TRACO POWER

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**
- **Ready to meet ErP directive, <0.3 W no load power consumption**
- **5-year product warranty**

ES 60601-1 IEC 60601-1
UL 60950-1

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 mecical 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	150 W	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		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)

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%)		0.5% max.
Ripple and Noise (20 MHz Bandwidth)		12 VDC model:	120 mVp-p typ. (with 1 µF X7R)
		15 VDC model:	150 mVp-p typ. (with 1 µF X7R)
		24 VDC model:	220 mVp-p typ. (with 1 µF X7R)
		28 VDC model:	220 mVp-p typ. (with 1 µF X7R)
		36 VDC model:	250 mVp-p typ. (with 1 µF X7R)
		48 VDC model:	250 mVp-p typ. (with 0.1 µF 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			±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.
Overvoltage Protection			115 - 135% of Vout nom.
Transient Response	- Response Deviation		3 % max. (50% to 75% Load Step)
	- Response Time		500 µs typ. (50% to 75% Load Step)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	UL 60950-1
	- 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/tpp150
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
			FCC Part 18, class B
	- Radiated Emissions		EN 55011 class A (internal filter)
			EN 55032 class A (internal filter)
			FCC Part 15, class A
			FCC Part 18, class A
	- Harmonic Current Emissions		EN 61000-3-2, class A
			EN 61000-3-2, class D
	- Voltage Fluctuations & Flicker		EN 61000-3-3
EMS Immunity			EN 55024 (IT Equipment)
			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, 10 A/m, perf. criteria A
	- Voltage Dips & Interruptions	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	- Operating Temperature		–25°C to +80°C
	- Storage Temperature		–40°C to +75°C
Power Derating	- High Temperature	See application note:	www.tracopower.com/overview/tpp150
	- Low Input Voltage		1.33 %/V below 100 VAC
Cooling System			Forced air cooling (with internal fan)
Fan Power Source	- Characteristic		Variable fan speed (temperature regulated)
	- Output Voltage		12 VDC
	- Output Current		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	- Input to Output, 60 s		4'000 VAC
	- Input to Case or PE, 60 s		2'000 VAC
	- Output to Case or PE, 60 s		2'000 VAC
Isolation Resistance	- Input to Output, 500 VDC		100 MΩ min.
Leakage Current (at 264 VAC)	- Touch Current		100 µA max.
Reliability	- Calculated MTBF		786'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration		IEC 60068-2-6
	- Mechanical Shock		IEC 60068-2-27
Housing Material			Alu alloy, black anodized coating
Connection Type			Screw Terminal
Weight			273 g

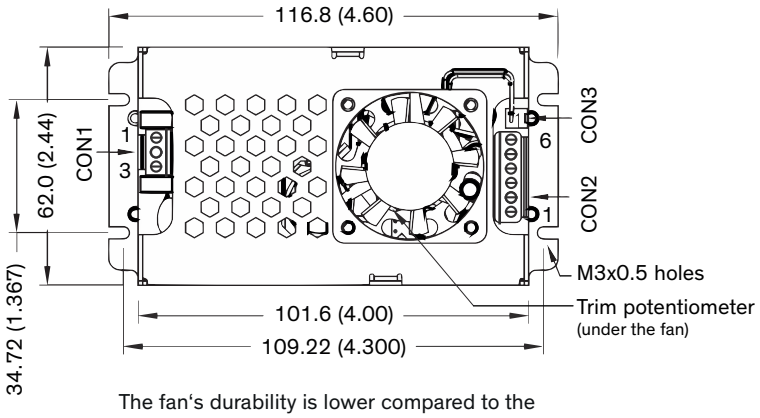
All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.

Environmental Compliance	- Reach	www.tracopower.com/info/reach-declaration.pdf
	- RoHS	www.tracopower.com/info/rohs-declaration.pdf

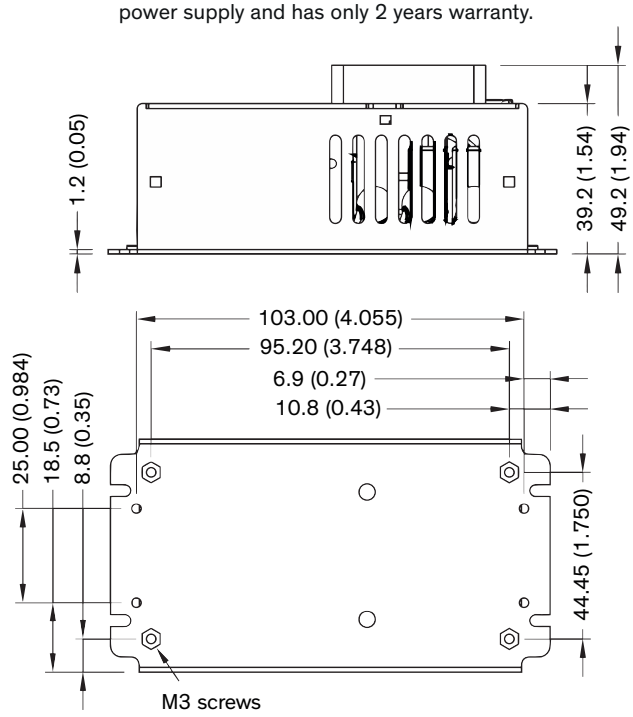
Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tpp150

Outline Dimensions



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



Dimension in mm, () = inch
Tolerances: x.x ±0.50 (±0.02)
x.xx ±0.25 (±0.01)

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

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