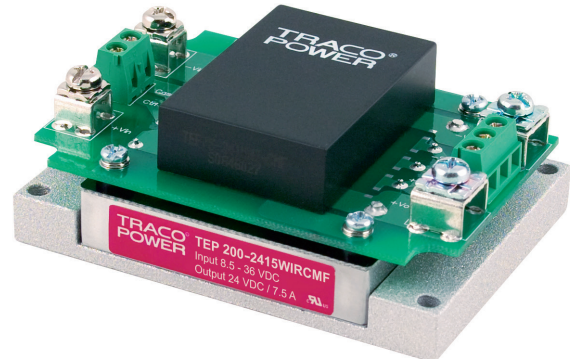


### Features

- ◆ Chassis mount with screw terminal block
- ◆ Including EMI filter to meet EN 55032, class A
- ◆ 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 91%
- ◆ No minimum load
- ◆ Soft start
- ◆ Under voltage lock-out circuit
- ◆ Adjustable output voltage +10/-20%
- ◆ Sense line
- ◆ Remote On/Off input
- ◆ Reverse input voltage protection
- ◆ Over temperature protection
- ◆ 3-year product warranty



The TEP 200WIR 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 and with integrated EMI input filter to meet EN 55032 class A. A very high efficiency allows full power operation at 25°C with only 100 LFM air flow cooling and operation at 60°C with only 40% power derating.

The very wide input voltage range and reverse input voltage protection 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.

### Standard Models

Order code	Input voltage	Output voltage	Output current max.	Efficiency typ.
TEP 200-2412WIRCMF	<b>9 – 36 VDC</b> (24 VDC nominal)	12 VDC	15 A	89 %
TEP 200-2413WIRCMF		15 VDC	12 A	90 %
TEP 200-2415WIRCMF		24 VDC	7.5 A	90 %
TEP 200-2416WIRCMF		28 VDC	6.5 A	90 %
TEP 200-2418WIRCMF		48 VDC	3.7 A	89 %
TEP 200-4812WIRCMF	<b>18 – 75 VDC</b> (48 VDC nominal)	12 VDC	18 A	90 %
TEP 200-4813WIRCMF		15 VDC	14 A	91 %
TEP 200-4815WIRCMF		24 VDC	9 A	90 %
TEP 200-4816WIRCMF		28 VDC	7.5 A	91 %
TEP 200-4818WIRCMF		48 VDC	4.5 A	90 %
TEP 200-7212WIRCMF	<b>43 – 160 VDC</b> (110 VDC nominal)	12 VDC	20 A	89 %
TEP 200-7213WIRCMF		15 VDC	16 A	90 %
TEP 200-7215WIRCMF		24 VDC	10 A	89 %
TEP 200-7216WIRCMF		28 VDC	8.5 A	90 %
TEP 200-7218WIRCMF		48 VDC	5 A	89 %

### Options

<b>TEP-MK1</b>	Din-rail mounting kit (incl. mounting screws)
<b>on demand</b>	Models with 3.3 VDC or 5.0 VDC output
	Models with 53 VDC output (input voltage range 33 - 75 VDC)
	Models with 2:1 input voltage ranges: 8.5-22, 16.5-36, 33-75 VDC (only to optimize cost at high volumes)
	Models for PCB mount (EMI Filter not included), optional heatsink and chokes for external filter
	Negative (passive = Off) Remote On/Off function (standard is passive = On)

### Input Specifications

Input current at no load (nominal input voltage)	24 V, 12 & 15 VDC models: 30 mA typ. 24 V, 24 VDC model: 35 mA typ. 24 V, 28 VDC model: 40 mA typ. 24 V, 48 VDC model: 45 mA typ. 48 V, 28 & 48 VDC models: 25 mA typ. 48 V, other models: 20 mA typ. 110 V, 28 & 48 VDC models: 15 mA typ. 110 V, other models: 10 mA typ.
Start-up voltage	24 V models: 9.0 VDC max. 48 V models: 18 VDC max. 110 V models: 43 VDC max.
Under voltage shut down (lock-out circuit)	24 V models: 7.3 – 8.1 VDC 48 V models: 15.5 – 16.3 VDC 110 V models: 33.0 – 36.0 VDC
Surge voltage (1 s max.)	24 V models: 50 VDC 48 V models: 100 VDC 110 V models: 185 VDC
Conducted noise	EN 55032 class A without external components
EMC immunity	EN 50121-3-2 EN 61000-4-2, air $\pm 8$ kV, contact $\pm 6$ kV, perf. criteria A EN 61000-4-3, 20 V/m, perf. criteria A EN 61000-4-4, $\pm 2$ kV, perf. criteria A EN 61000-4-5, $\pm 2$ kV perf. criteria A, 24 / 48V models: chemi-con KY 200 $\mu$ F, 100 V, ESR 48 mOhm 110 V models: ruby-con BXF 100 $\mu$ F, 250 V EN 61000-4-6, 10 Vrms, perf. criteria A
Reverse voltage protection	parallel diode
Recommended input fuse (fast blow)	24 V models: 32 A 48 V models: 20 A 110 V models: 10 A

### Output Specifications

Voltage set accuracy (at full load, nominal input)	$\pm 1$ %
Output voltage adjustment	+10 % / -20 % by external resistor <a href="http://www.tracopower.com/overview/tep200wir">www.tracopower.com/overview/tep200wir</a>
Regulation	- Application note - Input variation $V_{in}$ min. to $V_{in}$ max. 0.1 % max. - Load variation (0 – 100 %) 12 / 15 VDC models: 0.25 % max. 24 – 48 VDC models: 0.2 % max.
Temperature coefficient	$\pm 0.02$ %/K
Minimum load	not required
Remote sense	10 % max. of $V_{out}$ nom. (trim up value to subtract)
Ripple and noise (20 MHz Bandwidth)	12 / 15 VDC models: 100 mVp-p typ. 24 / 28 VDC models: 200 mVp-p typ. 48 VDC models: 300 mVp-p typ.
Start up time (nominal $V_{in}$ and constant resistive load)	75 ms typ. (at power On or remote On/Off)
Transient response (25 % load step change)	200 $\mu$ s typ., 250 $\mu$ s max.
Output current limitation	at 120 – 150 % of $I_{out}$ max.
Over voltage protection	at 115 – 130 % of $V_{out}$ nom.
Short circuit protection	indefinite, automatic recovery.

Max. capacitive load [ $\mu$ F]	12 VDC	15 VDC	24 VDC	28 VDC	48 VDC
24 VDC Input models	12'500	8'000	3'100	2'300	770
48 VDC Input models	15'000	9'300	3'700	2'600	930
110 VDC Input models	16'600	10'600	4'100	3'000	1'000

## General Specifications

Temperature ranges	<ul style="list-style-type: none"> <li>– Operating (ambient)</li> <li>– Case temperature</li> <li>– Storage</li> </ul>	–40°C to +75°C +115°C max. –40°C to +105°C
Derating (convection cooling) Guideline values:		depending on installation! see Application note
Over temperature protection		at +120°C
Thermal shock, mechanical shock & vibration	<ul style="list-style-type: none"> <li>– Test conditions</li> </ul>	EN 61373, MIL-STD-810F <a href="http://www.tracopower.com/products/mil810.pdf">www.tracopower.com/products/mil810.pdf</a>
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +70°C, ground benign)		300'000 h
Isolation voltage (60sec.)	<ul style="list-style-type: none"> <li>– Input/Output</li> <li>– Input/Case</li> </ul>	2'250 VDC (basic insulation) 1'600 VDC
Isolation capacitance	<ul style="list-style-type: none"> <li>– Input/Output</li> </ul>	2500 pF max.
Isolation resistance	<ul style="list-style-type: none"> <li>– Input/Output (500 VDC)</li> </ul>	1 GOhm min.
Switching frequency		250 kHz typ. (puls width modulation)
Safety standards	<ul style="list-style-type: none"> <li>– UL online certification E188913, QQQQ2</li> <li>– Railway immunity</li> <li>– Flammability identified acc.</li> <li>– Certification documents</li> </ul>	UL 60950-1 2nd edition + AM1 IEC/EN 60950-1 EN 50155, EN 45545-2 <a href="http://www.tracopower.com/overview/tep200wir">www.tracopower.com/overview/tep200wir</a>
Remote On/Off	<ul style="list-style-type: none"> <li>– positive logic (standard)</li> <li>– negative logic (option)</li> <li>– Off idle current:</li> </ul>	<ul style="list-style-type: none"> <li>– On: 3 to 12 VDC or open circuit</li> <li>– Off: 0 to 1.2 VDC or short circuit pin 1 and 3</li> <li>– On: 0 to 1.2 VDC or short circuit pin 1 and 3</li> <li>– Off: 3 to 12 VDC or open circuit</li> <li>3 mA</li> </ul>
Environmental compliance	<ul style="list-style-type: none"> <li>– Reach</li> <li>– RoHS</li> <li>– Flammability identified acc. EN 45545-2</li> </ul>	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> RoHS directive 2011/65/EU <a href="http://www.tracopower.com/info/en45545-declaration.pdf">www.tracopower.com/info/en45545-declaration.pdf</a>

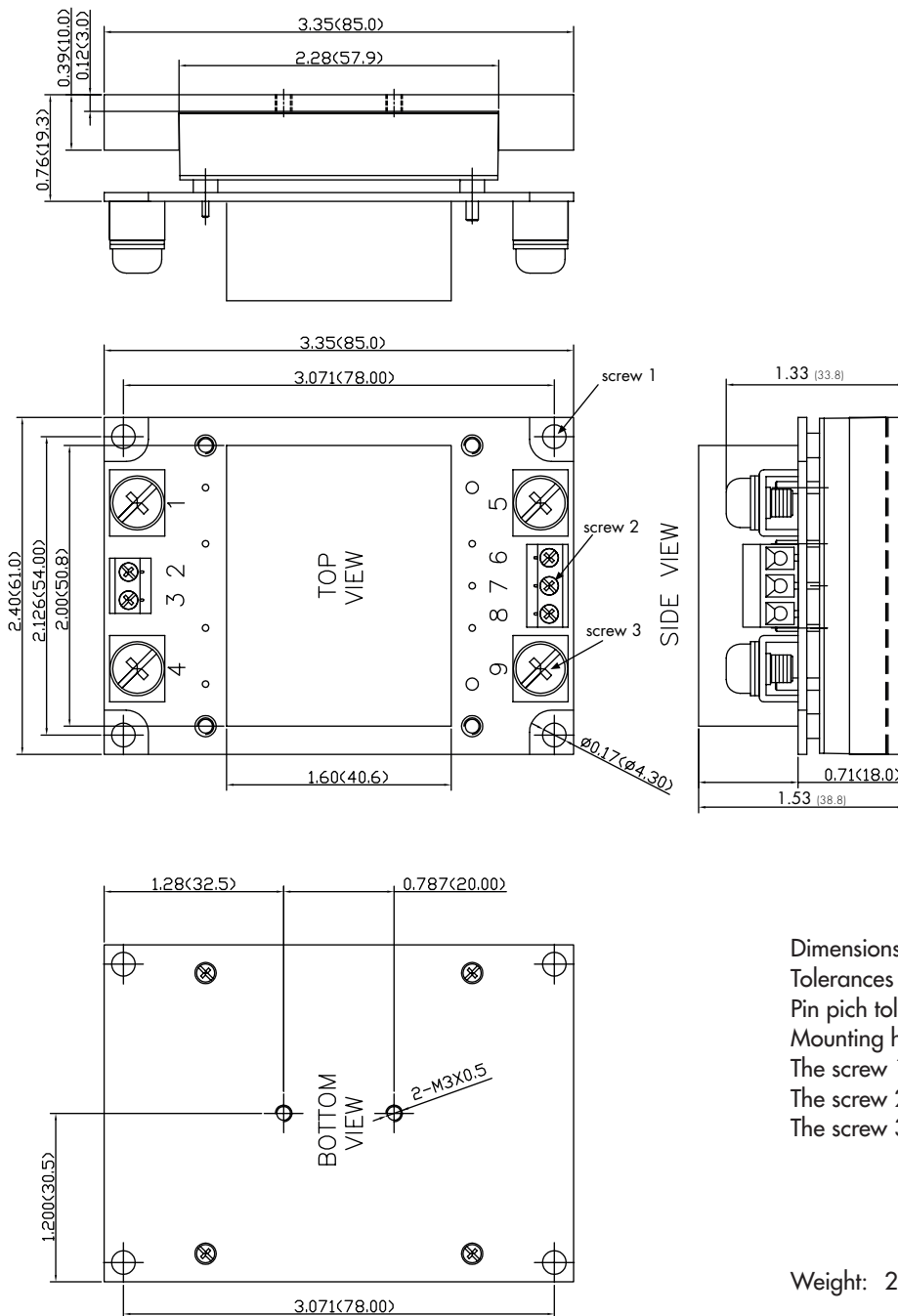
**Application note:** [www.tracopower.com/overview/tep200wir](http://www.tracopower.com/overview/tep200wir)

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

**General Specifications**

Casing material	24 Vin & 48 Vin models: metal 110 Vin models: Aluminium base-plate with plastic casing
Potting material	Epoxy (UL94V-0 rated)
Base material	FR4

**Dimensions**



Pin-Out	
Pin	
1	- Vin
2	NC
3	Remote On/Off
4	+ Vin
5	- Vout
6	- Sense*
7	Trim
8	+ Sense*
9	+ Vout

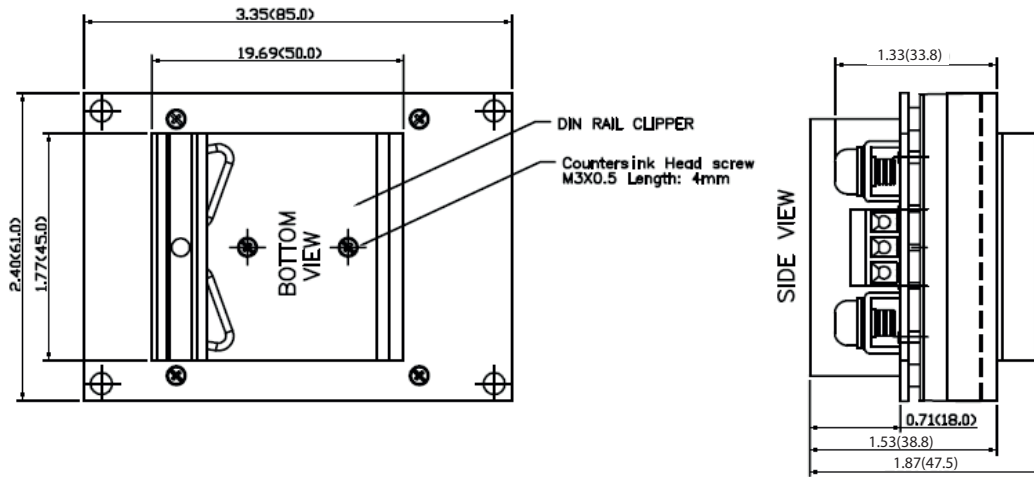
\*Sense line to be connected to the output either at the module or at the load under regard of polarity.

Dimensions in Inch, ( ) = mm  
 Tolerances  $\pm 0.02$  ( $\pm 0.5$ )  
 Pin pitch tolerances  $\pm 0.01$  ( $\pm 0.25$ )  
 Mounting hole pitch tolerances  $\pm 0.01$  ( $\pm 0.25$ )  
 The screw 1 locked torque: MAX 11.2kgf-cm/1.14N-m  
 The screw 2 locked torque: MAX 5.2kgf-cm/0.51N-m  
 The screw 3 locked torque: MAX 16.8kgf-cm/1.64N-m

Weight: 287 g (10.12oz)

**Options**

TEP-MK1 DIN-rail clip for chassis mount models



Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)