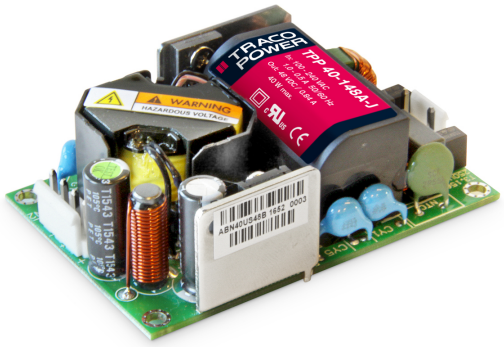
TRACO POWER

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**



2MOPP prepared ErP ready cULus CB Scheme

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) 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 (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 IEC 60601-1 ANSI/AAMI ES 60601-1 2 x MOPP (Means Of Patient Protection)
	- Certification Documents	www.tracopower.com/overview/tpp40a
Protection Class		Class I (Prepared): Connection to PE 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

EMI Emissions			EN 60601-1-2 edition 4 (Medical Devices)
	- Conducted Emissions		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)
	- Radiated Emissions		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)
	- Harmonic Current Emissions		EN 61000-3-2, class A
	- Voltage Fluctuations & Flicker		EN 61000-3-3
EMS Immunity			EN 60601-1-2 edition 4 (Medical Devices)
	- Electrostatic Discharge	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	Continuous:	EN 61000-4-8, 30 A/m, perf. criteria A
	- Voltage Dips & Interruptions	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:	www.tracopower.com/overview/tpp40a
	- Low Input Voltage	See application note:	www.tracopower.com/overview/tpp40a
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
			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

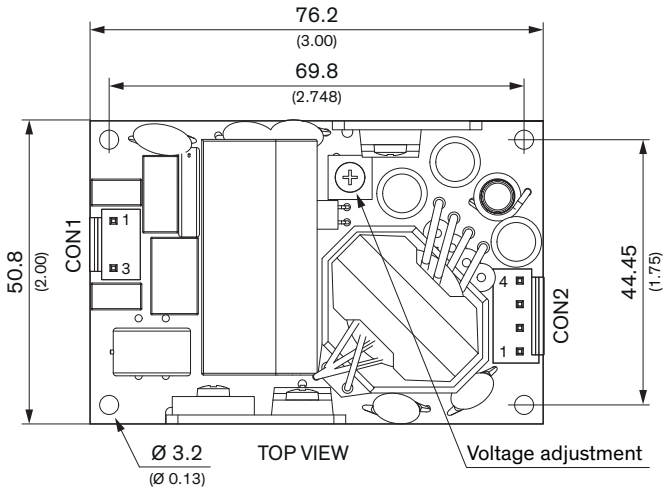
All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.

Connection Type		JST
Weight		114 g
Environmental Compliance	- Reach	www.tracopower.com/info/reach-declaration.pdf
	- RoHS	www.tracopower.com/info/rohs-declaration.pdf

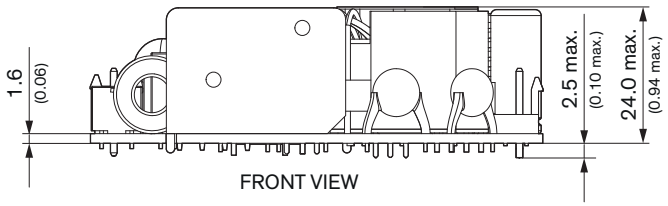
Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tpp40a

Outline Dimensions



Each one of the 4 screw holes can be used as a PE connection for CLASS I application.



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

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

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