

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	110 Vin models: 10 mA typ. 24 Vin models: 85 mA typ. (3.3 Vout model) 120 mA typ. (5 Vout model) 185 mA typ. (12 Vout model) 185 mA typ. (15 Vout model) 85 mA typ. (24 Vout model) 85 mA typ. (28 Vout model) 85 mA typ. (48 Vout model)
	- At full load	48 Vin models: 60 mA typ. (3.3 Vout model) 60 mA typ. (5 Vout model) 90 mA typ. (12 Vout model) 50 mA typ. (15 Vout model) 50 mA typ. (24 Vout model) 50 mA typ. (28 Vout model) 50 mA typ. (48 Vout model) 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 µF X7R or 68 µF 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/overview/tep75wi Output power must not exceed rated power!
Voltage Set Accuracy		±1% max.
Regulation	- Input Variation (Vmin - Vmax) - Load Variation (0 - 100%)	0.1% max. 0.1% max.

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

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	± 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	60 ms typ. (110 Vin models) 25 ms typ. (other models)
Short Circuit Protection	Continuous, Automatic recovery
Output Current Limitation	150% typ. of Iout max. (110 Vin models) 110 - 140% (other models)
Overvoltage Protection	115 - 130% of Vout 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
	- Railway Applications	EN 50155
	- Certification Documents	www.tracopower.com/overview/tep75wi

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/overview/tep75wi

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EMS (Immunity)	<ul style="list-style-type: none"> - Electrostatic Discharge - RF Electromagnetic Field - EFT (Burst) / Surge - Conducted RF Disturbances - PF Magnetic Field 	<p>EN 50121-3-2 (EMC for Rolling Stock) EN 55024 (IT Equipment) EN 55035 (Multimedia)</p> <p>Air: EN 61000-4-2, ± 8 kV, perf. criteria A 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</p> <p>Ext. input component: 24 & 48 Vin models: 2 x KY 220 μF 100 V 110 Vin models: 2 x KXJ 150 μF 200 V</p> <p>Continuous: EN 61000-4-6, 10 Vrms, perf. criteria A 1 s: EN 61000-4-8, 100 A/m, perf. criteria A EN 61000-4-8, 1000 A/m, perf. criteria A</p>
EMC / Environmental	- Certification Documents	www.tracopower.com/overview/tep75wi

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	<ul style="list-style-type: none"> - Operating Temperature - Case Temperature - Storage Temperature 	-40°C to +75°C +105°C max. -55°C to +125°C
Power Derating	<ul style="list-style-type: none"> - High Temperature 	Depending on model See application note: www.tracopower.com/overview/tep75wi
Over Temperature Protection Switch Off	<ul style="list-style-type: none"> - Protection Mode - Measurement Point 	115°C typ. (Automatic recovery at 105°C typ.) Base-Plate
Cooling System		Natural convection (20 LFM)
Sense Function		10% max. of Vout nom. (If sense function is not used, sense pins must be connected to corresponding polarity output pins.)
Remote Control	<ul style="list-style-type: none"> - 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))
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)		157 VAC (110 Vin models) 125 VAC (other input models)
Isolation Test Voltage	<ul style="list-style-type: none"> - 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 M Ω 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

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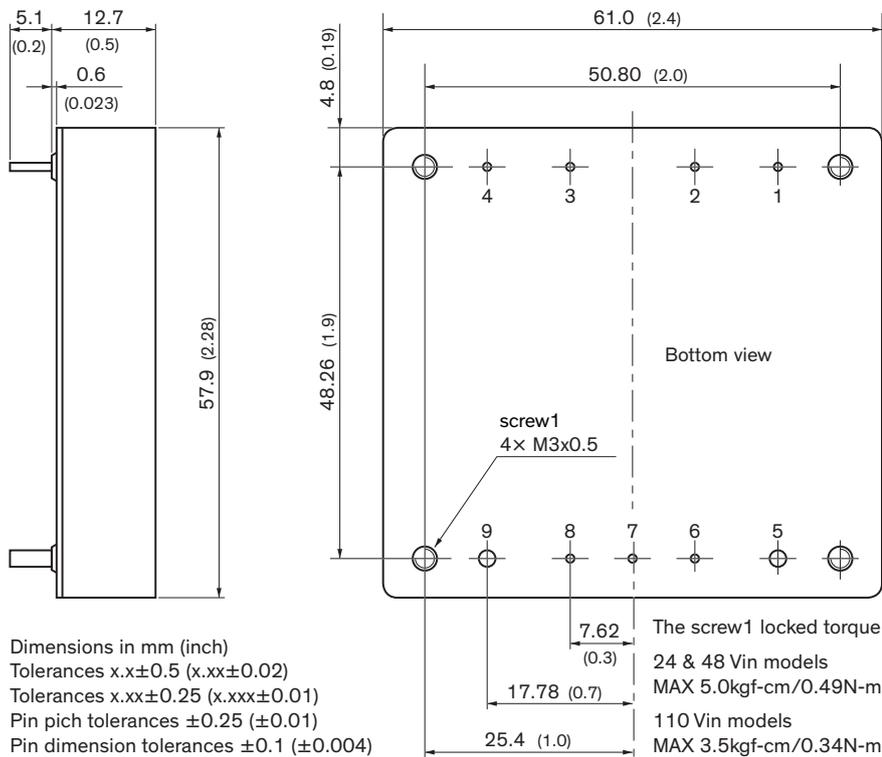
Environment	- Vibration - Mechanical Shock - Thermal Shock - Flammability	MIL-STD-810F EN 61373 MIL-STD-810F EN 61373 MIL-STD-810F EN 45545-2 www.tracopower.com/info/en45545-declaration.pdf
Housing Material		Alu base-plate w. metal case (24 and 48 Vin models) Alu base-plate w. plastic case (110 Vin models)
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
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 Heat Sink)
Environmental Compliance	- REACH Declaration - RoHS Declaration - SCIP Reference Number	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant 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).) 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

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Outline Dimensions



Pin diameter pin 5 & 9: 2.0 (0.08)
 Pin diameter other pins: 1.0 (0.04)

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.