TRACO POWER

DC/DC Railway Converter

TEP 150WI-F 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**
- **With input filter for EN 55032 class B**
- **Wide Operating temperature range: –40°C to +75°C**
- **Under voltage lock-out, overtemperature & reverse input 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, reverse input, 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-F	9 - 36 VDC (24 VDC nom.)	12 VDC (12.0 - 14.4 VDC)	12'500 mA	86 %
TEP 150-2413WI-F		15 VDC (15.0 - 18.0 VDC)	10'000 mA	86 %
TEP 150-2415WI-F		24 VDC (24.0 - 28.8 VDC)	6'300 mA	87 %
TEP 150-2416WI-F		28 VDC (28.0 - 33.6 VDC)	5'400 mA	87 %
TEP 150-2418WI-F		48 VDC (48.0 - 57.6 VDC)	3'200 mA	86 %
TEP 150-4812WI-F	18 - 75 VDC (48 VDC nom.)	12 VDC (12.0 - 14.4 VDC)	12'500 mA	88 %
TEP 150-4813WI-F		15 VDC (15.0 - 18.0 VDC)	10'000 mA	89 %
TEP 150-4815WI-F		24 VDC (24.0 - 28.8 VDC)	6'300 mA	89 %
TEP 150-4816WI-F		28 VDC (28.0 - 33.6 VDC)	5'400 mA	89 %
TEP 150-4818WI-F		48 VDC (48.0 - 57.6 VDC)	3'200 mA	88 %
TEP 150-7212WI-F	43 - 160 VDC (110 VDC nom.)	12 VDC (12.0 - 14.4 VDC)	12'500 mA	88 %
TEP 150-7213WI-F		15 VDC (15.0 - 18.0 VDC)	10'000 mA	89 %
TEP 150-7215WI-F		24 VDC (24.0 - 28.8 VDC)	6'300 mA	89 %
TEP 150-7216WI-F		28 VDC (28.0 - 33.6 VDC)	5'400 mA	89 %
TEP 150-7218WI-F		48 VDC (48.0 - 57.6 VDC)	3'200 mA	88 %

Options

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.)
Reverse Voltage Protection			Parallel diode (External input fuse required)
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-f
			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

Safety 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-f

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 B (internal filter) FCC Part 15 class B (internal filter)
	- Radiated Emissions		EN 55032 class B (internal filter) FCC Part 15 class B (internal filter)
EMS Immunity			EN 50155 (Railway Applications) EN 50121-3-2 (EMC for Rolling Stock)
	- 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, 10 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
	- 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

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-f
Over Temperature Protection Switch Off	- Protection Mode		110°C typ. (Automatic recovery)
Cooling System			Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote		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)
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 EN 50155
Case Ingress Protection			IP 55 (acc. IEC 60529)
Housing Material			Aluminum

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

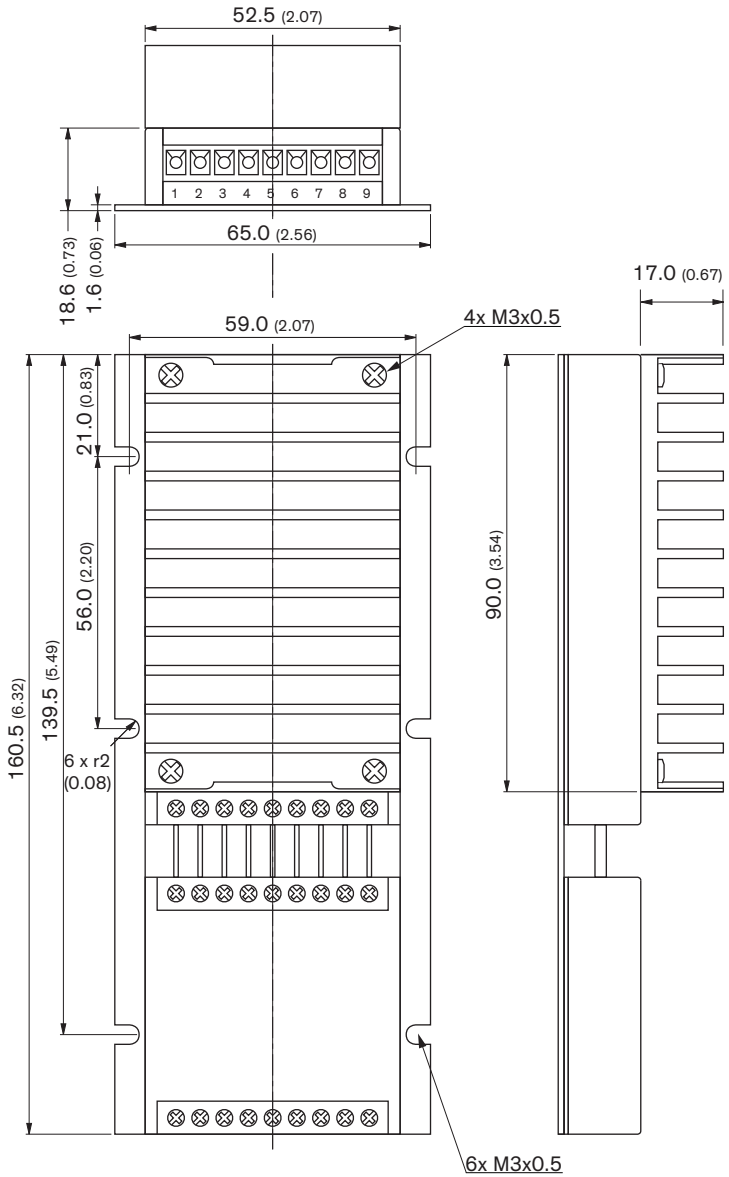
Potting Material		Silicone (UL 94 V-0 rated)
Housing Type		Metal Case
Mounting Type		Chassis Mount
Connection Type		Screw Terminal
Weight		435 g
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf
		REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	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	0a4fa6f7-fc99-4700-b630-51e819d0b5bb
	- Flammability (EN 45545-2)	www.tracopower.com/info/en45545-declaration.pdf

Supporting Documents

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

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

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