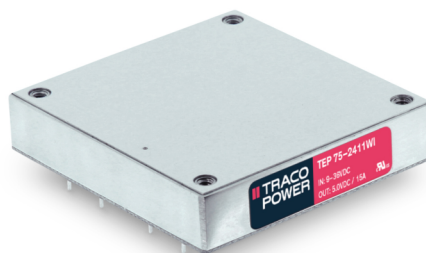


DC/DC Railway Converter

TEP 75WI Series, 75 Watt

- Compact half-brick package
- Screw terminal adaptor available for easy connection
- EN 50155 approval for railway applications
- Ultra wide 4:1 input voltage range
- Full load operation up to +60°C with convection cooling
- Undervoltage lockout
- Input protection filter
- 3-year product warranty



The TEP-75WI Series is a family of isolated high performance DC/DC converter modules with ultra-wide 4:1 input voltage ranges which come in a rugged, sealed case. These converters are suitable for a wide range of applications. For easy connection there is also an unique adaptor available with screw terminals. A very high efficiency allows an operating temperature up to +60°C with natural convection cooling without power derating. Further features include output voltage trimming, Remote On/Off and under voltage lockout. The very wide input voltage range makes these converters also an interesting solution for battery operated systems.

Models				
Order Code	Input Voltage Range	Output Voltage nom. (adjustable)	Output Current max.	Efficiency typ.
TEP 75-2411WI	9 - 36 VDC (24 VDC nom.)	5 VDC (4.0 - 5.5 VDC)	15'000 mA	88 %
TEP 75-2412WI		12 VDC (9.6 - 13.2 VDC)	6'300 mA	88 %
TEP 75-2413WI		15 VDC (12.0 - 16.5 VDC)	5'000 mA	88 %
TEP 75-2415WI		24 VDC (19.2 - 26.4 VDC)	3'200 mA	87 %
TEP 75-2416WI		28 VDC (22.4 - 30.8 VDC)	2'700 mA	87 %
TEP 75-2418WI		48 VDC (38.4 - 52.8 VDC)	1'600 mA	87 %
TEP 75-4811WI	18 - 75 VDC (48 VDC nom.)	5 VDC (4.0 - 5.5 VDC)	15'000 mA	90 %
TEP 75-4812WI		12 VDC (9.6 - 13.2 VDC)	6'300 mA	90 %
TEP 75-4813WI		15 VDC (12.0 - 16.5 VDC)	5'000 mA	89 %
TEP 75-4815WI		24 VDC (19.2 - 26.4 VDC)	3'200 mA	88 %
TEP 75-4816WI		28 VDC (22.4 - 30.8 VDC)	2'700 mA	88 %
TEP 75-4818WI		48 VDC (38.4 - 52.8 VDC)	1'600 mA	87 %
TEP 75-7211WI	43 - 160 VDC (110 VDC nom.)	5 VDC (4.0 - 5.5 VDC)	15'000 mA	91 %
TEP 75-7212WI		12 VDC (9.6 - 13.2 VDC)	6'300 mA	91 %
TEP 75-7213WI		15 VDC (12.0 - 16.5 VDC)	5'000 mA	91 %
TEP 75-7215WI		24 VDC (19.2 - 26.4 VDC)	3'200 mA	90 %
TEP 75-7216WI		28 VDC (22.4 - 30.8 VDC)	2'700 mA	90 %
TEP 75-7218WI		48 VDC (38.4 - 52.8 VDC)	1'600 mA	90 %

Options

Suffix CM	- Chassis mount models w/o filter: www.tracopower.com/overview/tep75wicm
Suffix CMF	- Chassis mount models w/ filter to meet EN 55032 class A: www.tracopower.com/overview/tep75wicmf
TEP-HS1	- Optional Heat Sink: www.tracopower.com/overview/tep-hs1
on demand (backorder with MOQ non stocking item)	- Optional model with 3.3 VDC and 20'000 mA Output, and 9 - 36 VDC Input - Optional model with 3.3 VDC and 20'000 mA Output, and 18 - 75 VDC Input - Optional model with 3.3 VDC and 20'000 mA Output, and 43 - 160 VDC Input - Optional models with inverse Remote On/Off function (passive = off)

Input Specifications

Input Current	- At no load	24 Vin models: 120 mA typ. 48 Vin models: 60 mA typ. 110 Vin models: 10 mA typ.
	- At full load	24 Vin models: 3'600 mA max. 48 Vin models: 1'800 mA max. 110 Vin models: 1'350 mA max.
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: 7.3 VDC min. / 7.7 VDC typ. / 8.1 VDC max. 48 Vin models: 15.5 VDC min. / 16 VDC typ. / 16.3 VDC max. 110 Vin models: 33 VDC min. / 34.5 VDC typ. / 36 VDC max.
Recommended Input Fuse		24 Vin models: 15'000 mA (fast acting) 48 Vin models: 8'000 mA (fast acting) 110 Vin models: 3'150 mA (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		Internal Pi-Type (For 24 Vin models an input capacitor 4.7 μ F X7R or 68 μ F Nippon chemi-con KY is recommended for a reliable supply.)

Output Specifications

Output Voltage Adjustment		-20% to +10% (By external trim resistor) See application note: www.tracopower.com/tep75wi-adj/ Output power must not exceed rated power!
Voltage Set Accuracy		$\pm 1\%$ max.
Regulation	- Input Variation ($V_{min} - V_{max}$) - Load Variation (0 - 100%)	0.1% max. 0.1% max.
Ripple and Noise (20 MHz Bandwidth)		3.3 Vout models: 100 mVp-p max. (w/ 4.7 μ F) 5 Vout models: 100 mVp-p max. (w/ 4.7 μ F) 12 Vout models: 125 mVp-p max. (w/ 4.7 μ F) 15 Vout models: 125 mVp-p max. (w/ 4.7 μ F) 24 Vout models: 250 mVp-p max. (w/ 4.7 μ F) 28 Vout models: 250 mVp-p max. (w/ 4.7 μ F) 48 Vout models: 350 mVp-p max. (w/ 2.2 μ F)
Capacitive Load		3.3 Vout models: 60'600 μF max. 5 Vout models: 30'000 μF max. 12 Vout models: 5'250 μF max. 15 Vout models: 3'330 μF max. 24 Vout models: 1'330 μF max. 28 Vout models: 960 μF max. 48 Vout models: 330 μF max.
Minimum Load		Not required
Temperature Coefficient		$\pm 0.02\%$ /K max.

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

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	60 ms typ. (110 Vin models) 25 ms typ. (other models)
Short Circuit Protection	Continuous, Automatic recovery
Output Current Limitation	150% typ. of I _{out} max. (110 Vin models) 110 - 140% (other models)
Overvoltage Protection	115 - 130% of V _{out} nom.
Transient Response	- Response Time 200 µs typ. / 250 µs max. (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 EN 50155 www.tracopower.com/tep75wi-safety-cert/
	- Railway Applications - Certification Documents	
Energy Source	- Output, acc. to 62368-1	ES2 (48 V _{out} models) ES1
Power Source	- Output, acc. to 62368-1	PS3
Over Voltage Category		Not mains connected

EMC Specifications

EMI (Emissions)	- Conducted Emissions	EN 50121-3-2 (EMC for Rolling Stock) EN 55011 class A (internal filter) EN 55011 class B (with external filter) EN 55032 class A (internal filter) EN 55032 class B (with external filter)
	- Radiated Emissions	EN 55011 class A (internal filter) EN 55011 class B (with external filter) EN 55032 class A (internal filter) EN 55032 class B (with external filter)
		External filter proposal: www.tracopower.com/tep75wi-emc-filter/
EMS (Immunity)	- Electrostatic Discharge	EN 50121-3-2 (EMC for Rolling Stock) EN 55024 (IT Equipment) EN 55035 (Multimedia)
	- RF Electromagnetic Field	Air: EN 61000-4-2, ±8 kV, perf. criteria A
	- EFT (Burst) / Surge	Contact: EN 61000-4-2, ±6 kV, perf. criteria A EN 61000-4-3, 20 V/m, perf. criteria A EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±2 kV, perf. criteria A
		Ext. input component: 24 & 48 Vin models: 2 x KY 220 µF 100 V 110 Vin models: 2 x KXJ 150 µF 200 V
	- Conducted RF Disturbances	Continuous: EN 61000-4-6, 10 V _{rms} , perf. criteria A
	- PF Magnetic Field	1 s: EN 61000-4-8, 100 A/m, perf. criteria A EN 61000-4-8, 1000 A/m, perf. criteria A
EMC / Environmental	- Certification Documents	www.tracopower.com/tep75wi-emc-cert/

General Specifications

Relative Humidity	95% max. (non condensing)
Temperature Ranges	- Operating Temperature - Case Temperature - Storage Temperature
	-40°C to +75°C +105°C max. -55°C to +125°C

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

Power Derating	- High Temperature	Depending on model
See application note: www.tracopower.com/tep75wi-cc/		
Over Temperature Protection Switch Off	- Protection Mode - Measurement Point	115°C typ. (Automatic recovery at 105°C typ.)
Cooling System		Base-Plate
Sense Function		Natural convection (20 LFM)
		10% max. of Vout nom.
		(If sense function is not used, sense pins must be connected to corresponding polarity output pins.)
See application note: www.tracopower.com/tep75wi-sense/		
Remote Control	- Voltage Controlled Remote (passive = on) - Off Idle Input Current	On: 3.0 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin 3 mA typ. (Optional models with inverse Remote On/Off function (passive = off))
See application note: www.tracopower.com/tep75wi-remote/		
Altitude During Operation		2'000 m max. (for basic insulation) 5'000 m max. (for functional insulation)
Switching Frequency		270 - 330 kHz (PWM) 300 kHz typ. (PWM)
Insulation System		Reinforced Insulation (110 Vin models) Basic Insulation (other models)
Working Voltage (rated)		125 VAC (24/48 Vin models) 157 VAC (110 Vin models)
Isolation Test Voltage	- Input to Output, 60 s - Input to Case, 60 s - Output to Case, 60 s	3'000 VAC (110 Vin models) 3'000 VDC (other models) 1'500 VAC (110 Vin models) 1'600 VDC (other models) 1'500 VAC (110 Vin models) 1'600 VDC (other models)
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	2'500 pF max.
Reliability	- Calculated MTBF	336'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Environment	- Vibration - Mechanical Shock - Thermal Shock - Flammability	MIL-STD-810F EN 61373 MIL-STD-810F EN 61373 MIL-STD-810F EN 45545-2 www.tracopower.com/info/en45545-declaration.pdf
Housing Material		Alu base-plate w. metal case (24 and 48 Vin models) Alu base-plate w. plastic case (110 Vin models)
Base Material		Non-conductive FR4 (UL 94 V-0 rated) (24 and 48 Vin models only)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Copper
Pin Foundation Plating		Nickel (2 - 3 μm)
Pin Surface Plating		Tin (3 - 5 μm), matte
Housing Type		Metal Case (24 and 48 Vin models) Plastic Case (110 Vin models)
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		Half-Brick

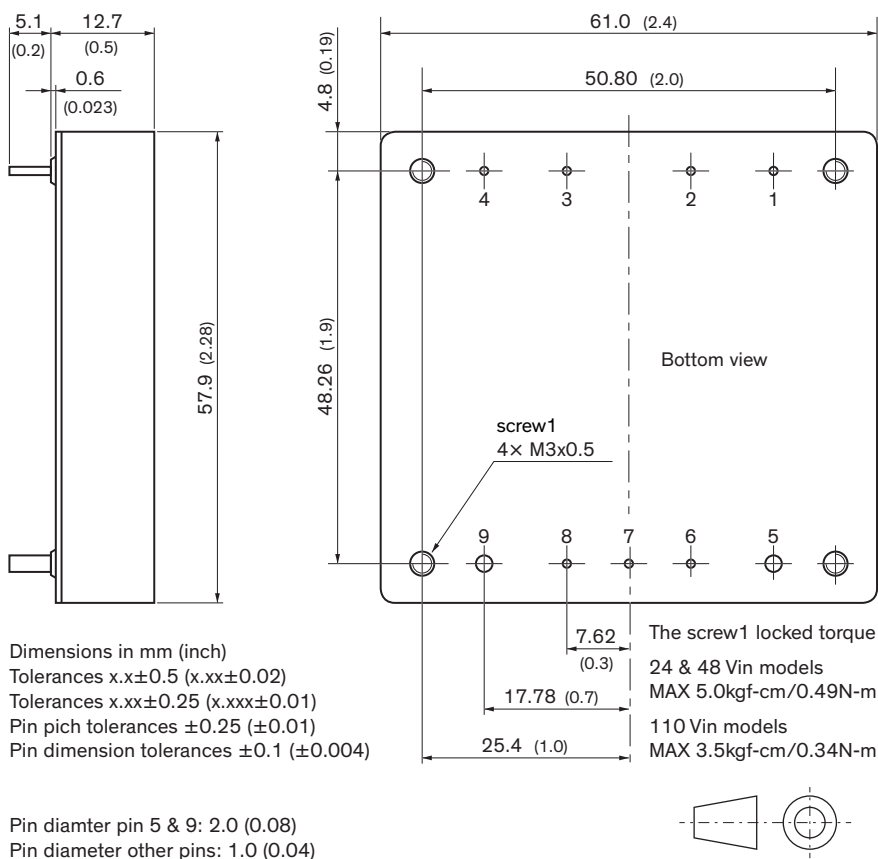
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

Soldering Profile	Lead-Free Wave Soldering 260°C / 6 s max.
Weight	97 g
Thermal Impedance	- Case to Ambient 6.7 K/W typ. 4.7 K/W typ. (with heatsink TEP-HS1)
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: 7(a), 7(c)-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).) - SCIP Reference Number b8b2d372-1660-418f-8c53-9823dfbc0f73

Additional Information

Supporting Documents	www.tracopower.com/overview/tep75wi
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf
Service Portal	www.tracoserviceportal.com

Outline Dimensions



Pinout	
Pin	Function
1	−Vin (GND)
2	Case
3	Remote
4	+Vin (Vcc)
5	−Vout
6	−Sense*
7	Trim
8	+Sense*
9	+Vout

*Sense line to be connected to the output either at the module or at the load under regard of polarity.

Avoid routing PCB traces under the converter.