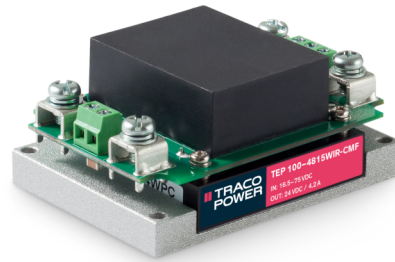


## DC/DC Railway Converter

## TEP 100WIRCMF 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



The TEP 100WIRCMF Series is a family of isolated high performance DC/DC converter modules with ultra-wide 4:1 input voltage ranges. They come in chassis mount version with screw terminal block. A very high efficiency allows full power operation without forced air cooling at 60°C. 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: <a href="http://www.tracopower.com/overview/tep-mk1">www.tracopower.com/overview/tep-mk1</a>
<p><b>on demand</b> (backorder with MOQ non stocking item)</p>	<ul style="list-style-type: none"> <li>- Optional model with 3.3 VDC and 25'000 mA Output, and 9 - 36 VDC Input</li> <li>- Optional model with 5 VDC and 20'000 mA Output, and 9 - 36 VDC Input</li> <li>- Optional model with 12 VDC and 8'400 mA Output, and 9 - 36 VDC Input</li> <li>- Optional model with 15 VDC and 6'700 mA Output, and 9 - 36 VDC Input</li> <li>- Optional model with 24 VDC and 4'200 mA Output, and 9 - 36 VDC Input</li> <li>- Optional model with 28 VDC and 3'600 mA Output, and 9 - 36 VDC Input</li> <li>- Optional model with 48 VDC and 2'100 mA Output, and 9 - 36 VDC Input</li> <li>- Optional model with 3.3 VDC and 25'000 mA Output, and 18 - 75 VDC Input</li> <li>- Optional model with 5 VDC and 20'000 mA Output, and 18 - 75 VDC Input</li> <li>- Optional model with 12 VDC and 8'400 mA Output, and 18 - 75 VDC Input</li> <li>- Optional model with 15 VDC and 6'700 mA Output, and 18 - 75 VDC Input</li> <li>- Optional model with 24 VDC and 4'200 mA Output, and 18 - 75 VDC Input</li> <li>- Optional model with 28 VDC and 3'600 mA Output, and 18 - 75 VDC Input</li> <li>- Optional model with 48 VDC and 2'100 mA Output, and 18 - 75 VDC Input</li> <li>- Optional model with 3.3 VDC and 25'000 mA Output, and 43 - 160 VDC Input</li> <li>- Optional model with 5 VDC and 20'000 mA Output, and 43 - 160 VDC Input</li> <li>- Optional model with 12 VDC and 8'400 mA Output, and 43 - 160 VDC Input</li> <li>- Optional model with 15 VDC and 6'700 mA Output, and 43 - 160 VDC Input</li> <li>- Optional model with 24 VDC and 4'200 mA Output, and 43 - 160 VDC Input</li> <li>- Optional model with 28 VDC and 3'600 mA Output, and 43 - 160 VDC Input</li> <li>- Optional model with 48 VDC and 2'100 mA Output, and 43 - 160 VDC Input</li> <li>- Optional models with inverse Remote On/Off function (passive = off)</li> </ul>

## Input Specifications

Input Current	- At no load	110 Vin models: <b>10 mA typ.</b> 24 Vin models: <b>20 mA typ.</b> (3.3 Vout model) <b>25 mA typ.</b> (5 Vout model) <b>25 mA typ.</b> (12 Vout model) <b>25 mA typ.</b> (15 Vout model) <b>25 mA typ.</b> (24 Vout model) <b>25 mA typ.</b> (28 Vout model) <b>35 mA typ.</b> (48 Vout model) 48 Vin models: <b>15 mA typ.</b> (3.3 Vout model) <b>15 mA typ.</b> (5 Vout model) <b>20 mA typ.</b> (12 Vout model) <b>20 mA typ.</b> (15 Vout model) <b>20 mA typ.</b> (24 Vout model) <b>20 mA typ.</b> (28 Vout model) <b>25 mA typ.</b> (48 Vout model)
Surge Voltage		24 Vin models: <b>50 VDC max.</b> (1 s max.) 48 Vin models: <b>100 VDC max.</b> (1 s max.) 110 Vin models: <b>185 VDC max.</b> (1 s max.)
Under Voltage Lockout		24 Vin models: <b>7.3 VDC min. / 7.5 VDC typ. / 8.1 VDC max.</b> 48 Vin models: <b>15.5 VDC min. / 16 VDC typ. / 16.3 VDC max.</b> 110 Vin models: <b>33 VDC min. / 34.5 VDC typ. / 36 VDC max.</b>
Recommended Input Fuse		24 Vin models: <b>20'000 mA</b> (fast acting) 48 Vin models: <b>12'000 mA</b> (fast acting) 110 Vin models: <b>5'000 mA</b> (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		<b>Internal Pi-Type</b>

## Output Specifications

Output Voltage Adjustment		<b>-20% to +10%</b> (By external trim resistor) See application note: <a href="http://www.tracopower.com/overview/tep100wircmf">www.tracopower.com/overview/tep100wircmf</a> Output power must not exceed rated power!
Voltage Set Accuracy		<b>±1% max.</b>
Regulation	- Input Variation (Vmin - Vmax) - Load Variation (0 - 100%)	<b>0.1% max.</b> <b>0.1% max.</b>
Ripple and Noise (20 MHz Bandwidth)		3.3 Vout models: <b>75 mVp-p max.</b> (w/ 1 µF X7R    22 µF poscap) 5 Vout models: <b>75 mVp-p max.</b> (w/ 1 µF X7R    22 µF poscap) 12 Vout models: <b>100 mVp-p max.</b> (w/ 1 µF X7R    22 µF poscap) 15 Vout models: <b>100 mVp-p max.</b> (w/ 1 µF X7R    22 µF poscap) 24 Vout models: <b>200 mVp-p max.</b> (w/ 4.7 µF X7R) 28 Vout models: <b>200 mVp-p max.</b> (w/ 4.7 µF X7R) 48 Vout models: <b>300 mVp-p max.</b> (w/ 2.2 µF X7R)
Capacitive Load		3.3 Vout models: <b>75'700 µF max.</b> 5 Vout models: <b>40'000 µF max.</b> 12 Vout models: <b>7'000 µF max.</b> 15 Vout models: <b>4'460 µF max.</b> 24 Vout models: <b>1'750 µF max.</b> 28 Vout models: <b>1'280 µF max.</b> 48 Vout models: <b>430 µF max.</b>
Minimum Load		<b>Not required</b>
Temperature Coefficient		<b>±0.02 %/K max.</b>
Hold-up Time		<b>10 ms min.</b> (acc. to EN 50155 Class S2, see application note for ext. capacitor calculation: <a href="http://www.tracopower.com/info/holdup_en50155.pdf">www.tracopower.com/info/holdup_en50155.pdf</a> )
Start-up Time		<b>75 ms typ.</b>

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 I <sub>out</sub> max. (110 V <sub>in</sub> models) 120 - 150% (other models)
Oversoltage Protection	115 - 130% of V <sub>out</sub> 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 - Certification Documents	EN 50155 <a href="http://www.tracopower.com/overview/tep100wircmf">www.tracopower.com/overview/tep100wircmf</a>

### EMC Specifications

EMI (Emissions)	- Conducted Emissions	EN 50121-3-2 (EMC for Rolling Stock) EN 55011 class A (internal filter) EN 55032 class A (internal filter)
	- Radiated Emissions	EN 55011 class A (internal filter) EN 55032 class A (internal filter)
EMS (Immunity)	- Electrostatic Discharge	EN 50121-3-2 (EMC for Rolling Stock) EN 55024 (IT Equipment) EN 55035 (Multimedia) 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
	- RF Electromagnetic Field	Ext. input component: 24 & 48 V <sub>in</sub> models: 2 x KY 220 μF 110 V <sub>in</sub> models: 2 x KXJ 150 μF
	- EFT (Burst) / Surge	Continuous: EN 61000-4-6, 10 V <sub>rms</sub> , perf. criteria A EN 61000-4-8, 100 A/m, perf. criteria A 1 s: EN 61000-4-8, 1000 A/m, perf. criteria A
	- Conducted RF Disturbances	
	- PF Magnetic Field	
EMC / Environmental	- Certification Documents	<a href="http://www.tracopower.com/overview/tep100wircmf">www.tracopower.com/overview/tep100wircmf</a>

### General Specifications

Relative Humidity	95% max. (non condensing)
Temperature Ranges	- Operating Temperature - Case Temperature - Storage Temperature -40°C to +75°C +105°C max. -40°C to +105°C
Power Derating	- High Temperature Depending on model See application note: <a href="http://www.tracopower.com/overview/tep100wircmf">www.tracopower.com/overview/tep100wircmf</a>
Over Temperature Protection Switch Off	- 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 V <sub>out</sub> 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	<ul style="list-style-type: none"> <li>- Voltage Controlled Remote (passive = on)</li> <li>- Off Idle Input Current</li> <li>- Remote Pin Input Current</li> </ul>	<b>On: 3.0 to 12 VDC or open circuit</b> <b>Off: 0 to 1.2 VDC or short circuit</b> <b>Refers to 'Remote' and '-Vin' Pin</b> <b>3 mA typ.</b> <b>-0.5 to 1.0 mA</b> (Optional models with inverse Remote On/Off function (passive = off))
Altitude During Operation		<b>2'000 m max.</b> (for reinforced insulation) <b>5'000 m max.</b> (for functional insulation)
Switching Frequency		<b>300 kHz typ.</b> (PWM) ( $\pm 10\%$ , 110 Vin models) <b>250 kHz typ.</b> (PWM) ( $\pm 10\%$ , other models)
Insulation System		<b>Reinforced Insulation</b>
Working Voltage (rated)		<b>177 VAC</b> (110 Vin models) <b>145 VAC</b> (24 and 48 Vin, 3.3 and 5 Vout models) <b>185 VAC</b> (24 and 48 Vin, 48 Vout models) <b>172 VAC</b> (24 and 48 Vin, other output models)
Isolation Test Voltage	<ul style="list-style-type: none"> <li>- Input to Output, 60 s</li> <li>- Input to Case, 60 s</li> <li>- Output to Case, 60 s</li> </ul>	<b>3'000 VAC</b> <b>1'500 VAC</b> <b>1'500 VAC</b>
Isolation Resistance	- Input to Output, 500 VDC	<b>1'000 M<math>\Omega</math> min.</b>
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	<b>2'500 pF max.</b>
Reliability	- Calculated MTBF	<b>409'000 h</b> (MIL-HDBK-217F, ground benign)
Environment	<ul style="list-style-type: none"> <li>- Vibration</li> <li>- Mechanical Shock</li> <li>- Thermal Shock</li> <li>- Flammability</li> </ul>	<b>MIL-STD-810F</b> <b>EN 61373</b> <b>MIL-STD-810F</b> <b>EN 61373</b> <b>MIL-STD-810F</b> <b>EN 45545-2</b> <a href="http://www.tracopower.com/info/en45545-declaration.pdf">www.tracopower.com/info/en45545-declaration.pdf</a>
Housing Material		<b>Alu base-plate w. metal case</b> (24 and 48 Vin models) <b>Alu base-plate w. plastic case</b> (110 Vin models)
Base Material		<b>Non-conductive FR4</b> (UL 94 V-0 rated) (24 and 48 Vin models only)
Potting Material		<b>Silicone</b> (UL 94 V-0 rated)
Housing Type		<b>Metal Case</b> (24 and 48 Vin models) <b>Plastic Case</b> (110 Vin models)
Mounting Type		<b>Chassis Mount</b>
Connection Type		<b>Screw Terminal</b>
Weight		<b>287 g</b>
Thermal Impedance	- Case to Ambient	<b>6.7 K/W typ.</b>
Environmental Compliance	<ul style="list-style-type: none"> <li>- REACH Declaration</li> <li>- RoHS Declaration</li> <li>- SCIP Reference Number</li> </ul>	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> <b>REACH SVHC list compliant</b> <b>REACH Annex XVII compliant</b> <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> <b>Exemptions: 7a, 7c-I</b> (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule.)) <b>54b7eea6-7f47-43d5-8690-a22fd8fc17c0</b>

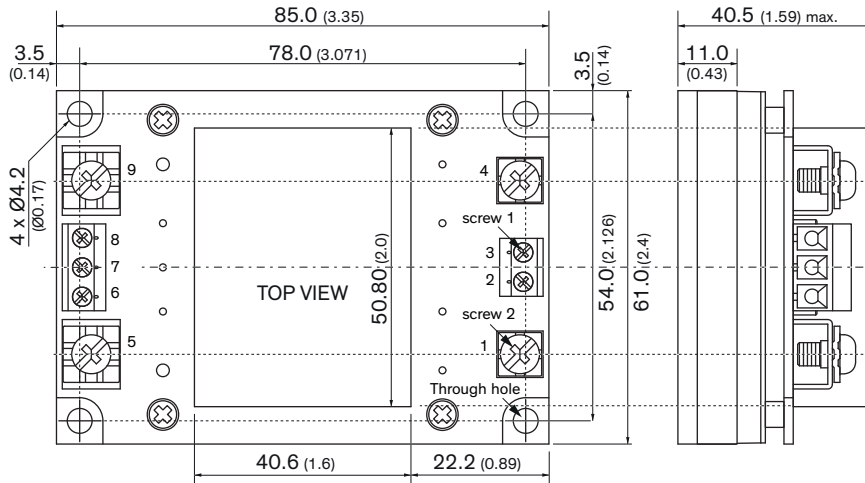
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tep100wircmf](http://www.tracopower.com/overview/tep100wircmf)

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)  
 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)

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

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

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

Wire gauge range:  
 AWG 14 - 26