

AC/DC Medical Power Supply

TPP 150 Series, 150 Watt

- **Encased 150 W power supply with screw connection 2.44" x 4.6" package**
- **Certification according to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP**
- **Low leakage current <100 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**
- **Active power factor correction >0.95**
- **Protection class I and II prepared**
- **Operating up to 5000 m altitude**
- **5-year product warranty**



ES 60601-1 IEC 60601-1
UL 62368-1 IEC 62368-1

The TPP 150 series of 150 Watt AC/DC encased power supplies feature a reinforced double I/O isolation system according to latest medical safety standards (60601-1 3rd edition, 2 x MOPP). The earth leakage current is below 100 µA which 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 4.6" packaging format. The full load operating temperature range is -25°C to +70°C while it goes up to 80°C with 40% load derating. The EMC characteristic is dedicated for applications in industrial and domestic medical fields. High reliability is provided by the 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 150-112		12 VDC (10.8 - 13.2 VDC)	12'500 mA	91 %
TPP 150-115		15 VDC (13.5 - 16.5 VDC)	10'000 mA	92 %
TPP 150-124	150 W	24 VDC (21.6 - 26.4 VDC)	6'250 mA	92 %
TPP 150-128		28 VDC (25.2 - 30.8 VDC)	5'360 mA	92 %
TPP 150-136		36 VDC (32.4 - 39.6 VDC)	4'170 mA	92 %
TPP 150-148		48 VDC (43.2 - 52.8 VDC)	3'130 mA	92 %

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	800 mA max.
	- Full Load & Vin = 115 VAC	1'700 mA max.
Power Consumption	- At no load	1'000 mW max.
Input Inrush Current	- At 230 VAC	60 A max.
Power Factor	- At 230 VAC	0.95 min. (Active Power Factor Correction)
	- At 115 VAC	0.95 min. (Active Power Factor Correction)
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	$\pm 10\%$ (By trim potentiometer) Output power must not exceed rated power!
Voltage Set Accuracy	$\pm 1\%$ max.
Regulation	- Input Variation (Vmin - Vmax) 0.2% max. - Load Variation (0 - 100%) 0.5% max.
Ripple and Noise (20 MHz Bandwidth)	12 VDC model: 120 mVp-p typ. (w/ 1 μ F X7R) 15 VDC model: 150 mVp-p typ. (w/ 1 μ F X7R) 24 VDC model: 220 mVp-p typ. (w/ 1 μ F X7R) 28 VDC model: 220 mVp-p typ. (w/ 1 μ F X7R) 36 VDC model: 250 mVp-p typ. (w/ 1 μ F X7R) 48 VDC model: 250 mVp-p typ. (w/ 0.1 μ F X7R)
Capacitive Load	12 VDC model: 10'400 μF max. 15 VDC model: 6'600 μF max. 24 VDC model: 2'600 μF max. 28 VDC model: 1'900 μF max. 36 VDC model: 1'150 μF max. 48 VDC model: 650 μF max.
Minimum Load	Not required
Temperature Coefficient	$\pm 0.02\%$ /K max.
Hold-up Time	- At 230 VAC 16 ms min. - At 115 VAC 16 ms min.
Start-up Time	- At 230 VAC 1'000 ms max. - At 115 VAC 1'000 ms max.
Short Circuit Protection	Continuous, Automatic recovery
Output Current Limitation	115 - 150% of Iout max.
Oversupply Protection	115 - 135% of Vout nom.
Transient Response	- Response Deviation 3% max. (50% to 75% Load Step) - Response Time 500 μ s typ. (50% to 75% Load Step)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 60950-1 UL 62368-1 EN 60601-1 IEC 60601-1 ANSI/AAMI ES 60601-1 2 x MOPP (Means Of Patient Protection) www.tracopower.com/overview/tp150
	- Medical Equipment	
	- Certification Documents	
Protection Class		Class I & II (Prepared): Reinforced Insulation

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

Pollution Degree	PD 2
Over Voltage Category	OVC II

EMC Specifications

EMI Emissions	<ul style="list-style-type: none"> - Conducted Emissions - Radiated Emissions - Harmonic Current Emissions - Voltage Fluctuations & Flicker 	<ul style="list-style-type: none"> 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 A (internal filter) EN 55032 class A (internal filter) FCC Part 15 class A (internal filter) FCC Part 18 class A (internal filter) EN 61000-3-2, class A EN 61000-3-2, class D EN 61000-3-3
EMS Immunity	<ul style="list-style-type: none"> - Electrostatic Discharge - RF Electromagnetic Field - EFT (Burst) / Surge - Conducted RF Disturbances - PF Magnetic Field - Voltage Dips & Interruptions 	<ul style="list-style-type: none"> Air: EN 61000-4-2, ± 15 kV, perf. criteria A Contact: EN 61000-4-2, ± 8 kV, perf. criteria A EN 61000-4-3, 20 V/m, perf. criteria A 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 EN 61000-4-6, 20 Vrms, perf. criteria A Continuous: EN 61000-4-8, 10 A/m, perf. criteria A 230 VAC / 50 Hz: EN 61000-4-11 30%, 25 periods, perf. criteria A 60%, 5 periods, perf. criteria A >95%, 0.5 periods, perf. criteria A >95%, 250 periods, perf. criteria B

General Specifications

Relative Humidity	95% max. (non condensing)	
Temperature Ranges	<ul style="list-style-type: none"> - Operating Temperature - Storage Temperature 	<ul style="list-style-type: none"> -25°C to +80°C -40°C to +75°C
Power Derating	<ul style="list-style-type: none"> - High Temperature - Low Input Voltage 	See application note: www.tracopower.com/overview/tpp150 1.33 %/V below 100 VAC
Cooling System	Forced air cooling (with internal fan)	
Fan Power Source	<ul style="list-style-type: none"> - Characteristic - Output Voltage - Output Current 	Variable fan speed (temperature regulated) 12 VDC 500 mA max.
Altitude During Operation	5'000 m max.	
Switching Frequency	45 - 75 kHz (PWM QR)	
Insulation System	Reinforced Insulation	
Working Voltage (rated)	250 VAC	
Isolation Test Voltage	<ul style="list-style-type: none"> - Input to Output, 60 s - Input to Case or PE, 60 s - Output to Case or PE, 60 s 	4'000 VAC 2'000 VAC 2'000 VAC
Isolation Resistance	<ul style="list-style-type: none"> - Input to Output, 500 VDC 	100 MΩ min.
Leakage Current (at 264 VAC)	<ul style="list-style-type: none"> - Touch Current 	100 µA max.
Reliability	<ul style="list-style-type: none"> - Calculated MTBF 	786'000 h (MIL-HDBK-217F, ground benign)

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

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		Alu alloy, black anodized coating
Connection Type		Screw Terminal
Weight		273 g
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
	- RoHS Declaration	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.)

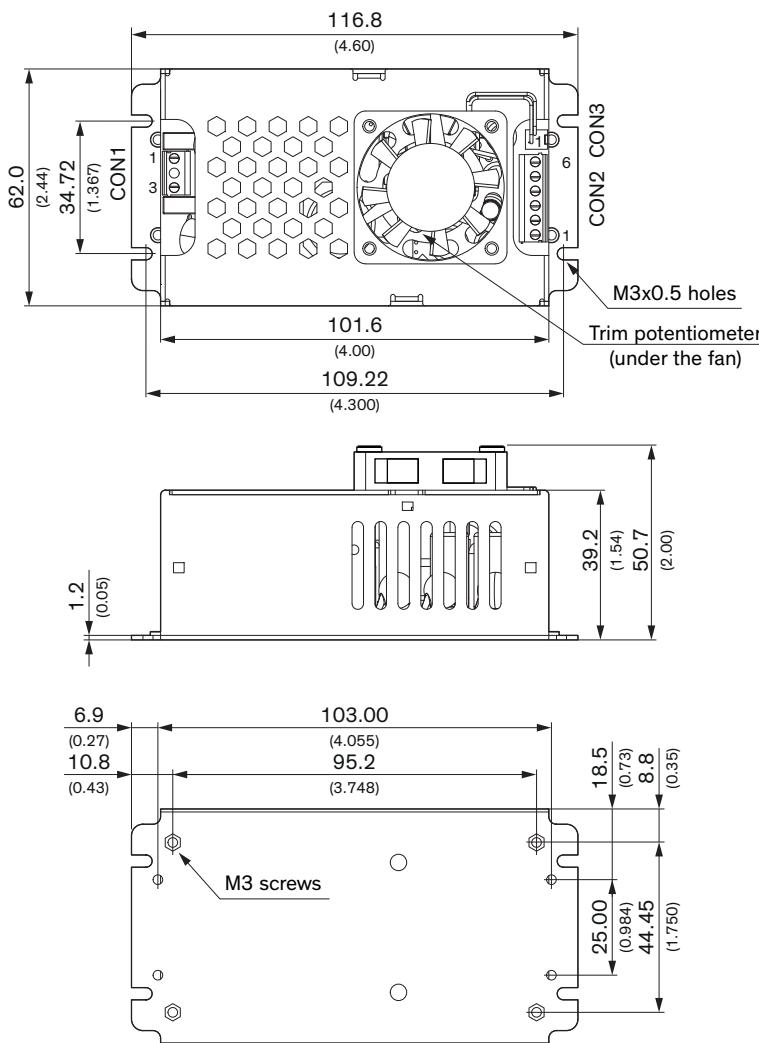
Supporting Documents

[Overview Link](#) (for additional Documents)

www.tracopower.com/overview/tpp150

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Outline Dimensions



Max. corner screw penetration: 1.8 (0.07)
Max. center screw penetration: 2.0 (0.08)

The fan's durability is lower compared to the power supply and has only 2 years warranty.

Dimension in mm (inch)
Tolerances: $x.x \pm 0.50$ (± 0.02)
 $x.xx \pm 0.25$ (± 0.01)

Terminal Block		Molex	
Input (CON1)	Output (CON2)	Fan (CON3)	
Pin	Function	Pin*	Function
1	Line	1-3	-Vout
3	Neutral	4-6	+Vout
		1	-Fan
		2	+Fan

*Terminal rated for 7 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

CON3: Molex series
mates with Molex crimp terminals: 2759
and Molex housing: 22-01-1022

Mouser Electronics

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