

- Compact metal package
- 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



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 and reverse input voltage protection make these converters an interesting solution for battery operated systems. Typical applications are in telecom/datacom, industry control and railway systems for on board power distribution. These series is available in many optional designs on demand.

| Models          |                                |                     |                     |                 |
|-----------------|--------------------------------|---------------------|---------------------|-----------------|
| Order Code      | Input Voltage Range            | Output Voltage nom. | Output Current max. | Efficiency typ. |
| TEP 100-2411WIR | 9 - 36 VDC<br>(24 VDC nom.)    | 5 VDC               | 20'000 mA           | 93 %            |
| TEP 100-2412WIR |                                | 12 VDC              | 8'400 mA            | 90 %            |
| TEP 100-2415WIR |                                | 24 VDC              | 4'200 mA            | 90 %            |
| TEP 100-2416WIR |                                | 28 VDC              | 3'600 mA            | 90 %            |
| TEP 100-2418WIR |                                | 48 VDC              | 2'100 mA            | 90 %            |
| TEP 100-4812WIR | 18 - 75 VDC<br>(48 VDC nom.)   | 12 VDC              | 8'400 mA            | 90 %            |
| TEP 100-4815WIR |                                | 24 VDC              | 4'200 mA            | 90 %            |
| TEP 100-4816WIR |                                | 28 VDC              | 3'600 mA            | 92 %            |
| TEP 100-4818WIR |                                | 48 VDC              | 2'100 mA            | 91 %            |
| TEP 100-7212WIR | 43 - 160 VDC<br>(110 VDC nom.) | 12 VDC              | 8'400 mA            | 90 %            |
| TEP 100-7215WIR |                                | 24 VDC              | 4'200 mA            | 90 %            |
| TEP 100-7216WIR |                                | 28 VDC              | 3'600 mA            | 90 %            |
| TEP 100-7218WIR |                                | 48 VDC              | 2'100 mA            | 91 %            |

## Options

|                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TEP-HS1</b>                                             | - Heat-sink for standard version (incl. thermal pad and mounting screws)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>on demand</b><br>(backorder with MOQ non stocking item) | <ul style="list-style-type: none"> <li>- Optional model with 3.3 VDC / 25'000 mA Output and 9 - 36 VDC Input</li> <li>- Optional model with 15 VDC / 6'700 mA Output and 9 - 36 VDC Input</li> <li>- Optional model with 3.3 VDC / 25'000 mA Output and 18 - 75 VDC Input</li> <li>- Optional model with 5 VDC / 20'000 mA Output and 18 - 75 VDC Input</li> <li>- Optional model with 15 VDC / 6'700 mA Output and 18 - 75 VDC Input</li> <li>- Optional model with 3.3 VDC / 25'000 mA Output and 43 - 160 VDC Input</li> <li>- Optional model with 5 VDC / 20'000 mA Output and 43 - 160 VDC Input</li> <li>- Optional model with 15 VDC / 6'700 mA Output and 43 - 160 VDC Input</li> <li>- Inverse Remote On/Off function (passive = off)</li> <li>- Chassis mount models without filter: <a href="http://www.tracopower.com/products/tep100wircm.pdf">www.tracopower.com/products/tep100wircm.pdf</a></li> <li>- Chassis mount models with EN 55032 class A filter: <a href="http://www.tracopower.com/products/tep100wircmf.pdf">www.tracopower.com/products/tep100wircmf.pdf</a></li> </ul> |

## Input Specifications

|                        |              |                                                                                                                                                                                                                              |
|------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Current          | - At no load | 24 Vin models: <b>20 mA typ.</b><br>48 Vin models: <b>15 mA typ.</b><br>110 Vin models: <b>10 mA typ.</b>                                                                                                                    |
| Surge Voltage          |              | 24 Vin models: <b>50 VDC max.</b> (1 s max.)<br>48 Vin models: <b>100 VDC max.</b> (1 s max.)<br>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><br>48 Vin models: <b>15.5 VDC min. / 16 VDC typ. / 16.3 VDC max.</b><br>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)<br>48 Vin models: <b>12'000 mA</b> (fast acting)<br>110 Vin models: <b>5'000 mA</b> (slow blow)<br>(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)<br>See application note: <a href="http://www.tracopower.com/overview/tep100wir">www.tracopower.com/overview/tep100wir</a><br>Output power must not exceed rated power!                                                                                                                                                                                                                                                          |
| Voltage Set Accuracy                   |                                                                | <b>±1% max.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Regulation                             | - Input Variation (Vmin - Vmax)<br>- Load Variation (0 - 100%) | <b>0.1% max.</b><br><b>0.1% max.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Ripple and Noise<br>(20 MHz Bandwidth) |                                                                | 3.3 Vout models: <b>75 mVp-p max.</b> (with 1 µF X7R // 22 µF poscap)<br>5 Vout models: <b>75 mVp-p max.</b> (with 1 µF X7R // 22 µF poscap)<br>12 Vout models: <b>100 mVp-p max.</b> (with 1 µF X7R // 22 µF poscap)<br>15 Vout models: <b>100 mVp-p max.</b> (with 1 µF X7R // 22 µF poscap)<br>24 Vout models: <b>200 mVp-p max.</b> (with 4.7 µF X7R)<br>28 Vout models: <b>200 mVp-p max.</b> (with 4.7 µF X7R)<br>48 Vout models: <b>300 mVp-p max.</b> (with 2.2 µF X7R) |
| Capacitive Load                        |                                                                | 3.3 Vout models: <b>75'700 µF max.</b><br>5 Vout models: <b>40'000 µF max.</b><br>12 Vout models: <b>7'000 µF max.</b><br>15 Vout models: <b>4'460 µF max.</b><br>24 Vout models: <b>1'750 µF max.</b><br>28 Vout models: <b>1'280 µF max.</b><br>48 Vout models: <b>430 µF max.</b>                                                                                                                                                                                            |

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

|                           |                                                                                     |
|---------------------------|-------------------------------------------------------------------------------------|
| Minimum Load              | Not required                                                                        |
| Temperature Coefficient   | ±0.02 %/K max.                                                                      |
| Start-up Time             | 75 ms typ.                                                                          |
| Short Circuit Protection  | Continuous, Automatic recovery                                                      |
| Output Current Limitation | 150% typ. of I <sub>out</sub> max.<br>(110 Vin models)<br>120 - 150% (other models) |
| Overvoltage Protection    | 115 - 130% of V <sub>out</sub> nom.                                                 |
| Transient Response        | - Response Time<br>200 µs typ. / 250 µs max. (25% Load Step)                        |

## Safety Specifications

|                  |                                                                                        |                                                                                                                                                         |
|------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Safety Standards | - IT / Multimedia Equipment<br><br>- Railway Applications<br>- Certification Documents | IEC 60950-1<br>EN 60950-1<br>UL 60950-1<br>EN 50155<br><a href="http://www.tracopower.com/overview/tep100wir">www.tracopower.com/overview/tep100wir</a> |
|------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|

## EMC Specifications

|               |                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EMI Emissions | - Conducted Emissions<br><br>- Radiated Emissions                                                                                              | EN 55011 class B (with external filter)<br>EN 55032 class B (with external filter)<br>EN 55011 class B (with external filter)<br>EN 55032 class B (with external filter)                                                                                                                                                                                                                                                                                                                                                                                          |
|               | External filter proposal:                                                                                                                      | <a href="http://www.tracopower.com/overview/tep100wir">www.tracopower.com/overview/tep100wir</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| EMS Immunity  | - Electrostatic Discharge<br><br>- RF Electromagnetic Field<br>- EFT (Burst) / Surge<br><br>- Conducted RF Disturbances<br>- PF Magnetic Field | EN 50155 (Railway Applications)<br>EN 55024 (IT Equipment)<br>Air: EN 61000-4-2, ±8 kV, perf. criteria A<br>Contact: EN 61000-4-2, ±6 kV, perf. criteria A<br>EN 61000-4-3, 20 V/m, perf. criteria A<br>EN 61000-4-4, ±2 kV, perf. criteria A<br>EN 61000-4-5, ±2 kV, perf. criteria A<br>Ext. input component: 24 Vin models: 2 x KY 220 µF<br>48 Vin models: 2 x KY 220 µF<br>110 Vin models: 2 x KXJ 150 µF<br>Continuous: EN 61000-4-6, 10 Vrms, perf. criteria A<br>EN 61000-4-8, 100 A/m, perf. criteria A<br>1 s: EN 61000-4-8, 1000 A/m, perf. criteria A |

## General Specifications

|                                        |                                                                                                                                              |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Relative Humidity                      | 95% max. (non condensing)                                                                                                                    |
| Temperature Ranges                     | - Operating Temperature<br>- Case Temperature<br>- Storage Temperature                                                                       |
| Power Derating                         | - High Temperature<br>See application note: <a href="http://www.tracopower.com/overview/tep100wir">www.tracopower.com/overview/tep100wir</a> |
| Over Temperature Protection Switch Off | - Protection Mode<br>- Measurement Point                                                                                                     |
| Cooling System                         | Natural convection (20 LFM)                                                                                                                  |
| Sense Function                         | 10% max. of V <sub>out</sub> nom.                                                                                                            |
| Remote Control                         | - Voltage Controlled Remote<br><br>- Off Idle Input Current<br>- Remote Pin Input Current                                                    |
| Altitude During Operation              | 2'000 m max.                                                                                                                                 |
| Switching Frequency                    | 300 kHz typ. (PWM) (±10%, 110 Vin models)<br>250 kHz typ. (PWM) (±10%, other models)                                                         |

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

|                                 |                                 |                                                                                                                      |
|---------------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Insulation System</b>        |                                 | <b>Reinforced Insulation</b>                                                                                         |
| <b>Isolation Test Voltage</b>   | - Input to Output, 60 s         | <b>3'000 VAC</b> (110 Vin models)                                                                                    |
|                                 | - Input to Case, 60 s           | <b>1'591 VAC</b> (other models)                                                                                      |
|                                 | - Output to Case, 60 s          | <b>1'500 VAC</b> (110 Vin models)<br><b>1'131 VAC</b> (other models)                                                 |
| <b>Isolation Resistance</b>     | - Input to Output, 500 VDC      | <b>1'000 MΩ min.</b>                                                                                                 |
| <b>Isolation Capacitance</b>    | - Input to Output, 100 kHz, 1 V | <b>2'500 pF max.</b>                                                                                                 |
| <b>Reliability</b>              | - Calculated MTBF               | <b>409'000 h</b> (MIL-HDBK-217F, ground benign)                                                                      |
| <b>Environment</b>              | - Vibration                     | <b>MIL-STD-810F</b><br><b>EN 61373</b>                                                                               |
|                                 | - Mechanical Shock              | <b>MIL-STD-810F</b><br><b>EN 61373</b>                                                                               |
|                                 | - Thermal Shock                 | <b>MIL-STD-810F</b>                                                                                                  |
| <b>Housing Material</b>         |                                 | <b>Alu base-plate w. plastic case</b> (110 Vin models)<br><b>Alu base-plate w. metal case</b> (other models)         |
| <b>Base Material</b>            |                                 | <b>Non-conductive FR4</b> (UL94 V-0 rated) (24 Vin & 48 Vin models only)                                             |
| <b>Potting Material</b>         |                                 | <b>Silicone</b> (UL 94 V-0 rated)                                                                                    |
| <b>Pin Material</b>             |                                 | <b>Copper</b>                                                                                                        |
| <b>Pin Foundation Plating</b>   |                                 | <b>Nickel</b> (2 - 3 μm)                                                                                             |
| <b>Pin Surface Plating</b>      |                                 | <b>Tin</b> (3 - 5 μm), <b>matte</b>                                                                                  |
| <b>Connection Type</b>          |                                 | <b>THD</b> (Through-Hole Device)                                                                                     |
| <b>Weight</b>                   |                                 | <b>105 g</b>                                                                                                         |
| <b>Thermal Impedance</b>        |                                 | <b>6.7 K/W</b>                                                                                                       |
|                                 | - with Heat Sink                | <b>4.7 K/W</b>                                                                                                       |
| <b>Environmental Compliance</b> | - Reach                         | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a>     |
|                                 | - RoHS                          | <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a>       |
|                                 | - Flammability (EN 45545-2)     | <a href="http://www.tracopower.com/info/en45545-declaration.pdf">www.tracopower.com/info/en45545-declaration.pdf</a> |

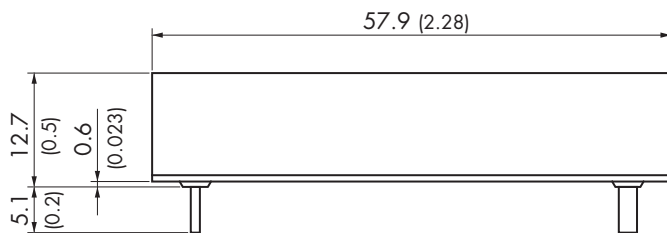
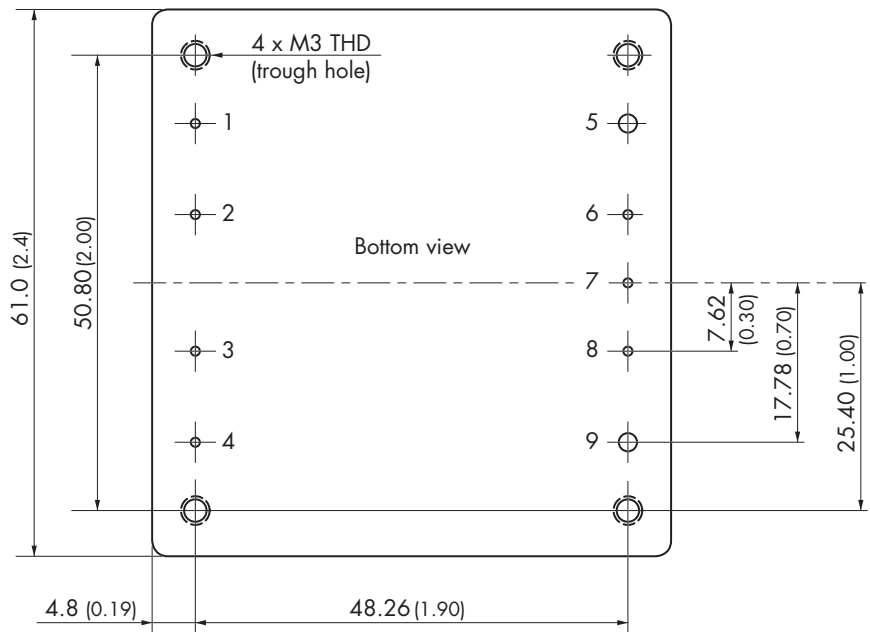
## Supporting Documents

**Overview Link** (for additional Documents)

[www.tracopower.com/overview/tep100wir](http://www.tracopower.com/overview/tep100wir)

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

## Outline Dimensions



Dimensions in mm (inch)  
Tolerances x.xx±0.5 (±0.02)  
Tolerances x.xxx±0.25 (±0.01)  
Pin pitch tolerances ±0.25 (±0.01)  
Pin dimension tolerances ±0.1 (±0.004)

Pin diameter pins 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      |

The screw 1 locked torque  
(24 and 48Vout models):  
MAX 5.0kgf-cm/0.49N-m

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