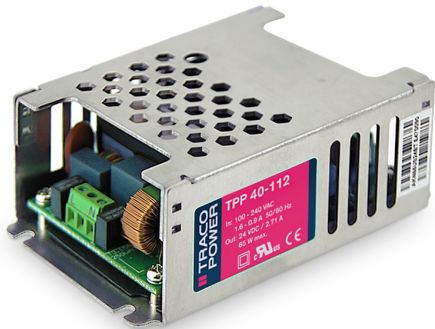


AC/DC Medical Power Supply

TPP 40 Series, 40 Watt

- 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 _{max}	Vnom	I _{max}	Vnom	I _{max}	
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: 85 - 264 VAC (Full Range) Rated Range: 100 - 240 VAC (Full Range)
	- DC Range	Operational Range: 120 - 370 VDC (Designed for, no certification) Polarity: +DC: L / -DC: N
Input Frequency		47 - 63 Hz
Input Current	- Full Load & Vin = 230 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)
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% (only Output 1) (By trim potentiometer) Output power must not exceed rated power!
Voltage Set Accuracy		±1% max. (Output 1) ±2% max. (Output 2 and 3)
Regulation	- Input Variation (Vmin - Vmax)	single output models: 0.2% max. dual output models: 0.2% max. triple output models: 0.2% max.
		single output models: 0.7% max. (5 VDC model) 0.5% max. (other output models)
		dual output models: 0.5% max. (Output 1) 1.5% max. (Output 2)
	- Load Variation (0 - 100%)	triple output models: 0.5% max. (Output 1) 1.5% max. (Output 2) 0.7% max. (Output 3)
		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)
		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)
		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)
	- dual 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.
		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.
		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.
	- triple output	
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.
		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.
		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.
	- dual output	
Capacitive Load	- triple output	

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

Minimum Load		Not required (0.5 W for Vout1 and Vout2 if Vout3 = Full Load)
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 - Response Time	3% max. (50% to 75% Load Step) 600 µs typ. (50% to 75% Load Step) (Only Output 1)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- 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/tpp40
Protection Class		Class I & II (Prepared): Reinforced Insulation
Pollution Degree		PD 2
Over Voltage Category		OVC II

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 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

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

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/tpp40
	- Low Input Voltage	See application note: www.tracopower.com/overview/tpp40
Cooling System		Natural convection (20 LFM)
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		8 mm min.
Clearance		8 mm min.
Isolation Resistance		100 M Ω min.
Leakage Current (at 264 VAC)		75 μ A 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
		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 Material		Aluminium
Housing Type		Metal Case
Mounting Type		Chassis Mount
Connection Type		Screw Terminal
Weight	- single output	169 g
	- dual output	216 g
	- triple output	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

REACH SVHC list compliant

REACH Annex XVII compliant

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). The SCIP number is provided on request.)

- RoHS Declaration

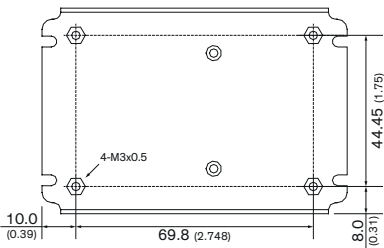
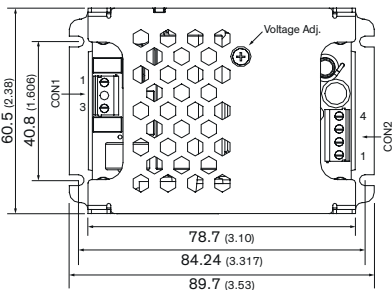
Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/tpp40

Outline Dimensions

Single Output Models

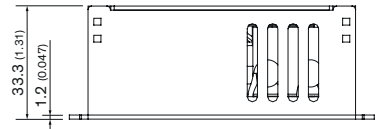


Max. corner screw penetration: 2.3 (0.09)
Max. center screw penetration: 2.0 (0.08)

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

The screw locked torque:
max. 5.0 kgfcm / 0.49 Nm

Terminal screw locked torque:
max. 4.0 kgfcm / 0.39 Nm



Screw Terminal

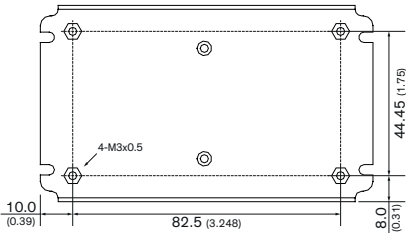
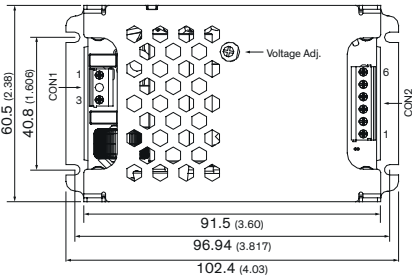
Input (CON1)		Output (CON2)	
Pin	Function	Pin*	Function
1	Line	1,2	-Vout
3	Neutral	3,4	+Vout

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

CON1: Terminal Block
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

Multi Output Models

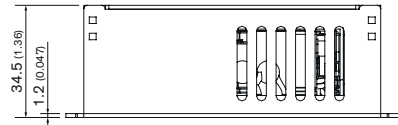


Max. corner screw penetration: 2.3 (0.09)
Max. center screw penetration: 2.0 (0.08)

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

The screw locked torque:
max. 5.0 kgfcm / 0.49 Nm

Terminal screw locked torque:
max. 4.0 kgfcm / 0.39 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)

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