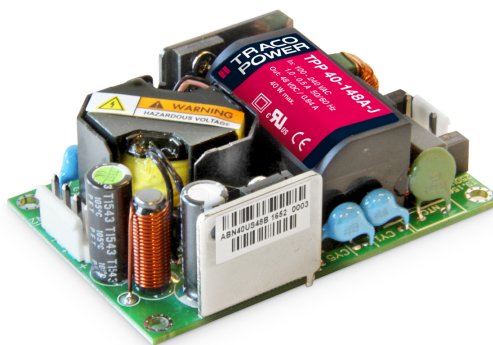


- Open frame power supply with pin connector
- Certification according to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP
- Low leakage current <75 µA rated for BF applications
- Risk management process according to ISO 14971 incl. risk management file
- Acceptance criteria for electronic assemblies acc. 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



ES 60601-1 IEC 60601-1

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 MSL. 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.

### Models

| Order Code    | Output Power max. | Output Voltage nom. (adjustable) | Output Current max. | Efficiency typ. |
|---------------|-------------------|----------------------------------|---------------------|-----------------|
| TPP 40-105A-J | 40 W              | 5 VDC (4.5 - 5.5 VDC)            | 8'000 mA            | 90 %            |
| TPP 40-112A-J |                   | 12 VDC (10.8 - 13.2 VDC)         | 3'340 mA            | 92 %            |
| TPP 40-124A-J |                   | 24 VDC (21.6 - 26.4 VDC)         | 1'670 mA            | 92 %            |
| TPP 40-148A-J |                   | 48 VDC (43.2 - 52.8 VDC)         | 840 mA              | 93 %            |

Note - Other output models are available on request.

## 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 = 230 VAC | 500 mA max.                                                                 |
|                        | - Full Load & Vin = 115 VAC | 1'000 mA max.                                                               |
| Power Consumption      | - At no load                | 150 mW max. (Ready to meet ErP directive)                                   |
| Input Inrush Current   | - At 230 VAC                | 60 A max.                                                                   |
| 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)<br>Output power must not exceed rated power! |
| Voltage Set Accuracy                   |                                 | ±1% max.                                                                  |
| Regulation                             | - Input Variation (Vmin - Vmax) | 0.2% max.                                                                 |
|                                        | - Load Variation (0 - 100%)     | 0.7% max. (5 VDC model)                                                   |
|                                        |                                 | 0.5% max. (other output models)                                           |
| Ripple and Noise<br>(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      | - Medical Equipment       | EN 60601-1<br>IEC 60601-1<br>ANSI/AAMI ES 60601-1<br>2 x MOPP (Means Of Patient Protection)<br><a href="http://www.tracopower.com/overview/tpp40a">www.tracopower.com/overview/tpp40a</a> |
|                       | - Certification Documents |                                                                                                                                                                                           |
| Protection Class      |                           | Class I (Prepared): Connection to PE<br>Class II (Prepared): Reinforced Insulation                                                                                                        |
| Pollution Degree      |                           | PD 2                                                                                                                                                                                      |
| Over Voltage Category |                           | OVC II                                                                                                                                                                                    |

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

## EMC Specifications

|                                  |                  |                                                                                                                                                                      |
|----------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EMI Emissions</b>             |                  | EN 60601-1-2 edition 4 (Medical Devices)                                                                                                                             |
| - Conducted Emissions            |                  | EN 55011 class B (internal filter)<br>EN 55032 class B (internal filter)<br>FCC Part 15 class B (internal filter)<br>FCC Part 18 class B (internal filter)           |
| - Radiated Emissions             |                  | EN 55011 class B (internal filter)<br>EN 55032 class B (internal filter)<br>FCC Part 15 class B (internal filter)<br>FCC Part 18 class B (internal filter)           |
| - Harmonic Current Emissions     |                  | EN 61000-3-2, class A                                                                                                                                                |
| - Voltage Fluctuations & Flicker |                  | EN 61000-3-3                                                                                                                                                         |
| <b>EMS Immunity</b>              |                  | EN 60601-1-2 edition 4 (Medical Devices)                                                                                                                             |
| - Electrostatic Discharge        | Air:             | EN 61000-4-2, $\pm 15$ kV, perf. criteria A                                                                                                                          |
|                                  | Contact:         | EN 61000-4-2, $\pm 8$ kV, perf. criteria A                                                                                                                           |
| - RF Electromagnetic Field       |                  | EN 61000-4-3, 20 V/m, perf. criteria A                                                                                                                               |
| - EFT (Burst) / Surge            |                  | EN 61000-4-4, $\pm 2$ kV, perf. criteria A                                                                                                                           |
|                                  | L to L:          | EN 61000-4-5, $\pm 1$ kV, perf. criteria A                                                                                                                           |
|                                  | L to PE:         | EN 61000-4-5, $\pm 2$ kV, perf. criteria A                                                                                                                           |
| - Conducted RF Disturbances      |                  | EN 61000-4-6, 20 Vrms, perf. criteria A                                                                                                                              |
| - PF Magnetic Field              | Continuous:      | EN 61000-4-8, 30 A/m, perf. criteria A                                                                                                                               |
| - Voltage Dips & Interruptions   | 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 |
|                                  | 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

|                                     |                              |                                                                                                                  |
|-------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>Relative Humidity</b>            |                              | 95% max. (non condensing)                                                                                        |
| <b>Temperature Ranges</b>           | - Operating Temperature      | -40°C to +85°C                                                                                                   |
|                                     | - Storage Temperature        | -40°C to +85°C                                                                                                   |
| <b>Power Derating</b>               | - High Temperature           | See application note: <a href="http://www.tracopower.com/overview/tpp40a">www.tracopower.com/overview/tpp40a</a> |
|                                     | - Low Input Voltage          | See application note: <a href="http://www.tracopower.com/overview/tpp40a">www.tracopower.com/overview/tpp40a</a> |
| <b>Cooling System</b>               |                              | Natural convection (20 LFM)                                                                                      |
| <b>Altitude During Operation</b>    |                              | 5'000 m max.                                                                                                     |
| <b>Switching Frequency</b>          |                              | 50 - 140 kHz (PWM)                                                                                               |
| <b>Insulation System</b>            |                              | Reinforced Insulation                                                                                            |
| <b>Working Voltage (rated)</b>      |                              | 258 VAC                                                                                                          |
| <b>Isolation Test Voltage</b>       | - 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                                                                                                        |
| <b>Creepage</b>                     | - Input to Output            | 8 mm min.                                                                                                        |
| <b>Clearance</b>                    | - Input to Output            | 8 mm min.                                                                                                        |
| <b>Isolation Resistance</b>         | - Input to Output, 500 VDC   | 100 MΩ min.                                                                                                      |
| <b>Leakage Current (at 264 VAC)</b> | - Touch Current              | 75 μA max.                                                                                                       |
| <b>Reliability</b>                  | - Calculated MTBF            | 3'000'000 h (MIL-HDBK-217F, ground benign)                                                                       |
| <b>Environment</b>                  | - Vibration                  | IEC 60068-2-6<br>1 g, 3 axis, sine sweep, 10-55 Hz, 1 oct/min                                                    |
|                                     | - Mechanical Shock           | IEC 60068-2-27<br>10 g, 3 axis, half sine, 11 ms                                                                 |
|                                     |                              | 20 g, 3 axis, 3 shocks                                                                                           |

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

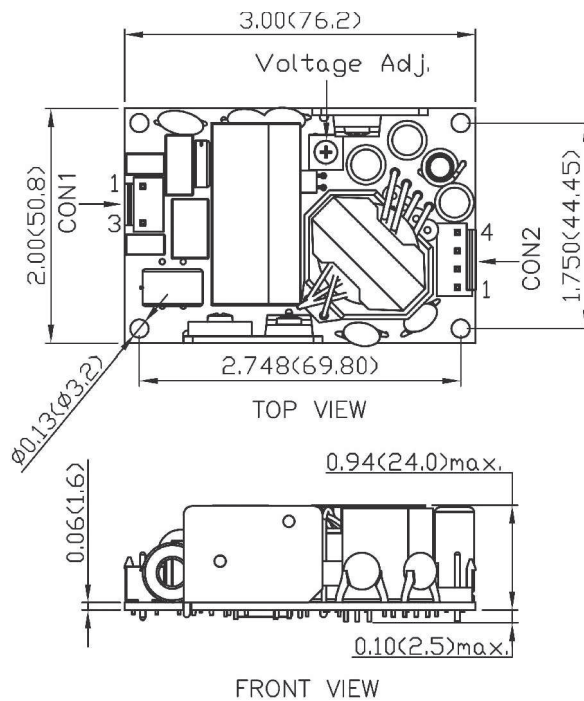
|                          |                                                                                                                                                                                                                                    |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection Type          | JST                                                                                                                                                                                                                                |
| Weight                   | 114 g                                                                                                                                                                                                                              |
| Environmental Compliance | - Reach<br>- RoHS                                                                                                                                                                                                                  |
|                          | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> |

### Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tp40a](http://www.tracopower.com/overview/tp40a)

### Outline Dimensions



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:  $\pm 0.02$  inch ( $\pm 0.5$  mm)

Hole spacing tolerance:  $\pm 0.01$  inch ( $\pm 0.25$  mm)

#### Pin connectors

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

\*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