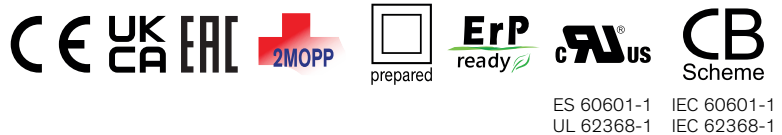
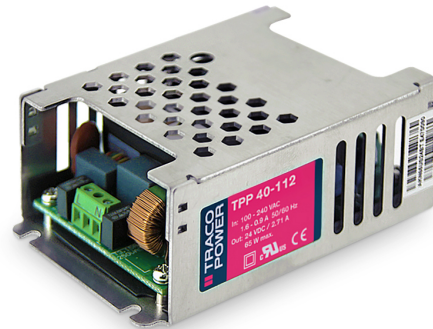


- Enclosed power supply with screw terminal connection
- Certification according to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP
- Low leakage current <75 µA rated for BF applications
- Risk management process according to ISO 14971 incl. risk management file
- Acceptance criteria for electronic assemblies 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 40 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 2.38" x 3.53" 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.

### Models

| Order Code   | Output Power | Output 1 |                  | Output 2 |                  | Output 3 |                  | Efficiency typ. |
|--------------|--------------|----------|------------------|----------|------------------|----------|------------------|-----------------|
|              |              | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| TPP 40-105   | 40 W         | 5 VDC    | 8'000 mA         |          |                  |          |                  | 90 %            |
| TPP 40-112   |              | 12 VDC   | 3'340 mA         |          |                  |          |                  | 92 %            |
| TPP 40-115   |              | 15 VDC   | 2'670 mA         |          |                  |          |                  | 92 %            |
| TPP 40-124   |              | 24 VDC   | 1'670 mA         |          |                  |          |                  | 92 %            |
| TPP 40-221   |              | +12 VDC  | 3'340 mA         | +5 VDC   | 6'000 mA         |          |                  | 89 %            |
| TPP 40-231   |              | +15 VDC  | 2'670 mA         | +5 VDC   | 6'000 mA         |          |                  | 89 %            |
| TPP 40-251   |              | +24 VDC  | 1'670 mA         | +5 VDC   | 6'000 mA         |          |                  | 86 %            |
| TPP 40-321M2 |              | +12 VDC  | 3'340 mA         | +5 VDC   | 6'000 mA         | -12 VDC  | 500 mA           | 88 %            |
| TPP 40-331M3 |              | +15 VDC  | 2'670 mA         | +5 VDC   | 6'000 mA         | -15 VDC  | 500 mA           | 88 %            |
| TPP 40-3512  |              | +24 VDC  | 1'670 mA         | +5 VDC   | 6'000 mA         | +12 VDC  | 500 mA           | 86 %            |

Note - Total output power must not exceed 40 W.  
 - Other output models are available on request.

### Input Specifications

|                        |  |  |
|------------------------|--|--|
| Input Voltage          | - AC Range   | Operational Range: <b>85 - 264 VAC</b> (Full Range)<br>Rated Range: <b>100 - 240 VAC</b> (Full Range)  |
|                        | - DC Range   | Operational Range: <b>120 - 370 VDC</b> (Designed for, no certification)<br>Polarity: <b>+DC: L / -DC: N</b>   |
| Input Frequency        |  | Operational Range: <b>47 - 440 Hz</b><br>Certified: <b>50/60 Hz</b>  |
| Power Consumption      | - No load & Vin = 230 VAC<br>- No load & Vin = 115 VAC         | <b>150 mW max.</b> (Ready to meet ErP directive)<br><b>150 mW max.</b>   |
| Input Current          | - Full load & Vin = 230 VAC<br><br>- Full load & Vin = 115 VAC | single output models: <b>500 mA max.</b><br>dual output models: <b>550 mA max.</b><br>triple output models: <b>550 mA max.</b><br>single output models: <b>1'000 mA max.</b><br>dual output models: <b>1'050 mA max.</b><br>triple output models: <b>1'050 mA max.</b> |
| Input Inrush Current   | - At 230 VAC<br>- At 115 VAC                                   | <b>60 A max.</b><br><b>35 A max.</b>   |
| Input Protection       |  | <b>T 3.15 A / 250 VAC</b> (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           |  | <b>±10%</b> (only single output models)<br>(By trim potentiometer)<br>Output power must not exceed rated power!   |
| Voltage Set Accuracy                |  | <b>±1% max.</b> (Output 1)<br><b>±2% max.</b> (Output 2 and 3)  |
| Regulation                          | - Input Variation (Vmin - Vmax)<br><br>- Load Variation (0 - 100%)<br><br>- Cross Regulation (25% / 100% asym. load) | single output models: <b>0.2% max.</b><br>dual output models: <b>0.2% max.</b><br>triple output models: <b>0.2% max.</b><br>single output models: <b>0.7% max.</b> (5 VDC model)<br><b>0.5% max.</b> (other output models)<br>dual output models: <b>0.5% max.</b> (Output 1)<br><b>1.5% max.</b> (Output 2)<br>triple output models: <b>0.5% max.</b> (Output 1)<br><b>1.5% max.</b> (Output 2)<br><b>0.7% max.</b> (Output 3)<br>dual output models: <b>1.5% max.</b><br>triple output models: <b>1.5% max.</b>   |
| Ripple and Noise (20 MHz Bandwidth) | - single output<br><br>- dual output<br><br>- triple output  | 5 VDC model: <b>75 mVp-p typ.</b> (w/ 10 µF X7R)<br>12 VDC model: <b>75 mVp-p typ.</b> (w/ 10 µF X7R)<br>15 VDC model: <b>75 mVp-p typ.</b> (w/ 10 µF X7R)<br>24 VDC model: <b>75 mVp-p typ.</b> (w/ 1 µF X7R)<br>12 / 5 VDC model: <b>120 / 100 mVp-p typ.</b> (w/ 10 µF X7R)<br>15 / 5 VDC model: <b>150 / 100 mVp-p typ.</b> (w/ 10 µF X7R)<br>24 / 5 VDC model: <b>240 / 100 mVp-p typ.</b> (w/ 10 µF X7R)<br>12 / 5 / -12 VDC model: <b>120 / 100 / 120 mVp-p typ.</b> (w/ 10 µF X7R)<br>15 / 5 / -15 VDC model: <b>150 / 100 / 150 mVp-p typ.</b> (w/ 10 µF X7R)<br>24 / 5 / 12 VDC model: <b>240 / 100 / 120 mVp-p typ.</b> (w/ 10 µF X7R) |

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

|                           |                      |  |
|---------------------------|----------------------|--|
| Capacitive Load           | - single output      | 5 VDC model: <b>16'000</b> $\mu$ F max.<br>12 VDC model: <b>2'785</b> $\mu$ F max.<br>15 VDC model: <b>1'780</b> $\mu$ F max.<br>24 VDC model: <b>700</b> $\mu$ F max.                             |
|                           | - dual output        | 12 / 5 VDC model: <b>1'750 / 2'000</b> $\mu$ F max.<br>15 / 5 VDC model: <b>1'670 / 2'000</b> $\mu$ F max.<br>24 / 5 VDC model: <b>440 / 2'000</b> $\mu$ F max.                                    |
|                           | - triple output      | 12 / 5 / -12 VDC model: <b>1'750 / 2'000 / 420</b> $\mu$ F max.<br>15 / 5 / -15 VDC model: <b>1'670 / 2'000 / 420</b> $\mu$ F max.<br>24 / 5 / 12 VDC model: <b>440 / 2'000 / 420</b> $\mu$ F max. |
|                           |                      |  |
| Minimum Load              |                      | <b>Not required</b><br>(0.5 W for Vout1 and Vout2 if Vout3 = Full Load)  |
| Temperature Coefficient   |                      | <b><math>\pm 0.02</math> %/K max.</b>  |
| Hold-up Time              | - At 115 VAC         | <b>25 ms min.</b>  |
| Start-up Time             | - At 230 VAC         | <b>1'000 ms max.</b>   |
| Short Circuit Protection  |                      | <b>Continuous, Automatic recovery</b>  |
| Output Current Limitation |                      | <b>115 - 180% of Iout max.</b><br><b>145% typ. of Iout max.</b><br>(Pout 1 + Pout 2)   |
| Overvoltage Protection    |                      | <b>125 - 140% of Vout nom.</b><br>(only Output 1)  |
| Transient Response        | - Response Deviation | <b>3% max.</b> (50% to 75% Load Step)  |
|                           | - Response Time      | <b>600 <math>\mu</math>s typ.</b> (50% to 75% Load Step)<br>(Only Output 1)  |

## Safety Specifications

|                       |                             |   |
|-----------------------|-----------------------------|---|
| Standards             | - IT / Multimedia Equipment | <b>EN 62368-1</b><br><b>IEC 62368-1</b><br><b>UL 62368-1</b>  |
|                       | - Medical Equipment         | <b>EN 60601-1</b><br><b>IEC 60601-1</b><br><b>ANSI/AAMI ES 60601-1</b><br><b>2 x MOPP</b> (Means Of Patient Protection)<br><a href="http://www.tracopower.com/overview/tpp40">www.tracopower.com/overview/tpp40</a> |
|                       | - Certification Documents   |   |
| Protection Class      |                             | <b>Class I &amp; II (Prepared): Reinforced Insulation</b>   |
| Pollution Degree      |                             | <b>PD 2</b>   |
| Over Voltage Category |                             | <b>OVC II</b>   |

## EMC Specifications

|               |                                  |  |  |
|---------------|----------------------------------|--|--|
| EMI Emissions | - Conducted Emissions            | <b>EN 60601-1-2 edition 4</b> (Medical Devices)<br><b>EN 55011 class B</b> (internal filter)<br><b>EN 55032 class B</b> (internal filter)<br><b>FCC 47 Part 18 class B</b> (internal filter) |  |
|               | - Radiated Emissions             | <b>EN 55011 class B</b> (internal filter)<br><b>EN 55032 class B</b> (internal filter)<br><b>FCC 47 Part 18 class B</b> (internal filter)  |  |
|               | - Harmonic Current Emissions     | <b>EN 61000-3-2, class A</b>   |  |
|               | - Voltage Fluctuations & Flicker | <b>EN 61000-3-3</b>  |  |
|               |                                  |  |  |
|               |                                  |  |  |

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

|              |  |  |
|--------------|--|--|
| EMS Immunity | <ul style="list-style-type: none"> <li>- Electrostatic Discharge</li> <li>- RF Electromagnetic Field</li> <li>- EFT (Burst) / Surge</li> <li>- Conducted RF Disturbances</li> <li>- PF Magnetic Field</li> <li>- Voltage Dips &amp; Interruptions</li> </ul> | EN 60601-1-2 edition 4 (Medical Devices)<br>Air: EN 61000-4-2, $\pm 15$ kV, perf. criteria A<br>Contact: EN 61000-4-2, $\pm 8$ kV, perf. criteria A<br>EN 61000-4-3, 20 V/m, perf. criteria A<br>EN 61000-4-4, $\pm 2$ kV, perf. criteria A<br>L to L: EN 61000-4-5, $\pm 1$ kV, perf. criteria A<br>EN 61000-4-6, 20 Vrms, perf. criteria A<br>Continuous: EN 61000-4-8, 30 A/m, perf. criteria A<br>230 VAC / 50 Hz: EN 61000-4-11<br>30%, 25 periods, perf. criteria A<br>>95%, 0.5 periods, perf. criteria A<br>>95%, 1 period, perf. criteria A<br>>95%, 250 periods, perf. criteria B<br>115 VAC / 60 Hz: EN 61000-4-11<br>30%, 25 periods, perf. criteria A<br>>95%, 0.5 periods, perf. criteria A<br>>95%, 1 period, perf. criteria A<br>>95%, 250 periods, perf. criteria B |
|--------------|--|--|

## General Specifications

|                              |   |  |
|------------------------------|---|--|
| Relative Humidity            |   | 95% max. (non condensing)  |
| Temperature Ranges           | <ul style="list-style-type: none"> <li>- Operating Temperature</li> <li>- Storage Temperature</li> </ul>          | -40°C to +85°C<br>-40°C to +85°C   |
| Power Derating               | <ul style="list-style-type: none"> <li>- High Temperature</li> <li>- Low Input Voltage</li> </ul>                 | Depending on model<br>Depending on model<br>See application note: <a href="http://www.tracopower.com/overview/tpp40">www.tracopower.com/overview/tpp40</a> |
| Cooling System               |   | Natural convection (20 LFM)  |
| Altitude During Operation    |   | 5'000 m max.   |
| Regulator Topology           |   | Flyback Converter  |
| Switching Frequency          |   | 50 - 140 kHz (PWM) (Output 1)<br>750 kHz typ. (PWM) (Output 2)<br>510 kHz typ. (PWM) (Output 3)  |
| Insulation System            |   | Reinforced Insulation  |
| Working Voltage (rated)      |   | 258 VAC  |
| Isolation Test Voltage       | - Input to Output, 60 s   | 4'000 VAC  |
| Creepage                     | - Input to Output   | 8 mm min.  |
| Clearance                    | - Input to Output   | 8 mm min.  |
| Isolation Resistance         | - Input to Output, 500 VDC  | 100 M $\Omega$ min.  |
| Leakage Current (at 264 VAC) | - Touch Current   | 75 $\mu$ A max.  |
| Reliability                  | - Calculated MTBF   | 3'000'000 h (for single output models)<br>1'700'000 h (for multi output models)<br>(MIL-HDBK-217F, ground benign)  |
| Environment                  | <ul style="list-style-type: none"> <li>- Vibration</li> <li>- Mechanical Shock</li> </ul>                         | IEC 60068-2-6<br>5 g, 3 axis, sine sweep, 5-500 Hz, 1 oct/min<br>IEC 60068-2-27<br>50 g, 3 axis, half sine, 11 ms  |
| Housing Material             |   | Aluminum   |
| Housing Type                 |   | Metal Case   |
| Mounting Type                |   | Chassis Mount  |
| Connection Type              |   | Screw Terminal   |
| Weight                       | <ul style="list-style-type: none"> <li>- single output</li> <li>- dual output</li> <li>- triple output</li> </ul> | 169 g<br>216 g<br>216 g  |

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

Environmental Compliance - REACH Declaration

[www.tracopower.com/info/reach-declaration.pdf](http://www.tracopower.com/info/reach-declaration.pdf)

- RoHS Declaration

REACH SVHC list compliant

REACH Annex XVII compliant

[www.tracopower.com/info/rohs-declaration.pdf](http://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))

- SCIP Reference Number

45cf137d-b509-486d-aa9d-97603cac3267

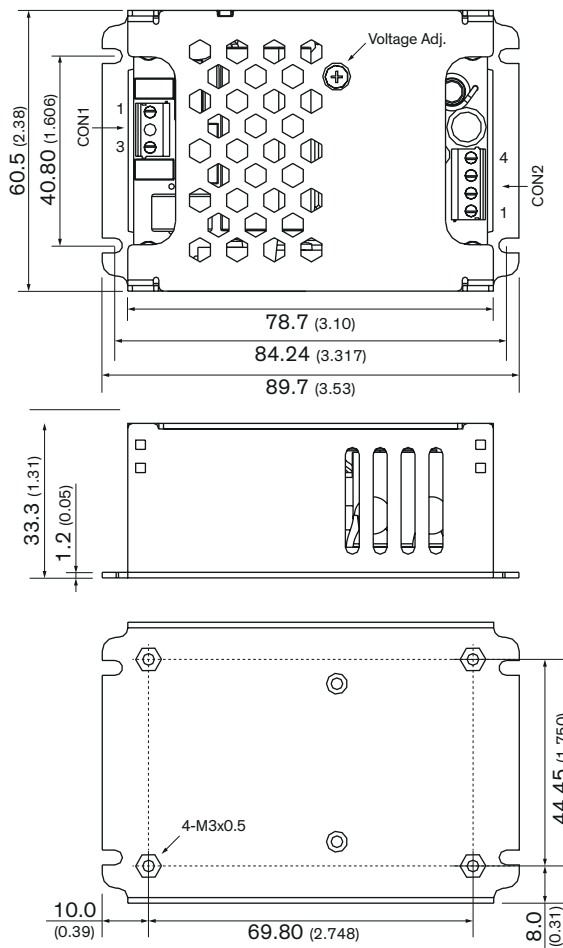
## Supporting Documents

Overview Link (for additional Documents)

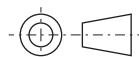
[www.tracopower.com/overview/tpp40](http://www.tracopower.com/overview/tpp40)

## Outline Dimensions

### Single Output Models



Max. corner screw penetration: 2.3 (0.09)  
Max. center screw penetration: 2.0 (0.08)



All dimensions in mm (inch)

Tolerance: X.X ±0.5 (X.XX ±0.02)

X.XX ±0.25 (X.XXX ±0.010)

Mounting screw locked torque:

max. 4.2 kgfcm / 0.41 Nm

### Screw Terminal

| Input (CON1) |          | Output (CON2) |          |
|--------------|----------|---------------|----------|
| Pin          | Function | Pin*          | Function |
| 1            | Line     | 1,2           | -Vout    |
| 3            | Neutral  | 3,4           | +Vout    |

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

**CON1:** Terminal Block

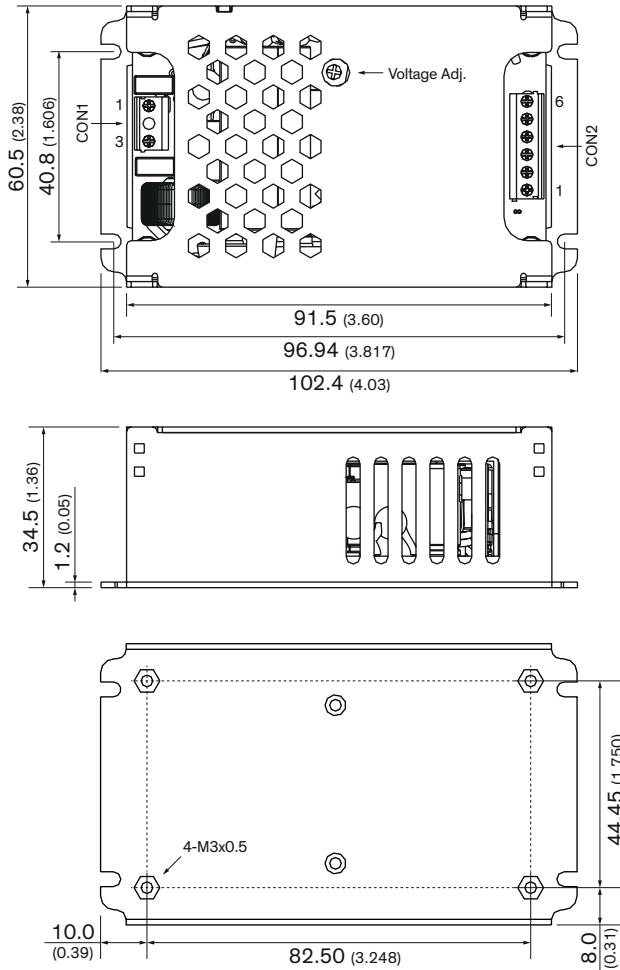
Max. screw locked torque 2 kgfcm / 0.2 Nm  
Wire dimension range: 26 - 16 AWG

**CON2:** Terminal Block

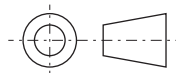
Max. screw locked torque 2 kgfcm / 0.2 Nm  
Wire dimension range: 26 - 16 AWG

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

### Multi Output Models



Max. corner screw penetration: 2.3 (0.09)  
 Max. center screw penetration: 2.0 (0.08)



All dimensions in mm (inch)  
 Tolerance: X.X ±0.5 (X.XX ±0.02)  
 X.XX ±0.25 (X.XXX ±0.010)

Mounting screw locked torque:  
 max. 4.2 kgfcm / 0.41 Nm

| Screw Terminal |          |               |          |
|----------------|----------|---------------|----------|
| Input (CON1)   |          | Output (CON2) |          |
| Pin            | Function | Pin*          | Function |
| 1              | Line     | 1             | Vout 3** |
| 3              | Neutral  | 2,3           | COM      |
|                |          | 4,5           | Vout 2   |
|                |          | 6             | Vout 1   |

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

\*\* Not connected on dual output models

**CON1:** Terminal Block  
 Max. screw locked torque 2 kgfcm / 0.2 Nm  
 Wire dimension range: 26 - 16 AWG

**CON2:** Terminal Block  
 Max. screw locked torque 2 kgfcm / 0.2 Nm  
 Wire dimension range: 26 - 16 AWG