TRACO POWER

DC/DC Railway Converter

TEP 100WIRCM Series, 100 Watt

- **Chassis mount with screw terminal block**
- **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 93%**
- **No minimum load**
- **Soft start**
- **Adjustable output voltage +10/-20%**
- **Sense line**
- **Remote On/Off input**
- **Under voltage lock-out circuit**
- **3-year product warranty**

UL 62368-1 IEC 62368-1

The TEP 100WIR 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 industry standard half brick package. A very high efficiency allows full power operation without forced air cooling at 60°C This temperature can be increased to 70°C with optional mounted heatsink or up to 85°C when mounted on an iron base plate. The very wide input voltage range make these converters interesting solution for battery operated systems. Typical applications are in telecom/datacom, industry control and railway systems for on board power distribution.

Options

TEP-MK1	- Optional DIN-Rail Mounting Kit: www.tracopower.com/overview/tep-mk1
on demand (backorder with MOQ non stocking item)	- Optional model with 3.3 VDC and 25'000 mA Output, and 9 - 36 VDC Input - Optional model with 5 VDC and 20'000 mA Output, and 9 - 36 VDC Input - Optional model with 12 VDC and 8'400 mA Output, and 9 - 36 VDC Input - Optional model with 15 VDC and 6'700 mA Output, and 9 - 36 VDC Input - Optional model with 24 VDC and 4'200 mA Output, and 9 - 36 VDC Input - Optional model with 28 VDC and 3'600 mA Output, and 9 - 36 VDC Input - Optional model with 48 VDC and 2'100 mA Output, and 9 - 36 VDC Input - Optional model with 3.3 VDC and 25'000 mA Output, and 18 - 75 VDC Input - Optional model with 5 VDC and 20'000 mA Output, and 18 - 75 VDC Input - Optional model with 12 VDC and 8'400 mA Output, and 18 - 75 VDC Input - Optional model with 15 VDC and 6'700 mA Output, and 18 - 75 VDC Input - Optional model with 24 VDC and 4'200 mA Output, and 18 - 75 VDC Input - Optional model with 28 VDC and 3'600 mA Output, and 18 - 75 VDC Input - Optional model with 48 VDC and 2'100 mA Output, and 18 - 75 VDC Input - Optional model with 3.3 VDC and 25'000 mA Output, and 43 - 160 VDC Input - Optional model with 5 VDC and 20'000 mA Output, and 43 - 160 VDC Input - Optional model with 12 VDC and 8'400 mA Output, and 43 - 160 VDC Input - Optional model with 15 VDC and 6'700 mA Output, and 43 - 160 VDC Input - Optional model with 24 VDC and 4'200 mA Output, and 43 - 160 VDC Input - Optional model with 28 VDC and 3'600 mA Output, and 43 - 160 VDC Input - Optional model with 48 VDC and 2'100 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:	**20 mA typ.** (3.3 Vout model)
			25 mA typ. (5 Vout model)
			25 mA typ. (12 Vout model)
			25 mA typ. (15 Vout model)
			25 mA typ. (24 Vout model)
			25 mA typ. (28 Vout model)
			35 mA typ. (48 Vout model)
		48 Vin models:	**15 mA typ.** (3.3 Vout model)
			15 mA typ. (5 Vout model)
			20 mA typ. (12 Vout model)
			20 mA typ. (15 Vout model)
			20 mA typ. (24 Vout model)
			20 mA typ. (28 Vout model)
			25 mA typ. (48 Vout model)
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. / 7.5 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:	**20'000 mA** (fast acting)
		48 Vin models:	**12'000 mA** (fast acting)
		110 Vin models:	**5'000 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			**–20% to +10%** (By external trim resistor)
		See application note:	www.tracopower.com/overview/tep100wircm
			Output power must not exceed rated power!
Voltage Set Accuracy			**±1% max.**
Regulation	- Input Variation (Vmin - Vmax)		**0.1% max.**
	- Load Variation (0 - 100%)		**0.1% max.**
Ripple and Noise (20 MHz Bandwidth)		3.3 Vout models:	**75 mVp-p max.** (w/ 1 µF X7R || 22 µF poscap)
		5 Vout models:	**75 mVp-p max.** (w/ 1 µF X7R || 22 µF poscap)
		12 Vout models:	**100 mVp-p max.** (w/ 1 µF X7R || 22 µF poscap)
		15 Vout models:	**100 mVp-p max.** (w/ 1 µF X7R || 22 µF poscap)
		24 Vout models:	**200 mVp-p max.** (w/ 4.7 µF X7R)
		28 Vout models:	**200 mVp-p max.** (w/ 4.7 µF X7R)
		48 Vout models:	**300 mVp-p max.** (w/ 2.2 µF X7R)
Capacitive Load		3.3 Vout models:	**75'700 µF max.**
		5 Vout models:	**40'000 µF max.**
		12 Vout models:	**7'000 µF max.**
		15 Vout models:	**4'460 µF max.**
		24 Vout models:	**1'750 µF max.**
		28 Vout models:	**1'280 µF max.**
		48 Vout models:	**430 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			75 ms typ.

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

Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			150% typ. of Iout max. (110 Vin models) 120 - 150% (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/tep100wircm

EMC Specifications

EMI (Emissions)			EN 50121-3-2 (EMC for Rolling Stock)
	- Conducted Emissions		EN 55011 class B (with external filter) EN 55032 class B (with external filter)
	- Radiated Emissions		EN 55011 class B (with external filter) EN 55032 class B (with external filter)
		External filter proposal:	www.tracopower.com/overview/tep100wircm
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, ±2 kV, perf. criteria A
		Ext. input component:	24 Vin models: 2 x KY 220 µF 48 Vin models: 2 x KY 220 µF 110 Vin models: 2 x 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/tep100wircm

General Specifications

Relative Humidity			95% max. (non condensing)
Temperature Ranges	- Operating Temperature		–40°C to +75°C
	- Case Temperature		+105°C max.
	- Storage Temperature		–40°C to +105°C
Power Derating	- High Temperature		Depending on model
		See application note:	www.tracopower.com/overview/tep100wircm
Over Temperature Protection Switch Off	- Protection Mode		115°C typ. (Automatic recovery at 105°C typ.)
	- Measurement Point		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.)

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

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 mA typ.
	- Remote Pin Input Current	-0.5 to 1.0 mA (Optional models with inverse Remote On/Off function (passive = off))
Altitude During Operation		2'000 m max. (for reinforced insulation) 5'000 m max. (for functional insulation)
Switching Frequency		300 kHz typ. (PWM) (±10%, 110 Vin models) 250 kHz typ. (PWM) (±10%, other models)
Insulation System		Reinforced Insulation
Working Voltage (rated)		177 VAC (110 Vin models) 145 VAC (24 and 48 Vin, 3.3 and 5 Vout models) 185 VAC (24 and 48 Vin, 48 Vout models) 172 VAC (24 and 48 Vin, other output models)
Isolation Test Voltage	- Input to Output, 60 s	3'000 VAC
	- Input to Case, 60 s	1'500 VAC
	- Output to Case, 60 s	1'500 VAC
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	409'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration	MIL-STD-810F EN 61373
	- Mechanical Shock	MIL-STD-810F EN 61373
	- Thermal Shock	MIL-STD-810F
	- Flammability	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)
Housing Type		Metal Case (24 and 48 Vin models) Plastic Case (110 Vin models)
Mounting Type		Chassis Mount
Connection Type		Screw Terminal
Weight		235 g
Thermal Impedance	- Case to Ambient	6.7 K/W typ.
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	e467ae10-310c-4737-9941-0ad3db466a7d

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tep100wircm

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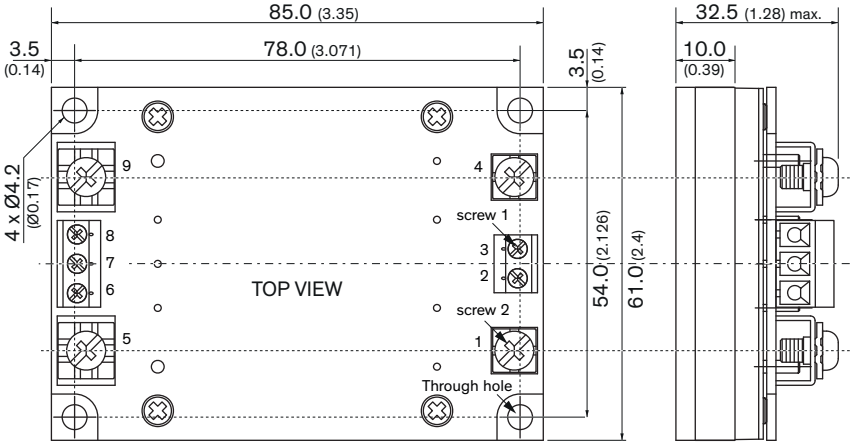
Outline Dimensions



Dimensions in mm (inch)
Tolerances x.x ±0.5 (x.xx ±0.02)
x.xx ±0.25 (x.xxx ±0.01)
Mounting hole pitch tolerances ±0.25 (±0.01)

The screw 1 locked torque: max. 5.2 kgfcm / 0.51 Nm
The screw 2 locked torque: max. 12.0 kgfcm / 1.18 Nm

Mounting screw locked torque: max. 11.2 kgfcm / 1.10 Nm

Screw 2:
Type M4
Head diameter 6.88 (0.271)
Rated current: 15 A

Pinout	
Pin	**Single**
1	–Vin (GND)
2	NC
3	Remote On/Off
4	+Vin (Vcc)
5	–Vout
6	–Sense
7	Trim
8	+Sense
9	+Vout

NC: Not connected

Wire gauge range:
AWG 14 - 26