.</td>
</tr>
<tr>
<td></td>
<td>- Load Variation (0 - 100%)</td>
</tr>
<tr>
<td></td>
<td>0.7% max. (5 VDC model)</td>
</tr>
<tr>
<td></td>
<td>0.5% max. (other output models)</td>
</tr>
</tbody>
</table>

| Ripple and Noise (20 MHz Bandwidth) | 5 VDC model: 75 mVp-p typ. (w/ 10 μF X7R) |
|                                      | 12 VDC model: 75 mVp-p typ. (w/ 10 μF X7R) |
|                                      | 24 VDC model: 75 mVp-p typ. (w/ 1 μF X7R) |
|                                      | 48 VDC model: 150 mVp-p typ. (w/ 0.1 μF X7R) |

| Capacitive Load | 5 VDC model: 16’000 μF max. |
|                | 12 VDC model: 2’785 μF max. |
|                | 24 VDC model: 700 μF max.    |
|                | 48 VDC model: 175 μF max.    |

| Minimum Load | Not required |
| Temperature Coefficient | ±0.02 %/K max. |
| Hold-up Time | - At 115 VAC: 25 ms min. |
| Start-up Time | - At 230 VAC: 1’000 ms max. |
| Short Circuit Protection | Continuous, Automatic recovery |
| Output Current Limitation | 115 - 180% of Iout max. |
|                          | 145% typ. of Iout max. |
| Overvoltage Protection | 125 - 140% of Vout nom. |
| Transient Response | - Response Deviation 3% max. (50% to 75% Load Step) |
|                      | - Response Time 600 μs typ. (50% to 75% Load Step) |

### Safety Specifications

| Safety Standards | - IT / Multimedia Equipment |
|                 | EN 62368-1 |
|                 | IEC 62368-1 |
|                 | UL 62368-1 |
|                 | - Medical Equipment |
|                 | EN 60601-1 |
|                 | IEC 60601-1 |
|                 | ANSI/AAMI ES 60601-1 |
|                 | 2 x MOPP (Means Of Patient Protection) |
|                  | www.tracopower.com/overview/tpp40a |
| Protection Class | Class I & II (Prepared: Reinforced Insulation) |
| Pollution Degree | PD 2 |
| Over Voltage Category | OVC II |

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
## EMC Specifications

<table>
<thead>
<tr>
<th>EMI Emissions</th>
<th>EN 60601-1-2 edition 4 (Medical Devices)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Conducted Emissions</td>
<td>EN 55011 class B (internal filter)</td>
</tr>
<tr>
<td>- Radiated Emissions</td>
<td>EN 55011 class B (internal filter)</td>
</tr>
<tr>
<td>- Harmonic Current Emissions</td>
<td>EN 61000-3-2, class A</td>
</tr>
<tr>
<td>- Voltage Fluctuations &amp; Flicker</td>
<td>EN 61000-3-3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EMS Immunity</th>
<th>EN 60601-1-2 edition 4 (Medical Devices)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Electrostatic Discharge</td>
<td>Air: EN 61000-4-2, ±15 kV, perf. criteria A</td>
</tr>
<tr>
<td>- RF Electromagnetic Field</td>
<td>Contact: EN 61000-4-3, 20 V/m, perf. criteria A</td>
</tr>
<tr>
<td>- EFT (Burst) / Surge</td>
<td>L to L: EN 61000-4-4, ±2 kV, perf. criteria A</td>
</tr>
<tr>
<td>- Conducted RF Disturbances</td>
<td>L to PE: EN 61000-4-5, ±2 kV, perf. criteria A</td>
</tr>
<tr>
<td>- PF Magnetic Field</td>
<td>Continuous: EN 61000-4-6, 20 Vrms, perf. criteria A</td>
</tr>
<tr>
<td>- Voltage Dips &amp; Interruptions</td>
<td>230 VAC / 50 Hz: EN 61000-4-8, 30 A/m, perf. criteria A</td>
</tr>
<tr>
<td>-</td>
<td>115 VAC / 60 Hz: EN 61000-4-11</td>
</tr>
<tr>
<td>-</td>
<td>30%, 25 periods, perf. criteria A</td>
</tr>
<tr>
<td>-</td>
<td>&gt;95%, 0.5 periods, perf. criteria A</td>
</tr>
<tr>
<td>-</td>
<td>&gt;95%, 1 period, perf. criteria A</td>
</tr>
<tr>
<td>-</td>
<td>&gt;95%, 250 periods, perf. criteria B</td>
</tr>
</tbody>
</table>

## General Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Humidity</td>
<td>95% max. (non condensing)</td>
</tr>
<tr>
<td>Temperature Ranges</td>
<td>Operating Temperature: -40°C to +85°C</td>
</tr>
<tr>
<td></td>
<td>Storage Temperature: -40°C to +85°C</td>
</tr>
<tr>
<td>Power Derating</td>
<td>High Temperature: See application note: <a href="http://www.tracopower.com/overview/tpp40a">www.tracopower.com/overview/tpp40a</a></td>
</tr>
<tr>
<td></td>
<td>Low Input Voltage: See application note: <a href="http://www.tracopower.com/overview/tpp40a">www.tracopower.com/overview/tpp40a</a></td>
</tr>
<tr>
<td>Cooling System</td>
<td>Natural convection (20 LFM)</td>
</tr>
<tr>
<td>Altitude During Operation</td>
<td>5,000 m max.</td>
</tr>
<tr>
<td>Switching Frequency</td>
<td>50 - 140 kHz (PWM)</td>
</tr>
<tr>
<td>Insulation System</td>
<td>Reinforced Insulation</td>
</tr>
<tr>
<td>Working Voltage (rated)</td>
<td>258 VAC</td>
</tr>
<tr>
<td>Isolation Test Voltage</td>
<td>- Input to Output, 60 s: 4,000 VAC</td>
</tr>
<tr>
<td></td>
<td>- Input to Case or PE, 60 s: 2,500 VAC</td>
</tr>
<tr>
<td></td>
<td>- Output to Case or PE, 60 s: 2,500 VAC</td>
</tr>
<tr>
<td>Creepage</td>
<td>Input to Output: 8 mm min.</td>
</tr>
<tr>
<td>Clearance</td>
<td>Input to Output: 8 mm min.</td>
</tr>
<tr>
<td>Isolation Resistance</td>
<td>Input to Output, 500 VDC: 100 MΩ min.</td>
</tr>
<tr>
<td>Leakage Current (at 264 VAC)</td>
<td>Touch Current: 75 µA max.</td>
</tr>
<tr>
<td>Reliability</td>
<td>Calculated MTF: 3,000,000 h (MIL-HDBK-217F, ground benign)</td>
</tr>
<tr>
<td>Environment</td>
<td>Vibration: IEC 60068-2-6</td>
</tr>
<tr>
<td></td>
<td>5 g, 3 axis, sine sweep, 5-500 Hz, 1 oct/min</td>
</tr>
<tr>
<td></td>
<td>Mechanical Shock: IEC 60068-2-27</td>
</tr>
<tr>
<td></td>
<td>50 g, 3 axis, half sine, 11 ms</td>
</tr>
<tr>
<td>Housing Type</td>
<td>Open Frame</td>
</tr>
</tbody>
</table>

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www.tracopower.com 

January 13, 2022
### Mounting Type
Chassis Mount

### Connection Type
Pin Connector

### Weight
114 g

### Environmental Compliance
- REACH Declaration
  - www.tracopower.com/info/reach-declaration.pdf
  - REACH SVHC list compliant
  - REACH Annex XVII compliant
- RoHS Declaration
  - www.tracopower.com/info/rohs-declaration.pdf
  - Exemptions: 7a, 7c-I
  (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)

### Outline Dimensions

#### Pin connectors

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
<th>Pin*</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Line</td>
<td>1,2</td>
<td>–Vout</td>
</tr>
<tr>
<td>3</td>
<td>Neutral</td>
<td>3,4</td>
<td>+Vout</td>
</tr>
</tbody>
</table>

*Terminal rated for 7 A max.
(at higher current connection has to be split)

**CON1**: JST series
mates with JST crimp terminal: BVH-21T-P1.1
and terminal housing: VHR-3N

**CON2**: JST series
mates with JST crimp terminal: BVH-21T-P1.1
and terminal housing: VHR-4N

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Dimensions in mm, ( ) = inch

Outside dimension tolerance: ±0.5 mm (±0.02 inch)
Hole spacing tolerance: ±0.25 mm (±0.01 inch)

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Rev. January 13, 2022
Page 4 / 4