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 2.44” 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>Models</th>
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<tbody>
<tr>
<td><strong>Order Code</strong></td>
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<tr>
<td>TPP 40-105</td>
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<tr>
<td>TPP 40-112</td>
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<tr>
<td>TPP 40-115</td>
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<td>TPP 40-124</td>
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<tr>
<td>TPP 40-221</td>
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<tr>
<td>TPP 40-231</td>
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<td>TPP 40-251</td>
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<tr>
<td>TPP 40-321M2</td>
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<tr>
<td>TPP 40-331M3</td>
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<tr>
<td>TPP 40-3512</td>
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</tbody>
</table>

Note: - Total output power must not exceed 40 W.  
- Other output models are available on request.  
- Multi output models have a common ground.
**Input Specifications**

Input Voltage
- AC Range 85 - 264 VAC (Full Range)
- DC Range 120 - 370 VDC (Designed for, no certification)

Input Frequency
47 - 63 Hz

Input Current
- Full Load & Vin = 930 VAC
  single output models: 500 mA max.
  dual output models: 550 mA max.
  triple output models: 550 mA max.
- Full Load & Vin = 115 VAC
  single output models: 1'000 mA max.
  dual output models: 1'050 mA max.
  triple output models: 1'050 mA max.

Power Consumption
- At no load 150 mW max. (Ready to meet ErP directive)
- At 230 VAC 60 A max.

Input Inrush Current
- At 230 VAC

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

Voltage Set Accuracy

Regulation
- Input Variation (Vin - Vin) single output models: 0.2% max.
  dual output models: 0.2% max.
  triple output models: 0.2% max.
- Load Variation (0 - 100%) single output models: 0.7% max. (5 VDC model)
  dual output models: 0.5% max. (other output models)
  triple output models: 0.5% max. (Output 1)
  triple output models: 1.5% max. (Output 2)
  triple output models: 0.7% max. (Output 3)
- Cross Regulation (25% / 100% asym. load) single output models: 1.5% max.
  dual output models: 1.5% max.
  triple output models: 1.5% max.

Ripple and Noise
(20 MHz Bandwidth)
- single output 5 VDC model: 75 mVP-p typ. (w/ 10 µF X7R)
  12 VDC model: 75 mVP-p typ. (w/ 10 µF X7R)
  15 VDC model: 75 mVP-p typ. (w/ 10 µF X7R)
  24 VDC model: 75 mVP-p typ. (w/ 1 µF X7R)
- dual output 12 / 5 VDC model: 120 / 100 mVP-p typ. (w/ 10 µF X7R)
  15 / 5 VDC model: 150 / 100 mVP-p typ. (w/ 10 µF X7R)
  24 / 5 VDC model: 240 / 100 mVP-p typ. (w/ 10 µF X7R)
- triple output 12 / 5 / -12 VDC model: 120 / 100 / 120 mVP-p typ. (w/ 10 µF X7R)
  15 / 5 / -15 VDC model: 150 / 100 / 150 mVP-p typ. (w/ 10 µF X7R)
  24 / 5 / -12 VDC model: 240 / 100 / 120 mVP-p typ. (w/ 10 µF X7R)

Capacitive Load
- single output 5 VDC model: 16’000 µF max.
  12 VDC model: 2’785 µF max.
  15 VDC model: 1’780 µF max.
  24 VDC model: 700 µF max.
- dual output 12 / 5 VDC model: 1’750 / 2’000 µF max.
  15 / 5 VDC model: 1’670 / 2’000 µF max.
  24 / 5 VDC model: 440 / 2’000 µF max.
- triple output 12 / 5 / -12 VDC model: 1’750 / 2’000 / 420 µF max.
  15 / 5 / -15 VDC model: 1’670 / 2’000 / 420 µF max.
  24 / 5 / -12 VDC model: 440 / 2’000 / 420 µF max.

Minimum Load
Not required
(0.5 W for Vout1 and Vout2 if Vout3 = Full Load)

All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.
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.
| (Pout 1 + Pout 2)
Overvoltage Protection | 125 - 140% of Vout nom.
| (only Output 1)
Transient Response | - Response Deviation 3% max. (50% to 75% Load Step)
| - Response Time 600 µs typ. (50% to 75% Load Step)
| (Only Output 1)

### Safety Specifications

| Safety Standards | - Medical Equipment EN 60601-1
---|---
| - Certification Documents IEC 60601-1
| - ANSI/AAMI ES 60601-1
| 2 x MOPP (Means Of Patient Protection) www.tracopower.com/overview/tpp40

| Protection Class | Class I (Prepared); Connection to PE
---|---
| Class II (Prepared); Reinforced Insulation
| Pollution Degree | PD 2
| Over Voltage Category | OVC II

### EMC Specifications

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

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

### General Specifications

| Relative Humidity | 95% max. (non condensing)
---|---

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

- **Operating Temperature**: –40°C to +85°C
- **Storage Temperature**: –40°C to +85°C

# Power Derating

- **High Temperature**: See application note: [www.tracopower.com/overview/tpp40](http://www.tracopower.com/overview/tpp40)
- **Low Input Voltage**: See application note: [www.tracopower.com/overview/tpp40](http://www.tracopower.com/overview/tpp40)

# Cooling System

- **Altitude During Operation**: 5'000 m max.
- **Switching Frequency**
  - 50 - 140 kHz (PWM) (Output 1)
  - 750 kHz typ. (PWM) (Output 2)
  - 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
  - Input to Case or PE, 60 s: 2'500 VAC
  - Output to Case or PE, 60 s: 2'500 VAC
- **Creepage**
  - Input to Output: 8 mm min.
- **Clearance**
  - Input to Output: 8 mm min.
- **Isolation Resistance**
  - Input to Output, 500 VDC: 100 MΩ min.
- **Leakage Current**
  - Touch Current: 75 µA max.
- **Reliability**
  - Calculated MTBF:
    - 3'000'000 h (for single output models)
    - 1'700'000 h (for multi output models)
  - MIL-HDBK-217F, ground benign
- **Environment**
  - **Vibration**: IEC 60068-2-6
    - 1 g, 3 axis, sine sweep, 10-55 Hz, 1 oct/min
  - **Mechanical Shock**: IEC 60068-2-27
    - 10 g, 3 axis, half sine, 11 ms
    - 20 g, 3 axis, 3 shocks
- **Housing Material**: Aluminium
- **Connection Type**: Screw Terminal
- **Weight**
  - Single output: 169 g
  - Dual output: 216 g
  - Triple output: 216 g
- **Environmental Compliance**
  - Reach: [www.tracopower.com/info/reach-declaration.pdf](http://www.tracopower.com/info/reach-declaration.pdf)

## Supporting Documents

- **Overview Link** (for additional Documents): [www.tracopower.com/overview/tpp40](http://www.tracopower.com/overview/tpp40)

All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.
Each one of the 4 screw holes can be used as a PE connection for CLASS I application.

Dimensions in inch, ( ) = mm
Outside dimension tolerance: ±0.02 inch (±0.5 mm)
Hole spacing tolerance: ±0.01 inch (±0.25 mm)

*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
mates with Screw locked torque MAX 2Kgf.cm/0.2N.m
Wire dimension range: 26 - 16 AWG

CON2: Terminal Block
mates with Screw locked torque MAX 2Kgf.cm/0.2N.m
Wire dimension range: 26 - 16 AWG