

## AC/DC Medical Power Supply

## TPP 40A Series, 40 Watt

- 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  
UL 62368-1 IEC 62368-1

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 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.

Models				
Order Code	Output Power max.	Output Voltage nom. (adjustable)	Output Current max.	Efficiency typ.
TPP 40-105A-J		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	40 W	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	Operational Range: <b>85 - 264 VAC</b> (Full Range)
	- DC Range	Rated Range: <b>100 - 240 VAC</b> (Full Range)
		Operational Range: <b>120 - 370 VDC</b> (Designed for, no certification)
		Polarity: <b>+DC: L / -DC: N</b>
Input Frequency		<b>47 - 63 Hz</b>
Input Current	- Full Load & Vin = 230 VAC	<b>500 mA</b> max.
	- Full Load & Vin = 115 VAC	<b>1'000 mA</b> max.
Power Consumption	- At no load	<b>150 mW</b> max. (Ready to meet ErP directive)
Input Inrush Current	- At 230 VAC	<b>60 A</b> max.
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> (By trim potentiometer)	
	Output power must not exceed rated power!	
Voltage Set Accuracy	<b>±1%</b> max.	
Regulation	- Input Variation (Vmin - Vmax) - Load Variation (0 - 100%)	
	5 VDC model: <b>0.2% max.</b> 12 VDC model: <b>0.7% max.</b> (5 VDC model) 24 VDC model: <b>0.5% max.</b> (other output models)	
Ripple and Noise (20 MHz Bandwidth)	5 VDC model: <b>75 mVp-p typ.</b> (w/ 10 µF X7R) 12 VDC model: <b>75 mVp-p typ.</b> (w/ 10 µF X7R) 24 VDC model: <b>75 mVp-p typ.</b> (w/ 1 µF X7R) 48 VDC model: <b>150 mVp-p typ.</b> (w/ 0.1 µF X7R)	
Capacitive Load	5 VDC model: <b>16'000 µF max.</b> 12 VDC model: <b>2'785 µF max.</b> 24 VDC model: <b>700 µF max.</b> 48 VDC model: <b>175 µF max.</b>	
Minimum Load	<b>Not required</b>	
Temperature Coefficient	<b>±0.02 %/K max.</b>	
Hold-up Time	<b>25 ms min.</b>	
Start-up Time	<b>1'000 ms max.</b>	
Short Circuit Protection	<b>Continuous, Automatic recovery</b>	
Output Current Limitation	<b>115 - 180%</b> of Iout max. <b>145%</b> typ. of Iout max.	
Overvoltage Protection	<b>125 - 140%</b> of Vout nom.	
Transient Response	- Response Deviation - Response Time	
	<b>3% max.</b> (50% to 75% Load Step) <b>600 µs typ.</b> (50% to 75% Load Step)	

### Safety Specifications

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

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

## 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 15 class B (internal filter) FCC Part 18 class B (internal filter) EN 55011 class B (internal filter) EN 55032 class B (internal filter) FCC Part 15 class B (internal filter) FCC Part 18 class B (internal filter) EN 61000-3-2, class A EN 61000-3-3
	- Radiated Emissions	
	- Harmonic Current Emissions	
	- Voltage Fluctuations & Flicker	
EMS Immunity	- Electrostatic Discharge	Air: EN 61000-4-2, $\pm 15$ kV, perf. criteria A Contact: EN 61000-4-2, $\pm 8$ kV, perf. criteria A EN 61000-4-3, 20 V/m, perf. criteria A 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 EN 61000-4-6, 20 Vrms, perf. criteria A Continuous: EN 61000-4-8, 30 A/m, perf. criteria A 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)
Temperature Ranges	- Operating Temperature	-40°C to +85°C
	- Storage Temperature	-40°C to +85°C
Power Derating	- 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>
Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
Switching Frequency		50 - 140 kHz (PWM)
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 (at 264 VAC)	- Touch Current	75 µA max.
Reliability	- Calculated MTBF	3'000'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration	IEC 60068-2-6 5 g, 3 axis, sine sweep, 5-500 Hz, 1 oct/min
	- Mechanical Shock	IEC 60068-2-27 50 g, 3 axis, half sine, 11 ms
Housing Type		Open Frame

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

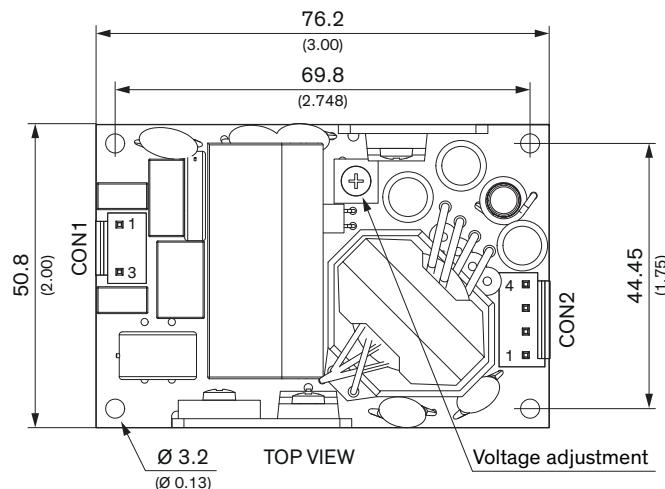
Mounting Type	Chassis Mount
Connection Type	Pin Connector
Weight	114 g
Environmental Compliance	- REACH Declaration  - RoHS Declaration
	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> REACH SVHC list compliant REACH Annex XVII compliant <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> <b>Exemptions: 7a, 7c-1</b> (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.)

## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tpp40a](http://www.tracopower.com/overview/tpp40a)

## Outline Dimensions

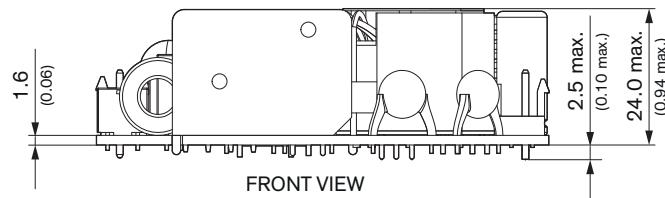


Pin connectors			
Input (CON1)		Output (CON2)	
Pin	Function	Pin*	Function
1	Line	1,2	-Vout
3	Neutral	3,4	+Vout

\*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



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