

- Shielded metal case with screw terminals
- 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 89%
- Constant current output characteristic for battery load applications
- Optional with input filter to meet EN 55032 class B
- Wide Operating temperature range: –40°C to +75°C
- Under voltage lock-out, overtemperature & reverse input protection
- Easy chassis and wall mounting
- 3-year product warranty



The modules have originally been designed for harsh industrial environment. High EMC immunity against surge, burst, radiated and conducted disturbances and the shock/ vibration and thermal shock resistance make them very popular for stringent requirements. With the extended input voltage ranges that cover the nominal 24, 36, 72 and 110 VDC with  $\pm 40\%$  tolerance and the approval in accordance to EN 50155 standard they now also offer a reliable solution for mobile and stationary railway applications. At 100% load the current characteristics goes from constant voltage to constant current what makes the units also suitable for battery charger applications. With protection against over-temperature, overload, short-circuit, reverse input, overvoltage and input under-voltage lock-out they are hard to destroy.

### Models

| Order Code     | Input Voltage Range            | Output Voltage nom. (adjustable) | Output Current max. | Efficiency typ. |
|----------------|--------------------------------|----------------------------------|---------------------|-----------------|
| TEP 150-2412WI | 9 - 36 VDC<br>(24 VDC nom.)    | 12 VDC (12.0 - 14.4 VDC)         | 12'500 mA           | 86 %            |
| TEP 150-2413WI |                                | 15 VDC (15.0 - 18.0 VDC)         | 10'000 mA           | 86 %            |
| TEP 150-2415WI |                                | 24 VDC (24.0 - 28.8 VDC)         | 6'300 mA            | 87 %            |
| TEP 150-2416WI |                                | 28 VDC (28.0 - 33.6 VDC)         | 5'400 mA            | 87 %            |
| TEP 150-2418WI |                                | 48 VDC (48.0 - 57.6 VDC)         | 3'200 mA            | 86 %            |
| TEP 150-4812WI | 18 - 75 VDC<br>(48 VDC nom.)   | 12 VDC (12.0 - 14.4 VDC)         | 12'500 mA           | 88 %            |
| TEP 150-4813WI |                                | 15 VDC (15.0 - 18.0 VDC)         | 10'000 mA           | 89 %            |
| TEP 150-4815WI |                                | 24 VDC (24.0 - 28.8 VDC)         | 6'300 mA            | 89 %            |
| TEP 150-4816WI |                                | 28 VDC (28.0 - 33.6 VDC)         | 5'400 mA            | 89 %            |
| TEP 150-4818WI |                                | 48 VDC (48.0 - 57.6 VDC)         | 3'200 mA            | 88 %            |
| TEP 150-7212WI | 43 - 160 VDC<br>(110 VDC nom.) | 12 VDC (12.0 - 14.4 VDC)         | 12'500 mA           | 88 %            |
| TEP 150-7213WI |                                | 15 VDC (15.0 - 18.0 VDC)         | 10'000 mA           | 89 %            |
| TEP 150-7215WI |                                | 24 VDC (24.0 - 28.8 VDC)         | 6'300 mA            | 89 %            |
| TEP 150-7216WI |                                | 28 VDC (28.0 - 33.6 VDC)         | 5'400 mA            | 89 %            |
| TEP 150-7218WI |                                | 48 VDC (48.0 - 57.6 VDC)         | 3'200 mA            | 88 %            |

### Options

|  |  |
|--|--|
| <b>Suffix -F</b>   | - Optional models with input filter to meet EN 55032 class B: <a href="http://www.tracopower.com/products/tep150wi-f.pdf">www.tracopower.com/products/tep150wi-f.pdf</a> |
| <b>on demand</b><br>(backorder with MOQ non stocking item) | - Optional models with inverse Remote On/Off function (passive = off)  |

## Input Specifications

|                            |              |  |
|----------------------------|--------------|--|
| Input Current              | - At no load | 24 Vin models: <b>100 mA typ.</b><br>48 Vin models: <b>65 mA typ.</b><br>110 Vin models: <b>30 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>7.9 - 8.5 VDC max.</b><br>48 Vin models: <b>15.6 - 16.8 VDC max.</b><br>110 Vin models: <b>33 - 36 VDC max.</b>  |
| Recommended Input Fuse     |              | 24 Vin models: <b>30'000 mA</b> (slow blow)<br>48 Vin models: <b>15'000 mA</b> (slow blow)<br>110 Vin models: <b>7'000 mA</b> (slow blow)<br>(The need of an external fuse has to be assessed in the final application.) |
| Reverse Voltage Protection |              | <b>Parallel diode</b> (External input fuse required)   |
| Input Filter               |              | <b>Internal Pi-Type</b>  |

## Output Specifications

|  |  |  |
|--|--|--|
| Output Voltage Adjustment              |  | <b>0% to +20%</b> (By external trim resistor)<br>See application note: <a href="http://www.tracopower.com/overview/tep150wi">www.tracopower.com/overview/tep150wi</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>0.2% max.</b><br><b>0.4% max.</b>   |
| Ripple and Noise<br>(20 MHz Bandwidth) |  | 12 Vout models: <b>100 mVp-p max.</b><br>15 Vout models: <b>100 mVp-p max.</b><br>24 Vout models: <b>200 mVp-p max.</b><br>28 Vout models: <b>200 mVp-p max.</b><br>48 Vout models: <b>300 mVp-p max.</b>          |
| Capacitive Load                        |  | 12 Vout models: <b>40'000 µF max.</b><br>15 Vout models: <b>26'000 µF max.</b><br>24 Vout models: <b>10'000 µF max.</b><br>28 Vout models: <b>7'600 µF max.</b><br>48 Vout models: <b>2'600 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>35 ms typ.</b>  |
| Short Circuit Protection               |  | <b>Continuous, Automatic recovery</b>  |
| Overload Protection                    |  | <b>Constant Current Mode</b>   |
| Output Current Limitation              |  | <b>105 - 120% of Iout max.</b>   |
| Overvoltage Protection                 |  | <b>125 - 140% of Vout nom.</b>   |
| Transient Response                     | - Response Time  | <b>200 µs typ.</b> (25% Load Step)   |

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

### Safety Specifications

|                       |                             |  |
|-----------------------|-----------------------------|--|
| Safety Standards      | - IT / Multimedia Equipment | EN 60950-1<br>EN 62368-1<br>IEC 60950-1<br>IEC 62368-1<br>UL 60950-1<br>UL 62368-1             |
|                       | - Railway Applications      | EN 50155   |
|                       | - Certification Documents   | <a href="http://www.tracopower.com/overview/tep150wi">www.tracopower.com/overview/tep150wi</a> |
| Pollution Degree      |                             | PD 2   |
| Over Voltage Category |                             | OVC I  |

### EMC Specifications

|               |                             |  |
|---------------|-----------------------------|--|
| EMI Emissions | - Conducted Emissions       | EN 50121-3-2 (EMC for Rolling Stock)<br>EN 55032 class A (internal filter)<br>FCC Part 15 class A (internal filter)  |
|               | - Radiated Emissions        | EN 55032 class A (internal filter)<br>FCC Part 15 class A (internal filter)  |
| EMS Immunity  | - Electrostatic Discharge   | EN 50155 (Railway Applications)<br>EN 50121-3-2 (EMC for Rolling Stock)<br>Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A<br>Contact: EN 61000-4-2, $\pm 6$ kV, perf. criteria A            |
|               | - RF Electromagnetic Field  | EN 61000-4-3, 10 V/m, perf. criteria A   |
|               | - EFT (Burst) / Surge       | EN 61000-4-4, $\pm 2$ kV, perf. criteria A<br>EN 61000-4-5, $\pm 1$ kV, perf. criteria A   |
|               | - Conducted RF Disturbances | Ext. input component: 24 Vin models: KY 470 $\mu$ F, ESR 45 mOhm<br>48 Vin models: KY 220 $\mu$ F, ESR 48 mOhm<br>110 Vin models: KXJ 150 $\mu$ F<br>EN 61000-4-6, 10 Vrms, perf. criteria A |
|               | - PF Magnetic Field         | Continuous: 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     | -40°C to +75°C<br>+100°C max.<br>-55°C to +125°C<br>(Mount on conducting surface to optimize thermal coupling)   |
| Power Derating                         | - High Temperature   | Depending on model<br>See application note: <a href="http://www.tracopower.com/overview/tep150wi">www.tracopower.com/overview/tep150wi</a>   |
| Over Temperature Protection Switch Off | - Protection Mode  | 110°C typ. (Automatic recovery)  |
| Cooling System                         |  | Natural convection (20 LFM)  |
| Remote Control                         | - Voltage Controlled Remote<br><br>- Off Idle Input Current                | On: 3.0 to 12 VDC or open circuit<br>Off: 0 to 1.2 VDC or short circuit<br>Refers to 'Remote' and '-Vin' Pin<br>3.5 mA typ.<br>(Optional models with inverse Remote On/Off function (passive = off)) |
| Altitude During Operation              |  | 5'000 m max.   |
| Switching Frequency                    |  | 203 - 330 kHz (PWM)  |
| Insulation System                      |  | Functional Insulation  |
| Isolation Test Voltage                 | - Input to Output, 60 s<br>- Input to Case, 60 s<br>- Output to Case, 60 s | 2'250 VDC<br>1'600 VDC<br>1'600 VDC  |

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

|                          |                                 |   |
|--------------------------|---------------------------------|---|
| Isolation Resistance     | - Input to Output, 500 VDC      | 1'000 MΩ min.   |
| Isolation Capacitance    | - Input to Output, 100 kHz, 1 V | 3'500 pF max.   |
| Reliability              | - Calculated MTBF               | 495'000 h (MIL-HDBK-217F, ground benign)  |
| Environment              | - Vibration                     | MIL-STD-810F<br>EN 61373<br>7.7 g, 3 axis, random waveform, 60 min  |
|                          | - Mechanical Shock              | MIL-STD-810F<br>EN 61373<br>50 g, 3 axis, 11 ms   |
|                          | - Thermal Shock                 | MIL-STD-810F<br>EN 50155  |
| Case Ingress Protection  |                                 | IP 55 (acc. IEC 60529)  |
| Housing Material         |                                 | Aluminum  |
| Potting Material         |                                 | Silicone (UL 94 V-0 rated)  |
| Housing Type             |                                 | Metal Case  |
| Mounting Type            |                                 | Chassis Mount   |
| Connection Type          |                                 | Screw Terminal  |
| Weight                   |                                 | 300 g   |
| Environmental Compliance | - REACH Declaration             | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant   |
|                          | - RoHS Declaration              | <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7a, 7c-I<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule)) |
|                          | - SCIP Reference Number         | 68d4622a-aca5-4900-9ad3-cda990716870  |
|                          | - Flammability (EN 45545-2)     | <a href="http://www.tracopower.com/info/en45545-declaration.pdf">www.tracopower.com/info/en45545-declaration.pdf</a>  |

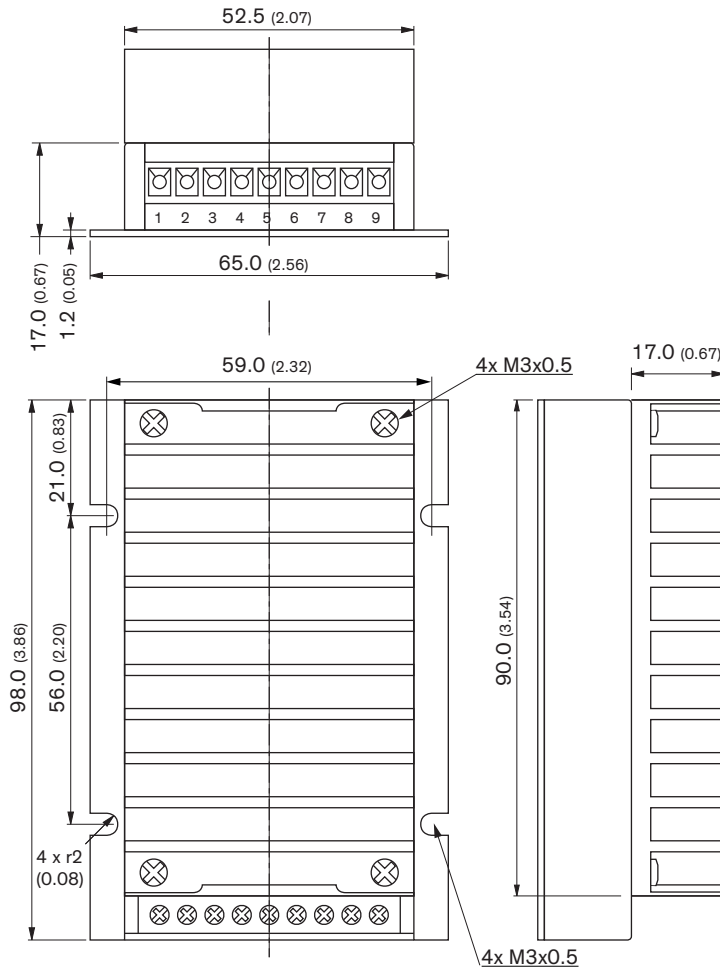
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tep150wi](http://www.tracopower.com/overview/tep150wi)

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

### Outline Dimensions



| Pinout |          |                  |
|--------|----------|------------------|
| Pin    | Function | recommended wire |
| 1      | + Vin    | 14 – 16 AWG      |
| 2      | + Vin    | 14 – 16 AWG      |
| 3      | - Vin    | 14 – 16 AWG      |
| 4      | - Vin    | 14 – 16 AWG      |
| 5      | Remote   | 14 – 24 AWG      |
| 6      | + Vout   | 14 – 16 AWG      |
| 7      | - Vout   | 14 – 16 AWG      |
| 8      | Trim 1   | 14 – 24 AWG      |
| 9      | Trim 2   | 14 – 24 AWG      |

Dimensions in mm (inch)  
 Mounting slot tolerance  $\pm 0.25$  ( $\pm 0.001$ )  
 Case tolerance  $\pm 0.5$  ( $\pm 0.02$ )

Screw locked torque: 0.49 Nm (5.0 kgfcm)  
 Terminal screw locked torque: 0.25 Nm (2.5 kgfcm)