AC/DC Industrial Power Supply

- Highest power density 150 W open frame power supply in 2” x 4” package
- I/O reinforced isolation 3000 VDC
- Ready to meet ErP directive, < 0.3 W no load power consumption
- Highest efficiency 91 - 92% across 10% - 100% load range
- Active power factor correction > 95
- Protection class II prepared
- Operating up to 5000 m altitude
- Adjustable output voltage
- 3-year product warranty

The TPI 150A Series of 150 Watt AC/DC power supplies features a 3000 VDC I/O reinforced isolation. Excellent efficiency of up to 92% allows a high power density for the standard 2.0” x 4.0” packaging format. The full load operating temperature range is –40°C to +50°C while it goes up to +80°C with load derating. The power supplies are designed to meet the ErP directive (< 0.3 W no load power consumption). They come with an active power factor correction and the EMC characteristic 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 any demanding industrial devices and space critical applications.

### Models

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>TPI 150-112A-J</td>
<td>150 W</td>
<td>12 VDC (10.8 - 13.2 VDC)</td>
<td>12'500 mA</td>
<td>8'340 mA</td>
<td>91 %</td>
</tr>
<tr>
<td>TPI 150-115A-J</td>
<td>150 W</td>
<td>15 VDC (13.5 - 16.5 VDC)</td>
<td>10'000 mA</td>
<td>7'340 mA</td>
<td>92 %</td>
</tr>
<tr>
<td>TPI 150-124A-J</td>
<td>150 W</td>
<td>24 VDC (21.6 - 26.4 VDC)</td>
<td>6'250 mA</td>
<td>4'590 mA</td>
<td>92 %</td>
</tr>
<tr>
<td>TPI 150-128A-J</td>
<td>150 W</td>
<td>28 VDC (25.2 - 30.8 VDC)</td>
<td>5'360 mA</td>
<td>3'930 mA</td>
<td>92 %</td>
</tr>
<tr>
<td>TPI 150-136A-J</td>
<td>150 W</td>
<td>36 VDC (32.4 - 39.6 VDC)</td>
<td>4'170 mA</td>
<td>3'060 mA</td>
<td>92 %</td>
</tr>
<tr>
<td>TPI 150-148A-J</td>
<td>150 W</td>
<td>48 VDC (43.2 - 52.8 VDC)</td>
<td>3'130 mA</td>
<td>2'090 mA</td>
<td>92 %</td>
</tr>
</tbody>
</table>

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## Input Specifications

| Input Voltage | Operational Range: 85 - 264 VAC (Full Range)  
|              | Rated Range: 100 - 240 VAC (Full Range)  
|              | - DC Range  
|              | Operational Range: 120 - 370 VDC (Designed for, no certification)  
|              | Polarity: +DC: L / -DC: N  
| Input Frequency | Operational Range: 47 - 440 Hz  
|                | Certified: 50/60 Hz  
| Input Current | - Full Load & Vin = 230 VAC  
|               | - Full Load & Vin = 115 VAC  
| Power Consumption | 800 mA max.  
|                  | 1*700 mA max.  
|                  | - No load & Vin = 230 VAC  
|                  | - No load & Vin = 115 VAC  
|                  | 300 mW max. (Ready to meet ErP directive)  
|                  | 300 mW max.  
| Input Inrush Current | - At 230 VAC  
|                     | - At 115 VAC  
|                     | 100 A max.  
|                     | 55 A max.  
| Power Factor | - At 230 VAC  
|               | - At 115 VAC  
|               | 0.95 min.  
|               | 0.95 min.  
| Input Protection | T 3.15 A / 250 VAC (Internal Fuse in L & N)  
| Recommended Input Fuse | (The need of an external fuse has to be assessed in the final application.)

## Output Specifications

| Output Voltage Adjustment | ±10% (By trim potentiometer)  
|                          | Output power must not exceed rated power!  
| Voltage Set Accuracy | ±1% max.  
| Regulation | - Input Variation (Vmin - Vmax)  
|            | - Load Variation (0 - 100%)  
|            | 0.2% max.  
|            | 0.5% max.  
| Ripple and Noise (20 MHz Bandwidth) |  
| 12 VDC model: | 120 mVp-p typ. (w/ 1 µF X7R)  
| 15 VDC model: | 150 mVp-p typ. (w/ 1 µF X7R)  
| 24 VDC model: | 220 mVp-p typ. (w/ 1 µF X7R)  
| 28 VDC model: | 220 mVp-p typ. (w/ 1 µF X7R)  
| 36 VDC model: | 250 mVp-p typ. (w/ 1 µF X7R)  
| 48 VDC model: | 250 mVp-p typ. (w/ 0.1 µF X7R)  
| Capacitive Load |  
| 12 VDC model: | 10'400 µF max.  
| 15 VDC model: | 6'600 µF max.  
| 24 VDC model: | 2'600 µF max.  
| 28 VDC model: | 1'900 µF max.  
| 36 VDC model: | 1'150 µF max.  
| 48 VDC model: | 650 µF max.  
| Minimum Load | Not required  
| Temperature Coefficient | ±0.02 %/K max.  
| Hold-up Time | - At 230 VAC  
|              | - At 115 VAC  
| Start-up Time | - At 230 VAC  
|               | - At 115 VAC  
| Short Circuit Protection | Continuous, Automatic recovery  
| Output Current Limitation | 115 - 150% of Iout max.  
| Overvoltage Protection | 115 - 135% of Vout nom.  
| Transient Response | - Response Deviation  
|                   | - Response Time  
|                   | 3% max. (50% to 75% Load Step)  
|                   | 500 µs typ. (50% to 75% Load Step)  

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

Safety Standards
- IT / Multimedia Equipment
  - EN 60950-1
  - EN 62368-1
  - IEC 60950-1
  - IEC 62368-1
  - UL 60950-1
  - UL 62368-1

- Certification Documents
  - www.tracopower.com

Protection Class
Class I & II (Prepared): Reinforced Insulation

Pollution Degree
PD 2

Over Voltage Category
OVC II

EMC Specifications

EMI Emissions
- Conducted Emissions
  - EN 55011 class B (internal filter)
  - EN 55032 class B (internal filter)
  - FCC Part 15 class B (internal filter)
- Radiated Emissions
  - EN 55011 class A (internal filter)
  - EN 55032 class A (internal filter)
  - FCC Part 15 class A (internal filter)
- Harmonic Current Emissions
  - EN 61000-3-2, class A
  - EN 61000-3-2, class D
- Voltage Fluctuations & Flicker
  - EN 61000-3-3

EMS Immunity
- Electrostatic Discharge
  - Air: EN 61000-4-2, ±8 kV, perf. criteria A
  - Contact: EN 61000-4-2, ±6 kV, perf. criteria A
- RF Electromagnetic Field
  - EN 61000-4-3, 20 V/m, perf. criteria A
- EFT (Burst) / Surge
  - L to L: EN 61000-4-4, ±2 kV, perf. criteria A
  - L to PE: EN 61000-4-5, ±1 kV, perf. criteria A
- Conducted RF Disturbances
  - Continuous: EN 61000-4-6, 20 Vrms, perf. criteria A
  - 230 VAC / 50 Hz:
    - 30%, 25 periods, perf. criteria A
    - >95%, 0.5 periods, perf. criteria A
    - >95%, 25 periods, perf. criteria B
  - 115 VAC / 60 Hz:
    - EN 61000-4-11
      - 30%, 25 periods, perf. criteria A
      - >95%, 0.5 periods, perf. criteria A
      - >95%, 250 periods, perf. criteria B
- PF Magnetic Field
  - EN 61000-4-8, 10 A/m, perf. criteria A
- Voltage Dips & Interruptions
  - EN 61000-4-11
  - 100% load, max. at Vin >100 VAC
  - 80% load, max. at Vin >200 VAC

General Specifications

Relative Humidity
95% max. (non condensing)

Temperature Ranges
- Operating Temperature
  - -40°C to +85°C
- Storage Temperature
  - -40°C to +85°C
  - (-40°C startup: 80% load max. at Vin >100 VAC
    - -40°C startup: 100% load max. at Vin >200 VAC)

Power Derating
- High Temperature
  - See application note: www.tracopower.com/overview/tpi150a
  - 1.33 %/V below 100 VAC
- Low Input Voltage

Cooling System
- Option 1
  - Forced air cooling (with external fan, 10 CFM)
- Option 2
  - Natural convection (20 LFM)

Fan Power Source
- Characteristic
  - Variable fan speed (temperature regulated)
- Output Voltage
  - 12 VDC
- Output Current
  - 500 mA max.

Altitude During Operation
5'000 m max.

Switching Frequency
45 - 75 kHz (PWM CR)

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

<table>
<thead>
<tr>
<th>Category</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation System</td>
<td>Reinforced Insulation</td>
</tr>
<tr>
<td>Working Voltage (rated)</td>
<td>344 VAC</td>
</tr>
<tr>
<td>Isolation Test Voltage</td>
<td>- Input to Output, 60 s 3'000 VAC</td>
</tr>
<tr>
<td></td>
<td>- Input to Case or PE, 60 s 2'000 VAC</td>
</tr>
<tr>
<td></td>
<td>- Output to Case or PE, 60 s 2'000 VAC</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 300 µA max.</td>
</tr>
<tr>
<td>Reliability</td>
<td>- Calculated MTBF 786'100 h (MIL-HDBK-217F, ground benign)</td>
</tr>
<tr>
<td>Environment</td>
<td>- Vibration IEC 60068-2-6 1 g, 3 axis, sine sweep, 10-55 Hz, 1 oct/min</td>
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<tr>
<td></td>
<td>- Mechanical Shock IEC 60068-2-27 10 g, 3 axis, half sine, 11 ms</td>
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<tr>
<td>Housing Type</td>
<td>Open Frame</td>
</tr>
<tr>
<td>Mounting Type</td>
<td>Chassis Mount</td>
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<tr>
<td>Connection Type</td>
<td>Pin Connector</td>
</tr>
<tr>
<td>Weight</td>
<td>187 g</td>
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<tr>
<td>Environmental Compliance</td>
<td>- REACH Declaration</td>
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<tr>
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<td><a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a></td>
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<tr>
<td></td>
<td>REACH SVHC list compliant</td>
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<tr>
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<td>REACH Annex XVII compliant</td>
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<tr>
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<td><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a></td>
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<tr>
<td></td>
<td>Exemptions: 7a, 7c-I</td>
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<td>(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.)</td>
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</table>

**Supporting Documents**

<table>
<thead>
<tr>
<th>Category</th>
<th>Specification</th>
</tr>
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<tbody>
<tr>
<td>Overview Link (for additional Documents)</td>
<td><a href="http://www.tracopower.com/overview/tpi150a">www.tracopower.com/overview/tpi150a</a></td>
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All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
**Outline Dimensions**

### Pin connectors

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Line</td>
<td>1-3</td>
<td>–Vout 1</td>
<td>1</td>
<td>–Fan</td>
</tr>
<tr>
<td>3</td>
<td>Neutral</td>
<td>4-6</td>
<td>+Vout 2</td>
<td>2</td>
<td>+Fan</td>
</tr>
</tbody>
</table>

*Terminal rated for 10 A max (at higher current connection has to be split)*

**CON1:** JST series
- Mates with JST crimp terminal: SVH-21T-P1.1
- And terminal housing: VHR-3N

**CON2:** JST series
- Mates with JST crimp terminal: SVH-21T-P1.1
- And terminal housing: VHR-6N

**CON3:** Molex series
- Mates with Molex crimp terminals: 2759
- And Molex housing: 22-01-1022

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*Dimension in mm, (i) = inch
Tolerances: x.x ±0.50 (±0.02)
               x.xx ±0.25 (±0.01)*