TRACO POWER

DC/DC Railway Converter

TEP 150WI Series, 150 Watt

- **Shielded metal case with screw terminals**
- **Ultra wide 4:1 input voltage ranges 9–36, 18–75, 43–160 VDC**
- **EN 50155 approval for railway applications**
- **Very high efficiency up to 89%**
- **Constant current output characteristic for battery load applications**
- **Optional with input filter to meet EN 55032 class B**
- **Wide Operating temperature range: –40°C to +75°C**
- **Under voltage lock-out & overtemperature protection**
- **Easy chassis and wall mounting**
- **3-year product warranty**

UL 62368-1 IEC 62368-1

The modules have originally been designed for harsh industrial environment. High EMC immunity against surge, burst, radiated and conducted disturbances and the shock/ vibration and thermal shock resistance make them very popular for stringent requirements. With the extended input voltage ranges that cover the nominal 24, 36, 72 and 110 VDC with ±40 % tolerance and the approval in accordance to EN 50155 standard they now also offer a reliable solution for mobile and stationary railway applications. At 100% load the current characteristics goes from constant voltage to constant current what makes the units also suitable for battery charger applications. With protection against over-temperature, overload, short-circuit, overvoltage and input under-voltage lock-out they are hard to destroy.

Models

Order Code	Input Voltage Range	Output Voltage nom. (adjustable)	Output Current max.	Efficiency typ.
TEP 150-2412WI	9 - 36 VDC (24 VDC nom.)	12 VDC (12.0 - 14.4 VDC)	12'500 mA	86 %
TEP 150-2413WI		15 VDC (15.0 - 18.0 VDC)	10'000 mA	86 %
TEP 150-2415WI		24 VDC (24.0 - 28.8 VDC)	6'300 mA	87 %
TEP 150-2416WI		28 VDC (28.0 - 33.6 VDC)	5'400 mA	87 %
TEP 150-2418WI		48 VDC (48.0 - 57.6 VDC)	3'200 mA	86 %
TEP 150-4812WI	18 - 75 VDC (48 VDC nom.)	12 VDC (12.0 - 14.4 VDC)	12'500 mA	88 %
TEP 150-4813WI		15 VDC (15.0 - 18.0 VDC)	10'000 mA	89 %
TEP 150-4815WI		24 VDC (24.0 - 28.8 VDC)	6'300 mA	89 %
TEP 150-4816WI		28 VDC (28.0 - 33.6 VDC)	5'400 mA	89 %
TEP 150-4818WI		48 VDC (48.0 - 57.6 VDC)	3'200 mA	88 %
TEP 150-7212WI	43 - 160 VDC (110 VDC nom.)	12 VDC (12.0 - 14.4 VDC)	12'500 mA	88 %
TEP 150-7213WI		15 VDC (15.0 - 18.0 VDC)	10'000 mA	89 %
TEP 150-7215WI		24 VDC (24.0 - 28.8 VDC)	6'300 mA	89 %
TEP 150-7216WI		28 VDC (28.0 - 33.6 VDC)	5'400 mA	89 %
TEP 150-7218WI		48 VDC (48.0 - 57.6 VDC)	3'200 mA	88 %

Options

Suffix -F	- Optional models with input filter to meet EN 55032 class B: www.tracopower.com/overview/tep150wi-f
on demand (backorder with MOQ non stocking item)	- Optional models with inverse Remote On/Off function (passive = off)

Input Specifications

Input Current	- At no load	24 Vin models:	100 mA typ.
		48 Vin models:	65 mA typ.
		110 Vin models:	30 mA typ.
Surge Voltage		24 Vin models:	50 VDC max. (1 s max.)
		48 Vin models:	100 VDC max. (1 s max.)
		110 Vin models:	185 VDC max. (1 s max.)
Under Voltage Lockout		24 Vin models:	7.9 - 8.5 VDC max.
		48 Vin models:	15.6 - 16.8 VDC max.
		110 Vin models:	33 - 36 VDC max.
Recommended Input Fuse		24 Vin models:	30'000 mA (slow blow)
		48 Vin models:	15'000 mA (slow blow)
		110 Vin models:	7'000 mA (slow blow)
			(The need of an external fuse has to be assessed in the final application.)
Input Filter			Internal Pi-Type

Output Specifications

Output Voltage Adjustment			0% to +20% (By external trim resistor)
		See application note:	www.tracopower.com/overview/tep150wi
			Output power must not exceed rated power!
Voltage Set Accuracy			±1% max.
Regulation	- Input Variation (Vmin - Vmax)		0.2% max.
	- Load Variation (0 - 100%)		0.4% max.
Ripple and Noise (20 MHz Bandwidth)		12 Vout models:	100 mVp-p max.
		15 Vout models:	100 mVp-p max.
		24 Vout models:	200 mVp-p max.
		28 Vout models:	200 mVp-p max.
		48 Vout models:	300 mVp-p max.
Capacitive Load		12 Vout models:	40'000 µF max.
		15 Vout models:	26'000 µF max.
		24 Vout models:	10'000 µF max.
		28 Vout models:	7'600 µF max.
		48 Vout models:	2'600 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Hold-up Time			10 ms min. (acc. to EN 50155 Class S2, see application note for ext. capacitor calculation: www.tracopower.com/info/holdup_en50155.pdf)
Start-up Time			35 ms typ.
Short Circuit Protection			Continuous, Automatic recovery
Overload Protection			Constant Current Mode
Output Current Limitation			105 - 120% of Iout max.
Overvoltage Protection			125 - 140% of Vout nom.
Transient Response	- Response Time		200 µs typ. (25% Load Step)

Safety Specifications

Standards	- IT / Multimedia Equipment	EN 60950-1
		EN 62368-1
		IEC 60950-1
		IEC 62368-1
		UL 60950-1
		UL 62368-1
	- Railway Applications	EN 50155
	- Certification Documents	www.tracopower.com/overview/tep150wi

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 I

EMC Specifications

EMI (Emissions)			EN 50121-3-2 (EMC for Rolling Stock)
	- Conducted Emissions		EN 55032 class A (internal filter) FCC 47 Part 15 class A (internal filter)
	- Radiated Emissions		EN 55032 class A (internal filter) FCC 47 Part 15 class A (internal filter)
EMS (Immunity)			EN 50121-3-2 (EMC for Rolling Stock) EN 55024 (IT Equipment) EN 55035 (Multimedia)
	- Electrostatic Discharge	Air:	EN 61000-4-2, ±8 kV, perf. criteria A
		Contact:	EN 61000-4-2, ±6 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 EN 61000-4-5, ±1 kV, perf. criteria A
		Ext. input component:	24 Vin models: KY 470 µF, ESR 45 mOhm 48 Vin models: KY 220 µF, ESR 48 mOhm 110 Vin models: KXJ 150 µF
	- Conducted RF Disturbances		EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous:	EN 61000-4-8, 100 A/m, perf. criteria A
		1 s:	EN 61000-4-8, 1000 A/m, perf. criteria A
EMC / Environmental	- Certification Documents		www.tracopower.com/overview/tep150wi

General Specifications

Relative Humidity			95% max. (non condensing)
Temperature Ranges	- Operating Temperature		–40°C to +75°C
	- Case Temperature		+100°C max.
	- Storage Temperature		–55°C to +125°C
			(Mount on conducting surface to optimize thermal coupling)
Power Derating	- High Temperature		Depending on model
		See application note:	www.tracopower.com/overview/tep150wi
Over Temperature Protection Switch Off	- Protection Mode		110°C typ. (Automatic recovery)
Cooling System			Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote (passive = on)		On: 3.0 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin
	- Off Idle Input Current		3.5 mA typ.
			(Optional models with inverse Remote On/Off function (passive = off))
Altitude During Operation			5'000 m max.
Switching Frequency			203 - 330 kHz (PWM)
Insulation System			Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s		2'250 VDC
	- Input to Case, 60 s		1'600 VDC
	- Output to Case, 60 s		1'600 VDC
Isolation Resistance	- Input to Output, 500 VDC		1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V		3'500 pF max.
Reliability	- Calculated MTBF		495'000 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	MIL-STD-810F EN 61373 7.7 g, 3 axis, random waveform, 60 min
	- Mechanical Shock	MIL-STD-810F EN 61373 50 g, 3 axis, 11 ms
	- Thermal Shock	MIL-STD-810F
	- Flammability	EN 45545-2 www.tracopower.com/info/en45545-declaration.pdf
Case Ingress Protection		IP 55 (acc. IEC 60529)
Housing Material		Aluminum
Potting Material		Silicone (UL 94 V-0 rated)
Housing Type		Metal Case
Mounting Type		Chassis Mount
Connection Type		Screw Terminal
Weight		300 g
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	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).)
	- SCIP Reference Number	68d4622a-aca5-4900-9ad3-cda990716870

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tep150wi

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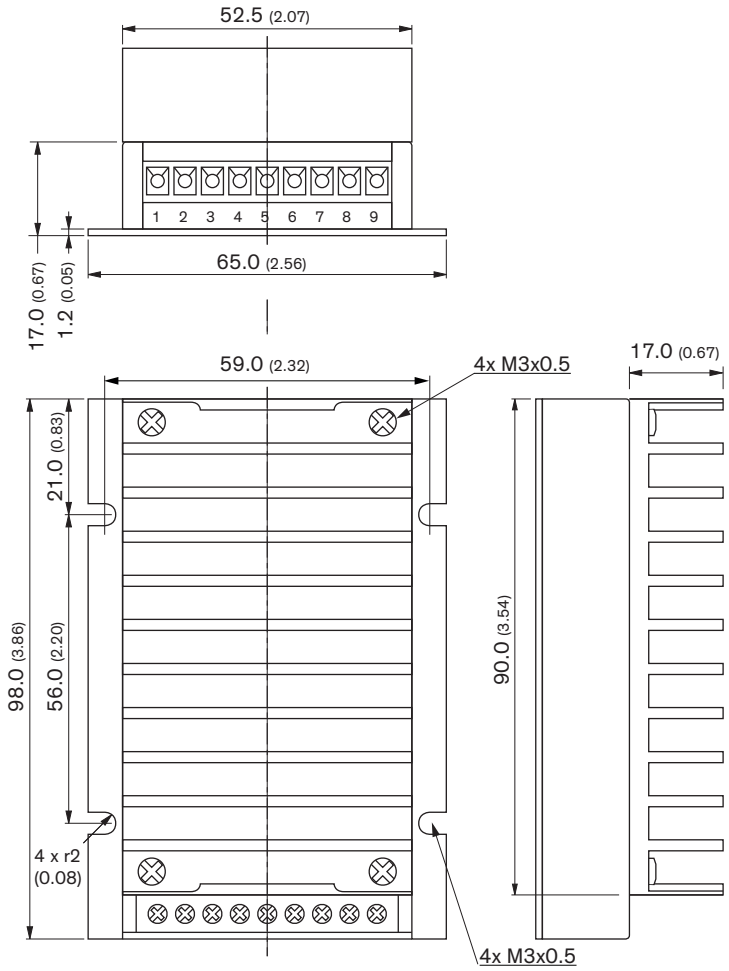
Outline Dimensions



Dimensions in mm (inch)
Mounting slot tolerance ±0.25 (±0.001)
Case tolerance ±0.5 (±0.02)

Screw locked torque: 0.49 Nm (5.0 kgfcm)
Terminal screw locked torque: 0.25 Nm (2.5 kgfcm)

Pinout		
Pin	**Function**	**recommended wire**
1	+ Vin	14 – 16 AWG
2	+ Vin	14 – 16 AWG
3	– Vin	14 – 16 AWG
4	– Vin	14 – 16 AWG
5	Remote	14 – 24 AWG
6	+ Vout	14 – 16 AWG
7	– Vout	14 – 16 AWG
8	Trim 1	14 – 24 AWG
9	Trim 2	14 – 24 AWG